

Agricultural sector transformation is teamwork

**Experiences of the Sesame Business Network
support programme in Northwest Ethiopia**



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Tale of Contents

Preface	iii
Acronyms.....	v
Contributors.....	x
1. Setting the scene: Introducing the SBN support programme	1
1.1 Sesame in Ethiopia.....	3
1.2 Data portrait of sesame farmer households.....	6
1.3 Programme design, orientations and principles.....	8
1.4 Result chain: road map and dashboard.....	11
1.5 Programme development.....	16
1.6 Structure and main topics of the book.....	21
2. Sustainable production improvement.....	25
2.1 Twenty important steps to double yields and improve quality of sesame.....	27
2.2 Partnership approach for scaling the 20 steps.....	36
2.3 Crop rotation for sustainable production and risk spreading.....	51
2.4 Increased demand for quality seeds of newly released varieties	62
2.5 Mechanisation: the need to move beyond talking and testing.....	70
2.6 Arming farmers to defend their sesame against pests.....	83
2.7 A one billion ETB challenge: reducing sesame losses.....	92
2.8 Marginal Rate of Yield and Marginal Rate of Return.....	102
2.9 Farmers' adoption of recommended agricultural practices	112
2.10 Improving the performance of smallholder and commercial farmers.....	126
3. Social inclusion and dietary diversity.....	133
3.1 Labourers: unsung heroes of the sesame sector.....	135
3.2 Location specific weather forecast for informed farm management decisions.....	147
3.3 Women and youth involvement in agricultural sector development.....	153
3.4 Household nutrition and dietary diversity.....	159
3.5 Piloting home garden.....	165

4. Agri-finance: decisive for agricultural sector transformation.....	171
4.1 The agri-finance system, challenges and entry points for change.....	173
4.2 Financial literacy training	183
4.3 The success of the gurantee fund scheme.....	192
4.4 Agri-finance innovations.....	201
5. Product and market development	208
5.1 The impact of currency dynamics and market systems	209
5.2 Post-harvest value creation.....	219
5.3 Cooperative development for market and product improvements.....	224
5.4 Market and farmer-company relations for value chain development.....	232
6. Enabling environment for sector transformation.....	241
6.1 Towards a robust information management system.....	243
6.2 Pluralistic extension system.....	252
6.3 Capacity building.....	265
6.4 Bottom-up planning and stakeholder collaboration.....	276
6.5 Communication: bringing the SBN stakeholders up to speed.....	290
6.6 The missed opportunity: regional and national stakeholder platforms to innovate and transform the sesame sector.....	299
7. An evidence-based agenda for action: the Ethiopian sesame sector.....	307
7.1 Yields can double, but for other than technical reasons they do not.....	311
7.2 Without value chain and market relations the perspectives for viable agribusiness development are bleak.....	315
7.3 Agri-finance is the cornerstone for agricultural sector transformation...	319
7.4 Improving social inclusion and diet diversity requires special efforts.....	323
7.5 Governmental institutions can do more for sector transformation.....	326
7.6 Evidence for an agenda for action.....	332
7.7 Priority leverage points for transforming the sesame sector.....	334
References.....	339

Preface

This book is about the sesame sector in Northwest Ethiopia and about the many challenges and opportunities for transforming the sector, to the benefit of farmers and stakeholders involved.

In the past eight years (2013-2020), we, as a team of Ethiopian and Dutch professionals, have gone through an interesting journey together with many farmers and stakeholders, both from the public and private sector. Together, the evolving network of actors developed a comprehensive approach for sustainable and inclusive agricultural development. This is reflected in the number and diversity of topics that are covered in this book. These range from sustainable agricultural production to product and market development, and include specific attention for agri-finance, social inclusion, diet diversity, and for creating a more enabling environment. The need for a comprehensive approach and stakeholder collaboration is reflected in the title: “Sector transformation is teamwork”.

The purpose of this publication is to share our experiences with an audience of development professionals, in Ethiopia and beyond. We think that our experiences in the sesame sector are relevant for agricultural sector transformation and agribusiness development in general. We specifically target development professionals who aim to support sustainable and inclusive sub-sector and value chain development that offers farmers a decent income, creates employment and economic multiplier effects, and that contributes to food security and the national economy at large.

The content of the book is based on action research, monitoring and evaluation, progress reports, case studies and most significant change stories, lessons learned papers and policy briefs, for all topics the Sesame Business Network (SBN) support programme and partners worked on in the past eight years. With this book, we seek to capitalise and share the multiple experiences in an attractive and well-structured manner.

In line with the comprehensive approach towards agribusiness development and sector transformation, the book offers you a menu of topics, which we structured according to five main chapters: Sustainable agricultural production (chapter 2), Social inclusion and diet diversity (chapter 3), Agri-finance (chapter 4), Product and market development (chapter 5) and enabling environment (chapter 6). The first introductory chapter sets the stage by explaining the origin, the principles and gradual evolution of the SBN support programme, which are backgrounds to the comprehensive, stakeholder-oriented approach that was developed. The final chapter (7) assesses the results obtained, shares the main lessons learned, identifies main leverage points for change and suggests an agenda for future action.

The Amhara and Tigray Agricultural Research Institutes (ARARI and TARI) deserve special thanks and appreciations for hosting the SBN support programme and its staff; developing and promoting technologies that improved sesame and rotational crops productivity and quality; organising workshops and discussion forums and field days.

During the same period, the Embassy of the Kingdom of the Netherlands in Addis Ababa has funded the SBN support programme, first as part of the CASCAPE project (2013-2015), later under the umbrella of the BENEFIT programme (2016-2020). The Embassy has strongly supported stakeholder collaboration and has been eager to bring local experiences to the level of policy makers, national programmes and partners. We hope and expect that this book may also contribute to this purpose.

It would have been impossible to think of the SBN achievements without the full hearted participation of the Amhara and Tigray Bureaus of Agriculture. The two bureaus, five zones and 13 woredas have been very active in popularising technologies and best practices in close to 260 kebeles, building capacity of farmers, organising field days and discussion forums.

The Federal Ministry of Agriculture and Natural Resources (MoANR) supported the extension of the 20 steps approach and the farmers' financial literacy programme. The MoANR is highly appreciated for its unreserved efforts to bring stakeholder identified challenges to high-level policy makers, which paved the way for some important policy changes.

The SBN support programme wishes to extend its gratitude and appreciation to all other partners with whom we collaborated: region, zone, woreda and kebele administration; unions and primary cooperatives; cooperative promotion offices; a range of small, medium and large enterprises, financial institutions (ACSI, DECSI, Cooperative bank of Oromia, Abay Bank, Lion bank), labour offices and several development partners (ATA, Agriterra, SNV, IFDC, ...)

Last, but not least we would like to extend our gratitude and appreciation to all farmers, labourers, and local entrepreneurs and other individuals for their work spirit and interest and willingness to work with us.

We deeply felt and appreciated the trust you all placed in us. Also for that reason the title of the book is "Sector transformation is teamwork". We dedicate this book to all actors and stakeholders of the Ethiopian sesame sector for whom we wish good health and prosperity.

SBN support programme

Acronyms

ACC	Agricultural Commercialisation Cluster
ACSI	Amhara Credit and Saving Institution
ADPLAC	Agricultural Development Partners Linkage Advisory Council
AGP	Agricultural Growth Program
AKLDP	Agriculture Knowledge, Learning, Documentation and Policy
ARARI	Amhara Regional Agricultural Research Institute
ARC	Agricultural Research Centre
Ardaita	Centre of Excellence for cooperative training in Ethiopia
ARI/ARIs	Agricultural Research Institute/s
ATA	Agricultural Transformation Agency
A-team	Agronomy Team
BBM	Broad Bed Maker
B2B	Business to Business
BENEFIT	Bilateral Ethio-Netherlands Effort for Food Security; Income and Trade
BoA	Bureau of Agriculture
BPP	Branches per plant
C4C	Cooperative for change
CASCAPE	Capacity Building for Scaling up of Evidence Based Practices in Agricultural Production in Ethiopia
CBE	Commercial Bank of Ethiopia
CBO	Cooperative Bank of Oromia
CDI	Centre for Development Innovation
CGFCs	Capital Goods Financing Companies
CIMMYT	International Maize and Wheat Improvement Centre
CoC	Certificate of Competency
CPO	Cooperative Promotion Office
CSA	Central Statistical Agency
CS	Crowd Sourcing
DA	Development Agent
DAP	Diamonium Phosphate
DBE	Development Bank of Ethiopia
DCSI	Dedebit Credit and Savings Institution
DM	Dry Matter

DOI number	Digital Object Identifier Number
ECX	Ethiopian Commodity Exchange
EIAR	Ethiopian Institute of Agricultural Research
EKN	Embassy of the Kingdom of the Netherlands
EMCWF	European Centre for Medium-Range Weather Forecasts
ENTAG	Ethiopia-Netherlands Trade for Agricultural Growth
EPOSPEA	Ethiopian Pulses, Oilseeds and Spices Processors-Exporters Association
ERCA	Ethiopian Revenue and Customers Authority
ETB	Ethiopian Birr
E-team	Economic Team
FAO	Food and Agriculture Organisation
FAOSTAT	Food and Agriculture Organisation of the United Nations Statistical Data
FCA	Federal Cooperative Agency
FHH	Female Headed Household
FPC/s	Farmer Production Cluster/s
FSC	Farmer Service Centre
F&S Ethiopia	Fair and Sustainable Ethiopia
FTC	Farmer Training Centre
FAN	Free Alpha Amino Nitrogen
GAP	Good Agricultural Practice
GARC	Gondar Agricultural Research Centre
GF	Guarantee Fund
GIZ	German Corporation for International Cooperation
GoE	Government of Ethiopia
GPS	Global Positioning System
GTP	Growth and Transformation Plan
Ha/ha	Hectare
HDDS	Household Dietary Diversity Score
HH	Household
HuARC	Humera Agricultural Research Centre
ICT	Information and Communication Technology
IFC	International Finance Cooperation

IFDC	International Fertiliser Development Centre
IFDC/2SCALE	Agribusiness development project '2SCALE' of IFDC
IF	Investor farmer
ILO	International Labour Organisation
IML/s	Informal Money Lender/s
ISBN	The International Standard Book Number
ISFM	Integrated Soil Fertility Management
ISSD	Integrated Seed Sector Development
IPM	Integrated Pest Management
IUF	International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations
IVR	Interactive Voice Response
KAEP	Kebele Agro-Economic Planning
Kg	Kilogram
KPI	Key Performance Indicator
LSB	Local Seed Business
M&E	Monitoring and Evaluation
MFI	Micro Finance Institute
MHH	Male Headed Household
MIE	Mesfin Industrial Engineering
METEC	Metals and Engineering Corporation-Ethiopia/National Industrial Engineering Corporation
MoA	Ministry of Agriculture
MoANR	Ministry of Agriculture and Natural Resources
M&EL	Monitoring, Evaluation and Learning
MoTI	Ministry of Trade and Industry
MoU	Memorandum of Understanding
MRR	Marginal Rate of Return
MRY	Marginal Rate of Yield
MSC	Most Significant Change
MT	Metric Ton
MT/ha	Metric Ton per Hectare
NBE	National Bank of Ethiopia
NGO	Non-Governmental Organisation
NMA	National Meteorological Agency of Ethiopia

ODK	Open Data Kit
PC/s	Primary Cooperative/s
PICS	Perdue Improved Crop Storage
PLC	Private Limited Company
PSNP	Product Safety Net Programme
PTO	Power Take-Off
PVS	Participatory Variety Selection
RCBD	Randomised Complete Block Design
RARI	Regional Agricultural Research Institute
RPCA	Regional Cooperative Promotion Agency
RUSACCO	Rural Savings And Credit Cooperative Organisation
SACCOs	Saving and Credit Cooperatives
SBC	Sesame Business Cluster
SBCCS	Social and Behavioural Change Communication
SBN	Sesame Business Network
SMART	Specific Measurable Attainable Relevant Time-bound
SMEs	Small and Medium Enterprises
SMS	Short text Message
SNNP	Southern Nations Nationalities and People
SNV	Netherlands Development Organisation
SPC	Seed Producer Cooperative
SPP	Seeds per pod
SVC	Seed Value Chain
TEC-team	Training-Extension-Communication team
T/ha	Ton per Hectare
TARI	Tigray Agricultural Research Institute
TGT	Tebebe General Trading
TLU	Tropical Livestock Unit
ToT	Training of Trainers
TVET	Technical Vocational Education and Training
UG	Under Grade (for sesame)
UNICEF	United Nations International Children’s Emergency Fund
USD	United States Dollar
USAID/ATEP	United States Agency for International Development- Agri-Busi- ness and Trade Ex-pansion

VSLA	Village Saving and Loan Associations
VC	Value Chain
WCDI	Wageningen Centre for Development Innovation
WHGS	Whitish Humera Gonder Sesame
WFP	World Food programme
WI	Weather Impact
WRF	Warehouse Receipt Financing
WR	Warehouse Receipt
WRS	Warehouse Receipt System
WUR	Wageningen University and Research
WoA	Woreda Office of Agriculture
WCPO	Woreda Cooperative Promotion Office
ZoDA	Zonal Department of Agriculture

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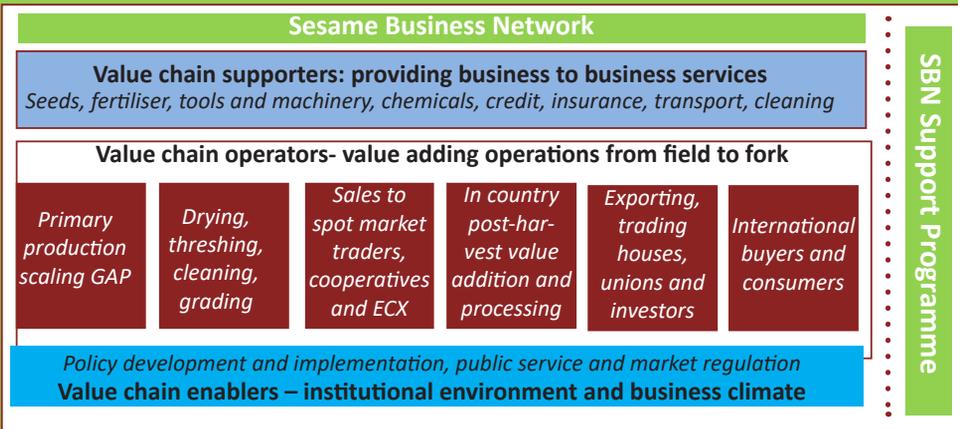
Chapter 1

**Setting the scene:
Introducing the SBN
support programme**

Introduction

Sustainable and lasting sector transformation cannot be achieved without the active involvement of farmers and a broad range of private and public sector actors, and their ownership of change processes. This is one of the key messages of the team of professionals that is sharing experiences and lessons learned with a support programme aiming to contribute to sesame sector development for farmer income improvement and socio-economic spill-over effects. The name of this support programme, Sesame Business Network (SBN), reflects the importance given to stakeholder collaboration.

In the figure below, the SBN support programme is positioned at the sideline, next to the players of the SBN: value chain operators, supporters and enablers. Externally funded programmes are only temporarily there, and are bound to go. Like a trainer of a sports team, an externally funded programme can listen, coach, encourage and evaluate, but should not take over the role of the players in the field. The players are there to stay and they have to win the match.



This chapter introduces the sesame (sub) sector in Ethiopia, the design and development of the support programme and the structure of the book. Specific attention is given to the choices that were made during start-up phase, which allowed for stakeholder involvement in the design, and stakeholder collaboration during the implementation of the programme. The last section of this chapter introduces the structure and the main topics of the book.

Key message

It is during the start-up phase that agricultural development programmes make choices, either explicitly or implicitly. The design principles and choices of the SBN support programme created conditions for stakeholder ownership and flexibility to adapt to new challenges and opportunities. As a result, the SBN support programme gradually evolved towards a comprehensive sector transformation programme.

1.1 Sesame in Ethiopia: high potential for further development and transformation

Introduction

Today, sesame is by far the most important oilseed crop in Ethiopia. Countrywide, sesame is grown on more than 700,000 hectares of land. The average annual production is around 300,000 metric tons (CSA, 2018). Sesame is providing an income to more than 200,000 farmers. Although most of these are smallholder farmers, some 5,000 large farmers cultivate a significant part of the sesame acreage (40%). The sector attracts half a million seasonal labourers, creates informal sector employment and triggers local economic development in the sesame growing areas.

After coffee, sesame is the second agricultural export commodity of Ethiopia. Depending on the production and world market price, annual export earnings have oscillated between 200 and 500 million US dollars in the past eight years. The contribution to export revenues is the major reason why sesame is one of the priority crops of the Ministry of Agriculture and Natural Resources (MoANR).

Sesame is mainly cultivated in the Northwest of the country, where conditions are optimal for sesame production. Sesame is best grown in production zones at lower altitudes (500-1,000 meters above sea level) that receive 500 to 800mm annual rainfall and register high temperatures during the production season (> 25 degrees Celsius). The lowlands of Tigray and Amhara in North-West Ethiopia account for more than 70 per cent of the national sesame production.

The sesame acreage has much expanded since the 1990s, mainly because of the price fall of cotton and the sesame price hike in the international market. This motivated farmers to move to sesame production and leave cotton production. This led to a tendency towards mono-cropping. Often, 50-65 per cent of the cultivated land is under sesame.

Introduction

The start of the SBN support programme coincided with a sharp increase of the cultivated area. Although the sesame sector already had significant turnover, stakeholders clearly saw a lot of potential for further growth and development. Average yields (300-400 kg/ha) are far below potential (800-1,200 kg under optimal farmers' conditions). The mono-cropping is leading to soil fertility degradation and decreasing yields.

Ethiopia can grow sesame varieties that have a good reputation in the international market because of its seed colour, size and appropriateness for the bakery industry. Other varieties are appropriate for tahini production and oil extraction. Although Whitish Gondar-Humera sesame is an international reference, Ethiopian sesame fetches below the average world market price. Traders, who buy sesame through the Ethiopian Commodity Exchange (ECX) export raw sesame to low-value markets, mainly China. In-country value addition is very limited. Most sesame is poorly cleaned, graded and stored. Tracing and certification are at their infancy.

To grasp market opportunities, there is much potential for increasing production and quality through the application of best-fit agricultural practices. These include timely and appropriate land preparation, use of quality seeds, row planting, soil fertility management, field operations (thinning, weeding), control of pest and disease incidence, reduction of high harvest and post-harvest losses.

In addition to these production and market challenges, the insufficient financing of the sector, the high cost of (informal) credit, high labour costs and hardship conditions of casual labourers are other key issues. These challenges, and the related room for improvement, were the starting point for designing the support programme.



Sesame field at flowering stage

A sector of prime importance to the country – challenges and opportunities at a glance

<p>2 regions, 5 zones, 13 woredas, 263 kebeles</p> <p>Sesame acreage 500 to 600,000 ha (2019: 588,000 ha sesame; 45 per cent of total cultivated areas; including non-sesame areas)</p> <p>170,500 sesame farming households (16% female headed households (FHH), especially at Tigray side)</p> <p>5,000 investor farmers – cultivating 40 per cent of the sesame acreage, especially in Western part of sesame lowlands</p> <p>10 Unions, 249 cooperatives (+ 170,000 members; 26% women)</p> <p>540,000 labourers at peak times - 320,000 (60%) seasonal labourers- originating from some 50 mid- and highland woredas</p> <p>A priority crop for the country, but largely underbanked sector; smallholder farmers depend on informal finance</p> <p>Average yield is low: 200-500 kg/ha, 800-1200 is possible under optimal farmer field conditions</p> <p>Production: 200-300,000 MT/year</p> <p>World market and ECX prices fluctuate: 1200-6000 ETB per ton (0.4 to 2 USD per kg)</p> <p>Market value of 200-600 million USD - fluctuating production and prices</p> <p>>95 per cent exported in bulk- mainly to China, quality not rewarded, limited in-country value addition, limited involvement of cooperatives and unions</p>	<p>Cash and food crops /surplus production zone!</p> <p>More than a million people depend on sesame and rotation crop production!</p> <p>Finance the sector !</p> <p>Double production, double farmer net income !</p> <p>Double export revenues!</p> <p>Cooperative and SME value addition and marketing!</p>
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1.2 Data portrait of sesame farmer households

The figure below shows important indicators that inform about the characteristics of sesame farmer households. This information is based on a survey among 674 households in 5 woredas in Amhara and 244 households in 3 woredas in Tigray (Worku et al., 2019). Although Amhara households are more represented than Tigray households, the farmer data portrait gives a good impression of main features of sesame farming households (HHs).

Smallholder farmers in sesame growing areas of Northwest Ethiopia		
HH characteristics	% of female headed households	11%
	Average age of respondents in years	41
	Average sesame cultivation experience in years	15
	% of literate household heads	62%
	Average literacy rate in years	5.4
	Average family size per households	5.3
	Number of male youth in household (15-30 years)	0.83
	Number of female youth in household (15-30 years)	0.76
Resource endowment	Average farm size (ha)	3.43
	Landholding per capita (ha)	0.77
	Average cultivated land per household (ha)	4.84
	Average rented-in land per household per year (ha)	1.69
	Average rented-out land per household per year (ha)	0.37
	Livestock holding	8.7
Access to agricultural service	% of households receiving extension services	76%
	Frequency of extension contact	3.39
	Number of trainings received per year	1.9
	Average field day participation	0.7
Credit access and source	% of credit beneficiary farmers	62%
	% of farmers who receive credit from relative	27%
	% of farmers who receive credit from local lender	7%
	% of farmers who receive credit from saving and credit coops	10%
	% of farmers who receive credit from multipurpose cooperatives	6%
	% of farmers who receive credit from microfinance (ACSI, DECSI)	51%
	% of farmers who receive credit from bank	1%

Access to infrastructure	Distance of house from Office of Agriculture (walking minutes)	19
	Distance of household from cooperative (walking minutes)	25
	Distance of household from road (walking minutes)	38
	Distance of household from spot market (walking minutes)	42
	Distance of household from open market (walking minutes)	60
Marketing	% of household selling to trader	77%
	% of household selling through cooperative	22%
	% of household selling to processor	0.2%

Highlights and observations:

- More than 10 per cent of the households are female-headed; this percentage is much higher in Tigray than in Amhara (>20%).
- With an average of 41, the experience of farmers in farming is about 15 years.
- Having attended formal elementary or junior secondary school, the majority of farmers (62 %) are literate, while 38 per cent were found to be illiterate.
- The average household size is 5.3 persons, of whom 1.6 are youth (15-30 years).
- The average land holding of the household is 3.43ha which is higher compared to the national average for smallholders (0.82 ha; CSA 2016). Renting in and renting out of land is a common practice.
- Livestock is an important asset for farm households; the household owned herd size is 8.7 Tropical Livestock Units (TLU). Livestock's are kept for different purposes: source of draft power, food, cash income and manure.
- About 76 per cent of the households had access to extension service, which above the national average; the average number of trainings and field days attended was, respectively 1.9 and 0.72.
- 62 per cent of the households have credit access, while 38 per cent of the respondents indicated not to borrow money from any source.
- Distance is a proxy for the access to important infrastructure and service providers. The walking minutes to the agricultural office, the primary cooperative office, a main road, a spot market and an open market are, respectively 19, 25, 38, 42 and 60 minutes.
- The marketing of sesame is highly regulated. Farmers are allowed to sell at specified local spot markets, where licensed primary traders and cooperatives collect sesame. Traders can only sell through Ethiopian Commodity Exchange (ECX) platforms. Cooperative unions and investor farmers have the choice to sell either through ECX or directly export. More than three quarters of the farmers are selling to traders at spot markets. About one-fifth of farmers reported that primary cooperatives are the main buyers of their sesame.

1.3 Focus: programme design orientations and principles

Three elements were decisive for the design of the SBN support programme: the general orientations of the funding agency, the fundamental principles of the programme designer and the actionable orientations of the sector stakeholders.

General orientations of the funding agency

Referring to national policies and priorities and the potential room for improvement, the Embassy of the Kingdom of the Netherlands (EKN) in Addis Ababa defined what it wanted to support: a sector transformation programme that is to the benefit of farmers and the local economy. The EKN indicated that this programme should evolve from an existing agricultural research programme for oilseeds by focusing on sesame (being the most important oilseed), concentrating on Northwest Ethiopia (where most sesame is grown) and by developing a business orientation, giving attention to both production-push and market-pull dynamics of value chain development. These orientations allowed for a clear focus on three P's: Product (sesame), Place (Northwest Ethiopia) and Producers. The EKN orientations clearly defined the scope of the 'programme to be', but did not define what it had to do. This combination of clarity and flexibility is extremely important.

Fundamental principles of the programme designer

Based on experiences with agricultural sector development and programme management, the programme designers of Wageningen Centre for Development Innovation (WC DI) employed five fundamental principles:

Work on practical cases	The orientations of the donor, which were based on the priority importance given to sesame by the Ethiopian government, allowed for a practical orientation on product and place and orientation on income improvement results for producers. This orientation was further operationalised by adapting programme activities to local realities (see below).
Treat farmers as entrepreneurs ('farmer agency')	Most often, development programmes explicitly or implicitly treat farmers as 'target groups' or 'beneficiaries'. This bears the risk of perpetuating farmers' dependency. The principle of farmer agency reflects the fact that farmers make up the largest part of the private sector, are knowledgeable and experienced and have their own ideas and priorities. In practice, this principle translated into action research with farmers, dialogue with farmers and their organisations and a supportive role for research, extension, training and facilitation services.

Ensure stakeholder ownership right from the start	This principle was important for creating sustainable change processes that are driven by stakeholder views, objectives and resources. In practice, the SBN support programme did not have a predefined set of activities. It aligned to national policies and built on analyses, priorities and activities of sesame sector stakeholders. The agenda for action, for instance, orientations of the annual work plan, was set by the stakeholders of the sector, including farmers, companies, financial institutions, public sector agencies and others.
Graft external support to existing human and financial resources.	This principle results from the preceding principles. In practice, the SBN support programme was based on collaboration agreements with a broad range of public and private sector stakeholders. These actors were leading joint activities and put in their available human and financial resources. The support programme only provided co-funding and did not 'buy participation' or fund what stakeholders could do themselves. As with the grafting of trees, additional resources provided by the programme were grafted to those of local stakeholders, who were like the mother tree that has the roots in the soil. This created conditions for organisational strengthening and institutional embedding.
Work at different levels	An important challenge is finding a balance between working at grassroots level and working at the policy level. Projects often lean towards one side or the other. Some are very hands-on but have no fundamental change. Others are policy-oriented, nice on paper but alienated from field realities and/or without practical follow-up. By working at both local and national level, evidence-based proposals for change can be made and the implementation of policy change can be supported. In practice, SBN support programme translated this principle by combining the support of stakeholders' operational work at the local level with the capitalisation of experiences and lessons learned and the organisation of strategic meetings to discuss and address identified structural challenges.

With these principles, the aim was to approach agricultural development differently and to conceive a 'game-changing' programme with lasting impact on the sector. We will come back to these principles in the last chapter of this book.

The impact level goal reflects the main focus on sector transformation and farmer-income improvement. Spill-over effects refer to the socio-economic effects such as employment opportunities, food and nutrition security and diet diversification, social inclusion, business opportunities for small and medium enterprises (SMEs), development of farmers' organisations and the increase of export earnings.

To achieve the goal, the SBN support programme pursued the combined effect

Actionable orientations of the sector stakeholders

Both before and after the formal EKN approval of the SBN support programme, much time and effort was given to stakeholder agenda setting. While literature review was done for situational analysis, most attention was given to stakeholder consultation and to the facilitation of stakeholder dialogue.

The word cloud to the right shows the main challenges identified during a multi-stakeholder workshop in Gondar in 2012. Stakeholder analyses and priority setting set the operational agenda, both for the SBN stakeholders and the SBN support programme. The programme proposal extensively showed the analyses of stakeholders (rich pictures, value chain analysis, quotes).



After the approval of the programme proposal in December 2012, the first SBN core team invested in baseline studies with the stakeholders of 19 local Sesame Business Clusters (SBCs), which resulted in the planning of activities. In May 2013, the SBN support programme was officially launched during a two-day interactive workshop in Gondar, which mobilised more than 100 representatives of a broad range of stakeholders, from farmers to national level decision-makers. This process laid the foundation of a stakeholder-owned support programme. The launch of the programme was extensively reported in the first SBN Newsletter. Field activities immediately started after the launch of the programme.



Stakeholders discuss action plans of local SBCs

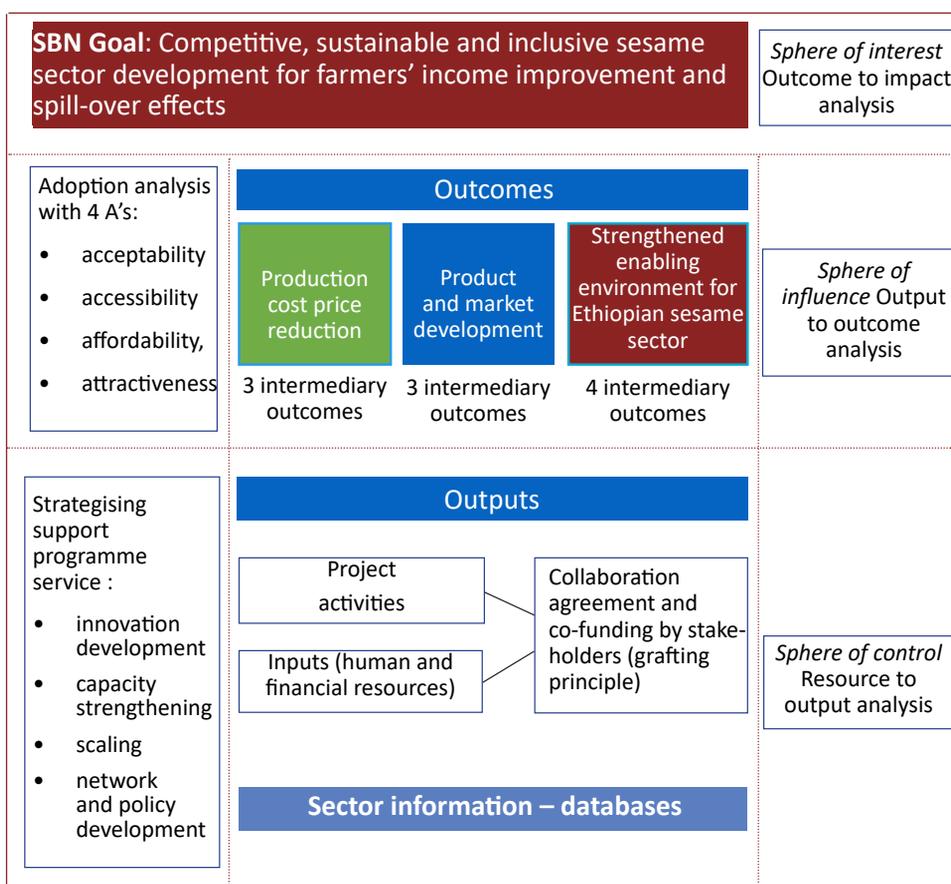


Baseline data and action plans of 19 local SBCs

1.4 Result chain: road map and dashboard of the SBN support programme

The figure below sketches the alignment of the overall goal, the outcomes, and the resources, activities and outputs, which are respectively in the sphere of interest, sphere of influence and sphere of control of the SBN support programme.

Key elements of the SBN support programme



Overall goal, primary and intermediary outcomes: the SBN support programme road map

The project goal, the three primary outcomes and the 10 intermediary outcomes, of which one is cross-cutting, are summarised in the below.

Overall goal, primary and intermediary outcomes

Goal	Competitive, sustainable and inclusive sesame sector development for farmers' income improvement and spill-over effects		
Primary outcomes	1. Sustainable agricultural development	2. Product and market development	3. Enabling environment
Intermediary outcomes	Yield and quality improvement	Post-harvest value creation	Evidence-based information and sharing
	Harvest, transport and storage loss reduction	Improved market linkages and sales	Stakeholder capacity development
	Improved farmers' access to input credit	Improved access to marketing credit	Enhanced stakeholder collaboration
	Strategic sesame sector innovation		

of three primary outcomes, which were the main pillars of the comprehensive support programme. Different intermediary outcomes would contribute to the primary outcomes. The first two pillars show that production-push and market-pull value chain development strategies were pursued and combined. Both aimed at farmers' income improvement. The activities for improving sustainable agricultural production focused on production cost price reduction as this appeared to be the most important pathway towards farmers' income improvement. At the market side, the eye was cast on possible options for post-harvest value creation and improving market relations and sales. A more enabling environment supports the first two pillars. The third pillar puts an emphasis on information management, communication, innovation, capacity development, scaling, networking and collaboration, policy development and institutionalisation.

Because of the high priority given to agri-finance challenges, access to input and marketing finance were important activity domains, respectively under 'Sustainable agricultural production' and 'Product and market development'. Empowerment, social inclusion and diet diversity were cross-cutting points of attention in all pillars.

Key performance indicators: the SBN support programme dashboard

Key Performance Indicators (KPIs) were formulated for all outcomes, generally in terms of stakeholders' activities, behaviour and results. The next page presents KPIs, as consolidated by the end of 2014, based on experiences and lessons learned during the first two years. Since then, this one-page overview has been the dashboard of the support programme and has structured the programme planning, monitoring, evaluation and reporting.

Result chain and Key Performance Indicators

Goal	Competitive, sustainable and inclusive sesame sector development for farmers' income improvement and spill-over effects		
Primary outcomes	Sustainable agricultural production	Product and market development	Enabling environment
KPIs	Farmers applying innovations reduce the farm-level production cost price with 25% per 100 kg	Sesame farmers involved in product and market development initiatives fetch a 10% higher price, as compared to spot market and ECX prices	The Ethiopian sesame sector enhances its performance as a result of a more enabling environment
Inter-mediary outcomes	Yield and quality improvement	Post-harvest value creation	Evidence-based information and sharing
KPIs	<p>50% of farmers in sesame clusters adopt innovative agronomic practices;</p> <p>Adopting farmers achieve 50% higher yields than those who don't</p> <p>More farmers produce first or second grade sesame</p> <p>Farmers diversify their farming systems</p>	<p>Entrepreneurs at different levels develop post-harvest value adding activities</p> <p>The traded volume of value added sesame doubles (as compared to the prevailing situation in 2013)</p>	<p>Sesame sector stakeholders develop, maintain and use information databases</p> <p>In the Ethiopian sesame business network, stakeholders share information and experiences through different communication channels</p>

Introduction

Inter-mediary outcomes	Harvest, transport and storage loss reduction	Improved market link-ages and sales	Stakeholder capacity development
KPIs	<p>Farmers applying recommended practices reduce sesame harvest losses with 30%</p> <p>Innovations for transport and storage loss reduction are introduced and taken up</p>	<p>More trading and processing companies directly source sesame and rotation crops from farmers and/or their organisations</p> <p>Farmers and their organisations directly sell 10% of their production to (inter) national buyers and processors</p>	<p>SBN stakeholders develop and update training and extension materials</p> <p>SBN stakeholders deliver training and coaching services through a cascaded approach to targeted audiences</p>
Inter-mediary outcomes	Improved farmers' access to input credit	Improved access to marketing credit	Enhanced stakeholder collaboration
KPIs	<p>Financial institutions double the value of input credit provided to farmers</p> <p>Farmers reduce the average input credit costs with 40%, as compared to 2014 data</p>	<p>Financial institutions significantly increase marketing credit provided to farmers' organisations</p>	<p>At different levels, stakeholders improve their interaction and collaboration, leading to better coordinated and more effective action (kebele-woreda-zonal-cluster-regional- national and international levels)</p>
Strategic sesame sector innovation			
SBN stakeholders address key strategic issues and engage in dialogue at decision-making levels			

Planning and implementation of programme interventions

Because of the principle of stakeholder ownership, the planning and implementation of programme interventions have been based on strong stakeholder involvement, both at local and strategic level. Activities have always been conducted in close collaboration with sector stakeholders, who provided co-funding. Programme interventions concerned information gathering, action research, innovation development, communication, capacity strengthening, scaling, networking, policy proposal development and support to the institutionalisation of innovations. These programme activities were in the sphere of control of the project.

Although the SBN support programme perceived itself as a facilitator at the sideline and did not have a predefined set of activities nor a predefined budget,

the role at the sideline did not mean that the programme did not play a proactive role. On the contrary, the programme tried to get the best out of players and to make the sector perform as well as possible. The following support were provided:

- Action research with stakeholders, among others on harvest and post-harvest losses, labourers, financing sesame production; sesame marketing transaction
- Sharing of information through a variety of communication channels;
- Suggestions of possible options for action, through pilots and demonstrations
- Facilitation of training sessions and exchange visits;
- Co-organisation of stakeholder meetings, from kebele to woreda, zone, regional and national level;

Resources

Concerning the use of resources, the programme was based on a limited staff strategy, as activities were to be owned and driven by stakeholders themselves. In addition to a coordinating team, responsible for the general oversight and facilitation of the programme, two teams were established for supporting stakeholders in Tigray and Amhara. Reflecting on the comprehensive nature of the programme the SBN support programme team was multidisciplinary in composition, integrating agronomists, economists and training, extension and communication specialists. The team furthermore consisted of support staff for financial administration and transport. In addition to staff, transport and logistic expenditures, the budget catered for stakeholder training and meetings and for demand-driven innovative financial instruments, such as innovation grants, collaboration agreements with stakeholders and a guarantee fund. To a great extent, activities were built on existing activities and dynamics, mobilising as much as possible farmers' and stakeholders' own resources. This included partnerships with some other development programmes (IFDC, Agritererra, SNV, ATA and others). In total, the SBN support programme has spent some 7 million Euro in eight years.

Monitoring and evaluation

The result chain and performance indicators allowed for goal-to-activities reasoning ('Are we doing the right things?') and activity-to-goal reasoning ('Are we doing the things right?'). Output-to-outcome analysis has been strongly oriented at farmer and stakeholder adoption analysis. This was done with four dimensions of adoption: acceptability, accessibility, affordability and attractiveness of innovations. Throughout this book, reference is made to the targeted outcomes and performance indicators. Chapter 7 will provide a critical review of the indicators, discuss whether primary and intermediary outcomes were achieved and evaluate whether the SBN support programme offered value for money.

1.5 Programme development

Gradual extension of the intervention zone

During the first phase (2013-15), the SBN support programme operated in eight woredas. Interventions were conceived at the level of local SBCs, of which the number evolved from 19 in 2013 to 38 in 2015. The local SBCs were centred around sesame spot markets, which were located in the main towns of kebeles (lowest administrative level). Depending on the importance of sesame production, an SBC coincided geographically with one, but most often two or three kebeles. The SBCs included farmer cooperatives, extension officers (development agents) and most often also a local branch of a micro-finance institution.

From the perspective of building local agribusiness clusters of collaborating stakeholders, the concept of SBC was a good idea. In actual practice, it did however not well enough to existing administrative structures. When moving to the second phase (2016-2020), it was therefore decided to align to the Agricultural Transformation Agency (ATA) defined Agricultural Commercialisation Clusters (ACCs). The ACCs were also based on the perspective of agribusiness clusters but at a larger scale. Both for Tigray and Amhara, sesame ACCs were defined. To align, the intervention zone extended to 12 woredas in 2016 and 13 woredas in 2017 (See maps in the next page).

Gradual evolution towards a comprehensive sector transformation programme

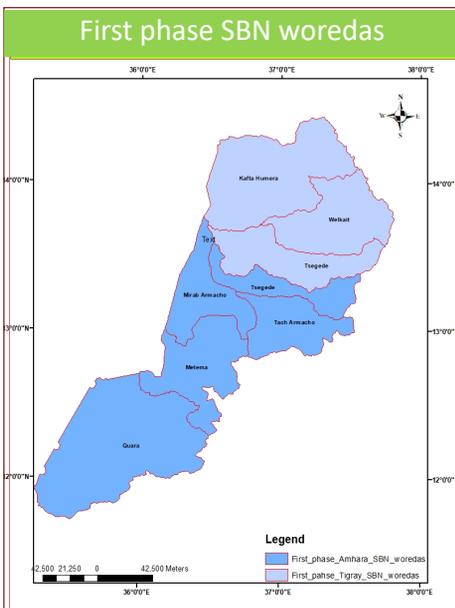
During the first phase (2013-15), the main focus was on production improvement, loss reduction and access to input finance, as these three subjects were most mentioned by stakeholders. This initial focus led to the development of the 20 steps improved sesame production guide and translated in much attention for agricultural innovation, training and extension, both for sesame and rotation crops.

The following activities started in 2013 and continued throughout the entire programme implementation period:

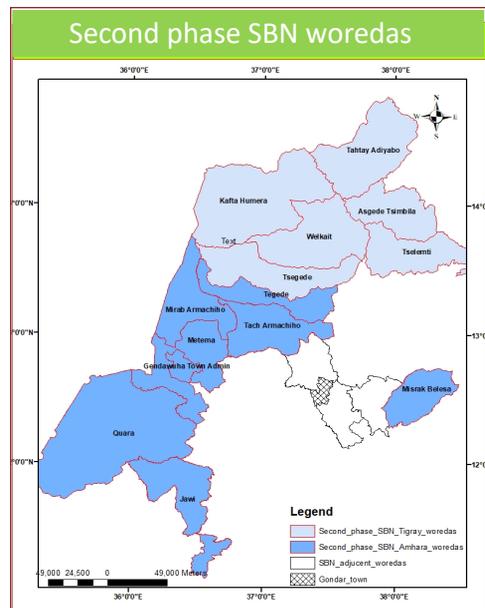
- Collaboration with the BoA for promoting good agricultural practices for sesame and rotation crops (training of experts and development agents, training of farmers, technology demonstrations at FTCs and farmers' fields, co-organising field days, ...)

- Collaboration with ARCs: for development and promotion of quality seeds, testing of options for mechanisation, pest and disease control, soil fertility management recommendations, ...)
- Development and sharing of farmer-friendly extension materials, both for sesame and rotation crops (production guides, posters, radio programmes, short documentaries, ...)
- Cascaded training sessions, first mainly on sustainable agricultural production subjects;
- Information and communication via different channels (newsletter, website, social media)
- Organisation and facilitation of regional and local stakeholder meetings.
- Sesame price monitoring at different levels (spot markets, ECX and international)
- Identification of options for local value creation.

During the first phase, action research with and for farmers and stakeholders was done on the following subjects: harvest losses (2014), sesame marketing (2014), finance system and access to credit (2014-15). A pilot on financial literacy training started in 2015.



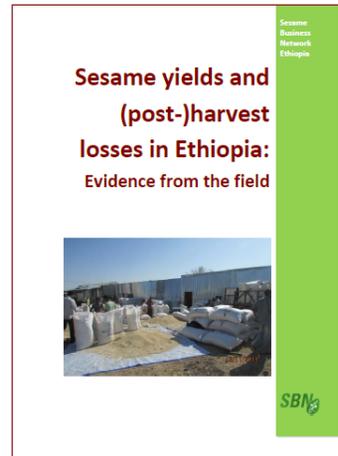
First phase (2013-2015): three woredas in Tigray and five woredas in Amhara



Second phase (2016-2020): six woredas in Tigray and seven woredas in Amhara region



Action research with farmers



During the second phase, quite some important additional subjects were added to the spectrum of activities:

- Financial literacy training of farmers (2015-2020), in collaboration with unions and cooperatives and the CPAs;
- Guarantee fund supported marketing credit for cooperatives and loan management training (2016-2020), in collaboration with several banks and unions and cooperatives;
- Weather forecast services (2016-2020), in collaboration with National Meteorology Agency (NMA) and Weather Impact;
- Collecting and sharing spot market information (2016-2017), in collaboration with Trade and Industry Development Department;
- Home garden production and nutrition training (2017-2019), in collaboration with ARCs and BoAs;
- Database development and sharing (2016-18), in collaboration with woreda administration and experts;
- Digital information management system (2018-2020), in collaboration with farmers cooperatives and eProd;
- Development and application of bottom-up planning method (2017-2019), in collaboration with 50 kebeles, BoA, unions and cooperatives and micro-finance institutions;
- Cooperative capacity development (2017-2018), in collaboration with RCPA, CPO, Ardaita college and unions and cooperatives;
- Organisation of thematic meetings (2016-2020), on several topics, with a range of stakeholders.

Action research subjects also diversified, including farmers' hilla drying options (2018), diet diversity survey (2018), gender roles and options for action (2018). For monitoring and evaluation purposes, an adoption study (2018), a household survey (2018-19), marginal rate of yield and marginal rate of return analyses (2017 and 2018), weather forecast users assessment surveys (2017 and 2018), the collection of Most Significant Change stories (2018-19) and sesame market price trend analysis. In 2020, possibilities for contract farming (linking soybean producers to processing companies) and for innovating agri-finance (lease financing and warehouse receipt system) were explored.

The last year (2020) was a budget-neutral extension, with a focus on capitalising experiences and developing policy briefs. Work in the field was constrained by the outbreak of the Covid-19 pandemic. Because of health and income loss risks, specific attention was given to the position of seasonal labourers. With stakeholders, three rapid sector assessments were conducted at two-month intervals (June, August and October 2020) so as to respond to identified challenges.

Diversity of actors and stakeholders involved

The SBN support programme has been focusing on stakeholder ownership and collaboration. Over the years, the reach of the support programme also extended in terms of the stakeholders involved. The table below gives an impression.

Value chain operators	Value chain operators are entrepreneurs/ enterprises performing basic functions along a value chain; they create value and own the product at some stage. The actors operating on sesame and rotation crop value chains included: farmers (different categories; large, intermediate and small), primary cooperatives, cooperative unions, traders, local processors, processing companies (Selet Hulling, Richland, ...), exporters, international buyers.
Value chain supporters	Value chain supporters provide support services to value chain operators, who pay for it. Chain supporters have a stake in the value chain, but, contrary to value chain operators, they do not own the product. In the sesame zone, value chain supporters include Labourers, Seed suppliers, Seed Producer Cooperatives (SPCs), Input dealers (wholesale and retail), Informal money lenders (IMLs), Micro-finance institutions (ACSI, DCSI), Abay bank, Lion bank, Cooperative Bank of Oromia (CBO), Development Bank of Ethiopia (DBE), Capital Goods Financing Companies (Waliya/Kaza), Sesame cleaning centres, Ethiopian Pulses Oilseeds and Spices Processors-Exporters Association (EPOSPEA), ...

<p>Value chain enablers</p>	<p>Enablers define and control the policy environment and/or create conditions for private sector players to develop their business. Value chain enablers are public sector organisations and include government structures at different levels and all kinds of public services. In the sesame zone, the following actors are enablers: Amhara Regional Agricultural Research Institute (ARARI) and Tigray Agricultural Research Institute (TARI), Gondar and Humera ARCs (GARC and HuARC); MoANR, MoTI; BoA, WoA, DA’s, FCA), RCPA, CPO, Ardaita cooperative college, ECX, NMA, Women and youth office, Labour and Social Affairs, Radio and television (Amhara mass media, Dimtse woyane).</p>
<p>Externally funded supporters</p>	<p>In many countries, donor-funded development projects and programs, international development organisations, donor-supported international and national NGOs provide significant technical and/or financial support. These externally funded facilitators, who have in common that their activities are based on funds that are not generated in the national economy, should also be added to a stakeholder overview. In the sesame zone, in addition to the SBN support programme, the following actors belong to this group:</p> <p>Ethiopian ATA, Agriterra, the International Fertiliser Development Centre (IFDC) and the Netherlands Development Organisation (SNV).</p>

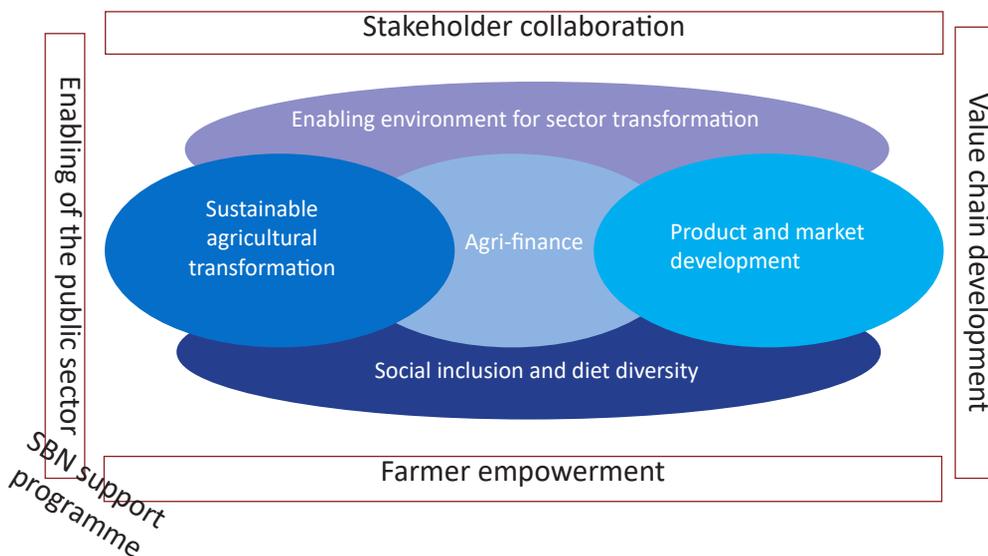
Although the intensity and duration of collaboration differed a lot, the SBN support programme collaborated with most, if not all of these stakeholders. The collaboration with stakeholders is specified in the different chapters and paragraphs of the book. Many lessons learned relate to success and/or failure of stakeholder collaboration and coordination.

1.6 Structure and main topics of the book: A complex story to tell

This book reflects on the challenges, experiences and lessons learned of a support programme that sought to contribute to improved performance and transformation of the sesame sector in Northwest Ethiopia. The focus is on the complementarity of actions in different intervention areas and activity domains and the importance of coordinated action and stakeholder collaboration.

The diversity of subjects and the many stakeholders involved mirror the complexity of agricultural sector transformation. Coherent action for structural change requires working on a broad range of subjects, which are often related to each other. This induces the necessary involvement and collaboration of a broad range of actors, both from the private and public sectors. And it requires alignment of actions at different levels (from local to national level). This makes the story of this book rather complex.

The book tells the SBN experiences according to five main chapters, respectively devoted to sustainable agricultural production, social inclusion and diet diversity, agri-finance, product and market development and enabling environment for sector transformation. These chapters and topics are strongly interrelated as shown in the figure below.



In addition to the five chapters, the figure shows four transversal subjects: farmer empowerment, the enabling role of the public sector, value chain development and stakeholder collaboration. These are recurrent keywords that cut across all chapters.

The five chapters contain a total of more than 25 paragraphs, which focus on certain key topics, for instance 'mechanisation', 'weather forecasting' or 'communication'. Efforts are made to discuss these subjects in all their dimensions: background, importance of the subject for sector transformation, activities undertaken, technical content, tests and pilots, capacity development, stakeholder ownership and collaboration, results obtained, lessons learned and way forward. For instance, the paragraph on mechanisation not only talks about machines but also about training of tractor drivers, tax exemption for agricultural machinery, rental services, lease financing and other related topics.

Each paragraph has a clear title that reflects the key message of the article. If particular subjects have most of your interest, for instance 'financial literacy', 'contract farming', 'pest and disease control' or 'marketing credit', you can go to a particular paragraph. The paragraphs are part of a broader picture that is sketched in each of the five chapters. Together, the five chapters tell the story of the complexity of agricultural sector transformation. The figure on the next page provides an overview of key topics that are presented in the five central chapters of the book (chapters two to six).

In chapter seven, the primary and intermediary outcomes and related key performance indicators presented in this chapter are critically reviewed. The evaluation will show varying results, ranging from very good results and impact to no results and impact. The subsequent question how the sesame sector, more than is the case now, can become an engine for local economic development is discussed in the last section of this chapter.

Key topics presented and discussed

Chapter 3 - Social inclusion and diet diversity

1. Labourers
2. Weather forecast services
3. Women and youth involvement and empowerment
4. Household nutrition and dietary diversity
5. Home garden production

Chapter 2 - Sustainable agricultural production

1. Twenty steps to double yields and improve quality of sesame
2. Partnership approach for scaling the 20 steps
3. Crop rotation
4. Quality seeds
5. Mechanisation
6. Pest and disease control
7. Sesame loss reduction
8. Marginal rate of yield and return
9. Adoption of innovation
10. Performance smallholder and investor farmers

Chapter 5 - Product and market development

1. Market system and prices
2. Post-harvest value creation
3. Cooperative development
4. Market and company relations

Chapter 4 - Agri-finance

1. Agri-finance system
2. Farmers' financial literacy
3. Risk sharing scheme for cooperative marketing credit
4. Agri-finance innovations

Chapter 6 - Enabling environment for sector transformation

1. Information management
2. Pluralistic extension system
3. Capacity building
4. Bottom-up agro-economic planning
5. Communication
6. Regional and national stakeholder platforms



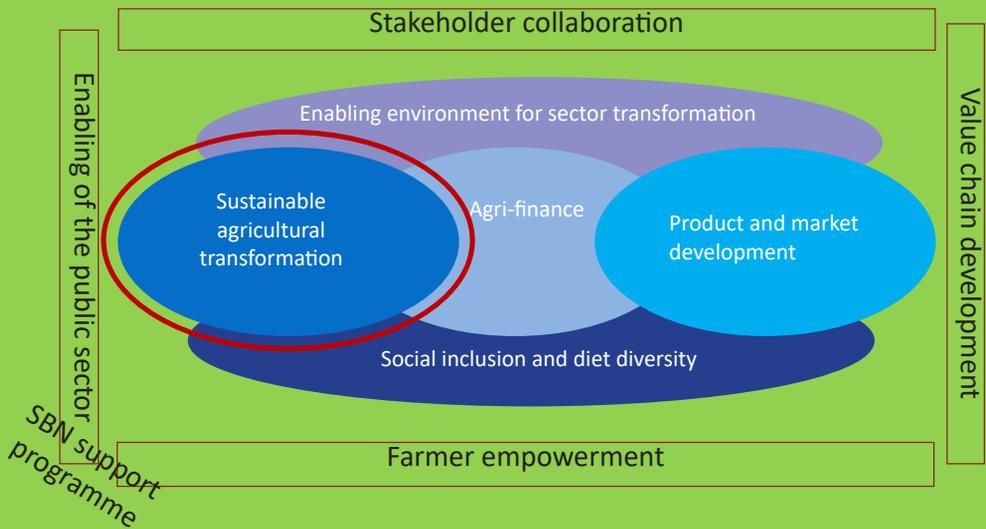
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Chapter 2

**Sustainable production
improvement: farmers can
produce and earn much more**

Introduction

In the past years, sustainable agricultural production has been the major focus of the SBN support programme. The agronomic reasons are that there was- and is- overwhelming evidence for doubling crop yields. The economic reason is that yield improvement can lead to significant reduction of the cost price of production, hence the likelihood of profit for farmers. The agro-ecological reason is that crop rotation, integrated soil fertility management and integrated pest management are important challenges for avoiding soil depletion and increased prevalence of insect pests and diseases.



This chapter first presents the twenty steps for sustainable production increase of sesame that were recommended to farmers and the partnership approach that was adopted to promote and scale these steps (2.1 and 2.2). Subsequent articles zoom in specific subjects that are part of the package of recommended practices: crop rotation, quality seeds, mechanisation, pest and disease control and loss reduction (2.3 to 2.7). Finally, results are assessed from three angles: the marginal rate of yield (MRY) and marginal rate of return (MRR) of row planting, fertiliser application and thinning (2.8), adoption levels and adoption analysis of recommended practices (2.9) and the performance of smallholder and investor farmers (2.10).

Key message

There is no doubt that sesame yields can double and farming systems can be more diverse. The promoted package of 20 steps to improve yields and quality is widely accepted by farmers. The rate of return and the (partial) level of adoption of recommended agricultural practices is encouraging. Structural impediments, mainly related to farmers' access to finance, seeds, inputs and machinery, have to be addressed to unfold the sustainable production potential of farmers in the sesame lowlands.

2.1 Twenty important steps to double yields and improve quality of sesame

Hagos Tadesse, Melisew Misiker, Hagos Woldegebriel,
Muez Berhe, Alemayehu Kassa, Ted Schrader

Based on previous research results, twenty recommended practices were packaged in a user-friendly guide for farmers. Farmers call the guide in short “20 steps” or “Farmers’ friend”. The ‘20 steps’ guide is an example of making research results available to farmers.

Introduction

To increase productivity and quality of sesame and thereby to contribute to farmer income, improved technologies were packaged into a user-friendly guide called “20 important steps to double yields and improve quality of sesame”. The promotion of these recommended practices, in close collaboration with farmers and several partners, has been one of the key features of the SBN support programme. This article shortly presents the twenty recommended practices and how they were developed, communicated and promoted.

Starting point

Based on many years of agricultural research, a comprehensive sesame production manual was published (Geremew et al. 2012), under the auspices of the Ethiopian Institute of Agricultural Research (EIAR). This manual was prepared to inform agronomists, development agents, agricultural training centres, commercial farmers, intermediate and small sesame farmers about the state-of-the-art production techniques. The guide focused on practical recommendations to increase production and productivity of sesame. The guide, together with the research results of both Humera and Gondar ARCs and the experiences of

the regional Bureaus of Agricultural of Tigray and Amhara, provided a very good starting point for developing a coherent set of recommendations to farmers.

Preparing a guide for farmers

After the launch of the SBN support programme, the recommended practices were tested in each of the local SBCs, in close collaboration with GARC, HuARC and BoA. During the 2013 production season, very good results were obtained. This increased the trust of BoA that, under farmers' production conditions, the recommended practices can indeed lead to much higher yields. This laid the foundation for future collaboration (cf, 2.2).

The action research on harvest, transport and storage losses led to additional insights and recommendations, which were going to be integrated in the 20 steps guide, which was prepared in the first months of 2014. This required the formulation of short recommended operations and explanation of the purpose of certain of these operations. The feedback of farmers that was gathered in the first year, helped to formulate the short texts. To increase the clarity and attractiveness of the guide, the short texts were accompanied by clear pictures. The draft farmer guides were discussed with TARI, ARARI, EIAR and the BoA of Amhara and Tigray. After approval of the guide, the next step was lay-out and printing of the guide.

Before the start of the 2014 agricultural season, 100,000 copies of the guide were published and printed in Amharic and Tigrigna languages, in collaboration with agricultural research and extension (TARI, ARARI, BoA and EIAR) and several partners. The guides were mainly distributed to farmers and local development agents, through Offices of Agriculture, cooperative unions and primary cooperatives. The cost price of one pocket size guide was 20 Euro cents.

Combination of short text and pictures

When opening the booklet, each of the 20 recommended practices are explained with short texts at the right side of the booklet (Explanations of operations) and clear pictures at the left side (Pictorial examples of operations). This helps farmers to easily understand what to do and what not.

The 20-steps guide was printed in Amharic, English and Tigrigna

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20 Important Steps to Double Yields and Improve Quality of Sesame

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Pictorial examples of operations

1 Land cleaning and first ploughing soon after harvest

Cleaned field

Deep ploughing by using a camel



Explanations of operations

Operations

- Clean the field soon after harvest
- Distribute / scatter the chopped stalks over the land and under plough soon
- Deep plough (20-30 cm) once every 3-5 years, using mouldboard or disc plough

Purposes

- Minimize weed infestation in the next season
- Improve the soil fertility (organic matter content and moisture holding capacity)
- Disturb the breeding and living sites of insects (seed bugs, termites, ants)
- Bury to decay diseased plant parts
- Expose soil borne fungi, insects and bacteria cells for desiccation.

The main recommendations to farmers

The twenty steps that were recommended to the farmers are shared in the overview below:



1. Land cleaning and first ploughing after harvest

- Clean the field soon after harvest
- Distribute / scatter the chopped stalks over the land and under plough soon
- Deep plough (20-30 cm) once every 3-5 years, using mouldboard or disc plough

Purposes:

- Minimise weed infestation in the next season
- Improve the soil fertility (organic matter content and moisture holding capacity)
- Disturb the breeding and living sites of insects (seed bugs, termites, ants)
- Bury to decay diseased plant parts
- Expose soil borne fungi, insects and bacteria cells for desiccation.



2. Rotation crops

- Avoid mono-cropping of sesame
- If possible, rotate with sorghum, soybean, mung bean, haricot bean, cotton, sunflower or other crops such as teff, cowpea, finger millet or maize.

Purposes:

- Crop rotation is very important for pest and disease management
- Improves soil fertility
- Diverse and sustainable production
- Crop diversification is important for risk spreading and better guarantees food security and increase household income



3. Land preparation

- For the second time clean remains of weeds and crop residue
- Plough deep when soil is moist by disk harrow or oxen plough for pulverising the clods and to kill early flushing weeds
- Third ploughing (at planting), using row planter or dixi for broadcasting;
- Apply Broad Bed Making (BBM) and ensure drainage for waterlogged areas.

4. Using quality seeds

- Use seed that is free from weeds and pests and diseases. This is very important for the prevention of insect pests
- Use viable seeds (>90% germination)
- Preferably use seeds of known origin or quality declared or certified
- Select seed varieties that are adapted to your climate conditions: Setit-1 (adapted for dry conditions), Humera-1 (medium rainfall); Abasena (high rainfall) or use well-adapted local varieties
- Select varieties that are known to be resistant to certain diseases (for instance blight resistant varieties)
- Dress seeds with cruiser/Gaicho 300ml/100kg to reduce risks of pests and diseases in first weeks. The use of dressed seeds is especially important for the control of fusarium wilt, termites, ants and seed bugs.



5. Row planting

- Seed rate in case of broadcasting: 3-4 kg/ ha (no need of mixing soil or ash)
- Seed rate in case of row planting: 1-2 kg/ ha. Mix the seed with soil and ash at 1:5 ratios (one kg of seeds to five kg of soil/ash)
- Sow after rain – soil should be moist enough; only consider sowing sesame under dry conditions if land is very well prepared (ploughed, harrowed and levelled) and seeds are dressed against insects
- Ensure a seed depth of 3-5 cm and cover seeds with light soil
- Plant at a distance of 40 x10 cm, between rows and plants, respectively
- Maintain 250,000 plants per hectare
- Use a line or rope in case of manual row planting
- Use of row planters is recommended (man-driven, animal traction or tractor mounted).

Purpose of row planting:

- Ensures appropriate plant density and seed rate
- Reduces labour costs,
- Eases weeding, pest scouting, fertiliser and insecticide application and harvesting.

6. Fertiliser application

- Use recommended dose: 100 kg DAP + 50 kg Urea
- Apply 100 kg DAP and 25 kg urea at planting
- Cover the fertiliser by soil soon after application
- Apply remaining 25kg of urea at the start of flowering (35-45 days after planting)
- Do not apply fertiliser on dry soil
- Cover fertiliser with soil soon after application.



7. Gap filling

- If after 5-7 days there is too much empty space between plants, fill gaps by re-sowing seeds to replace the non-germinated seeds or lost seedlings. (The use of quality seeds is important to avoid gap filling as much as possible)

8. Weeding

- Ensure a minimum of three times weeding. This is very important for avoiding competition of sesame plants with weeds and to minimise the weed seed bank
- Critical weeding periods: First weeding 7-14 days after emergence
- Second weeding: 30-35 days
- Third weeding: 55-65 days after emergence
- Fourth weeding as necessary to remove weeds halting clean harvest.



9. Thinning

Respecting planting distance and using high quality seeds are important to establish the right spacing right from the onset of the growing season and can avoid thinning labour costs. However, sesame plants need space. If sesame plant density is too high: thinning is advised.

- Thin out when 2-3 leaves emerge and at the height of 10-15 cm, or do this during first weeding
- Thin-out to 10 cm distance between plants
- Remove weak plants.

10. Pest scouting

- Check field from emergence to harvest, every week or fortnight
- Start inspection for pests early in the morning or at evening when they are inactive
- Move diagonally or in zigzag
- Check minimum of 100 plants/ha in more than 20 check points
- Monitor hillas for termites and crickets infestation during drying.



11. Pest control

- Use integrated pest management methods: pests can be controlled by combining cultural, biological and chemical methods
- For webworm: check every week for the presence of webbed leaves; if 5 webbed leaves with larvae inside are found: apply advised insecticides
- For phyllody control: eradicate and destroy diseased plants immediately
- Use specific chemical treatments for different pests and diseases
- Respect specific recommendations that are given.

12. Maturity and harvesting

- Harvest timely. This is when 2/3 of the plants and pods turn from green to yellow. This is generally between 90 and 120 days, depending on the variety used
- Avoid too early harvesting. This may lead to 20% yield loss
- Avoid too late harvesting. Do not allow bottom capsules to shatter. This may also lead to losses.



13. Preparing drying spots

- Prepare drying sites for > 10 hillas
- Use levelled, well-cleaned high spots to avoid waterlogging during drying. This is important for quality and for controlling termites and seed bugs.
- If needed treat the site with recommended pesticide before putting the hillas.
- Put hillas next to each other to protect from wind damage
- Put hillas on permeable polyethylene sheets.

14. Stacking and drying

- Stack upright in shocks of 6-8 bundles
- Peg shocks to protect against wind damage by tightening strings around it
- Do this for 10 or more hillas, which are placed next to each other on the polyethylene sheet
- Preferably use drying site as threshing site to minimise shattering losses occurring while carrying dried sesame plants to threshing ground
- Do not apply any pesticide on or near drying shocks/hillas as this may cause contamination and reduce quality and marketability
- Monitor drying site frequently for any damage
- Dry not more than 2 weeks, preferably shorter, to avoid losses from shattering, insect pests or wind damage, e.g. thresh as early as possible.



15. Threshing

- Thresh near the hillas on canvas or plastic sheets of enough size, free from soil, gravel, dust, chemicals or other inert materials
- Do not carry dry plants long distance as this causes significant seed losses
- Use the drying spot as threshing site or thresh next to the hilla. If not possible, take the plastic sheet to hillas ready for threshing.

16. Winnowing and cleaning

- Repeatedly winnow the seeds until 98-99% cleanliness is obtained
- Avoid contamination with soil, gravel stone or other inert materials.



17. Bagging

- Use new and clean bags.
- Never use chemical contaminated and/or torn bags
- If possible, use airtight bags
- Avoid over filling (bags should contain 100 kg)

18. Loading, transporting and unloading

- Lift and lower bags carefully during loading and unloading to minimise tearing of bags
- Transport bagged seed on smooth surfaced trucks, carts or wheelbarrows that are not contaminated with chemicals or oil
- Lift, lower and pile sacks slowly to avoid injury/ split.



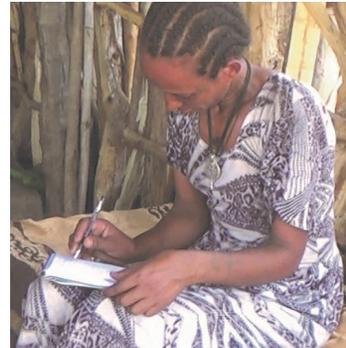
19. Storing

- Dry seeds before storing to a moisture content of 7%
- Do not leave freshly threshed seeds (> 7% moisture) on a truck for a long time
- Do not store under very hot temperature (sesame can be stored at room temperature (< 20 °C) for approximately 5 years without loss of viability)
- Store sesame in clean, well-ventilated concrete floored rooms
- Close openings that allow the entrance of insects and rodents
- Do not store pesticides or used sprayers in the same room where sesame is stored
- Do not spray on bags with sesame
- Fumigate stores when storage pests are observed.

20. Monitoring and evaluation

Throughout the production season keep a logbook and take notes on:

- Dates of conducting the different field operations
- Number of labourers / labour days
- Cost of operations
- Results of pest scouting and control measures taken and
- Field visits of development agents and other professionals and their advices given.



2.2. Partnership approach for scaling the twenty steps

Hagos Tadesse, Melisew Misiker, Hagos Woldegebriel, Muez Berhe, Alemayehu Kassa, Fiseha Baraki, Tewodros Tesfaye, Geremew Terefe, Ted Schrader

The roll out of the twenty steps could not have been successful without strong stakeholder involvement and commitment, the complementary role and effects of different scaling efforts that aim to gradually move from a top-down transfer of technology approach to an agricultural innovation system.

Introduction

The SBN support programme has operated in close collaboration with partners and stakeholders. Based on its principles, outlined in chapter 1, the SBN support programme aimed to be stakeholder-owned. As such, the support programme did not have a pre-defined programme of activities. The goal, primary outcome and intermediary outcome objectives were only formulated after intensive stakeholder consultation and baseline studies. The SBN support programme budget was mainly used for joint activities with stakeholders and the support programme staff costs (including office and transport costs). What to do, where, when, how and with whom, was all defined with stakeholders and partners, according to their analyses, priorities and available (human and financial) resources. Instead of 'buying participation' to increase the reach of a development programme (that is bound to go when external financing stops), the support programme strived to improve the reach and performance of stakeholders that are there to stay.

The diverse efforts for rolling out the 20 steps for improved sesame yields and quality are outlined in this paragraph, by addressing the following dimensions of the SBN support programme scaling and partnership approach:

1. Clear objectives	6. Capacity building and farmer-to-farmer extension
2. Interdisciplinary SBN support programme team	7. Manuals, brochures and posters
3. Joint planning with stakeholders	8. Input supply
4. Stakeholder ownership: collaboration agreements and cost sharing	9. Demonstration plots
5. Intervention area	10. Mechanisation testing and demonstration
Partnerships for roll-out and adoption of 20 steps	
11. Communication	16. Regional platforms
12. Weather forecasting	17. Lobby and advocacy for addressing strategic issues
13. Yield measurement	18. Agri-finance
14. Record keeping and cost-benefit analysis	19. Farmer Production Clusters
15. Field days	20. Market pull for production push

1. Clear objectives

The promotion of Good Agricultural Practice (GAP) targeted an average 50 per cent production increase in the sesame zone, from an average of 400 kg/ha to an average of 600 kg/ha. Although the full application of the package would require 50% more production costs, it would lead to the doubling of yields, which would largely compensate for the extra investments.

These were the main objectives for the first pillar of the SBN support programme (cf. chapter 1) and were strongly underscored by farmers and stakeholders. The common vision that yields could double, national production could increase by 50 per cent and farmers' income and sesame exports could strongly improve fuelled the implementation of the SBN support programme and the scaling of the 20 steps.

2. Interdisciplinary SBN support programme team

The interdisciplinary nature of the support team (agronomists, economists and training, extension and communication experts) reflected the broad programme orientation on sesame sector transformation, which required innovation in many domains: production, agri-finance, product and market development and the enabling policy and business environment. Throughout the years, the SBN support programme team operated effectively, with an increasingly integrated approach. In the 'SBN family', capacities, experiences, pains and successes were shared. Agronomists became economists and trainers, economists understood agronomy and adult learning and training, extension and communication experts became agro-economists.

3. Joint planning with stakeholders

The joint planning of activities paid attention to: geographic intervention area selection, collaboration agreements and resource allocation, determining number and location of demonstration plots, organisation of supply of seeds and agro-inputs, training topics and cascaded training sequence, preparation and printing of training materials, planning of monitoring and evaluation (M&E) activities (experimental plots, surveys, case studies), field days, annual meetings, thematic meetings (etc). The figure below gives an idea of the flow of activities during the year, before, during and after the production season.

Activities	Months											
	J	F	M	A	M	J	J	A	S	O	N	D
Preparation of the production season												
Annual pre-season meeting- planning with stakeholders	■	■										
Planning per woreda (FTCs, farmer demo plots, FPCs)		■	■	■								
Partnerships and signing collaboration agreements			■	■	■							
Timely printing guides, manuals, posters, training materials			■	■	■							
Planning and distribution of seeds and inputs				■	■	■						
Core team training (ToT 1)				■								
Training at zone and woreda level (ToT 2)					■							
Distribution training materials					■							
Farmer selection and training of farmers					■	■						
Preparation logbooks					■							
Design MRY and MRR trials					■	■						
Production season												
Field preparation, field lay-out and planting					■	■						
Field monitoring, coaching and technical backstopping					■	■	■	■	■			
Experience sharing visits/ kebele level field days							■	■	■			
Woreda, regional and national level field days							■	■	■			

Partnership approach for scaling the 20 steps

Activities	Months											
	J	F	M	A	M	J	J	A	S	O	N	D
Harvesting, threshing, transporting and storing												
End-of-season field days (woreda, region, national)												
After-season												
Marketing												
Logbook collection, data entry and analysis												
Season reporting												
Regional workshops												

4. Stakeholder ownership: collaboration agreements and cost-sharing

For transferring the packaged technologies, collaboration agreements were signed with several partners. Research and Extension were in charge of the training and dissemination of the 20 steps, while SBN and ATA made financial and technical contributions. From 2014 to 2019, ARARI and TARI and the regional BoA took the lead to roll out the recommended agricultural practices ('20-steps'). They were highly motivated for doing this because the 20 steps package was based on their research results and recommendations. Collaboration agreements were signed at the regional level. Agreements were communicated to lower administrative levels.

Collaboration agreements with TARI and ARARI concerned the ongoing efforts for technology testing and development, seed multiplication and distribution and contributions to capacity building, workshops and field days. Research activities included variety development, testing of machinery, best practices for soil fertility management and pest and disease control and socio-economic surveys. Through collaboration with the Integrated Seed Sector Development (ISSD), GARC/ARARI and HuARC/TARI adopted more participatory approaches for seed selection: Participatory Variety Selection (PVS) and Crowd Sourcing (CS).

Collaboration agreements with the Amhara and Tigray Regional BoA concerned all activities related to the scaling of the 20 steps: site and farmer selection (smallholder and commercial farmers, female and young farmers); training to zone and woreda experts, development agents and selected farmers; input supply and distribution, coaching and monitoring during the production season by development agents, coordination at woreda level, organisation of field days at different levels, data collection and reporting.

Contract agreements were also established with:

Production improvement

- Amhara and Tigray mass media for preparing and broadcasting radio programmes, following the 20-steps during the year, including expert advice on specific issues.
- NMA, Weather Impact and Apposit for weather forecast services.
- CPAs, unions and cooperatives for financial literacy training (which contributes to a more entrepreneurial assessment of the agricultural practices).

The collaboration agreements were based on joint activity planning and joint budgets. The collaboration and bond between implementing partners on the one hand and SBN support programme and ATA on the other hand allowed to increase the available human and financial resources. The SBN support programme and ATA staff supported the staff of partners. Budgets for scaling the 20 steps significantly increased. In 2015, a total budget of 40 million ETB was mobilised, 14 million in Amhara and 26 million in Tigray, of which the contribution of SBN support programme was 8.35 million ETB. Therefore, for improving the performance of all, collaboration agreements, joint planning and co-funding remained the priority focus of the SBN support programme. Working with different partners increased the reach, improve resource use efficiency and effectiveness, reduce risks and increase impact and likelihood of sustainable change.

5. Intervention area

As indicated in the first chapter, the SBN support programme started with the concept of local SBCs in eight woredas, three in Western Tigray zone (Kafta Humera, Welkaiet and Tsegede) and five in the former North Gondar zone (Metema, Quara, Tegede, Tach Armachiho and Mierab Armachiho). Within these woredas, the geographical coverage evolved to include 103 kebeles in 2015. As from the start of the second phase, the SBN support programme aligned to the Sesame Agricultural Commercialisation Clusters (ACC), which were prioritised by the regional governments of Amhara and Tigray. In Tigray, the number of woredas increased to six as three woredas of Northwest Tigray zone were added: Asgeda Tsembla, Tahtay Adieyabo and Tselemti. In Amhara, the number of woredas increased to eight; Jawi woreda was added in 2016 and East Belesa in 2018-2020. The total number of kebeles increased to 263. With the alignment to the ACC approach of the ATA, SBN support programme and ATA better harmonised their support to demonstration and scaling activities. Both provided support to training activities, input supply, field days and regional workshops and platforms.

6. Capacity building and farmer-to-farmer extension

To facilitate the transfer of knowledge and skills on sesame and rotation crops, researchers, agricultural experts, DA, and farmers were repeatedly trained on the recommended practices. From 2013 to 2020, the SBN support programme and partners provided ToT to more than 90 per cent of experts from regions, zones and woredas. These trainees in turn trained DA and farmer trainers at woreda level. Woreda Offices of Agriculture evaluated whether trained farmers qualify to be farmer trainers. Out of the trained 'model farmers', 50 per cent who passed the test were awarded a Certificate of Competency (CoC). The SBN and research staff technically coached experts while training the DAs at woreda level and farmers at kebele levels.

At kebele level, DAs and farmer trainers trained a cumulated total of around half a million farmers, who participated in technology demonstration and scaling. The farmer trainers, called 'model farmers' were selected by the BoA and local authorities. Model farmers were expected to apply the 20 steps and to share their experience with at least five other farmers. As of 2016, more attention was given to the targeting of investor farmers as well and to the organisation of specific training sessions for female and young farmers. All in all, the majority of households were trained and exposed to the twenty steps. The reach of farmers close to towns and villages and tarmac roads is better than those living in more isolated areas.

7. Manuals, brochures and posters

Trainers used training modules that were elaborated and trainees received production guides and manuals for future reference. In addition to the sesame '20 steps', production guides were prepared, printed and distributed for soya bean, mung bean, sorghum and cotton. Sesame, sorghum and home garden vegetable production manual were also prepared. What is more, a thematic guide on pest, disease and weed management was printed and distributed. All these were made available to many farmers and DAs. Of the mentioned guides, 5,000 to 10,000 copies were printed and distributed. Posters were prepared for important diseases (webworm, blight), on the preparation of drying sites and hilla stacking and on financial literacy and market price information. The use of training and extension materials contributed to increased farmers' awareness, knowledge and skills on the 20 steps.

Production improvement



Production guides, posters, leaflets and brochures for farmers

8. Input supply

BoA delivered fertiliser through unions to primary cooperatives, who then supplied to farmers in the kebele. The assessment of fertiliser needs was top-down and did not take farmers' needs, as communicated by cooperatives and unions, into account. This has affected farmers' acceptance of fertiliser recommendations. Quite some unions and cooperatives, especially in Tigray, still find themselves with unsold stock of fertilisers and outstanding debts. Farmers acquired fertiliser by paying cash (most farmers), through vouchers (in Amhara), or on credit (some

few cooperatives). In Tigray, HuARC and farm service centres supplied sesame seeds, sprayers and pesticides. In Amhara, GARC supplied most of the sesame seeds. Seed producer cooperatives (SPCs) also participated in multiplying and selling sesame seeds. Depending on woredas and kebeles, the SBN support programme also distributed seeds of farmer-selected varieties at the end of practical training sessions at kebele levels. Only in the first two years, inputs were provided for free to model farmers. GARC's research led to an adaptation of the fertiliser recommendation in Amhara. Instead of 100 kg DAP and 50 kg Urea, a dose of 65 kg Urea was recommended. This made the application of fertiliser more affordable to farmers.

9. Demonstration plots

The table below shows that in seven years, more than 50,000 demonstration plots were established, involving 52,845 model farmers and 106 FTCs. During field days, a cumulated total of half a million people visited the demonstration plots and learned about innovations. Model farmers had the chance to explain what they did and experienced during the application of the 20-steps.

Type and number of demonstration plots

Demonstration plots	2013	2014	2015	2016	2017	2018	2019	Total
Model farmers	13	823	1,868	15,209	11,688	12,000	10,244	52,845
FTCs	11	93	82	91	91	82	106	106
Total	24	916	1,950	15,300	12,014	13,000	9,835	52,039

Note: MF= model farmer; FTC= farmer training centre; Source: SBN annual reports 2013-2019

10. Mechanisation testing and demonstration

The agricultural research centres (HuARC and GARC), WoA, SBN support programme and ATA facilitated the planning of machinery testing and demonstrations. The SBN support programme supported HuARC and GARC with the purchase of row planters (Sfoggia seed driller) for planting their own research plots and for planting the fields of FTCs, commercial farmers and SPCs. This allowed for demonstrating row planting, training operators, showing the difference of row planted and broadcasted fields. The machinery demonstration helped to change the attitude of farmers and increased interest in row planting, the purchasing of implements or getting machinery rental services. The available number of row planters could not satisfy farmers' demand. In 2019, there were only three-row planters in Amhara. In Tigray, the situation is somewhat more encouraging with 23-row planters. In Tigray, the Humera Farm Service Centre (FSC), Mamaye Plc and Hiwot agricultural mechanisation started to avail tractors and planters on rent.

11. Communication

To enhance technology transfer, reach more farmers and increase adoption, radio programs in Amharic and Tigrigna languages were aired twice a week. The radio programs addressed many topics and followed the season, from land cleaning to harvesting and marketing. Documentary films were prepared for different subjects (loss reduction, 20 steps, labour management) and were used during training sessions and awareness-raising events. The SBN newsletter and website were also used to convey important messages and alerts to partners.

12. Weather forecasting

The sesame producing areas in Northwest Ethiopia experience variable weather conditions. Every year is different. Sesame is sensitive to weather changes during the growing season. Sesame is intolerant to waterlogging at any stage of its development but much responsive to excessive rainfall, especially during capsule formation and maturity. High and extended rainfall predispose sesame to bacterial blight infection. Winds can cause important losses, particularly during hilla drying. To minimise these losses, farmers need to have timely and reliable weather information to take preventive or corrective measures, such as: changing varieties in case delay in rainfall on-set, or applying urea top-dressing and weeding (aeration) in case of excessive rainfall during vegetative growth.

Upon strong demand of stakeholders, especially TARI, SBN support programme started a pilot with the Common Sense project in 2016. In collaboration with NMA, Weather Impact and Apposit, kebele specific weather forecasts were sent to 9,500 farmers in 2020. These forecasts were sent twice a week as Short text Message (SMS) messages in Amharic and Tigrigna languages. The message predicted the rainfall amount, temperatures and wind speed for the next three days. Especially the rainfall prediction helped farmers to decide on land preparation, sowing, weeding, hiring of labour, fertiliser top dressing, pesticide application, flood protection, harvesting and threshing. The information on wind speed helped to plan for the preparation of drying spots, hilla stacking direction, the use of plastic sheets and the moment of threshing. With weather information, farmers mitigate risks and reduce yield losses. More than 90% of the recipient farmers were satisfied with the service and are willing to pay for it. Unfortunately, reliable delivery of the weather forecasts remained a challenge.

13. Yield measurement

In the early years (2013-14), the discrepancies between the data of the Central Statistical Agency (CSA), reporting yields of 600-800 kg/ha, and the yields reported by farmers (400 kg/ha) was a challenge. The SBN support programme and partners conducted sesame yield measurement on 93 fields (of small, medium

and large farmers) grown under conventional practices. Per farmer field, yield measurement was done in three randomly selected 20 by 20m plots. The average yield recorded was lower than 450 kg/ ha. This and subsequent studies confirmed the low yields under farmers' managed conditions.

Yield measurements were repeated in subsequent years on plots of different categories of farmers (< 5 ha, 5-10 ha, 10-30 ha and > 30 ha), in different clusters with different agro-ecological conditions. Yields of plots with recommended practices applied were 100-200% higher than plots under conventional farmer practices. The average productivity of sesame under farmers' management conditions is not much higher than 400 kg/ha. According to the recurrent studies, an average yield gap of 350 kg/ha was recorded across all years between improved and farmer practice. This indicates that from estimated annual sesame acreage of 700,000 ha, it is possible to harvest additional production of 245,000 tons. At average ECX prices of 40 ETB per kg, this represents an additional household income of 14,000 ETB per hectare and a total value of more than 9.8 billion to the country.

Yield measurement is important for many reasons: (i) to improve the reliability of currently available production and yield data; (ii) to capture seasonal variations; (iii) to make more accurate sesame production predictions and plan for marketing; (iv) to explore determinants of low and high yields and (v) to develop a more entrepreneurial and professional attitude among farmers.

Why CSA and FAOSTAT report high yields per hectare?

For 2013-2018, Food and Agriculture Organisation of United Nations Statistical Data (FAOSTAT), using official data, mentions a national production of 220,000 to 302,000 MT. For the same years, FAOSTAT, using official data, mentions a sesame acreage of 300,000 to 421,000 ha. This acreage is not correct. More than likely, the acreage of investor farmers is not taken into account, because it falls outside the scope of CSA, who is responsible for the taking sample from smallholder farmers fields. During the mentioned period, the total sesame acreage in Ethiopia was definitely between 500,000 and 700,000 ha. This implies that at least 200,000 ha are missing, which is the investor acreage, estimated at 40 per cent of the total sesame acreage. FAOSTAT and CSA calculate the yield by dividing the national sesame production by the acreage of smallholder farmers only, leading to communicated yields oscillating between 687 and 793 kg/ha for the period 2013-18. If 200,000 ha are added to the registered acreage, yields are between 440 and 510 kg/ha which is much closer to the reality on the ground. (Source: <http://www.fao.org/faostat/en/#data/QC>; selection: Ethiopia; sesame seed; area harvested, production quantity and yield for the years 2013-2018).

From 2016 to 2018, validation and yield measurement sites were designed to determine the marginal rate of yield (MRY) from fertiliser application, row planting and thinning. The MRY studies were conducted at FTCs, research stations, and farmers' fields. The experimental plots, laid out by the SBN support programme, GARC and HuARC, were managed by local extension workers at the kebele level. Every year, the SBN support programme, in collaboration with the BoA and research centres, organised two high-level field days to popularise the treatment effects. Farmers were invited to walk through and learn the different treatment plots at least thrice in a season, at seedling, flowering and before harvest.

14. Record keeping and cost-benefit analysis

Insight in production costs and cost-benefit analysis is important for farmers to decide on additional investments and for facilitators to assess the likelihood of adoption of technological innovations. Capacities for production cost recording, accurate yield measurement, analysis of the marginal rate of return (MRR) and cost-benefit analysis are essential for an entrepreneurial farmer.

Farmer literacy training, which was an important support activity between 2015 and 2020, concentrated on the farmers' capacity to record all cash flows (cash in and out) and to do a cost-benefit analysis, taking family labour and depreciation costs into account (cf. chapter 4).

From 2014 to 2019, production costs were monitored in Tigray and Amhara. Production costs in Tigray were slightly higher. When all recommended practices are applied, the most important production costs relate to harvesting (25%), land preparation and planting (24%), fertiliser purchase and applications (24%), weeding (20%) and others (7%). Over the years, the production costs have increased because of increasing input and labour costs (expressed in ETB, an average increase of 25% per year has been observed). The labour costs vary a lot from one year to another. Labour costs can be very high in one year, and fall in the next (as was the case in 2020).

These costs are subject to change from place to place over years and using tractors, row planters, cultivators and harvester. The break-even point depends on the investment cost and sesame price at the selling spot market and time of the year. It varied from place to place depending on weather conditions, input costs, and management practices employed and recording of all activities and their related costs.

For three key practices (row planting, fertiliser application and thinning), MRY and MRR studies done for three consecutive years (2016-18). The extra yields of recommended practices were found to be high, especially if these were combined. The MRR of recommended practices were 200 to 400 per cent, implying that an

additional investment of 1000 ETB leads to an increase in revenues of 2000-4000 ETB. This is important information since farmers are often reluctant to invest upfront. An important challenge is to link economic analysis to the advice of different improved agricultural practices. Access to input credit and the financing for the last stages of production activities remain a crucial challenge for farmers to apply the production package.

15. Field days

During field days, model farmers and DAs at FTCs exhibited applied new practices and technologies to guests. The aim was to convince farmers to go home with new insights of what is possible, based on nearby, real-life experiences. At kebele level, field days were conducted at the seedling and flowering stage and just before harvesting. Participants were farmers and DAs from the neighbouring villages and around the demonstration plots. At woreda level, field days were organised twice per season, at the seedling and maturity stages of crops. Participants were mainly zone officials, experts and woreda office heads and farmers drawn from other kebeles with similar agro-ecology and production systems. The aim was to make zone and woreda experts and officials aware of the contribution of the package to yield improvement, to listen to farmers' experiences and to identify challenges and opportunities for further scaling. Regional and national field days were organised once a year in both regions, specifically for higher officials. Every year, the field days mobilised thousands of people (more than half a million during the past 7 years). A large majority of all farmers have observed the improved sesame production practices at FTCs and/or in model farmers' and investor farmers' fields.

16. Regional platforms

The aim of the regional and national field days was to show the impact of packaged technologies on yield improvement and get buy-in of federal and regional officials. Regional presidents, ministers, regional bureau heads (BoA, ARIs, RCPA), members of the parliament, representatives of development partners, federal and regional researchers, representatives of banks and MFIs, woreda and zone administrators and heads of offices and departments, mass media, and others took part in the regional and national field days. In the current context of Ethiopia, field days are the best opportunity to have policymakers available for discussing main sector challenges. As the organisers (BoA, ARI, SBN support programme and ATA) increasingly managed to bring in a diversified and large audience, including important decision-makers, the regional field days became increasingly important for putting strategic subjects on the agenda of decision-makers. Field days created opportunities for farmers directly to talk to the higher officials, pass their concerns to those personalities they never dreamed of seeing physically and shake hands.

The field days served as open hall meeting places, where farmers, DAs, and experts aired their voice to zone, regional and federal officials. The combination of field days and strategic meetings afterward proved to be important. In the field, high officials could see the activities, feel the challenges of farmers, perceive opportunities and get ideas for necessary actions. After the field visits, farmers and stakeholders raised strategic issues such as finance, mechanisation, seeds, technology, marketing, pest and disease problems and infrastructure. Reacting on what was brought forward, decision-makers sometimes took decisions on the spot, ordered bureau heads to further investigate the challenges and/or put subjects on the agenda of higher-level meetings. Regional and national field days thus served as learning and experience sharing events, with intensive communication between sesame sector stakeholders and policymakers. It was the mud of the field that led to communication, advocacy and decision-making.

In addition to field days, throughout the years, regional multi-stakeholder platform meetings were annually held at the end of the calendar year, both in Amhara and Tigray regions. During these workshops, stakeholders presented the results of the production season to a broad audience with participants from local to federal level. Data collection and the presentation of results was the responsibility of the BoA. Data were consolidated as from kebele and woreda level by woreda focal points. The lack of a digital monitoring and evaluation system, lack of computers and high turnover of staff were challenges. The annual meetings were opportunities to discuss challenges and priorities for the next season.

17. Lobby and advocacy for addressing strategic issues

Briefs have been prepared and shared with policymakers to address key strategic issues. These were informally discussed or during specific thematic meetings or regional workshops. The following are challenges that were fully or partially addressed at the policy level: duty-free importation and or sales tax exemption on agricultural machinery; lease financing modalities for acquiring machinery and equipment; loan rescheduling for commercial farms after production failure or price downfall; increased loan amount for farm production activities; reduction of interest rates on agricultural investment loans; opening up additional agricultural research sub-centres; adaptation of ECX grading, storing and marketing systems. Other subjects have been put on the table but did not find a solution yet. Among others, farmers' access to input finance, marketing credit for cooperatives, fertiliser debt of some unions and cooperatives, policies related to contract farming of farmers' organisations can be mentioned:

18. Agri-finance

Evidence from six subsequent years of scaling has shown that applying the 20-steps double sesame yields. Applying the full package requires additional investment of (currently) some 6,000 ETB/ha. These investments payback because of doubled productivity and even leads to lower production costs per kg of sesame produced. Farmers can earn thousands of ETB extra per ha and the country can earn millions of dollars more. Although interest is high, most farmers are partial adopters. This is mainly due to the lack of input finance that is needed for the required additional investment in improved seeds, row planting, fertiliser application, pest control, sesame drying methods, and additional labour.

19. Farmer Production Clusters (FPCs)

One way of addressing the challenges related to mechanisation, row planting and effective adoption of recommended practices is to create economies of scale and dynamic groups with internal peer pressure. This is the aim of the FPC approach introduced by ATA and taken over by BoA. The idea is to organise farmers with adjacent plots in a group of 20-30 farmers, with a minimum of 20 ha. This would facilitate the full application of the 20-steps, because:

- It would be easier to access machinery (hiring from machinery rental services);
- Development agents and agronomists could increase their reach, frequency and quality of support;
- Peer control and mutual encouragement could improve the frequency, quality and efficiency of field operations (weeding, thinning, top dressing, pest and disease control, transport of harvested sesame);

Voluntarily formed FPCs with farmers working together and applying the package were found promising entry points for supporting and teaching farmer, joint use of mechanised operations, use of uniform variety seeds and taking coordinated action when pests are observed. The FPC approach is taking off with different levels of success in different woredas and kebeles. If results are visible, it may motivate more farmers to join existing FPCs or establish new ones.

20. Market pull for production push

Improved sesame production requires developing strong value chains where actors collaborate according to a common vision and goal. This is now missing, even though there are many opportunities, such as: suitable climatic conditions for large scale production of world standard sesame seed; large-seeded Humera type sesame that is appreciated by the bakery industry; good varieties for tahini making in the middle east; sesame seeds of Humera and Gondar origin are a reference in the sesame world market.

Scaling of agricultural technologies is not only about technical questions, it is also about costs, revenues, credit and efficiencies. For many practices, farmers ask themselves if the investment pays back. This is also the case for farmers deciding whether to grow rotation crops or not. That is why, the SBN support programme has made efforts to create market linkages for sorghum, soya and mung bean.

Lessons learned

Collaboration with committed partners and stakeholders on well planned and clearly defined activities and shared roles and responsibilities are a key factor for success. To arrive at sustainable scaling, it is important to be institutionally embedded right from the beginning, even before implementation starts. Stakeholder ownership explains why the 20-steps were easily integrated into the regional extension programme and adopted by the MoANR. All 20-steps scaling activities are transferable, as partners have been trained and materials were handed over.

SBN support programme was embedded in the RARIs and the roll-out of 20-steps was done in very close collaboration with the regional BoA. These partners increasingly took part in planning and shared responsibility of training, implementation, and monitoring with SBN or in its absence. The sharing of human, physical and financial resources improved the efficiency of time and resource use. It led to a much broader reach (in terms of woredas and kebeles and number of farmers), improved the organisation of training sessions, workshops, and field days; and improved visibility and impact.

Efforts to deliver the training sessions with more interactive methods succeeded partially and contributed to improved farmers' understanding and increased participation. An important lesson learned is that it is important to take current farmer perceptions as the start of training, and not the recommended practice. Some examples: (i) farmers often see pests and diseases as 'God given' and do not believe that pest management is possible; (ii) farmers are very reluctant to use fertilisers or (iii) farmers do not like thinning ('weeding out young sesame plants that emerged'). It is important to discuss first with farmers about their perceptions and what they think is important.

The insufficient access to input finance and, as a result, the limited farmers' capacities to make the extra required investment explains why most farmers are only partial adopters or remain in the 'business as usual vicious cycle'. Agri-finance solutions are key to achieving higher adoption rates and higher performance levels. Systemic change for solving the sesame finance challenge requires the involvement of different, complementary financial service providers. There is an enormous potential that is still untapped, as will be developed in more detail in many other articles in this book.



The use of 20 steps pays off

2.3 Crop rotation for sustainable production and risk spreading

Hagos Tadesse, Hagos Woldegebriel, Geremew Terefe, Fisiha Baraki, Alemayehu Kassa, Tewodros Tesfaye

A diverse and sustainable farming system is important for preventing soil depletion and pest build-up, reducing market and climate risks and improving the nutrition and income of farmer households. Several rotation crops have been promoted in the sesame zone (soybean, mung bean, sorghum, malt sorghum, cotton and sunflower). In addition to farmers' awareness and skills and the availability of seeds and inputs, marketability and contract farming are drivers for further expansion of these crops.

Introduction

Diversifying the sesame dominated farming system

Crop rotation means growing different crops in the same plot of land in the succeeding years or seasons. The agro-ecology of the lowlands of Northwest Ethiopia is suitable for growing cereals, oilseeds, pulses, spices, fruits and vegetables. Due to increasing prices for sesame and the price decline of cotton, sesame became the major cash crop in the past 15 years, with a tendency to mono-cropping. After years with high prices, sesame could cover up to 60% of the cultivated area. The second major crop is sorghum. To some extent, farmers are aware of the limited crop diversity and attributed pest outbreaks, declining soil fertility, and sesame productivity to mono cropping.

The SBN support programme and its partners identified crop diversification as an important priority. To this end, crop types and varieties with different food, economic and environmental benefits were selected and included in the technology demonstration, scaling, and promotion activities. The main goal was to support farmers to diversify their crop portfolio for sustainable farming systems, with improved soil fertility and pest management practices and to reduce product

and market risks. In addition, the aim was to build more evidence about the best crop sequence and to contribute to food security and diet diversity.

Cropping sequence

Cropping sequence is a planned order of planting purposefully selected crops on the same field for a predetermined period. The success of crop sequencing depends on the right choice of crops for specific soil type. Thus, while selecting crops for sequencing the following assumption were considered: soil fertility status; rooting habit of crops; availability of improved seeds; economic and market values; farmers' experience, knowledge and skill on growing the selected crops. Accordingly, sesame and cotton were targeted for marketing; sorghum for food and diet diversification; soybean and mung beans were chosen for soil reconditioning, marketing and food diversification purposes.

Widespread demonstration of rotation crops

To promote the uptake of rotation crops, the different activities were undertaken, in collaboration with different actors. Sorghum, cotton, mung bean and soybean were included as rotation crops in demonstration activities for farmers. Especially the pulses were considered as very important, not only for agronomic reasons, but also because of market demand and possible contribution to food intake diversification.

Collaboration agreements were signed with the BoA, the GARC, HuARC RCPA, cooperative unions and primary cooperatives. Research centres provided the seeds of the rotation crops and trained agricultural experts and farmers. Woreda Offices of Agriculture demonstrated the crops in FTCs and model farmers' fields. Farmers were supported in establishing demonstration plots and monitored and coached during crop development.

To fill the knowledge gap of agricultural experts, DAs, and farmers, cascaded trainings were provided at zone, woreda, and kebele levels. For this purposes production manuals were developed for sorghum, soya bean, mung bean and cotton production. These guides were printed in thousands of copies and distributed to farmers and extension workers.

The selected crop types and varieties were first demonstrated at research sites (2013), FTCs and model farmers' fields (2014-15). From 2016 onwards, the crops were scaled on a large number of farmers' fields. During field days much attention was given to rotation crops. Farmers and stakeholders visited the fields and took what caught their eyes. Yield data was collected, analysed and reported in newsletters and annual reports and shared with stakeholders.

Production improvement

SBN support programme collaborated with the IFDC/2Scale project for the demonstration and scaling activities. This collaboration allowed for the testing of hybrid sorghum, brought in from India by Advanta International, and allowed for testing contract farming relations with of primary cooperatives and unions with agro-processing companies.

For demonstration and scaling, seeds of sesame, sorghum, soybean, mung bean, and cotton were cleaned and packaged in small bags, in line with the demonstration plot sizes. In the first four years (2014-2017), when the emphasis was on demonstration plots, the amount of seed purchased and distributed to FTCs, model and commercial farmers was limited. In 2018 and 2019, when attention was given to commercialisation and to demonstration in investor farmers' fields, the amount of distributed seed was much higher.

The widespread demonstration of rotation crops helped to create awareness about the benefits of rotating crops. More and more farmers recognise the contribution of soybean, mung bean, and haricot beans to more balanced and sustainable production systems, with positive effects on soil fertility management and pest and disease prevention. Household income improved through increased yields and sales, especially of sorghum. Varieties tolerant to drought, disease and water logged conditions were identified and recommended for use. Challenges were summarised for intervention by research and other stakeholders. Opportunities were assessed for consideration in future investments. Recommendations were given for farm, marketing, and policy considerations.



Demonstrated rotation crops

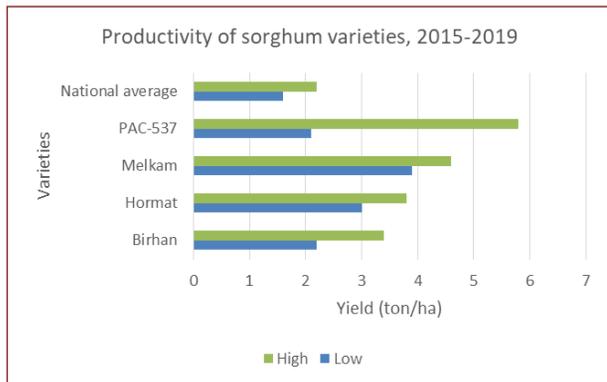
In the next sections, we first present the specific experiences with the promoted rotation crops (sorghum, mung bean, soybean and cotton) and then discuss the lessons learned with promoting a more diverse farming system.

Results and challenges related to promoted rotation crops

Sorghum: a food security crop

Sorghum is the most important food crop in the sesame lowlands. Seeds of internationally, nationally and regionally released sorghum varieties were acquired and demonstrated in FTCs, on model and commercial farmers' fields. The sorghum varieties evaluated for grain yield were Hormat, Birhan and Melkam, and PAC-537, a hybrid from Advanta, India. The varieties that performed well in the demonstration plots were further scaled in FTCs, model and commercial farmers' fields.

Hormat, Birhan, and Melkam were demonstrated in FTCs and on model farmers' fields in Amhara and Tigray for one year and then scaled in the subsequent years (2015-2019) on commercial and smallholder farmers' fields. Hormat yielded 3.0 to 3.8 MT/ha. Birhan recorded 2.2 to 3.4 MT/ha and Melkam yielded 3.9 to 4.6 ton. Birhan adapted well to both regions; it is much liked in Tigray and is taking over the place of other sorghum varieties.



The hybrid PAC-537 was remarkable in productivity. The grain yield ranged from 2.5 to 6 MT/ha in Amhara and 1.8 to 3.0 MT/ha in Tigray region. Yields largely depends on rainfall distribution, agronomic practices and input use. Farmers liked it very much for its white seed colour, sweet taste, and suitability for preparing injera. PAC-537 was criticised for its early maturity which leads to severe bird damage. Even when the sowing date was adjusted by planting PAC-537 15 days later than the local varieties, it still headed earlier thereby inviting birds to feed on just developing embryos. This greatly wrecked farmers' enthusiasm for the hybrid sorghum variety. Further delay of the planting date may help, but then rainfall distribution might be a constraint.

According to CSA 2018, the three-year average sorghum yield (2015-2017) was 2.2 to 2.3 MT/ha. In the sesame zone, yields in demonstration plots and farmers' fields varied from 2 to 6 MT/ha. Compared to this average, multi-annual data suggest that sorghum yields can increase with more than 50% for open pollinated varieties. The recorded yield advantage for Birhan, Hormat, and Melkam over the national average was 48, 65, and 100 per cent, respectively. The hybrid PAC-537 could increase yield by more than 150%.

Determining factors for sorghum yield improvement are the cultivar, the agro-ecological conditions, the application of recommended agronomic practices and use of inputs, rainfall distribution, and pest and disease control. Stalk borers, fall armyworm, striga and birds have inflicted substantial damage to sorghum. There is still great potential to double productivity of sorghum if all recommended practices are applied.

The current national sorghum production of 480,450 MT (CSA 2018)) is estimated to feed around 1.2 million households at least for a year (6 million people). If productivity is increased with 50 per cent, the country can feed 600,000 households more (3 million people). For farmers, 50 per cent higher sorghum production results in 1000 kg more production per hectare. At a farm gate price of 1000 ETB/100 kg, the additionally harvested sorghum fetches 10,000 ETB more revenues for farmers.

Malt sorghum

In Ethiopia, the growing brewery industry is very dependent on imported malt barley, of which only a small portion is produced locally. To fill the gap, seeds of widely grown sorghum cultivars and varieties were evaluated for their suitability for malting and beer making quality. This was done in collaboration with IFDC/2scale and Diageo Company. SBN support programme staff collected seed from farmers and research centres, while Diageo took the responsibility of laboratory analysis. The varieties Dekeba, Birhan, Hormat, Red Swazi and Deber (local cultivar) were included in the laboratory tests for malting quality, free alpha amino nitrogen (FAN), betaglucans, diastatic activity and alcohol). Deber, Dekeba, and Birhan proved to be suitable for malting.

Sorghum varieties with malt quality were evaluated at FTCs and research centres for their grain yield under the different environments in Northwest Ethiopia. Grain yields of Birhan varied from 2.2 to 3.5 MT/ha, of Dekeba ranged from 2.1 to 2.6 MT/ha, while the recorded average yield for Deber was 1.8 MT/ha.

Contractual agreements for producing and sourcing malt sorghum were made between Diageo/Meta Abo Brewery on the one hand, and Metema, Dansha, and Setit Unions on the other hand. Cooperatives and interested farmers were trained on organic sorghum production techniques. According to the agreement, Diageo bought more than 5,000 MT sorghum from the three unions in the period 2016-2018. The sourcing agreement improved the financial situation of unions, cooperatives and farmers. After 2018, the price for grains increased because of drought and food shortages in Ethiopia. This resulted in farmers' default (side selling). The high price pushed the malt sorghum out of the market and the contract with Diageo came to an end.

Soybean

Soybean was included in the rotation system with the objectives of soil fertility improvement, market risk diversification and income improvement. Nationally released varieties Afgat, Awassa-95, Belessa-95, Gisham, Nova, and Williams were evaluated for yield in FTCs and research centres. The crop was new to the sesame dominated farming system of Northwest Ethiopia. There was no local market outlet for the produce. It was thus not easy to convince farmers with its economic, biological, and social benefits. To tackle the marketing challenge, a study identified the demand for soybean in the national market and opportunities to link farmers and their organisations with exporters and processors in Addis Ababa and other areas of the country. This study gave impetus to demonstration, scaling and market linking efforts, which has resulted in a steady take-off of production and marketing.

Productivity varied from 2.6 to 3.0 MT/ha according to rainfall and agronomic practices applied. In Tigray, lower yields (0.7 to 1.2 MT/ha) were recorded. However, maintaining proper plant population and applying recommended agronomic practices increased productivity significantly. In Amhara, the varieties Afgat, Gisham, and Belesa-95 are recommended for areas with sufficient rainfall. Nationally released varieties could not perform well in West Tigray Zone, where rainfall was short or erratic in distribution. Therefore, developing early maturing and drought tolerant varieties is highly recommended for Tigray. Farmers indicate that threshing is a challenge. This could be resolved by introducing mechanical threshers with different sieve sizes.

Production of soybean is slowly rooting in the Amhara. Despite their wider adaptation in Amhara region, in terms of production, soybean is most adapted to conditions in Quara, Metema and Tegede woredas. In 2017, the estimated production cost was about 8,000 ETB per hectare. With a farm gate price of 1,000 ETB/100 kg, the break-even is at 0.8 MT/ha. The low yields in Tigray induce losses to farmers. In Amhara, soybean is attractive: farmers fetched 16,000 to 20,000 ETB/ha income. Soybean can be stored for many months or even years, this can help

Production improvement

farmers to wait for better prices. As from 2018, soybean can be easier sold since it can be marketed through the ECX. Increased soybean production in Amhara attracted many traders to aggregate soybeans and take these to Addis Ababa. Competition among traders resulted in an increase of farm gate prices. Unions and cooperatives started to compete with traders. Admas, Metema, Selam, and Tsehay Unions have traded larger volume soybean in the last two years.

Mung bean

Mung bean is better locally known than soybean, especially in Tigray and Belessa woredas in Amhara. Two varieties of mung bean can be produced in Northwest Ethiopia. Arkebe variety is more popular in Tigray, while Rasa is in Amhara. A newly introduced variety, Boreda, has shown good adaptation in Amhara. Average productivity of local mung bean varieties has been below one MT. Yields of improved varieties oscillated between 1.5 and 2.0 MT. The higher productivity contributes to increased household income. With an additional production of one MT per hectare, farmers can earn an additional revenue of 15,000 ETB.

Multiplying seeds of Rasa in Amhara and Arkebe in Tigray might increase production, home consumption and improve income. As for now, the largest part of the marketed volume is channelled through traders to exporters in Addis Ababa. Cooperatives and unions are not yet much involved in mung bean marketing. The recent integration of soybean and mung beans in the ECX marketing platform may boost the production of these crops and contribute to farmers' income generating possibilities. Because they are easier to grow than sesame, female farmers show specific interest in pulses. An important point of attention is the threat of the pod weevil (*Aphion sp.*) and the storage problems of mung bean. These need to be addressed, if not, mung bean may go out of production soon.

Haricot bean

Haricot bean was demonstrated in Amhara and Tigray with the purpose of supplementing the diet with proteins. Nasir is a variety that is adapted to conditions in Amhara region, especially Tach Armachiho and Belessa woredas. So far, very low productivity levels have been recorded (0.7 to 1.3 MT/ha), because of weather conditions (both drought and high rainfall), pest infestation, low input use and poor agronomic practices. Proper application of recommended agronomic practices and input use can double productivity. Early planted haricot bean matures before other cereals crops in the area and helps to address food shortages before the next harvest. Food recipes that include haricot bean supplement the cereal based consumption pattern with proteins of vegetal origin.

Cotton

Varieties Deltapine 90 and Acala SJ2 were demonstrated in FTCs. At the Amhara side, seed cotton yields of 3.8 to 4.0 MT/ha were recorded, while 2.5 to 2.7 MT/ha was picked at the Tigray side. However, the market is a major challenge that holds back cotton production in Ethiopia. Despite the unreliable market price, farmers prefer growing cotton after planting sesame for 3 to 4 years consecutively. This indicates the well-recognised benefit of cotton for soil property improvement and increased sesame yield when planted after cotton. The major challenge in cotton production is its susceptibility to pest infestation. Unless the market is improved, growing cotton in the current context is not profitable.



Soil fertility improvement

Experiments were conducted in more than 20 FTCs to determine the best precursor crop for sesame. In 2014, the five rotation crops (sesame, sorghum, mung bean, soybean, and cotton) were planted in 5m x 5m plots, using the randomised complete block design (RCBD) with three replications. In each FTC, all fifteen plots were randomly planted with the five selected crops. In 2015, the fifteen plots were planted with sesame to see the contribution of previous crops on sesame yield improvement. Even though the study needs long term investigations, preliminary results indicated presence of imminent soil fertility improvements on plots planted with cotton and soybean. Therefore, the general recommendation is to combine cereal grains, legumes, fibre and oil crops in the system to maximise the food, feed, environmental and economic benefits.

Pest resistance

The contribution of rotating crops to the reduction of pests and diseases could not be established. This needs further studies; it is recommended to include a wider area in the rotation system to sense the real benefit of rotating crops on pest management.

Household income improvement

Income improvement was not easy to measure directly. It was explained in terms of productivity improvement of crops.

Contribution to nutrition diversity

Soybean and mung beans were new crops in the sesame lowlands. In addition to ecological and economic reasons, they were suggested because of their possible contribution to food and nutrition security and diversification of farm households. The aim was to enrich the diet diversity and quality of the local population and seasonal labourers. In addition to the technical and economic aspects related to the introduction of pulses in the farming system, much attention was given to the consumption of pulses, and integration in local food habits. For this purpose, numerous recipes comprising sorghum, soybean, mung bean, wheat, tef, and vegetables crops were developed and demonstrated during field days, workshops, annual meetings and training sessions.

In Metema and Tach Armachiho woredas, jobless women were trained in groups. The trained women further trained other women on food preparation at household level. Some of the foods prepared were soybean powder, bread, shiro, dabo kolo, milk and cheese, biscuits and sticks, kita and injera. Soybean was also good for sauce making (key and alicha wot/red and yellow sauce). Some of the recipes developed from mungbean include shirshim, kick, nifro, bokelt/sprout, sauce/red or alicha wot from the whole kernel, samosa, soup, and kita.

The acceptance of new food items in the local diet takes time. Still much remains to be done to make soybean attractive for the daily dishes of farmers and labourers. Mung bean is better positioned because of its suitability to shiro, samosa and soup making.

Way forward

Rotating legumes, cereals, oil crops and vegetables enhance soil fertility, prevent pest build-up, ensure sustainable crop production, reduce market and weather related risks, improve household income and improve food and nutrition security. The promotion of rotation crops, especially the introduction of new crops, requires endurance. At the beginning, limited experience on the production of soybean and mung beans; unavailability of adaptable, high yielding and market preferred varieties; limited seed supply; lack of improved agronomic practices and low use of inputs were major obstacles.

While initial take-up was discouraging, the production of malt sorghum, soybean, and mung bean is increasing, both in terms of acreage and number of farmers involved. The introduction of pulses can importantly contribute to more sustainable production systems, farmer income improvement, diet diversity and risk spreading. To keep the momentum, the current achievements require ongoing efforts for increasing agricultural professionals' and farmers' knowledge and skills.

There is a huge potential for producing and marketing sorghum, soybean, mung and haricot beans, cotton, sunflower, noug, vegetables and fruits, in rotation with sesame. Farmers' motivation to grow these crops is encouraging. Each of these rotation crops has its own area of adaptation. More diversity of varieties is needed. Quality seeds must be multiplied and disseminated through the formal seed system at affordable price and accessible distance. The risk of storage pests require the use of hermetic bags to reduce mung bean and sorghum seed infestation.

Experiences show that the yield of most crops in the rotation system can double: hybrid sorghum (5-6 MT/ha), open pollinated sorghum (4 MT/ha), soybean (3 MT/ha), mung bean (2.8 MT/ha) and cotton (2 MT/ha). The marketability of soybean and mung beans at ECX platforms is the major driver for further expansion of these crops. Agronomic practices should be improved to cope with changing weather and environmental conditions.

Market demand, specifically for cotton and sorghum, is another important aspect that needs strategic thinking. Trade bureaus and offices must play a facilitating role in connecting companies with rotation crop producers and their organisations. In that context, contract farming is a good option to develop further.

2.4 Increased demand for quality seeds of newly released varieties

Geremew Terefe, Hagos Tadesse, Melisew Misiker, Hagos Woldegebriel, Ataklti Fiseha, Fiseha Baraki, Alemayehu Kassa, Tewodros Tesfaye

The use of improved seeds importantly contributes to yield and quality improvement. The release of new varieties is an important achievement. Farmers' demand for these new varieties is growing. The seed multiplication and distribution system is however not yet able to satisfy this demand. This calls for a seed action plan and a better organisation of the seed value chain.

Introduction

Quality seeds are important for improving crop productivity. They can contribute for 20-25 per cent to productivity improvement (Mirza, 2015). Quality seeds have a better germination, ensure rapid emergence and vigorous growth of seedlings and improve nutrient and water uptake. Although the use of quality seeds leads to somewhat higher production costs, this increase is insignificant when compared to the costs of other inputs. Moreover, the rate of return of investing in quality seeds is potentially high.

Problem statement

Despite the high potential for productivity improvement and the relatively low cost, the use of quality seeds is still very limited in Ethiopia. Whereas in most developed countries the use of quality seeds surpasses 90 per cent of the cultivated area, this does not reach 10 per cent in Ethiopia. Only the use of hybrid maize varieties is widespread. For sesame, the use of formally released seeds is also very limited: 5-6 per cent of the cultivated area. There are three major reasons for the limited use of quality seeds:

- **Limited farmers' awareness.** Farmers insufficiently realise themselves that, to a large extent, the type and quality of the seed that is used: (i) determine the response to inputs and crop stand; (ii) help in tolerating environmental stresses, weed, insect and disease pest infestations; and (iii) enhance uniform maturity and timely harvesting; which improve quality and marketability of the produce. And they fail to see that investing in seeds can bring relatively high returns.

- **Deficient seed value chain.** In Ethiopia, sesame variety release and official registration started in the 1970s. A few high yielding and disease tolerant varieties were developed and released for use under different agro-ecologies. The released varieties were demonstrated and scaled in major sesame producing areas and the type and amount of required inputs were determined. However, the provision of seeds of released varieties to farmers through the formal system has never been reported until 2012.
- **Limited commercial interest.** Sesame is not much interesting for seed business, as seed quantities per hectare are limited (2-4 kg) and seeds can be easily farmer-saved. Farmers tend to buy seeds of a new sesame variety only once. Thereafter, it is rare that farmers would buy again seeds of the same variety, unless the seed in their hand is lost due to environmental stress and pest infestations.

Seed identified as one of the major challenges

In 2013, the baseline study among 19 local clusters and stakeholder consultation workshops identified the lack of quality seed as one of the top challenges for sesame productivity improvement. Using seeds of improved varieties was considered as an important element for reaching the goal of 50% yield increase. From 2014 to 2019, the use of well-adapted quality sesame varieties was an important recommendation to farmers and part of the '20 steps' package.

Released varieties

In the past decade, six sesame varieties have been officially released. Humera-1, Setit-1, Setit-2 and Setit-3 were developed by Humera ARC. Abasena, Gonder-1 and Gonder-2 were developed by Gonder ARC. Abasena was released in 1990, Humera-1 and Setit-1 in 2011, Gondar-1 and Setit-2 in 2016 and Setit-3 in 2017.



Demonstration of new varieties

Having newly released varieties at hand, the aim was to lay the foundation for the formation of the formal seed system, either private or public. Consequently, the Amhara and Oromia seed enterprises started multiplying basic seeds, but stopped after one season, this is because of failure in creating sustainable demand, weak distribution system, non-customised package size and low quality of the so-called certified seeds.

When it proved that the regional seed enterprises would not lead the formal seed distribution, the SBN support programme supported the GARC and HuARC to multiply and avail seeds of improved varieties of sesame and rotation crops. GARC provided Abasena, Gonder-1 and Gonder-2 to the BoA and farmers in the Amhara region. HuARC provided Humera-1, Setit-1, Setit-2 and Setit-3 in Tigray. The seeds were cleaned, and packaged in small bags of 1, 2, and 4 kilograms, to be used on demo plots of 0.25 to 1 hectare.

Between 2014 and 2019, more than 41 MT of seeds of selected varieties were availed for demonstration at FTCs, smallholder plots, investor farmer fields and plots of local seed producer groups. In Amhara, the Abasena accounted for two thirds of the demonstrated seeds, followed by the Humera-1 variety (29%). In Tigray, Setit-1, Humera-1 and Setit-2, respectively accounted for 44, 35 and 20 per cent of the distributed seeds (see table below).

Sesame seed distributed for demonstration

Sesame varieties	Seeds distributed per year (MT)						Total (MT)	%
	2014	2015	2016	2017	2018	2019		
Tigray								
Humera-1	0.35	2.80	3.25	2.75	2.50	0.50	12.15	35%
Setit-1	0.25	3.15	2.50	3.14	3.78	2.50	15.32	44%
Setit-2	-	-	-	0.75	2.50	3.75	7.00	20%
<i>Tigray total</i>	0.60	5.95	5.75	6.64	8.78	6.75	34.47	
Amhara								
Abasena	0.21	1.79	0.27	0.05	0.99	1.62	4.93	67%
Humera-1	0.24	1.03	0.08	0.03	0.70	0.08	2.16	29%
<i>Amhara total</i>	0.53	2.90	0.35	0.08	1.92	5.70	7.40	
Grand total	1.13	8.85	6.00	6.72	10.70	12.45	41.87	

Recommended varieties were demonstrated on more than 150 FTCs in 170 kebeles and on (a cumulated total of) 12,000 model farmers' fields. In Tigray, Setit-2 sesame variety was scaled on 10ha of land owned by a Wuhdet SPC. The objective of the scaling effort was to create awareness on the availability of improved sesame varieties and to demonstrate the yield increase of quality seeds.

Adaptability to local conditions

Among the scaled sesame varieties, Abasena has shown wider adaptability especially in areas with severe bacterial blight infection in Amhara. Similarly, in Tigray, where rainfall is a more limiting factor, the varieties Setit-1 and Setit-2 have wider adaptation and cover more areas. Humera-1 has shown wider adaptability in areas with relatively high rainfall.

Informal seed exchange

So far, farmers' uptake of the Abasena and Humera-1 varieties in Amhara and the Setit-1 and Setit-2 varieties in Tigray is mainly resulting from farmer-to-farmer seed exchange, rather than supply from the formal seed system. Although it is not easy to quantify the amount of seed exchanged through the informal system, farmer-to-farmer seed exchange has definitely played a very important role in the scaling of the new varieties. This can be clearly observed when driving through sesame fields in Amhara in September. At that moment, no one can miss the Abasena variety, because, at maturity, this variety develops a brownish black stem colour. Because of this behaviour, the variety is locally called 'Tikur Gojjam', meaning plainly black Gojjam, idiomatically to say sesame that has a black morphology or black external appearance. If you see a black sesame field at a distance, then that is certainly Abasena. Farmers like Abasena because of its tolerance to bacterial blight, its resistance to falling at maturity because of heavy pod load and/or wind damage, short cycle (100 days) and early and uniform maturity as compared to the local variety called Gojjam.

Increased yields

The direct contribution of quality seed to improved productivity is 20-25%. This translates in a yield increase of about 80-100 kg/ha, which, in case of a cultivated area of 500,000 hectares, results in 40,000 MT extra production. If marketed at 1400 USD/MT, this additional harvest would fetch 56 million USD additional foreign currency per year. Similarly, the effect of fertiliser and other inputs and field operations largely depends upon the quality of seeds used. Marginal rate of yield studies (cf. 2.8) show that the combined effect of using quality seeds, fertiliser, and good agronomic practices leads to a yield improvement of more than 50 per cent. This again translates in a yield increase of about 200 kg/ha, bringing 100,000 MT extra production.

Seed producer cooperatives and private seed producers

There is a lack of formal seed producing enterprises for certified seed distribution and marketing. Collaboration with the ISSD programme contributed to the training of SPCs and private seed producers. Farmers were trained in quality seed production, local seed business and financial record keeping. The crops covered in the training were sesame, soybean, sorghum, and haricot bean. GARC and HuARC provided pre-basic seed to the SPCs. The SPCs have still limited capacity for quality seed production, cleaning, packaging, distributing and marketing. Produced seeds are often kept in poor storage conditions that predispose to pest infestations. Efforts were made to link the SPCs with buyers, but as the seed was not inspected by the relevant authority in the field, it was not easy to get buyers. The seeds produced by SPCs were distributed through the informal system or sold at the spot market. The major lesson taken here is that SPCs should be supported to fulfil the necessary procedural requirements. This calls for ensured supply of basic seeds and controls for certification purposes. Also the market risks of seed producers should be reduced, among others through better needs assessments, contract-based seed production and sufficient price incentives for producers.

Participatory variety selection and crowd sourcing

Collaboration with the ISSD programme also contributed to the introduction of Participatory Variety Selection (PVS) and Crowd Sourcing (CS). In Amhara SBN and ISSD supported farmers in improving access to seeds through PVS and CS activities conducted in 2019. For this purpose, 9 improved sesame and 8 soya bean varieties were collected and distributed to PVS and CS to a total of 300 hosting farmers. Sesame varieties were used for PVS while soya bean was for CS. Field days were organised in different kebeles to create awareness and popularise varieties assessed in the PVS and CS. More than 200 farmers visited the sesame, soya bean and sorghum PVS and CS plots, jointly set criteria, evaluated and selected adaptable varieties for each location and learned from each other through the PVS and CS methods farmers select their own preferred varieties. These approaches helped many farmers to acquire their favourite crop types and seeds.

Increased demand

At the start of the SBN support programme, farmers' demand for new varieties and quality seeds was very limited. The demonstration and scaling-up efforts made by SBN and its partners between 2013 and 2019 have succeeded in raising farmers' awareness and creating a much higher demand for quality seeds of new varieties. Farmers observed that yields can double or even triple and that the use of quality seeds was part of the solution.

Insufficient supply from the formal seed sector

The supply from the formal seed sector is insufficient, due to the absence of a well organised seed value chain, which would need collaboration between research, seed producers (SPCs, private farmers and companies) and relevant authorities for seed control and certification. The establishment of farm service centres in Amhara and Tigray started to contribute to the distribution of certified seeds.

Main lessons learned

It remains important to increase the awareness of farmers on the contribution of improved seeds to productivity improvement. PVS and CS are good participatory practices for seed selection. There is a substantial gap between the demand for quality seeds and what is produced and supplied. Supplying the required amount of quality seeds at accessible distance and affordable price calls for urgent action of stakeholders.

Agenda for action

1. Attention for raising farmers' awareness and informal sharing of seeds

Raising farmers' awareness on the essential role that improved seed plays in sesame production must be given priority in formulating transformation agendas. The affordable option is demonstrating seeds of improved varieties along with farmer cultivars on their own farms. Another option is integrating improved seed with other inputs to surface its direct contribution and the catalytic effect played in improving sesame productivity, MRY and MRR. Therefore, it is essential to include improved seeds in the sesame production package as major input and as a catalyst for exploiting the full potential of other inputs and agronomic practices.

The farmer to farm seed exchange is easier and faster for seed technology take up by farmers. Therefore, in the absence of the formal seed system it is advisable to capacitate and technically support the informal system to ensure sustainable supply of improved seeds.

2. Bottom-up seed needs assessment

Creating sustainable demand for quality seed is very essential before starting to produce a variety in large quantities. The kebele agro-economic planning (cf. 6.4) is anticipated to help in getting the actual farmers' quality seed demand and agro-inputs. It is also important to design an effective distribution mechanism and evaluate the success of the programme in terms of the amount of seed disseminated and area covered. Continued demonstration of varieties and the importance of quality seeds for production improvement will raise farmers' demand for quality seeds.

3. Variety development and the production of pre-basic and basic seed

HuARC in Tigray region is the national centre of excellence for sesame research. GARC has a leading role for Amhara region. The human, physical and financial resources do not reflect the responsibilities given to the research centres. To generate problem solving technologies a strong breeding programme must be in place. Both HuARC and GARC can ensure the provision of basic seed to certified seed producers. Unless the research capacity is built, getting pre-basic and basic seeds of sesame might be a major challenge for a sustainable seed system development in Ethiopia. As is done in other countries for commercial crops, a levy system could create a sustainable funding source and would make research more accountable to the sector.

4. Professional seed multiplication

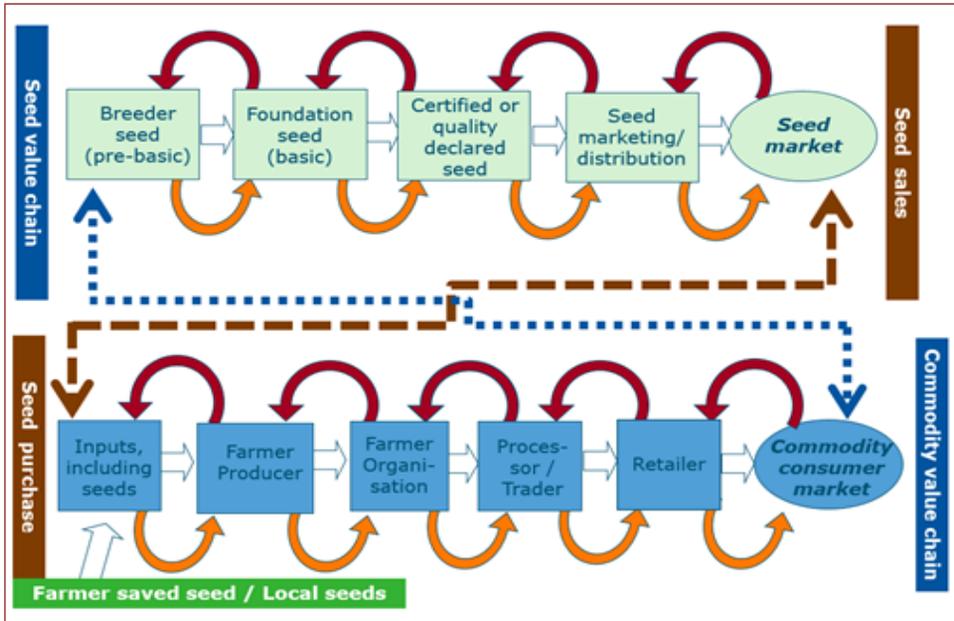
The research centres, responsible for pre-basic and basic seed, have to be linked to seed producing farmers, companies and groups. Key activities to strengthen their role in the seed value chain are the following: (i) supporting their physical capacity; (ii) providing training and technical backstopping through regular field inspections; (iii) organising functional public, private and cooperative distribution channels; (iv) training on packaging in customised sizes, and (v) establishing price incentives. Addressing these challenges may attract private entrepreneurs and investor farmers into the seed business.

5. Linking seed and commodity value chains

The figure on the next page shows the seed and commodity value chain. Ideally, these are linked. The blue-dotted line suggests that market demand should be taken into account in breeding programmes. The brown-dotted line shows that farmers are central: they are the clients of seed producers (at the end of the seed value chain) and are at the start of the commodity value chain.

For sesame, the following are important connections that have to be made:

- market demand as parameter for breeding;
- connecting the (GARC/HuARC) breeder and foundation seed to (cooperative and private) seed producers;
- the involvement of seed inspection so as to produce certified or at least quality declared seeds
- seed needs assessment for improving the sales of quality seed to farmers.



High rate of return on investment

To cover 500,000 hectares with improved sesame seed, the country needs only 1,500 ton. To produce this amount of seed, there is a need to plant 2,000 ha for seed production purposes, with average productivity of 750 kg/ha. This would require an investment 24 million ETB (12,000 ETB/ha), which is equivalent to only 1.3% of the additional revenue generated by using quality seed alone. In practice, the seed production would of course be spread over several years, which would spread the investment costs as well. It is clear however that the seed sector needs a professional support.

Towards sesame seed action plan

Taking the recently ratified national seed policy as an opportunity, Ethiopia has to formulate a sesame seed action plan, ensuring that breeder, pre-basic and basic seeds are sufficiently produced and maintained, professional seed multiplication is done by seed producer groups, large farmers and/or companies, regulatory bodies function in harmony for seed testing, quality assurance and certification, and establishing effective and efficient distribution channels.

2.5 Mechanisation: the need to move beyond talking and testing

Geremew Terefe, Hagos Tadesse, Melisew Misiker, Hagos Woldegebriel, Asfaw Azanaw, Fiseha Baraki

In the flat sesame lowlands, there are ample possibilities for appropriate mechanisation. After the testing of machineries and the adoption of some enabling measures, emphasis has now to be given to financial and organisational solutions, e.g. lease financing and machinery rental services, that would facilitate farmers to use tractors and implements of their choice.

Introduction

Agricultural field activities in Ethiopia, like in most countries in Sub-Saharan Africa, mainly depend on animal and human power. Despite high ambitions for agricultural mechanisations, efforts of federal and regional governments failed during the past three decades, mainly due to the low purchasing power and limited demand of farmers. Although throughout the country hundreds of tractors and implements (ploughs, harrows, discs, planters, cultivators, fertiliser and pesticide applicators, harvesters, stubble cutters and others) have been evaluated, machinery is only used at 4 per cent of the cultivated area, mainly for ploughing. Pilots and tests do not move to the next level; many machinery are idle at parking lots.

Taking into account the topographic suitability of the area for mechanising sesame production, several machineries have also been tested and demonstrated in the sesame production zone of Northwest Ethiopia. More than other parts of Ethiopia, the sesame lowlands are in principle very suitable for mechanisation: (i) the farmlands are flat and often large; (ii) sesame is labour-intensive and has important labour peak times; (iii) labour costs show a tendency to increase; (iv) draught animals are more difficult to keep due to feed shortages, theft and health problems.

In this paper, out of the many evaluated machineries, only the most effective ones are presented below. The aim is to bring these to the attention of farmers and their organisations, without necessarily endorsing the mentioned brands or makes. After this review, the current policy context and the current level of mechanisation will be discussed and recommendations for improving the adoption of mechanisation will be shared.

Machineries tested, demonstrated and scaled

In the past 7 to 8 years, many machineries have been tested and assessed on technical and economic performance, in collaboration with RARIs, MoANR and BoA and supplying companies. Among these are tractors, ploughs, row planters, disc harrows, levellers, ridge makers, cultivator and others. The tested machineries showed varying level of efficiencies depending on the topography and soil conditions and types. Prominent machineries have been selected for land preparation, sowing, weeding and harvesting, and for scaling to small, intermediate and large farmers. Even though most of the tested and recommended machineries caught the eyes of many farmers, insufficient accessibility and affordability limited effective adoption.

Tractors

Tractor density is low in Ethiopia, only 4 per 100 square km, while in Kenya and South Africa, this is 27 and 43, respectively (Berhane, 2014). An inventory of available tractors in the sesame growing woredas of Northwest Ethiopia shows that Massey Ferguson is widely used. A quick survey on the opinion of farmers learned that farmers favour Massey Ferguson, followed by New Holland. The Indian origin tractor known as 'Sonalika', assembled by Mesfin Industrial Engineering Company (MIE) in Mekelle, is getting some market share. The least preferred tractor, which no one wants to have, is the Metals and Engineering Corporation (METEC) assembled Chinese tractor YTO. According to farmers, this tractor breaks easily and is difficult to maintain in workshops (lack of spare parts and poor after sales service). Farmers feedback needs to be taken into account by METEC, but most probably farmers' trust has already been eroded.

Farmers call Massey Ferguson "King of tractors" mainly because of its durability and ease of operation under difficult conditions. Farmers are proud of Massey and say confidently "No mud can stop it". The trust in Massey Ferguson tractor is based on long years of usage for those who possessed one and through observations for those dreaming to own it. The justification for its durability does not need any scientific calculation, but it is simply a matter of observing 40-50 years old tractors still running strong in the heavy-clayed sesame fields and on the roads around Metema and Humera (See photo in the next page).



Massey Ferguson tractors

Farmers easily access secondhand Massey tractors and spare parts from neighbouring Sudan. The old tractor is much cheaper than the new ones, which makes it affordable to medium-scale farmers. The current policy change in tax exemption may encourage farmers to purchase new tractors instead of looking for 20 to 30 years old. Because of the long accumulated experience and skill of technicians, it is easily maintained in almost all local workshops. Another point of attraction is its versatility, where even the salvaged engine is used for generating electricity or water pumping or operating mills for grinding grains and welding in workshops. This is why farmers consider it as king.

However, the king of tractors could do better. Currently, it provides services far below its prestige in Northwest Ethiopia. The tractor is mainly used for transport and for pulling trailers. From June to July it is used for shallow ploughing of soils just before sowing and/or during sowing for seed coverage. Almost all tractors are without a hydraulic system, three point linkages hitches and power take-off shaft (PTO). Farmers lack knowledge and experience for using a tractor for deep ploughing and lifting different types of farm implements. As a result, farmers in the area often disable the hydraulic system, remove the PTO and linkage hitches, and sell to black smiths. Future interventions should primarily focus on the efficient use of the tractor parts and its attachments. The major lesson learned is that owning a tractor is easy, but making an efficient use of it is very difficult.

Ploughs

Mouldboard, disc and chisel ploughs were found effective in inverting the soil, thereby improving water infiltration, sowing efficiency, reduced weed and pest infestation, enhancing crop development and increasing productivity. The chisel plough or sub-soiling equipment demonstrated for deep (>35cm) ploughing of

compacted soil attracted attention of commercial farms. This resulted in better uptake, but only few farmers own it. For improving soil physical properties, it is recommended to use mouldboard and disc ploughs every year and chisel plough once in every three to five years.

Power harrow

The Lemken rotary power harrow, which is able to perform three operations at a time (tillage, pulverising and levelling), was scaled for more than five years (2012-2016) in Humera and Metema areas. It was efficient in seedbed preparation and sowing sesame and very much appreciated by farmers. However, it required a heavy duty tractor (>120hp) for lifting the power harrow alone. If it is attached with a planter to perform four operations in one go, then an even more heavy duty tractor is required. Currently, the power of the tractors in the sesame zone are not powerful enough (70-90hp) and miss the three-point hitch and hydraulic system. The use of the power harrow would thus require the purchase of new heavy-duty tractors. Despite the high efficiency, its heaviness coupled with expensiveness deterred the power harrow adoption in sesame areas. However, it is possible to use on commercial scale with possible rental service to surrounding farmers.

Small tractors

To contribute to the smallholder mechanisation, SBN support programme and partners have demonstrated small horse powered (15-30 hp) tractors. These included 4 wheeled (TY304 and Kioti 2830) and a 2 wheeled (Rumptstadt) walking tractors. These 4 and 2-wheeled tractors have been tested in different parts of the country.

The South Korean four-wheel 30 hp KIOTI tractor and the Chinese make, METEC assembled model TY304 were demonstrated at Humera ARC during the 2018 and 2019 crop seasons. The 'TY304' was poor in lifting attachments and other equipment and could not be fully tested. The KIOTI tractor performed well in tilling 15-17cm depth of the soil and pulling lightweight implements. The tractor can be used for planting, harrowing, cultivation, harvesting, stubble slashing and transportation and other field activities. Because of its multiple utilities it is recommend for use for medium-scale farms. A group of smallholder farmers, cooperatives, and unions can use it for rental services.

To fill the technology gap of smallholder farmers, the TGT enterprise has signed a dealership agreement with Rumptstadt (Netherlands). From 2014 to 2016, TGT, in collaboration with several universities, has demonstrated the Rumptstadt two-wheel walking tractor (2WT) and its attachments on smallholder farmers' fields in different parts of the country. In 2015, the SBN support programme extended the

Production improvement

testing and scaling of the two-wheeled walking tractor to sesame growing areas of Metema, Dansha and Humera. According to farmers and experts observations, the tractor was simple and easy to be operated by children and women, performed tillage operations well and was affordable for intermediate farmers or a group of smallholder farmers.

Based on field performance and farmers' feedback, Tiebebe General Trading (TGT) was ready to facilitate demand and use with the following measures: (i) establish after sales services centres and rental service providing stations in locations where high demand; (ii) build capacity of entrepreneurs (youth, farmers, associations, share companies, unions, or cooperatives) interested in providing tractor-hiring services to smallholders; (iii) develop lease financing arrangements for entrepreneurs. It was expected that the two-wheel tractor would then be an attractive option for smallholder farmers. Despite this effort, the company was not able to create demand and enter into business. The recent tax exemption on agricultural machineries may encourage the purchase and use of walking tractors.



Left Rumpstadt 2 wheel and right 4 wheel small tractors

Cultivators

The spiked cultivator, attached with harrow and leveller, supplied by Rhea (Netherlands) was evaluated at Humera ARC in 2018. It harrowed the soil and levelled the field for sesame planting and can be used by intermediate and groups of smallholder farmers.

The Agromaster cultivator (model KB11) was tested at Humera ARC for hoeing and row weeding. The cultivator removed weeds and heaped the soil near to sesame roots, which increased anchoring and reduced the risks of falling of sesame plants when these are heavily loaded with capsules. Inter-row cultivation was however possible only at seedling stages, as the prevailing 40cm spacing is not enough to drive conventional tractors with wide wheels. The cultivator was more convenient for use under wider row spaced crops like cotton, maize, sorghum and sunflower.

For sesame, the recommendation is to consider increasing inter-row spacing from 40 to 60cm or change the wheels to slim types in order to avoid trampling of plants by tractor wheels.

Row planters

By far the largest part of the cultivated area in the sesame lowlands is sown manually by broadcasting. Manual row planting is tiresome, take longer time, and require many labour days. Planters are developed to ease the burden of hand row making, fertiliser and seed dropping and then covering with the soil. Good planters maintain uniform seed depth throughout the field, ensure good soil-to-seed contact and uniform soil pressure all around the seed. They allow for an accurate seed population and accurate in-row seed spacing. If sesame planting is not optimal, it immediately impacts the profitability of farmers. The testing of row planters was therefore given top priority.

During the past decade, numerous makes and types of row planters were tested in Metema and Humera for efficient sesame seed sowing and drilling. The tested row planters included imported tractor-mounted precision row planters with 5 to 14 rows (Lemken and Sfoggia), an imported small tractor mounted 5-row planter (Rhea), locally produced chest-held row planter and animal drawn 5 row seed drillers. The diversity of tested row planters were designed to address the needs of small, intermediate and large farmers.

The precision row planter from Lemken Company (Germany) was tested for 5 years (2010-2015), in collaboration with the supplying company and Humera ARC. The precision planter allows to have the required plant population. Seeds were precisely dropped at 15cm interval and at 3-5cm depth. The Lemken planter reduces the seed rate to one kg per hectare (instead of 5 kg in conventional broadcasting), reduces thinning costs and increases germination because of uniform deposition. The drawback of this planter is that it is very expensive and requires a heavy duty tractor.

The Sfoggia precision row planter (5 and 7 rows) was tested in 2016 at Metema and Humera. It crushed sesame seeds while sowing. The oil expelled from the crushed seeds resulted in wetting of gears, thereby blocking uniform flow of seeds causing uneven seed distribution and patchy plant population. The planter worked well for large seeded crops like cotton and sunflower. The recommendation is to use the planter for cotton and other large seeded crops but, not for sesame.

The Sfoggia seed driller, supplied in Ethiopia by Ultimate Motors, is available in 5 to 14 rows options. The SBN support programme tested drillers with 7 and 11 rows. It was highly preferred by farmers because it can be operated by available

Production improvement

70hp tractors that are of its low tractor power (70hp). Farmers furthermore appreciate the ease of operation, the low seed rate (1.5 kg/ha), the large sowing capacity (25ha per day), the durability and robustness of the driller and the ease of maintenance at local level. Using row planting, and combining this with the use of quality seeds and optimal use of inputs, leads to a significant yield increase and a much lower cost of production per kg produced. This led to a growing interest for using Sfoggia seed driller for sesame and rotational crops.

Satisfying the demand for the Sfoggia seed driller is the major challenge. So far, the demand has only been very partially met: only 16 seed drillers were acquired in the past five years. Some are used by investor farmers on their own farms. Others are used by FSC, unions and primary cooperatives for machinery rental services. Two private companies, Mammay and Hiwot Agricultural Mechanisation PLC, started giving rental services for 1200 ETB/ha. In 2020, four cooperatives from Kafta Humera and Welkait woredas were in preparation to purchase the row planters.



Sfoggia seed driller

Chest held seed driller

The Aybar Engineering Enterprise (Addis Ababa) manufactured chest-held 3-5 row seed driller was demonstrated at Humera ARC, in collaboration with the manufacturer. It was very good in dropping seeds in the open furrows. Before seed sowing shallow furrows have to be opened, either by tractor, oxen plough or human labour. After sowing the seed, it has to be covered with a light soil layer,

which is additional work that may reduce acceptability. The good side of this driller is that it addresses the farmers' observation that row planting is a "backbreaking operation", as it avoided bending while sowing. The machine can sow a one hectare field in 80 minutes. This is much faster than hand drilling, which takes more than three hours. The chest-held driller is recommended when three people can participate at the same time. The tools needs further finetuning to improve uniform seed dropping and to combine furrow opening, seed dropping and covering in one pass.



Chest held seed driller

Harvesters

Timely harvesting and stacking is very essential for optimising yields and quality and for reducing shattering losses. During peak harvesting times, labour shortages often occur, leading to delayed harvesting and losses. Different makes and models of harvesters were tested in the past decade, with specific attention for sesame cutting.

The Alvan Blanch harvester, which can be mounted onto conventional tractors of more than 70hp, was demonstrated at Werer Research Centre in collaboration with USAID-ATEP. The harvester was affixed with a reaper binder model TH1400. The reciprocating knife cutter bar has 1.4m width equipped with gathering tines. It was good in binding and conveying the bundles sidewise, with a capacity of cutting 0.5 to 0.6 hectares per hour. It has safety devices, shock absorbers and is able to operate on steep gradients. The bundle can be stacked directly in the field or loaded onto a trailer and transported to drying spot. The harvester recorded low loss in terms of uncut, cut but not tied and decorticated plants. The harvester can cut different crops: sesame, soya, sorghum, sunflower, finger millet, and rice, which makes it multi-purpose. The Alvan Blanch harvester is recommended for use in sesame harvesting, but needs well-trained operator for managing strings and the bundle size.

The Italian-made, self-propelled sesame harvester (Mazotti company, model Sahara 1-4x4), was demonstrated at Humera ARC in collaboration with the supplying enterprise. The cutting unit was specifically designed for sesame harvesting. It was very efficient in cutting, strapping and throwing the bundle to the cut side of the field. It performed well in row planted fields with a uniform sesame stand (capacity of harvesting one hectare in 1.5 hours). A low loss, less

Production improvement

than 10%, was recorded. The 1.4 meter cutting width can be increased to 2.8 meter by attaching two cutting units at a time. The tractor can be attached to other mowing bars for weeding and manure spreading and can also pull trailers for transporting goods. Because of its efficiency, ease of cut head adjustment according to topography and crop height, low fuel consumption and ease of operating, the machine was much appreciated by commercial farmers. Although the self-propelled harvester can be technically recommended for use in sesame harvesting, the high cost is for now inhibitive. The lifted tax duties on imported agricultural implements may motivate commercial farmers and agro-companies to own the machine.

As a cheaper option, the tractor-mounted Sahara-3 cutting unit was tested for sesame harvesting. Results showed good cutting potential, but poor tying and discharging ability from the conveyer. After repeated trials and technical adaptations, the bundle size was successfully improved, but the tying efficiency and discharging ability could not be improved. This option can therefore not yet be recommended for use.

A tractor-mounted reaper binder of Agromaster company was evaluated for harvesting sesame at Humera and Metema for two consecutive years (2018-19). It was poor in cutting, binding and conveying the sesame to the cut side. Recorded loss was about 15-20 per cent. Due to limited skills of the operators and failure of adjusting the string for correct bundling, the machine could not be exhibited during field days. In case of severe shortage of labour, the reaper binder could be considered for sesame harvesting, but at the current level of performance, it is not likely that farmers will buy it.



Demonstration of sesame harvesters

Rotary stubble mower

The Agromaster AT8110-LP/ER/TA rotary cutter was tested in 2018 and 2019 at Humera ARC. It was found effective in slashing weeds and shrubs in and around the sesame fields. In order to remove weeds before they shatter their seeds, sesame fields were mowed soon after harvest. Even though the test was done only on sesame stalks, it can successfully cut stalks of cotton, sorghum, and sunflower. The added value of the rotary cutter is the slashing of crop residues, grasses and shrubs in crop fields, improving the organic matter content of soils and reducing the weed seed bank. The rotary stubble mower can only be economically used if it serves a large area. The rotary cutter could be part of a machinery rental system.

Current situation

Mechanisation is feasible but is not happening

Despite the suitability for mechanisation, the many testing and demonstration efforts and the rhetoric and intentions of government offices, mechanisation has remained stagnant in the sesame zone of Northwest Ethiopia. The current situation is that large farmers use old MF tractors, disk ploughs and trailers. Intermediate and small farmers are using draught animals. Only row planting is on take-off. There is high interest for purchasing Sfoggia seed drillers, which can be mounted on available tractors.

The low adoption rate is due to many factors: poor understanding of the contribution of mechanisation to productivity improvement and production cost reduction; financial limitations and uncertainties on the efficiency and durability of equipment, absence of spare parts and after sales service provision.

This does not mean it is not feasible, on the contrary. In the sesame zone, ploughing with oxen is for instance (much) more expensive than tractor ploughing.

- The cost of oxen-drawn local ploughing (Maresha) is 600 ETB per day (0.25ha ploughing). Sesame planting requires a minimum of three times ploughing before sowing depending on the field condition and soil type. This means for 0.25 hectare a farmer has to spend 1800 ETB for ploughing.
- The cost of hiring a tractor for one hour (nearly 2ha ploughing) costs 800 ETB. This means that a farmer has to pay 3 times 200 ETB for ploughing 0.25 hectare. This means that a shift from oxen ploughing to tractor ploughing could result in 67% cost reduction.

This is an important illustration that mechanising sesame production is economically feasible, not only for investors, but also for smallholders. This calls for strategies leading to the effective uptake of tested machineries. The recent tax exemption for agricultural machineries is a first encouraging step.

Tax exemption is creating a more enabling environment

As of recent, the Ethiopian Government has allowed tax-free importation and purchase of about 625 agricultural machineries. The aim is to transform the agriculture sector by removing duty and taxes on imports of farm machinery and supplies; irrigation and drainage equipment. The policy change and related incentives have multiple objectives:

- To attract foreign direct investment and investment of Ethiopian companies in the importation, local production of machineries and related after sales services;
- To support farmers acquiring implements that help to transform agriculture from subsistence farming to more commercial mechanised farming;
- To facilitate smallholder farmers' organisations to acquire capital goods (machineries and implements) to use as collateral to access credit;
- To attract agricultural university and college graduates to engage in the farming business and to create job opportunities related to the machinery supply chain (spareparts sales, tractor and machinery operators, workshops and maintenance, local adaptation and production of implements, ...).

Farmer Production Clusters could help to deal with land fragmentation

For the mechanisation of smallholder areas, the fragmentation of land holdings is a challenge to deal with. Experience has learned that hired tractor operators are not willing to enter a farm with less than 2 hectares, because of its inconvenience for making turns and that it take more time to plough a unit area of land. As a result, hiring tractor service is very rare or non-existent. Ploughing with the oxen-drawn local plough does not meet the required level of soil preparation even after repeated ploughing. Thus, it may require more tilling, thereby building costs of production. Hence, the recommendation is urgently to look for solutions for mechanising smallholder farming. A possible solution is the creation of FPCs. It is very important that this is on voluntary basis and is not seen as an obligation to comply with government instructions. Lessons learned with the top-down attempts to create FPCs most likely very useful in this context.

Appropriate mechanisation: priority for row planting

The partial adoption of Sfoggia seed drillers, the use of MF tractors, the rejection of METEC tractors and the insufficient economic feasibility of most machineries learn that mechanisation has to be appropriate and aligned to the prevailing situation. At short notice, satisfying the demand for row planters is the most important priority. Row planting is the major missing element in the adoption of the 20 steps package. The Sfoggia seed drillers are widely appreciated and can be operated by available 70hp tractors. One seed driller can plant 25 hectares per

day. This means that one driller can plant 250-500 hectares per season, especially if the drillers would be flexibly used from the South to the North, e.g. from Quara to Humera. There is thus, a need of 1000 to 2000 seed drillers. Investor farmers and cooperatives could acquire the row planters through lease financing. Unions, cooperatives, FSCs and private companies like Mamma and Hiwot agricultural mechanisation could provide rental services.

Way forward

Opportunities

Tests and demonstrations have learned that there is huge potential for mechanising the sesame lowlands: the topographical conditions are good, the dependency on animal power is high and labour peaks are difficult to deal with because of labour shortages and labour costs. Because of these reasons, farmers have high interest in mechanisation. Especially, the perspectives for row planting are good. The recent tax exemption removes an important financial barrier and may encourage the purchase of agricultural machineries for farmers, cooperatives and unions. Investments for mechanising the sesame sector can significantly contribute to better soil, water, pest and weed management and increased production, representing millions of US dollars.

To convert the ignited willingness into practical realities, the Ethiopian government should take the lead role in facilitating the mechanisation process. In addition to ongoing innovation testing and scaling, the key elements of a mechanisation action plan are lease financing and machinery rental services, which both help to eliminate financial barriers.

Lease financing

To exploit the opportunities, lease financing is necessary. Timely arranging lease financing options to unions, cooperatives, youth and farmers to acquire tractors and machineries will increase adoption and enhance agricultural transformation. To realise the lease financing modalities, unions, cooperatives and eligible farmers have to be communicated and convinced; their financial and management capacities assessed; business plans developed, staff recruited and trained on operating the machineries and making business. The first priority should be given to farmers and farmer organisations with sufficient own capital to take care of the required 20-30 per cent down payment.

Machinery rental services

The demand for mechanisation options is on the rise at the farmers' side and the interest of the private sector to invest in machinery rental services is growing. To arrive at machinery rental services, we suggest the following:

- Support farmers, cooperatives and unions eligible for lease financing to exploit the tax exemption privilege on agricultural machineries and implements. Help them with the procurement process and inevitable paper work and bureaucracies;
- Create conducive working environments, support viable business models for machinery rental services, which can be provided by different providers (investor farmers, PLCs, FSC, unions and cooperatives and possibly organised youth groups);
- Give priority to the training of cooperatives in providing machinery rental service to farmer-members, who are organised in voluntarily created FPCs;
- Train the machinery rental service providers, especially cooperatives, on efficient service provision and financial management;
- Ensure optimal and efficient utilisation of machineries, which requires collaboration between machinery rental service providers and machinery suppliers: training of operators, technical support and after sales service;
- Periodically revise economic policies, including loan and interest rate; legal and regulatory frame works and create conducive working environments for the private sector, cooperatives and unions to engage in providing agricultural machinery rental service to farmers.

Private sector involvement

Based on our own experience and lessons learned during technology testing, demonstration and scaling, it is important to involve the machinery suppliers in the continuous testing, development and adaptation of machineries and implements like ploughs, planters, cultivators, harvesters and ripper binders, etc. Feedback of farmers is important to arrive at machineries that are durable, efficient, easy to operate and maintain. Agricultural Research Centres and FSCs can play important facilitating roles. It is important to link farmers and their organisations to machinery suppliers and facilitate agreements for import, distribution, training of operators, technical support and after sales service provision.

2.6 Arming farmers to defend their sesame against pests

Geremew Terefe, Muez Berehe, Asfaw Azanaw

Many pests and diseases are a threat to sesame production. Farmers, supported by local experts, a practical field guide and ICT solutions, should be able to early detect the symptoms of ravaging pests and diseases, so as to take timely action.

Introduction

The farming system in Northwest Ethiopia is dominated by sesame and sorghum. Pests and diseases are building up because of insufficient crop rotation and pest and disease prevention and control. This is causing significant damage. Both in the household surveys of 2013 and 2018, farmers mention pests and diseases as a major threat for profitable sesame production. The prevalence and damage of these pests and diseases depend on many factors: climate and weather conditions, soil type, field topography, cropping system, varieties grown, applied agronomic practices and management capacity of farmers. Ideally, farmers are able to detect different pests and diseases in their fields and take appropriate action.

In this article, we present the most common diseases (bacterial blight, phyllody and wilt) and insect pests (webworm, gall midge, sesame seed bug and termites) that cause severe damage to sesame. After sharing the experience with developing a sesame pest identification and management booklet (የሰሊጥ ሰብልን የሚያጠቁ ተባቦችና የመከላከያ ዘዴዎች, 2019), we discuss options for improving prevention and control.

Three important diseases

Bacterial blight

In wet years, bacterial blight, locally known as ‘Mitch’ (ግሽ) is a destructive disease. It is also common in areas where water logging is common or humidity persists for some days. The worst damage occurs when rainfall is heavy and continues for some days. Sesame is most susceptible to blight when it is closer to maturity. Fields can die within days. Infection can even appear on freshly harvested and stacked hillas. In waterlogged fields, infected sesame plants slowly turn black and finally die (see figure). In the past years, many areas commonly experienced heavy blight infections (Dellelo in Metema; Sanja and Ashere in Tach Armachiho; Gonder Deyu, Muthadgi, Serekua, Addis Alem and Marzeneb in Tegede; Zuria Dansha, Lekatit and Kibabew in Tsegede; Banat, Adebay and Adigoshu in Kafta Humera; Maygaba and Korarit in Wolkaiet).

So far, there is no single method for controlling bacterial blight. It is best to grow resistant varieties like Abasena in areas with wet weather. Farmers also had good experiences with growing sesame on slightly sloping fields with light or sandy soils and with draining excessive water after heavy rains.



Bacterial blight infected leaf and pods

Phyllody

Phyllody or ‘witches broom’, locally known as ‘Ajengul’ (አጅንጉል), has been observed in all woredas, albeit with varying intensities. More than physical weight loss, phyllody causes quality damage. Sesame obtained from infected fields cannot be used for seed purpose. Phyllody can be recognised by the following symptoms: plant terminal shoots grow abnormally with extremely short internodes; leaves do not grow large and unfold normally; flowers become green and horn shaped; no pod formation and no seed or only a few weightless seeds. As a result the top part of the plant assumes a narrow leaved structure. This is why Phyllody is called witches broom (see figure in the next page).

Because of this morphological difference, farmers can easily distinguish infected plants from a distance. The disease symptoms are most visible from flowering to maturity stages. In fields where farmers fail to carefully observe the symptom and remove infected plants, late season incidence can be very high.

There is no remedy for phyllody. To prevent it, it is best to use clean and certified seed. To control it and to stop further dissemination, it is best to pull out the infected plants and burn or bury these. If jassid infestation is high, spraying insecticide at flowering stage is recommended, but farmers did not take this advice. Recycling seeds from infected fields was the main reason for the ever-increasing incidence of phyllody in most sesame fields in Northwest Ethiopia. Farmers with phyllody infected fields thus better sell out all the harvested sesame and not to use it for planting.



Symptoms of phyllody infection

Wilt

Wilting is caused by a fungus known as *Fusarium oxysporium*. Wilt occurs in patches, specifically at low spots or on flood runways, where plants suffer from oxygen deficiency. Run-off water spreads the disease from infected areas to healthy parts of fields. Infected plants fully dry up or at one side. Leaves fall off the plant and bare stems remain, with or without branches. Greyish-white fungal growths at the stem base is a sign of the wilt disease (see figure).

Another distinguishing feature of *Fusarium* wilt is that stem remains intact and cannot be easily pulled up. When uprooted with force, it is dry, without secondary roots or with a few dried brownish lateral roots. In the



Wilted sesame plants

past years, the disease was not severe, but caused severe damage in certain years and certain production areas. There is no cure for this disease. Therefore, the advice is to rotate crops, plough the field repeatedly, and expose the infected soil to sunshine.

Insect Pests

Webworm

Webworm (*Antigastra catalaunalis*) has been the major insect pest in all sesame growing woredas. Webworm infestation starts soon after germination, continues until harvest, and with harvested sesame, it is taken to the store in the form of eggs, larvae or pupae. The vegetative growth stage attack is on young leaves. Damaged leaves wrinkle, shrink and do not fold out fully, causing plant growth retardation. The larvae fold young leaves and wrap these with silken threads. They feed inside by scrapping-off leaf epidermis. When capsules are formed and seeds start to mature, the larvae bore into pods and eat the pod contents. When fully matured,



Webworm larva feeding on leaves

the larvae pupate inside the pod, or fall out and pupate in the soil. Early stage infestation can be discovered by looking for webbed leaves in the field. As the larvae continue feeding and grow older, somewhat round, greenish-black excrement can be easily found inside wrapped leaves. Pods with round holes at all sides is a late season symptom of webworm damage.

The identification of webworm is not easy for inexperienced DAs and farmers. Because of this, the pest can stay unnoticed and cause significant damage. The recommendation is to weekly scout sesame fields and to attentively look for webbed leaves and count the number of larvae per hectare. It is advised to spray fields with any one of the available contact insecticides if more than five larvae per hectare are counted during scouting.

Gall midge

The second most important insect pest of sesame is the gall midge (*Asphondilia sesami*). At the early stage of development, the symptoms of gall midge, scrapping and wrinkling of leaves, is very similar to those of webworm. To differentiate the symptoms of gall midge from webworm infestation requires experience, careful observation and good eyes.

The main midge-distinguishing feature is that it does not web leaves. A tiny maggot feeds inside the wrinkled leaf, but this is difficult to see, unless aided with magnifying lenses. Midge damage becomes clearly visible when pod formation start. Infestation is very severe at flowering stage as it causes flower abortion. Infested flowers do not transform into normal 4 or 6 edged capsules, but change into galls or somewhat barrel or round disc shaped structures.

Damaged plants are green and do not bear normal capsules, because of the small gall formed at the place where pods are normally formed. On these plants, it is evident that there is midge infestation (see figure). To detect gall midge, it is advised to monitor fields every week and check plants carefully at flowering stage, whether they bear normal flowers and pods. If not, check for midge infestation and spray contact insecticides before and during flowering.



Gall midge attack on the different stages of sesame

Sesame seed bug

Sesame seed bug (*Elasmolomus sordidus*) is an import pest with variable infestation rates, depending on rainfall and humidity. The sesame seed bug starts feeding on sesame when it is dried in the field. After threshing and bagging, the bug moves with the harvested seed to warehouses in the stages of egg, nymph and adult. It is fast moving insect and can also make a short distance flights. The bugs feed by sucking oil and other contents of the seed. Their feeding result in quantitative and qualitative losses. In highly infested stores, it can cause weight loss of more than 50 per cent within a short period of time. In terms of quality, seed bug feeding changes colour and taste, which makes the sesame seed unmarketable. In the dry season and in the absence of sesame seed the bugs feed on many species of weeds, trees, and vegetable crops. Combining cultural, biological and chemical

control is essential for managing the seed bug. Important cultural measures are the following: early harvesting and threshing, stalk removal, field clearing and plough soon after the harvest time to destroy weeds and other host plants, storage in polyethylene bags with inner lining or airtight bags, storage in clean stores to reduce the survival and fecundity of sesame seed bug. Neem kernel and leaf extracts have not yet proven to be sufficiently effective. There are numerous predators that could be used for biological control (ants, termites, spiders, lizards. *Grionini sp.* causes 40-60 per cent egg parasitism. The use of insecticides can be a measure of the last resort.

Termites

Termite infestation has been observed in all sesame growing woredas. Termites attack at all stages of sesame growth, but cause most damage during the hilla drying and threshing stages. This is manifested by the withering of plants. Infested plant leaves dried up, but do not fall-off. Stems start browning bottom-up and slowly dried-up. Contrary to plants affected by Fusarium wilt, stems affected by termites are easily uprooted or they break at ground surface. Termites hollow the taproot from the inside and do not eat the lateral roots. In many cases, termites feed upward from inside the stem and hollow the woody part of the stem. The damage during sesame drying is expressed by building soil mound around hillas and in coating soil layer on stacked individual plant stems. In fields where measures are not timely taken and/or threshing is late, termites can cause 100 per cent harvest loss. Termites also cause quality loss because the soil mounds create difficulties in winnowing. The only solution is carefully select drying spots and thresh as soon as possible, preferably within 10 to 12 days.



Sesame stack damaged by termites

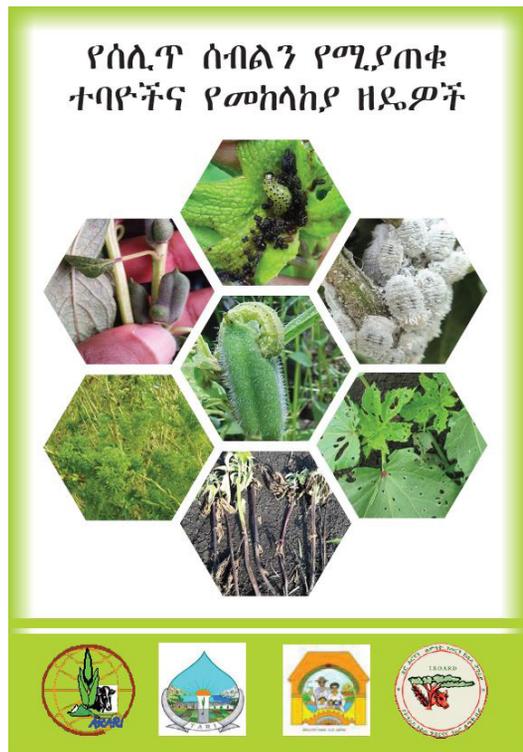
Other insect pests

A number of other insect pests can threaten sesame. These include: jassids, thrips, aphids, whiteflies, African bollworm, and different species of shield bugs. Their attack has been sporadic in the past years and caused minor damage.

Improving pest and disease control

Pest identification and management booklet

Pest scouting and pest control are steps 10 and 11 of the 20 steps for improving sesame yields and quality. Pest and disease prevention and control were part of the general 20 steps training and extension activities. During these trainings, which were organised before the start of the season, time was limited to address the subject of pest and disease control in depth. To support agricultural experts and DAs with properly identifying pests and recommending appropriate control measures, a pocket size sesame pest identification and management booklet was prepared. This booklet was prepared in Amharic (የሰሊጥ ሰብልን የሚያጠቁ ተባዮችና የመከላከያ ዘዴዎች, 2019). It was printed in 10,000 copies and distributed



to farmers through BoA, unions and cooperatives. The booklet was much appreciated and eased sesame pest identification and management challenges to some extent. A booklet is however not enough: pest identification and management has to be exercised in the field.

Cascaded training

Trainings on the identification, prevention and control of important weeds, insects and disease pests that challenge sesame production have been organised and delivered in a cascaded manner. At regional level, in-depth trainings were provided to region, zone, and woreda experts, who were selected to become trainers on the subject of pest and disease control. After the ToT, these experts in turn provided on-the-job and practical trainings for DAs and selected farmers drawn from all woredas, who in turn would train farmers in the field. During the growing season technical backstopping was given by experts, DAs, and SBN staff during field visits.



Practical training on pest and disease control

Pest and disease control remains a major challenge

One of the major lessons learned is that improved knowledge and skills for identifying and controlling insect pests and diseases is not enough. Farmers often consider pests as God given or a punishment from God and conclude that they are uncontrollable. Even when the damage is apparent, farmers are often reluctant to take action. Farmers' hesitation to act predisposes sesame to severe damage and losses. In the past years, there were many cases of well-managed fields (quality seeds, row planting, fertiliser application, thinning, gap filling, weeding, ...) with a very good crop stand with many capsules from the bottom to the top of the stem, which ended in a very low yield, e.g. less than 200kg/ha. In such cases, farmers complained about the package but the main reason was the lack of proper identification and appropriate control of pests and diseases.

Recommendations

To be more effective in pest and disease prevention and management, the following actions are recommended:

- Ensure having trained farmers in all kebeles and cooperatives. Farmers who have demonstrated to be capable of identifying pests and diseases could receive a Certificate of Competence (CoC).
- The network trained farmers, supported by DAs, could be a very important asset that allows for a pest and disease early warning system. There are several options to get information from the field to experts: specific focal points per kebele and woreda, specific telephone lines (hot lines) at ARCs. With increased use of smart phones, it should be possible in the very near future that farmers and/or DAs send pictures of diseased plants to experts.

Arming farmers to defend their sesame against pests and diseases

- Training of input dealers is another priority. In the current situation, chemical products are sold in local shops, often together with food items. The retailers are hardly knowledgeable about the products they are selling.
- Product information on the etiquettes is often in languages that farmers do not understand (Arabic, English, Chinese). This is very risky and can lead to improper use of chemical products.
- Farm service centres and shops of unions or cooperatives have the perspective to become recognised sales points of crop protection products.

Prevention is better than cure. This adage leads to the following recommendations:

- Give more attention to the importance of field preparation, crop rotation, plant densities, densities, weeding and timely pest scouting.
- Use weather forecast information to alert farmers on possible pests and diseases that might occur.
- Use local radios to disseminate information about pests and diseases and their control.

2.7 One billion ETB challenge: reducing sesame losses

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Ataklti Fiseha, Kahsu Kelali

Action research allowed determining the main sesame yield losses, both at field level and subsequent handling stages. The losses are high and represent a value of more than one billion Ethiopian ETB. Farmers and other stakeholders have to be involved in the design of loss reduction options.

Introduction

For many crops, harvest, transport and storage losses are high to very high, and reportedly may reach up to 50% (Dubale, 2018). During its long production and marketing cycle, a lot of sesame is lost as well, in the field because of pests and diseases, during harvesting, drying and threshing and afterwards during transport, bagging and storage. In this paper, we focus on harvest and post-harvest losses. We first share experiences with action research to quantify losses and to prepare for strategies and practical actions. Based on experiences gained and lessons learned in the past seven years, recommendations are suggested for minimising losses.

Quantifying sesame losses

Although it was clear that losses were important, exact data were missing in 2013 at the start of the SBN support programme. Before engaging in loss reducing activities, the first step was therefore to identify and quantify the losses along the long sesame value chain. A sesame loss study was therefore fielded from harvesting time to the end of the 2013 marketing season. The yield loss study was conducted on 93 farmers' fields during harvesting, threshing and sesame transport from the farm to the farmer storage place (or directly to the spot market). To get the whole picture, efforts were made to capture the losses during different handling stages at local spot markets, ECX markets and losses during cleaning or processing.

Measuring yield loss in farmers' fields

The activity started with measuring sesame seed losses on farmers' fields before and during harvesting; drying, threshing and transporting to home on 93 farmers' fields. From each field a 20m x 20m quadrant area was sampled for the study. Additionally, 14 quadrants were taken from neighbouring farmers' fields for measuring losses due to unharvest plants. The study identified five critical stages where field losses are significant.

- The largest amount (25 kg/ha; 5.5%) of sesame is lost during field drying. During drying, sesame pods shatter and seeds fall on the ground
- The second highest seed loss was recorded due to late harvesting (13.6kg/ha; 3.25%). This is because farmers wait until all top pods mature, letting the lower capsules to split open and shatter before starting harvest.
- The third most important source of field level losses is the carrying of dried sesame from the drying site (hilla) to the threshing site (8,3 kg/ha; 1.85%).

These three factors account for a shattering loss of some 47 kg/ha or 10.6% of the possible harvest (see table below). The losses due to unharvested plants or capsules and from transport from the field to the farmers' home or spot market were relatively less important.

Sesame seed loss factors and the amount

Field level losses			Losses at different handling stages		
Loss factors	Kg/ha	%	Loss factors	Kg/ha	%
Field drying at hillas	25.0	5.5	Re-bagging at market centres	4.7	1.1
Shattering before harvest	13.6	3.3	Cleaning and processing	1.9	0.5
Carrying dried sesame to threshing site	8.3	1.9	Storage loss at ECX (sampling, unloading and loading)	0.6	0.2
Unharvested plants or capsules	0.7	0.2	Storage loss at ECX before exporting	0.1	0.02
Transport from farm to home/spot market	0.5	0.1	Sub total	7.3	1.8
Sub-total	48.1	10.9	Total losses	55.56	12.7

Losses at different handling stages: from home up to market, processing and exporting

The second phase of seed loss occur when the produce starts moving from the farmer home until it is loaded onto the trans-country lorries. Measurements were made at spot markets with traders and cooperatives; on transporting facilities; in processing and storing plants and until exporting. In this phase the highest

Production improvement

seed loss (4.7kg/ha; 1.12%) was recorded at spot markets while the seed is being traded between the farmer and traders or cooperatives. This is the stage where sesame is commonly bulked, cleaned and re-bagged. If sesame is cleaned at processing plants, the loss is 0.5 per cent. Storage losses at ECX for depositors and before exporting were relatively less important, but, on a total of 2 million bags of sesame, still do account for more than 300,000 bags of sesame.



Sesame losses at different handling stages

The country loses more than one billion ETB

The total sesame seed loss from field up to exporting was 55.56 kg/ha or 12.7 per cent of the average yield of 438 kg/ha. Extrapolated to a sesame acreage of more than 600,000 hectares and/or a production of more than 200,000 million MT, this implies that losses are more than 25,000 MT, which represent, at a market price of 4,000 ETB/100 kg, represent a value of one billion ETB. Shattering losses in the field are the most important. If farmers manage to reduce shattering losses, they can earn thousands of ETB more. Similarly the country would earn millions of dollars more.

Women see the value of lost sesame

Due to the considerable amount of losses in the field, harvesting time comes as a blessing for some Kunama women. For them, shattered and fallen sesame is as an important source of income. The picture below shows Mrs Hawa Anesha collecting sesame still laying in the field, along with the soil and dirt that clings to it. She can collect between five and 35 kg of sesame in a day. In areas that are prone to windy conditions that damage hillas, this can be up to 50 kg. She sieves the collected sesame using mosquito nets and porous cloth. After sieving, she takes the somewhat cleaned sesame to the nearby river or water source to wash and dry it. In some cases she is able to clean 100 kg of sesame in two days. Hawa managed to collect up to 300 kg, which she sold it in good prices. At some point she fetched 7,000 ETB (280 Euro). This incomes was generated without any investment in ploughing, planting, weeding, harvesting and threshing!



Hawa Anesha, separating the trash from the sesame seed

SBN Newsletter 2, January 2014

Action research raised awareness on losses

The action research identified major factors or stages of sesame yield loss and helped to generate quantitative evidence on the amount of seed loss occur from field up to export. Footages were taken during the field work and these were used for the short movie known as 'The long road of sesame and the many losses along the way'. The use of plastic sheets for measuring the field level losses at many different sites spread across the sesame zone, raised farmers' awareness about field level losses. The sesame loss study paved the way for further in depth studies on crop yield losses in Northwest Ethiopia.

Recommended operations

Net production improvement is about producing more and losing less. In addition to the promotion of good agricultural practices to improve yields and quality, loss reduction has therefore been an important activity domain for the SBN support programme. In fact, many of the 20 steps focus on loss reduction, as shown in the overview below, which reproduces the key messages communicated to farmers and DAs. Many of the recommendations for loss reduction go along with advices for avoiding the loss of quality. The texts in bold are key suggestions that are discussed in the next section.

Maturity and harvesting	<ul style="list-style-type: none"> • Avoid too early harvesting. This may lead to 20% yield loss. • Avoid too late harvesting. Do not allow bottom capsules to shatter. This may also lead to high losses. • Harvest timely. This is when 2/3 of the plants and pods turn from green to yellow. This is generally between 90 and 120 days, depending on the variety used.
Drying spots	<ul style="list-style-type: none"> • Prepare drying sites for > 10 hillas. Use levelled, well-cleaned high spots to avoid waterlogging during drying. This is important for sesame quality and for controlling termites and seed bugs. • If needed treat the site with recommended pesticide before putting the hillas. • Put hillas next to each other to protect from wind damage • Put hillas on permeable (porous) polyethylene sheets.
Stacking and drying	<ul style="list-style-type: none"> • Stack upright in shocks of 6-8 bundles • Peg shocks to protect against wind damage by tightening strings around it. • Do not apply any pesticide on or near drying shocks/hillas as this may cause contamination and reduce quality and marketability. • Thresh as early as possible. Dry not more than 2 weeks, preferably shorter, to avoid losses from shattering, insect pests or wind damage.
Threshing	<ul style="list-style-type: none"> • Thresh near the hillas on canvas or plastic sheets of enough size, free from soil, gravel, dust, chemicals or other inert materials • Do not carry dry plants long distance as this causes significant seed losses • Use the drying spot as threshing site or thresh next to the hilla. If not possible, take the plastic sheet to hillas ready for threshing

Bagging and loading	<ul style="list-style-type: none"> • Use new and clean bags. Never use chemical contaminated and/or torn bags • If possible, use airtight bags • Avoid over filling (bags should contain 100 kg)
Transport	<ul style="list-style-type: none"> • Lift and lower bags carefully during loading and unloading to minimise tearing of bags • Transport bagged seed on smooth surfaced trucks, carts or wheelbarrows that are not contaminated with chemicals or oil
Storage	<ul style="list-style-type: none"> • Dry seeds before storing to a moisture content of 7% or less. • Do not leave freshly threshed seeds (> 7% moisture) on a truck for a long time • Do not store under very hot temperature • Store sesame in clean, well-ventilated concrete floored rooms • Close openings that allow the entrance of insects and rodents • Do not store pesticides or used sprayers in the same room where sesame is stored • Do not spray on bags with sesame • Fumigate stores when storage pests are observed

Timely harvesting

Farmers are much aware of the effect of too early and too late harvesting. The main challenge they face is the mobilisation of enough family and/or hired labour to harvest in time. Harvesting is done in a rush, often at night. Low-cost, best-fit harvesters could support timely harvesting and reduce shattering losses.

Drying sites for more than 10 hillas

As mentioned, the loss study showed that due to carrying hillas to threshing ground, more than 8 kg of sesame is lost per hectare. With a cultivated acreage of 600,000 hectares, this leads to a loss of close to 5000 MT. For a farmer, it is a loss of 350 ETB/ha. This loss can easily be avoided by bringing the freshly cut sesame to (much) larger drying spots. However, the big constraint is time, as this has to be done during harvesting. Labourers who are hired for harvesting are generally paid per stacked hilla. They thus do not like to walk an extra distance for collecting the harvested sesame plants at larger drying sites. In case of labour shortages, harvesters could help finding time to make large drying sites.

The extra work should be negotiated at the beginning or incentivised by paying extra per harvested and stacked hilla. Another option is to hire extra labour for putting harvested sesame at larger drying sites. On average, the additional labour

Production improvement

cost would be 100-150 ETB per hectare, so there are perspectives that the extra effort pays back. For now, there are only some areas where the practice of large drying sites has been adopted, among others in Shimelegara and Lemlem Terara Kebeles in Amhara.



Large drying site in Lemlem Terara kebele

Put hillas on permeable (porous) polyethylene sheets

To minimise losses and to improve seed quality, permeable plastic sheets were tested and recommended for hilla stacking in sesame fields. The average amount of collected shattered seeds was 1 kg per hilla, which equals 25 kg for an optimum sesame field with 25 hillas per hectare. When using large drying spots, the quantity of seeds recovered is more because the sesame was better protected against wind and animal damage. The loss increases with increase in number of hillas and wind damage.

Cost-benefit analysis shows that the use of plastic sheets is in principle attractive. At a price of 40 ETB/kg and a shattering loss of 25kg, farmers lose 1000 ETB/ha. Depending on the mesh size, a farmer needs 500-600 ETB to purchase plastic sheets for one hectare, which can be used for two seasons if properly handled. Even when counting some additional labour costs, the rate of return is >50%. Using plastic sheets for drying also reduces termite infestation and avoid soiling of the stack, thereby improving the quality of the sesame seed.

Although the use of plastic sheets seems a viable innovation, both in terms of reducing losses and increasing quality, the adoption has remained very low (<4% of sesame farming households). The combination of different factors discourage farmers from investing in plastic sheets:

- Most farmers were not exposed to the innovation and are not aware of possible quantitative and qualitative benefits;
- Initial investment costs are relatively high and have to be made at a moment when farmers are very cash-short;
- Unavailability of polyethylene sheets at close distance from farmers;
- High variability of sesame market prices from one year to another;
- Lack of incentive for high quality seed, as volume is more rewarded than quality at ECX market centres.



Hilla drying on polyethylene sheet

Farmers' innovations

Very interestingly, farmers have been piloting innovations related to the establishment of large drying spots: positioning of hillas in the fields (best geometry to reduce walking distances), the drying of sesame on grass beds and the fencing of hillas (to reduce wind and animal damage).

Airtight bags

Action research has learned that hermetic bags enable farmers to store sesame, mung bean and sorghum seeds for long period without evident storage pest infestation and significant kernel damage. Hermetic bags help to minimise post-harvest losses and to maintain the quality and safety of stored products.

Performance of hermetic bags

The Purdue Improved Crop Storage (PICS) bag is a hermetic bag system that consists of two inner layers made of high-density polypropylene and an outer woven polypropylene bag. The bag is designed to enclose seeds in air-tight containers that minimise oxygen and increase carbon dioxide exchange inside. The insects' aerobic respiration depletes oxygen and increases carbon dioxide inside the bag. PICS bags and comparable Zero fly hermetic bags were demonstrated under storage conditions of farmers, cooperatives and traders. To substantiate the efficacy of hermetic bags for the storage of sesame, mungbean and sorghum, a study was made at three locations in Amhara. Hermetic bags were filled with 25 kg seeds of mung bean, sorghum and sesame and replicated three times. Polypropylene (Madaberia) bags were used as a control treatment. Insect infestation and kernel damage were recorded after one, three and six months of storage. The seed damage rate was quantified by taking random samples of 100 seeds from each bag (Boxall 1986). The weight loss due to insect feeding was quantified by counting the number of insect damaged and healthy seeds. Additional information was collected for the 1000 seed weight; moisture content and germination rate. Among others, the main observations were the following:

- The moisture content is slightly more in hermetic bags than polypropylene bags. This applies for the three crops and all months, as hermetic bags conserve outlet moisture.
- Seed viability and germination rate is not affected by storage in hermetic bags. Germination rate of seeds stored in hermetic bags is respectively 12, seven and three per cent higher for mungbean, sorghum and sesame.
- The seeds weight for mungbean, sesame and sorghum is higher for hermetic bags than polypropylene bags.
- The moisture content is more stable in hermetic bags.
- After six months, weevil damage on mungbean stored in hermetic bags was five per cent, whereas in polypropylene bags, it was 20 per cent.

Way forward

It is important to continue action research with the involvement of farmers. This contributes to awareness raising and more robust technical and economic data. It is important to listen to farmers and have an open eye and ear for their ideas and suggestions, as was learned with the farmers' innovations for the establishment of large drying spots (positioning of hillas in the fields, use of grass beds and fencing of hillas).

The best results can be obtained by combining the collection of hillas at large drying site and stacking cut sesame on plastic sheet. This could reduce field level losses by 33 kg per hectare, thereby increasing household income by 1,400 ETB. Therefore, the recommendation is to show the combined economic benefit of gathering hillas to a large drying spot and using plastic sheets. This exhibition could be done at demonstration sites, preferably on farmer field schools operated by farmers themselves. The calculations could be part of financial literacy training. The investment in plastic sheets and the extra labour costs at harvesting time should be taken into account when calculating production costs and applying for loan.

A shift from the current production system that is oriented of bulk sesame of low quality, to a quality oriented system, would be a major incentive for loss reduction measures, as these often also improve sesame quality (large drying spots, use of plastic sheets and use of hermetic bags). This is crucial as competition on quality may become more important in the near future. At that moment, grading and storage losses can get more attention. In that context, cooperatives could be capacitated to invest in professional warehousing services.

2.8 Marginal Rate of Yield and Marginal Rate of Return of essential agricultural practices

Yonas Worku, Melisew Misker, Hagos Tadesse,
Hagos Woldegebriel, Ted Schrader

By investing more, farmers produce and earn more and reduce the cost price of production per kilogram of sesame produced. This is good for farmers and for the country at large. Any one of the recommended practices leads to yield and income improvement, but the application of the full package is highly recommended because of positive agronomic and economic synergetic effects.

Introduction

For Ethiopia, sesame is the second most important foreign currency earner. Although Ethiopia is among the top ten sesame producers in the world, yields per hectare are below the world average. Many factors contribute to this underperformance: lack of high yielding varieties, sowing by broadcasting, too dense plant population, poor soil fertility, weed and pest management and field preparation. Research results and on-farm demonstrations and farmers' experiences consistently show however that sesame yields can be (much) increased by applying improved farming practices, both under favourable and less favourable weather conditions.

As indicated in paragraph 2.1, the SBN support programme and partners have invested a lot of time and effort in the promotion of recommended agricultural practices, known as the 20 steps. Significantly higher production costs explain farmers' reluctance to adopt recommended practices. Farmers are cash-short during the production season and do not have easy access to affordable credit.

In such a context, it is important for farmers to know:

- What is the Marginal Rate of Yield (MRY) if I apply a certain practice?
- What is the Marginal Rate of Return (MRR) on my investment?

Farmers need to find agricultural practices attractive. The farmers’ perception of an innovation is much related to the benefit he/she will obtain from adopting the proposed technology relative to the additional costs incurred. In the context of a cash crop like sesame, costs and benefits are mostly in terms of money, but can also concern (additional or reduced) workload, time, physical and psychological benefits.

Knowing the costs of applying certain practices and having information about the MRY helps to make realistic estimates of the MRR on investments. Knowledge of the MRY and the MRR is essential for delivering tailored advice to farmers, on how to get the highest yields and returns. It is also important to policymakers to focus on addressing challenges that hold back farmers’ adoption of yield improving technologies and practices.

MRY and MRR studies were conducted for three years (2016-2018), with the aim to have evidence about the MRY of critical agricultural practices: row planting, fertiliser application and thinning. Or, in other words, the marginal loss of yield because of non-application of certain critical practices.

Methodology

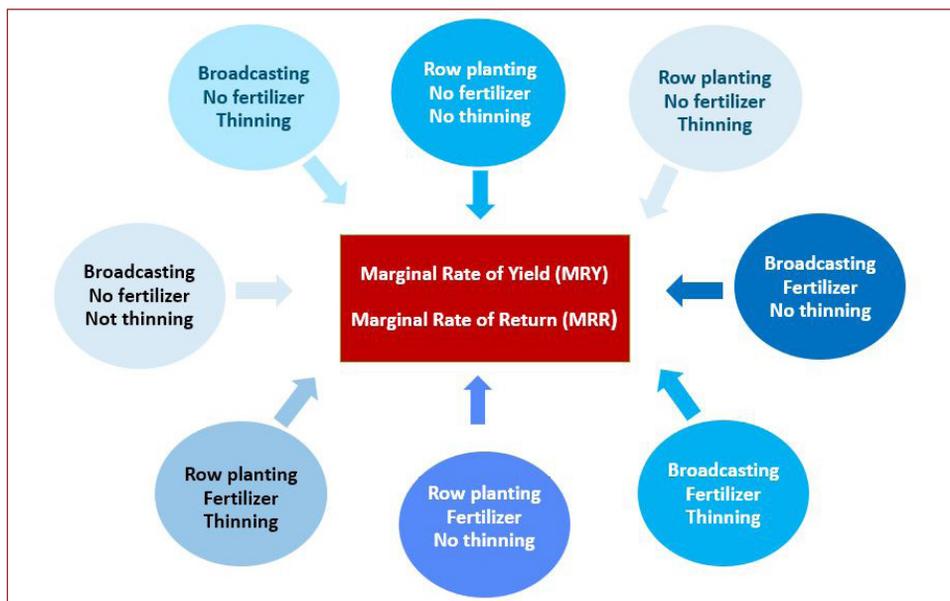
Randomised plot design

The MRY and MRR trials were conducted on research sites, FTCs, and on farmers’ fields, and focussed on row planting, thinning and fertiliser application, keeping other treatments constant or uniformly applied. In 2016, a fourth parameter, pest control, was also included. The plots were laid out in randomised plot design at 18 locations in 2016, 31 in 2017 and 20 in 2018, with a unit plot size of 50m by 50m. In addition to the ‘full package’ (row planting, fertiliser application and thinning) and farmer practice (none of these), other treatment combinations were created by eliminating one or two activities.

Treatment combinations

Row planting		Fertiliser		Thinning	
Yes	No	Yes	No	Yes	No
Green	White	Green	White	Green	White
Green	White	Green	White	White	Red
White	Red	Green	White	Green	White
White	Red	Green	White	White	Red
Green	White	White	Red	Green	White
Green	White	White	Red	White	Red
White	Red	White	Red	Green	White
White	Red	White	Red	White	Red

Treatment combinations



In each experimental site, eight treatment combinations were set up. The same varieties were used in all plots (Humera-1 in Tigray and Abasena and Humera-1 in Amhara), at the rate of 3 kg per hectare. Fertiliser was applied at a rate of 100Kg DAP and 50Kg Urea per hectare. Weeding and other farm activities were done uniformly for all plots. Two to three field days were organised before harvesting the treatment plots, with the aim to show the response of treatments and their combinations. Farmers, agricultural experts, higher officials including policymakers participated in the field days.

Recordings and calculations

For MRY calculations, 90 per cent of the yield obtained from each treatment was used. This is to avoid yield exaggeration from small plots due to the intensive care made. The adjustment made is in line with the recommendation of CIMMYT (1988) to reduce the harvested amount with 10 per cent.

For cost recording, a data recording template was prepared for each site. Extension agents assigned to monitor and record the activity were theoretically and practically trained. The real market input and output prices were used for calculating production costs and revenues. Labour time was recorded by noting the starting and ending time for each plot separately. Later, the time taken for each plot was multiplied by the amount of labour assigned for each treatment plot. To calculate labour costs, the wage rate on that particular day was used. Finally, the total labour time was converted to work days of eight work hours. The total labour costs were calculated by summing all labour days.

To calculate revenues, the average price of 40 ETB/kg was used. The net benefit of a treatment is calculated by deducting the total production cost from the total revenue.

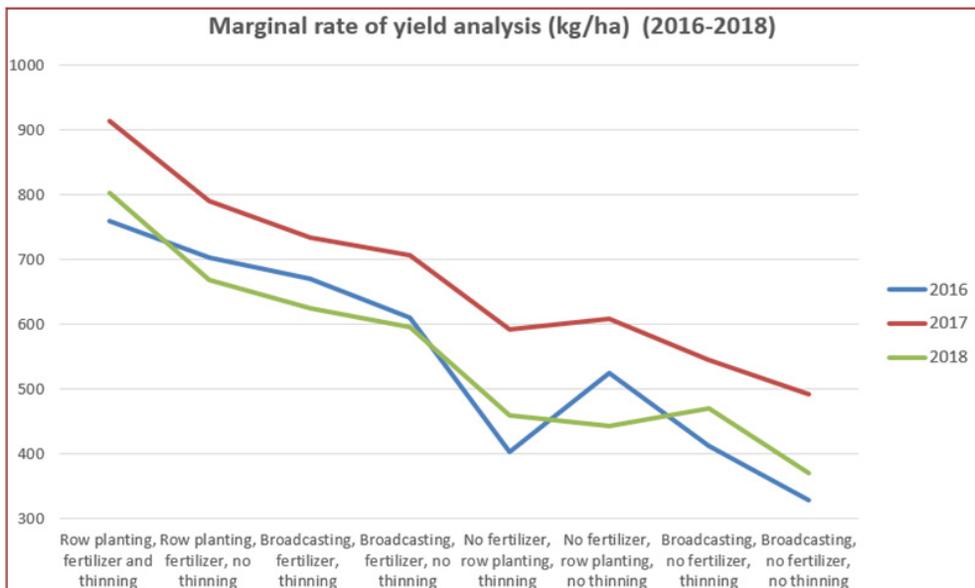
The MRR analysis focused on the economic benefits of applying fertiliser, planting in a row and thinning, and their combinations. The total production costs are composed of common costs (which relate to the costs incurred equally for each plot) and the treatment costs, which concern the costs that are specifically made for the application of the specific treatments and costs affected by the treatments i.e. weeding, harvesting, threshing and bagging costs. Weeding costs were considered as treatment costs, since planting method (broadcasting or row planting), fertiliser application and thinning affect the weeding task. Fertiliser for instance benefits both the sesame plant and the weeds simultaneously.

Results

The table and the graphs below present the results obtained during the study period (2016-2018).

Sesame yield at MRY/MRR plots and marginal rate of yield analysis

Agricultural practices	Yield (kg/ha)				Yield advantage (%)			
	2016	2017	2018	Average 2016-18	2016	2017	2018	Average 2016-18
Row planting, fertiliser and thinning	759	913	802	825	232%	186%	217%	208%
Row planting, fertiliser, no thinning	702	790	667	720	215%	161%	180%	182%
Broadcasting, fertiliser, thinning	670	733	624	676	205%	149%	169%	171%
Broadcasting, fertiliser, no thinning	609	707	595	637	186%	144%	161%	161%
No fertiliser, row planting, thinning	402	591	458	484	123%	120%	124%	122%
No fertiliser, row planting, no thinning	525	607	442	525	161%	124%	119%	132%
Broadcasting, no fertiliser, thinning	411	545	470	475	126%	111%	127%	120%
Broadcasting, no fertiliser, no thinning	327	491	370	396	100%	100%	100%	100%



Marginal Rate of Yield (MRY)

The highest three-year average yield is harvested from the full package (825 kg/ha) and the lowest from farmer practice (396 kg/ha). The full package had a yield advantage of 429 kg/ha. The combined effect of the three practices is thus doubling of production per hectare, as compared to prevailing farmer practices (average three year increase of 108%, range of 86-132%). The second highest yield advantage (324 kg) was recorded from the combination of row planting and fertiliser application, without thinning. This suggests that thinning has an interesting MRY when row planting and fertiliser use are applied. The third highest yield advantage (280 kg) was recorded from the combination of fertiliser application and thinning, without row planting. This suggests that row planting can add significantly, once farmers are using fertilisers and thinning. Fertiliser use, without row planting and thinning, still has a significant yield effect.

The findings strongly suggest that applying fertiliser has the most important MRY. Yields decrease sharply if fertiliser is not applied. Row planting or thinning alone lead to modest yield improvements. Thinning does not seem to make sense on row planted plots without fertiliser use. In 2016, when pest control was part of the experimental design, it was found that not applying pest control reduced yield by 136kg. This suggests that yields of 900-1000 kg/ha are very possible.

Cost-benefit analysis and marginal rate of return (MRR)

The costs, revenues, profits and the MRR were computed for all treatments. Table 2 combines the results obtained from Amhara and Tigray regions for the 2017 and 2018 production seasons.

Observations:

- With the highest yield and at a price of 40 ETB/kg, the revenues obtained from the full package was 34,298 ETB/ha. This is about two times more than the farmers' practice (broadcasting, no fertiliser and no thinning). The average 2017-2018 production cost for the full package was 12,070 ETB/ha. The basic cost of farmers' practices (land preparation, broadcasting, weeding, harvesting, ...) was 8,030 ETB/ha. The additional cost of row planting, fertiliser and thinning was 4,040 ETB more per hectare.
- The highest net profit is for the full package (22,228 ETB/ha), whereas the lowest net benefit was recoded from the farmer practice (9,190 ETB/ha).
- Treatments with fertiliser require a relatively high extra investment, but also have a higher net profit.
- The table in the next page shows that, starting from farmers' practice to the full package application, the costs, the yields, the revenues and the net profits increase. This implies that adopting the full package requires an additional investment that pays off because of the increased productivity and profitability.

Production improvement

Treatment	Average yield	Production cost	Revenue	Net profit	Marginal cost	Marginal Profit	MRR (%)
	(kg/ha)	(ETB/ha)					
Row planting, fertiliser and thinning	857	12,070	34,298	22,228	4,040	13,038	323%
Row planting, fertiliser, no thinning	729	11,320	29,140	17,820	3,290	8,630	262%
Broadcasting, fertiliser, thinning	678	10,943	27,138	16,195	2,913	7,005	240%
Broadcasting, fertiliser, no thinning	651	10,561	26,036	5,475	2,531	6,285	248%
No fertiliser, row planting, thinning	525	9,244	20,986	11,742	1,214	2,552	210%
No fertiliser, row planting, no thinning	524	8,946	20,978	12,032	916	2,842	310%
Broadcasting, no fertiliser, thinning	507	8,699	20,298	11,599	669	2,409	360%
Broadcasting, no fertiliser, no thinning	431	8,030	17,220	9,190	-	-	

Marginal rate of return (MRR)

To calculate the MRR, the additional profit is divided by the additional investment (cf. table 2 above). The MRR is a multiplier: a MRR of 3 (300%) means that an investment of one ETB generates three ETB. In the context of smallholder farming, a MRR of 2 is generally required to convince farmers about the attractiveness of an activity and investment. The table shows that any combination of recommended agricultural practices has a relatively high MRR. It must however be observed that the production costs do not include credit and depreciation costs. Labour costs (also opportunity costs of family labour) are factored in though, as labour work days were accounted for according to prevailing wages.

Observations:

- Applying one or two of the recommended practices can already improve the biological yield as well as the net return on investment of farmers.

- The combination of row planting, fertiliser application and thinning gives however the best result because of synergetic effects.
- It is strongly recommended to thin fields that are row planted and received fertiliser. The contribution of thinning to higher yields seems to be very high because of synergetic effects. This can be realised at relatively low cost.
- Taken separately, the extra costs of fertiliser application is around 2600 ETB/ha, for thinning 750 and for row planting 1000 ETB. When these treatments are combined, the overall cost is slightly lower than the sum of the separate costs. This is an additional reason why it is good to combine the recommended practices.
- Although fertiliser has the highest yield impact and can boost national production and farmer income, it has a good but more modest return on investment, because fertiliser application require a somewhat higher farmers' investment.
- Remarkably the highest MRR was recorded for thinning (360%). Farmers who are not yet applying recommended practices can win a lot by thinning their broadcast planted fields.

Conclusions and way forward

For the eight treatments that were subjected to the MRY and MRR analysis, the results, observations and recommendations are summarised in the overview below:

Agricultural practices	Observations on MRY and MRR
Row planting, fertiliser and thinning	<ul style="list-style-type: none"> • MRY: important synergetic effect of the three practices (+108% on average). Very high marginal rate of yield of thinning, once row planting and fertiliser are applied. • MRR is high (+323%) because of synergetic effects. The specific contribution of thinning to higher yields is very high and can be realised at relatively low extra cost.
Row planting, fertiliser, no thinning	<ul style="list-style-type: none"> • MRY: interesting yield improvement (+82%), but it is strongly recommended to thin as well. The effect of fertiliser use increases with row planting (+21%). The difference between row planted fields with and without fertiliser use is large: 50% (82-32%); • MRR: the effect of row planting is much more pronounced when fertiliser is used. It is strongly recommended to thin fields that are row planted and received fertiliser.

Production improvement

Broadcasting, fertiliser, thinning (+71%)	<ul style="list-style-type: none"> • MRY: fertiliser use gains in importance with thinning (+10% on average). A modest positive effect is observed during three years. • MRR: considering the relatively low costs, it makes sense to thin, but the results are not spectacular at all. It is much better to go for the full treatment with row planting.
Broadcasting, fertiliser, no thinning	<ul style="list-style-type: none"> • MRY: it is clear that a jump in yield starts with the use of fertiliser (+61%). Additional yield resulting from fertiliser use alone was 198, 216 and 225 kg, respectively for 2016, 2017 and 2018. Important to do cost-benefit analysis of fertiliser use. • MRR: although fertiliser application leads to a strong yield improvement, the marginal rate of return is relatively modest (248%), because fertiliser application needs a higher investment than thinning or row planting. Farmers who want to invest in fertiliser, better also invest in row planting and thinning.
No fertiliser, row planting, thinning	<ul style="list-style-type: none"> • MRY: this is a bit of an outlier, MRY is limited (+22%). If fertiliser is not used then thinning does not seem to make sense. With row planting, the number of plants per hectare is already much lower and plants are less vigorous without fertiliser. • MRR: this treatment combination is not recommended
No fertiliser, row planting, no thinning	<ul style="list-style-type: none"> • MRY: in itself, row planting is having a significant yield effect (+32% on average), but the combined effect of row planting and fertiliser use is much higher (+82%). • The MRR is in itself very positive (310%), because row planting is not as expensive as fertiliser. Cash short farmers or organic farmers could consider this option.
Broadcasting, no fertiliser, thinning	<ul style="list-style-type: none"> • MRY: in itself, thinning, as a stand-alone intervention on broadcasted fields, has a good yield effect (+20% on average). • Remarkably the highest MRR was recorded for thinning (360%), because costs of thinning are relatively low. Farmers who are not yet applying recommended practices can win a lot by thinning their broadcast planted fields. There is a need to convince farmers, train family labour and external labour
Broadcasting, no fertiliser, no thinning	<ul style="list-style-type: none"> • Predominant farmer practice, leading to low yields, between 300-500 kg/ha. • With this treatment, the production cost of produced sesame is 19 ETB per kg, which is much higher than with the full package (14 ETB/kg).

The main conclusion is that by investing more, farmers produce and earn more and reduce the cost price of production per kg of sesame produced. This is good for farmers and for the country at large.

Generally, applying any one of the improved practices alone or in combination gives higher sesame yields than the prevailing practices.

To get the highest yield advantage and farmer income improvement, the application of the full package of recommended practices (20 steps) is highly recommended. This requires an extra investment of some 4000 ETB per hectare. This amount is now inhibitive for farmers.

An action plan has to be made that should have the following key elements:

- farmers' access to agri-finance and/or input vouchers for purchasing fertilisers;
- adaptation of fertiliser recommendations to local conditions;
- strongly improved availability of row planters and machinery rental services;
- demonstration of the positive effect of thinning, both in the context of prevailing farmers' practices (as a first, affordable step) and/or in the context of applying the full package;
- continuation of MRY and MRR studies, preferably with highest involvement of farmers themselves.

2.9 Farmers' adoption of recommended agricultural practices

Ted Schrader, Yonas Worku

After years of dissemination, the vast majority of farmers is informed about the package of recommended agricultural practices. Although adoption levels are improving, these could have been much higher if fundamental challenges would have been more adequately addressed.

Introduction

This article presents an overview and analysis of the adoption of recommended agricultural practices. It is structured in five parts:

- General results of a broad household survey that was organised in 2017 after four years of dissemination of the recommended agricultural practices (20 steps).
- Adoption dashboard: overview of the adoption level and adoption trend for the 20 steps and adoption analysis according to 4 As: acceptability, accessibility, affordability and attractiveness
- Lessons, challenges, opportunities and way forward for the specific recommended practices
- Concluding observations

Results household adoption survey

The household survey involved 1 per cent of the sesame growing households (918), of the eight sesame growing woredas that were part of the SBN support programme since the start in 2013 (five in Amhara and three in Tigray).

Farmers have heard about the 20 steps

After four years of dissemination, it clearly came out that the large majority of the sesame farmers (93%) have heard about the 20 steps, with slight variations from woreda to woreda (range of 84 to 99%), as shown in the table below. Without doubt, the collaboration with the BoA and the huge efforts for training and demonstration led to this result.

Survey respondents and their information about 20 steps

Woreda	Total respondents		Heard about 20 steps?	
	N	%	Yes	No
Quara	51	100	84%	16%
Metema	201	100	89%	11%
Tach armachiho	110	100	99%	1%
Mirab armachiho	213	100	98%	2%
Tegede	99	100	92%	8%
Kafta humera	153	100	93%	7%
Wolkayit	58	100	84%	16%
Tsegede	33	100	94%	6%
Total	918	100	93%	7%

Practices that are spontaneously mentioned

To know more about the knowledge of the twenty steps, an open-ended question was put forward, asking respondents to mention the recommended practices that they know. Some 10 practices were frequently mentioned. For some practices, especially those that are generally applied, farmers did not mention these as part of the 20 steps.

Production improvement

Following the open question, respondents were refreshed about the 20 steps. For each of the steps, farmers were asked if they had tested the practice (at least once) and whether they continued applying the practice. The results are presented in the table below.

Adoption of improved sesame technologies and practices

Practices	Percentage of respondents		
	Spontaneously mentioning the practice	That applied the practice only once	That continued using the practice
> 2x ploughing	50%	51%	44%
Improved variety	48%	57%	42%
Row planting	34%	40%	25%
Fertiliser use	48%	57%	42%
3x weeding	54%	75%	71%
Thinning	32%	65%	56%
Pest scouting	41%	75%	71%
Large drying spots	29%	64%	60%
Plastic sheet	5%	10%	6%
Hermetic bag	2%	4%	3%

Adoption dashboard

Very low	Low	Average	High	Very high
--	-	+/-	+	++

The next table presents the adoption dashboard, assessing adoption levels in 2013 and 2019 according to five options: from very low to very high.

The adoption analysis can be deepened by a look at four indicators: acceptability, accessibility, affordability and attractiveness. We call these the four As that determine adoption:

- **Acceptability.** Are farmers convinced that agricultural practice or technology works out better?
- **Accessibility.** Do farmers have the access to the necessary services and inputs? Are these available in the right place at the right time?
- **Affordability.** Do farmers think that the cost of the innovation is reasonable and do they have own funds or do they have credit that can be used when the activity is to be done?

Adoption of recommended agricultural practices

- **Attractiveness.** Do farmers have confidence that the benefits of the new practice or technology will (significantly) outweigh the costs?

Adoption level and trend of recommended agricultural practices (2013-2019)

Agricultural practices	Adoption level		Adoption trend	
	2013	2019	Trend	Observations
1. Deep ploughing after harvest	-	-	=	Field cleaning, ploughing in chopped stalks and deep ploughing once every 3-5 years are rare
2. Crop rotation / diversification	-	+/-	+	Pulses (soya and mung bean) are increasingly part of the farming system
3. Land preparation/ ploughing	+	+	=	Ploughing was and is a widely adopted practice, can still be improved
4. Use of quality seeds	-	+/-	+	More varieties released and known, but supply does not satisfy demand
5. Row planting	--	-	+	High interest in row planting, but only modest row planted area because of lack of machinery
6. Fertiliser application	--	+/-	++	Less resistance against fertiliser use and modest increase of fertiliser application
7. Gap filling	--	-	+	Practice of gap filling is increasing but not widespread
8. Weeding	+	+	=	First and second weeding was and is farmer practice. Some more farmers do 3 rd weeding.
9. Thinning	--	-	+	Practice of thinning is increasing but not widespread
10. Pest scouting	+/-	+/-	=	Farmers inspect their fields; early detection of pests and diseases remains a challenge
11. Pest control	-	-	=	Effective pest control remains very limited
12. Timely harvesting	++	++	=	Farmers do whatever they can to harvest in time
13. Preparation large drying spots	--	+/-	++	A remarkable increase in the preparation of large drying spots with many hillas

Production improvement

14. Stacking and drying	--	-	+	Shattering losses still high, plastic sheets hardly used, drying on grass beds as local innovations
15. Threshing	-	+/-	+	Use of canvas is common practice – carrying dry plants to the threshing site has slightly reduced
16. Winnowing and cleaning	-	-	=	Not well done; low level of cleanliness. Quality not rewarded at ECX
17. Bagging	--	--	=	Use of new, clean bags and airtight bags is hardly existing
18. Transporting	+/-	+/-	=	Loading, transporting and unloading practices have remained the same
19. Storing	-	-	=	Storing sites and practices were and still are not up to standard
20. Monitoring and evaluation	--	+/-	++	After exposure to financial literacy training, thousands of farmers keep records

The next table summarises the farmers' perception of the agricultural practices according to the 4As (acceptability, accessibility, affordability and attractiveness).

Adoption of agricultural practices: 4A analysis

Agricultural practices	Accept	Access	Afford	Attract	Farmers' perception
1. Deep ploughing after harvest	-	-	-	-	Not part of the farming habits
2. Crop rotation diversification	+	+/-	+	-	Market perspective of rotation crops is the main challenge
3. Land preparation ploughing	++	+	+	++	Access to tractors and ploughs, or animal traction, is the main challenge
4. Use of quality seeds	+	--	+/-	+	Needs assessment, seed multiplication and distribution are the main challenges
5. Row planting	+	--	--	+/-	Row planters are insufficiently accessible

Adoption of recommended agricultural practices

6. Fertiliser application	+/-	+/-	-	-	Less resistance, increased acceptance, costs are high, doubt about profitability
7. Gap filling	+/-	+	+	-	Farmers are not fully convinced it is worth the effort
8. Weeding	++	+	-	+	Availability and cost of labour are the main bottlenecks for not weeding properly
9. Thinning	-	+	+	+	Farmers hate taking out young plants - can be done at a low cost though
10. Pest scouting	+	-	+	+	Main bottlenecks are knowledge about pest control and the availability of good and affordable crop protection products
11. Pest control	+	--	-	+/-	
12. Timely harvesting	++	+	+	++	Availability and cost of labour are sometimes challenges
13. Preparation large drying spots	+	+/-	+/-	+	How to organise the work with labourers at peak harvest time is the main question
14. Stacking and drying	+/-	+/-	--	-	Costs and rate of return of plastic sheets are prohibitive, even if much seed is saved
15. Threshing	++	+	+	++	Using canvas sheet for threshing is farmers' practice
16. Winnowing and cleaning	+/-	+	+	--	General lack of quality orientation among farmers. The lack of price incentives for quality discourages farmers to improve quality.
17. Bagging	+/-	-	--	--	
18. Transporting	+/-	-	-	--	
19. Storing	+/-	-	-	--	
20. M&E	+	-	+/-	+	Farmers' training and coaching on record keeping and their commitment and time investment are the main challenges

Lessons, challenges, opportunities and way forward for specific practices

Land cleaning and first ploughing

Only after a more generalised level of mechanisation and professionalisation it can be expected that after-harvest field cleaning, ploughing in of chopped stalks and deep ploughing once in every three-five years would become common practice. At short notice, it seems most promising for professional organic farming for progressive investors and cooperatives that are sufficiently equipped and trained.

Rotation crops

Crop rotation is not yet spontaneously mentioned as being part of the recommended practices for improving sesame yields and sustainable farming. This is a challenge to address, as crop rotation is one of the best ways for preventing soil depletion and pest build-up, and a good strategy for reducing market and weather-related risks. Awareness-raising on the possible use of new food items to diversify local diets is an important priority.

Considering the adoption of rotation crop varieties, the situation is as follows:

- Sorghum: Melkam has shown fast acceptance by both smallholder and investor farmers' and spread in all sorghum-growing areas of the two regions. Deber has good acceptance by commercial farmers, while smallholders preferred Birhan.
- Soybean: Belessa-95, Awassa-95 and Gisham are expanding in Amhara region.
- Mung bean: Arkebe is widely grown in Tigray, while Rasa is well adapted in Amhara.
- Sunflower: Oissa and Russian black are performing well in both regions, but their uptake remained slow due to a shortage of improved seed and limited experience in oil extraction from this crop.
- Haricot bean: Nasir adapts well to the lowland areas, but production is still very low. It was demonstrated to improve household nutrition level of smallholder farmers and slowly move to commercial production for export, however, its production is very low.

The demand for quality seeds for rotation crops is growing, both from smallholder and investor farmers. For the scaling of pulses, but also of sorghum, sunflower and cotton, the market demand will be crucial. Working on market linkages and contract farming seems to be the best popularisation strategy. The establishment of the Be'aker and Bure industrial parks in both regions may trigger large-scale production of soybean and sunflower.

Land preparation and mechanisation

Farmers usually sow sesame, after one or two times ploughing. Half of the respondents in the household survey had information that at least three times ploughing is recommended. When asked, close to 50 per cent of the respondents say they have tried this practice and continue. Structural improvement of land preparation practices will go hand in hand with mechanisation and the availability of machinery rental services. The recent tax exemption on farm machinery is an opportunity that has to be exploited to promote mechanisation and enhance adoption of recommended practices. Strategies should focus on tractors that are appreciated (Massey Ferguson is number one by far, followed by New Holland and Sonalika). Smaller tractors could do many field operations, except ploughing. Mouldboard, disc and chisel ploughs improved water infiltration, sowing efficiency, reduced weed and pest infestation, and enhanced crop development.

Use of quality seeds of improved varieties

Out of the household survey respondents, 48 per cent mentioned that using seeds of improved varieties is a component of the package; about 57 per cent at least tested the improved sesame varieties once and 42 per cent continued using the tested varieties. About 15 per cent discontinued the use of improved seeds because they are not sufficiently exposed or convinced about the economic effects of using new varieties (47%) and because of a lack of finance (32%).

During the same survey, farmers were asked to indicate how and where they accessed the seeds of recommended, officially released varieties (Abasena, Humera-1 and Setit-1) for the first time. By far, the most important source was the WoA (81%), followed by neighbouring farmers (9%), support programmes like SBN and ATA (6%) and cooperatives (3%). In Amhara, Abasena and Humera-1 have wider adaptation and use. In Tigray, Setit-1, Setit-2, and Humera-1 reached more farmers. The observed increase in area coverage of improved sesame varieties resulted mainly in farmer-to-farmer seed exchange. Both for sesame and rotation crops, the main challenge is the sufficient supply of quality seeds of improved and farmer selected varieties. This requires the development of the seed value chain, with the involvement of all relevant actors: GARC and HuARC, BoA, seed producer groups, large seed producers enterprises and the seed inspection authorities.

Row planting

Row planting ensures seed rate, plant density and depth; eases weeding and reduces labour cost; and facilitates pest scouting, fertiliser and pesticide application and harvesting. In the HH survey, about one-third of the respondents spontaneously mentioned row planting as one of the recommended practices. About 40% have tested it for the first time. However, only 25% of them have

Production improvement

continued sowing sesame in row, often manually or with draught animals. Those who adopted row planting, most do so by hand drilling and/or by using draught animals. This requires sufficient family or hired labor. Farmers complain that without mechanisation row planting is labour intensive and back-breaking. Hence, some farmers believe that the use of row planting may incur loss if the weather condition is unfavourable for a good yield. After trying for the first time, about 15% stopped using row planting. Reasons for discontinuation were shortage of capital (33%), high labor demand (30%), insufficient profitability (15%) or insufficient awareness (9%). The high capital and labour requirement of the technology thus restricts farmers to use the practice. For those who observed, the Sfoggia mechanical seed driller has a high level of acceptance. All efforts should be focused on increasing the availability and affordability of robust, well functioning and affordable row planters, for different categories of farmers.

Fertiliser application

Close to 50 per cent of the household survey respondents mentioned fertiliser application as one of the recommended practices. About 57 per cent of farmers tested it at least once and 42 per cent continued using fertiliser. The main reasons mentioned for not applying chemical fertiliser are capital shortage (38%), insufficient profitability (28%) and lack of awareness (15%). The recommended fertiliser rate was 100 kg DAP and 50 kg urea per hectare. The purchase of fertiliser requires cash or credit, which farmers often do not have at the beginning of the production season.

Of all recommended practices, fertiliser use has been the most controversial one. Around 2013, most farmers did not like fertilisers, because of a combination of technical and political factors. The continued investment in demonstration sites, where different treatments, including the use of fertiliser, could be observed, has gradually changed the situation (see box below). In Amhara, GARC changed the blanket recommendation from 100 kg DAP and 50 kg urea to 65 kg of urea per hectare. This was in reaction to the experiences of some investor farmers. The ‘fertiliser story’ shows that it is important to invest in dialogue and communication. Forcing farmers to use certain inputs will not work.

There is still a long way to go to arrive at integrated soil fertility management (ISFM). The most important elements of an ISFM strategy are the following: Ploughing crop residues, rotation crops (especially pulses and fodder crops), agroforestry, crop-livestock integration, erosion control, windbreaks and other cultural methods. Concerning the use of chemical fertilisers, it is of utmost importance to move beyond blanket recommendations and to have tailored recommendations, based on soil tests and optimal rate of return.

Fertiliser use: differing perceptions of farmers and experts

According to agricultural experts, farmers considered the use of chemical fertiliser as ‘a demonised input’ for sesame production in Northwest Ethiopia. Farmer opinion leaders believed that applying fertiliser kills the soil and would make it unproductive in succeeding years. The price of fertiliser and the top-down planning and forced distribution of fertiliser to cooperatives and farmers led to a widely spread distaste for fertiliser in farming communities. As part of the dissemination of 20 steps, BoA, GARC and HuARC, supported by the SBN support programme, conducted thousands of demonstration sites, with plots with fertiliser (100kg DAP and 50kg urea) and without fertiliser planted next to each other. Both smallholder and farmers were invited to observe the difference at three growing stages (seedling, flowering, and maturity). In all kebeles and investor farmer areas, farmers and opinion leaders were asked to attend while threshing to witness and record the yields. This convinced many farmers that fertiliser application significantly contributes to yield improvement. Others still doubt and put forward that fertiliser increases vegetative growth and is uneconomical.

Affordability is another farmers’ argument. After some years of demonstrations, the general farmers’ opinion can be summarised as: ‘we do not say fertiliser is useless, but we do not have money to purchase fertiliser’. Considering the experience of some commercial farmers applying 50kg urea per hectare in waterlogged fields, GARC tested different fertiliser combinations and rates. It was found that the result of using 65 kg urea per hectare came close to the harvest after using the blanket recommendation (100kg DAP and 50kg urea). This led to a new fertiliser recommendation since 2018, which triggered the use of fertiliser in Amhara.

Looking back, it can be concluded that there were two major stages. Between 2013 and 2016, farmers were very suspicious and thought SBN support programme was with the government promoting the use of fertiliser. During this period, the demonstration plots were widely spread to show the results of different treatments. Farmers could see with their own eyes that fertiliser use accounts for the lion’s share of yield increase. The period 2017-2019 was the period of scaling, both in smallholder and investor farming areas. Remarkably, quite some commercial farmers approached the SBN support programme and research centres to demonstrate the package on their farms. Investors prepared the land, purchased all inputs and managed the fields. GARC or HuARC availed a row planter and seeds of improved varieties. Experience sharing visits were organised for commercial farmers from neighbouring areas. The combination of mechanisation, improved seeds, row planting and fertiliser use is now convincing more and more investor farmers.

Weeding

It is recommended that sesame fields are weeded at least three times, respectively after 7-14 days, 30-35 days and 55-65 days after emergence. A fourth weeding could be the removal of weeds halting a clean harvest. More than half of the farmers participating in the household survey spontaneously mention three times weeding as one of the recommendations. About 75 per cent of the farmers said doing it at least once and 71 per cent said continuing to weed their sesame field three times.

Gap filling and thinning

An optimal plant density creates conditions for the best results. For sesame, a plant density of 250,000 plants per hectare is recommended. Low plant density is generally the result of using bad seeds or drought after planting, resulting in limited germination of seeds and/or drying out of seedlings. The open space is a waste of land. Gap filling is not a widespread practice. In case of insufficient germination, farmers may decide to start all over again. Dense plant population reduces yield because of the fierce competition among plants. Thinning is recommended when two-three leaves emerged and young plants are at the height of 10-15 cm. Thinning can be combined with the first weeding. In the household survey, 65 per cent of the respondents said having tried this practice and 56 per cent said to continue with thinning. At the start of the survey, only 32 per cent of the respondents did however spontaneously mention thinning as a recommended practice. Field observations strongly indicate that thinning is at best partially done. More efforts have to be made to raise farmers' awareness that thinning is a low-cost operation that can very much contribute to higher yields when: (a) a conventional broadcasted field has a very high plant density and (b) when row planting and fertiliser application are both applied.

Pest and disease control

Pests and diseases can lead to yield losses ranging from 5 to 100 per cent, depending on weather conditions, pest type and severity (Asfaw, 2018; Geremew et al., 2012; Berhe et al., 2008; Geremew and Asfaw, 1992). Due to sesame mono-cropping, webworm, gall midge and bacterial blight became serious pests that threaten sesame production. The lack of experience and skill in sesame pest identification and management are major challenges that significantly reduce productivity.

In the household survey, 40 per cent of the respondents spontaneously mention pest scouting and/or pest and disease control as part of the 20 steps. The majority (71%) of the responding farmers indicate to practice it. This shows that farmers are conscious about the risk of pests and diseases. In the survey, farmers mention pest and disease control and lack of pesticides as major challenges.

As for other subjects (seed availability, row planting, thinning, integrated soil fertility management), there is a need for a specific action plan for Integrated Pest Management to support farmers to effectively prevent and control pests and diseases.

Drying, threshing and bagging

One hilla is a line of 400 bundles of sesame, stacked in shocks of 6-8 bundles. Conventionally, hillas are scattered throughout the field, as farmers and labourers are in a rush when harvesting. Hillas dry for 12-15 days and dried sesame bundles are then carried to a more central threshing site. Research and experience have shown that this leads to high losses, at the drying spot and when carrying dried sesame to the threshing site. The conventional hillas are also sensitive to wind damage.

Although only 29 per cent of the household survey respondents spontaneously mention larger drying sites of ten or more hillas as being part of the package, it has been widely tested and 60 per cent of the farmers say to continue this practice. Although this percentage seems to be exaggerated, the preparation of larger drying sites has a very remarkable adoption rate indeed. More attention is needed for the best 'geometry' of drying sites in sesame fields and how to practically organise the establishment of large drying sites, by convincing and incentivising labourers.

Using plastic sheets for drying and threshing sesame reduces the loss and improves the quality of the produce. Putting hillas on plastic sheets for drying is a new practice that was included in the package. Only five per cent of the respondents spontaneously mention it as a recommended practice. Ten per cent of the farmers tested it once, of whom half say they continue using plastic sheets for drying sesame stacks. Drying on grass beds is more widespread. It is recommended to compare different practices to reduce shattering losses.

Very few farmers use hermetic bags for storing sesame seeds. This can only improve if quality would be rewarded. The adoption of airtight bags has the best perspective for storing mung bean.

Concluding observations

The multi-annual effort to promote recommended technologies and practices, using training sessions, field guides, demonstration plots, field days and other communication channels, has played a key role in enhancing knowledge and skill transfer. The adoption levels and trends are encouraging but could have been much better if structural challenges would have been more adequately addressed. A breakthrough is possible, but the sector is far from being transformed. The

Production improvement

majority of farmers use conventional production practices. Low-value bulk markets are still the dominant export destination. It is our strong conviction that the adoption of the 20 steps can improve yields and quality, allowing Ethiopia to access higher-value markets.

In the household survey, farmers indicate that they currently see pest and disease control, climate variability and lack of capital as the major challenges.

For pest and disease control, there is a large gap between awareness and action. Farmers are insufficiently ready to take action. Therefore, building the capacity of DAs and young and literate farmers in pest identification and management is very essential. Equally, due emphasis should be given in organising pest control groups, with increased use of ICT tools. Promoting more diverse farming systems reduce the risk of structural pest and disease problems.

Climate variability (years of high or low rainfall, waterlogging, high humidity, wind storm and dry spell during the production period) affects sesame production. High rainfall causes waterlogging and bacterial blight infection. Late rain onset delays planting. Extended rain hampers harvesting. Dry spells create favourable conditions for sucking insect pests. Uncertain weather conditions mainly slowed down the adaption of fertiliser application. Farmers could better cope with weather variability and take necessary preparations if timely and accurate weather forecasts are provided. The provision of accurate and sustainable weather information is a top priority for action.

The lack of capital is indeed a major constraint for improving sesame production, as it limits access to inputs, labour and machinery. To improve adoption, a structural solution to the liquidity problems of micro-finance institutes has to be found. Commercial banks should be convinced and supported to allocate a larger part of their portfolio for agriculture. To reduce risks of loan diversion, it is advised to release funds in at least two disbursements, based on the cash flow and financial needs of farmers. The first disbursement should be for the first and second weeding, the second disbursement should be for covering the costs of the second and third weeding and harvesting. Labour costs take the lion's share of the total production costs. Addressing credit challenges help to address labour challenges. The bottom-up agro-economic planning approach, which would induce collaboration between kebele administration and office of agriculture, financial institutions and primary cooperatives could prepare for improved farmers' access to inputs and credit.

Improved seeds and row planting are key for adopting other practices. This is because the combination of using improved seeds and row planting leads to fields that invite for better care. The insufficient availability of quality seeds and row planters are major bottlenecks that need to be addressed with the highest priority. It is advised to put emphasis on local seed producer groups and to promote machinery rental services.

Improved drying, threshing, bagging, transport and storage strongly depend on price incentives for quality, which are currently lacking. Inversely, the adoption of the 20 steps would allow for producing sesame of much higher quality. This catch-22 situation needs to be addressed.

Many of the challenges and shortcomings that hamper adoption result from the weak institutional linkage among stakeholders. All specific action plans (seeds, mechanisation, agri-finance, ISFM, IPM) require intensive stakeholder collaboration. Further improved collaboration between ARIs, BoA, ATA and Agricultural Growth Programme (AGP) can help to further scale and institutionalise the dissemination of the recommended agricultural practices. The establishment of private and cooperative farm service centres and/or machinery rental services, with strong involvement of private machinery providers and agro-dealers and financial service providers, is a good opportunity for improving access to production factors and agro-inputs thereby contributing to technology adoption.

The use of ICT solutions can innovate the training, extension and communication efforts. And, last but not least, farmers and their organisations, can be much better involved in planning and dissemination, not as target groups, but as actors and entrepreneurs.



2.10 Improving the performance of smallholder and commercial farmers

Geremew Terefe, Hagos Tadesse, Getasew Atnafu, Hagos Woldegebriel

Tailored interventions are required to improve the performance of different farmer categories. For the sesame zone in Northwest Ethiopia, this requires specific action plans for investor farmers and smallholder farmers. Considering the performance of smallholders and investors, more attention for smallholder farmers and creating a level playing field are justified.

Introduction

In the sesame zone of Northwest Ethiopia, there are two distinct production systems: smallholders and investors. The smallholder farmer production system matches semi-commercial, because of the importance of cash crops (sesame and cotton). Investor farmers are fully commercially oriented. Although both in Amhara and Tigray the classification of farmers is based on land size, farmer categories are differently defined. In the lowlands of Amhara, five farmer categories are distinguished: extra small (<5 ha), small 5-10 ha), medium (10-30 ha), large (30-100 ha) and very large (>100 ha). In Tigray, two farmer categories are distinguished: small farmers (< 20 ha) and commercial farmers (>20 ha). In Amhara, farmers with more than 10 hectares are considered investors, while in Tigray this is the case when a farm is larger than 20 hectares.

In this article, the small semi-commercial farmers and the large commercial farmers are further characterised. Based on observations about the conditions and performance of the two groups, recommendations for improving the performance of smallholder and commercial farmers are suggested.

Spatial presence of smallholder and investor farmers

In the sesame lowlands of Northwest Ethiopia, there are some 170,000 smallholder farmers and some 5,000 investor farmers. The smallholder farmers are spread over all woredas and kebeles. This group of farmers on average cultivate about 1.3 million ha of land, of which generally 40-50 per cent is covered by sesame. Investor farmers' land holdings exceeding 400,000 hectares. The investor farmers

are predominantly located in the most western parts of the sesame zone, close to the border with Sudan. Most investor farmers are in Kafta Humera (Tigray) and Mierab Armachiho (Amhara). Woredas with important pockets of investor farmers are Metema, Quara and Tegede in Amhara and Tsegede and Tahtay Adieyabo in Tigray.

Semi-commercial smallholder family farms

These farms seek to satisfy first of all the basic needs of the households. They are semi-commercial because the farming systems and livelihoods are strongly oriented at cash crops (sesame and cotton). Sorghum is the most important food crop. Crop diversity is very low because of the short growing season and the erratic nature of the rainfall. Livestock (cow and oxen; sheep and goat; camel and donkey, and poultry) are well integrated and are an important component of farming and livelihood system. These animals are kept for meat, milk and egg consumption, provide draught power and transport and are a source of income, savings and social status. Product diversity improves with the production of vegetables and fruits in home gardens or along with permanent water points.

Smallholder production is mainly based on family labour. When the farm is larger than the available family labour, hired labour is used during field operation. The household size is around five persons (husband, wife, and children) and can include other family members like mother or father, brothers, sisters and other relatives. Most households are male-headed (84%). The number of female-headed households is very important in Tigray.

Investor farmers

Investor farmers are farmers who lease large farms and agreed to commercially develop them. The purpose of the establishment of these farms is profit-making, primarily from sales of sesame and cotton. Investor farms are fully dependent on hired labour. Every year, a large number of seasonal labourers descend from mid- and highlands to work on investor farms. Investors produce sorghum for feeding labourers. Farm managers (*kobrari*), most often family members of the investor, generally supervise the large commercial farms.

Scaling of 20 steps and observed performance of farmers

The '20-steps' package was first demonstrated to smallholders. Since 2015, it was scaled to commercial farms. Full adoption of the package is rare, both for smallholder and investor farmers. Nearly 37 per cent of the smallholder farmers are partial adopters. They omit certain steps, for instance, one-time ploughing and no row planting. Or they apply practices at a reduced rate and intensity, for instance, half the rate of the fertiliser amount or not doing the second urea application. Also, investor farmers who adopt the 20 steps do it partially. Most

Production improvement

do not plant in rows, nor do they stack cut sesame on plastic sheets. Many investors do however gather many hillas to one drying site, which they see as a good practice to protect the sesame against wind damage. Fertiliser use is mostly below the recommended rate, except for farms that own a seed driller and plant in rows. Both for smallholders and investor farmers, row planting seems to induce the application of other recommended practices.

Productivity performance of smallholder and investor farmers

When both use conventional practices, sesame yields from commercial farms are generally lower than those of smallholders. This is due to the higher level of attention that smallholder farmers give to their own plots. With full adoption, smallholder farmers increase production from 300-400 kg/ha to 700-900 kg/ha. Few farmers harvested up to 1.3 MT/ha, indicating the possibility of tripling yields. With full adoption, investor farmers increase production from 300 to 600 kg/ha. Sesame productivity thus doubled for investor farmers but remained lower than the average yield harvested from smallholder fields (0.68 MT/ha).

Determining factors for yield improvement

Without doubt, it is also possible to triple yields at investor farms. Key determining factors for sesame yield improvement are appropriate and timely land preparation, use of quality seeds, row planting, fertiliser application, timely weeding, thinning and optimal plant density and distances, pest control and loss reduction. To sustain the production system, protecting natural resources, preventing soil and water quality degradation and considering economic viability and social acceptance are crucial.

You cannot manage what you cannot measure

Farm management starts with keeping records, which provide the data needed for measuring farm activities and lay the foundation for financial management. Both smallholder and commercial farmers do not have a culture of keeping records of their farm activities. Farming is not seen as a business that demands agricultural skills, planning, resource mobilisation, production cost recording and financial management capacity. Because of the lack of data, farmers do not know their farm expenditures and cannot calculate whether they made profit or not. Some farmers keep notes on a piece of paper, others try to memorise all expenses, but remember only a few of the bigger ones and often forget the smaller costs and end up with an incomplete financial picture.

Investors need to reflect better about investments

Investors often do not act as entrepreneurs . It seems that a mindset change is needed. Except for some entrepreneurial commercial farmers, investors need to think more economically about investments. It is better to acquire inputs, machinery and labour for a certain acreage and then to produce well than to occupy vast acreages without the necessary inputs and attention. It is possible to produce more on a smaller land area, at a lower cost. Investor farmers should thus plan their cropping plan based on available resources, reduce the cultivated area and apply the full package. The remaining land can be planted with less resource-demanding crops, such as sorghum, pulses or fodder crops, which can integrate the production system, contributing to soil fertility management, pest and disease control and food and income security.

Loan repayment performance

Both smallholder and investor farmers face the challenge of accessing loans but have different options. Commercial farms can access loans from banks and informal moneylenders. Smallholder farmers get loans from MFI, cooperatives, relatives, friends and from informal moneylenders. Commercial farms can have bank loans at 9.5 to 12.5 per cent interest rate per year if they submit a business plan and have hard collateral. The amount that an investor farmer can borrow depends on the available collateral. Smallholders cannot access bank loans unless they have hard guarantees in towns or cities. Smallholders can access MFI loans with group collateral, at an annual interest rate of 18-20 per cent. The loan size is however very small due to liquidity problems.

Commercial farmers' loan repayment performance

To address the commercial farmers' financial difficulties, the SBN support programme created awareness and played an advocacy role in front of policymakers and financial institutions. From 2017 to 2019, the Amhara Credit and Saving Institution (ACSI) availed 256 million ETB to 424 commercial farmers, for an acreage of close to 40,000 ha, at a calculated production cost of 6,500 ETB/ha. Although the loan was meant for improving sesame production and productivity by applying the 20 steps, the commercial farmers failed to apply the full package. Because of conventional ('business as usual') production practices, harvested yields were very low. Some lost the harvest because of weather conditions (high/ low rainfall, winds and hail). Most investors did not apply the recommended practices and diverted the loan to other purposes. The repayment rate on the due date was less than 75 per cent of the total borrowed amount. This disrupted the trust between ACSI and commercial farmers. Other banks, who were observing the case and preparing for deploying money for sesame production, lost their

appetite to do so and kept their distance. Since then, revitalisation of the relationship between commercial farmers and financial institutions has proven to be impossible.

Opportunities

There is abundant land and there are very good agro-ecological conditions for sesame production in Northwest Ethiopia. Experiences gained in working with smallholder and investor farmers show that much more can be produced, both for sesame and rotation crops. The additional investment required for doubling the yield is about 30 per cent in the case of smallholders, and 40-50 per cent in the case of commercial farms. Taking a cultivated area of 600,000 ha of sesame, multiplied by an additional investment of 5,000 ETB/ha, the additional investment that is needed is 3 billion ETB per year. If the productivity improvement is 300 kg/ha, this will generate 7.2 billion ETB (at 40 ETB/kg). The surplus production can serve as raw material for the newly developing industrial parks and oil processing companies. Investors or other entrepreneurs could also invest in cleaning, oil extraction and tahini production.

Investor farmers have land certificates, houses, stores, tractors and implements that can be used as collateral for accessing credit from commercial banks. Furthermore, they have the privilege of establishing direct marketing relations with foreign buyers for sesame and with domestic buyers for rotation crops.

Challenges

Both categories of farmers fail to consider farming as a business. This results in low technology adoption, and subsequent declining production, because of soil fertility depletion and the build-up of insect pests and diseases. In that sense investor farmers are like 'extractor' farmers: exploiting natural resources without preserving or replenishing them. Both smallholders and investors are not proactive to engage in the production of new crops.

Banks, including the Development Bank of Ethiopia (DBE), are collateral centred and urban biased. For example, in 2020, the Government of Ethiopia (GoE) allocated 11.8 billion ETB for export promotion. Surprisingly, the agricultural production side is forgotten. One may wonder: what will be exported if there is no produce. For an agrarian country like Ethiopia, the failure to give priority to agri-finance and farm investments for improving production is a self-defeating policy.

On the other hand, it should be acknowledged that the distrust of banks and MFIs in the agricultural sector is also due to the behaviour of farmers themselves. Investor farmers have succeeded in their lobby for loans but then defaulted by using credit for other purposes. Their limited performance and recorded low loan repayment rate frustrate the creditors. Therefore, for the case of commercial

farmers, default and not using the loans for the intended purpose is the major challenge, more than the lack of finance.

Experience shows there is a lot of talking about smallholder farmers, but that in actual deeds they are marginalised, in terms of availing input finance, tax exemption benefits, contract farming and direct marketing options. This should change because in actual practice smallholders perform better than investors.

For defaulting commercial farmers, the easy way to earn money is renting-out their land to others. This is a serious challenge that needs committed government officials with enforcement structures.

Lack of a coordinated database at national, regional, zone, woreda, and kebele or individual farmer levels is a major challenge. It hinders tracking performance towards sustainable agricultural production systems. Above all, limitations in law enforcement on natural resources management and conservation, especially in investment areas is an important problem that needs attention to improving investor farmers' performance.

Lessons learned

Evidence revealed that under conventional production practice, the productivity of sesame on smallholder farmers' fields was higher than that of commercial farms. This also is the case when production practices improve, but then the performance gap of investor farmers can become smaller. Sesame productivity can increase by more than double under both small and large-scale farms.

The exclusion of commercial farmers from the public extension system, while expecting that investor farmers would provide a good example (professional farms) and provide services (inputs, technical advice, machinery rental services) to surrounding farmers did not work well in the current Ethiopian context. This created a gap between commercial farmers and the government and opened a loophole for those who were registered as an investor for the sake of getting credit or renting out at a high price (up to 5000 ETB/ha) of cheaply leased land (30-75 ETB/ha). The remoteness and inaccessibility of investment areas for supervising bodies, such as land administration, has created a fertile ground for farm mismanagement. This is costing millions of dollars to the country.

Lease financing and input finance remain major challenges for farmers, both smallholders and investors. Finance is a root cause for many deficiencies in the field. Financial limitations diminish farmers' performance at all levels. In order to milk a cow, first we have to feed it.

Recommendations

Timely and correct application of the recommended agronomic practices, inputs, and use of machinery demand knowledge and skill. Therefore, there is a strong conviction that commercial farms should be managed by agricultural professionals in order to maximise farm profit from the sustained environment, increased productivity, and product quality.

Capacity building and season-wide technical backstopping can reduce the gap between investor farmers and governmental organisations and improve investors' performance. Extension agents can strictly follow the production process, assess the farm challenges, give immediate advice or bring issues to the attention of principals. Stronger working relationships can reduce distrust and contribute to the transformation of the currently under-performing investor farms into better-managed farm enterprises.

To improve the performance of farmers', government and financial institutions should give emphasis to revising current financial policies and develop new loan products, that respond to the realities and needs of different categories of farmers. Barriers for smallholder farmers have to be lifted. Smallholder farmers produce more per hectare and contribute to 60-70 per cent of the total sesame production. Nevertheless, commercial farmers have had more support and incentives than smallholders, for example, tax-free purchase of vehicles, tractors and other types of machinery and bank loans at a lower interest rate (9.5-12.5%). In the Ethiopia context, an agricultural transformation policy must foster a level playing field, facilitate equitable access to resources, and give priority to the farmer group that harvests the majority of sesame seed, while ensuring transparency and accountability.



Andualem Tadesse

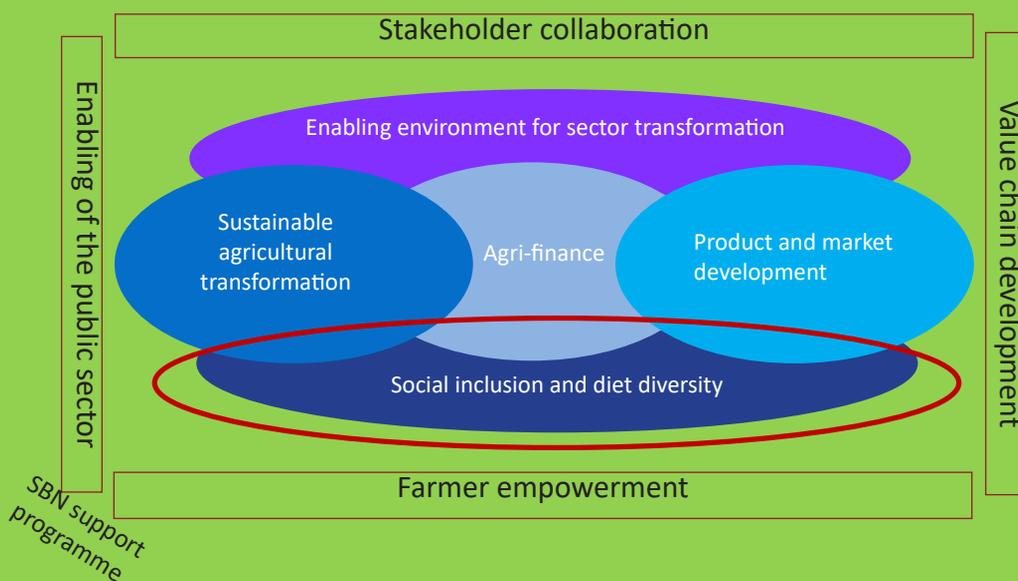
Chapter 3

Social inclusion and dietary diversity

Introduction

Social inclusion and dietary diversity are important cross cutting themes within sector transformation. To improve the livelihoods of the most vulnerable groups, tailored interventions are needed based on the specific needs and challenges related to their situation. Vulnerable groups are labourers, smallholder family farms, women, children and youth. The agricultural sector is the largest employer in Ethiopia, employing about 73 per cent of the labour force. The sesame zone strongly depends on hired labour: 75 per cent of all working days are provided by seasonal labourers. Despite the strong contribution of labourers, the services, benefits and support labourers receive is limited. The inclusion and empowerment of vulnerable groups is discussed in the first three articles of this chapter.

Nutrition improvement is critical for the development and wellbeing of current and future generations. Without healthy and diverse diets, the sectors' most important asset of human capital will deteriorate and limit the opportunities for development and transformation. Knowledge on the value of dietary diversity is limited and alternative nutritious food items should be made available in a sustainable and affordable way to gradually change consumption patterns.



Key Message

Inclusion of vulnerable groups requires a thorough understanding of the existing power balances, social perceptions and attitudes within those groups and the communities they are part of. Solutions for inequality and malnutrition need to address the access to knowledge, resources and services with effective methodologies to reach these groups. Preferably through the integration of vulnerable groups into the farming or livelihood system, adoption and sustainability can be achieved.

3.1 Labourers: unsung heroes of the sesame sector

Andualem Tadesse, Hana Getahun, Aregawi G/Silassie, Ted Schrader

Sesame production largely depends on seasonal labourers. More than half a million of poor, young, vulnerable people complement their sources of income with seasonal labour. Labour is thus not only of high macro-economic value, but also of high importance for the resilience and security of the livelihoods of many vulnerable people.

Introduction

Rural labour wages, typically for low-paid manual labour jobs in agriculture are the most important form of income for the poorest households, both for economic survival and as a pathway out of poverty (Muller and Chan, 2015). Globally, it has been estimated that up to 40 per cent of the agricultural work force is employed as labourers (Valdés et al., 2009). Accounting for 73 per cent of the labour force, agriculture is also the main employer in Ethiopia (FAO, 2019). Labourers are employed under the poorest health, safety and environmental conditions, and are the least likely to have access to effective forms of social security and protection (Hurst, 2005).

Sesame production includes time consuming, manual labour activities. Around 70 man-days per hectare are needed to produce sesame. A study of the SBN support programme, shows that at peak times sesame smallholders depend on hired labour for 60 per cent of their field operations. Investor farmers in the sesame area fully depend on hired labour for the manual production activities (SBN, 2019).

An estimated 300,000 seasonal labourers work in the sesame fields in Amhara and Tigray regions. They mainly originate from food insecure highland areas of these regions. Working in the lowlands of the sesame areas is not easy, including high temperatures (35-42°C) and the risk of illnesses emanating from communicable diseases such as malaria, typhoid-typhus and cholera.

The harsh environment and limitations in access to basic health services, nutritious food, clean drinking water and appropriate shelter create severe challenges for labourers. Because of the temporary nature of the employment, employers offer very limited support to labourers. The short-term labour requirement, limited resources of the farmers and informal nature of the employment are the major obstacles for investments in health, nutrition and living conditions for labourers. Hence, labourers in the northwest sesame zone are the most disadvantaged and socially vulnerable group of the society.

The situation can be summarised as:

- labourers constitute a very significant portion of the total workforce required to produce sesame
- are poorly paid, as employers are opportunistic and labour supply is generally abundant
- are often living below the poverty line with their families, especially those coming from food insecure Product Saftynet Programme (PSNP) woredas
- are a victim of poor working and living conditions and limited access to fundamental human rights like access to food, health and shelter

Labourers are the most important asset for the production of sesame, creating wealth for farmers and the country through (export) revenues. Despite their important contribution they are highly marginalised and ignored. Therefore, the SBN support programme engaged in activities that contribute to improved working and living conditions for labourers. In collaboration with departments and offices of Labour and Social Affairs; Health and Agriculture on zone and woreda level, the SBN support programme developed awareness creation activities. Employers were briefed on responsible use of the labour force and labourers on labour rights. Through several studies more information on hired labour in sesame production; food security and resilience and labour contracts and payment modalities was collected.

Labour demand in the sesame sector

Four main labour forces can be distinguished in the sesame region. In order of importance: 1) hired labour; 2) family labour; 3) social groups; 4) share-cropping labourers. An individual (labourer) that sells his workforce for money or in-kind payments is called hired labour. Family labour is the labour force obtained from any member of a family including parents, relatives and other extended family members or kinship working in the field that share a common living home or area. Social groups usually consist of smallholder farmers that form a group and barter labour force by working on each other's farms. Often social groups are formed by friends and neighbouring farmers or relatives for the purpose of helping each

other to finish the pressing field work on time. These groups could be formed for selected production activities or for the season. Share cropping labourers are labourers that work for one farmer for the whole production season under a special agreement. The labourer agrees with the landowner/farmer to take a quarter (25%) or one-third (33%) of the produce after harvest either in kind or cash. Small scale farmers especially FHHs enter into such type of agreements when family labour is limited, or they lack the financial capacity to hire labourers.

Sesame and sorghum are produced in rotation with other crops, including soya bean, mung bean, cotton, and sunflower. Labour requirements for sorghum and pulses (soya and mung bean) are much less than for sesame and cotton. On the smallest farms (0-2 ha of land), family labour is used for most of the field operations. Female headed households (9% and 23% of the total number of households in Amhara and Tigray) are an exception as they depend more on hired labour. Larger smallholder family farms (2-5 and 5-10 ha) need more support from hired labourers, especially at peak times for weeding, harvesting and threshing. Intermediate farms (10-50 ha) largely depend on hired labour but are still overseen by the farm owner. Large investor farms (> 50 ha) fully depend on hired labour and often have some permanent labourers. These farms are generally overseen by hired farm managers (*kobrari*).

Characteristics of labour supply

Poor people migrate to the sesame area from the highlands of Amhara, Tigray, Oromia and Southern nations regions and from Sudan. Similarly, Ethiopians cross the border to work in sesame fields in Sudan. The number of Ethiopian labourers working in Sudanese farms is much higher than the number of Sudanese working in Ethiopia.

Wherever they come from, migrant workers are always heavily disadvantaged in terms of pay, social protection, housing and medical protection (FAO-ILO-IUF, 2005). The labourers engage in various types of employment relationships, such as casual, seasonal or full-time. The categories of hired labour do not form a homogeneous group and the terms and conditions of employment vary depending on geographic area and farming system. The following categories of labourers are found in the sesame sector:

Full-time or permanent workers: these labourers engage in a relatively longer term work relationship with the employer. These types of workers receive more job security, relatively higher wages and better housing, food, water and health services than casual workers. However, this does not mean that such workers are well-paid and entitled to benefits, such as paid holidays, sickness or maternity leave or pensions (FAO-ILO-IUF, 2005).

In Northwest Ethiopia, the *kobrarries* or farm managers and the *salugs* fall under this category. These types of workers are more affiliated to commercial farms, that have labour camps. *Kobrari* is a farm manager who is hired to work permanently on farms of more than 100 hectares. Most often they are immediate family members, like sons, brothers or very close relatives, in rare cases they are mid-level agricultural and vocational college graduates. A *kobrari* is responsible for the supervision of all field activities and management of the human and physical assets of the farm. *Salugs* are labourers that permanently settled in the sesame area. These year-round labourers engage in on and off-farm paid work and are few in numbers.

Contract or temporary workers: are those employed for a specific but limited period of time. The period could be a number of days, weeks or months. This type of employment is less common in the sesame sector but sometimes used in commercial farms and in research centres for sowing, weeding and harvesting activities. Farmers also use this type of employment to hire labourers they trust or have proven their ability to perform well.

Casual/daily wage workers: refers to labourers that are paid at the end of each workday (ILO, 1994). This group is called ‘*wemya*’ in Ethiopia. An increasing number of women, living in the same village or in close proximity of the fields, are employed as *wemya*. The *wemya* gather in local physical labour markets (*Mogn mekomia*), where the employer comes to recruit strong labourers. They enter into a verbal ‘agreement’ on the type of work and compensation for that day. This is the second largest group of hired labour in the sesame area and commonly used by smallholders and to some extent by medium scale farmers.

Piece-rate workers (*Gual*): is a small group of labourers, normally friends, that move to the sesame area and work based on piece-rate agreements. *Gual* labourers negotiate the price with the farmer after inspection of the specific field. The *gual* workers are paid when the work is completed, checked and approved by the farmer. This is the largest and most important group of labourers in the sesame areas that mostly offer their services to medium and large-scale farms. They are often confused with contract labourers, while they are truly piece-rate workers.

Sharecropping labourers: are labourers who work for one farmer for a whole production season under a special kind of agreement. The labourer performs all agricultural activities on the farmer’s land, and sometimes may cover a part of the production costs, generally a quarter (25%) or a third (33%). In return, the labourer will receive an agreed share of the produce after harvesting. Most of the time, small-scale farmers hire these labourers because they lack the labour and financial resources to properly finish the agricultural activities by themselves.

An employment relationship creates a legal link between the “employee” and the “employer” to whom he/she provides labour under certain conditions in return for remuneration (Hurst, 2005). The legal employment framework is well stipulated in the ILO Labour Proclamation No. 42/1993, section four and the Ethiopian labour law No. 337/2003. The law demands a written employment relationship for all types of work, specifying names and addresses of the employer and employee, period of work, the wage rate and payment modality, signed by the parties. In the sector labour contracts are more informal and labourers do not receive any form of social security or benefits, nor paid holiday, sickness or maternity leave.

Labour movements

The frequency of labourers moving to the sesame area varies, some are recurrent labourers while others are once in a lifetime job seekers. Among others, the decision whether to return depends on a combination of factors, such as satisfaction with work and income, housing and living conditions, necessity (poverty and food insecurity), security situation, prevailing weather conditions, healthy return home and peer pressure.

Most migrant labourers stay for a large part of the season in the sesame area (from first weeding to harvesting and threshing). Drivers are the need to earn enough money to bring home, pay for the transport costs or a given commitment to work until harvest. These labourers often know the area very well (where to eat and live) and have good relations with camp administrators and colleagues (from the same zone of origin). Sometimes, labourers rent a small plot of land to cultivate during the season. Not all labourers stay throughout the season, some only work at the beginning of the season. For instance, students who have to go back to school in September. While others only go to the sesame zone during the harvesting period.

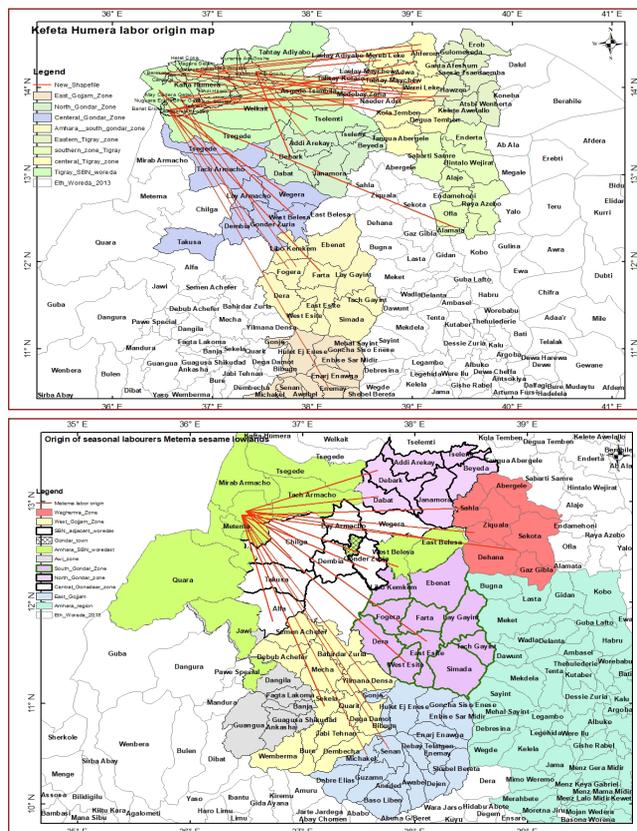


Young labourers in front of their seasonal shack

Social inclusion and dietary diversity

The first activities of the season (land preparation, planting) are often performed by permanent and local labour forces. For the next production stages, two waves of massive labour movements are observed. The first wave of seasonal labourers come for weeding (July -August). A second important wave of seasonal labourers come for harvesting and threshing (September-October). During these peak production periods labour shortage is always a problem. Therefore, some investor farmers go to their area of origin to mobilise, labourers, negotiate contracts, and arrange transport to their farms. Some farmers offer a better wage or a bonus at the end of the season in order to attract labourers. Additional labour movements take place, mainly within the same sesame woredas and zones, based on the demand and supply. Sometimes, movements between regions is observed (mainly from Amhara to Tigray).

Origin of labourers for Kafta Humera and Metema woredas



The sesame lowlands and the areas of labour origin are mutually dependent: investor farmers in the sesame lowlands cannot produce without seasonal labour and small farmers living at higher altitudes need to earn an additional income as labourer. These areas can complement each other because of the different rhythm of agricultural production seasons in the two areas. Poor small farmers in

the highlands plant the early crops of the *belg* season, before they move to the lowlands as labourers. This coincides with the peak in labour demand for sesame production. While they are away, the family of seasonal labourers takes care of the fields. Most of the 'regular seasonal movers' (an estimated 75%) go back home for harvesting the *belg* crops and for preparing for wheat or teff production.

Labour demographics

Most of the hired labour workforce in the sesame zone are men, especially in remote areas. Around towns, female labourers are involved in weeding and harvesting. At labour camps, women are mainly working as cooks. By far, most of the labourers are youth. Data of the Labour and Social Affairs offices of four woredas in Amhara suggest that 70-97% of the labourers is younger than 35. This is visible in the field. Labourers mainly consists of poor landless/jobless youngsters or students from poor families. Some very young (adolescents) people may in some areas participate in late sesame harvesting and threshing of sesame. The few older labourers (>35) are the very poor landless, singles, or family farm heads supporting their family. Labourers are not from a specific ethnic group or tribe.

Cramer, et al., (2014) reported that in Ethiopia and Uganda, the poorest members of communities, landless or FHHs depend on agricultural wage labour for their survival. The same applies to the sesame areas, where many of the places of origin are chronically food insecure and classified as PSNP area. Labourers are in most cases from resource-poor micro or small farmer families. Many labourers move to the sesame lowlands to reduce the burden on their families and aim to get back home with some bags of cereals.

By only spending money on food and other basic necessities, many try to save as much as possible to buy food, rent land, buy farm inputs, improve their house or support their family otherwise when they return. Displaced people often also end up working as seasonal agricultural labour. Members of middle-income families sometimes work as labourers because of peer pressure.



Labourers weeding sesame

Poverty and food insecurity issues push people into seasonal migration:

- Structural difficulties to make a living from micro or small farm production and revenues
- Food shortage resulting from drought, specifically during the short rainy season (*belg*)
- Weak local economy and difficulties to find off-farm employment or other sources of income
- High levels of youth unemployment
- Lack of family revenues to pay for school fees
- Inflation and related diminishing purchase capacity of household income

Contribution of labourers to sesame sector development

Labourers are at the very heart of sesame and other food crop production. As the land holding of farmers is mostly greater than five hectare, additional labour is required beyond the average available family labour. Likewise, no commercial farm would have been established in the northwest lowlands of Ethiopia in the absence of labourers. Annually, the sesame area employs an estimated 500,000 seasonal labourers that work on average 40-45 days and cover 75 per cent of the workload. On average each labourer contributes to the creation of an export value of 600 USD for the country (see blue box on the next page).

In addition to the indirect impact on development through stimulating the country's sesame export revenues, seasonal laborers directly contribute to income improvement of farm households and small businesses such as guest houses; restaurants and cafe's; roadside takeaway kiosks; street traders; shops and transporters. Thanks to the large labour movements, most village settlements are transforming into towns. Chocked thatch houses are being replaced by spacious corrugated iron roofed rooms with ventilation and most homes are equipped with colour TV sets and satellite receiver dishes. Old towns like Humera, Metema, Abrahajira, Midregenet, Sanja, Dansha are booming with modern air-conditioned hotel apartments and two to three story buildings. Though not well recognised, the contribution of seasonal labourers to the development of the area is significant.

Improving labourers' working and living conditions

While striving for responsible investment and business development in agriculture, due attention should be given to economic, social and environmental aspects. For the sesame zone, one of the key topics for economic and social inclusion is improving the working and living conditions of labourers. A challenge that cannot be tackled, regulated or managed by a single stakeholder. Various stakeholders joined hands to organise several campaigns in major towns and labour markets to

create awareness. The Labour and Social Affairs office of the respective woredas led these initiatives.

The bilateral talks, sensitisation events and discussion forums helped to review the treatment and rights of labourers. Photos illustrating the poor labour working and living conditions were distributed via newsletters, websites and social media. Many labourers are constantly moving from farm to farm to look for work. To reach these labourers, mobile cinema shows were organised at locations where temporarily large numbers of labourers can be found. More than 5,000 labourers were reached through mobile cinemas, brochures and radio programmes that were transmitted twice a week in Amharic and Tigrigna languages.

The economic value of labour:

- The expenditures for labour are estimated at 3 billion ETB or 90 million USD per annum
- The export value of sesame produced on 550,000 ha (200,000 MT) is around 10 billion ETB, or 300 million USD.
- Without hired seasonal labour, sesame production would not be possible. Each labourer contributes to the creation of an export value of 600 USD.
- Half a million of poor, young, vulnerable people complement their sources of income with seasonal labour in the sesame zone. At an average wage of 100 ETB/day, they earn some 5,000 ETB (167 USD) per season.
- This is a significant amount of money, especially for landless labourers, cross-border migrants, small farmers from food insecure highland areas and for jobless youth and students.
- Labour is thus not only of high macro-economic value (exports and food production), but also of high importance for the resilience and security of the livelihoods of many vulnerable people.



Labour sensitisation attended by hundreds of labourers

This increased the recognition of the critical role labourers play in sesame production and improved the understanding of minimum requirements for safe labour working and living conditions. According to the proclamation, investor farmers should provide quality (safe) food, clean water, shelter and establish minimum health clinics around the camps. An investment committee reviews the performance of investor farmers' in that respect and non-complying investor farmers' have been penalised. Some labourers work selectively for farmers with a good reputation on the treatment of labourers.



Mr. Mohamed Kati, investor farmer from Metema, Kokit

"I am glad that the SBN support programme facilitated sensitisation events, which is recognised by zonal and regional institutions. Once the problem is brought up and dealt with, we (investor farmers and labourers) are the primary beneficiaries. We must treat labourers the way we should, and as far as possible we must improve the working and living conditions of labourers. If labourers are treated properly, they will be productive and we will all benefit. We need to understand the reciprocal nature of our relationship, we need one another."

"The awareness campaign is really interesting, I have never taken part in such a campaign before. I was hoping for such an opportunity to express my frustration. I am a family man and make my living by working as a labourer for investor farmers. It is known that we cannot live without investor farmers and they can't produce without us. However we receive much misery. We want a smooth relationship between us and the farmers who invest. I can't tell it's just farmers who are causing the problem, there are some labourers who behave badly. Investor farmers and labourers should recognise and benefit from our shared interest. The relevant public agency should monitor and improve the relationship."



Mr. Mohamed Aman - labourer from South Wollo Borena woreda, Amhara region

Lessons learned

Despite the huge number of labourers migrating from different parts of the country to the Ethiopian sesame sector, labour shortages are still a commonly observed issue during peak weeding and harvesting times. The challenge is specifically severe in less accessible and remote farms. During these peak times, almost all farmers need hired labour at the same time. This is an opportunity for labourers to choose among employers based on their preferences and earn higher wage payments. For instance, working on larger fields secures work for a longer period. In such scenarios smallholder farmers are forced to wait up to a week or more to get labourers, which exposes them to potential crop losses due to late weeding and/or harvesting.

A culture of making formal employment agreements does not exist. Employers prefer informal/verbal agreements as they employ many labourers and value flexibility. Both sides consider written agreements as time consuming and bureaucratic, while the informal option only takes a few minutes. This practice creates a problem when conflicts arise between farmers and labourers, often related to performance and payment agreements.

In general, working and living conditions of labourers are poor. Labourers do not have access to proper shelter, sufficient clean water and safe and nutritious food items. In addition, no health services are provided and working safety is not respected. In certain cases, wages are not paid on time. As long as rules and regulations are not clear or cannot be enforced effectively, it is difficult to structurally improve labour conditions.

While the discussions on the treatment of labourers led to encouraging positive changes, much remains to be done as the process of changing attitudes requires time.

Way forward

The conditions for decent work and fair employment should be established for labourers in the sesame sector. This starts with respecting the basic human rights that are stipulated in the Ethiopian labour law that is prepared in accordance to ILO and FAO recommendations. Responsibilities to achieve effective implementation and enforcement of these rules should be assigned to the appropriate institutions and offer labourers an option to report issues and grievances.

Neither employers nor employees know the labour law. Thus, increasing awareness and understanding on the issues, challenges and opportunities related to labour working and living conditions is needed. The sensitisation events should continue. Also, the government should promote and assist farmers in developing

facilities that enhance labourers' working and living conditions. Encouragement of those farmers that perform well and using them as role models can spread preferred practices faster.

There must be a structured and organised labour market information system. This central labour information system should include the contact details of farmers and labourers, information on the labour demand for different farms and the labour supply. The information system should be supported with modern communication technologies. This would simplify the lives of both farmers and labourers and improve the way farmers and labourers reach each other. When developing the database structure, the Labour and Social Affairs office should take the initiative and arbitrate formal contracts to improve the relationship between farmers and labourers through increased transparency and legal protection.

Producing for higher value markets may induce more attention for the working conditions of smallholder farmers and labourers. Many international buyers are sensitive to discussions around 'living wage', security and food security of labourers.

The support for improving labour conditions should be institutionalised. Relevant stakeholders at all levels should work together to focus on respecting employment laws and regulations and incorporate labour topics into their regular support services. Actually, it is remarkable that there is little attention for the contributions and conditions of labourers, who, in terms of numbers, are the largest group of people involved in the sesame sector. It is not exaggerated to say that labourers are second-class citizens. There should therefore be structural proactive collaboration among stakeholders to implement the aforementioned strategies successfully.



Labourers traveling in the sesame zone

3.2 Location specific weather forecast for informed farm management decisions

Melisew Miskir, Ataklti Fisha, Hagos Tadesse, Hogos Woldegebriel

One of the main challenges for farmers in the sesame production zone is to deal with unpredictable weather conditions, which can occasion important yield losses. Location specific weather forecasts help farmers to adjust their farm activities and reduce risks.

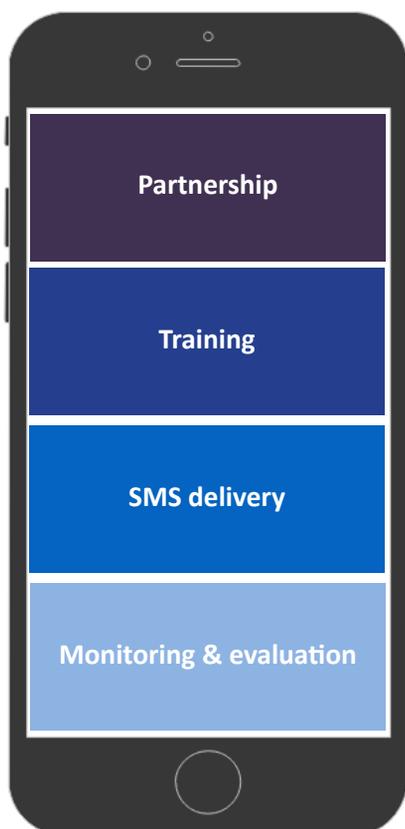
Introduction

Farmers depend on weather conditions. The amount and distribution of rainfall affects the germination of seeds, the growth of plants and the prevalence of diseases. Heavy rain or winds may cause high losses at the time of harvesting and drying of sesame. Farmers are eager to be better able to deal with the climate change they observe. While weather is beyond the sphere of control of farmers, localised weather forecasts help farmers to adapt their farm management to seasonal weather conditions, produce as best they can and reduce losses.

In Ethiopia, sesame farmers can access weather forecast information through national mass media, such as radio and television. However, these weather forecasts, which are aired at the end of the news programme, are less relevant because they focus on the weather around major cities. The National Meteorological Agency (NMA) provides early warning weather forecast information during the crop production season. Unfortunately, most farm households are not able to access this information broadcasted through television and radio. This implies that most sesame farmers produce without adequate weather information. Location specific and timely weather predictions help farmers to manage farm activities better and minimise risks.

Between 2017 and 2020, the SBN support programme, the NMA, Weather Impact (WI) and Apposit LLC made a joint effort to provide location-specific weather forecasts to sesame farmers. The key aspects of this service were accurate

weather forecast information and effective delivery to farmers via their mobile phone as a short message service (SMS). The objective of the pilot was to support farmers with making informed agronomic decisions during the production season and to create conditions for scaling the service to many farmers.



Providing weather forecast services requires accurate meteorological data, technical expertise and support from relevant

Training is given to experts that help farmers interpret the weather information and decide on the appropriate response for the farm.

Forecasts are delivered twice a week by SMS during the season containing rain, temperature and wind data for the next three days.

The accurateness of weather forecasts and the clarity of the SMS messages has been constantly improved based on user feedback.

Location specific weather forecast implementation strategy

Providing location specific weather information is critical, especially in the sesame production area where weather conditions can significantly change over small distances. In the Northwestern part of Ethiopia, 11 sesame growing woredas and more than 83 kebeles are receiving weather forecast services. A total of 15,500 farmers, DAs, researchers, and woreda agricultural experts, kebele level geography teachers were registered. The weather information is send per SMS from 8338 specific for kebeles or sub-kebeles and includes the following information: likelihood and amount of rain, the expected average, minimum and maximum temperatures and wind for the next three days.

User experience and feedback

At the end of the cropping season, the recipients of the weather forecast SMS services were asked to share their opinion about the accuracy and relevance of the weather information. Respondents confirmed persistently that the service helped them to better prepare their farm activities, improve yields and reduce losses.

Farmers mentioned that the weather information allowed for the making of decisions related to the right time of sowing, weeding, and harvesting; application of fertiliser top-dressing; the amount of labour to hire and the protection of the harvest from weather impacts. 76% of the respondents' use the wind forecast information to reduce post-harvest loss by harvesting early, taking appropriate measures in hilla stalking, threshing and storage.

Nearly 88 per cent of the interviewed farmers did not face a significant challenge in understanding the meaning of the text message. A significant number (60 - 70%) of farmers said not using the temperature forecast. It appeared that farmers are not familiar with the measurement units of weather parameters (millimeter and degree centigrade). Converting the weather information into practical farm advice is also a challenge. Trainings were organised to farmers and experts to support them to better understand and interpret the SMS message.

Farmers observed that due to network interruptions, SMS messages got sometimes delayed. Based on this feedback, the date and period of the weather forecast was included in the SMS message.

Mr. Gureshaw Yilma, 33 years old, is a farmer from Ergoye kebele in Tegede woreda. He owns 24 hectare of land and engages in crop cultivation and rearing animals. In 2017 production season, he sown sesame on 15 hectares, millet on two hectares for home consumption and forage crop as livestock feed on seven hectares. He has 50 sheep, 30 cows and an ox. Mr. Gureshaw is one of the farmers who received weather forecasts via his cell phone.

The rainfall forecast is the main information he uses. Explaining how the information helped him, he indicates that he once received a SMS forecasting rain for the next three days. He has only two permanent labourers and his plan was to thresh his crop with this labour. However, the weather information made him change his mind. He employed six extra labourers and threshed 1,700 kg of sesame within a day. As predicted in the SMS, in the evening there was heavy rainfall in his area. Without the forecast the post-harvest loss would have been huge, however the SMS helped him to save his crop.

Earlier in the season, he received a SMS message indicating the rain chance is very high the coming three days. He covered the pile of harvested sesame with a plastic sheet to protect it from damage. Similarly, he had harvested the forage and left it in the field to dry. Warned by a SMS of a high chance of rain, he quickly collected, piled and covered the forage with a plastic sheet. This protected it from the risk of fungal development which is favoured by high moisture and temperature and consequently affects the health of the animals.

Mr. Gureshaw strongly recommends the weather forecast SMS service to reach more farmers.

Lessons learned

Nowadays more and more farmers are using mobile phones which is a nice opportunity to disseminate essential weather forecast services effectively through the telephone network. The added value of the weather forecast was repeatedly confirmed by farmers and other stakeholders. The regularity and accuracy of the forecasts created trust among recipient farmers, who increasingly used the weather forecast to plan and adjust farm activities.

Weather forecasting should start at the end of the dry season and continue until all crops are harvested and bagged, so that farmers benefit from weather information for all farming operations. To monitor accuracy, forecasts were compared with observed weather conditions in the field (rainfall, wind, temperature). The forecasts were found to be close to accurate and further improved if needed through close communication between the service providers (NMA and Weather Impact- WI) and agricultural professionals in the sesame zone.

Though most farmers have limited literacy skills, children attending school help with reading and interpreting the weather forecast messages. Moreover, the content and presentation of the forecasts was continuously improved to increase the understanding among farmers. For example, the weather information must be provided in local language and the date and period of the forecast, as well as the location to which it applies have to be clearly indicated. This requires continuous evaluation and assessment with users. Delivering practical training to agricultural professionals and farmers to ensure that the weather information in the SMS message is clearly understood contributes to this as well.

Providing weather forecast information only will not solve the problem of farmers in relation to weather. The next step includes, translation of the weather forecast information into farm management decisions and farm activity adjustments which can be supported through more extended farm advisory services.

Another important aspect is the business model and sustainability of location specific weather forecast services. There are significant costs that cannot be covered by one institution or two. To ensure the sustainability of the service, eventually the end users need to value the information sufficiently and be willing to cover a reasonable cost. In the sesame zone, farmers, who have experienced the service, are ready to pay for the weather information and in the case of commercial commodities, like sesame, a levy system could also be an option.



Farmer checking the weather forecast on his mobile phone



Weather information is critical during the sesame drying period

Way forward

The pilot has proven that location specific weather forecast information service delivery is of paramount importance in the sesame sector to improve farmers productivity and reduce post-harvest losses. The only way for achieving sustainable results is through collaboration with institutions mandated for weather forecasting services. Thus, relevant stakeholders should focus on developing an accurate, affordable and inclusive weather forecast service model and act collectively. Much attention has to be given to the testing of models with continuous feedback from the end users, and to modalities to reach out to (different categories) of farmers.

To reach illiterate farmers (40% in the sesame zone), involvement of family members enrolled in education is important. Collaboration with schools and teachers providing and explaining weather information during lessons could improve the reach and understanding of the value of weather forecast services.

Ideally, the provision of weather information is accompanied by the training of farmers on how to use it for farm management decisions and complemented with extension advisory services. In this regard the MoANR has valuable experience in providing extension services to farmers. The main extension workers at kebele level should understand the meaning of the weather information to transfer the message to farmers. Therefore, training organised for these experts have to include weather information. This will help DAs to give climate adaptation recommendations and advise farmers.

At regional level, a task force, composed of plant production, crop protection, soil and water conservation specialists, can be established to develop farm management advice that are linked to the locally specific weather forecasts. Ideally, the profile of the farm like GPS location, farm size, soil type and other information should be included in a central database and taken into consideration when the advisory service is provided. In that respect, technological innovations create endless opportunities to digitalise the sector and establish sustainable services such as location specific weather forecast for all farmers.

3.3 Women and youth involvement in agricultural sector development

Andualem Tadesse, Aregawi G/selasie, Hana Getahun

Prevailing social norms determine the opportunities and constraints of women and youth. For their socio-economic empowerment and for better and more inclusive local economic development results, it is important to make specific efforts to increase the representation and involvement of women and youth in agricultural sector development.

Introduction

Smallholder agriculture is a family business venture. Adult men, however, are generally regarded as head of the household and mainly responsible for the farming business. Socially defined roles define the ownership of resources and strongly influence who receive extension or other support services. Thus, in general men make the decisions, manage the resources and receive support, while women are burdened with both on-farm and household duties and have limited influence on the management of the family farm. Youth are also disadvantaged as they have less access to economic opportunities, capital, and thus less chances to apply their skills and expertise.

For a long time, support services and development programmes mostly reached male heads of households, failing to support the female and young members of farmer households. Women, in particular female headed households (FHHs), have no collateral to apply for loans. Qualification for financial services still largely depends on the possession of fixed assets. The same goes for young sesame farmers, who often lack land ownership and the necessary working capital. Both financial institutions and extension service providers often neglect these groups. Based on the significant contribution of women to farm activities, both men and women should be considered head of the household (Amdissa, 2018). Therefore, specific attention should be given to women and youth empowerment, economic independence and social inclusion.

The overall objective of the SBN support programme is to support the development of a competitive, sustainable and inclusive sesame sector to increase incomes and spill-over effects. With the above background in mind and in line with national policies, it endeavoured to ensure that women and youth could equally benefit from the support services. Gender mainstreaming and social inclusion became cross-cutting themes for the initiatives of the SBN support programme.

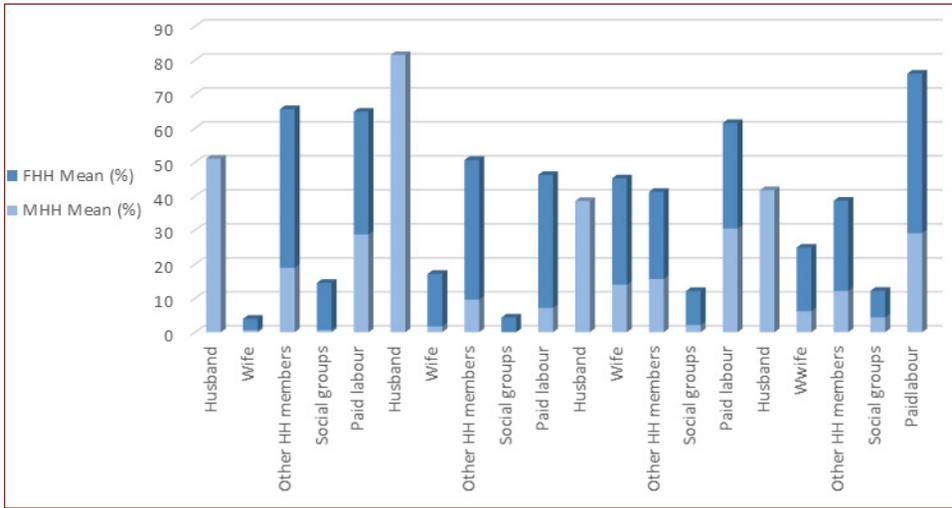
Position of women and youth

Ethiopia is the second most populous country in Africa. Women represent 50.8 per cent of an estimated population of 110 million people. Agriculture is the main source of livelihood for millions of rural men and women in Ethiopia. The agricultural sector offers employment to around 73 per cent of the workforce, of which 50 per cent are women (FAO, 2019). Women account for 47.5 per cent of the more than 1.3 million people in the 13 sesame-producing woredas where the SBN support programme operated (SBN baseline report, 2013). Of all households, 15 per cent are female headed. The percentage of FHHs is much higher in Tigray (23%) than in Amhara (6%).

The SBN support programme performed a gender analysis among farmer households to assess production relationships, the establishment of targets and objectives within the household, resource allocation, division of labour, and decision-making processes (SBN, 2018). The study revealed that there is a high involvement of all household members in various farm activities, but roles and responsibilities differ. Especially in smallholder families, women perform a major part of the family labour. Though land preparation is the responsibility of male members in both MHHs and FHHs, women engage in other farm activities like weeding, harvesting and cleaning (see the figure on the next page). Some women also work on large-scale farms, mainly as seasonal labourers.

The study results showed that while women contribute significantly to agricultural activities in married households, the value of their contribution is not completely acknowledged or appreciated. Women rarely engage in decision-making equally and do not take an equal share of the rewards compared to their male counterparts. Development agents and other support providers often do not invite women to workshops and trainings. Within other activities along the sesame value chain, the number of women and their participation gets even smaller. It is for instance very unusual to see women in sesame spot markets as a trader or involved in transportation, processing and exporting (SBN, 2018).

Labour division among HH members on farm activities



When we review the involvement of women in rural organisations, their participation is limited. For instance, from the total 185,082 members of 251 sesame farmers cooperatives in the thirteen woredas of the SBN support programme, only 28 per cent are female in Tigray and 22 per cent in Amhara.

Another important segment is youth. The United Nations define youth as any individual in the age group of 15 till 24 years old (United Nations, 2001). According to the African Union youth are between 15 and 35 years old (African Union, 2006). In Ethiopian law, everyone with an age between 15 and 30 is recognised as youth. More than 28 per cent of the Ethiopian population is aged 15 to 29 (FAO, 2019).

It is difficult to find accurate age disaggregated data for the sesame sector. In towns, villages and in the fields it is however clearly visible that the youth dominate. Youth are engaged in different farm activities. Data of the Labour and Social Affairs offices of four woredas in Amhara suggest that the number of labourers younger than 35 lies between 70 and 97 per cent. This group predominantly consists of poor landless/jobless youngsters or students from poor families in nearby zones and woredas (cf. 3.1). For most young people in rural areas of Ethiopia, agriculture is not an appealing enterprise. Many think that agriculture requires (too) much energy for (too) meagre earnings and little room for improvement in life.

The main challenges for women and youth in the sesame sector are:

- **Mindset:** Internalising gender and age equality in the mindset of experts, leaders and women and youth themselves is a major challenge. Though the SBN support programme in collaboration with stakeholders made a huge effort to increase women participation, the prevailing trends, norms and attitudes remain a barrier.

- **Access to services:** Women and youth have limited opportunities to develop capacity, to access resources and face systemic barriers to borrow money from formal financial institutions. Often services do not target women and young farmers. Input, extension, information and financial services systematically bypass women and youth. Financial service providers are hesitant to provide credit due to lack of collateral and perceived higher risk profiles, which is related to the difficulty of women and youth to acquire land. Socially defined roles, capital shortage, lack of land and limited exposure to training result in limited income earning opportunities, among others because women and youth cannot invest in inputs and GAPs.

Interventions to enhance the participation of women and youth

Increase access to knowledge and skills

In training, the inclusion of women and youth was a specific objective. Traditionally, women and youth hardly attended training. The SBN support programme helped to raise these levels to reach for example 24 per cent women and 29 per cent youth of the 162,545 people trained in 2018 GAP training. Also, during the field days and exchange visits, female attendance increased to around 21 per cent. During activities on nutrition improvement and home gardening half of the participants were female (49%) (cf. 3.4 and 3.5).

Targeted and tailored training sessions allow to focus on specific situations and challenges related to the position and needs of women and youth. In such sessions, women feel more at ease to freely and openly discuss certain issues. The mainstream extension efforts also started to follow this approach and adapted the training sessions for the training of youth and women separately. Accordingly 16,000 and 50,000 women were trained on GAP in 2017 and 2018 respectively.



Women cleaning seed

Facilitate access to credit

Access to credit is one of the major constraints that hinder women and young farmers from investing in their farm businesses or other economic activities. Therefore, specifically women farmers were targeted as beneficiaries of cooperative input loans through the marketing credit initiative (cf. 4.3). Of the total beneficiaries 21 per cent and 22.5 per cent were female farmers in 2017 and 2018, respectively.

“The credit accessed by the guarantee fund has helped me a lot. Once upon a time, I was in a bad financial condition and planned to sell the farm because of the shortage of money. Due to the loan that I received from the cooperative for the past four years, I didn’t had to sell my farm and it supported me to pay the school fees of my children.”

Mrs. Mulu Mekuriaw – female member Meka cooperative and loan beneficiary

Adopt a farm household approach

Participants in the financial literacy training declared they often record their costs as husband and wife (cf. 4.2). Children help with reading, writing and calculations. This household and family farm perspective is very interesting, as it may contribute to improved internal household communication and transparency and to the inclusion of less literate farmers. Based on these findings, trainees were invited to attend the training together with a family member. For instance, in 2018 about 7,791 farm household heads including their family members were trained, of whom 30 per cent were youth.

Lessons learned

The most important lesson learned is that including and engaging women and youth in the support activities has vital significance to make sector transformation more inclusive and to avoid that position of marginalised groups is further weakened. Any initiative aimed at changing the livelihoods of rural communities needs to come up with a plan on how to reach and capacitate different social groups.

The SBN support programme promotes collective planning with partners, placing vulnerable groups at the centre. This strategy played a crucial role in changing the efforts of stakeholders to mainstream women and youth within their interventions. In general, using a gender or age lens in the design of activities helps to better understand the roles and needs of various groups. Women and youth face different challenges than adult men in the sesame sector. Next to the planning phase, gender and youth parameters should be included in the monitoring and evaluation framework to effectively measure the progress and impact.

This starts with considering the situation and position of women and youth for capacity building activities. For instance, it is important to bear in mind that women in general are very busy with domestic work and cannot leave children at home to attend trainings. Capacity building activities targeted at women and youth should therefore consider these specific circumstances and adapt the training delivery accordingly.

The influence of social and cultural expectations on the position and opportunities of women and youth is enormous. The shift of values and perceptions within a community is a long-term process, yet necessary for the structural inclusion and empowerment of these groups. It is also delicate. For example, male heads of sesame households, often find it difficult to send or bring their spouse or daughter to meetings and trainings based on traditional beliefs, which undermined the adoption of a farm household approach in the financial literacy training to a large extent.

Way forward

From the lessons and experiences of the SBN support programme, the following directions are suggested as a way forward to enhance the involvement and empowerment of women and youth in agricultural value chains. Most importantly, gender and youth mainstreaming should be included in any support service before implementation. Projects can be an example for other institutions and stakeholders by establishing clear and achievable targets for the inclusion of women, youth and other socially disadvantaged groups. This can be strengthened through defining SMART monitoring and evaluation indicators and continuous follow-up. In order to tackle gender and youth inequality in public institutions, awareness creation on the importance of providing tailored products and strategies for various groups, is needed.

Enhancing women's involvement in decision-making at the household and community level would help to change cultural expectations and behaviours that impede women's involvement and empowerment. Increasing women participation in different development initiatives and their representation in different institutions will provide them with the necessary opportunities to empower and contribute to change themselves.

3.4 Household nutrition and dietary diversity

Andualem Tadesse, Hana Getahun, Ataklti Fisha

Increased agricultural productivity raises the income of farmers but does not necessarily make them food or nutrition secure. Improving the diversity of agricultural production systems is an essential part of the solution in order to increase the sustainable availability of varied foods and thus ensure nutritional food security for farm households.

Introduction

The development agenda on nutrition is gradually shifting from examining nutrition from a purely quantitative perspective towards dietary diversity. This shift is described by the term ‘hidden hunger’, referring to a situation where the amount of calorie intake is within the benchmark, but there is a serious shortage of fundamental macro- and micronutrients (Muthayya et al., 2013). This usually happens when diets mainly consist of starchy staples and not enough nutrient-rich foods such as fruits, vegetables, legumes, and livestock products. A household is food secure when they have physical and economical access at all times to sufficient, safe and nutritious food that is required to lead an active and healthy life (FAO, 1996). People are nutrition secure if, in addition, they also have access to adequate caregiving practices, hygienic environments and health care services that allow them to stay healthy and utilise the foods they eat effectively (Ghattas, 2014).

In Ethiopia, several efforts aim to improve the food and nutrition security of the population and encouraging results have been reported. Especially on reducing the malnutrition among children. Between 2011 and 2016, stunting and underweight were reduced from 44 to 38 per cent and from 29 to 24 per cent respectively. The level of wasting remained at 10 per cent (UNICEF, 2018). However, malnutrition is still a public health problem and remains a concern within the country’s rapid economic development (WFP, 2019).

The highest prevalence of food energy deficient households is found in Addis Ababa (50%), Amhara (49%), and Tigray (42%) (UNICEF, 2018). According to the WHO classification, malnutrition is in Ethiopia more prevalent in rural areas and 24 per cent of the children under the age of five are underweight which is considered a 'serious' population health problem (WFP, 2019).

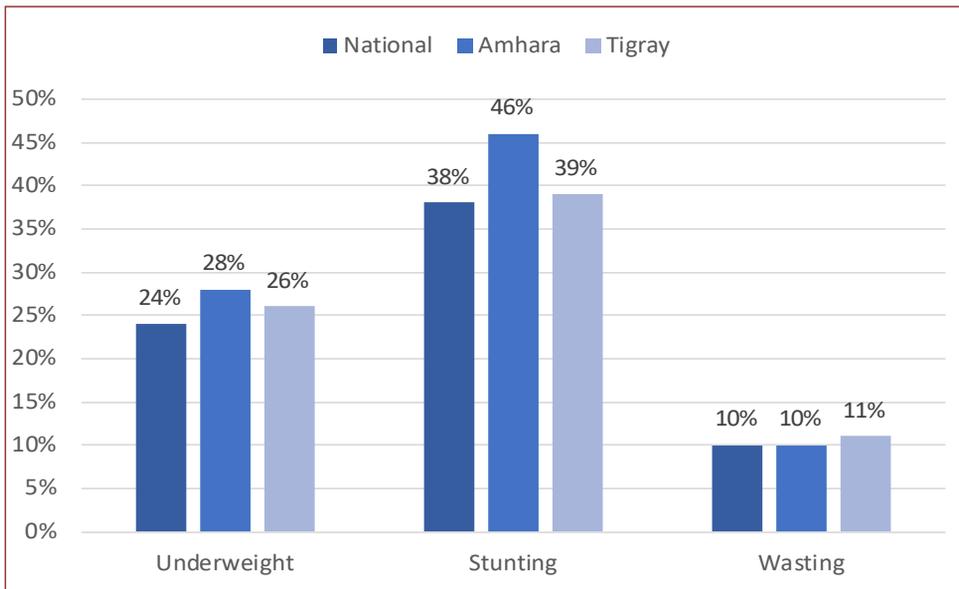
Dietary diversity in the sesame areas

The sesame production area is a commercial area, where farmers primarily grow cash crops (sesame and cotton). National and regional studies show that in the sesame growing areas farmers' income and food availability is relatively higher compared to other areas. Many argue that commercial farmers are therefore food secure. The assumption is that a higher income stimulates farm investments that lead to higher production, which further boosts food security. However, empirical evidence suggests that an increase in income does not necessarily result in a higher or a more nutritious consumption of food. Some researchers claim that commercialisation leads to less crop diversification, which has a negative impact on the food security of farm households (Achterbosch et al., 2014). Farm households who grow multiple crops increase their access to various food types, thereby enhancing the nutritional status of their household. Thus, the diversification of agricultural production systems is increasingly recognised as a potential solution for providing more nutritious food within farm households.

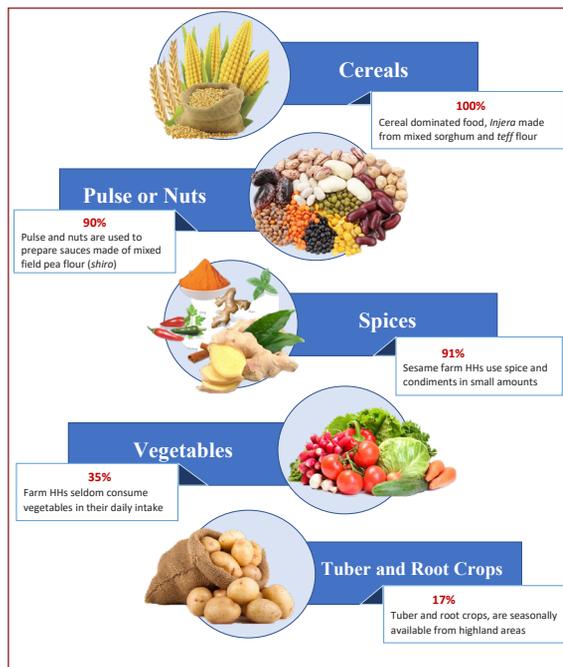
Farmers in the sesame area mainly produce sesame and cotton as cash crops and sorghum as the staple food crop. Usually, these farm households consume *injera* (pan cake) made of sorghum and *teff* flour with a sauce made of field pea flour (*shiro*) and some spices. In these areas most farm households have a homestead plot, but a culture of planting leafy vegetables, roots, tubers, and fruits hardly exists. Farmers attribute this to the arid nature of the area and water scarcity during the dry season. The limited production diversity in the sesame sector leads, together with other factors such as poor food habits and awareness, to a lack of diversity in meals. Farmers consume mostly cereals, while vegetables and fruits which are rich in vital nutrients, vitamins and minerals are missing. Malnutrition is a serious, common health problem in the sesame area. The figure on the next page presents the nutritious status of children in the Amhara and Tigray region compared to national averages.

The results of the nutrition survey performed by the SBN support programme, revealed that three food groups are mostly consumed: cereals (100%); pulses or nuts (90%) and spices (91%). Other food groups consumed by less households are vegetables (35%), tuber and root crops (17%); and oils/fats (12%). The average Household Dietary Diversity Score (HDDS) lies in the lowest tercile (3.8), meaning that there is a low dietary diversity.

Nutrition status of children and nutrition survey result of sesame farmer HHs



The nutrition survey indicates that respondents, when thinking about nutrition, mainly consider the amount of food that is consumed. This is reflected in the survey results where respondents share the belief that they consume enough. Consuming food mainly made of cereals, which is high in starch but low in protein, fat and micronutrients, result in under-nutrition even if dietary energy intake is sufficient (Abeshu et al, 2016). The study result of the sesame area is comparable with a national survey that shows that the share of starchy staples in total calorie consumption is very high (71.4%) reflecting a highly unvaried diet (WFP, 2019). This contributed to stunting, nutrition related anemia and iron, zinc and vitamin A deficiencies. The prevalence of these problems is indeed very high in the two regions (UNICEF, 2018).



The survey revealed that there are substantial differences in the perceptions related to nutrition problems. For instance, around half of the respondents do not perceive malnutrition as a major cause for stunting while the other half does. Actually, 52.9 per cent of the respondents do not relate malnutrition to the quality or type of food. This implies that consuming food made of sorghum and pulses alone is considered as healthy in the sesame area, even among households, that can afford to eat other food types. Awareness creation on nutrition thus needs to be improved among sesame farm households.

Labourers

Labourers are another important stakeholder group in the sesame area (cf. 3.1). Especially, large scale farmers are highly dependent on labourers. These farmers normally provide shelter, food and water in addition to wages. However, in most cases the quality, safety and nutrition levels of the food are not up to standard. The provision of monotonous low quality diets to labourers is the norm in most investor farmer camps.

Thirty labourers in Metema and Quara were asked to recall what they ate in the past 24 hours. Obviously, this does not give a picture of dietary habits. Nonetheless, the diet information obtained from labourers showed that the HDDS score of labourers is even lower than farm households (3.5) and 64 per cent of them eat less than three food groups (cereals, pulse and spices).



Labourers preparing food

Promoting nutrition sensitive agriculture

Many agricultural programmes are not necessarily designed to improve nutrition but have a great potential to do so (Ruel et al. 2013). Diverse production systems influence the availability and access to food for smallholders (Herforth and Harris, 2014). The SBN support programme advocated and promoted nutrition sensitive agriculture by introducing new nutritionally dense and marketable crop

types. Improving farmers' household nutrition status involves capacity building, awareness creation, and facilitating the access to resources.

Multi-stakeholder approach

For ownership and sustainability of change processes, the SBN support programme followed a multi-stakeholder approach. The BoA, ARIs, Health offices and farmers collaborated. The involvement of various stakeholders, directly or indirectly linked to nutrition enhancement, has helped to address the key challenges for dietary diversity improvement at household level.

Production diversity through scaling up rotation crops

To sustainably provide varied food and thereby ensure nutritional food security of farm households, improving the diversity of agricultural production systems is increasingly recognised as a promising option.

Accordingly, soybean and mung bean were promoted as rotation crops (cf. 2.3). These pulses have three advantages: nitrogen fixation and soil fertility improvement, nutritional value (protein of plant origin) and market perspective (ECX commodity and increased demand of traders and agro-processors). The acreage of these crops is modestly expanding and farmer households are starting to consume them (especially mung beans). Marketing of these crops used to be the main challenge, but with the opening of agro-processing companies demand increased, especially for soy bean in Amhara (cf. 5.4).

Home gardens for household nutrition improvement

Home gardens play an important role in fulfilling dietary and nutritional needs by providing households with direct access to food that can be harvested, prepared and consumed by household members. Home gardens were piloted in two woredas to create awareness on the importance of nutrition and the need for eating more diversified food. The pilots proved that it is possible to produce vegetables and other crop types in home steads in the sesame area, even when there is water scarcity and high evapotranspiration (cf. 3.5).

Increase awareness and influence consumption patterns

To stimulate the consumption of rotation crops (soya and mung bean) and crops produced in the home gardens by households, training sessions on food preparation were organised, during which recipes for pulses, sorghum, fruits and vegetables were shared. The training showed how easily different meals can be prepared from soya, mung bean and the vegetables produced. Participants tasted the food prepared and provided positive feedback. The combination of capacity building for the production of new crop types and awareness raising on nutrition, helped to enhance local product development and consumption.

Lessons learned

One important lesson is that the general conviction that commercial farmers are more food secure may not necessarily be true everywhere, especially not according to the FAO definition. While the income of cash crop producing farmers in Northwest Ethiopia might be relatively higher than of other farmers, their nutrition status is very poor.

The market orientation of sesame farmers resulted in the production of only a few crops which reduced the diversity of farming systems and resulted in a very low HDDS score. This can be reversed through the promotion of rotation crops and home gardening. The home garden pilot proved that it is possible to supplement and diversify household food consumption by producing vegetables and other crops around the homestead. Nutritionally dense pulses (soya and mung bean) can improve the household dietary diversity. However, the limited availability of a market and a lack of consumption hindered a quick adoption of these crops.

Food preparation and tasting events help to increase farmers' awareness about the nutritious value of various food items but the structural change of food habits is extremely difficult.

Way forward

Sesame farm households considered themselves as food self-sufficient families. However, from a nutrition perspective this is often not true. High income does not necessarily guarantee consumption of ample diverse food in a household. So, in any effort to improve the household nutrition status, creating awareness on nutrition and dietary diversity should get sufficient attention.

Social and Behavioral Change Communication (SBCCS) seems to be a good option for promoting nutrition sensitive agriculture. SBCCS concentrates on awareness raising on nutrition and practical actions, taking social norms, attitudes and beliefs into account.

The promotion of rotational crops (soybean and mung bean) is an important step for nutrition and food security of sesame farmers. The effort must be further strengthened by adding more crop types and scaling to more woredas. Similarly, capitalising on the experience and lessons from the pilots, home gardening should also be scaled out further (cf. 3.5). This requires continued collaboration among stakeholders. Facilitating multi-sectoral stakeholder collaboration will help to create strong and consistent interventions to address the various causes of malnutrition.

3.5 Piloting home garden

Hagos Woldegebriel, Ataklti Fiseha, Hana Getahun, Andualem Tadesse

A household approach towards home garden promotion can enhance food availability and diversity, primarily through increased home production and consumption and through the income generated from surplus sales.

Introduction

Homestead gardening can be an effective strategy to improve food security and diet diversity of farm households, especially in countries like Ethiopia where farmers only produce a few crops. In many parts of the world, home gardens provide supplementary food, fuel and fodder, and serve as a recovery area for households (Reta, 2016). If done correctly homestead production can also supplement farm household income.

Home gardening can be integrated in the farming and livelihood system of sesame farming households. Most farm households in the sesame zone, have some space in their backyards that is used to grow cereal crops, especially maize. They have limited experiences with the production of vegetables and fruits in home gardens. Due to the narrow food diversity (mainly cereals, pulses, and oils), malnutrition and stunting are critical health problems (cf. 3.4). Although farmers earn cash income with the production of sesame and cotton, they do not use this for diversifying the food they buy and consume.

Recognising the challenges and seeing potential for change, the SBN support programme promoted home garden production in nine kebeles, in collaboration with five woreda offices of agriculture, Gondar and Humera ARCs, Benefit-CASCADE programme and health professionals from Gondar University. The production of vegetables and fruits was introduced, piloted and demonstrated. The pilot also included the demonstration of different food recipes for home garden products and certain field crops such as sorghum, soybean, mung bean, teff and wheat.

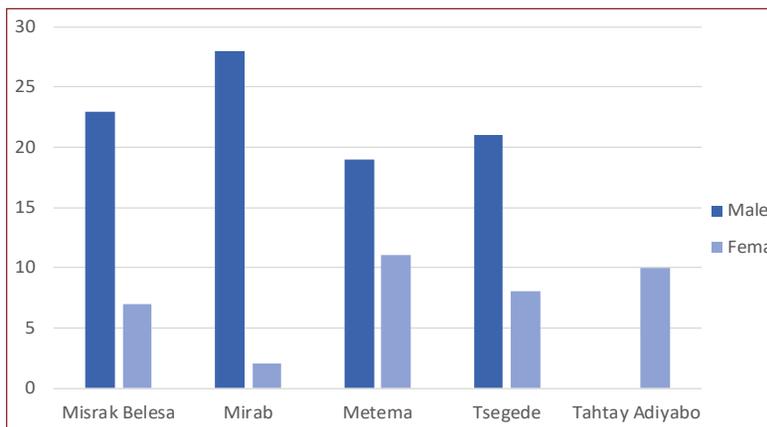
Piloting home gardens

The home garden pilot was conducted from 2018 to 2019 in five woredas in Amhara and Tigray regions. Woreda and kebele agricultural experts selected kebeles and participating farms. Criteria for farmer selection were farmer interest and willingness to participate, access to water sources, availability of space in the backyard and family size. Reflecting the generally observed male bias (cf. 3.3), only men were invited for the first year of the pilot. Considering the potential role of women in home gardening, both husband and wives were invited in the second year. In total, 129 hosting farmers were selected (91 men and 38 women).

After the training of woreda experts and DAs, the selected farmers were trained together with their family members (total 250). Main training topics were: setting up a home garden, collecting grey water after households use, agronomic practices for different vegetables and fruits and the nutritional value of vegetables and fruits. At the start of the pilot, farmers were provided with vegetable seeds, a row maker, buckets and watering jars. Farmers were responsible for land and compost preparation, fencing, seedling raising, transplanting, pest and water management. Woreda experts and DAs, together with SBN support programme staff, monitored field activities and gave technical support to farmers.

Both in Amhara and Tigray, the home garden pilots recorded successful results that can be scaled to other woredas and kebeles. Demonstrations, training sessions and field days raised farmers' awareness, not only on home gardening, but also on diet diversity and nutrition. As from the onset of the pilot, it was foreseen that participating farmer households would share experiences with two to five neighbouring households for scaling good practices within the community. Experiences and lessons learned with home gardens will also be shared among relevant stakeholders.

Number of farmers participating in home garden pilot



“We are greatly benefitting from home gardening”

Mr. Gashaw Mesafnt, aged 37 and a father of four children, is a sesame farmer who lives at the outskirts of Dansha town. The sesame and sorghum that he produces is not enough for him to lead a better life. To supplement their income, Mr. Gashaw and his wife Mrs. Enanye Tizazu started growing vegetables and fruits in their backyard a couple of years ago.

Building upon their previous experience and the provided training and technical support, they started to produce vegetables. “Not only I and my family, other people who happen to be here in our garden feel happy when they see the papaya, guava, lemon, mango trees and the vegetables such as okra, sweet potatoes, green pepper, tomato...”, said Mr. Gashaw. Their garden is always filled with fruits and seasonal vegetables except for two hottest months in the area - April and May. In these months, there is water scarcity due to high evaporation.



Gashaw’s family largely uses the vegetables for home consumption. In case of surplus, they share the okras with neighbors. They also earn a good deal of money from the sale of fruits. Mr. Gashaw said “Thanks to God! we are doing well. We have had enough for our family. We earned more than 3,000 ETB from the selling of mangoes. This money covered the labour cost of weeding sesame. I also got over 7,000 ETB from the papayas.”

Mrs. Enanye adds : “Our kids get what they want from the garden. We will never stop growing vegetables and fruits as we have seen the benefit. Although it is challenge, we will continue the search for seeds”.

Mr. Gashaw Mesafnt and Mrs Enanye - Dansha, Tigray

(SBN newsletter Issue 21, 2019)

Women involvement

Women play an important role in food production but, at times, their role is not recognised as such. In practice, home gardening is mostly done by women. It enhances womens’ economic empowerment and decision-making power. This is not to say that home gardening is a female activity. Both husband and wife, children and any other members of the family capable of doing small farm activities can contribute. The pilot proved that households can establish diverse home gardens, which contribute to household nutrition improvement.



Fruits and vegetables	
Fruits	Vegetables
Papaya	Onion
Mango	Tomato
Lemon	Leafy vegetable
Guava	Swiss chard
Water melon	Okra
	Lettuce
	Pepper

Lessons learned

The pilot was successful in demonstrating and promoting home gardening. Home gardening can be integrated in the farming and livelihood system of sesame farming households. The income from sesame and other field crops can be invested in home gardening. The money from the sale of fruits and vegetables can support sesame production costs. It also showed that home gardens can enhance household food availability and diversity, primarily through increased production of food grown in the homesteads and through the income generated from surplus sales.

Since the sesame area is very hot, availability of water is a big challenge. Most farmers mention that water scarcity is the main reason for not having an operational home garden. Some of the successful gardens during the pilot were the result of household willingness to invest in water wells and water conservation. Successfully demonstrated activities led to spontaneous adoption of home gardens by neighbouring farm households that were not targeted during farmers’ selection. Farmer-to-farmer extension should be at the heart of a promotion campaign.

The trainings, which were not only about production but also about more nutritious and diversified diets, were successful in changing farmers' awareness and attitude regarding household nutrition and how it can be supplemented with homestead food production. This needs much more attention as diet diversity is very limited and awareness on nutrition and food diversity is low in the sesame production zones of Amhara and Tigray.

A family approach, training household heads and other family members together was an effective way to create awareness, ensure access to information, knowledge and skills. The pilot showed that if women are targeted it will help to empower them by improving their role and control over household resources and enhancing their decision-making power.

Finally, achieving the desired impact requires the collaboration between stakeholders, from the bottom to the top and back from higher to grassroots levels.

Way forward

The ultimate goal of homestead gardening is improving household nutrition and health by consuming produced vegetables and fruits or by buying additional foods from the generated income. To achieve this goal, the promotion of home gardening should be accompanied by nutrition education and appropriate extension support. If the scale improves, fruits and vegetables, together with cereals and pulses that are grown as rotation crops, can improve the monotone diet of sesame farming households. Based on the pilot experiences, a home garden scaling plan has to be made per kebele and woreda.

These scaling plans need to include mechanisms for the sustainable and regular supply of, seeds, inputs and technical support. To scale out the homestead gardening, linkages between input suppliers, service providers and farmers should be created and strengthened. Options for water conservation and smart water use should be further developed. Some of the successful gardens during the pilot showed that water scarcity could be managed through innovative ways of conserving moisture. Woreda and kebele action plans should specify the investments that could be made to improve water availability. Economies of scale can be created.



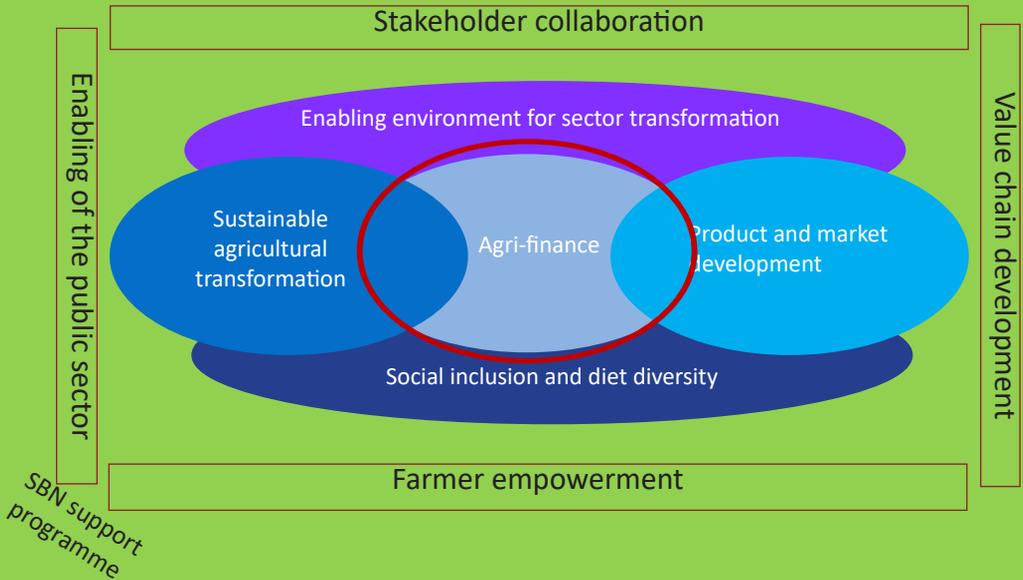
Flo Dirks

Chapter 4

Agri-finance: decisive for agricultural sector transformation

Introduction

As shown in the figure, finance is an important dimension for agricultural sector transformation, supporting both the production and market side. Farmers' access to credit is generally limited and a critical constraint for rural economic development. The key challenge is: how can farmers improve their financial literacy and improve their relations with financial institutions, to better access and use loans for their productive and marketing activities?



Reflecting the priority that stakeholders were giving to 'Finance', the SBN support programme has worked hard to analyse the agri-finance system and to find solutions for the insufficient funding of the production, mechanisation, processing and marketing of sesame and rotation crops. Based on stakeholder consultation and initial analyses, four intermediary outcomes were targeted: improving farmers' record keeping and cost-benefit analysis, increasing the input credit provided to small and intermediate farmers; reducing the input credit costs of farmers and increasing the marketing credit provided to cooperatives and unions.

Key Message

To improve the access to finance for farmers several interventions are needed. On the side of farmers and farmer organisations, financial management knowledge and skills need to be improved through financial literacy and loan management training. On the side of financial institutions (FIs) agricultural expertise need to be developed to offer innovative solutions. Supporting organisations can stimulate financing relationship through risk sharing modalities and technical advice. Farmers and FIs should become long term business partners based on trust.

4.1 The Agri-finance system, challenges and entry points for change

Flo Dirks, Ted Schrader, Judith Jacobs

Agricultural development stagnates because of agri-finance deficiencies
Mapping and analysis of the agri-finance system allows to get to grips with the
complexity of situation, to detect challenges and entry points for change.

Introduction

Although agriculture contributes more than one third to the nation's GDP and employs about two thirds of the population, resources for investing in the agricultural sector are limited. According to a recent report of the National Bank of Ethiopia (NBE), only 10 per cent of loans disbursed to entrepreneurs was for the agricultural sector. Commercial farms take the lion share (95%). This means that small- and medium-holder farmers hardly access formal credit and therefore must rely on own savings and informal sources. The formal financial sector gives low priority to agricultural loans; financial institutions prefer investing in less risky economic sectors.

The insufficient availability of financial resources to farming communities severely hampers agricultural professionalisation. Farmers are not able to purchase inputs and apply GAP to increase productivity. Although doubling of yields is possible for most agricultural sub-sectors, closing the large yield gap remains a remote goal without appropriate financing.

This general picture also applies for the sesame zone in Ethiopia, where some five thousand large and intermediate farmers and around 170 thousand smallholder farmer households produce sesame and food crops, creating employment for half a million casual labourers. Insufficient and/or costly access to finance are critical problems for these farmers and their organisations. The absence of adequate agri-finance solutions is holding the sector back and blocks the effective implementation of innovations, both at the production and market side.

The consequences are low yields, high production costs, limited surplus production and marketing of agricultural commodities. As a result, farmers are not improving their income and the country misses' opportunities to improve food production and export revenues. Farmers could earn ten thousand ETB more per hectare and Ethiopia could earn millions of dollars more export revenues (cf. 7.7).



Sesame spot market

Complexity of the agri-finance system

The agri-finance system in Ethiopia is complicated. It consists of many different players and various modalities to access and use finance, both informal and formal. The different players are insufficiently linked and financial products are not tailored to the client needs. The financial literacy of farmers is limited and financial institutions do not have well-adapted financial products.

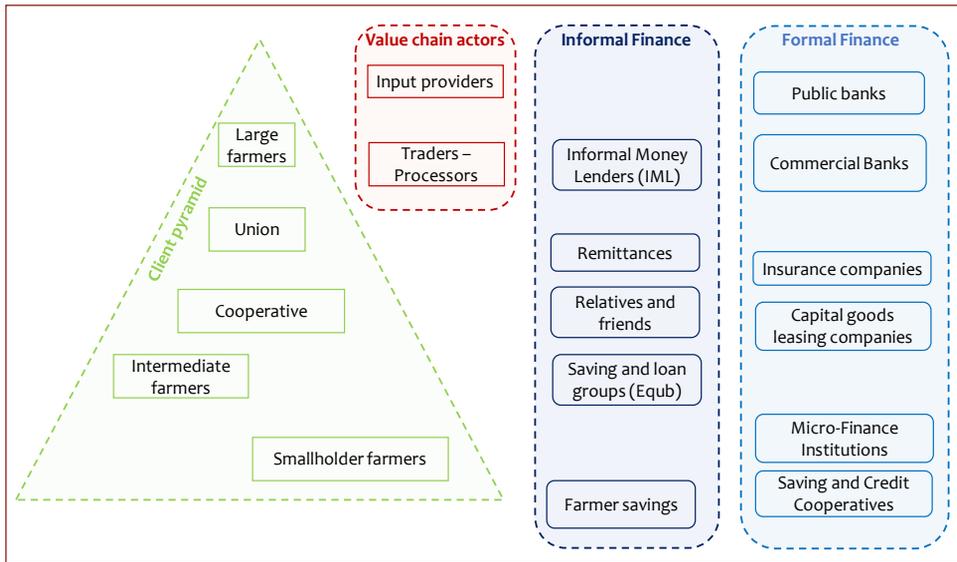
The SBN finance study of 2015 revealed that the following are the major sources of finance for sesame farmers: own savings, informal social sources (friend and relatives), informal money lenders, and formal credit providers such as cooperatives, saving and credit cooperatives (SACCOs), Microfinance institutes (MFIs) and banks. In that study, on average 51 per cent of the farm investments are paid from savings and 49 per cent from borrowed money sources. The combination of formal and informal sources is important, see the table on the next page. To reduce the cost of credit, it is important to improve the access to formal credit.

Access percentage of loans from formal and informal credit providers				
Credit source	Amhara		Tigray	
	Small-scale	Investor	Small-scale	Investor
MFI	39.0%	0.0%	39.3%	12.5%
Cooperative	14.7%	3.8%	28.9%	25.0%
IML	25.4%	69.2%	16.7%	19.4%
Relative	14.1%	3.9%	7.1%	8.3%
Friend	6.2%	7.7%	3.9%	5.6%
Bank	0.0%	15.4%	0.0%	29.2%
SACCO	0.0%	0.0%	3.3%	0.0%
Other	0.6%	0.0%	0.8%	0.0%
<i>Sub-total formal</i>	53.7%	19.2%	71.5%	66.7%
<i>Sub-total informal</i>	46.3%	80.8%	28.5%	33.3%
Total	100%	100%	100%	100%

Rural finance in Ethiopia, as in other developing countries, has dualistic features: agricultural finance is operated by both formal and informal credit institutions. The formal ones are established legally and entitled to provide credit and mobilise savings. These include three public banks: National Bank of Ethiopia (NBE), Development Bank of Ethiopia (DBE), and Commercial Bank of Ethiopia (CBE), and 16 privately owned commercial banks; credit and savings cooperatives, and microfinance institutions. Currently there are about 17 insurance companies with 425 branches operating all over the country.

The figure on the next page visualises the agri-finance system that is relevant for the sesame sector. The figure shows the diversity of stakeholders involved: formal and informal sources of finance, value chain actors (who are clients of financial institutions and can play a role in agri-finance innovation) and (different categories of) farmers and farmers' organisations requesting financial services. The majority of the Ethiopian population does not have an account with a financial institution nor access to formal finance. Financial exclusion is most severe among the rural poor, women and youth. Below, we present the different players and modalities and we suggest entries for addressing agri-finance challenges.

Stakeholders of the agri-finance system



Farmer client pyramid

Large farmers

In the sesame zone, larger farms (>30 hectares) are considered ‘investor farmers’. They are mainly the client of the Commercial Bank of Ethiopia (CBE). They need credit for machinery, infrastructure, agro-inputs and labour costs. For accessing the loan, they need to have a business plan and agricultural insurance. In the past, investor farmers have been successful in lobbying the government for providing capital to CBE for providing loans. The loan management capacity and loan repayment motivation of investor farmers are often weak. Loans are regularly used for other purposes than agricultural production. Improved farm management, business plans and monitoring are needed.

Intermediate farmers

Intermediate farmers (10-30 hectares) are too small for banks and too big for MFIs. This often implies that they fail to finance their activities. Banks do not finance them because of lack of sufficient collateral, while the loans from MFIs are too small. This is unfortunate. Compared to smallholder farmers they have more potential to innovate and improve their performance. Compared to large farmers, who rely on hired labour and managers, intermediate farmers manage and work on the farm themselves and closely monitor their field activities.

Unions and cooperatives

Ethiopia has a large number of cooperatives and unions (cf. 5.3). In the Amhara region there are more than 180 multipurpose cooperatives, who channel 80 per cent of the government provided inputs to farmers and take care of the administration of input credit that is related to this channelling function. Close to 25 per cent of the cooperatives provide some input credit to members (Kifle, 2015). This is based on the limited amount of own capital; thus, cooperatives play a minor role in supporting farmers to access input finance. Interest rates range from 18 till 20 per cent per year.

Except for some banks, most financial institutions do not lend money to unions and cooperatives. Unions and primary cooperatives with strong internal governance and skilled staff have however shown good efficiency in terms of generating income and member financial support. Guarantee schemes to lower the risks may encourage banks to avail credit to unions and cooperatives with good internal governance and management (cf. 4.3).

Smallholder farmers

Smallholder farmers have to rely on a combination of own savings, diverse informal finance sources, micro-finance and sometimes loans from cooperatives. This leads to a fragmentation of financing sources and high credit costs. After years of evidence that yields can double, the situation in the sesame zone is that most farmers accept the recommended agricultural practices and see the economic attractiveness. The adoption rate is however low because credit is not accessible and affordable enough. For improved smallholder farmer access to finance the following challenges need to be addressed:

- (i) improved financial literacy to enhance the attitude that farming is business
- (ii) improved saving and repayment culture
- (iii) capital strengthening of MFIs
- (iv) standardised procedures of MFIs and loan size based on accepted parameters
- (v) bottom-up planning and identification of farmers that are most eligible for loans
- (vi) internal capitalisation of cooperatives and eligibility of cooperatives for input finance loans

Formal finance

Public banks

Three public banks are important for the agricultural sector: National Bank of Ethiopia (NBE), Development Bank of Ethiopia (DBE), and Commercial Bank of Ethiopia (CBE). The National Bank of Ethiopia is not involved in the provision of credit as it has a regulatory function.

Commercial banks

There are 16 commercial banks operating in Ethiopia, some of them operate in the sesame zone such as Abay Bank S.C., Cooperative Bank of Oromia (CBO), Lion International Bank S.C., among others. Ethiopia is one of the most under-banked countries in the world (Gashayie and Singh, 2016). Commercial banks are concentrated in cities and zonal towns. Their reach to rural areas and the farming community is limited. Bankers perceive agriculture as a highly risky business and their interest to understand the farming business and manage production and market risks is low. Banks require collateral, preferably fixed assets which most farmers and their organisations in Ethiopia do not have. Guarantee schemes to share risks may encourage banks to give out more loans to the agriculture sector (cf. 4.3).

Micro-finance institutions

There are many MFIs in Ethiopia. They have been established to address the financial needs of non-bankable citizens. Farmers and urban poor are the most important target groups. MFIs are established and owned by regional governments, NGOs, associations and/or individuals (NBE, 2013/14 cited in Gashayie and Singh, 2016). In the sesame zone, the Amhara Credit and Saving Institute (ACSI) and the Dedebit Credit and Saving Institute (DCSI), respectively controlled by the regional governments of Amhara and Tigray, are the two major MFIs.

Although MFI credit supply is far below the client needs, they are a relatively important source of credit to smallholder farmers. MFIs are closer to farmers because they have local branches, this is also the case in the sesame zone with offices at kebele level. The conditions of MFIs allow small groups of resource-poor farmers to access credit without collateral (group solidarity). The MFI interest rate, ranging from 16-20% per year, is much lower than the rate of informal money lenders, but higher than the interest rate of commercial banks. In Amhara, ACSI is involved in the management of the input voucher system, which led to an increased local presence.

In the sesame zone, there are many challenges related to the performance of MFIs. With political will and the involvement and commitment of multiple stakeholders (MFIs, regional government, BoA, unions and cooperatives), these can however be well addressed as indicated in the table.

Challenges and opportunities for MFIs performance in the sesame zone	
Challenges	Opportunities
Capital shortage	- Improve productivity through agricultural practices to increase export revenues - Openness to foreign capital
Insufficient government support to solve the liquidity shortage	
Limited saving of clients	- Financial literacy training of farmers - Prioritisation of farmers with good saving and repayment track records
Poor loan repayment performance	
Small loan size	- Define optimal loan size for best practices - Target trained and motivated farmers
Staff capacity limitations for supporting borrowers and loan management	
No split disbursement which increases the risk of loan diversion	- Provide tailored loan services to agricultural sectors based on crop calendars

Saving and Credit Cooperatives

Rural saving and credit cooperatives (RuSACCOs) are established to operate their business through self-financing. Capital is expected to be raised through compulsory and voluntary savings. Compulsory savings are defined by the general assembly and determine eligibility to credit for the members. Members can withdraw voluntary savings whenever they need it. RuSACCOs in the sesame growing areas have a limited membership outreach and capital mobilisation. Capacities of leaders and hired staff are weak. As a result, the RuSACCO credit availed for sesame production is negligible.

Insurance companies

There are 17 insurance companies operating all over the country. Their branches are only in regional or zonal towns. Except for some investor farmers, their reach of farmers is insignificant. In the sesame zone, an agricultural insurance is one of the conditions for large farmers to access CBE loans.

Capital Goods Financing Companies

Access to finance to purchase capital goods, such as machinery, is important for investor farmers and cooperatives to provide rental services to members. The regulatory mandate for leasing capital goods was initially given to the DBE and five Capital Goods Financing Companies (CGFCs). For the sesame zone, Waliya in Amhara and Kaza in Tigray region are potentially important. These CGFCs are closely linked to the MFIs: ACSI is 50 per cent owner of Waliya and 73 per cent of Kaza is owned by DECSI. In 2019, Ethio lease (Ethiopian Capital Goods Finance Business S.C) started as one of the first foreign and privately-owned equipment leasing company. Thus far, the leasing companies hardly addressed the pressing needs of the agricultural sector. Although agribusiness development is targeted, especially for export purposes, no lease finance agreements were concluded for the sesame zone (cf. 4.4).

Informal Finance

Informal finance refers to informal groups or individuals that provide financial transaction services without being registered. They are not regulated by government laws but rely on self-regulating mechanisms (Gashayie and Singh, 2016).

Farmer savings

Albeit there is much room for improvement, setting money aside for the next season is part of the habits of sesame farmers. In fact, farmers own capital is on average used to finance around half of the production costs. Sesame revenues are often invested in economic activities, as rearing animals and non-farm economic activities generate more than the interest on bank savings. Farmers, including women and youth, often participate in informal saving and credit groups (see below). Improved financial literacy may increase cost consciousness and motivate savings (cf. 4.2).

Relatives and friends

In case of cash shortages, farmers generally look first in their social network. Capacities of relatives and friends to provide financial support or loans is however generally limited. Depending on the household situation, remittances from family members working elsewhere might be important.

Informal money lenders

The role of informal money lenders (IMLs) is important in the rural areas of Ethiopia. According to FCA (2014 cited in Aderaw and Singh 2016), the percentage share of IML, locally known as *Arata Abedari*, was 20 per cent. Also, in the sesame zone, many farmers depend on IMLs, especially for the final stages of the production season. Having run out of cash and in the need to harvest the sesame, desperate farmers enter into agreement with IMLs who charge more than 100 per cent interest. This phenomenon is known as “*shih be shih*” (“thousand for thousand”). This means that a farmer who borrows 1,000 ETB from an IML must pay back 2,000 ETB. Repayment is generally within three months, in cash or in kind. If calculated on an annual basis this interest rate may reach up to 300 per cent (Getaneh, 2005; SBN finance study, 2015). Traders who buy green sesame at low prices in the planting season are also seen as IMLs.

Informal saving and loan groups (Merry go round and Table banking)

Informal saving and loan groups are especially important for those who cannot meet the conditions of formal finance. For long, informal saving and credit groups are known and common in Ethiopia, both in rural and urban areas and among all social classes. These groups are known as ‘*Equb*’, ‘*Idir*’ and other local names.



Sesame is an engine for the lowland economy

Equb are like a Merry-go-round, an informal saving and credit system, where members make regular financial contributions that are defined by the group. During each meeting, the money is given to a different member. This rotates until all members have had the opportunity to get a loan, hence the term merry-go-round. “*Equb* is an informal institution established voluntarily to collect a specific amount of money from the members on a specific date to be paid on round and lottery basis to the members” (Dessalegn and Aklilu, 1999; Gashayie and Singh, 2016).

Table banking is another form of informal saving and loan groups. Table banking is a group based informal saving and credit system where members of a particular group regularly meet, place their savings, loan repayments and other contributions on the table to form a kitty from which members can borrow. During weekly, bi-weekly or monthly meetings, the members administer loans, address issues, confront defaulters and make fines paid. The main difference between table banking and merry-go-round is how the money is handled. The focus of table banking is the kitty to borrow from, the characteristic of merry-go-round is the rotational character.

Informal saving and credit groups consist of 10-30 members with a high level of social cohesion and internal control. Saving and loan amounts are defined according to the financial capacities of the members. This explains the social homogeneity of the groups that is observed. In addition to saving and credit, the social aspect is important: friendship, mutual visits and mutual aid during difficult times. Monthly interest rates are generally high, 10 till 20 per cent. Repayment rates are high due to social pressure from the group. The interest can be used for social activities and mutual aid. The close interaction between members foster the exchange of knowledge, skills and experiences with income earning activities.

The importance of informal saving and loan groups, often referred to as ‘saving groups’ or village saving and loan associations (VSLA), for the farming community and their agricultural production needs further exploration. Using informal saving groups as a steppingstone to formal finance is a possible innovation (cf. 4.4).

Value chain actors and innovative modalities

Input providers – input vouchers

Input providers are generally private entrepreneurs. This is only partly the case in Ethiopia; the government handles most of the procurement and distribution of inputs, especially fertiliser, which are channelled to farmers via cooperatives. The use of input vouchers is an innovative modality for financing the access to inputs and reducing the risk of inappropriate use of credit. Based on input needs, farmers can order or get a voucher, provided by a financial institution (MFI or bank) and use for the collection of inputs.

Processors and traders – contract farming

The buyers often also need credit for purchasing the agricultural commodities from farmers. Most often they can provide collateral and are (public or commercial) bank clients. In case of contract farming, these buyers have a business relation with farmers. A contract stipulates the volume and quality of the product to deliver, time of delivery and may indicate prices. A contract can raise farmers' eligibility to loans (as they have a market for their product). Advance payments or delivery of seeds and agro-inputs may be part of the contractual agreement. Contract farming is done at larger scale with cotton producers in the sesame area and is coming up in the sesame sector (cf. 5.4).

Involving financial institutions in agricultural sector transformation

Improving farmers' access to input and market credit is decisive for effective sector transformation. Without agri-finance solutions, production improvement and farmer income improvement are targets that are hard to achieve. For many reasons, formal financial institutions are not interested in the agricultural sector:

- Agricultural ventures are full of risks, both at the production and market side, that are unpredictable and can most often not be insured or only at a high premium
- Most farmers are resource-poor and cannot provide collateral
- Farmers generally cannot show facts and figures about their business
- Value chains and markets are often not well structured: relations between value chain actors are weak and informal

Formal financing of the agriculture sector at affordable interest rates will only become possible when these challenges are addressed. The challenges suggest what needs to be done: risk reduction, strengthening of capital and improved structuring of value chains and markets. The combined effect of increased financial literacy of farmers, targeted and timely provision of input finance, farmer-bank partnerships for marketing credit and the development and implementation of additional innovative agri-finance solutions can bring the sector to the next level.

4.2 Financial literacy training to improve farm management and farmers' creditworthiness

Getasew Aginche, Gezu Seyoum, Hana Getahun, Yonas Worku

Farming is a complex business that requires careful financial management. Without good monitoring of income and expenses it is impossible to estimate the added value of different farm activities and make informed decisions. The development of financial literacy skills helps farmers to both carefully manage their farming business and to improve their creditworthiness.

Introduction

Field observations show that most sesame farmers memorise farm expenditures and revenues instead of recording them. At the end of the production and marketing season, farmers calculate the profitability of their farm activities without consulting any written notes or records. Due to this, hidden or more complex cost elements are often not considered in the profit analysis, leading to wrong conclusions and future business decisions. Choices on how to spend or invest savings also impacts farmer household financials.

As mentioned before, one of the reasons why financial institutions are not much interested in the agricultural sector is because farmers generally cannot show facts and figures about their business (costs, prices, cash flows). Financial institutions require documentation on the performance of a farm to assess risk and approve loan applications. Without insights in appropriate investment amounts and (historical) cash flow data, financial institutions are reluctant to offer suitable credit products.

In line with the program objective to reduce production costs and improve farmers' income, a financial literacy training was introduced under the slogan: "Manage your farm – manage your pocket". The example of the financial literacy training developed for sesame farmers in Ethiopia provides valuable lessons on how to create effective training material and to implement and scale it successfully within a short period of time.

Development of a practical cost recording and profit analysis tool

The development of effective training materials for farmers is a challenging and time-consuming process. The main challenge is to find the right balance between optimal calculations for sound business analysis and feasible calculations for farmers, of whom the majority have low education and literacy levels.

A simple cost recording book, focusing on cash transactions with basic cost-benefit analyses was developed over the course of 2015-2018. Based on the feedback from trainers and farmers, the materials were gradually improved, resulting in clearer formats and more practical examples. The final version of the cash book consists of two A5 size booklets with a cashbook and a manual. The cashbook contains the cost recording and profit analyses tables, while the manual explains how to perform the various steps and calculations.

In the manual, 'Henok Selit' (meaning Henok Sesame in English) is introduced as an entrepreneurial sesame farmer who wants to improve his business results. Henok is used as an example throughout the training material, which helps to facilitate context-based learning. The training and cost recording booklets are printed in local languages (Amharic and Tigrigna). To make them more durable and allow farmers to use them for several years the manual is printed on waterproof paper.



Henok Selit and financial literacy manual and cost recording booklets

Six financial literacy training steps

The financial literacy training consists of six steps. In addition, the steps are separated based on temporal appearance of field activities in the season (step 1) or after the season (steps 2 to 6).

Step one starts with the principles of clear and consistent record keeping for all cash and family labour transactions related to the farm business. Step two and three show how to calculate the end cash balance based on the total cash inflow and outflow during the season. Thus, at the end of step three farmers know if they have more or less cash in their pocket after the season compared to before.

As from step four non-cash elements are introduced. This includes the concepts of: family labour, capital assets, depreciation and in-kind payments. Adjusting the end balance with these elements results in a more realistic profit or loss estimation. These concepts are generally more difficult for farmers and has been simplified as much as possible, for instance assuming linear depreciation. The same holds for the profit and loss analysis which is not aligned to international accounting standards but helps farmers to get a first sense of business elements that impact profitability.

Step five helps to gain insight in the credit costs of various sources and measures the remaining stock value to further improve the profit or loss calculation. Finally, step six shows the farmer how to take informed decisions about the next production season, among others on the expected investment amount and the use of different credit sources.

From an inclusion point of view, the training content needs to be applicable for farmers with diverse financial skills. Therefore, the six steps can be completed depending on the capacity of each farmer. The table below shows that step one to three can be done by almost all participating farmers. After step three you have deducted total costs from your total income based on accurate cash recordings. Step four to six are more difficult, e.g. calculating depreciation. Farmers may need additional help to perform these calculations.

Percentage of farmers that completed the steps (sample N=479)

Financial Literacy Step	Topic	%
Step 1: Cost recording	Monthly recording of activities, cash in, cash out and invested time as family labour	100.0
Step 2: Cash flow analysis	Total cash in production cycle	91.0
	Total cash out production cycle	100.0
Step 3: End cash balance	End cash balance production cycle	89.6
Step 4: Profit or loss	Value of invested family labour	80.2
	Purchase of fixed assets	32.8
	Depreciation costs of fixed assets	38.2
Step 5: Credit costs and stock	Credit cost calculation	32.8
	In-kind payment	12.7
	Credit costs in-kind loan repayment	15.7
	Stock value	43.8
Step 6: Decisions for next season	Estimated investment amount	40.7
	Amount of saving used for reinvestment	42.8
	Calculation required loan amount	29.2

Training set-up for rapid scaling

To effectively implement the financial literacy training, four design elements were considered: the channel, the approach, the resources and the support.

Cascaded training delivery channel

Most of the sesame farmers are member of primary cooperatives, which are affiliated to cooperative unions (cf. 5.3). For this reason, it was decided to roll out the training through these organisations with the ambition to reach at least ten per cent of the estimated 150 thousand smallholder farmer households in the targeted sesame area. The channel proved to be efficient as the membership structure made it easy to reach farmers and establish training groups of twenty-five farmers living close to each other (which was important for peer-to-peer learning).

The financial literacy training was provided through a cascaded approach. Selected cooperative employees received a training of trainers (ToT). These ‘trained trainers’, who were referred to as the ToTs, were trained on the financial literacy content as well as on effective training and facilitation techniques. The level of understanding of trainers was tested at the end of the training and they were invited for training sessions in consecutive years to refresh and improve their knowledge and skills. The selection and training of trainers is an important step that largely determines the quality level of the cascaded training sessions to small-scale farmers. Trainers trained two groups of (25) farmers per season.

A learner-centred household approach

In both the training of trainers and the farmer training learner-centred teaching approaches were applied. Consisting of participatory sessions with many exercises to immediately practice the new learnings. Moreover, based on adult learning theory, relevant practical examples and experiences from the trainees were integrated in the training content and central in the discussion. This was further strengthened by facilitating peer to peer learning sessions in the season to motivate each other, timely resolve questions and challenges and reflect together.

Based on acquired insights over the years, a family approach was added. Many farmers that received the training were supported by family members, spouses or children, with the recording and calculations. To increase adoption, the inclusion of women, youth and illiterates, and the transparency on farmer household finances, trainees were invited to bring one family member to the training. Due to cultural characteristics this was not easily realised everywhere and specific attention on communication and training arrangements was needed to implement it successfully.

An important lesson is that it is important to consult farmers for their preferences before deciding on the training logistics such as timings and locations. For instance, the training should be provided in line with the agricultural season so that the steps can be immediately put in practice. Therefore, the content was split over two training sessions, one before the start of the season and one after the production season, during the marketing season. However, as planting and harvesting are time sensitive agricultural activities, farmers will refuse to follow training during these peak times. Training were provided in the cooperative premises or in other places close to the farmers to reduce travel time and costs.



A farmer applying what he learned



Peer-to-peer support

Cost-sharing local resources

The necessary resources for providing financial literacy training are: printed cashbooks and manuals, flip charts, markers and pens. In order to design a sustainable training set-up, affordability and cost sharing were guiding principles since the start. Therefore, simple and low-cost solutions were found for the needed physical resources. For the cashbooks, the ordering of large volumes resulted in a cost price that eventually farmers are willing to pay themselves. The cooperatives contributed at least half of the training costs, except for the cashbook and manual. For example, to the salaries if additional employees were hired to become trainers.

Sustainable support

The final element was organising the support for the financial literacy training with other stakeholders. An important aspect to build interest and transfer knowledge and capabilities from the beginning to promote continuation. A tripartite memorandum of understanding (MoU) was signed between cooperative unions, RCPA and the SBN support programme. Unions supported the practical and financial arrangements with cooperatives, while CPO provided technical backstopping to cooperatives and trainers.

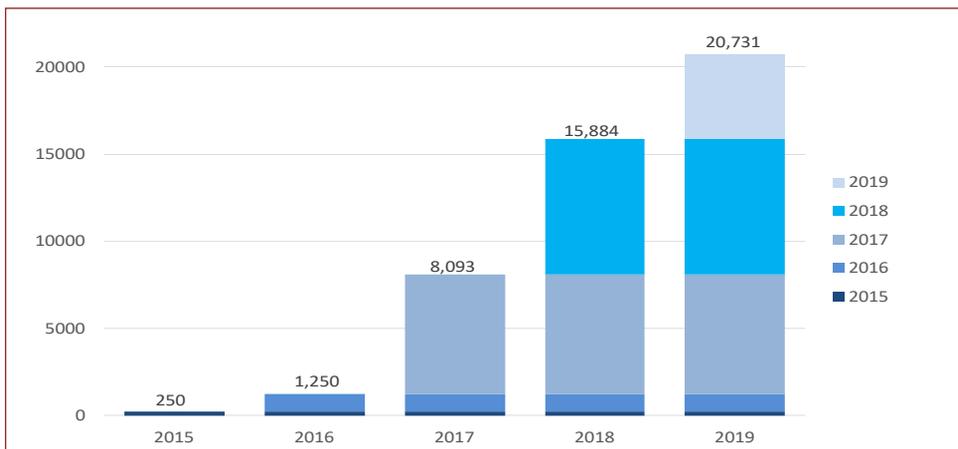
Interest and awareness creation

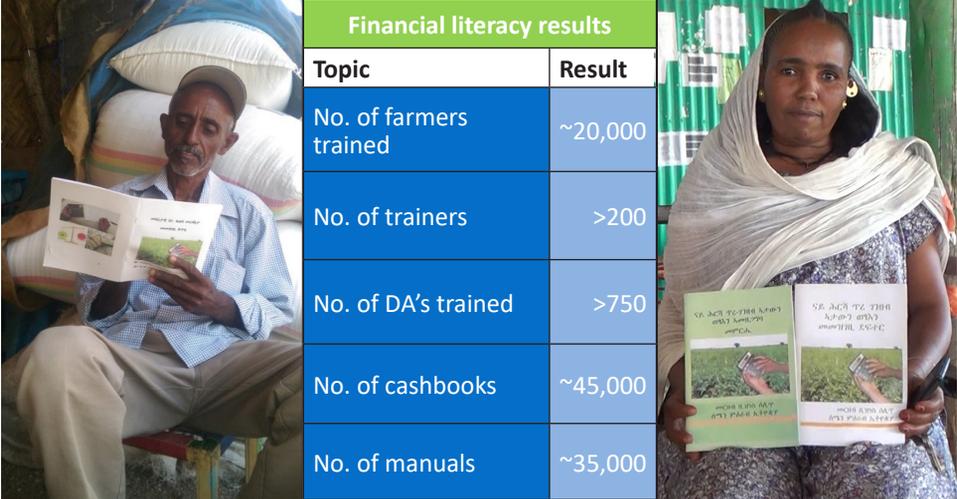
The added value of the training to improve farmer income, agricultural production and financial inclusion was carefully communicated and matched with the objectives of the implementing partners. For instance, besides the fact that most by-laws dictate cooperatives to invest in the capacity building of members, the direct benefit for cooperatives of increased production by members is to aggregate more produce and more actively engage in collective marketing. To reach farmers, posters and newsletters were distributed for promoting financial literacy training. Later, awareness was created through recognition ceremonies and word of mouth. The high interest in financial literacy training became visible through: farmers requesting outside the intervention area to participate in the training; cooperatives showing willingness to invest in the printing costs of training materials and trained farmers buying cashbooks from the cooperative to continue recording in the following year.

Henock Asfaw, a trainee farmer and member of Hamusit Cooperative from Misrak Belesa Woreda expressed the importance of the training and the need to change people’s attitude. According to him, farmers are lucky to have this training for free. “It is an important lesson. We should not hesitate to take it even with some fee.”

Zewdu Wonde, one of the 2018 trained and recognised farmers from Jahimala kebele, Jawi woreda said also that the training helped him and other trained farmers to learn whether their farm activity is profitable or not. “In the past, I did not calculate the costs I incurred for different activities. This year, I took the training and recorded all my costs including labour costs. I have learnt that my farm activity was not profitable. Now, I have come to realise which crop is profitable with the current market price. I used family labour and this helped me to increase my profit.”

Cumulative number of farmers trained on financial literacy





Financial literacy results	
Topic	Result
No. of farmers trained	~20,000
No. of trainers	>200
No. of DA's trained	>750
No. of cashbooks	~45,000
No. of manuals	~35,000

Institutionalisation

The goal of the financial literacy training was to arrive at a sustained effort to improve farm management and farmers' creditworthiness. This objective is fully underscored by the stakeholders involved, who have also validated the training materials and training methodology. Limited management skills, high staff turnover, and lack of resources are however main barriers to continue the efforts by themselves. Therefore, other routes for institutionalisation have been explored.

To reach as many farmers as possible, the MoANR was informed about the positive results in the sesame areas in Ethiopia. This raised high level interest and the decision was taken to incorporate financial literacy as a subject in the national extension package. More than 15,000 additional copies were printed to train the DAs in all regions. The training materials are reviewed for further adoption and modifications for other agricultural sectors and according to regional characteristics and languages.

In addition, the SBN support programme approached financial institutions. Both MFIs and banks reviewed the cashbook and acknowledged the importance of the recorded information for the assessment and approval of farmers' loan requests. Farmers that were recording costs were more eligible to receive loans from their cooperatives, creating a pull factor for farmers (cf.4.3). This shows that financial literacy is an action that can improve farmers' access to input and marketing credit. Moreover, the high repayment rates and the collection of savings convinced banks of the importance and opportunities of providing financial literacy training. Unfortunately, bureaucracy prevented any financial institution from sponsoring the training material or incorporate it as a preferred condition for loan applications.

Lessons learned

From the four years that the financial literacy training was implemented several important lessons are extracted. First, adequate time investment in farmer participatory methods in the design and delivery of training (material) is extremely important. One of the biggest challenges is to find the right balance between detailed calculations and easy to understand content for most farmers. Region and crop specific examples help farmers to relate to the content. Also, updating and improving the materials based on the feedback of trainers and farmers contributes to the training effectiveness. For the training delivery, alignment with the agricultural season helps farmers to apply the steps since the start of the season and put the knowledge immediately into practice. Overlap of the financial literacy training with peak moments in the agricultural season affects attendance rates and needs to be prevented.

Another important lesson is the added value of adopting a household training approach to support farmers with a limited level of literacy. To stimulate the support of wives or children with recording and calculation each farmer is invited to bring a family member to the training. This improves the inclusiveness and effectiveness of financial literacy training.

To reach a large number of farmers, following a cascading training approach is recommended. Careful selection and technical support are needed to ensure the quality of the training provision through the training of trainers.

Collaboration with stakeholders is critical for effective training implementation and institutionalisation. Planning, budgeting, implementation and evaluation of performance have been done together with the relevant stakeholders, such as farmers' cooperatives, unions and Woreda CPO. Yearly reflection sessions with all involved stakeholders are essential to continuously learn, adapt and improve together. Cost-sharing of printing costs of training material from the beginning should be considered.

Measure and strengthen stakeholder benefits from the financial literacy training to increase adoption. There is great interest of farmers to increase their financial literacy because they directly benefit from the opportunity to improve income. Integration of training and recording materials within the credit procedures of financial institutions can also improve farmers' access to finance and benefit financial institutions access to reliable farm data and saving mobilisation. Farmers appreciate primary cooperatives to take up their capacity development role and provide training on this topic. Financial literacy training can improve the relationship between farmers and their organisations.



Way forward

To ensure sustainability, below are some important considerations that require close collaboration among key stakeholders: farmers, farmer organisations, CPA, policy makers and the financial sector. CPO is the ideal partner to coordinate and safeguard the quality of the training provision. Unions and cooperatives should be responsible for allocating resources towards the capacity building of members and awareness creation. Ministry of Agriculture can further strengthen the institutionalisation and expand the reach by integrating financial literacy in the training curriculum for extension workers. Financial institutions can reinforce financial literacy practices through credit and saving service provision based on cashbook information. Intensive discussion among these parties is needed to share responsibilities and assign appropriate resources and focal persons at different levels. A better understanding of the stakeholders on how capacity building of farmers in financial literacy will help strengthen sector transformation and benefit all is therefore essential.



Training of trainers on financial literacy

4.3 The success of guarantee fund scheme

Anemut Belete, Getasew Atenafu, Flo Dirks, Judith Jacobs

Compared to dominant practices to demand physical collateral for more than 100 per cent of the loan value, the risk sharing scheme provides an innovative, effective, less costly alternative of a tailor-made product that addresses both input and marketing credit needs of farmers and their organisations.

Introduction

To improve the agri-finance system two important topics to work on are risk reduction and strengthening of capital. In Ethiopia, most smallholders are member of a primary cooperative that are part of cooperative unions (cf. 5.3). Cooperative unions and primary cooperatives lack the capital to avail inputs on credit or provide loans to members for production activities. Equally, they lack the finance for aggregating and marketing members' produce.

While many farmers are convinced that improved agricultural practices increase productivity, adoption is low due to a lack of input finance. Similarly, farmers could earn more by selling for higher prices and through collective trading but a lack of marketing credit force them to sell early or elsewhere. The absence of both input and marketing credit severely impacts the two main options to improve farmer income: cost price reduction and price maximisation. Currently, cooperatives aggregate less than 2 per cent of the sesame produced by their members which results in weak membership relations and low dividend payments (Girar consult, 2014). In addition, traders' collusion is high, and farmers do not receive a fair price for their products.

To enhance cooperative unions and primary cooperatives access to marketing credit and build trustful farmer-bank relations, the SBN support programme together with the Dutch NGO Agriterro piloted a risk sharing scheme based on a guarantee fund from 2016 till 2020. A one-year marketing loan addresses credit needs on various levels as it is provided by private banks to cooperative unions, and from cooperative unions to primary cooperatives and their members.

The risk sharing scheme facilitates access to marketing credit for both cooperative unions and primary cooperatives, which allows sesame farmers to get a better price for their produce. The scheme also improves access to input finance for members, which supports their production and harvesting activities and reduces credit costs. The risk sharing scheme contributes to: increasing farmers household income; improving livelihoods; strengthening membership relationships between cooperative unions, primary cooperatives, and members; and building trustful relations between banks and farmers that can extend beyond the intervention.

The risk sharing scheme is highly appreciated by the borrowers, as it is much cheaper than other finance sources, as well as by the lenders, as it stimulates interest earnings, increased transactions, mobilisation of savings, portfolio diversification and banks' reputations. The intervention was extremely successful, with zero defaults, in establishing interest and improved trust from financial institutions in the agricultural sector.

Risk sharing scheme modality

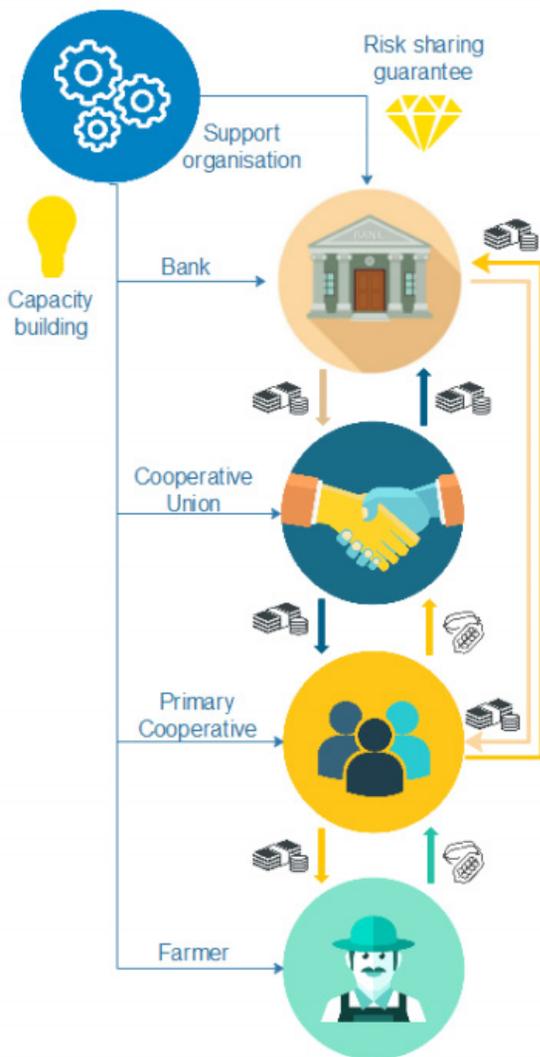
The risk sharing scheme is based on four agreements. First, the bank and support programmes aligned the risk sharing distribution and the maximum loan amount that can be guaranteed with a cash deposit in local currency. A thorough assessment and discussion with unions and cooperatives results in a finance recommendation based on several performance indicators and financial demand. Guided by this recommendation the bank signs a one-year loan agreement with cooperative unions or primary cooperatives. While loan application and approval follow the bank's procedures, the loan product is tailored based on the cash flow needs during the agricultural season and on risk mitigating measures.

Next, cooperative unions agree with primary cooperatives on a shorter-term marketing loan (<8 months) to enable the primary cooperatives to aggregate the produce of members. Unions carefully select, with technical support of the SBN support programme strong cooperatives using tools for cooperative profiling and evaluation, based on eligibility criteria that are underscored by both the banks and the farmers' organisations. Cooperative unions will add a small percentage to the interest rate to cover their operational expenditures.

Finally, primary cooperatives provide input finance loans to members based on an agreed loan criteria and approval processes. Primary cooperatives receive loan management training from the SBN support programme to strengthen their knowledge and documentation practices..

The selection of member farmers that received financial literacy training (cf. 4.2) reinforced both activities, creating a pull factor to record farm costs and strengthening loan repayments through improved financial farm management. The short-term input finance loans (<4 months) targets the last stages of the production season (weeding and harvesting) to reduce risks. Primary cooperatives determine the interest rate taking their operational costs into account. Especially, on this level repayment is recommended to be in-kind to encourage farmers to sell the sesame to the primary cooperative and benefit from collective marketing profits through dividends and stronger farmer organisations providing services such as input loans.

Visualisation of the risk sharing scheme



Achievements and stakeholder benefits

During the five years that the risk sharing scheme was implemented: four unions, 25 cooperatives, and more than 15,000 smallholder farmers received access to credit. Three banks provided nearly 80 million ETB (more than 2.8 million USD) marketing loans to the sesame sector. Repayment rates were extremely high, with zero defaults in bank repayments and high willingness to compensate rare losses from member farmers or member cooperatives. The most important achievement of these strong results is a yearly increase in the risk share of banks, from 50 to 80 per cent, indicating trust and facilitating higher loan amounts. A success that is eventually sustained by replacing the external guarantee of the support programme by a cash deposit of the borrowers.

The initiative started small in agricultural season 2016/17 with the CBO and a 50/50 risk-sharing agreement. In the third year, Abay bank S.C. and Lion International Bank S.C. joined. The figure below shows the development of the risk sharing scheme over the years in detail.

Risk sharing scheme results per year

2016/17	2017/18	2018/19	2019/20	2020/21
Risk sharing - bank: 50% - guarantor: 50%	Risk sharing - bank: 63% - guarantor: 37%	Risk sharing - bank: 70% - guarantor: 30%	Risk sharing - bank: 80% - guarantor: 20%	Risk sharing - bank: 80% - borrower: 20%
Banks: 1 	Banks: 1 	Banks: 3   	Banks: 1 	Banks: 1 
Marketing loan - amt: 4.0 million ETB (~185,000 USD) - term: 12 months - interest rate: 12% - phased disbursement - repayment: 100%	Marketing loan - amt: 10.7 million ETB (~469,000 USD) - term: 12 months - interest rate: 12.75% - phased disbursement - repayment: 100%	Marketing loan - amt: 30.5 million ETB (~1.1 million USD) - term: 12 months - interest rate: 12.5% - phased disbursement - repayment: 100%	Marketing loan - amt: 15.5 million ETB (~540,000 USD) - term: 12 months - interest rate: 12% - phased disbursement - repayment: 100%	Marketing loan - amt: 18.3 million ETB (~520,000 USD) - term: 12 months - interest rate: 12% - phased disbursement - repayment: 100%
Unions: 2 - Setit union - Metema union	Unions: 2 - Setit union - Metema union	Unions: 3 - Setit union - Metema union - Dansha union	Unions: 1 - Metema union	Unions: 1 - Metema union
Marketing Loan - amt: 4.0 million ETB - term: <9 months - interest rate: 13.5% - repayment: 100%	Marketing Loan - amt: 10.7 million ETB - term: <9 months - interest rate: 13% - repayment: 100%	Marketing Loan - amt: 23.6 million ETB - term: <9 months - interest rate: 13.5% - repayment: 93%	Marketing Loan - amt: 14.2 million ETB - term: <9 months - interest rate: 13.5% - repayment: 95%	Marketing Loan - amt: 18.2 million ETB - term: <9 months - interest rate: 13.5% - repayment: fbc
Cooperatives: 4	Cooperatives: 7	Cooperatives: 22 Direct financing: 1 - Sanja	Cooperatives: 10 Direct financing: 2 - Sanja - Godebe	Cooperatives: 10 Direct financing: 2 - Sanja - Godebe
Input loans - amt: 4.3 million ETB - two times: weeding & harvesting - term: <4 months - interest rate: 15% - repayment: 100%	Input loans - amt: 9.1 million ETB - two times: weeding & harvesting - term: <4 months - interest rate: 15% - repayment: 98%	Input loans - amt: 22.2 million ETB - two times: weeding & harvesting - term: <4 months - interest rate: 15.5% - repayment: 98%	Input loans - amt: 8.9 million ETB - two times: weeding & harvesting - term: <4 months - interest rate: 17% - repayment: 92%	Input loans - amt: >5.2 million ETB - one time: harvesting - term: <3 months - interest rate: 18% - repayment: fbc
Farmers: 2166	Farmers: 3048	Farmers: 5541	Farmers: 2650	Farmers: 1955

All stakeholders experienced various benefits from inclusion in the risk sharing agreement. Farmers received access to affordable credit to finance agricultural production activities and potentially improve yields. This helps to reduce their dependency on IMLs and allows them to sell the sesame for fair market prices to their cooperative. The loan service and active marketing participation of cooperatives is appreciated by members and improves the relationship. At the time of loan disbursement, banks visited cooperative offices and offered the opportunity to open individual saving accounts. An important first step for financial inclusion and expanding the range of financial services.

Annual transaction volumes on sesame and other products of primary cooperatives has greatly improved because of the marketing credit. Two examples are the primary cooperatives Gelego and Sanja that significantly increased their sesame collection record from 10 to 55 MT in 2013 to respectively 13 to 120 MT in 2019. These transactions run through the account of the primary cooperatives at the bank which stimulates mutual interest and trust. The improved marketing participation enabled cooperatives to pay dividends to members, which stimulated additional investments of members buying more shares. This also attracted new members, increasing the internal capital of cooperatives.

In general, the circumstances influencing the relationship between primary cooperatives and farmers changed drastically: cooperative managements' accountability and transparency increased; new committees are established, and members are selected to distribute roles and responsibilities; General Assembly involvement in decision making and developing a collective strategy strengthened. Moreover, cooperatives developed loan management capacities based on training and experiences that have enhanced transparency and reduced defaults or misappropriations. Also, awareness on the value of assets like buildings (offices, warehouses) and machinery increased, and some cooperatives started to invest in these types of resources. This further increased the credit worthiness of cooperatives.

Unions benefitted from intensified interaction with cooperatives that enhanced their output marketing activities. The aggregation capacity of unions has significantly increased. For example, Metema union went from 40 MT in 2017 to 2500 MT in 2019. Also, on union level the improved performance strengthened the relationship with member cooperatives and the willingness to contribute to internal capitalisation.

Banks benefited from interest profits, attracting clients, increased volume of transactions, saving mobilisation and improved reputation and above all gathered experiences in the agricultural sector. Knowledge on agricultural productions is essential to develop attractive financial products against acceptable risks. The opportunity to develop this expertise and get to know farmer organisations provided first mover advantages to realise profitable business cases and satisfy shareholder and government pressures to invest more in agriculture.

Critical factors to develop and sustain the risk sharing scheme

From the start, the intention of the risk sharing scheme was to establish a sustainable relationship between financial institutions and the agricultural sector. Long term partnerships are needed to make sure both businesses help each other grow, sharing benefits and risks in good and bad seasons. Several factors are critical to develop a sustainable financing modality.

Stakeholder's interest and participation

The interest and participation of various important stakeholders must be secured in the beginning. Following a win-win strategy helps to develop and sustain interest. Banks, unions, cooperatives and smallholder farmers gain from the risk sharing scheme. Most attention was given to approaching and convincing commercial banks to participate by identifying their strategic interest. The SBN support programme organised yearly platforms to support the exchange of ideas and experiences among the various stakeholders to foster learning and strengthening collaboration and relationships. First, the number of stakeholders involved was small, to pilot the risk sharing scheme with a few strong partners and expand over time.

Capacity development

The provision of technical support to all levels is critical for the success of the risk sharing scheme. For the banks that support consisted of developing union and cooperatives assessment tools to select strong borrowers. Also, sharing the agricultural knowledge to develop a suitable loan product including risk mitigating measures like phased disbursement. Among the main reasons for credit default is loan distortion that arises either from unseasonal loan release or misusing the credit for non-intended objectives. While implementing the risk sharing scheme, the finance was designed to reach the farmers in the right time when demanded for the intended objectives which strengthened its effectiveness.

Banks are invited to field days and relevant union and cooperative activities: broadening their knowledge on agriculture helps them in designing risk mitigation measures that fit the agricultural sector. For unions, cooperatives and CPA, loan management training were organised. In loan management and administration, recording and documentation is a key success factor. Strengthening administration skills increases transparency and accountability in bank-client relations.

Monitoring and evaluation

Continuous support in monitoring and yearly performance evaluations are needed to reduce risks of default. Findings of the yearly performance evaluations are shared during stakeholder platforms. During these evaluations, stakeholders discuss challenges and lending mechanisms are improved with mutual consent. This has helped to adopt a learning cycle and strengthen the finance modality from time to time supported by all actors.



Bank employees visiting cooperatives to open saving accounts for members

Lessons learned

The success and sustainability of the risk sharing scheme comes with some important considerations that are highlighted in the lessons learned. The risk sharing scheme can have a real impact in improving access to finance for smallholder farmers but requires commitment and some degree of risk taking from all parties involved. Thus, to be successful, the strategic interests together with the risks of all stakeholders need to be well articulated.

Starting small and target a year by year increase of the loan amount, risk sharing percentage by banks and scope of borrowers helps to build trust and credit history. Also, the careful selection of unions and cooperatives based on thorough objective assessments contributes to limiting risks. As well as facilitating timely reflection and learning sessions throughout the process to implement improvements. Working with different partners, both at the bank and farmers' side contributes to healthy market dynamics and competition.

Capacity building remains necessary at all levels. Topics to be covered include financial literacy for farmers including the promotion of a repayment and saving culture, loan and marketing management for cooperatives, financial and business development for unions. Additionally, strengthening membership relations across all levels is key. There are still improvements to be made from the banks side. Efforts should be increased in improving their sector understanding so tailored financial product can be developed and investments in monitoring loan repayments in the field should be made.

Especially, verification of the strategic interest of banks in the agricultural sector and their willingness to invest in resources and agri-knowledge is important to ensure that tailored loan products will be developed.

Additional loan managers with agricultural expertise are needed to properly monitor the loans, support farmers and inform the banks' strategy. Farmer organisations are not used to filling in the documents needed in the loan application process and procedures are easily perceived as bureaucratic and not flexible, especially at headquarters. Therefore, engagement of bank staff at different levels from decision-making to local branch level is important as branches are closer to the farmers and have more insights in their realities. Banks are not easily convinced to establish necessary new functions.



Loan administration by cooperatives

Define the loan contract terms and the loan application process clearly and facilitate the communication between banks, farmers' organisations and farmers. The timely distribution of loans from primary cooperatives to farmers, but also from the banks to the cooperative unions is essential. If delays occur, then farmers do not have the financial means to start the agricultural activities like weeding in time.

Though the guarantee fund increased the amount of credit available for the sesame sector, the amount per loan was still too small: primary cooperatives say they could not adequately perform marketing activities and they also received many complaints from farmers that the loan was not adequate for sesame production. This could be solved by teaming up with other development organisations to complement each other and increase the reach to farmers or stimulating internal resource mobilisation of cooperatives and unions to increase the cash guarantee amount.

Overall, investing in relationship building and the creation of trust between the stakeholders involved is necessary for sustainability. The main goal of risk sharing scheme was to increase access to finance for farmers, primary cooperatives and cooperative unions. However, the strong relationship created between these actors and the improvements noticed in involvement, trust, internal resource capitalisation, leadership capacity and commitment, and profitability were some of the indirect but very crucial achievements. These win-win situations helped to make the risk sharing scheme a success through commitment and transparency.

Way forward

The implementation of the risk sharing scheme in the sesame sector provides valuable insights for the financial sector and policy makers on how to improve the agri-finance system. There lies an important task with local stakeholders and policy makers to ensure the sustainability and scaling of the risk sharing scheme. This could be done by starting discussions with the National bank to develop guidelines for financial institutions to allocate a certain amount of money within the portfolio for the agricultural sector, particularly targeting smallholder farmers and their organisations.

Encouraging and lobbying boards of directors of banks to invest in agricultural expertise, to develop financing modalities with farmer organisations and allocate financial resources for capacity building and awareness creation will put them in a win-win situation. Capacitate the CPA at all level to have the necessary and efficient expertise in the areas of loan administration, marketing, and business management and ideas.

Capacitating cooperative unions and primary cooperatives to become viable farmer business organisations is another area that needs attention if the agri-finance systems is to improve. Topics to work on include assessing and creating market linkages and working on value chain development, supporting unions and cooperatives to build a physical infrastructure to strengthen their capital and collateral as alternative means of accessing loan and participating in income generating activities by enhancing their business skills. As unions and cooperatives are participating more on enhancing social welfare, capacitating their setup towards earning more profit and changing their environment, they need training on financial and loan management, including internal capitalisation (cf. 5.3). Moreover; the expansion of new Agro-processing industries has created great demand that changes the production modality from production push to market pull (cf. 5.2). The shortage of supply will encourage companies, banks and government to involve actively in solving the financial problems of the sector.

Since there is still a huge financial demand unfulfilled in the agricultural sector, additional risk sharing funds could be explored. These funds could then be managed by microfinance institutes (ACSI and DCSI) and expand the support to include non-member farmers.

4.4 Agri-finance innovations

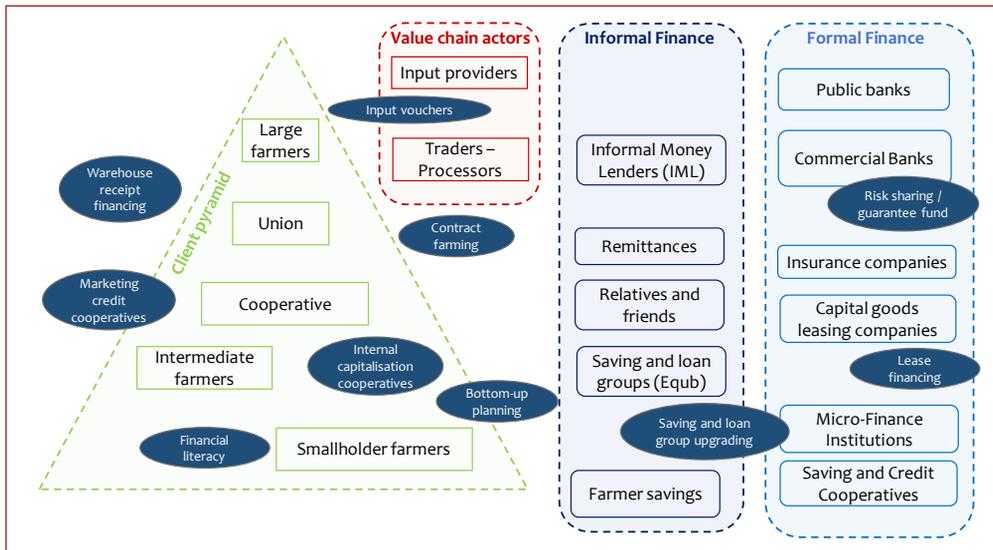
Getasew Aginche, Anemut Belete, Flo Dirks, Judith Jacobs

The importance of agri-finance for sector transformation is very high. There are many options for innovating the agri-finance sector. The stakeholders of the sector and agricultural development programmes should give more attention to it.

Introduction

For the sesame zone, there are many innovations possible. The figure below shows possible innovations within the agri-finance system, that are shortly reviewed in the following paragraphs.

Agri-finance system and innovations



Homogeneous informal saving and loan groups as units for collective action

Informal saving and loan groups, which can take the form of ‘Merry-go-round’ or ‘Table banking’, can help members to save and get access to a certain amount of money that can be used for socio-economic activities. Informal saving and loan groups are relatively small and have a high level of social cohesion and control. Existing local informal saving and loan groups could make up farmer production clusters (FPCs), who would jointly invest in improved farming practices, possibly with appropriate mechanisation solutions.

Stepping up from informal saving and loan groups to formal finance

Informal local group-based saving and credit systems can be a steppingstone to formal credit. A first option is that members of an informal group act as guarantors to each other’s loan (group collateral). This would provide security to the financial institutions. When one member defaults, the rest can not access finance. A second option is that members of an informal group decide to open a bank account, with the idea that the saving can be used to access a loan of a larger amount. Group guarantees and group savings may give access to bigger loans from financial institutions that are willing to work with them. Informal saving and credit groups are good entry points for building financial literacy and for preparing small projects.

Internal capitalisation of cooperatives

Cooperatives need stores, cleaning machines, offices and other hardware for their activities. And they need collateral in order to be eligible for bank loans. Targeted efforts can be made to raise the internal resource mobilisation through the sale of shares.



Lease financing could strongly support mechanisation

Lease financing

As indicated in the article on mechanisation (cf. 2.6), the sesame lowlands are very suitable for mechanisation. The shift from animal to tractor power could result in a 67 per cent cost reduction from ploughing alone. Row-planting would increase productivity and efficiency of field operations (weeding, pest and disease control, harvesting). Labour-intensive operations could be mechanised, reducing the dependency on animal power and human labour at critical periods of the agricultural season. Many different machineries and tools have been identified. Interested farmers have however a hard time to finance the purchase of machineries and tools. This is the major problem that holds back the shift to mechanisation. Equipment financing or lease financing can be the solution.

Lease financing is an in-kind credit provision by which a lessor grants the lessee with the use of specified capital goods. It is a method of transferring possession of an asset from the owner (lessor) to the user (lessee) fully or for a certain period in agreement with periodic payments. Through lease financing the debt is secured by the machinery itself which makes financial institutes safer and farmers eligible for acquiring the necessary implements without offering an additional collateral.

The lease finance gives farmers, the right to purchase machineries and slowly payoff the debt. The lessee must contribute 15 till 20 per cent of the purchase amount through a down payment and the lessor will finance the remaining amount. The interest rate is about 12 per cent per year. The lease period varies from one up to six years depending on the value of the leased machinery during which the lessee pays instalments.

The following two examples of the SBN support programme efforts to arrive at lease financing, show that it is possible to come to innovative arrangements.

In 2019, the SBN support programme lobbied CGFCs to avail their lease financing services to farmers' organisations. Kaza and Waliya agreed to lease agricultural machinery to unions and primary cooperatives. Two private companies, Mamaye and Mesfin Industrial Engineering (MIE) PLC's developed interest to lease agricultural machinery to farmers and their organisations at 50 per cent instalments. The companies and farmer organisations reached an agreement for a 50 per cent down payment, while the remaining 50 per cent loan was guaranteed by WoA.

In 2020, Kaza CGFC financed Dansha and Tekeze unions and Fana limat and Orena primary cooperatives for purchasing agricultural machinery (tractor, disk plough and sorghum thresher) from MIE PLC. Tekeze union and Orena cooperative also purchased a row planter from Mamaye PLC. Dansha union purchased two sorghum threshers from MIE PLC.

Other unions and cooperatives have applied for financing purchase of tractors and their attachment, but without success so far due to the lengthy bank process and the changed risk sharing modalities.

Currently, the Ethiopian government prioritises mechanisation and has chosen lease financing as a vehicle to achieve the goal. The plan is to avail tractors and ploughs to smallholder farmers and cooperatives via CBE and to commercial farmers through DBE. The very recent import tax exemption on agricultural machinery may increase the availability and affordability of machinery and create more business opportunities to lessor companies', like banks and CGFCs.

This could lead to important breakthroughs if regional governments properly implement the lease financing proclamation and directive, such as cooperatives providing machinery rental services for members and FPCs acquiring machinery through lease financing or in rent.

There are however many hurdles and challenges: limited capacity of NBE to regulate the leasing business; inadequate funding; lack of management skills at the financial institutions (lessor) and unions and cooperatives (lessee); limited availability of machinery suppliers and maintenance service providers (Asfaw, 2016). The observed price hike of machinery, which is partly due to the inflation of the ETB, raises the question who benefits from tax exemption, the farmer or the importer? Unless these fundamental challenges and questions are properly answered mechanising the Ethiopian agriculture may remain a bridge too far to cross.

Contract farming

Two fundamental changes may open the door towards contract farming relations, which for now are rare in Ethiopia and absent in the sesame zone. If the ECX price is controlled and realistically reflecting the prevailing world market price, it becomes possible to develop contract farming between sesame farmers and sesame traders or processing companies (cf. 5.4). The best perspectives are for organic sesame, because trade in organic products requires traceability. With the development of the domestic agri-food and textile industry, demand for soya bean, cotton and potentially mung bean and sunflower may increase and give rise to contract farming relations. Contract farming may include solutions for input finance, such as advance payments and/or the provision of inputs in kind.

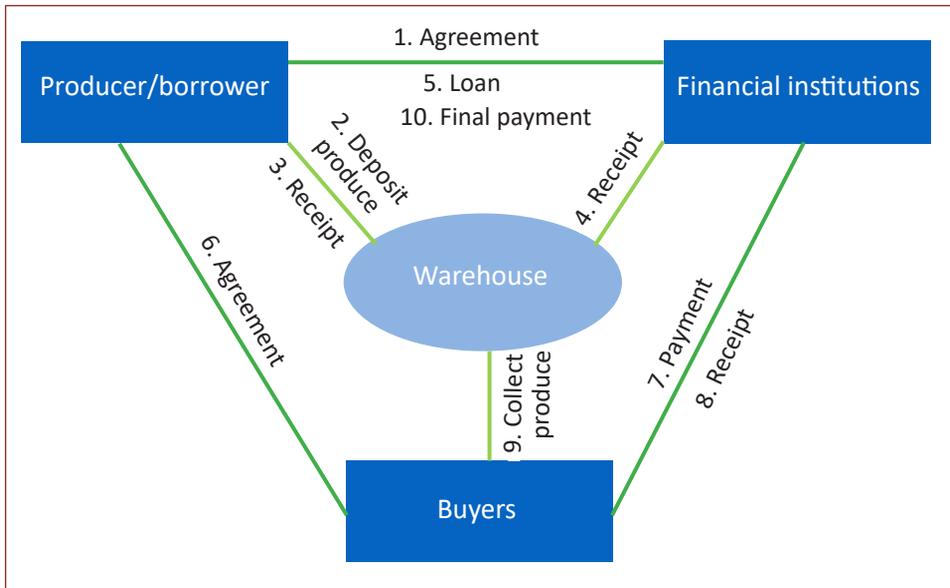
Warehouse receipt financing

In Warehouse Receipt Financing (WRF), loans are provided against stored commodities in a warehouse that serves as collateral. Warehouse receipt financing is an inventory credit that offers two valuable solutions to farmers: access to storage services as well as addressing urgent liquidity needs.

Recent efforts to establish WRF systems in Sub-Saharan Africa showed relative successes with cash crops such as maize, cocoa, coffee, cotton, paddy rice and sesame (IFC, 2013).

Warehouse receipt financing involves three parties: producers, warehouses and a financial institution. Farmers bring their produce to the warehouse to serve as collateral for a loan. Upon delivery of the produce, farmers receive a Warehouse Receipt (WR), often in two copies. This document is issued by the warehouse operator specifying type of the deposited commodity with a stated quantity, quality and grade. By providing a copy of the WR to the financial institution, farmers access a loan. The loan often equals a certain percentage of the market price of the stored commodities but does not exceed 70 per cent. When farmers sell the produce, buyers (ECX) settle maturing loans to the financial institution and then they release the WR, needed for collection of the commodities at the warehouse. The financial institution deducts the loan amount from the payment by the buyer and transfer any remaining amount to the farmer.

Visualisation of the WRF modality



In Ethiopia, the WRF system was launched in 2003. Though, proclamation No. 372/2003, was envisioned to cover a large variety of commodities and different types of warehouse operators, the institutions that were allowed to operate warehouses were limited. Between 2003 and 2008 only two deposits were made and no receipt was financed. In 2008, the ECX was established with the mandate to manage WRF systems for its platform traded commodities. In September 2010, ECX began the WRF system for sesame with the aim of providing short-term loan to depositors using the grain as collateral.

During 2011 and 2012, about 122 WRs were given to 42 borrowers and a total of 25 million ETB was disbursed through Commercial Bank of Ethiopia (CBE) that was delegated to finance the warehouse receipts.

Cooperatives are also officially allowed to act as warehouse operators. But most cooperatives have free storage service for their members' commodities and so an incentive is lacking. Moreover most cooperatives' warehouses do not meet the required standards which makes financial institutions reluctant to collaborate with them.

Warehouse receipt financing challenges and opportunities

The benefits of a WRF are reducing post-harvest losses, creating awareness of and/or raising warehouse quality standards, promoting aggregation of commodities, empowering producers to negotiate better prices and reducing loan defaults. This financing modality also includes low transaction costs for financing institutions, achieves high repayment rates and generally involves export crops that generate foreign currency.

Several challenges prevented a successful implementation of WRF in Ethiopia and for sesame. The needed legislation following the WRF proclamation has not yet been put in place and responsibilities have not been assigned to the appropriate bodies by the MoT. Due to this there is not a single warehouse operator in the country that is licensed in accordance with the WRF proclamation and there have been no efforts to involve the private sector. The level of understanding on WRF by all parties, including financial institutions and producers is very low and the physical distance and high costs of transport to the warehouse locations for smallholders does not contribute to a successful implementation. Lastly, when WRF was put in practice, the conditions were not clear and if understood, found unattractive for depositors, farmers and traders because of a short (30-45 days) storage duration and the lengthy bank process.

At the same time, opportunities arise to establish WRF. Especially for sesame, which can be stored up to 20 months and is a cash crop produced for export. On the side of the warehouse operators, unions could play an important role because they have standardised warehouses relatively close to the producers. For financial institutions, the NBE lifted the requirement to purchase an NBE bill for 27 per cent of any new loan amount which makes the provision of a larger number of smaller loans more attractive. In addition, there is more push for the involvement of private banks in agriculture since working with cooperatives became increasingly interesting. Recently, very few MFIs have got privilege to gain a bank status which allows them to engage in WRF as well. Other opportunities are that ECX restarted WRF activities and that WRF was added to the agricultural reform strategy.



Stored commodities serve as collateral for banks

Way forward

Generally, financial institutions should lead the development of the rural economy through improving geographic reach and tailoring innovative financial products to the agricultural sector. MFIs like ACSI and DCSI which have foot on the ground could play a significant role in reaching farmers in more remote areas. For wider reach and better service, the government support in availing additional cash to MFIs should be intensified.

Awareness creation and training for relevant stakeholders is needed to increase the understanding on innovative financial products such as lease financing and WRF. Specific support to unions and cooperatives is necessary to develop viable business plans to engage in lease financing and operate as warehouse managers.



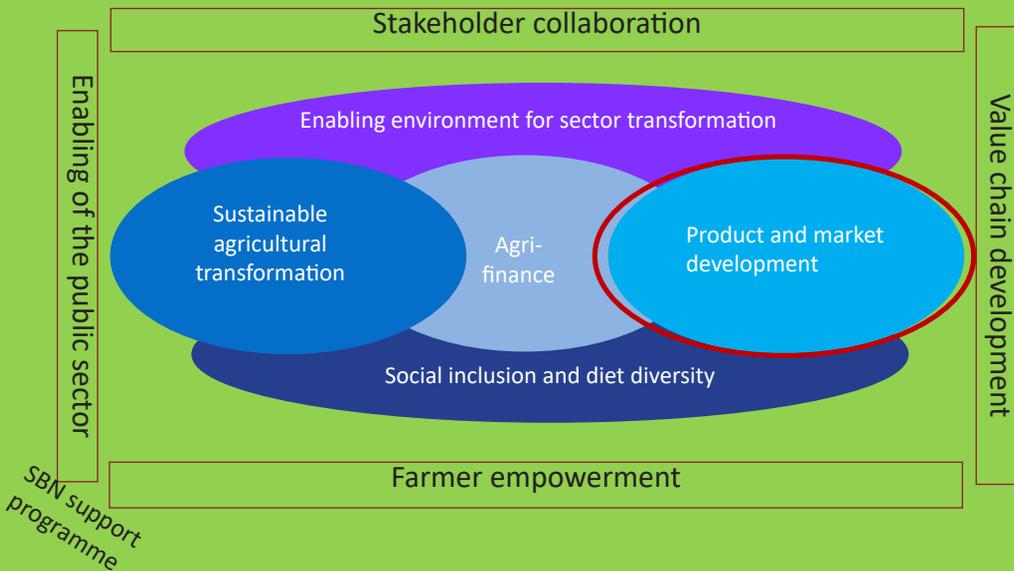
Judith Jacobs

Chapter 5

Product and market development

Introduction

The second pillar of the SBN support programme focused on creating a market pull for value chain development. Through product and market development post-harvest value creation can be maximised and long-term marketing relations established. The key challenge is how the sector can develop new value creation activities to produce qualitative products that meet the market demand and contribute to diversification, sales price improvement and market relations.



This chapter reflects on the key challenges and lessons learned for product and market development, based on the specific dynamics of the Ethiopian context and the sesame sector, posing serious barriers to achieve concrete results.

Key Message

Product and market development are important opportunities to create value within the sector. Marketing systems and dynamics can however severely hamper this development. An enabling environment that stimulates a level playing field, an attractive investment climate and direct farmer-company relationships is therefore important. Farmer organisations aim to create additional value for members through collective action. They are in a unique position to implement change, linking stakeholders at the grass root level and at administrative levels.

5.1 The impact of currency dynamics and market systems on value chain development

Getasew Aginche, Flo Dirks, Ted Schrader

Real value chain development requires realistic price setting at different levels and direct linkages between suppliers and buyers. Inflated domestic prices, due to foreign currency shortage, have not been to the disadvantage of farmers but cannot be maintained on the long run.

Introduction

Sesame seed is the second-largest export crop of Ethiopia. More than 95 per cent of the Ethiopian sesame is exported in bulk, with China as the predominant destination (66%) (MoTI, 2019). Exporters focus on volume rather than quality. Producers sell the sesame at designated spot markets in each woreda, where licensed traders and primary cooperatives collect sesame. The Ethiopian Commodity Exchange (ECX) regulates the domestic market since 2010 and is the only legal platform to trade sesame after the spot market.

The persistent foreign currency shortage in the country has resulted in inflated domestic sesame prices. Traders were competing to get large volumes of sesame and willing to make a loss on exported sesame. The hard currency earned would allow for import business that would largely compensate the losses. Cooperatives and unions do not have the right to engage in import business. There is therefore an unfair market competition and a non-level playing field. The high domestic price of sesame was as such not to the disadvantage of farmers, if indeed they were able to get the ECX price.

In addition, the quality grading process at the ECX fails to adequately reward premium quality. Generally, quality determines the demand, price and marketing channel of a produce. Processors need a certain quality that complies with manufacturing requirements, while traders demand different grades to meet specific consumer's demand. A well-established grading system is to meet

Product and market development

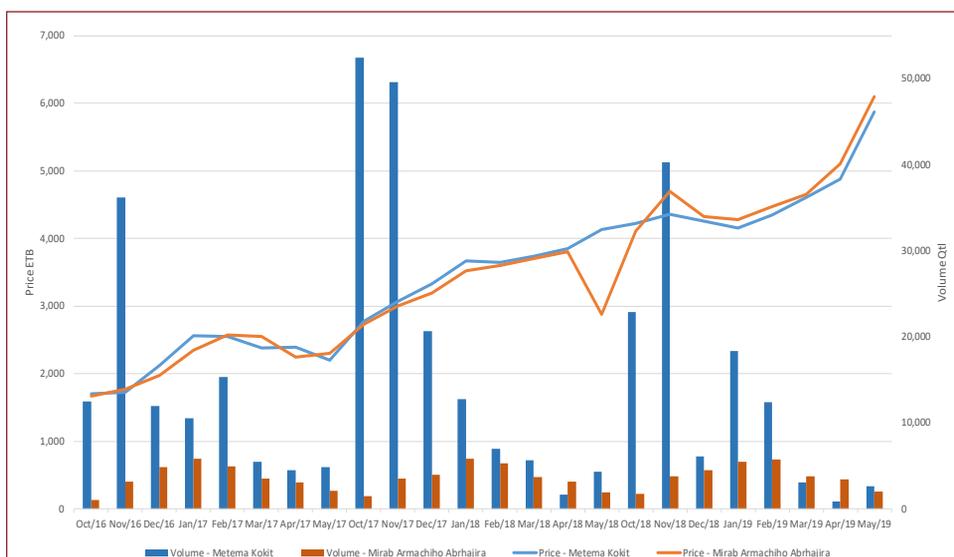
specific consumer’s demand. A well-established grading system is necessary to provide the appropriate information to traders to decide on which product to buy. In addition, it allows consumer differentiation based on their preferences and willingness to pay a premium for improved quality. Developing a marketing system based on grades and quality will encourage farmers to produce high quality sesame for which they will be rewarded. Most importantly, it will improve transparency and avoid adulterations at various levels. Therefore, quality grading provides an important opportunity to diversify export products according to market destinations, including the penetration of high-end market destinations like Europe, the Middle East, Japan, Korea, and North America. These countries have stringent quality requirements for size, aroma, taste, oil content, product quality, and food safety.

However, the current market dynamics do not encourage value chain operators to collaborate and invest in offering traceable quality products to the market. Without market system reform, value chains are not developed, and Ethiopia will deteriorate its competitive position in the world market.

Spot market prices and volumes

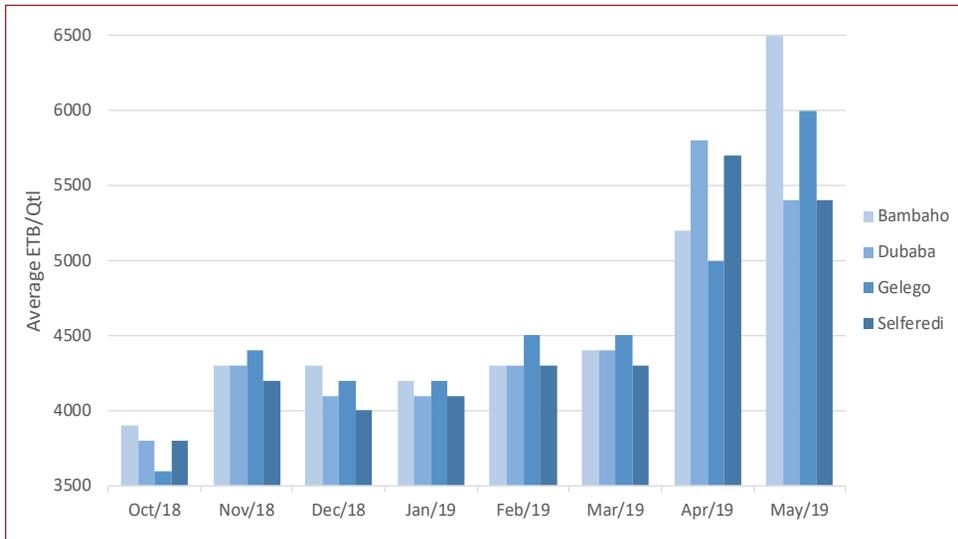
Most farmers only have access to one spot market, nearest to their fields, as they cannot afford to pay for transportation costs. The number of traders operating per spot market varies. Also, the months that trading takes place differs. The peak marketing season at the spot market is between October and January. The increasing trend of sesame prices, from 2016/17 till 2018/19 production season, is clearly visible in below graph.

Prices and volumes of two spot markets in Amhara region



Spot market prices are based on the daily ECX rate, transport costs and the level of competition. The graph below shows for four spot markets in Quara that average monthly sesame prices significantly vary impacting farmer incomes. For the 2018-19 market season the observed difference oscillates between 200 and 1,100 ETB/100 kg. Also, the quality is not objectively determined or rewarded. Farmers complain about price collusion of traders, especially if cooperatives are not present at the spot market. The bargaining power of farmers depends to a large extent on the availability of accurate price information from ECX and other spot markets.

Price differences between spot markets in Quara woreda



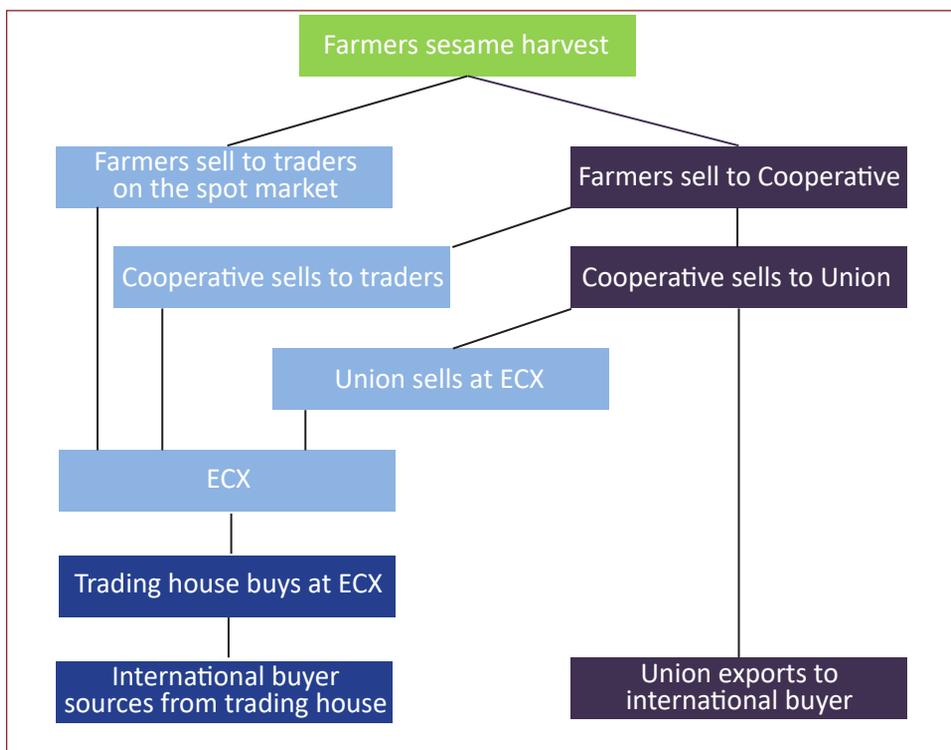
In 2016, the SBN support programme in collaboration with the then North Gondar Trade, Industry and Market Development department and software company Apposit LLC started the collection of sesame spot market information to disseminate to farmers. The collected price information was shared via Short Message Service (SMS) and Interactive Voice Response (IVR) messages. More than 25,000 farmers called 8338, on their cell phones to get information on sesame prices at the spot markets.

Processing companies can source at spot markets if they create added value through processing, beyond storage and cleaning. This is hardly occurring, because post-harvest value creation for sesame is under-developed. Because of recent ECX market pricing control there seem to be more perspectives for sesame value chain development, especially for organic sesame, as processors need to pay more attention to quality and traceability. An example of direct sourcing of processors are the recent established of contracts between agri-food companies and large soya bean farmers (cf. 5.4).

ECX marketing

There are seven ECX warehouses where sesame is marketed in the intervention areas of the SBN support programme. The vast majority of sesame sales (98%) is channelled through the ECX. The remaining volume is directly exported by farmer unions or investor farmers. Other traders are only allowed to sell and buy via ECX. Officially, farmers with more than one tonne of sesame can trade directly at ECX warehouses but this is not used in practice because of the long distance and high transportation costs for farmers. Below image summarises the possible sesame marketing channels.

Sesame marketing channels



The ECX grading system recently increased the number of grades from five to six, one being the best quality and under grade (UG) the worst quality. These grades are defined per sesame variety. Whitish Humera Gondar sesame (WHGS) is the most well-known variety in the SBN support programme intervention areas. The only two grading parameters are seed purity and colour. Grading is not applied consistently and there is no significant price difference. A trader with quality sesame seed does not receive any competitive advantage over a trader with poor quality. This leads to practices where farmers and traders mix any kind of sesame quality before offering it to the market.

An analysis of the ECX price trends for sesame from 2014 till 2018 illustrates the grading issue. The analysis focuses on the different grades for “Whitish Humera Gondar (WHG)” sesame seed. The table below shows that only in 2016 and 2018 grade one received a higher price than all lower grades and that in 2014 grade two had almost a similar price to grade four. Even more remarkably, in all years except for 2017, the price of grade two sesame was lower than grade three. A trader would earn an additional 54, 380 and 27 ETB per 100 kg over the years, if he mixed two kilograms of foreign matter with grade two sesame and traded it for grade three. This can be derived from the ECX quality indicator of foreign matter, which is respectively three, five and seven percent for grade two, three and four. Similarly, an additional 770 ETB per 100 kg could be earned by mixing four kilograms of foreign matter to grade two and trade it as grade four sesame instead in 2015. Next to earning a higher price, the trader benefits even more due to the extra weight of foreign matter per 100 kg in a lower grade. Due to this, many traders prefer to buy lower grade sesame to exploit weight gains. Recently, ECX expressed the intention to improve the grading system.

ECX price differences among WHG sesame grades

WHG Grade	ETB	2014	2015	2016	2017	2018
Grade 1	Price		1,991	2,282	2,805	4,435
	Δ G1 & G2		109	226	-182	392
Grade 2	Price	3,208	1,882	2,056	2,987	4,043
	Δ G2 & G3	-54	-380	-27	123	-27
Grade 3	Price	3,262	2,262	2,083	2,864	4,070
	Δ G3 & G4	56	-391	64	141	139
Grade 4	Price	3,205	2,653	2,019	2,723	3,930
	Δ G4 & G5	119	50	138	156	158
	Δ G4 & G2	3	-771	37	264	113
Grade 5	Price	3,086	2,603	1,881	2,567	3,773

Cooperatives and union marketing

A neglectable amount of sesame is marketed through cooperatives and unions. There are several considerations that play a role in the farmers' decision-making: (i) Does my cooperative have the means to buy the produce (which is often not the case, cf. 4.3); (ii) Does the cooperative offer an interesting price and perspective on dividend, as compared to prices offered by traders (which are generally high) and; (iii) Do I need to reimburse (formal or informal) credit? For the promotion of the marketing role of cooperatives, conditions have to be created that farmers give an affirmative answer to the first two questions and are not tied to money lenders. Similar considerations play a role at cooperative level when deciding to sell to the union or to traders.

To increase hard currency earnings, the Federal Cooperative Agency (FCA) and the Commercial Bank of Ethiopia (CBE) strongly encouraged and facilitated cooperative unions to directly export sesame to international buyers. The first direct sesame transaction was of Selam Union during the 2012-13 marketing season. Experiences have learned that unions lose 100-200 USD per tonne (the same loss taken by exporters), because of the inflated domestic prices that are out of sync with the international market prices. Contrary to exporters, unions could not engage in import business and compensate losses. In addition, the union leaders and managers were inexperienced, which made direct export even more hazardous. In fact, for cooperatives and unions the only viable marketing path was selling to ECX. Unions have a seat at the ECX and sell sesame to exporters.

In principle, cooperatives and unions can be competitive in the logistics of the supply chain (lower costs for commissioners, less loading and unloading, more efficient transport, and less weight losses at store). In most areas, members can use warehouse facilities of cooperatives or unions. This marketing modality is thus an option for farmers to get a slightly higher price and some dividend. Cooperatives and unions must of course have the funds and business skills to effectively engage in marketing which are often serious bottlenecks (cf. 5.3).

National vs international market

The comparison of ECX prices to sesame world market prices requires more in-depth analysis. Compared to world market prices, exporting trading houses pay high ECX prices. As mentioned before, they accept losses, as these can be compensated with the profits made with import business that was made possible with the hard currency earned with exporting sesame. The graph on the next page shows the minimal differences between export and domestic sesame prices over several years. While exact price comparisons are difficult due to exchange rate conversions and limited price data availability (national and international data are of different sesame batches), it illustrates the general trend.

Average sesame price on spot markets in Amhara region and traded and exported from Gondar ECX



To change the market dynamics, MoTI has taken measures to control the export of agricultural commodities ('Export Contracts registration and control directives No 21/2012'; November 2019). This policy reform aimed to align domestic sesame prices to international prices. As a result, the local sesame prices immediately dropped in the 2019-20 marketing season, which was clearly to the disadvantage of farmers. Although the export marketing regulation affects smallholder farmers, it creates opportunities for farmer organisations and investors to engage in direct sesame exports and earn a premium on the export market. Realistic domestic market prices are a precondition for competition based on quality, for post-harvest value addition and the establishment of stronger market linkages.

Way forward

The recently adjusted marketing regulations have the potential to change the Ethiopian sesame market dynamics which create opportunities for the future. Marketing improvements should start at the spot market by enhancing the presence of cooperatives. Cooperatives and unions have the comparative advantage that they are closer to the farmers than traders and exporters. As direct export may become interesting to earn a premium price, unions and cooperatives need intensive capacity building and advisory support to operate on the international market. Knowledge and skills in market intelligence, contract negotiation, communication, faster decision making, handling of export documentation and shorter shipment lead times are essential.

Product and market development

International quality requirements demand further development of the grading system to promote traceability and food safety. This could be supported by the introduction of additional parameters like oil content, seed size and free fatty acid.

Measures should also focus on creating professional exporters that do not compromise on product quantity and quality, meet agreed deadlines and deliver on time and on promoting a more equal distribution of benefits among the various value chain actors. And finally, a level playing field should be established: either unions can have import business licenses like trading houses or sesame exporters should specialise on export business only.



Weighing sesame at spot market

5.2 Post-harvest value creation

Anemut Belete, Flo Dirks, Ted Schrader

Post-harvest value creation is a key opportunity to increase sector profits and improve international competitiveness. Prices, demand and investment climate are important factors determining the attractiveness of developing value addition activities.

Introduction

Most Ethiopian agricultural export commodities leave the country without value addition. Sesame is not an exception. A lack of favourable policies, weak governance, high officials' turnover and barriers for foreign investments are some of the reasons that affect the development of the Ethiopian agro-processing sector. For sesame, the limited domestic market for sesame products is further exacerbating the situation. Sesame-based food products are not rooted in the national food culture.

The post-harvest value creation in the sesame sector is therefore close to not existent. The current in-country value addition is confined to cleaning and artisanal oil production using rejected low quality sesame seeds. Nonetheless, Ethiopia has comparative advantages for producing highly valued white-seeded sesame varieties that are preferred for producing high quality oil. The opportunities for developing other products, including hulled, toasted, roasted, grounded sesame flour, tahini and halva, are very high.

There are also missed import substitution opportunities. Ethiopia imports for instance 98 per cent of its edible oil from abroad. This requires millions of dollars, which further deteriorates the country's trade deficit. Local oilseeds (sesame, noug, sunflower.) could be promoted as an alternative. Paradoxically, imported palm oil is subsidised to make it accessible for the Ethiopian population, while locally produced oils are taxed. This hinders a transformation to domestic production of edible oils, product quality, and food safety.

Business ideas for sesame product development are not viable because of high costs and limited demand. The SBN support programme has been looking for opportunities to support at encouraging existing enterprises and new entrepreneurs with sesame product development. Many activities aimed at capacitating entrepreneurs in business development, facilitating market linkages, developing concept notes for grant competitions and/or providing technical support. However, the viability and feasibility of business ideas was limited due to the high cost of sesame, limited local market demand and high-quality requirements of international demand for processed products. In this context, the identification of barriers and hindrances for sesame value addition and bringing them to the attention of policy makers became the most important activity.

Value addition cases

The SBN support programme supported a local entrepreneur to further develop and fine-tune a mobile sesame cleaning machine. Normally, labourer's clean sesame manually at the spot market. The cleaning machine would ease the burden of hand cleaning and winnowing; increase purity levels up to 99 per cent and saves time. The SBN support programme facilitated the testing of the machine at spot markets to get feedback from traders and to create visibility. The entrepreneur sold an improved prototype to Miebale Cooperative at Adebay. The demand for cleaning services was low because of limited incentives to invest in cleaning, cheap labour alternatives and unreliable access to power to operate the machine.

Cleaning is a business opportunity for unions. Unions can offer a cleaning service to exporters and improve the value of the own sesame traded. Selam union approached the SBN support programme with the request for support to get a cleaning machine up and running. After construction of a new road and electricity lines, this machine, a gift from a donor programme, could become operational with some investments and training. Although the SBN support programme helped the union to some extent, it put most emphasis on internal capital mobilisation. Although the union was in a difficult financial position, the required capital was raised. The cleaning machine service is an income generating opportunity and might be a steppingstone to other cooperative business activities.

In agribusiness, crop residues can be put to value. In the sesame zone, a huge biomass of stalks of more than 500 thousand hectares are burnt. These could be used for producing briquettes, which may be an alternative energy source, for industrial use or for replacing firewood. The primary cooperative 'Dehenet Dani Fabrica Faham' of Adebay (Tigray) entered in this business.

Supply to the Mesebo cement factory in Mekelle was a good opportunity. The factory uses the sesame briquettes as a supplement to imported natural coal. Women were trained to produce the briquettes. However, the need for additional investments for a new stove called 'lakech', the high transport costs and limited promotion efforts, prevented a successful adoption.

To encourage the development of small-scale local entrepreneurship, women groups were organised in Metema, Dansha, and Humera, in collaboration with IFDC/2scale Project. These groups learned recipes for using sorghum, mung bean, soya bean, and vegetables, with the aim to add value to the primary produce. The prepared dishes were demonstrated to stakeholders during meetings, workshops and training sessions to promote demand. 2scale supplied the organised women with the necessary equipment for food preparation, cooking, and storage to encourage creating a sustainable business. Due to power supply shortage and limitations in credit access the groups were however unable to perform according to expectation. Nevertheless, some women that received the training continued their activities locally.

Together with the Industry and Investment Department, the SBN support programme provided trainings on business plan development to entrepreneurs involved in sesame value addition activities. The participants had businesses in bakery, sesame oil production and cleaning machines.



Tahini oil processing and local developed cleaning machine



Locally developed cleaning machine

Lessons learned

The results of the efforts to promote post-harvest value creation are not encouraging. The prevailing market system and related price setting mechanisms do not induce post-harvest value creation. On the contrary, it was most realistic to export raw, undifferentiated sesame and almost impossible to start value addition activities. Far reaching policy reform is required.

The high domestic price makes sesame an expensive input product for local processing. Because of high production costs, inflated ECX prices and taxation of locally produced oils, sesame oil products are unaffordable to the majority of the low-income population. Best perspectives exist for processing the under-grade sesame into oil and for sunflower.

Way forward

Developing and sustaining post-harvest value creation requires an enabling environment; government commitment to create an enabling environment for value addition is essential. The Government of Ethiopia has started to review and amend policies and to move towards the transition from a public led to private sector led economy. An example of an encouraging policy reform is the nine-year tax relief for agro-industries and bio-chemical companies that are using Ethiopian agricultural products as inputs. Other benefits offered to entrepreneurs are loan provision preferences; machinery lease financing, land lease at a nominal rent, 100 per cent insurance coverage options, accessing workspaces with lower capital investments and reduced construction lead times.



Local sesame oil pressing

A second main orientation is import substitution, which, for addressing the hard currency challenge, is as important as export promotion. This should especially be applied to the edible oils sector. Reduction of imported palm oil could save millions of dollars. This requires a campaign for producing edible oils domestically. This campaign should be accompanied by tax measures: gradual removal of subsidies on imported palm oil and providing tax exoneration for domestic oil producers.

To promote local processing, industrial parks have been established in proximity of production zones. Industrial parks in Amhara and Tigray host some processing plants that are interested in sourcing sesame and rotation crops. Direct relations between farmers and their organisations on the one hand and these agro-processing companies on the other hand, would be an important step towards value chain development. The demand of local companies would not only diversify market outlets but would most importantly create dialogue between value chain operators. Therefore, matching the demand of agro-processors to local production and establishing market linkages through contractual agreements is a corner stone for product and market development.

Working on the comparative advantages of Ethiopian sesame to penetrate high value international markets is another strategy to strengthen the market pull for value addition. The unique product characteristics can serve specific international consumers' preferences. Careful investigation of international demand and quality standards is required to develop differentiated high value products. These need to be promoted through strong branding initiatives to secure markets. Joint ventures are an option to realise this. As access to finance, knowledge and technology remain important bottlenecks, partnerships with international companies are a good opportunity to access these necessary resources.

To accompany a shift towards product and market development, important accompanying measures are the following: (i) development of options for product development for sesame and rotation crops, including their by-products; (ii) promotion of local products and efforts to change food habits and (iii) improvement of agricultural practices to increase yields, improve quality and reduce the cost price of production, so as to promote the use of local production in agro-processing ventures.

For sector transformation, it is key to give attention to production improvement and to product and market development. Therefore, it is very important to address productivity improvement and value creation side-by-side in order to sustain the uptake of technologies and ensure market demand.

5.3 Cooperative development for market and product improvements

Getasew Atenafu, Anemut Belete, Flo Dirks, Ted Schrader

Cooperatives can play a critical role in sector transformation and can contribute to farmer empowerment and income improvement. Through their structure, change can be initiated from the field level up to the strategic level. If cooperatives are allowed to emerge towards farmer-owned companies, there are good opportunities for cooperative development.

Introduction

In Ethiopia, there are 84,496 primary cooperatives, 388 cooperative unions and three federations, which have nearly 20 million members and 22.8 billion ETB capital (FCPA, 2019). These organisations, which operate in diverse sectors (agricultural, financial, housing and others), offer collective action services to their members and create employment opportunities for more than 1.5 million people. Also, in the Amhara and Tigray sesame lowlands, cooperatives are important. There are 10 cooperative unions and 251 primary cooperatives, with a total of 185,070 members, of which 26 per cent are females.

In rural areas, cooperative societies are primarily established in order to address farmers' challenges, such as input supply, access to finance and access to markets. This is also the case for the sesame zone. Collective action of cooperatives could improve access to quality inputs at affordable prices and farmers' access to credit. At the marketing side, cooperatives can improve their presence at spot markets and by doing so reduce the traders' price collusion. In practice, most cooperative services are limited to the distribution of agro-inputs and consumption goods, which are received through government channels.

Sesame unions and cooperatives face many challenges such as: access to capital, asset development, weak leadership and management and limited service provision to members. Despite the long tradition of cooperatives in Ethiopia, there are only a few examples of successful cooperatives.

Both the government and (most) farmers themselves do not perceive cooperatives as organisations that are owned, governed and controlled by their members, nor seen as farmer-owned enterprises.

Unfortunately, the Ethiopian saying ‘የሺን ገንዘብ ብላው፤ የሺን ወንድም አትጻካው’ is the norm in cooperative society. This saying suggests that by pretending to respect the thousands of members, their money is embezzled. Internal governance, management, transparency and communication are weak, which allows practices to continue that sustain the bad reputation of unions and cooperatives. Hence, there is a need to strengthen these farmer organisations to improve the income of their members and encourage technology adoption and innovations.

Cooperatives are different from other types of businesses because they are member-owned and the purpose is to serve the members, not only to maximise profits. Yet like all businesses, cooperatives can only thrive if they are able to at least cover the operational costs of the services to their members. Cooperatives thus have to balance two goals: satisfying member needs and pursuing profit for sustainability.

For several activities, the SBN support programme collaborated with cooperatives and unions in the sesame sector, as well as with institutions that work with unions and cooperatives, such as the Cooperative Promotion Agency (CPA), Ardaita Cooperative Training College, and financial institutions. Collaboration started with some selected primary cooperatives and unions and gradually expanded to 99 primary cooperatives and ten unions.

Through various activities unions and cooperatives received support on developing management skills, creating linkages to access inputs and finance, and strengthening market and business development. Guidelines, training materials and cooperative assessment tools have been used to identify the areas that require most attention and to develop tailored trainings. Often, creating awareness on cooperative principles was an important starting point.

Cooperative governance and management

Cooperatives generally fulfil both social and business objectives that attract farmers to become a member of the organisation. Member participation and ownership are one of the most important performance indicators and critical for long-term viability. Cooperative membership is relatively high in the sesame areas in Amhara and Tigray. Many are only member in name, the interest of farmers to be active in the cooperatives is limited. For most cooperatives, members are not satisfied with the services provided. The attendance rate of general assembly meetings is often low and the willingness to buy additional shares or contribute to internal capital mobilisation is limited.

Product and market development

Many farmers only become a member to access consumer goods, such as cooking oil and sugar, through the cooperative. Most cooperatives have no bottom up control: members do not sense they own cooperatives and cooperatives do not sense they own the union. Supporting organisations have not managed to create awareness on essential cooperative principles.

Although cooperatives are supposed to be managed and controlled by members, cooperatives are characterised by weak internal governance and management, strong external interference and weak external support for cooperative capacity development. Internal governance is characterised by weak leadership, limited internal resource mobilisation, lack of qualified management and insufficient strategic planning and business activities. Internal regulations and documentation are often not well organised. Relevant documents are not archived or maintained, minutes or decisions not recorded, and committees and management bodies do not operate according to their mandate. Similarly, most of the cooperative employees, such as accountants and managers, are not qualified, lack the experience or change frequently. This bears the risk of mismanagement of cooperative property and finance. As a result, most cooperatives are not able to perform their duties and meet membership expectations.

In principle, cooperatives are to be governed according to cooperative law and proclamations and to internal by-laws. While external support can support cooperatives to come to a level of independent business organisations, this support should be provided according to the principle that cooperatives are autonomous. In Ethiopia, relevant authorities and supporting agencies do not demonstrate that they perceive and treat cooperatives as autonomous organisations. Often, cooperatives are instructed to distribute agro-inputs and consumer goods in rural areas, sometimes to non-members as well. Sesame unions have been pushed into direct marketing at a loss. Staff of administrations and cooperative promotion offices do not always have the necessary skills, information or tools. Cooperative principles, laws and privileges, enacted by national or regional legislative bodies, are not known or accepted by supporting bodies. Supporting cooperative development requires intensive support that is organised on the basis of cooperative principles. Training modules need to be tailored and delivered in a participatory manner. Platforms for cooperative experience sharing and networking would be very useful. Cooperatives have to be audited by the CPA. In practice, most cooperatives have not been audited for years due to a shortage of auditors and other challenges. This leads to delayed dividend payments and reduced membership trust.

The SBN support programme has provided support to improve the governance and management of cooperatives. This included: advice on the division of roles between board members and staff; the establishment of task-oriented committees; internal communication; use of notice boards and SMS, preparation

of subjects to be discussed during general assemblies, internal resource mobilisation, financial administration and loan management. An innovative digital information management system was piloted with four cooperatives. This system has the potential to improve member administration, marketing transactions and financial administration (cf. 6.1).

Cooperatives have an extensive experience of working with NGOs, which might lead to dependency. Almost all cooperatives are depending on external funds and most of the capital and existing assets are funded through donations. The SBN support programme always collaborated with unions and cooperatives on a cost-sharing basis. This stimulated them to take responsibility from the start for any intervention.



Cooperative members discussion on financial literacy

Cooperative services

Cooperatives can provide a wide variety of services to members. The most important types of services are presented below, as well as the efforts of the SBN support programme to develop these services.

Input supply

Currently, cooperatives provide agricultural inputs, especially fertiliser, to farmers, both members and non-members. The provision of inputs is not based on member needs assessments but supply driven (instructions by government to distribute a certain amount). Farmers complain about the availability, price, quality and timeliness of delivery. Often private shops offer the same items at a lower price. The top-down system and the disconnect from farmer needs have resulted in unsold stocks and large fertiliser debts, which are still not settled.

The SBN support programme has made an effort to improve the assessment of farmer needs for inputs, training and credit (cf. 6.5). The potential of cooperative involvement in the planning of the agricultural seasons remains largely unexploited.

Extension

Next to inputs, knowledge and skills are important asset for farmers. By-laws mention that cooperatives commit themselves to training of members. In practice, the training capacity and resources are limited, and cooperatives rely on the government extension system or non-governmental projects. The top-down extension system is still like a transfer of technology system, whereby research develops innovations, extension disseminates the message and farmers are expected to adopt the innovation, after awareness was created. The potential of farmers acting as co-research and the potential of farmer-to-farmer extension is largely untapped.

Together with partners, the SBN support programme invested a lot in the training of farmers, who hosted many demonstration plots. The experience learns that it is possible to create farmer field schools that are owned and managed by cooperatives or farmer communities. Furthermore, financial literacy training was introduced and delivered together with cooperatives (cf. 4.2). Cooperative members and supporting agencies increasingly acknowledge the merits of cooperative involvement in knowledge development and sharing.

Machinery rental services

There is potential for developing machinery rental services, for tractors, row planters, threshers and other machineries. This does not yet exist in the sesame zone but cooperatives and unions can learn from other cooperatives and unions that have experience with providing rental services for members (FCPA, 2019).

The SBN support programme has helped ten cooperatives to submit a bankable proposal for lease financing, for obtaining tractors, row planters and other machineries. This did not (yet) lead to practical results, due to bureaucracy and insufficient attention for investments in the agricultural sector.

Access to credit and loan provision

As mentioned earlier, financial management skills, limited internal resource mobilisation and limited access to credit are challenges for cooperatives. Cooperatives do not always properly consider all operational costs, which may threaten the sustainability of their activities. The shortage of working capital is a chronic problem that limits the capacity to buy inputs, to provide loans and to engage in sesame marketing. Without access to affordable loans, farmers do not invest in improved agricultural practices.

Financial institutions do not offer tailored financial products for cooperatives. Although working with cooperatives could be more efficient than working with scattered smallholder farmers, both Micro Finance Institutions (MFIs) and Rural Saving and Credit Cooperatives (RuSACCOs) are not exploring this option.

Loans of commercial banks have to be backed by fixed collateral. With the guarantee of regional governments, the Commercial bank of Ethiopia (CBE) has provided loans to cooperatives to facilitate direct sesame exports. Because of the inflated domestic market this was however unattractive for cooperatives and led to losses. In addition to the negligence of the financial sector, it has to be observed that cooperatives do not know the available financial products and their requirements. Farmers are not organised to lobby for more appropriate financial solutions for the sector.

The SBN support programme facilitated the provision of input loans by cooperatives through the marketing credit initiative (cf. 4.3). This was highly successful. Members strongly appreciated the cooperative financial service, member participation, share purchases and willingness to sell produce to the cooperative increased. Default rates were low and cooperatives were willing to support members, who for social or other reasons had difficulties to repay their loan.

Marketing

One of the main purposes of cooperatives is to facilitate collective marketing to improve farmer income from a stronger bargaining position. In principle, members are willing to supply to primary cooperatives, because: (i) PCs are ready to pay a higher price than traders at the spot market; ii) PCs weighing scale is more trusted and (iii) PCs pay dividends. Also this potential has not been captured: cooperative market participation has been very limited to date. The main reason is that cooperatives and unions lack the financial resources to buy produce from their members.

The SBN support programme addressed the marketing credit needs of unions and cooperatives through the marketing credit intervention (cf. 4.3), leading to a significant increase in market participation. This attracted new members, improved internal capitalisation and increased marketing profits. Moreover, cooperatives presence in spot market reduced trader collusion on prices improving the market environment for all farmers.

Cooperative-union relation and collaboration

According to the subsidiarity principle, unions should not do what cooperatives can do themselves. Unions can take up activities that cooperatives cannot do and create economies of scale. In that manner, cooperatives benefit from the affiliation to the union. Currently, most of the unions are involved in the same business activities as primary cooperatives. This leads to competition and tensions. Cooperatives and unions often see each other as different entities. Using the subsidiarity principle as guidance, it is possible to arrive at a better distribution of roles and responsibilities, which could make operations more efficient and complementary.

Lessons learned

The existence of union and cooperative structures and their high membership base in sesame producing areas are an opportunity to effectively improve farmer incomes and sector development. Cooperatives need to strengthen their governance and management. Changing the mindset of the leadership and the attitude of cooperative societies towards their responsibilities and ownership structures is one of the most difficult things but essential. Moreover, improved staff incentive mechanisms can attract more qualified staff and reduce staff turnover.

Strengthening the relationship between unions and cooperatives helps to reinforce the efforts on each level. Unions and cooperatives can both flourish if they differentiate their mandates, specialise in different business operations and share responsibilities, risks and benefits.

Supporting cooperative development requires intensive support. Supporting government authorities need to properly coordinate and respect cooperative laws and principles while promoting cooperative development. Current policy restrictions and government interference inhibit unions and cooperatives to fully and equally engage in sesame business.

Cooperatives have an extensive experience of working with non-governmental organisations, which might lead to dependency. Collaboration with unions and cooperatives based on cost-sharing stimulates ownership and involvement. The reputation of cooperatives has to improve at financial institutions and financial institutions need to be lobbied to engage in agricultural finance. Commercial banks, MFIs, and RuSACCOs can complement each other to serve different segments in the agricultural sector. To improve the access to credit, new financial products need to be developed including feasible collateral requirements.

Way forward

The figure and table below visualise an action plan for the inclusive development of the cooperative sector that is essential for sesame sector transformation.

Top 10 actions for developing the cooperative sector		
Objectives	Actions	Key elements
Improve cooperative self-reliance	1. Cooperative auditing, assessment and training	<ul style="list-style-type: none"> • Improve auditing services • (Self-) assess cooperatives and align services to different performance levels
	2. Create level playing field	<ul style="list-style-type: none"> • Align export / import allowances for traders and cooperatives / unions
	3. Digital information system	<ul style="list-style-type: none"> • Build databases from local level onwards • Promote digitalisation of unions and cooperatives
Increase production and value chain development	4. Farmer-to-farmer extension system	<ul style="list-style-type: none"> • Establish farmer field & business schools / production clusters and extension incentive system with farmer contributions
	5. Post harvest value addition	<ul style="list-style-type: none"> • Support storage, transport, cleaning and possibly processing activities
	6. Direct supplier-buyer relations	<ul style="list-style-type: none"> • Promote direct sourcing from farmers • Improve specialisation on producing certain varieties and their characteristics
Access to finance	7. Financial literacy training	<ul style="list-style-type: none"> • Stimulate the investment in knowledge • Collaborate with supporting institutions • Train farmer trainers and certify them
	8. Bottom-up planning and input finance	<ul style="list-style-type: none"> • Involve local administration, extension, FIs and farmers for planning agricultural season • Target strong farmers for input finance
	9. Lease financing and internal capitalisation	<ul style="list-style-type: none"> • Accompany process to obtain lease finance • Develop and implement rental services • Promote internal capitalisation for assets
	10. Marketing credit	<ul style="list-style-type: none"> • Support banks with risk assessment • Support unions / cooperatives with loan management and internal onlending

5.4 Market and farmer-company relations are key for value chain development

Gezu Seyoum, Getasew Aginche, Hagos Tadesse, Hagos Woldegebriel

Improved relations between suppliers and buyers offer the potential to reach high-value markets increasing sector revenues. Especially, organic farming offers the potential for more sustainable production techniques, improved relations between suppliers and buyers, in-country value addition and reaching high-value markets. Although there are some perspectives for change, this potential is still far from being realised.

Introduction

In Ethiopia, the establishment of market relations largely depends on government policies that determine the organisation of the marketing system. Fundamental change is needed to establish business relations between sesame suppliers and international buyers. The first should know the market demand and the second should know the production conditions.

The prevailing system is to the advantage of powerful benefit-seeking traders and exporters. As explained in 5.1, the sesame market has been characterised by a relatively rigid Commodity Exchange system and export traders with high purchasing capacity who are interested in sesame for earning hard currency for their import business. This led to inflated domestic market prices and the predominance of bulk sales of undifferentiated low-quality sesame. National sesame market relations are one off and ad hoc.

Traders at spot markets buy from farmers and sell to local ECX warehouses. The exporting trading houses source at the ECX and engage in international sales, which are characterised by bulk sales and short-term relations. From a value chain development perspective, this situation is dramatic: suppliers and buyers do not know each other, there is no exchange of information among value chain operators, farmers and local traders do not know market demand and quality requirements and international buyers do not want to operate in Ethiopia because

of the inflated sesame price and the inflexibility of the marketing system. Recent policy adjustments may eventually create opportunities to arrive at new forms of market relations and to focus more on quality.

National sesame market relations

The national sesame marketing channel starts with producers and ends with exporters. Traders operating at spot markets and bringing the produce to the ECX are in between. All marketing channels are regulated by the Ministry of Trade. Spot market traders have to submit their licence application to the Woreda Trade Office and should show their ability to purchase with a bank statement showing a capital of at least one million ETB. After a trader is granted the license to trade in a spot market, he has to build a 5x5 meter collection centre in the spot market. Farmers usually trade at the spot market that is closest their farm/residence. ECX-mandated commodities cannot be transported like others. The government may consider it as contraband.

In this highly regulated and constrained market context, the SBN support programme concentrated on facilitating marketing credit for cooperatives. This intervention had multiple benefit: internal credit to members, improved cooperative presence at spot markets which reduced the traders' price collusion (cf. 4.3).

An important marketing restriction is that processing companies are not allowed to directly source raw materials from unions or cooperatives. Processing companies should buy the produce directly from farmers or through the ECX. This prevents trade relationships between farmer organisation's and processing companies that become more important through the investments in industrial parks (cf. 5.2).

Together with the IFDC 2Scale project, the SBN support programme made efforts to link sorghum and soya bean producers of four unions (Setit and Dansha unions in Tigray and Selam and Metema unions in Amhara).



Local transport of sesame

The unions in Tigray delivered malt sorghum to Diageo/Meta brewery. The unions in Amhara delivered soya bean to Ambasel. Due to several issues (price, volume, quality) the delivery contracts were discontinued.

Contract farming

Based on the new demand for soya bean from two large processing companies in Amhara, the SBN support programme lobbied for market linkages with farmer organisations. Due to prevailing regulations this was not feasible. In the hope to connect the companies to farmers, the SBN support programme shifted its efforts to facilitating market linkages with commercial farmers.

Sesame farmers are increasingly interested to produce rotation crops, such as sorghum, cotton, soybean and mung bean. The main reasons are the price volatility and high cost of production of sesame and soil fertility depletion. Home consumption is only practiced for sorghum. The establishment of large agro-processor companies in the recently established industrial parks is therefore an opportunity. Soya bean demand is increasing and as a result soya bean acreage is increasing, especially in Amhara region. After assessing the potential for soya bean production and multiple communications with the companies and farmers, more than 25 investor farmers, cultivating nearly 1,100 hectares, signed an agreement with Richland Biochemical Processing Factory.

The agreement is attractive for farmers, as Richland offers the highest ECX market price registered during the three months after product delivery. At delivery, farmers receive a 50 per cent advance payment. Depending on quality indicators such as foreign matter, colour and the amount of split beans, a premium of 5 per cent is possible. While signing the agreement, the owner of the company informed the commercial farmers that the company considers facilitating organic certification and production loans in the future. While the agreement has been made with a limited number of farmers, it is a breakthrough as there is communication between the producers and the buyer. Both parties need each other. The producers need the market perspective and the processors needs to ensure sufficient supply. This type of market relations is essential for value chain development, with mutual benefits and profit improvement.

“The agreement is an assurance for us that we will not have marketing problems after we produce. It allows us to sell the produce in advance. It will cut off the unnecessary chains in the supply chain and reduce costs that we pay for the brokers. Also, the company will collect our produce from the production area and this will also reduce our spending on transport costs.”

Mr. Bere Shimelash - commercial farmer

International market relations

In 2010, Ethiopia ranked as third sesame exporter in the world. This position is under pressure as many other countries have expanded their sesame production and marketing. China was and is by far the most important destination of Ethiopian sesame, followed by Israel, Turkey and Jordan.

In the international market, Ethiopia has some comparative advantages: good local varieties, favourable growing conditions, vast suitable sesame growing area and relatively cheap labour. The Ethiopian sesame varieties are appreciated in high-end markets for their colour, size, sweet taste and aroma. Most sesame is 'organic by default, because of limited use of fertilisers and agro-chemicals. This offers opportunities for the organic market. The country's proximity to the Middle East is another comparative advantage. According to Lehr and Yared (2018), the demand for sesame and the rotation crops is likely to increase in the future. Potentially, there is an interest from companies around the world to do business with Ethiopian partners. These comparative advantages are not materialising because of the focus on bulk export and the negligence of quality management.

In 2016, Dutch, French and German importers and entrepreneurs visited the Ethiopian sesame zone to see the production areas and to get to know the farmers and their organisations. An effort was made to convince a large Israeli buyer to start contract farming relations with selected cooperatives. Similarly, an investor cooperative from Tigray was sponsored to visit potential sesame buyers in Israel. In another effort, exporters and a farmer union joined a trade mission to India on pulses and oilseeds.

These efforts did not lead to any significant results. The inflated domestic sesame price, the strong and unpredictable government regulations, security issues and the unattractive conditions for direct foreign investment hold international buyers back to invest in business relations in Ethiopia. The new marketing directives might finally change the situation. There is however a long way to go to convince international buyers to work more closely together with Ethiopian partners. The weakness of cooperatives and unions and the limitations to their functions do not help either.

Organic production and sourcing companies

Most sesame is 'organic by default, because of limited use of fertilisers and agro-chemicals. This offers opportunities for high quality organic sesame to access niche markets. Specialising on organic value chains could be an alternative strategy to regain some of the lost international market position. There are quite some sesame farmers that have been involved in the supply of organic produce.

generally induced and supported by companies interested in the sourcing of organic sesame for export markets. Farmers who opt for organic production need to transform their entire farming system and no longer use fertilisers and agro-chemicals. This is an important farm management decision. It means that farms have to be organic and that they then produce organic sesame and rotation crops, for which they need to find specific markets.

Organic production can be an alternative to conventional farming, which is often extractive and polluting the environment. Organic farming may help to balance the ecosystem and create opportunities to specialise. It requires knowledge about the interaction of different factors (ecology, soils, weather conditions, pests and diseases) that can affect crop growth and development of the plants that are grown. And it requires proper land use planning and crop and variety selection.

Organic production challenges and solutions

Organic sesame production cannot use synthetic fertiliser. It is difficult to maintain the soil nutrient balance under organic production systems. The advice is to increase organic matter using green manure, cover crops or ploughing under crop residues immediately after harvest. Ploughing crop residues in the soils helps to kill weeds before they shed their seeds and increase soil organic matter. Using pulses in the farming system and applying compost and manure are recommended. Avoiding mono-cropping and using rotation crops with different biological behaviour reduce the risk of pest and diseases. The high volume of compost required (30 MT/ha), difficulties of compost making under dry environments, inadequacies in green matter, limitations in technologies that replace synthetic fertilisers are major challenges that needs attention to sustain organic sesame production.

In 2016 and 2017 field trials were conducted in Kafta Humera woredas to select organic fertilisers that can replace synthetic fertilisers. For this purpose, Orga, and Eco-green were respectively used at rates of 200 kg/ha, 100 l/ha and 800 ml/ha. Results were evaluated in relation to the conventional practice of using 100 kg DAP and 50 kg urea per hectare.

Data were collected for the following yield and yield components: days to maturity (DM), number of branches per plant (BPP), plant height (PH), pods per plant (PPP), seeds per pod (SPP) and seed yield (kg/ha). Table 1 shows that plots receiving Orga yielded almost the same amount of sesame as plots treated with DAP/Urea. Fertilisation with Eco-Green did not lead to good results. In 2018, Orga was further demonstrated on commercial farmers' fields and gave similar yields. Therefore, the tentative conclusion is that 200 kg/ha Orga could be used for organic sesame production.

Yield and yield components to organic and synthetic fertilisers (Humera, 2016-2017)						
Treatment	DM	BPP	PH (cm)	PPP	SPP	Yield (kg/ha)
100 kg DAP + 50 kg/ha urea	91	4	117.4	58	64.6	459.6
200 kg/ha Orga	90	3.2	106.6	30.8	60.4	456.0
No fertiliser applied	88	2	110.8	39.6	59.8	424.7
100 lit/ha Eco-green	89	4	120.2	58.8	63.2	414.2
800 ml/ha Bombar-dier	89	2.6	104.6	30.6	58.6	361.3

DM = days to maturity, BPP = branches per plant, PH = plant height, PPP = pod per plant, SPP = seed per plant

Organic farmers have to know the early signs of pests and diseases very well and act as soon as possible. For pest and disease control, they can only use botanicals (products of plant origin, such as nimbidine) or biological control measures (using predators and parasites to control insect pests). So far, bacterial blight, wilt, and phyllody do not have effective remedy. For webworm, early planting, at the onset of the rains, combined with two applications of neem oil extract, 2 and 4 weeks after emergence, resulted in a good control of the pest. Control measures recommended for webworm also work for the control of gall midge. Seed bug control should focus on habitat management (cleaning fields soon after harvest, removing plant residues from the field and threshing points. Spraying neem oil extract at breeding sites, and exposing eggs, nymphs and adults to predators and parasites like *Grionini* sp. a wasp, causing egg parasitism, are control options.

Weeds cause up to 100 per cent yield loss unless managed timely. Thus, 3-4 times weeding using manual labour is mandatory; this operation is time taking and back breaking. Indigenous knowledge on organic farming and pest management is limited. Thus, it is very important to develop new technologies, standards, and practices and inform and train farmers.

In 2018, the SBN support programme, in collaboration with Tsehay Union, provided training on standards and accepted practices for organic farming to 69 experts of three woreda offices of agriculture and agronomists from Tsehay Union. In 2019, about 272 farmers were trained in organic sesame production. In 2019, the SBN support programme, in collaboration with the WoA demonstrated 20-steps at farmers' training centres by substituting the synthetic fertilisers with organic fertiliser and using mung bean, sorghum, and haricot bean as green manuring.

Yields, costs and markets

Although organic farming may be advantageous, small-scale farmers face serious challenges. Yields from organic farms range from 300 to 400 kg/ha, while in conventional farming it varies from 500 to 800kg/ha when recommended conventional practices are applied. Although fertiliser and agro-chemicals are not used, production costs per hectare are not much lower, because of the high labour intensity and the high costs of alternatives (compost, manure, botanicals).

If yields are low and production costs are high, these need to be offset by incentives. The high domestic market price for conventional sesame made it difficult for organic companies to offer attractive price incentives. If ECX prices reflect world market prices, companies have better perspectives to offer price incentives that raise the interest of farmers. In addition to price incentives, companies can/should a full package of incentives: advance payment that can be used as input finance, intensive training and coaching, purchase of organic rotation crops and other measures.

To meet the organic certification standards, farms must prove that they have applied recommended organic practices for at least three years. Farmers and cooperatives have to go through a rigorous certification process before getting a certificate. In Ethiopia, accredited certifying agents use to come from Europe. Costs of certification are too high for farmers and cooperatives, who are also not allowed to access foreign currency to pay to authorising and certifying agencies. Sourcing companies thus generally pay for authentication and annual fees, which may affect transparency.

In two woredas in Amhara region (Misrak and Mierab Belesa), more than ten thousand households supplied in the previous year's organic sesame to Maviga Company, which collaborates with Tsehay Farmers' Agricultural Cooperatives' Union. The Belesa production zone is poor, farmers did not use fertilisers and chemicals before they were certified organic.

In Kafta Humera woreda (Tigray), some three thousand farmers use to sell organic sesame to Selet Hulling Plc and Dipassa. These companies operate in some kebeles, in collaboration with cooperatives, who are the communication channel that link the company to the farmers and vice versa. Farmers willing to supply organic sesame do so through the cooperative. After signing an agreement with the primary cooperative, the company provides an advance payment and technical support during the production season. For several reasons, sourcing targets were not met: (i) farmers are not converted to organic production; (ii) widespread use of chemicals in nearby conventional sorghum and sesame fields, leading to very high rejection rates; (iii) limited price incentive (as compared to the inflated ECX price).

The SBN support programme collaborated with Selet Hulling Plc, a Dutch company sourcing and roasting organic sesame for the European market, and recently supported the establishment of sourcing relations with farmers in Amhara region.

Lessons learned and way forward

Marketing policies in Ethiopia are not promoting direct relations between suppliers and buyers. This blocks value chain development. Multiple comparative advantages of Ethiopian sesame (varieties, colour, taste, proximity to Middle East market) are not transformed in competitive advantages.

Fundamental change is needed, targeting the establishment of supplier-buyer relations that are based on information exchange and trust. The initiated reform of market regulations should continue and be implemented at all levels. The marketing opportunities for unions and cooperatives need to be carefully considered as they are currently at a disadvantage. In the international market they cannot compete with export/import trading houses. In the national market they are not allowed to supply to local processors.

Ethiopian sesame unions and cooperatives have not developed their production and marketing capacities. For the empowerment of farmers in the market, it is important to invest in those capacities. A first step is the recognition that cooperatives and unions are autonomous, farmer-owned companies. A second step is to allow them to engage in business relations, delivery contracts and contract farming on behalf of their members.

Organic sesame may provide opportunities for change, because it may lead to more diverse, sustainable and resilient production systems and value chain development, because suppliers and buyers need to know each other, and traceability is a must. This requires robust agricultural practices for organic production; dedicated organic sourcing companies; technical and financial support to farmers; investments in organic storage capacity; establishing an accredited company for certification and creating a platform or taskforce for promoting Ethiopian organic agricultural production, processing and marketing.

Organic production is one of the factors that can also stimulate in-country value addition. Which promotes the establishment of farmer-company relationships that have the potential to shift the focus from ad hoc bulk export to medium to long-term business relations focusing on quality to access higher value markets. The mutual benefits of farmer-company relations could create incentives for more investments in the sector.



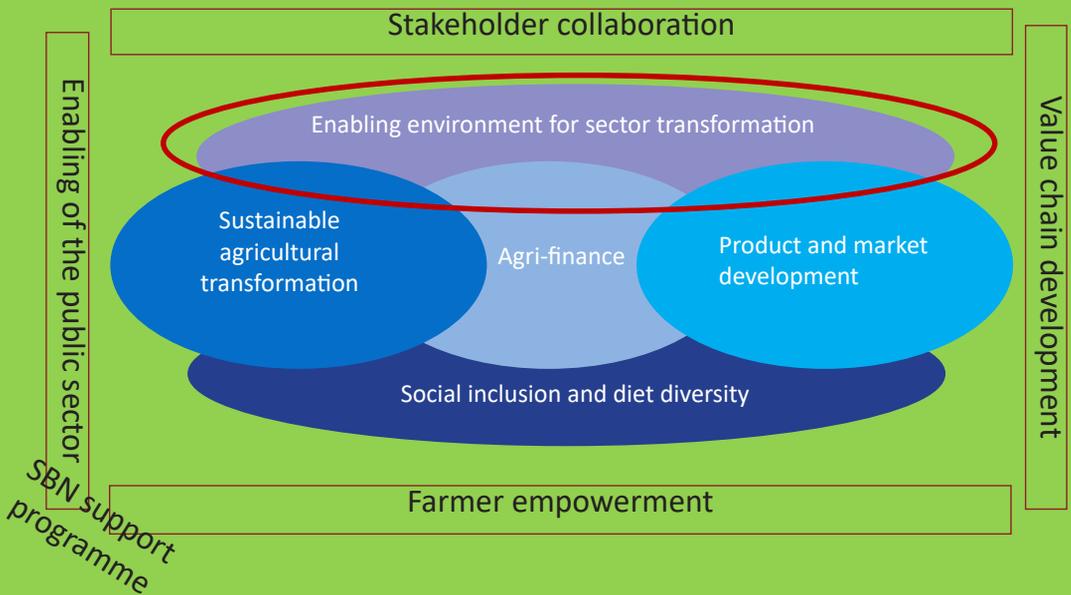
Anteneh Mekuria

Chapter 6

Enabling environment for sector transformation

Introduction

The SBN support programme aimed at strengthening of the enabling environment of the sesame sector as one of its major objectives. This chapter discusses six major innovations that would create conditions for better sector performance, and which would support all other pillars of the programme. The first three articles deal with the innovation and improvement of information management, agricultural extension and stakeholder capacity development. The next three articles take up the subject of bottom-up, stakeholder-owned planning, the possibilities of reaching different audiences with multiple communication tools and channels and the challenges of multi-stakeholder innovation platforms at different levels.



Key message

Sector transformation results from change processes. Digital information management solutions, pluralistic extension systems, the use of multiple training and extension materials and participatory training methods, smart use of diverse communication tools and channels, a stakeholder owned planning, monitoring, and evaluation system and the establishment of stakeholder platforms can contribute to a more enabling environment to facilitate change and stakeholder collaboration.

6.1 Towards a robust information management system for the sesame sector

Flo Driks, Anteneh Mekuria, Getasew Aginche

Improving the information management system is a prerequisite for bringing the sesame sector to the next level. Digitalisation can improve data quality and use and help address multiple systemic challenges.

Introduction

Finding accurate, reliable, and up-to-date data and information remains one of the biggest challenges in the sesame sector. Most often, the available data from the offices at the local level are inconsistent, scattered, incomplete, and not well organised.

For most organisations, the planning, monitoring and evaluation system is not well developed. Templates or data-sheets for the collection, organisation, and processing of basic agronomic, marketing, finance and other relevant data are missing. Information management is not aligned from one department or organisation to another, nor between higher and lower levels of the same organisation. The attention given to information and database management seems to be very limited.

The situation described is largely attributed to inadequate knowledge and skills of employees at kebele and woreda levels, resulting from insufficient training on data collection, handling, and processing as well as to the lack of resources such as computers and internet services. Most places where agricultural production takes place are often remote and with poor infrastructure. This exacerbates the situation as this makes it more difficult to gather detailed sector information and to provide services to stakeholders.

The lack of accurate and reliable data has negative impact, as decisions are based on inadequate information. Data are collected at local level and is then cumulated and analysed at higher levels. If local data collection is deficient, plans, decisions, budgets, evaluations are deficient as well. The lack of accurate and reliable data from the lower level influences decisions at policy-level.

While the world is going through an information and ICT revolution, the practice of data gathering and processing has not much changed in the sesame sector.

In order to improve the sesame sector stakeholders information management system and contribute to the establishment of a stakeholder owned database, used for planning, monitoring and evaluation by different stakeholders, the SBN support programme endeavoured to improve the overall data gathering and compiling process at Woreda Offices of Agriculture (WoA) using the already existing manual Microsoft Excel database system in 2016. In 2017, the programme introduced eProd, an information management solution, to be used by multiple stakeholders, in order to provide proof of concept for a digital information management system and facilitate alignment and transparency in the sector database.

This article briefly highlights the works done to improve the Excel database system and the piloting of the eProd digital information management system. It presents the challenges faced, lessons learned and suggests the way forward.

Information management tools

Excel database system

While Excel is a spreadsheet programme that is not comparable to modern digital information systems, it is still important in the context of the sesame sector. It features several benefits such as low costs, easy to understand, flexible and versatile formats. Taking this into account, the development of databases in Excel, which is a commonly available and well-known tool, was the first step towards improving the information management system at the local level.

A comprehensive manual Excel database was developed to support WoA, to collect, organise, process and maintain important information, such as statistics on the general population, land characteristics, cultivated acreages for different crops, production, productivity and market prices, and other relevant information. Attention was given to the disaggregation of population data according to gender and age.

This database, which can help align different agronomic and marketing data and can be easily used for different purposes, was developed and shared with 12 WoA, along with 12 new desktop computers. Woreda employees received training to help them improve their ability to collect, process, organise, archive, report, and

disseminate information. They were also trained on basic concepts of monitoring and evaluation methods, data collection methods, a geo-data collection using GPS, data archiving and analysis using Microsoft Excel Programme. Attempts were also made to mentor and support these practitioners in using the database at their workplace.

Notwithstanding these efforts, the use of the Excel database was very limited. Woreda staff continued using the formats they receive from their bosses. Although these formats served the immediate purpose for communicating information to higher levels, they do not help to integrate and align data from different sources within and outside the organisations.

Digital information systems

Despite the low penetration of the internet in Ethiopia (<18%), encouraging developments have been seen in the use of digital information and communication tools that optimise the information management to the benefit of agricultural sector development.

In line with this, and parallel to the Excel database system, alternative software solutions were investigated and two digital information management systems were introduced in 2018: FarmForce and eProd, with the ultimate objective of simplifying data collection, improve data accuracy and uniformity, and streamlining data transfer and aggregation. Both systems are specifically developed for smallholder agriculture and marketing in remote areas and work with a mobile application to collect field-level data, including GPS references.

eProd

The goal of the eProd information management system is to increase efficiency and promote transparency in the sesame sector. Data uniformity allows for efficient, reliable, and timely information exchange that supports collaboration and trade within the sector. The eProd information management system allows for extensive analyses of data and can generate several reports.

Stakeholders involved

Several stakeholders of the sesame sector, including the BoA, CPA, farmer cooperative unions, and primary cooperatives, were involved in the process of building a sector-wide information management system that meets their data and information needs. The piloting of the digital information systems was done in two kebeles in Tigray and two kebeles in Amhara region, where minimum infrastructure and human resources were available.

The most important features of eProd are:

- **Offline functionality.** As the internet is largely unavailable at WoA and cooperatives, the advantage of the eProd software is that the information can be accessed offline.
- **Data aggregation and multi-stakeholder accessibility.** The application makes it easy to aggregate data at different administrative levels (e.g. from kebeles to woreda, zone, and regional level). The information can be easily accessed by various stakeholders in separate locations, who can add and manage additional information according to their specific needs.
- **Detailed and diverse information.** The database includes personal, GPS, membership, financial, production, and collection data.
- **Automated service provision.** The software allows communication through SMS messages, it can distribute weather forecasts, market information and manage loan provisions.

Implementation of eProd information system

The SBN support programme piloted eProd in two arrangements:

1. Business application with two farmer cooperative unions and four primary cooperatives. This is in line with the original or main purpose of the tool to manage supplier-buyer relationships.
2. Public sector information system with government authorities through two WoA to offer extension services to all farmers.

For the introduction of information management systems, several aspects were especially important.

Software customisation. During the eProd pilot, a lot of efforts were made to customise the software application to the sesame sector context. For example, the texts in the software were translated into local languages, namely Amharic and Tigrigna. Based on inputs from the involved stakeholders' the information setting was adapted so that it could be convenient for both using the desktop application and for enabling field level registration of farmers using a mobile phone or tablet.

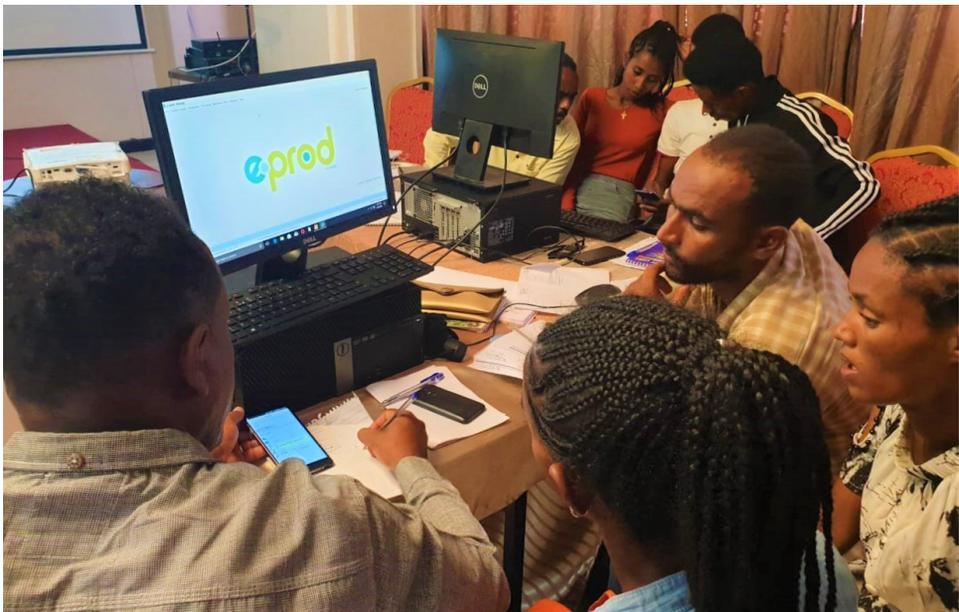
Community willingness. In the agriculture sector, farmers are the most important data providers. Providing personal information requires trust and understanding. Careful introduction with the help of community leaders or local authorities is key for community acceptance and cooperation. Explaining the benefits for farmers, such as weather forecast services and the provision of market information, helps enhance the likelihood of acceptance.

Align activities to crop cycle. The time of collecting different data points should be aligned to the crop cycle. For instance, collecting basic farmer profiles for registration can be done year-round but production data needs to start at the beginning of the season.

Respond to stakeholder demand. During the pilot, primary cooperatives showed a strong interest and eagerness to develop their capacity and software skills to use eProd. For that reason, the primary cooperatives eventually received training on the desktop application while initially, the idea was to only provide the simplified and more intuitive mobile application. This outcome is not completely unexpected, as the primary cooperatives use the system for member administration, transactions, and loan provision, which is closest to the original business purpose for which eProd was developed.

Results

The two year pilot of eProd provided important insights into the opportunities and challenges of digitalising data and information processes in the Ethiopian sesame sector. Through the interventions on information management tools, stakeholders have gained insights about how to: work with information management tools; structure and prioritise the information; organise data collection and quality control; exchange information with other partners; analyse data and streamline reporting.



Practical eProd training session

eProd piloting from 2018-2019

Region	Tigray	Tigray	Amhara	Amhara
Woreda	Kafta Humera	Kafta Humera	Mierab Armachiho	Mierab Armachiho
Kebele	Adebay	Bae-kar	Midregenet	Abrehajira
Union	Setit	Setit	Selam	Selam
Cooperative	Miebale	Shewit	Godebie	Angereb
Farmers per kebele	4,867	2,044	2,936	1,803
Farmers per cooperative	3,300	1,503	589	510
Registered farmers	2,472	1,455	2,055	964
% of target	54%	86%	79%	57%

For the four kebeles and participating cooperatives, the majority of the farmers were registered. The woreda offices did not benefit from the eProd software according to its full potential, as the system was not integrated in daily work processes. The eProd data and software become valuable when the complete farmer population of the woreda would be registered and woredas could align all processes to the information in the system. This requires the buy-in from regional level higher officials.

The main challenges, lessons learned, and way forward

Limited awareness and scant attention to the importance of data management.

In most cases, data is collected upon request of higher level officials. Different templates are used. Employees do not seem to understand the importance of having a comprehensive and robust database system. Developing the awareness, knowledge and skills of information management staff and managers is a first step to improve the quality and consistency of data.

Employees limited knowledge and skill in data management. Employees assigned to work as a data person are of diverse backgrounds and many of them have inadequate knowledge and skills of data management, knowledge and skills. Developing the awareness, knowledge and skills of employees who are working in a data management system and managers who lead overall activities of the offices will help to improve the quality and consistency of data. Public service delivery organisations such as BoA need to recruit or assign individuals with some educational background and/or experience in information and data management systems, and investments in hardware and software have to be made.

Staff turnover. Often, trained and relatively better-experienced employees leave either their job, their position, or the woreda in which they worked in. When this happens, proper transfer of databases and activities does not take place and newcomers start from scratch again. Setting incentive mechanisms to those who perform well in data gathering, processing, and archiving can help reduce the staff turnover.

Evaluation criteria. As some people teasingly claim, evaluating kebele and woreda employees on the basis of their performance, which is measured by focusing on the numbers they report may contribute to the inconsistency and exaggeration of numbers. Whether this is true or not, it is observed that quantitative information from kebele and woreda levels tend to be contradictory and inflated.

Local security issues influenced effective data collection and even resulted in a change in the pilot area.

No constant and standardised format is available to collect different types of data. Aligning data from different woredas is always a challenge. The formats in the woreda and kebeles regularly change, leading to interrupted data sets.

Questions of reliability and accuracy. The excel based woreda databases featured several benefits like low cost and easy to understand and flexible formats. However, a downside of the flexibility is that data can easily be modified, impacting the reliability and compatibility of databases. Also, in some cases, the process to update information depends on field data collected on paper, which needs to be entered manually. This is a time-consuming process and, if not carefully managed, may affect the accuracy of the information.

eProd

Multi-step introduction approach. The step from a simple Excel database to a customised public information system is huge. The transition to a customised public information system needs to be developed step by step, given the context of non-existent digital data collection practices and a non-conductive environment, such as unreliable power supply and absence of hardware and internet.

With hindsight, a smaller scope at the beginning could have reduced the time and investments for getting a digital information system up and running. This would have reduced the risk of errors and limited use of the information system. Although this would have required more software and system changes, more interaction could have increased the learning, interest, and (financial) support of partners.

Sustainability/affordability of scaling. The introduction of advanced information management software such as eProd includes high implementation costs. Major cost items are computers, phones, motorbikes. System licenses are expensive and require yearly payments in foreign currency. Costs become more affordable if a system is broadly rolled out.

Technical assistance. Digital tools are complicated and can face many technical problems. A computer expert is needed to support stakeholders with any challenges they face along the way. In addition, support for the use of the information management system is required.

Value of offline functionality. In a context of unreliable internet access, a software system that can be accessed offline is a valuable asset. Field data synchronisation and data sharing between stakeholders in different locations are challenges for which appropriate solutions need to be found.

Invest in infrastructure. Stakeholders hardly owned functional hardware such as computers on which the information tools could be installed. In addition, power cuts, virus infections, and damaged hardware made installation and reliable functioning of the software challenges. Sufficient investment in infrastructure and its protection helps to overcome these challenges.

Assess the user-friendliness and adaptability of the software. Some software interfaces are more intuitive and easier to use than others. A combination of a simple mobile and advanced desktop application is a good solution to accommodate the different capacities and needs of stakeholders. A flexible and adaptable system increases the likelihood of relevancy and future potential use by local stakeholders.



Practicing eProd mobile application

Develop human capacity. Stakeholders had limited experience in working with computers or any type of software. As a result, sufficient time needs to be allocated to train dedicated staff members. Organising continuous on-job training and introducing employees with new knowledge, skills and tools can help improve overall data collection, processing, archiving, analysing, and dissemination process.

Allocate time for data collection. Data collection in the field, including GPS references, takes time. Often, the value of information tools becomes visible if a certain threshold of relevant data is reached that makes it worthwhile to use it as a primary source of reference and start aligning additional information management processes to it.

Investigate the sustainability/affordability of scaling. The introduction of advanced information management systems includes high implementation costs. Often, providers are international companies that require payments in foreign currency. Payment means and purchasing power of local stakeholders are an important consideration to select a software provider.

In conclusion, in order to build upon the experiences of introducing information management systems and the developed software and databases of the pilot, policy and decision-makers need to become involved to acknowledge its potential to transform the sector. The buy-in of higher officials can facilitate the change of work routines and the search for sustainable funding, for which a levy system is a possible solution. In particular, BoA as a main institution for training and extension service provider to farmers and collecting agricultural data need to work on digitalising. The lessons learned from the eProd database system can be a valuable starting point.

6.2 Pluralistic extension system: using a diversity of materials and channels

Anteneh Mekuria, Judith Jacobs, Andualem Tadesse

The use of multiple extension and training methods increases farmers' awareness, knowledge and adoption of Good Agricultural Practices.

Introduction

When the SBN support programme started in 2013, the vast majority of sesame farmers did not use Good Agricultural Practices (GAP) and they were reluctant to apply new production techniques. They hardly used fertiliser or improved seed varieties and were not aware that row planting increases yield.

There are several reasons why farmers were not applying the full GAP package. These include financial constraints, lack of mechanisation options, scarcity of or limited access to quality seed, and lack of output markets. Another important factor is the attitude of farmers and their limited and/or risk taking ability. Failure to apply the package not only impeded farmers from increasing yields and income, but it also deprived the country of earning a huge amount of foreign currency.

The national extension system in Ethiopia is centrally organised and top-down, focusing on the transfer of technology. Experts and researchers in the field of agricultural extension have criticised the government extension system, the main agent in transferring technologies to farmers, for not fully convincing farmers to adjust their practices. They contend that planning and information flows from national to regional bureaus then to zone, woreda, and kebele levels. It is top-down and not based on the needs and feedback of farmers. Research also shows that top-down planning and promoting inadequate technologies as key bottlenecks of the Ethiopian government extension system (Gerba, 2018).

The government extension system faces additional challenges, such as a lack of enough expertise, a high staff turnover, a shortage of resources, limited infrastructure and facilities. As a result, they are not in a position to reach a large number of farmers and provide quality services to them. Cognisant of the problems, and in line with the request of farmers and other SBN stakeholders, the SBN support programme set out to change this situation by supporting the development and application of a more pluralistic extension system, marked by the use of demand-driven and participatory approaches, and more involvement of farmers and the private sector.

In collaboration with stakeholders and partners, the SBN support programme carried out multiple extension and training activities which increased farmers' awareness and knowledge and improved their productivity through the use of the full GAP package. Currently, there is a consensus that the pluralistic extension system brings about positive changes in the agricultural sector. This chapter endeavours to shed light on the major extension, training, and communication activities pursued, focusing on the diversity of materials and channels used, results gained, challenges faced, and lessons learned since 2013.

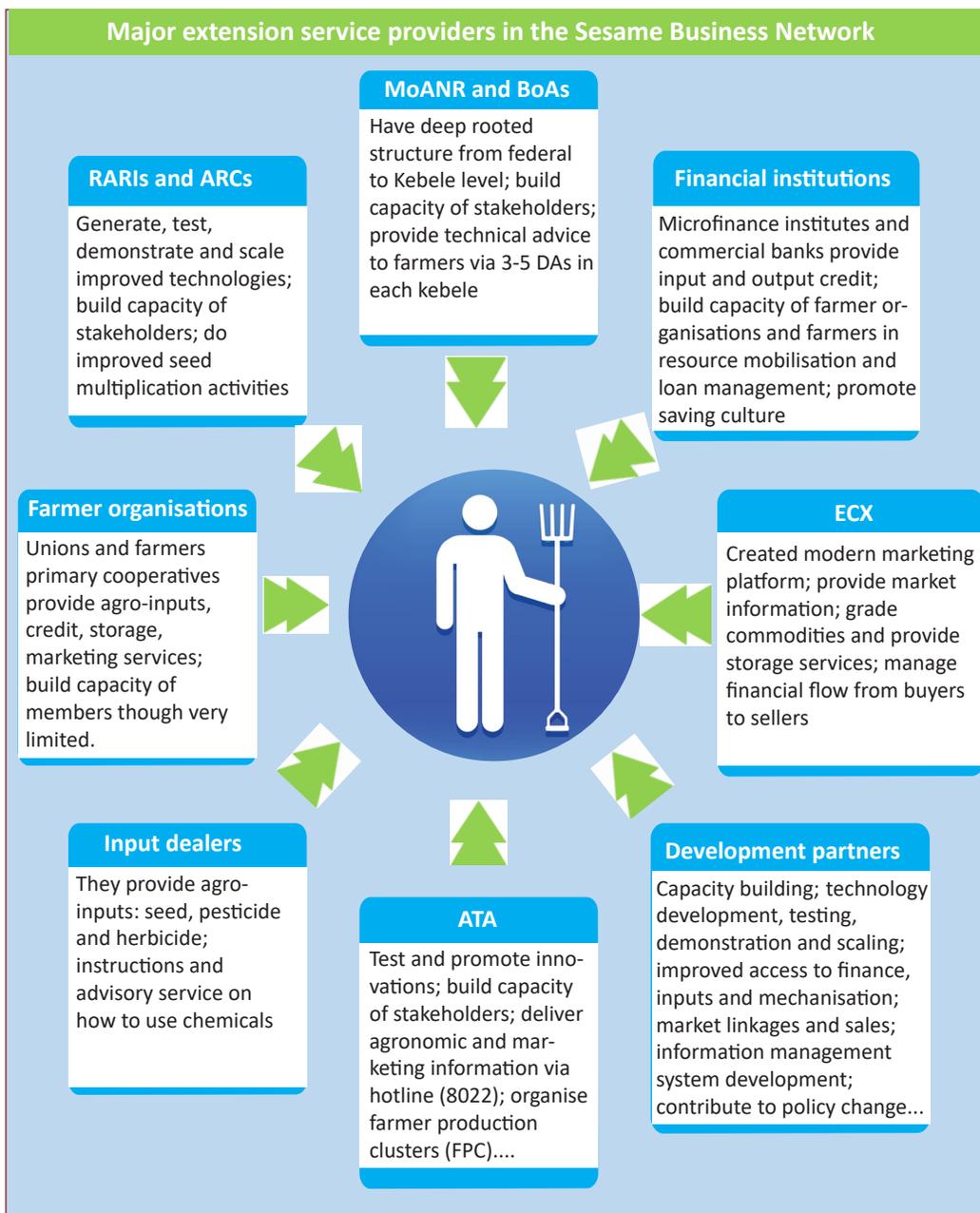
Approaches used in the sesame extension system

The most commonly used extension approaches in the sesame lowlands are: training and demonstration at Farmer Training Centres (FTCs); farmer development groups, visits to the plots of so-called Model Farmers. In recent years, the roll-out of the sesame package Farmer Production Clusters (FPCs) is getting increased attention. FPCs would offer smallholders the benefit of collective action by making broader use of machinery possible, getting better extension service, reducing input costs, consolidating produce, supplying in bulk, and minimising transportation and transaction costs.

ATA and MoANR (2014) indicate that the government led extension system integrates the following: scaling of GAP, value chain and market development, participatory extension approaches, diversification and specialisation in training, gender mainstreaming, financial literacy, access to finance and mainstreaming sustainable environment practices.

Extension service providers in the SBN

Several actors are providing extension and advisory support to farmers, though the degree and type of services vary. The figure below presents the major extension service providers. The SBN support programme has collaborated with most of them and contributed to the strengthening of their services.



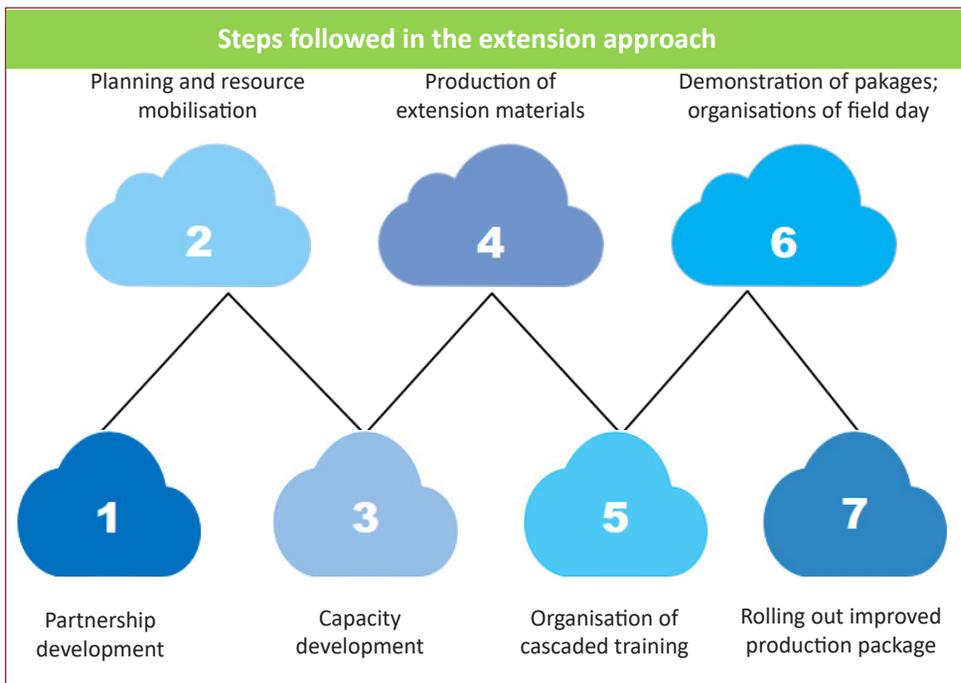
Mobilising resources and institutionalisation through collaboration from the start

The figure below presents several extension service providers. The SBN support programme has collaborated with most of them and contributed to the strengthening of their services.

Agricultural development is teamwork that requires multiple stakeholders to work together to achieve a common goal. To this end, the SBN support programme was conceived with the involvement of various stakeholders for the development of competitive, sustainable and inclusive sesame value chains for farmers' income improvement and spill-over effects.

Stakeholder collaboration and interaction has been limited in the sesame sub-sector. The relationship between research centres and WoA was not up to the expected level. The 2014 National Strategy for Ethiopia's Agricultural Extension System prepared by ATA and MoANR indicated the lack of strong linkages and poor coordination between and among research, extension and other partners providing agricultural extension services. This is in full agreement with observations of Purcell and Anderson (1997) who indicated a lack of alignment between the national agricultural research systems, extension service providers, and the farmers in setting priorities and developing innovations, leading to undesirable outcomes.

The following chart shows the steps followed in the extension approach.



Partnership development

In order to improve collaboration and the performance of stakeholders, the SBN support programme intensively worked together with different actors, especially with regional BoA and their respective departments and offices at zone and woreda levels. At the local level attempts have been made to implement bottom-up agro-economic planning which tried to align the major stakeholders at the kebele level (cf. 6.4). As strategic challenges cannot be addressed at the local level, synergy and collaboration have been created with ministries and agencies at the national level for issues like the institutionalisation of GAP, farmers’ financial literacy, improving access to rural finance, mechanisation, and the organisation of a national sesame platform. The following table shows the collaborations between the stakeholders and partners.

Diversity of stakeholders

Stakeholders and Partners	Level	Services that they provide	Activities (collaboration)
Value chain operators			
Farmers, Cooperatives (>160), and Unions (10),	Local	Availing agro-inputs: seed, pesticides, credit, marketing	Training on GAP, financial literacy, loan management, gender mainstreaming, nutrition, home gardening; capacity building
Traders	Local	Marketing, credit	
Small and medium scale processors	All levels	Processing and marketing	Technical advice and training on business planning and entrepreneurship
Value chain supporters			
Labourers	Local	Ploughing, weeding, harvesting...	Sensitisation and awareness creation
Microfinance institutions (ACSI, DECSI)	Local and regional	Availing credit; input finance; training and advice on saving	KAEP, input finance, saving
Banks (CBO, Lion and Abay)	All levels	Finance- both input and marketing finance capacity building and advisory	Guarantee fund Training on loan management and saving culture
Machinery renters	Local-level	Renting machinery	Ploughing fields and sowing seeds
Private input dealers	All levels	Availing agro-inputs- seed, pesticide, and herbicide; pest management service	Training on seed production, pest management
Transporters	All levels	Transportation	Transporting inputs, labourers, produce field to store/markets
Consultants-Apposit LLC	All levels	Advice, availing ICT solutions and training	Training and ICT service- weather and market information

Enablers			
Administrations: Woreda (13) and Kebele (263)	Local	Facilitation	Organising meetings, woreda and kebele level field days
MoANR, Bureaus, Departments, and Offices of Agriculture	Local	Extension and training on GAP	Training, coaching, scaling up of GAP, financial literacy ...
	National and regional	Policies and directions; planning and implementing, monitoring	Strategic issues: institutionalisation of GAP, financial literacy, finance, weather forecasting, marketing, mechanisation, lease financing sesame platform and cooperative development etc.
Cooperative Promotion Agency	local	Capacitating cooperatives and unions	Financial literacy, guarantee fund
	National	Policies and directions	Cooperative capacity building
Trade, Industry, and Investment	local	Capacity building	Availing market information
Women and Social Affairs	local	Capacity building	Gender mainstreaming- training
ARARI and TARI- Research Centres (GARC and HuARC)	Woreda, zone and regional	Generating and introducing technologies	Technology generation, production of extension materials, seed multiplication, capacity building, mechanisation, regional platform
ECX	All levels	Marketing, quality, grading	Platforms
ATA	All levels	Provide different extension services, marketing relations	Organisation of regional platforms, scaling GAP, demonstrations and field days...
Mass Media Agencies	All levels	Information and knowledge sharing	Radio programmes and television documentary
Partners			
Fair and Sustainable, Agriterra, IFD-C/2SCALE, BENEFIT projects, Weather Impact, Common-Sense, Selit Hulling/Sesame Open, RHEA, Aeres	All levels	Consultation on diversified topics, capacity building, technology	For output financing, rotation crops, marketing, seed production, weather forecasting, organic production, mechanisation, module development and capacity building, contract farming...

Planning and resource mobilisation

In all collaboration agreements, SBN support programme followed the principles of grafting and co-funding. In line with this principle, mobilisation of technical and financial resources of the stakeholders and partners was a prerequisite to use innovative approaches and reach a greater number of farmers and wider geographical areas. Collaborations started with setting joint objectives and targets, identifying activities and plans as well as checking the available human, physical and financial resources of partner organisations. All the activities were aligned to the plans and priorities of stakeholders and partners. This has resulted

Enabling Environment

in effective execution, improved performance and institutionalisation of the joint training and extension activities in GAP. The collaboration with BoA, RARI and ATA contributed a great deal not only for generating production packages, scaling up and scaling out of GAP but most importantly for institutionalisation of the practices.

Capacity development

In collaboration with stakeholders and partners the SBN support programme organised several capacity building activities such as cascaded training sessions, demonstrations, field days, visits etc. (Cf. 6.3)

Production and distribution of extension communication materials

Observations in the inception phase of the SBN programme showed that most sesame related research outputs did not reach farmers and other intended users. This is also recognised by Tilaye (2016) who concludes that research outcomes do not reach farmers and remain on the shelves of research centres. This is because most papers are in English using research and academic terminology, which is not easy for farmers and DAs to understand. As a result, available research outputs and recommendations are insufficiently included in extension and communication systems.

Extension and communication materials	
Production Guides	Sesame: 100,000 Sorghum: 5,000 Soya bean: 15,000 Mung bean: 10,000 Cotton: 10,000 Pest and disease: 10,000
Training Modules	Sesame, sorghum and financial literacy Provide clear guidelines and procedures Allow for participatory and interactive learning
Radio Programmes	Bi-weekly programme in Amharic and Tigrigna Follow the production and marketing season provide technical information in a range of topics
Short movies and Documentaries	Instructional messages; covered different topics Support training; shown during meetings mobile cinema, field days.
Others: SMS/IVR, Posters, Leaflets...	Weather and spot market price information Different message in a range of subjects

Production guides

The SBN support programme, in collaboration with GARC and HuARC tried to bring research findings from the shelves of research institutes to the farmers' fields. Together they synthesised the available knowledge and information and made tailored and attractive production guides in local languages for sesame (20 steps), sorghum, soya bean, mung bean, cotton, and sesame pest management. The guides primarily targeted farmers and DAs, who were deprived of any reference material. The guides combined short and easily understandable texts with attractive pictures. Thousands of copies were printed and distributed to farmers, DAs, agricultural professionals and researchers. Electronic copies were shared with many, both inside and outside Ethiopia. All the production guides are available on the SBN website (www.sbnethiopia.org). This effort played an important role in availing research results and practical recommendations to farmers and extension agents.

Dasashe Genet, a development agent from Gelego Kebele Quara woreda, has a strong belief that farmers will double their product this agriculture season. "The production guide is produced nicely. It will easily attract farmers' attention. Even those farmers who cannot read and write can understand something from the pictures."

(SBN newsletter, Issue 4, 2014)



Training modules

Trainers in the sesame sector are knowledgeable about the content but fail to deliver their knowledge in such a way that farmers know how to improve their practices. Farmers are used to top-down, one-way lecturing in a surrounding where they cannot apply what they have learned. To improve training delivery, the SBN support programme invested in the development of training modules that guide participatory and interactive



training methods for sesame production, sorghum production, and financial literacy. The modules are composed of a trainer's guide, session plans, and assignments for trainees, and provide guidelines for organising quality and effective training sessions. They help trainers think about the facilitation methods ahead of time. Since farmers are the main recipients of the training, the modules have been prepared in such a way that they are suitable for field training.

Radio programmes

Production and dissemination of radio programmes is among the most commonly used approaches in Ethiopia to reach a large number of farmers. A radio programme, targeting the sesame sector, started in 2014. Known as the 'White Gold', continued to be a valuable extension and communication tool that helped farmers learn about various issues, ranging from farming to marketing and value addition. Also in 2020, when field visits were limited because of the Covid-19 pandemic, the radio programmes were an important source of information for the rural areas. It has been developed and broadcasted in collaboration with the Amhara Mass Media Agency in Amharic and with Dimtsi Woyane Tigray Radio in Tigray. In both cases, the information disseminated follow the seasonal pattern of sesame production and marketing. The programme reaches thousands of farmers and other stakeholders through different genres: news, narratives, interviews, and short dramas that focus on marketing, value addition, post-harvest loss, pest outbreak, access to finance, women and youth, nutrition, home gardening, mechanisation, and other topics of the sesame value chain. Feedback from farmers and agricultural professionals shows that the radio broadcasting are playing an important role for informing farmers on this broad array of topics.

Short movies and documentaries

To raise farmers' awareness and increase their knowledge and skills in using improved technologies, the SBN support programme has produced and used short movies and documentaries on 20 important steps to double yield and improve the quality of sesame; the long way of sesame and the many losses along the way; thinning without fear of losing; and labourers living and working conditions. These movies have been shown to farmers, DAs, agricultural experts and higher-level authorities during training sessions, mobile cinemas, meetings, workshops, and field days. The movies are instructional, providing knowledge and skills and portray early adopter farmers while practicing different production activities. They were used as training tools and helped to stimulate farmers' learning. Farmers who have not been able to attend formal training sessions have benefited from watching the movies. Through the mobile cinemas, it became possible for labourers and the larger community to see the movies. All the movies are shared with audiences on the YouTube page of SBN Ethiopia.

SMS and IVR messages

Weather and market information has been provided to farmers and DAs through Short Message Services (SMS) and Interactive Voice Responses (IVR). These messages aimed at supporting farmers to cope with erratic weather conditions and volatile market prices.

In collaboration with CommonSense, Apposit LLC, Weather Impact, and the National Meteorology Agency of Ethiopia (NMA), SBN support programme provided localised weather forecast service to farmers via SMS. From 2017-2020, nearly 9,000 registered weather information recipients received text messages in Amharic and Tigrigna languages through their mobiles twice a week. Surveys conducted in three consecutive years indicated that the information has a significant effect on the performance of the farm activities (cf. 3.2).

Information on spot market prices was collected and disseminated through a pilot together with the North Gondar Zone Trade, Industry and Market Development Department and Apposit LLC in 2016 and 2017. The data was collected using an Open Data Kit (ODK) from Sanja, Kokit, Dubaba, Shinfa, Gendawuha, Seroka, Abrahajira, and Midregenet spot markets. More than 8,000 farmers received spot market price information via SMS or IVR (25,000 calls) within a relatively short time.

The pilot proved to be effective in supporting farmers to make informed decisions about their sales. Farmers were able to get the market price information with very little cost, without being present in the spot markets in person and spending much on transportation. This activity however did not continue due to the extended bureaucratic chain to get approval from concerned government bureau.

Mr. Yeshewas Degefaw, a quality controller in Kokit spot market who used to collect and send data for Kokit spot market via the ODK system, said: “Farmers like the information they get from 8338. It inform them without spending too much money in the process. They do not need to physically come to the spot market and spend money on transportation. They can simply get information at their fingertips.”



SBN Newsletter, Issue 13, February 2017

Challenges faced

- Bringing all the relevant stakeholders together, especially decision-makers at the regional and federal levels was not an easy task. The recurrent turnover of officials at federal, regional, zone and woreda levels significantly affected institutionalisation of innovations and hindered efficient decision-making about strategic agricultural sector challenges.
- The introduction of participatory approaches and innovative ICT based methods did not go as expected due to bureaucracy and low interest of authorities.
- Top down methods still prevail and affect the quality of extension services to stakeholders.
- Although there is progress in convening relevant stakeholders together, the involvement of the private sector is rather limited. Until today, extension support is largely provided by government structures.
- Cooperatives and unions are well-positioned to provide extension services to their members. However, their roles are currently limited to providing inputs and collecting members' products only. Their role in other extension services such as building the capacity of their members is rather limited.
- Good progress has been made with the development of attractive production guides. However, a lot remains to be done in the distribution of extension materials to farmers, especially in more remote areas.

Achievements and lessons learned

- Intensive collaboration with stakeholders and partners has helped to mobilise the available financial and technical resources, which in turn helped to increase the reach and quality of the extension services. Working with the BoA, RARI, CPA and offices, unions, cooperatives, financial institutions, and others helped in providing better extension services and institutionalisation of the joint activities. The support programme played an important role in facilitating, coordinating, and linking stakeholders.
- The introduction and use of training modules helped to better prepare training sessions and apply more participatory, interactive training methods.
- The production of easy to understand guides and manuals contributed to farmers' knowledge and skills improvement, technology uptake, and application. The production guides for sesame and several rotation crops have got institutional support at different levels. The packages have been accepted by regional BoAs and MoANR.

- In 2018 and 2019, the SBN support programme joined BoA and ATA for the organisation of FPCs and trained and coached farmers in collaboration with zone and Woreda Offices of Agriculture. Although it was not an easy task to convince farmers to come together and work in their adjacent fields, some encouraging results have been achieved in using the cluster farming approach: farmer-to-farmer support and learning, joint use of mechanisation, use of uniform seed, planning of rotations, and coordinated storage. The approach however has not yet been implemented in the vast sesame production areas. A lot remains to be done in convincing farmers to come together in clusters and plan, set a common yield target, and take the advantage of the economy of scale.

Farmers in Lemlem kebele, Tahtay Adyabo woreda started to implement cluster farming in 2018. They use *wefera*, which is a pre-existing cultural practice in which farmers form a working party using communal labour. They planted the same variety seed; performed land preparation, row planting, chemical spray for insect pest control, weeding, harvesting, and transporting the produce together. While working, the farmers eat and drink together. After harvest, they supplied their product to ECX through their multipurpose cooperatives called Orena. Working together in their adjacent farms helped the smallholders reduce their production costs. It also allowed them to get better support from the DAs throughout the entire production season.

Way forward

- Research institutions and agriculture bureaus need to give utmost attention to the production and use of multiple extension and communication materials that meet the demands of diversified farmers.
- The extension system needs to make better use of new information and communication technology. As more and more farmers are using mobile phones, more emphasis needs to be given to ICT based extension methods, as IVR and SMS and interactive radio programmes.
- It is important to move towards an extension system that is less sensitive to high staff turnover. Adaptation of incentive systems for DAs, establishing local farmer field schools and farmer business schools owned and managed by cooperatives and unions, can help advance bottom-up, participatory, and demand-driven extension approaches.
- Better information management system would improve planning, implementation, monitoring, evaluation and learning, and contribute to better tailoring of extension services.

Enabling Environment

- Farmers' cooperatives and unions can play a significant role in building the farm management capacities of their members (agronomic practices, cost recording, savings, farm planning, assessment of input and credit needs, etc). To realise this, it is important to first strengthen the capacity of cooperatives and unions.
- The cluster farming approach can better be implemented by aligning it with pre-existing social structures or institutions like *wofera* and/or *debo*. Doing so can help strengthen already existing social ties for increasing farmers' productivity.



Thousands of farmers got the 20 steps production guide

6.3 Capacity building using a variety of methods

Anteneh Mekuria, Judith Jacobs

The use of different capacity building methods such as cascaded and participatory training, demonstrations and field days helps to build farmers' competencies and increases adoption rates.

Introduction

Every year, before the production season begins, along with stakeholders and partners, the SBN support programme supported training sessions on a range of topics including Good Agricultural Practices (GAPs) for sesame and rotational crops, farm cost recording and cost benefit analysis, weather forecasting, home gardening and loan management. Besides training, farmers could learn during demonstrations of GAP on farmers' fields and in FTCs. Also during field days, there was room for discussing challenges of the sector with fellow farmers, professionals and authorities.

In organising capacity building activities, a top-down approach has been predominantly used. There is a long tradition that training sessions are developed without conducting a needs assessment. The traditional top-down and supply-driven approach is combined with grouping farmers during massive training events, sometimes with hundreds of farmers in one hall. Attention is not given to follow up activities and farmer-to-farmer learning.

This chapter briefly presents efforts made to improve capacity building activities by introducing experiential and participatory training methods. In doing so, it gives emphasis to the cascaded training approach, demonstration plots and field days that were used to capacitate farmers and other stakeholders.

Objectives of capacity building

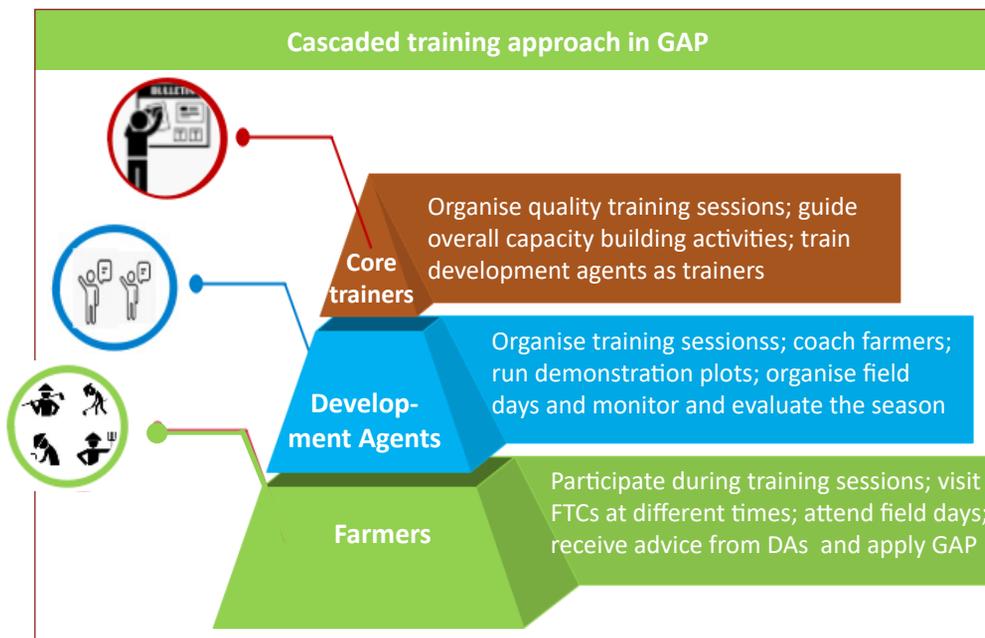
The main objectives of capacity building activities are to:

- improve the competencies of farmers, DAs and other professionals in different subjects
- change farmers’ attitude and foster adoption of improved technologies
- develop the competence of professionals in facilitating training sessions

A cascaded training approach

A cascaded training approach in GAP- the 20 steps

The agronomic training sessions on GAP were held in a three layer sequence. First, a core team of experts, convened from regional agriculture bureaus and zone departments were trained as main trainers (ToTs). The training sessions were jointly organised with Gondar and Humera ARCs, Regional BoAs and ATA. The training mainly focused on improved sesame and rotational crops production packages and extension communication skills.



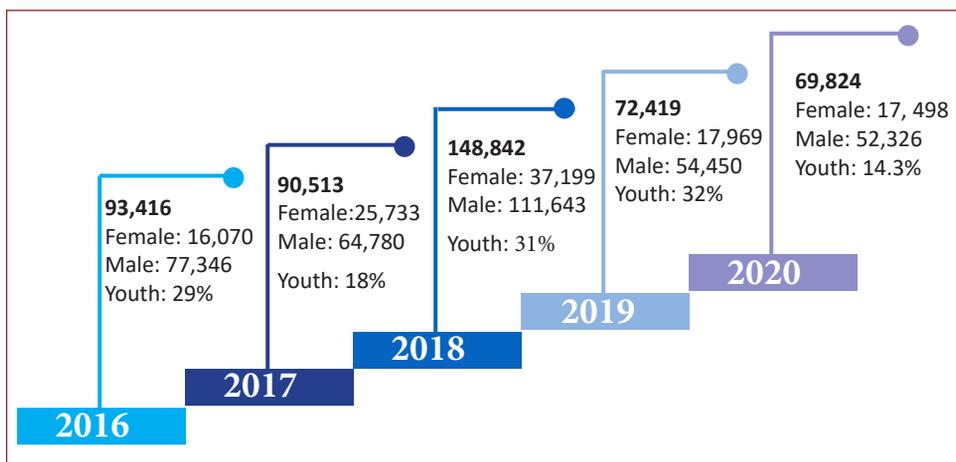
The core trainers (50, both in Amhara and Tigray), trained hundreds of DAs and agricultural professionals, who in turn would be the trainers at woreda level. Armed with the updated knowledge and skills about recommended agricultural practices, the DAs further created awareness and increased knowledge and skills of farmers at the kebele level. In this manner, tens of thousands of farmers have been trained on GAP for sesame and rotational crops following this approach. The

training of farmers, which is the third level training, has mainly been coordinated by BoA with financial and technical support from the SBN support programme, AGP, ATA and other partners.

Following a cascaded training is an efficient and effective approach to reach a greater number of farmers and DAs within a relatively short period of time and at lower costs. More than 90 per cent of DAs in sesame producing kebeles have been trained in GAP and were involved in the scaling of recommended agricultural practices. Additional training topics were: weather forecasting, rain gage reading, pest and disease management, home gardening, climate adaptation and nutrition sensitive agriculture.

In 2017, 1,614; in 2018, 1,134 and in 2019, 1,844 DAs were trained from the 13 woredas. Nearly 34 per cent of the trained DAs were female and more than 90 per cent were youngsters. The training of DAs helped them to provide practical training and coaching to farmers. Over the years, BoA was able to reach 13 woredas and 170 kebeles, which is much more than planned (9 woredas, 100 kebeles).

The organisation of training sessions started small in the first phase and was scaled in the later years of the programme. In 2013, 320; 2014 nearly 800; and 2015, 75,260 farmers were trained. Trained farmers who performed well on their own farms and in training others received Certificates of Competence. On average about 25 per cent of the trained farmers were females and 25 per cent were young farmers. The following figure shows the number of trained farmers from the 13 woredas, from 2016-2020.



Trhas Aregawi, a young female farmer from Adebay, believes that the training on '20 Steps' is very important for her and her friends. She said this kind of training will help improve the living standard of women and youth in the area. Trhas learnt that the improved production techniques will help get high yields from a small area. "Here in our kebele, women and youth face challenges. The working environment is difficult for us. Our farms are far from where we live. Most of us used to apply traditional farming practices. The training will help us improve the productivity of sesame. It also encourages women and youth to do their own job and thereby contribute to decrease the high migration of youth to other places."



SBN Newsletter, Issue 11, July 2016

Melkamu Molla, a farmer from Mehadid Kebele, Quara said, "until recently we have been following what our fathers and forefathers were doing. I have never tried row planting for example. I never used improved seed varieties. We did manage to improve our yields because of the traditional farm practices that we followed. The efforts that we exerted and the benefits that we got out of it did not match." He added, "This year, I am trained in good agricultural practice. By following the 20 steps, I hope I will double my yield. I am determined to get 10 quintals from a hectare."



SBN Newsletter, Issue 4, August 2014

The cumulated number of trained farmers and results suggests that at least 70 per cent of the smallholder farmer households have been exposed to training and demonstration of recommended agronomic practices. This is confirmed by the results of the Household Survey (2018), according to which 76 per cent of the farmers are recipient of extension services, with a frequency of 3.4 visits/training per year), The 2019 annual report shows that one third of the farmers are adopters (26 per cent of the farmer households have adopted some innovative agronomic practices and seven per cent are full adopters of the 20 steps package). Adoption rates in the household survey, albeit slightly higher, confirm this trend. Training and extension activities of the SBN support programme and stakeholders contributed to this change.

Cascaded training approach in financial literacy training

Also in training farmers on financial literacy, a cascaded training approach was applied. Every year, a core team of trainers convened from farmers' cooperative unions, primary cooperatives, WoA and CPOs were trained as trainers on farm cost recording, farm cash inflow and outflow; end balance; profit or loss calculation, credit costs and stocks, in-depth farm analysis and decisions for next season. Trainers were also trained on training facilitation methods: participatory training delivery methods and adult learning principles.

Being knowledgeable on cost recording and cost benefit analysis as well as being skilful in facilitating training sessions for adult learners, the trainers further supported several farmers in their cooperatives to become financially literate. It was decided to keep the class size manageable of the trainers, mostly 20-25 farmers in one session, allowing for participatory training and interaction between the facilitators/trainers and the trainees.

Along with the formal training sessions, the financial literacy training has included farmer-to-farmer sessions (peer learning). Trainers facilitated farmer-to-farmer sessions so that farmers can learn not just from the trainers, but from their fellow farmers as well. This allowed farmers to share and exchange their experience and explain each other in their own words and logic. It has led to enhanced learning and contributed to better understanding and comprehension.

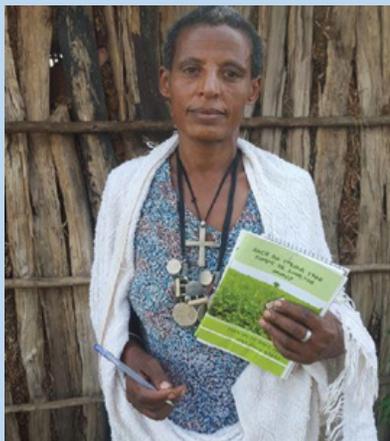
In the last couple of years, more than 1,000 employees of unions, cooperatives and DAs were trained as trainers. These trainees in turn trained over 20,000 farmers in recording farm costs and performing cost-benefit analysis. At present, a vast majority of them are not only recording and calculating but they are also making informed decisions about their farm activities. Most of them began to see their farm activities as business (cf. 4.2).



Cooperative members participating in financial literacy training at Humera

Farmers and their cooperatives have given positive feedback on the training and farmer-to-farmer discussions.

Emebet Bekele, a woman farmer who attended the training with 24 male farmers in 2017 in Swatamp kebele, Jawi woreda, said: “Previously, I did not record my costs. I simply tried to remember my costs and compare with what I gained but I often got confused. Since I was busy with different farm activities, I forgot things. This year, however, based on the lessons that I have learnt from the training, I have been recording all my costs. It will be easier for me to calculate my costs and see my profitability at the end.”



Mr. Abera Abeyu, from Hayelom Multi-purpose Cooperative, is one of the participants of the ToT which was organised in Sheraro town. He said: “the training is very good as it helps us fill the gaps we have in keeping records. In doing their agricultural activities, farmers are not giving attention to the costs that they incur. Almost all farmers are not recording their costs. They do their activities in a very traditional way. This training will help us change farmers' traditional practice.” He further added: “I feel that I am trained very well and I am going to share what I have learnt to farmers in my kebele”.



SBN Newsletter Issue 15, September 2017

Other training sessions

Apart from the training on improved agricultural practices of sesame and rotation crops and financial literacy, several other tailored training sessions have been organised for different groups. In particular, in the second phase of the programme, specific attention was given to young and women sesame farmers and a vast majority of them were trained in seed production and marketing, gender mainstreaming, nutrition sensitive agriculture, home gardening, food recipe preparations, weather forecasting and pest and disease management.

Demonstrations of improved production technologies

To convince farmers to adopt GAP, providing a field guide on improved production technologies and conducting training sessions alone may not be sufficient. Not all farmers are the same. Some may be convinced with the knowledge that they acquired from the training or from their reading of the production guide, while others may not. Bearing this in mind, multiple capacity building approaches were used and these helped to reach farmers with different backgrounds and attitudes.

In order to scale up the technologies, especially the improved sesame production package, demonstration activities were conducted on model farmers' and FTCs. The SBN programme began to demonstrate improved sesame production technologies in 25 model farmers' fields in 2013. The technologies tested came from the shelves of ARCs.

After proving and demonstrating that the improved package can double yields, the technology was packaged into the 20 steps production guide, which was published in 100,000 copies and distributed to farmers. The package was scaled on nearly 1,000 model farmers' plots and in 92 FTCs. Farmers were chosen by the kebele and WoA on the basis of their previous technology adoption experience and the location of their farm. Farmers who have fields along the road side were chosen so that other farmers could see and learn from the performance of the demonstration fields. Not only sesame production was shown at the FTCs, also the production of rotation crops (sorghum, soya bean, mung bean and cotton) was demonstrated. Farmers who hosted demonstration plots learned by doing while other farmers learned by visiting demonstration plots during the field days.

Demonstration and scaling activities continued in 2015 with 1,950 farmers (82 plots in FTCs) in eight woredas. The number of female participants was only six per cent in 2014. Starting from 2015, the demonstration at FTCs included further features- full package, package without fertiliser; package minus row planting and farmers practice. The comparison of different treatments played an important role in the extension and adoption process. It helped farmers to observe the effect of the treatments on crop development and yield of sesame and in such cases, the farmers could give priority to some steps over others. Farmers who wish to apply the full package, but for some reason for example lack finance and may not be able to pay for all the steps, learn from these trials.

In the first three consecutive years, the demonstration activities showed that the use of 20 steps performed well. The data collected from farmers and DAs proved that it was possible to double yields in a good season. Even in bad years, for example in 2015 where there was too much rain in some areas, the performance of the package was way better than the conventional practice.

As of 2016, demonstration activities continued but at the time it was also more institutionalised. The regional BoA took a big step by accepting the 20 steps and its scaling. In that year, demonstration activities were conducted in 91 FTCs and 14 investor farmers' plots in the 12 woredas. Attention was given to the 20 steps package, MRY and MRR trails and demonstration of sorghum, soya bean and mung bean. The demonstration was especially instrumental in meeting the fourfold purpose of food security, nutrition improvement, climate resilience and market diversification. On investor farmers' plots the package was demonstrated with mechanised row planting.

With the objective of improving farmers' income, and improving food security and soil fertility, from 2017-19, demonstration, popularisation and scaling of sesame, sorghum, soybean, mung bean, haricot bean, cotton, sunflower and cow pea continued and further expanded. Rotation crops were demonstrated and scaled in FTCs and in farmers' fields. (cf. 2.3). Tens of thousands of farmers observed these fields and were triggered to consider growing them.

Recipes using soya and mung bean were developed and demonstrated, mainly to women, during practical training sessions. As they are easier to grow and have less labour requirements, many women are interested to this activity.

Organising field days at different levels: seeing is believing

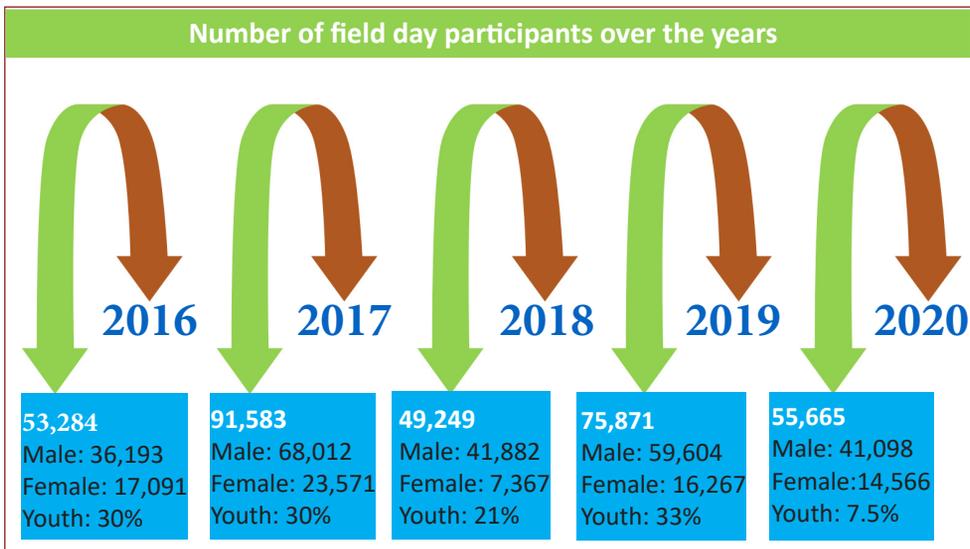
With the belief that 'seeing is believing', field days have been organised to demonstrate the performance of improved production technologies of sesame and rotational crops to stakeholders. Field days were conducted both on model farmers' fields and in FTCs where farmers could learn about improved production technologies and the ongoing research activities.

Field days have been organised at kebele, woreda, zone, region and national levels. The kebele level field days have been run at different growth stages of crops so that farmers can closely see the performance of the improved package at different times. Attendees were farmers, kebele administrators and DAs. The woreda level field days were mainly organised at the maturity stage in which farmers from other kebeles, and woreda level stakeholders participated. These field days gave the opportunity to farmers to discuss with fellow farmers, researchers and professionals and learn from farmers employing GAP.

The field visits at zone, regional and national level have been organised before harvesting. These field days are not only learning occasions but they serve as platforms which bring together all SBN stakeholders including farmers, agricultural professionals, researchers, government officials and partners. These platforms helped farmers to voice the challenges they face in their farming system to

researchers and policy makers and got solutions for their queries. Policy makers and researchers used inputs for their further research activities and or for policy related issues.

Female participation in field days varied from region to region and year to year. For example, in 2013 out of 721 participants 23 per cent; in 2014, of 124,226 participants 30 per cent and in 2015, 28 per cent of the 101,454 participants were female. The figure below shows field day participants disaggregated into male, female and youth from 2016-20.



SBN stakeholders visiting sesame fields

Challenges faced

- Changing traditional training approaches and providing demand driven training and extension services continue to be a challenge. Though improvements have been observed, training sessions are still insufficiently planned and prepared. Need assessments are hardly conducted and trainees are not adequately monitored. Most agronomic training sessions are still organised in a supply driven way, following the traditional top-down approach and involving a massive number of trainees in one class.
- Similarly, field days are still organised in a traditional way. Most of the time, professionals explain to farmers who listen passively. Only a few farmers were able to ask and interact with them in the discussions held at the end.
- Authorities' buy-in of the participatory training approaches varies. Some have understood its importance and agree with the idea in principle, but in practice they keep on doing business as usual.
- A cascaded training approach, though it allows scaling, has the disadvantage of miss-interpretation of content when it goes from one level to the other. Although this is not well studied, to some extent the quality of training might have been compromised.
- In some cases, as some playfully say, the training sessions are liked by participants for the incentives, which is given as emoluments for transportation and accommodation costs. Giving more attention to the per diem than the knowledge and skills that they get from the training affects the overall purpose.
- In organising agronomic training sessions, lead organisation's give much attention to quantity. They want to reach a large number of trainees per season. This often compromises with the quality.

Lessons learned and way forward

- Intensive collaboration with various stakeholders and partners improved and facilitated the organisation of training sessions, workshops and field days, reduced costs and improved visibility and impact.
- Training sessions, demonstrations, field days and other capacity building activities have to be prepared in a congenial atmosphere and in collaboration with all concerned stakeholders. Together, collaborating partners must commit themselves to the set objectives, the planned activities, the distribution of tasks and cost sharing.
- The use of multiple approaches such as training, demonstrations, field days, and extension materials led to attitude changes among farmer population.

- Cost recording and cost-benefit analysis is adapted and included in the national extension package. This is a very good development in institutionalising the activity as DAs began to train farmers with financial literacy, in addition to agronomic subjects.
- The cascaded training system, the attractive and user-friendly production guides, the training modules, other extension materials, the radio programmes and the films have had an impact on the perception of training delivery. These approaches helped to scale out and reach a vast number of farmers and DAs.
- Observations showed that the cascaded approach served its purpose well. However, studies need to be conducted to see the quality of the training sessions provided at the farmers' level.
- Although participatory and bottom-up approaches are highly favoured, in some cases top-down instructions are needed, for example for KAPE, market information delivery via SMS/IVR, high level approval, commitment and support is needed to have success at grassroots level. The choice of training delivery should be based on the training objectives.
- Learning from the pedagogy and andragogy departments of nearby colleges and universities and working with TVETS will help to organise quality training sessions.
- The use of ICT such as smartphones, tablets and user-friendly software on the internet will help improve the overall capacity building activities in general and organising efficient and effective training sessions in particular.

6.4 Bottom-up planning and stakeholder collaboration for improved performance

Ted Schrader, Anteneh Mekuria, Andualem Tadesse, Samson Gizaw

Kebele Agro Economic Planning (KAEP) is a bottom-up planning approach that helps to strengthen the collaboration and synergy between stakeholders in identifying local realities and working for improved planning and execution of activities. In particular, it helps to: address the input credit challenges, organise different need-based capacity building activities and facilitate the supply of quality seeds and agro-inputs.

Introduction

Despite the multi-faceted extension approaches as described in previous chapters, the adoption of the 20-steps for improved sesame production is not as high as expected and hoped for. Full adoption of the 20 steps is rare; at best partial adoption is observed. As a result, the yield gap is still large as most farmers do not get more than 400 or 500 kg of sesame per hectare in contrast to the eight to 10 hectares that could be harvested if improved production methods would be applied.

The most important inhibitors for farmers' adoption of GAP are limited access to quality seeds and agro-inputs, limited access to and use of appropriate machinery (especially row planters) and limited options to acquire sufficient input credit. Many farmers who want to apply GAP cannot do so because of a lack of credit.

These challenges have so far been insufficiently addressed. Resolving these challenges requires the coordinated action of different stakeholders, working together as a team. A first concrete step would be a collective planning that is based on local realities and targeted provision of input finance. It is in this context that the SBN support programme has promoted a bottom-up agro-economic planning approach that encourages stakeholders to design and implement their kebele plans.

This paper first presents the objectives of the bottom-up planning system and the justification why stakeholder collaboration is important. Next, it explains the five steps of the KAEP approach. Subsequently, it shares the three-year experience with designing and piloting KAEP, highlights lessons learned and suggests some recommendations for the way forward.

Objectives

The main objective of KAEP is to strengthen the collaboration and synergy among the kebele level stakeholders for improved planning and implementation of activities that support the adoption of recommended agricultural practices.

Specific objectives are:

- Collaboration between DAs and cooperatives for training and coaching of farmers and for the timely supply of the required quantity and quality of seeds and agro-inputs.
- Improved information and risk management of financial institutions leading to the best possible targeting of farmers for agricultural credit (trained farmers, who are seriously interested in the adoption of best agricultural practices and who have a good credit repayment history).
- Organisation of clusters of collaborating farmers, allowing them to improve results and organise themselves for mechanisation solutions, with a focus on row planters.

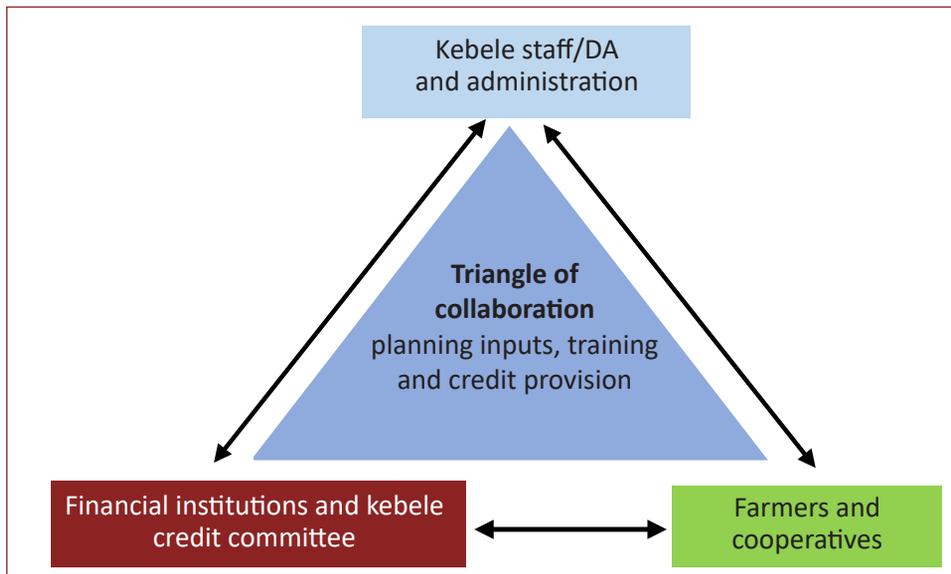
The ultimate aim is to increase the yields and quality of sesame and rotation crops, both for farmer income improvement and national export earnings.

Stakeholder collaboration at different levels

Why stakeholder collaboration at kebele level is so important?

There are fundamental reasons why a 'Triangle of collaboration' is proposed for coordinated action of government, farmers and financial institutions at kebele level. Field realities vary from one place to another. To increase the adoption of GAP, it is important to have plans per kebele, as it is at this level that field realities and farmers are known in detail. The SBN support programme has developed a strategy that requires the teaming up of tripartite kebele team, which is composed of:

1. Kebele representatives (administrator, DAs);
2. Farmer representatives (lead farmers and cooperative board members); and
3. Financial institution representatives (local financial institutions operating in kebele and kebele credit committee).



Bottom-up: from kebele to region

The idea is that KAEP is developed by the kebele teams at the request or upon the instruction of regions, zones and woredas. Once elaborated, the KAEPs are communicated to woredas, and then to the zonal and regional levels, where the information is aggregated and the planning is endorsed and communicated back to the lower administrative levels. Relevant organisations are expected to collaborate, for instance at:

- **Woreda level:** (1) Woreda Office of Agriculture and woreda administration; (2) farmers’ cooperatives and union; (3) financial institutions providing input finance, e.g. DECSI and ACSI branch managers.
- **Regional level:** (1) Regional BoA and regional administration; (2) Farmer unions and (3) regional headquarters of financial institutions providing input finance.

The collaboration is meant and expected to create a ‘win-win’ situation for all: better training and coaching of farmers, adequate supply of seeds and agro-inputs, needs-based training, better risk management for financial institutions and effective uptake of the recommended agricultural innovations. This strategy was endorsed in 2019 by regional authorities, both Tigray and Amhara, who wrote a supportive letter to the zones and woredas of the sesame zone in Northwest Ethiopia.

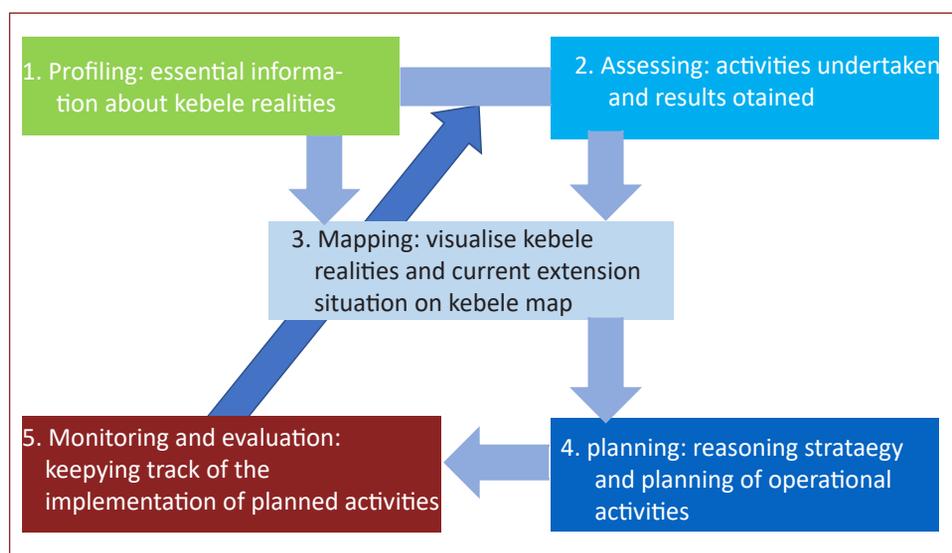
The KAEP guide, format and steps

The SBN support programme developed a practical tool for agro-economic planning at kebele level: the KAEP tool. A planning format, accompanied by an explanatory guide was developed and tested in 2017 and 2018 and further adapted in 2019. As computers are not available at kebele level, the printed planning document is filled out manually by the kebele teams. The kebele working documents could be recorded in the computer at woreda level. This would be input for setting up a digital planning, monitoring and evaluation system at woreda, zonal and regional levels.

Five-step approach for local agro-economic development

The KAEP methodology is proposed to follow 5 steps:

1. **Profiling:** essential information about kebele realities
2. **Assessing:** activities undertaken in previous years and results obtained (input supply, training and extension cooperatives, credit)
3. **Mapping:** visualise kebele realities and current adoption on a kebele map, with a proposal of kebele farmers' production clusters
4. **Planning:** reasoning the best strategy and required operational activities to improve performance
5. **Monitoring and evaluating:** keeping track of the implementation of planned activities.



These five steps follow each other in a logical sequence: steps 1 and 2 allow to make a map (step 3); the profiling, assessment and mapping are input for strategic and operational planning (step 4) and the planned activities are monitored and evaluated throughout the year (step 5). The cycle is to be repeated every year. Because of the activities and other developments, the realities in the kebele change and the profile can be adapted (step 1 again). The monitoring and evaluation data are input for assessment (step 2 again).

Step 1: Kebele profiling

Good planning is based on evidence. It is therefore important to make an overview of quantitative information (key parameters) and to highlight the main characteristics and challenges of the kebele. The first KAEP chapter is thus the Kebele profile, with a suggestion of key information to enter. All this information is essential for strategising, planning, monitoring and evaluation. Considering their primary role in the administration of the country, kebeles are responsible for data recording on:

- Population and administration of the kebele
- Land use (hectare), production (kg) and productivity (kg/hectare)
- Sesame sales, realised prices and value of sales
- Agricultural production, marketing, food and nutrition (all agricultural commodities)
- Labour and labourers

Step 2: Performance assessment and current situation

The next step is the assessment of agro-economic development activities that were undertaken and the results that have been obtained. The assessment concerns the performances during the past two years. The main topics and analyses are the following:

Topics	Information and analysis
Agricultural inputs provided and/or used in the past two years	Seeds distributed for different crops, with a specification of varieties. Fertiliser and other inputs distributed, with observations on needs, distribution and use of seeds and inputs and orientations for what to improve.
Farmers trained in good agricultural practices	Number of DAs, availability and size of FTC, farmers training in 20 steps for sesame production, farmers trained on other subjects, the participation of farmers in field days. Reflection on the involvement of female, young and investor farmers in training and demonstration activities.

Farmer trainers that can provide services	Identification of farmers who received a CoC, their village or sub-kebele, gender, cooperative membership and telephone numbers and identification of farmers with good farming results and good motivation level.
Adoption 20 steps	Four levels of adoption are distinguished: conventional, limited partial adoption, advanced partial adoption and full adoption, both for smallholders and investor farmers. For reflecting on adoption, the following questions are suggested: do farmers accept the proposed technologies/practices (acceptability); can they do them (accessibility/availability, for instance of seeds, inputs, machinery); do they have the required funds (own resources and credit) to do them (affordability); and do farmers find that the proposed 20 steps are profitable (attractiveness). Based on the identified challenges, strategies for action can be identified.
Agricultural credit	For the analysis of the agricultural credit situation, the financial institutions that operate, or could operate in the kebele are identified, preferably with information on the location of the nearest branch, the profile and number of clients, the type of loans, client savings and loan repayment. Key information to have is the loan amount that was provided to farmers in the previous season and the number of farmers in the kebele who received a loan. Based on this information, challenges and opportunities can be defined, with perspectives of banks/MFIs, farmers, cooperatives and technicians if possible.
Cooperative profile and performance	Information on: intervention area of the cooperative, affiliation to union, members, shares, assets, total own capital, credit provided to members, staff members and main activities of the cooperative. This information help to identify challenges and opportunities.
Financial literacy training	Financial literacy trainers in the cooperative; number of persons trained so far (male, female, youth); number of farmer coaches for peer-to-peer coaching; observations on the actual use that members make of the financial literacy training and observations on the involvement of women and children.

Step 3: Kebele mapping and identification of production clusters

Maps are very helpful to visualise a situation and to think strategically. Using the outline of the woreda maps from the CSA, the kebele map provides the following basic information: delimitation of kebeles; main roads and rivers and main settlements. The basic map is then completed with the following information: sub-kebeles (*got*) and the number of farming households per *got*, the FTC, main and secondary road infrastructure, seasonal rivers, spot markets, branches/satellites of financial institutions (MFIs, Banks, SACCOs) and other information that is found to be important to show on the map. With this specific information, a nice kebele map is produced that can be used for strategising and planning.



Abrahajira Kebele committee mapping of their kebele



Bambaho kebele map

The next steps, which are more analytical, are the following:

- Visualisation of the sesame production zone in the kebele, with a specification of smallholder and investor farmer areas
- Showing the reach of training, extension and current adoption levels of recommended practices. With the location of current farmer-trainers and adopting farmers on the map, it can be seen where training and adoption are

concentrated and where extension efforts have not yet reached or had an impact. This is a very important input for strategising next steps.

- Indicating the service area of financial institutions. Financial institutions do not always effectively reach all parts of the kebele. The map visualised where most clients of financial institutions are located.

All this is input for strategising:

- Where to concentrate training and coaching activities, for instance, sub-kebeles not yet well reached?
- Where can farmer-trainers operate and where can current adopters spread information and experience to their neighbours?
- Where to consolidate and expand the provision of agricultural credit?
- What are the potential suitable areas for developing FPCs? E.g. areas where farmers can work together, for access to inputs, mechanisation, pest and disease control, access to finance, marketing, transport and possibly other (economic or social) reasons.

Step 4: Annual planning

The profile, assessment and map show the current situation and dynamics. The planning of activities is driven by targets that are set for the next season:

- Targets for main crops in the kebele: acreage, production and yield
- Adoption of '20 steps', with targets for smallholders and investors.
- Required seeds, fertiliser, agro-chemicals and other inputs
- Training and coaching of farmers
- Financial literacy training
- Facilitation of labour services and improvement of labour conditions.
- Cooperative activity planning
- Agricultural credit needs. This is a very important part of the planning. Increased production and higher yields/hectare require a much better adoption of GAP, for sesame and rotational crops, which requires credit.

The planning tables help to calculate the finance requirement for smallholder and investor farmers sesame and rotation crops production. The calculations allow determining the estimated total production costs, farmer's funds and credit need for the kebele. This credit need is to be compared with the credit that was provided in the preceding years. In case of a large discrepancy, there should be more credit availed or targets have to be adapted.

Step 5: Monitoring and evaluation

The M&E is aligned to set targets and planned activities. The planning of the kebele can be transformed into an M&E document. Record keeping would, among others, be needed for sales and distribution of seeds, fertiliser (cooperative or voucher system); measurement of acreages (GPS); sample of farmers to estimate/measure the production and yield per hectare (selection of sub-kebeles and farmers); training reports with a list of participants; input credit provided to farmers, output credit provided to cooperatives, (...).

Activities and experiences

Introducing KAEP (2017-2018)

KAEP was first introduced to the SBN stakeholders at the end of 2016. The background and objectives, the reasons for collaboration and bottom-up planning and the structure and contents of the KAEP tool were introduced to stakeholders. In 2017 and 2018, the KAEP tool was tested in 24 kebeles in all 12 woredas where SBN support programme was operating (two kebeles per woreda).

The 2017 exercise was merely a test of the newly developed tool, which was successful as such. Selected kebele planning team members were trained on how to use the tool and they managed to work with the planning tool. With hindsight, it was realised that formal buy-in of the regional BoAs, cooperative unions and headquarters of the main financial institutions (ACSI and DECSI) should have been sought.

In 2018, the KAEP was repeated in the same 24 kebeles, this time to act upon the planned activities. The follow-up on the planning was however not successful due to the late start of the activity and farmers' outstanding loans with the financial institutions. In 2018, one kebele in Mierab Armachiho woreda used the KAEP to identify eligible farmers, who got credit, applied GAP, increased their productivity and repaid their loan. Although this was a limited success, it was the first proof of concept. The level of commitment varied strongly from one woreda to another. Without explicit instructions from higher levels, doing business as usual strongly prevailed. In most cases, the elaboration of KAEP was mainly in the hands of the DAs. In some places, project incentives were asked for. At woreda level, especially the WoA developed a better understanding of the approach and provided feedback that the approach can bring required changes in the planning and delivery system. In some woredas, the weak relationship and communication between the WoA and ACSI/DECSI affected the implementation of the activity. In general, the staff of financial institutions did not yet see the kebele planning as part of their job. Nevertheless, the two years of testing increasingly led to the understanding that the KAEP tool helps to: (i) define and visualise the overall realities of kebeles; (ii) identify agro-input and agricultural credit needs and (iii)

define the farmers' contribution and credit amounts per hectare (for sesame and possibly rotation crops).

Regional endorsement and training for 2019 season

Building on the experiences of the previous two years, the KAEP guide and format were improved. Discussions were made at different levels: with regional, zone and woreda level authorities of the three parties (BoA, farmers' organisations, financial institutions). After information and discussion with the stakeholders at the regional level, ACSI/DECSI and the two regional BoAs endorsed the idea of bottom-up planning and wrote a supportive letter to 13 woredas involved in the 2019 planning. It was decided to scale the KAEP to 55 kebeles in 2019 (20 per cent of the total number of kebeles in the 13 woredas). The relatively good involvement of higher BoA, DECSI and ACSI officials in the 2019 exercise suggest that stakeholder collaboration and bottom-up planning is increasingly seen as relevant for the sector.

Training and kebele plan preparation (2019)

Early 2019, the SBN support programme facilitated training sessions for 55 kebeles. Seven one-day sessions were organised for 27 kebeles in Amhara (in Gondar, Jawi, Belessa and Mierab Armachiho) and two sessions were organised for 28 kebeles in Western and North-western Tigray. To effectively learn, participants exercised the different KAEP steps during the training.

The level of understanding of KAEP committee members varies; some understand it well and try to support the process while others do not seem to have a clear understanding. A complicating factor is that there is no culture of documenting information in most kebeles; often it is difficult to find basic information. High staff turnover contributes to the lack of data and documents.

In addition to kebele committee members, woreda and zone level representatives (WoA, CPO, ACSI/DECSI branch managers) participated in the training sessions. This increased ownership of the approach and tool. Of the selected and trained 55 kebeles, 50 effectively-prepared their kebele plans. SBN support programme staff members provided coaching support to the kebele committees. Due to the increased number of kebeles, this was more cumbersome than in 2017-18. In some areas, security issues affected proper coaching and follow-up.

The plans helped to assess the need for seeds and inputs and to identify farmers with agronomic and financial literacy training needs. It was however unfortunate that the plans were only available just two months from the onset of the agricultural season. A major lesson learned is that the Kebele planning process should start much earlier, in the fourth quarter of the preceding year.

Access to finance for applying the recommended agricultural practices

The main objective of the KAEP is to increase farmers' adoption of GAP. The kebele plan helps to identify those farmers who want to apply GAP but need credit to do so. In selecting farmers, kebele committees combined the following criteria: (1) hardworking sesame farmers ready to apply improved agricultural technologies; (2) farmers with good reputation in credit repayment and no outstanding loans from financial institutions and (3) farmers who have the capacity and willingness to finance part of the costs with their own capital.

With these criteria, 2,833 farmers (31 per cent of the farmers in selected kebeles trained in 20 steps) were identified as eligible for input finance (82 per cent men and 18 per cent women). Slightly more than 50 per cent of these selected farmers received credit (1,459 farmers, of which 1,004 men and 455 women). 88 per cent of the selected female farmers received credit, compared to 43 per cent of the selected male farmers. Though limited, KAEP has shown encouraging results in five woredas: Kafta Humera, Wolkaiet and Tsegede in Tigray (1,387 farmers who got credit from DECSI or Adeday) and Quara and Jawi in Amhara (70 farmers who got credit from ACSI).

The 2019 results in Tigray are encouraging and suggest that the KAEP approach can be scaled and institutionalised. In the Western Tigray zone, DECSI has a specific loan product for sesame farmers (9,000 ETB per hectare), which is disbursed in May. For accessing DECSI loans, selected farmers had to form groups, as the group collateral modality is applicable; this often proved difficult. Adeday microfinance specifically targets women, which partially explains the proportionally high rate of credit provision to female sesame farmers in Western Tigray. In the North-western Tigray zone, selected farmers did not get credit for the season, as there were no clear guidelines and misunderstandings on how to use DECSI's agricultural loan for sesame.

In Amhara, the credit from ACSI via KAEP was very limited. The major reason is that ACSI disburses agricultural credit in the first months of the year, which is long before the start of the agricultural season in the sesame zone. This bears a great risk that farmers use the credit for other purposes. A thematic meeting, organised to address the challenges of providing input finance to selected farmers, has not been effective to change this. ACSI's shortage of funds due to limited repayment from previous years is one reason why the institute did not avail credit. It is clear that the regional officials have to decide on the modalities and conditions for allocating input finance for sesame farmers and to specify available amounts according to woredas and kebeles.

Production costs and credit needs

For estimating the cost per hectare, the kebele committees took the following practices into account: land clearing, ploughing (3 times), row planting, use of quality seed, fertiliser application, weeding (3 times), pest and disease control, harvesting, hilla placement on plastic sheets, bagging and transporting.

The kebele committees estimated the average costs for applying the 20 steps at 9,700 ETB per hectare (8,900 in Amhara and 10,300 in Tigray). They considered that farmers' own funds could cover almost half of these costs (49%). They suggested a credit amount of 4,963 in Amhara and 4,921 in Tigray. This suggests that the amount for sesame input finance can for now be established at 5,000 ETB per hectare. This is significantly lower than the current DECSI sesame loan product for Western Tigray. A revision of the credit amount would stress farmers' responsibilities to save and prepare for the next season and would reduce the risks of DECSI.

Challenges, lessons learned and way forward

Overall, the experiences and results of the past three years show that there is a lot of potential and ample room for improving the KAEP process and impact.

KAEP guide, manual, training and coaching

The KAEP guide and format have been developed and adapted in the past three years. Stakeholders increasingly see the importance of detailed bottom-up planning for optimal preparation of the agricultural season. It is important to adapt the KAEP guide and format based on experience and intensively train a core group of experts at woreda level, composed of WoA, CPO, union staff, and MFI branch managers and loan officers, for supervision and coaching of kebele teams.

Stakeholder collaboration, ownership, and commitment

Developing a culture of stakeholders planning and working together takes time. This applies to all levels, from kebele to region. All offices and organisations can however benefit a lot from collaboration and achieve better results: higher adoption rates of recommended agricultural practices (BoA), better services to members (cooperatives), and better targeting of farmers for agricultural credit and higher loan repayment rates (financial institutions). The KAEP approach thus has strong potential to strengthen the collaboration and synergy among grassroots level stakeholders. For this to happen, the KAEP bottom-up approach needs top-down direction and guidance. Formal instructions are indispensable for lower-level officials and staff. Full commitment of regional level authorities, including BoA, cooperative unions, and regional headquarters of financial

institutions (especially ACSI and DECSI) is crucial for successful implementation. For this realising the importance of joint KAEP, regional officials need to make it an integral part of the work of their institutions.

Data collection, information management and PME system

The KAEP tool improves the recording and documentation of key information (kebele realities, assessment of previous seasons, mapping) which is the basis for detailed planning and informed decision-making and contributes to a culture of professional planning, monitoring and evaluation. In fact, it may be the basis for digital information management and a digital planning, monitoring and evaluation system, which is ambitioned by BoA, financial institutions and cooperative unions.

- Manual agro-economic planning at kebele level
- Support to digitalise KAEP at woreda level (to start with in Word and Excel documents)
- Use the kebele and woreda planning as reference for monitoring, reporting and evaluation at different levels.
- Align the format of the KAEP to reporting requirements of the institutions; and adapt reporting formats according to the information in the KAEP.

Credit modalities and risk management of microfinance institutes

Credit modalities of micro-finance institutes are quite different in Amhara, Western and North-western Tigray. Western Tigray has a specific loan product for sesame farmers, which is disbursed some two months before the start of the rainy season. As discussed, the amount per hectare could be adapted from 9,000 to 5,000 ETB/hectare. This could also be applied in North-western Tigray, which requires the development and communication of clear guidelines. Considering the importance of sesame in the Amhara lowlands, it is indicated that ACSI develops a specific sesame loan product as well for Amhara. To enhance the likelihood that loans are used for the intended purpose, it is recommended that the disbursement would take place later than is currently the case. Considering the policy to promote FPCs and the requirements for group collateral, it is also recommended that small groups of farmers are selected for input finance.

Practical action points

- Define the credit amounts per hectare for farmers who adopt the full package. Based on the results of 2019, an amount of 5,000 ETB per hectare is proposed, which gives farmers the responsibility to ensure the mobilisation of a similar amount, which encourages savings and wise use of revenues.
- Adapt the current DECSI sesame input finance product for Western Tigray to this amount and extend this DECSI loan product to North-western Tigray.
- Develop a tailored ACSI sesame input finance product for Amhara
- Disburse loans in the second quarter of the year, to reduce the risk that loans are used for other purposes than agricultural production
- Target the farmers eligible for input finance, based on sound analysis and clear criteria; whenever possible recommend small groups of full packages adopting farmers, who can provide group collateral.
- Through the collaboration of financial institutions, DAs and cooperatives, monitor the appropriate use of input finance.

Available funds for input finance for the sesame sector

Currently, the available credit for financing the sesame sector is not enough. This is the major bottleneck for the sesame sector in Northwest Ethiopia and explains to a large extent the low adoption of recommended practices and large yield gaps. As a result, the revenues of farmers and the country at large are way below of what is possible. To give an indication: a yield increase of 100 kg per hectare would yield to 93 million USD extra revenues. The analysis of credit needs and gaps, per kebele, woreda, and the sesame zone at large can be used to provide input for discussing the efforts to be made to avail enough credit to sesame farmers, without which the increase of production will not be possible.

- Dialogue between regional administration, regional BoA, union leaders and financial institutions, especially DECSI and ACSI, with the aim to decide on the amount of input finance available for the season, preferably specified per kebele and/or woreda.
- Relate the available credit to the targeting of farmers and acreages and the other way round. Should targets be adapted in case of scarce funds or should more capital be made available for financing realistic kebele plans?

KAEP, which is based on stakeholder collaboration, is very important for addressing the input credit challenge. Additional measures are farmers' financial literacy training, marketing credit for cooperatives with on-lending modalities, lease financing, improved information systems and involvement of cooperatives for reducing the transaction costs of the financial institutions (cf.4).

6.5 Communication: bringing the SBN stakeholders up to speed

Anteneh Mekuria, Ted Schrader, Andualem Tadesse,

Communicating through diversified channels ranging from the conventional print and electronic media to that of the proliferating new technologies supported the successful execution of programme activities, contributed to the achievements of intended objectives and facilitated to reach broad and multiple audiences.

Introduction

Despite its vital importance, the value of communication for agricultural development and sector transformation is often underestimated. In the Ethiopian agricultural sector, it is sometimes difficult to find written and audio-visual information about the activities, achievements and lessons learned. The sesame sector is not an exception stakeholders give scant attention to communication as an important tool for achieving their goals and objectives. Most do not use newsletters, websites, reports and other outlets to inform others, while those who have communication channels often fail to run and update their intended audiences on a regular basis.

Important information that could change the lives of farmers often does not reach them. Field evidence, study findings and stakeholder experiences that are vital for bringing about policy changes hardly reach the concerned authorities. The reality that important information and evidence does not reach the relevant audiences can be largely attributed to poor, limited or inefficient communication methods and approaches. It is therefore vital and strategic to think of communication as an essential component of agricultural development programmes.

This short article shares experiences of the SBN support programme with communicating information and knowledge to stakeholders, partners, funders, and a wider audience. It first introduces the relevance of having a clear communication strategy, then it elucidates the major communication outlets and how they have

been used to reach the various audiences and concludes by highlighting the major challenges, lessons learned and suggestions for the way forward.

Designing a communication strategy

Recognising the importance of communication in fostering and realising the goals and objectives of the stakeholders and the programme, the SBN support programme designed its communication strategy in the very first year of its operations. The strategy clearly states that the communication activities of the SBN support programme belong to the stakeholders and are at their service. Specific attention is given to the identification of different communication channels to ensure that relevant information is shared to the right audiences at the right time. This ranges from simple dissemination of information about activities or outputs to that of outcomes and evidence-based information which can contribute to policy changes.

Due attention was given to the development of the SBN house style which plays an important role in determining an identity. This included the design of the SBN logo which shows the acronym 'SBN' and a sesame plant. The light green colour was used as the recognisable colour of the SBN communication products and tools.



Identifying audiences and choosing communication channels

In communication, one of the first steps to do is identifying the audiences, their characteristics, their information needs and interests. Accordingly, the whereabouts of the audience, their level of education, language, age, preferred communication channels and other variables have to be taken into account.

The SBN support programme segmented the various audience into main sesame value chain actors, supporters and enablers, funders, international partners and projects/programmes. Segmenting audiences helped to identify the information and communication needs and align messages in line with their needs.

Communication activities were closely aligned to the Monitoring and Evaluation system of the programme. Many communication outputs, such as semester and annual progress reports, profiles of farmers, organisations or companies, impact stories, most significant change stories and/or documentary films have been used for communicating about activities, results/outcomes, impacts set against targeted performance indicators.

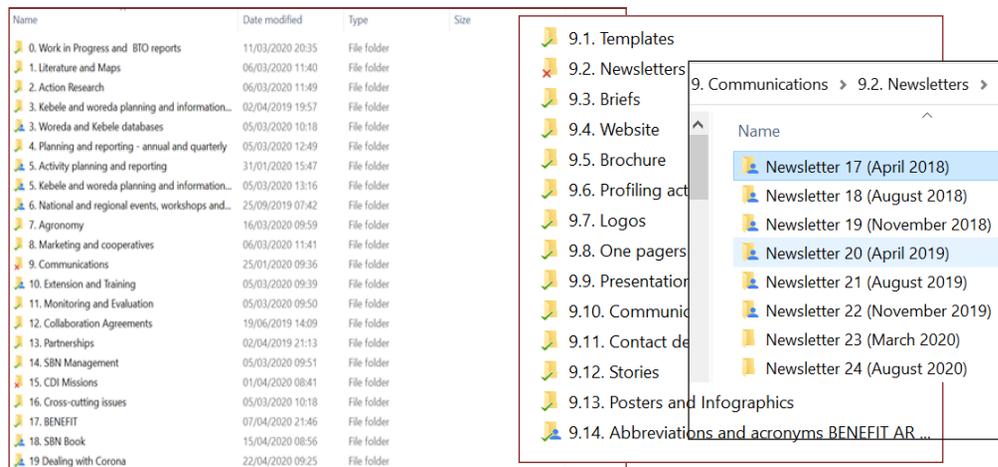
Enabling Environment

Considering the diversity of SBN stakeholders and partners, in terms of language, education level and information and communication needs, three languages were used: English, Amharic and Tigrigna.

Internal Communication

Internal communication refers to the interaction and sharing of information that takes place between and among the staff members and teams of the SBN support programme. Several templates were developed, to be used by the team: data collection sheets, back to the office reports (BtO), activity, quarterly, bi-annual and annual reports.

A cloud based GoogleDrive allowed to have one information database for the entire team, even though team members were at different localities. Internal communication among the different teams was either in person or mediated (personal and group emails, cell phones, quarterly meeting). Smooth internal communication among staff members helped to update one another and is key for implementing programme activities. The informal communication culture, without rigid procedures, played an important role in doing the day-to-day job and achieving the set objectives.



External communication

The external communication is the communication with the farmers, stakeholders, partners and sister projects, the funding agency and all those reading or viewing the communication products. Continuous efforts have been made to consider not only the demand of the different stakeholders but also their preferred communication channels. Multiple outlets have been used to reach different and diversified audiences through the use of traditional channels (newsletters,

reports, minutes, posters, radio...) and new media (website and social media such as Facebook, Twitter, LinkedIn and YouTube). These tools were used to disseminate information and share experiences and results.

SBN Newsletter

The aim of the quarterly SBN newsletter, published in English, Amharic and Tigrigna, both in electronic and hard copies, was to disseminate information to SBN stakeholders and the larger audience. In total, 24 issues were produced. The newsletters informed about a broad range of topics: stakeholder plans, upcoming events, field activities, achievements, profiles of farmers, organisations, entrepreneurs, companies, financial institutions, strategic challenges, workshops, visits of high officials to the sesame zone recipes that use sesame, rotation crops and fruits and vegetables, upcoming activities of partners and of the SBN support programme.



A total of 2,000 hard copies of each issue were printed and shared with partners and stakeholders. Electronic copies were shared with more than 750 individuals and uploaded to the SBN website and shared on the SBN social media. The newsletter was an efficient communication tool for informing and sharing evidence with stakeholders who do not have access to internet and social media. The positive feedback from readers helped to improve the content and reach. In situations where internet is inaccessible and social media are limited in reach, using printed materials are highly recommended for sharing information. Hard copies can be shelved for a longer period and used later as reference.

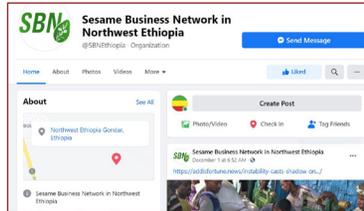
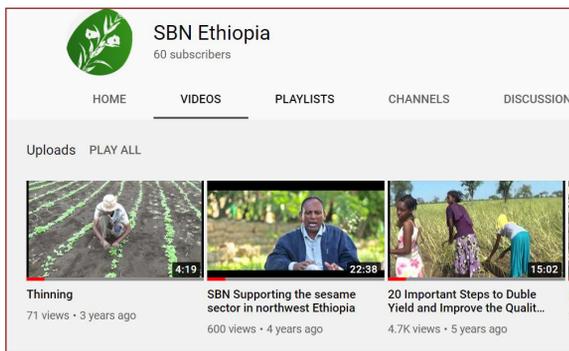
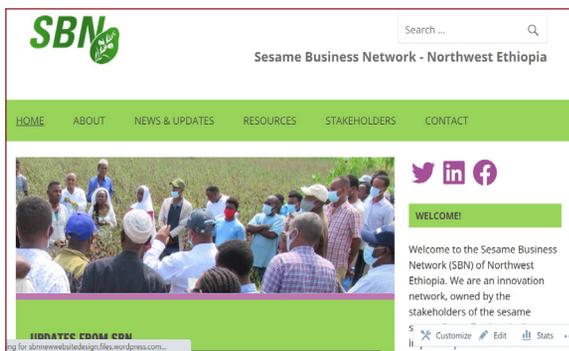
The SBN Website

The SBN website- www.sbnetiopia.org - has been a major platform, informing stakeholders and partners about recent developments in the Ethiopian sesame sector. The website not only provides up-to-date information on the activities of the stakeholders and the support programme, but it also showcases stakeholders' activities and performances to visitors.

Enabling Environment

The website has six main pages: Home, About, News & Updates, Resource, Stakeholders and Contacts. The 'home' page has basic information about the SBN and its support programme, goals, objectives, staff profiles. It has also links that directs to the SBN Facebook, Twitter and LinkedIn pages. The 'News & Updates' page provides short news and articles and pictures that support the texts. It provides timely information to viewers about the overall activities of the SBN and the SBN support programme. The 'Resource' page has newsletters, brochures, briefs, reports, tools, experience papers, lesson learned and other documents. The 'Stakeholders' page introduces stakeholders with a one-page profile focusing on their roles and responsibilities in the sesame sector, mission, goals, objectives, plans, performances, areas of work and addresses.

Google analytics, which is an online tool to analyse websites, show that the SBN website has been visited by thousands of people from different parts of the world, mainly from Ethiopia, United States, United Kingdom and the Netherlands. The website as a convergent media was instrumental for stakeholders and many other visitors to easily access information and learn about SBN and its support programme; where and how it is operating; what achievements recorded and challenges faced. Because of the website, messages from sesame buyers were received from Korea, Japan, China, Thailand and other countries, which were forwarded to unions for establishing market relationships.



SBN Social Media

Although internet reach in Ethiopia is still modest (15-20%), more and more people, especially youngsters and those who have access to the internet, are becoming users of social media such as Facebook, Twitter, LinkedIn, YouTube. The SBN social media pages have been visited and followed by thousands of people around the world.

Facebook

According to the Internet World Stats webpage, over six million people use Facebook in Ethiopia. The SBN Facebook page has more than 2,250 followers, most are youngsters from Northwest Ethiopia. The page shares news, articles, pictures/albums that depict the various activities such as training sessions, field days, workshops, demonstrations, spot markets and other activities. Similarly, links on activities and actions taken by stakeholders or policymakers in relation to sesame and rotational crops and reported in other websites have been shared. Facebook allowed for some level of interaction as followers sometimes provide comments and feedback or reflect what they feel about the activities (<https://www.facebook.com/SBNEthiopia/>).

Twitter

The SBN Twitter page has more than 370 individual and organisational followers, most are professionals working in similar projects or from the international community. This number is limited because, unlike Facebook, most SBN stakeholders are not using twitter (<https://twitter.com/SBNEthiopia>).

LinkedIn

The SBN LinkedIn page has nearly 800 connections. The links of all news and articles from the SBN website and pictures that portray activities of the SBN actors and the SBN support programme are shared. Most LinkedIn connections are mostly local and international professionals and therefore the page mainly share activities written in the English language.

YouTube

The SBN support programme has produced short movies and documentaries about the 20 steps, yield losses, thinning, labourers and experiences of the first phase of the programme, and shared these on the SBN YouTube page. The short movies are used as extension and training tools while training farmers and other stakeholders. The documentary on the SBN experiences shows the achievements and results of the stakeholders and the SBN support programme. Videos ease facilitation, increase understanding of farmers, and improve application of technologies and practices. The short videos and documentaries have been shared

in the SBN YouTube page so that others can learn and adopt similar practices. Thousands of viewers visited the films posted on YouTube.

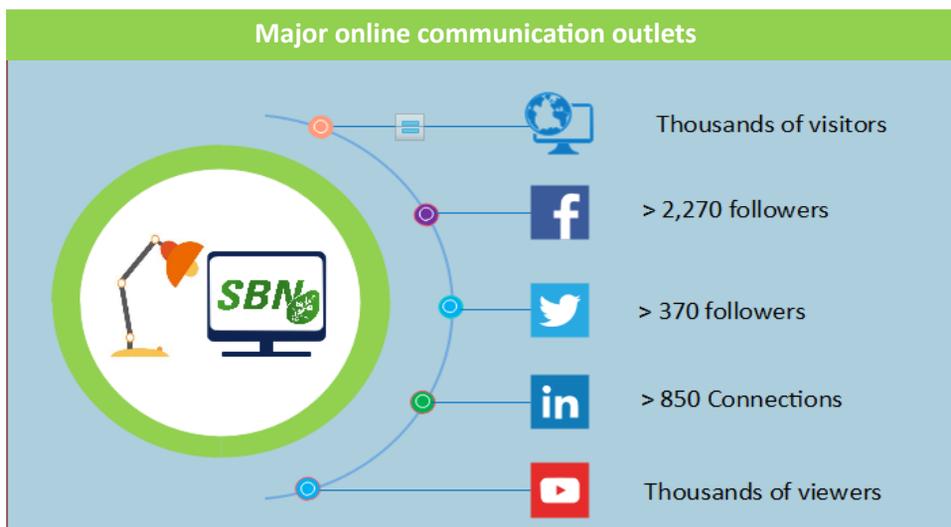
Reports

The SBN support programme staff have produced different types of reports with different formats (back to office reports, activity reports and quarterly, semester and annual progress reports). Templates somehow ease the burden of report writing and help to keep consistency and uniformity. Activity reports are written after completing a particular pursuit. Quarterly, semester and annual reports have been produced and shared with stakeholders and partners via different communication channels, and during meetings and workshops.

Issue/Policy briefs, experience papers and lessons learned documents

Aside from the aforementioned regular communication channels, SBN support programme produced issue briefs, lessons learned documents and experience papers that mainly focused on strategic challenges of the sesame sector. These outlets mainly targeted regional and national level policy makers are written in a very clear and concise way and supported with clear pictures and attractive layout. The shared briefs, coupled with the discussions held during thematic meetings, regional workshops and field days helped to bring about policy changes on ECX marketing, sesame grading, lot size, storage period elasticity, input and marketing credit availability and lease financing for mechanisation.

Collecting feedback has been an integral part of all the communication process. Feedbacks were mostly collected using unobtrusive method. Some audiences provided feedback during meetings, workshops, via the SBN email and social medias. The positive and constructive feedbacks received from readers encouraged us to further improve the quality of the communication outputs.



Challenges

- The communication tools are designed mainly to serve the SBN actors and therefore they have been encouraged to contribute to the newsletter, website and social media. This was a good opportunity for those stakeholders who do not have their own communication outlets, but unfortunately their contribution has been quite limited.
- In Ethiopia, people usually prefer oral communication to written communication. Because of the oral culture, it was not only difficult to get written contributions, but it was also observed that people often fail to read and react. It was not easy to get a written reply or feedback from stakeholders via email or a formal letter.
- Communication tools are often used to create awareness, provide information and knowledge and persuade stakeholders to take some action. Informing authorities about some challenges is not enough and does not result in follow-up action. To advocate for change, more is needed.
- Communication with illiterate or hardly literate farmers is difficult, as they could not benefit from the written communication tools.
- Stakeholders limited media literacy and/or limited access to internet affected the impact of the website, social media and electronic copies. Not all individuals and stakeholders learn and use the new technologies in the same way. Some are really savvy and become familiar to new technologies immediately while others are very slow learners. The low digital literacy level of farmers limited the benefit that could be exploited from the written and visual communication tools.
- The sustainability of the production and distribution of the SBN communication materials and channels is a point of concern. The challenge is to launch a strong national sesame platform or sector association which is also responsible for communication.

Achievements, lessons learned and way forward

- A clear communication strategy, segmentation of audiences, information needs assessment, clear and concise messages and using multiple, complementary communication channels significantly support agricultural development processes and should get the attention it deserves.
- The use of multiple channels (posters, banners, brochures radio programmes, short movies and documentary films contributed to increase awareness, knowledge and skills of stakeholders.

- Time-bound information was timely delivered. These days, day-to-day communication is more and more mediated through the use of the electronic media. The use of email, mobile phone, internet and social media are becoming the rule of the day. More attention must be given to stakeholders' digital media literacy.
- Most of the information that is conveyed to stakeholders using the digital communication channels are time sensitive and attempts have been made to disseminate such information timely. Often times the communication outlets such as newsletters, reports and brochures are released in a schedule and the support programme has been successful in availing such materials on time.
- Communicating through diversified channels, ranging from the traditional print and electronic media to that of the proliferating new technologies, supported the effective implementation of programme activities. They contributed to reaching different audiences and many people and contributed to achieving the objectives of the SBN support programme.
- The SBN communication tools have been successful in setting the agenda; framing issues, informing about planned and executed activities, indicating challenges, and presenting recommendations to various stakeholders and partners.
- Experience papers and Issue briefs that presented lessons learned and strategic challenges to decision makers contributed to policy implementation and policy changes.
- For the communication tools to serve the stakeholders in a sustainable way there should be a national platform or sector association that can own and run communication channels. The budgetary requirements for running the platform could be solicited through a levy system that is feasible for an export crop like sesame.

6.6 The missed opportunity: regional and national stakeholder platforms to innovate and transform the sesame sector

Geremew Terefe, Ted Schrader, Kahsu Kelali

Transforming the sesame sector requires stakeholders to come together and address the multiple strategic challenges that hold back the sector, ranging from production to that of finance and marketing. Fundamental sector transformation requires strong regional and national stakeholder platforms.

Introduction

Ethiopian sesame sector at the crossroads

To create a sense of urgency, it is good to be clear about the current situation: Ethiopia has comparative advantages, but is losing its competitive edge. Potentially, Ethiopia has a sesame growing tradition, vast acreages and sesame seed that is internationally referred to as “Humera and Gondar type” sesame, that is known for its large white seeds (preferred in bakery industry) and the distinct nutty taste (giving it an aroma that is preferred for tahini making). Nevertheless, the country does not benefit from these comparative advantages because of low production and quality, poor storage and inability to meet higher value market standards and food safety requirements. Production costs are relatively high because of low yields per hectare and domestic market prices have been inflated because of exporters’ quest for hard currency. Limited exporters’ market intelligence and delays in delivery are also affecting Ethiopia’s competitiveness in the international market.

Ethiopia is losing ground in the international market. On the other hand, countries such as Nigeria, Guatemala, Sudan, Tanzania, Uganda, and Burkina Faso have become sesame producers in the past decade. They produce better quality sesame seed at a lower cost. To excel in the international market these countries are building necessary infrastructures, complying with stringent food safety protocols and developing trustful relations with buyers.

The need for national coordination and action

The challenges of the Ethiopian sesame sector need substantive action from a wide range of stakeholders, notably: Ministries (Agriculture; Trade and Industry; Finance; Labour and Social Affairs); Financial institutions (public banks, commercial and cooperative banks, micro-finance institutions and capital goods leasing companies); ECX Authority; Traders, processors and exporters; Ethiopian Pulses Oilseeds and Spices Processors Exporters Association (EPOSPEA); ARIs and EIAR); BoA; FCA, RCPA; farmers and their organisations; ATA; transporters, input providers, store managers and other service providers. These stakeholders should work together and have strategies to win the game. In short: these stakeholders should make up the SBN.

Stakeholder collaboration at different levels

As from its start in 2013, the SBN support programme aimed to bring these stakeholders together. This started at local, woreda, zone and regional level. The ultimate objective was to also have a national innovation platform that would bring sector stakeholders together to discuss, diagnose and address major strategic issues and systemic bottlenecks. The process of building stakeholder collaboration clusters at different levels was guided by the ‘subsidiarity principle’, which stipulates that responsibility should be assigned and kept at the lowest possible level. In practice, this implied that, as much as possible, kebeles, woredas, zones or regions should organise themselves and do what they can at their level. It also applies that these levels can bring issues to higher levels if this would be required to adequately address identified challenges. The idea was that experiences at local level would be brought up to the regional level and issues that would require solutions at national level would be brought up to the national level.

A practical example, showing how different levels can complement each other, is the following, complementary division of tasks: (i) Inventory of farmers’ interest for purchasing agricultural machinery at kebele and woreda level, for instance as part of the bottom-up agro-economic planning system; (ii) financial reservations and orientations for capital goods leasing companies (Waliya and Kaza) which are related to the large regional microfinance institutions (ACSI and DCSI) and promotion of machinery rental services at regional level (iii) supporting measures at national level, such as tax exemption on agricultural machinery and facilitation of the Ethiopian Capital Goods Finance leasing company.

Summary of achievements at local and regional level

Local level

With the SBC approach that was adopted in the first years (2013-2015), local stakeholder collaboration, especially between farmers, research and extension was better established. The financial literacy efforts led to closer collaboration between farmers, cooperatives and CPOs. For certain direct sourcing relations (sorghum, soybean and organic sesame), direct relations between farmers, their organisations and sourcing companies were facilitated. Local field days at kebele and woreda level brought many stakeholders together. A bottom-up agro-economic planning approach has been piloted to strengthen the collaboration and synergy between stakeholders for the planning and implementation of priority actions. This approach puts specific focus on input supply, input finance and training needs and aims at a better involvement of farmers' organisations and financial institutions in local planning, implementation, monitoring and evaluation.

Regional level

Regional field days have been opportunities to bring important stakeholders together. These field days were attended by regional presidents, ministers, regional bureau heads (BoA, ARIs, RCPA), members of the parliament, representatives of development partners, federal and regional researchers, representatives of banks and micro-finance institutions, woreda and zone administrators and heads of offices and departments, mass media, and others. More than workshops or meetings, field days seem to be the best opportunity to have policy makers available for discussing major sector challenges. Field days, followed by strategic meetings afterwards proved to be a good combination. In the field, high officials could see the activities and feel the challenges of farmers, perceive opportunities and get ideas for necessary actions. After the field visits, farmers and stakeholders could raise strategic issues such as finance, mechanisation, seeds, technology, marketing, pest and disease problems and infrastructure. Field days thus opened doors for intensive communication between sesame sector stakeholders and policy makers; it was the mud of the field that led to communication, advocacy and decision-making.

In addition to field days, regional multi-stakeholder platform meetings were annually held at the end of the calendar year, both in Amhara and Tigray regions. During these workshops, stakeholders presented the results of the production season to a broad audience with stakeholders from local to federal level. The annual meetings were opportunities to discuss challenges and priorities for the next season, but have not really lead to strategic decisions.



2018 regional meeting in Bahir Dar

Efforts at national level

Topics lobbied for at national level (2018)

In 2018, the MoANR and the MoTI organised some high level thematic meetings and workshops, with support of the SBN support programme. EPOSPEA and investor farmers' associations were invited to these meetings, during which some major issues and proposals for sector transformation were discussed. The main topics were the following: financing the sesame sector; rewarding quality sesame seed; adapting /improving the ECX sesame marketing system; enacting rules and regulations for contract farming; preparing protocols for the branding of Ethiopian sesame and market promotion; endorsing lease financing for mechanisation; building additional capacity for Humera and Gondar ARCs and providing agricultural extension services to commercial farmers.

As a result of the deliberations, policy documents on major strategic challenges, with more than 60 suggested solutions, were prepared and submitted to the Prime Minister Office for final decision-making. Because of political developments in the country, formal feedback was never received. Nevertheless, the following important decisions were taken after formal and informal meetings, workshops and field days:

- Tax exemption on agricultural machinery;
- Lease financing to acquire tractors and implements under 30 per cent initial deposit;
- Allowing farmers who produce more than five ton of sesame, to directly deliver to the ECX market, bypassing the primary market centres;
- Prohibiting traders to buy sesame at a price above international market;

- Availing 14 billion ETB to promote production and marketing of oilseeds and pulses;
- Approved loan extension for investor farmers with difficulties in repayment; making extension services accessible to commercial farmers.

Investor bias

The decisions taken show that the interests of investor farmers have had most chances to be addressed at national level. The tax exemption on agricultural machinery may also be important for smallholders if cooperatives may be eligible, like large farmers, for lease financing. Considering the better performance of smallholder farmers, it is rather remarkable that representatives of smallholder farmers were not invited to high-level deliberations. Addressing other challenges, which are key for smallholder farmers may be more productive, both from an economic and social point of view.

First steps to national coordination

As from 2018, the MoANR has a specific department that concentrates on oilseeds and pulses. Upon request of the Minister, the SBN support programme facilitated the appointment of a sesame expert to support the department.

Although a sustainable sesame platform has not yet been officially established at national level, the establishment of an Oilseeds and Pulses sub-sector Council was in principle endorsed. It is strategically of the greatest importance that this Council is effectively perceived as the National Transformation Council for the oilseeds and pulses sectors and is open for all stakeholders, including all farmer categories, the private sector and financial institutions.

Sesame ACC value chain alliance meetings

At regional level, after the establishment of Agricultural Commercialisation Clusters (ACC), the ATA initiated ACC-VC alliance meetings seem to best indicated as forums at regional level. Both in Amhara and Tigray, the sesame ACCs were highly prioritised by the regional governments. The ACC-VC meetings are quarterly meetings, officially chaired by the regional president, but in practice mostly chairs by the regional BoA as the official co-chair. ATA ensures the secretariat. The ACC-VC alliance meetings are aligned to Regional and National Transformation Councils. This means and implies that, when necessary, certain strategic issues could be upgraded to higher levels.

Agenda 2020

For 2020, the following subjects were planned to be discussed at regional level, during a sequence of quarterly meetings, under the umbrella of the ACC-value chain alliance meetings.

Selected strategic issues for high-level alliance meetings and decision-making

- Kebele Agro-Economic Planning
- Planning and modalities for improving farmers' access to input finance
- Improving the access to quality seeds, fertiliser and agrochemicals
- Promoting appropriate mechanisation for the sesame lowlands (lease financing, machinery rental services, FPCs)
- Availing marketing credit for cooperatives (output finance with on-lending to farmers)
- Improving the performance of investor farmers
- Scaling weather forecast services and related agri-services to farmers
- Innovating and improving training and extension services
- Scaling weather forecast services and related agri-services to farmers
- Innovating and improving training and extension services
- Digitalising information management for the sesame sector
- Sustainable functioning of regional and national platforms

In November 2019, a tentative planning for ACC-VC alliance meetings was prepared. The ACC-VC alliance meetings were proposed to be short (morning or afternoon), to be attended by a maximum of 30 participants (all decision makers). During the meetings, the key subjects would be introduced by 'Issue briefs' and short presentations. The aim of the meetings was to come to important decisions for fundamental change and performance improvement. Assuming the Secretariat of the ACC/VC alliance meetings, the decisions taken would be reported by ATA.

The idea was that the meetings would be attractive because of efficiency of briefing and decision-making, and the opportunity to network. Additionally, it was thought that the regional stakeholder group could develop a 'Vision 2025' for the sesame ACCs in the lowlands of Northwest Ethiopia and reflect on the sustainability of the multi-stakeholder alliance, both at regional and national level, including information and communication services among stakeholders (secretariat, website, newsletter, ...). Unfortunately, most of the planned meetings for 2020 could not take place because of Covid-19 and political developments in the country.

Challenges

Many strategic issues have been identified and presented to decision makers in the form of experience paper and/or issue briefs, with supportive facts and figures and practical examples. The challenge now is to bring farmers and public and private sector stakeholders together in platforms at different levels, as originally planned. This seems to be the only way to systematically address strategic challenges that hold back the Ethiopian sesame sector. Instead of stakeholders operating in isolation, multi-stakeholder collaboration and action is needed to reposition Ethiopia in a rapidly changing world market and to restore Ethiopia's competitive position.

Other factors that hold back the establishment of the sesame platform and the national pulse and oilseeds council are:

- Low level of awareness among stakeholders on the importance of platforms;
- Lack of stakeholders' willingness to look beyond own interests and take responsibility;
- Frequent leadership and senior staff turnover in almost all ministries;
- Lack of coordination between different ministries, value chain operators and financial institutions;
- Bureaucratic procedures that hamper the effective implementation of decisions taken;
- Resource limitations to sustainably run a national sesame and pulses platform; and
- Tendency to look for external funds instead of finding local solutions and funds.

Opportunities

There are however many opportunities as well:

- High motivation at federal level to support the sesame sector and increase export earnings;
- Prioritisation of sesame ACCs at regional level;
- Identification of sector challenges and evidence that solutions are possible and profitable (availability of experience papers and issue briefs);
- Increased interest of some financial institutions to finance the sesame sector because of evidence that financing through farmers' organisations is possible;
- Willingness of exporters to finance sesame research and development
- Existence of ACC-VC alliance meetings as possible forums at regional level
- Endorsement of Oilseeds and Pulses sub-sector Council

This means that, in principle, there is fertile ground for launching regional platforms and a national platform. And the time is ripe to do so because there is a general fatigue among stakeholders to hear and discuss the same challenges over and over again.

Recommendations

Lessons learned in the past eight years show that it is not easy to organise multi-stakeholder platforms in Ethiopia. Due attention should be given to increasing awareness among stakeholders on the importance of establishing the oilseeds and pulses council and organising sesame, soybean, chickpea, and other platforms. Awareness raising is best done by showing that Ethiopia is losing its competitive edge and is losing millions of dollars as a result.

Pursuing own interests is the major obstacle for sustainable value chain development and healthy navigation of the business locally and internationally. Thus, creating strong linkages between the value chain actors is an essential step towards addressing common challenges and making policy influences. Both regional and national platforms can bring government, financial institutions, farmers, traders, processors and exporters together and create communication channels.

The frequent structural changes and turnover of high-level authorities and senior staff affect the decision making process. It is therefore, important to have a medium-term strategy for sector transformation and to have a functional structure with appropriate facilities and human and financial resources.

To run platforms sustainably, it is important to identify viable funding sources. The oilseeds and pulses council can leverage funds through a levy system. The country exports nearly 500,000 metric tons of oil and pulse seeds. A ten-ETB levy per metric ton seed would raise about five million ETB per year, which is enough to professionally run the platforms and ensure communication among stakeholders.



Ted Scharder

Chapter 7

An evidence-based agenda for action: the Ethiopian sesame sector

Introduction

“Action research is a research strategy that pursues action and knowledge in an integrated fashion through a cyclical and participatory process. In action research, process, outcome, and application are inextricably linked” (O’Leary 2004: 138). According to this definition, the SBN support programme has clearly been an action research programme the past eight years. Following priorities set by stakeholders, it piloted innovations and facilitated capacity development and scaling with the aim to improve the performance of the Ethiopian sesame sector. Based on collaboration agreements, the programme supported multiple stakeholders to implement practical activities. Pilots, capacity strengthening and scaling activities were jointly planned, implemented and evaluated with stakeholders. By doing so, a comprehensive programme gradually evolved. All involved learned by doing.

This chapter reviews results obtained, reflects on the experiences gained, results obtained and lessons learned during the past eight years, with the aim to suggest best options for making the sesame sector more competitive, sustainable and inclusive. Performance indicators, as consolidated in 2014, are compared with the current situation (2020). The review points out that for different, complementary intervention areas important innovations are possible in practice. Based on experiences and lessons learned, an evidence-based agenda for action suggested, which is both practical, comprehensive and far-reaching.

Key message

The sesame sector can become more competitive, sustainable and inclusive. This potential is not captured; the sesame sector is still underperforming. Structural changes for addressing fundamental challenges are required. This requires decision-making at the highest regional and federal levels. More than ever a functional, multi-stakeholder Sesame Business Network is needed. With good leadership this network can make a flying start, based on the rich experiences of the past years and the agenda for action that is based on these experiences.

An evidence-based agenda for action

Ted Schrader, Geremew Terefe, Anteneh Mekuria

The dashboard on the next pages provides an overview of all intermediary outcomes and scores. It shows that the outcomes vary for the five main intervention areas: (a) Limited results for product and market development; (b) Average results for sustainable agricultural production and for social inclusion and diet diversity and (c) Good results for agri-finance and enabling environment.

For scoring the level of achievement, we use five options:

Hardly any result	Limited result	Average result	Good result	Very good result
--	-	+/-	+	++

Dashboard

Sustainable agricultural production	Score
50% of farmers in targeted sesame producing areas have improved access to input markets	+/-
50% of farmers adopt innovative agronomic practices	+/-
50% of agricultural area is under productive and sustainable agriculture	-
Farmers who adopt GAP get 50% higher yields than those who don't	++
30% of the farmers who adopt innovative practices produce first or second grade sesame	+/-
Farmers diversify their farming systems and improve productivity through crop rotation	+
Reducing sesame losses with 30%	+/-

Product and market development	Score
Business development pilots with cooperatives, unions, SMEs and processing companies	--
50% higher traded volume of value added products	--
Farmers have improved access to output markets	++

An evidence-based agenda for action

More companies directly source sesame and rotation crops from farmers (organisations)	+/-
Sesame farmers (organisations) directly sell 10% of their production to (inter) national buyers	--
Increased value of investments and exports of sesame and rotation crop products	-

Agri-finance	Score
10% of the farmers keep financial records and make cost-benefit analysis	++
Financial institutions double the input credit provided to small and intermediate farmers	+/-
Small and intermediate farmers who access formal credit reduce input credit costs with 40%	++
Financial institutions increase marketing credit provided to (sesame) cooperatives and unions	++

Social inclusion and diet diversity	Score
SBN specifically targets women and youth	+
SBN contributes to improved labour conditions according to prevailing labour office regulations	+/-
Rotation crops contribute to food and nutrition security and income improvement	+/-
Diversification and quality improvement of nutrition of farmers and labourers	-

Enabling environment	Score
Sesame sector stakeholders develop, maintain and use information databases	+/-
Stakeholders share information and experiences through different communication channels	+
Developing and updating training and extension materials	++
Stakeholders deliver training and coaching services through a cascaded approach	+
More than 50% of DA's contribute to the scaling of recommended agricultural practices	+
25% of DA's advice on crop rotation, climate adaptation and nutrition-sensitive agriculture	+
Improved performance of supported cooperatives	+/-
Improved stakeholder collaboration, and more effective action at kebele, woreda and zone level	+/-
SBN stakeholders address strategic issues and engage in dialogue at decision-making levels	+/-
SBN contributes to policy changes and reforms in the sesame sector	+

7.1 Yields can double, but for other than technical reasons they do not

Critical review of performance indicators for sustainable agricultural production

The review in this paragraph leaves no doubt that the primary outcome (farmers applying innovations reduce farm-level production cost price with 25 per cent) could be achieved. For eight years in a row it has been consistently demonstrated that farmers applying recommended practices double their yields and arrive at a significant reduction of the production cost per kilogram of sesame produced. For many of the intermediary outcomes good progress has been made and even more potential has been demonstrated. Based on experiences, conclusions are drawn and strategic orientations and practical actions are suggested (in italic).

50 per cent of farmers in targeted sesame producing areas have improved access to input markets (+/-)

In the household survey, 42 per cent of the respondents indicated to continue using quality seeds and applying fertiliser. Experience shows that this will be for limited amounts of seeds and fertiliser and/or for small acreages. The supply of seeds is still a major challenge, even though several new varieties were released. Fertiliser use has increased, especially in Amhara. Cost, supply, quality and safe use are major points of concerns for pesticide use.

Improvement of input supply requires improved planning, from farmers up to decision-making levels, coordinated action of stakeholders involved and a functional input finance system that responds to validated kebele and woreda plans. Fundamentally, the top-down system needs to change into a stakeholder-owned, locally specific input market system.

50 per cent of farmers adopt innovative agronomic practices (+/-)

Referring to training data and household survey results, it can be safely concluded that at least 70 per cent of the smallholder farmer households have been exposed to recommended agronomic practices. Field guides, trainings and demonstrations have raised high interest for recommended agricultural practices for sesame, rotation crops (sorghum, cotton, soya and mung beans), and for fruits and vegetables that can be grown in home gardens. Generally, an encouraging average

result was obtained for this performance indicator, except for drying sesame on plastic sheets and the use of hermetic bags for storage. Woreda data suggest that one third of the farmers are adopters of the 20 steps package (7% full adopters and 26% partial adopters). Communicated adoption rates in the household survey confirm this trend: improved varieties (42%), two times ploughing (44%), row planting (25%), thinning (56%), fertiliser application (42%), three times weeding (71%), pest scouting (71%), putting hilla in one area for drying (60%).

Referring to the 4A's of adoption, acceptability and attractiveness of the innovations are not the problem. Insufficient accessibility and affordability are the limiting factors and explain why most farmers are partial adopters. The fundamental challenges are the lack of input finance, the insufficient planning and delivery of seeds and agro-inputs and the insufficient facilitation of lease financing and rental services for mechanisation. If these challenges are not addressed, it is unlikely that adoption levels will increase.

50 per cent of agricultural area is under productive and sustainable agriculture (-)

While adoption rates are relatively high, given the circumstances, the acreage with recommended agricultural practices is much lower, not more than 10 per cent of the smallholder acreage and even lower for the investor farmers.

The key bottlenecks are the same as for the adoption rate: limited availability of machineries, mainly row planters, the insufficient provision of quality seeds and agro-inputs and the deficient input finance system.

Farmers who adopt innovative practices get 50% higher yields than those who don't (+ +)

For eight years, evidence shows that the yields of farmers who fully adopt the 20 steps are at least two times higher than the yields of farmers with conventional practices. Marginal Rate of Yield (MRY) studies show that the yield effects of fertiliser application, row planting, weeding and quality seeds are highest. In terms of cost-effectiveness, thinning is very important (low cost but high yield effect).

This evidence justifies an ambitious investment plan to double yields per hectare, and double national production as a result. This requires decision-making and commitment at the highest level, without which further technical training and extension is not likely to alter the situation.

30 per cent of the farmers who adopt innovative practices produce first or second grade sesame (+/-)

Varieties, planting seeds of high homogeneous quality, field management, harvesting, drying, winnowing, cleaning, bagging, careful transport and good storages are most important for quality. Full adopters easily produce high quality sesame (1st or 2nd grade).

The fundamental problem that hampered quality improvement is that higher quality was not rewarded with higher prices, because of exporters' orientation on accessing hard currency through sales on the bulk market. This is a very important explanation why Ethiopia is losing its competitive edge in the world market. The only way out is to arrive at direct communication between international buyers who specify their quality requirements and farmers and their organisations.

Farmers diversify their farming systems and improve productivity through crop rotation (+)

There is a modest move towards more diverse farming systems. Mung and soya beans are increasingly produced and are now eligible for marketing through ECX. Research data and observations at FTCs suggest that pulses, especially soya and mung beans, are a very good precursor crops for sesame. The agri-food industry demand for soya bean is growing and offers perspectives for developing supplier-buyer relations (contract farming). Also sunflower can develop as a commodity with in-country value addition. Farmers increasingly show interest in this crop, which can contribute to the production of edible oils in the country. Farmers, women in particular, have increased interest in fruit and vegetable production.

The encouraging trend towards diversification, which is also important for spreading farmers' production and market risks, can be further supported. Options are woreda action plans for pulses, fruits and vegetables, for more sustainable production and improved diet diversity.

Reducing sesame losses with 30 per cent(+/-)

Action research in 2013-14 allowed to get more insight in harvest, storage and transport losses. The use of plastic sheets, to collect shattered seeds at drying and threshing sites, came out as a recommendation for farmers. Farmers hardly adopted it, mainly because of the extra costs after harvesting time when farmers have run out of cash, and lack of price incentives for clean seeds. Instead, quite more farmers decided to have larger hilla sites, e.g. bringing many sesame stacks together at a combined drying and threshing site. This practice, which is mainly a farmers' innovation, significantly reduced the seed loss that occur while carrying dried sesame plants to a threshing ground in another part of the field. Carrying freshly cut sesame plants to drying/threshing sites that are further away create

an additional work load for labourers, hence additional time and costs at harvest time. The benefits seem to outweigh the additional costs.

The optimal organisation of harvesting, drying and threshing, which is acceptable for farmers and labourers still has to be fine-tuned. Hermetic bags seem to make good sense for mung beans and sorghum, both for technical and economic reasons. It is however still unclear why hermetic bags are not popular with farmers.

Conclusions, lessons learned and orientations for way forward

Adoption levels of GAP for sesame production are still below expectation, mainly because of lack of row planters and input finance. Many challenges that need policy decisions were highlighted in chapter 2. It is important to conduct marginal rate of yield analysis (technical perspective) and marginal rate of return analysis (economic perspective) in collaboration with farmers. This is not only important for monitoring and evaluation, but also for developing advisory services that perceive and treat farmers as small entrepreneurs. From a macro-economic point of view, the reduction of the production cost price is very important for the competitive position of Ethiopian sesame in the world market. Due to production cost price reduction, farmers can earn thousands of ETB extra per hectare.

A focus on yield improvement and cost price reduction remains very important for farmers to improve their profits. Because of training and exposure, farmers know and accept most of the recommended practices (20 steps) and are willing to adopt these because of economic attractiveness. Farmers are making efforts and most are partial adopters. Availability of row planters is a key constraint, which can be addressed by coherent action. The recommended practices could be affordable if farmers would have access to formal input credit. Investments in mechanisation and agri-finance are needed to improve the accessibility and affordability of the innovations.



7.2 Without value chain and market relations the perspectives for viable agribusiness development are bleak

Critical review of performance indicators for product and market development

The results for product and market development have been disappointing. The primary outcome (Sesame farmers and SMEs involved in product and market development initiatives fetch a 10 per cent higher price, as compared to spot market and ECX prices) was not achieved. Most attempts to support business development initiatives did not lead to encouraging results. Fundamental market system change is required.

Business development pilots with cooperatives, unions, SMEs and processing companies (- -)

Many efforts were undertaken to support value adding activities (inventories, market studies, business planning, trainings for entrepreneurs, support to some pilot activities), but largely in vain.

In the prevailing policy and business environment the perspectives for successfully developing value adding activities are limited. For sesame, there are perspectives if direct communication and linkages between farmers, processors, exporters and international buyers are established. For pulses, sunflower and cotton there are perspectives both for local initiatives and for linkages with the emerging agrifood and textile industry.

50 per cent higher traded volume of value added products (- -)

Compared to the situation of five-eight years ago, there is hardly any change. Economic circumstances were not favourable for business development in the sesame sector.

If the domestic ECX price is no longer inflated, sesame would be more attractive input for product development and value creation and some options for using sesame in Ethiopian food products can be explored. As said, perspectives for rotation crops are promising.

Farmers have improved access to output markets (+ +)

The risk sharing scheme for promoting marketing credit for cooperatives has been a big success for farmers to sell through their cooperative. The presence of cooperatives at spot markets has much improved for participating cooperatives and led to less traders' price collusion.

The marketing credit for cooperatives can be scaled and institutionalised. This would be one of the key components of an investment plan for the Ethiopian sesame sector.

More trading and processing companies directly source sesame and rotation crops from farmers and/or their organisations (-/+)

During the period 2016-19, there were attempts to develop supplier-buyer contracts (unions and sourcing companies), for sesame, sorghum and soya, but these did not come to fruition or were discontinued. As of recent, sesame price control policies create some perspectives for developing direct sourcing relations between national and international companies on the one hand and farmers and their organisations on the other hand. This is creating conditions to invest in real value chain development. Direct sourcing relations between (agrifood and textile) companies and farmers are also possible for rotation crops. In 2020, contracts were established again between commercial farmers and a soya bean oil processing company in the Amhara region.

The first contract farming relations for soya bean are a first breakthrough. There are however still too many obstacles for farmers' organisations to engage in contract farming relations with sourcing companies. This is among the top priorities for policy change and subsequent implementation.

Sesame farmers and their organisations directly sell 10 per cent of their production to (inter)national buyers and processors (- -)

For years, direct export to international buyers would come at a loss of 100-200 USD per tonne for farmers' unions. Unlike trading houses, they were not allowed to use the hard currency for importing goods. For farmers, the best option was to sell at spot markets and to the ECX, where the prices were inflated because of exporters' quest for hard currency.

Recent government measures to control the ECX price can change the deadlock situation that has existed for years, as witnessed by first signs of increased opportunities for farmers to sell organic sesame to (inter)national companies.

Increased value of investments and exports of sesame and rotation crop products (-)

There is more attention from policy makers, research and extension and, to a certain extent, financial institutions. Some positive policy decisions, such as tax exemption for agricultural machinery were taken. This was however not accompanied by financial investment, such as agricultural credit or lease financing. The value of sesame export has fluctuated with the cultivated area and international market price. For some years, unprecedented high prices were observed, but these later collapsed.

The value of exports depend on the productivity of farmers, which depends on investments for the sector. As always in business, investments come before benefits.



Sesame packaging, loading and transporting

Conclusions, lessons learned and orientations for way forward

Sesame value chain and business development could not take off because of the inflated domestic ECX price. Without a profitable import business that would compensate losses on exported sesame, it was not possible for farmers, cooperatives and unions to profitably engage in sesame export. The traders' quest to export large volumes of sesame, mainly to the Chinese bulk market and for earning hard currency, furthermore proved to be a disincentive for producing quality sesame for higher value markets. This is a tragic loss for the Ethiopian sector, which has clear comparative advantages, because of good sesame varieties and suitable production conditions.

As such, the inflated ECX price was not to the disadvantage of farmers: nowhere in Africa farmers could get such a high domestic price for sesame (that is if farmers were out of the claws of money lenders and actually got the prevailing spot market price).

Being unable to address the policy context and the pricing system, the SBN support programme decided not to put efforts on quality improvement, nor on direct international market relations, because both would lead to losses for farmers. Instead, the following strategies were pursued:

- Promoting farmer/cooperative sales at spot markets to take advantage of inflated ECX prices, among others through the promotion of marketing credit for cooperatives;
- Improving yields and reducing production cost price;
- Improving farmers' access to input credit to reduce credit cost and dependency on informal money lenders;
- Promoting production, processing and marketing of rotation crops.

In the long run, the domestic price inflation, resulting from the exporters' quest for hard currency, is not sustainable. A commercial sector like sesame must however invest in post-harvest value adding activities, as well as in the development of direct relations between value chain operators. If not, Ethiopia will continue losing its competitive position in the international sesame market. Further market reform is therefore necessary. The recent Government policy that prohibits buying beyond the international sesame price is a first step in this direction. With realistic domestic prices and accompanying measures for creating a level playing field, direct relations between international buyers and supplying farmers' organisations could be established. This would allow for aligning Ethiopian sesame to different promising market segments. In addition, there are good perspectives for product and market development for rotation crops. With market system change, the time and effort that was put in preparatory studies, trainings and business plan development could materialise for the purpose of product and market development, both for sesame and rotation crops.

7.3 Agri-finance is the cornerstone for agricultural sector transformation

Critical review of performance indicators for agri-finance

Reflecting the priority that stakeholders gave to ‘Access to finance’, the SBN support programme has worked hard to find solutions for the insufficient funding of the production, mechanisation, processing and marketing of sesame and rotation crops. The work on input finance was put under the pillar of ‘sustainable agricultural production’, whereas the work on marketing credit was put under the pillar of ‘product and market development’. For most intermediary outcomes very promising results were obtained. The evidence that fundamental change is possible should guide sesame sector transformation.

10% per cent of the farmers keep financial records and make cost-benefit analysis (++)

The training of farmers in record keeping and cost-benefit analysis has reached more than 20,000 farmer households in the sesame zone (12% of all farmer households in 13 woredas). This is almost three times more than initially foreseen. This is thanks to the close collaboration with cooperative unions, primary cooperatives and the CPO in each woreda. The financial literacy training approach and materials have received much attention. The MoANR has decided to integrate financial literacy training in the national agricultural extension system.

Scaling of the financial literacy training is thus possible, in the sesame zone and beyond. This can be a large specific national programme. Intensive guidance of farmers and participating cooperatives is required. Financial literacy could be part of school programmes, especially in rural areas where sons and daughters of farmers go to school.

Financial institutions double the input credit provided to small and intermediate farmers (+/-)

In the past 5 years, the amount of credit provided to farmers has somewhat increased, but has also much fluctuated. Dedebit credit and saving institute (DCSI) has adopted a sesame loan product for Western Tigray zone, which is being extended to Northwest Tigray zone. The Amhara credit and saving institute (ACSI) could consider doing the same. Abay Bank has intensified its business relation with farmers’ cooperatives in Amhara. Although to a lesser extent, the same applies for the Cooperative Bank of Oromia (CBO) and Lion bank in Tigray. *As for now, there is no structural solution for financing the inputs and labour*

costs of sesame production. Thousands of tonnes of sesame are not produced, production costs remain high per kg and millions of dollars are not earned. Input finance needs can be based on bottom-up planning (see 7.5) and should consider the performance of farmers and their credit repayment history.

Small and intermediate farmers who access formal credit reduce input credit costs with 40 per cent (++)

Farmers who by accessing formal credit become independent from informal money lenders reduce their credit costs with 90 per cent; instead of, 100 per cent interest rate per season (250% on annual basis) to 15-20% per year.

Access to formal affordable credit is the gateway to professionalisation and better performance of farmers in the sesame zone. Trustful relations of unions and cooperatives with banks can lead to more modest interest rates.

Financial institutions increase marketing credit provided to (sesame) cooperatives and unions (++)

The risk-sharing scheme for promoting marketing credit to unions and cooperatives has been a great success. In 2018-19, three banks provided marketing credit to 22 cooperatives for a total value of 30.5 million ETB (one million USD). In Amhara, Abay bank is really becoming a partner for agricultural development, by offering an attractive interest rate for cooperatives (12.5% per year), collaborating in training, participating in general assembly meetings of unions and promoting a strong saving and repayment culture among farmers. After the guarantee fund was dismantled in 2020, Sanja and Godebie primary cooperatives established direct banking relations, while nine cooperatives continued their banking relation with Abay bank through the Metema farmers' cooperative union. In Tigray, CBO has been working with Setit union and ten cooperatives. After dismantling the guarantee fund in 2019, there are promising signs of sustainability. Dansha and Setit Union continued providing input credit to member coops from their own capital sources.

The achieved results are an important breakthrough and show that sustainable banking relations are possible between banks and farmers' organisations. The marketing credit for cooperatives can be scaled and institutionalised. This can be facilitated by wisely used temporary risk sharing arrangements. This requires a guarantee fund, and maybe more importantly, loan management training of farmers' organisations, a better understanding of the agricultural sector of bank staff and close monitoring of loan use and results by both parties.

Conclusions, lessons learned and orientations for way forward

Financial literacy training develops the professionalism and entrepreneurial outlook of farmers and triggers more reflection about farm investments and innovations. It raises awareness for savings, creditworthiness and loan repayment, which can increase farmers' eligibility for input finance. The quality of farmer record keeping and cost-benefit analysis can definitely improve, which require commitment of cooperatives and unions, the CPA and financial institutions. Financial literacy training can be organised from a family farm perspective and involve men, women and youth.

The decision of the MoANR to integrate financial literacy training in the national agricultural extension system is a very good example of an innovation that went from piloting, capacity development and scaling to the level of institutionalisation. In a short time, hundreds of DA's and thousands of farmers were additionally trained. The fear is that this training was rather fast and superficial manner and may not lead to expected results. The lesson is that full-fledged scaling of farmer literacy training is like a project in itself. Regional and national policy discussions are needed to conceive an action plan for the roll-out of financial literacy training and coaching. Financial institutions show interest to consider cash book recording data for assessing farmers' eligibility to loans. The alignment of farmers' book keeping to criteria of banks and MFIs need to be further explored.

Improving farmers' access to input finance proves to be a long-term struggle. For now, participants in this struggle are only losing. Farmers are desperate for input finance, financial institutions need viable clients and the country is desperate for hard currency. Without access to input finance, the potential to double yields will not materialise and farmers will not reduce their production cost price. Addressing the input finance challenge requires decision-making at the highest level and full involvement of ministries, government agencies, financial institutions and farmers' organisations. Without full-fledged multi-stakeholder commitment, efforts for transforming the sesame sector are likely to be in vain.

The risk-sharing scheme for promoting marketing credit to cooperatives has a very strong proof of concept: 100 per cent repayment rate, increased trust and collaboration between farmers' organisations and financial institutions, better relations between farmers, cooperatives and unions and very encouraging signs of sustainability. Pre-harvest loans from cooperatives to members facilitated the financing of the last stages of the production season. Based on this proof of concept, the risk-sharing support scheme for cooperative marketing credit can

An evidence-based agenda for action

be scaled. When scaling, the intensive training, coaching and monitoring system that accompanied the risk-sharing scheme has to be maintained. This requires competent staff and high commitment of banks and farmers' organisations.

Marketing credit can be used for financing the last stages of the production season (2nd weeding, harvesting). This credit, which is supplied in August when crops are standing, is much less risky than input finance, which is provided before the rain starts (March-June). Marketing credit can thus be an important part of the solution for the major input finance problem. In practice, the combination of input finance and marketing credit can lead to two disbursements to farmers.

7.4 Improving social inclusion and diet diversity requires special efforts

Critical review of performance indicators for social inclusion and diet diversity

In the sesame zone, an estimated 16 per cent of the 170,000 farmer households are female headed. The percentage of female headed households is much higher in Tigray (23%), than in Amhara (9%). At peak times during the agricultural season, the number of wage labourers is higher than family labourers. In total, more than half a million seasonal labourers arrive in the sesame lowlands. They are generally young and poor and originating from food insecure midlands and highlands in Tigray and Amhara. Most people in the sesame zone, especially labourers, have a very monotone diet. Over the years, social inclusion (gender, youth, labour) and nutrition became a more integral part of the SBN support programme.

SBN specifically targets women and youth (+)

As from 2016, separate training sessions were organised for women (agricultural practices, financial literacy). Young men and women participated in their gender groups. This improved the reach of women and youth. For the following (gender-disaggregated) indicators, the percentage of women were as follows: farmers receiving inputs in kind (18%); training on agricultural practices (37%); adoption of agricultural practices (23%); weather forecast recipients (27%); financial literacy training (17%); on-lending of marketing credit (28%).

Key lessons learned are the following: have a family farm perspective, specifically target female headed households and train young and older women on subjects they find important. For the financial literacy training, the household approach (training both men and women) only succeeded to a certain extent. The number of participating women was below expectation, because of cultural barriers and overlapping commitments, the novelty of the training approach and insufficient commitment of the trainers.

SBN contributes to improved labour conditions according to labour office regulations (+/-)

In 2016, SBN conducted a labour study to understand labourers' working and living conditions. Since 2017, the SBN programme supported the labour office to raise awareness of investor farmers and labourers on prevailing regulations, with specific attention for labourers' rights and responsibilities, health and nutrition,

both in Tigray and Amhara. During mass meetings, thousands of labourers have been reached. Labourers were also informed about improved production practices. Brochures on the labour proclamation and on labourers' living and working conditions were distributed. Short movies on the same subjects were shown using mobile cinema.

Although important efforts were made, the attention for labourers was not a main part of the programme. It was not among the key concerns of stakeholders as well. Considering the number of labourers, their poor living conditions and the importance of labour costs and revenues, more explicit attention would have been warranted. A specific point of attention is the effect of wage labour income on smallholder farming in food insecure zones of origin of labourers.

Rotation crops contribute to food and nutrition security and income improvement (+/-)

Mung and soya beans are increasingly produced and are now eligible for marketing through ECX. Mung beans, vegetables and fruits have most potential for integrating local food habits. In the training sessions organised on home gardening and seed production, participant farmers were trained on nutrition, food groups and causes and consequences of poor nutrition. Agri-food industry demand for soya bean is growing and offers perspectives for supplier-buyer relations. This may result in increased attention of possible uses of soya beans in local diets and domestically produced agrifood products.

A good basis has been laid for moving to a more balanced farming system that can contribute to improve local diets.

Diversification and quality improvement of nutrition of farmers and labourers (-)

Although the availability of locally produced pulses is growing, the actual use is still limited. Home garden production is also quite limited still.

The pilot activities are receiving interest for scaling. It is suggested to have woreda action plans for improving local food production and use.

Conclusions, lessons learned and orientations for way forward

Separate training sessions for men and women have a positive result on raising their awareness. More attempts have to be made to raise stakeholder awareness about possibilities for improved attention for gender relations and for women and youth participation. As farms are family enterprises with complementary roles of different family members, a household approach seems to be appropriate and acceptable, both for technical, social-economic and cultural reasons.

Most perspectives for local value addition exist for rotation crops (especially mung and soya beans) and for fruits and vegetables. Many women are interested in soya and mung beans, especially as crops for sale. If opportunities for local business development arise, specific attention has to be given to female and youth entrepreneurship.

Labourers are essential for sesame production, and labour costs make up the largest part of production costs. Around half a million seasonal labourers come from nearby mid and highland woredas to earn some additional income. They live and work under poor housing and working conditions and have a very monotone diet. Considering their importance for sesame production, their number and poverty, much more attention for labourers is needed. For several reasons this is not easy: they are not residents of the sesame zone, they are weak and vulnerable and not organised. Remarkably, there is also limited attention for labourers in the development discourse, especially when compared with the attention of gender and youth. More attention can be given to the relations between the commercial sesame lowlands and the food insecure zones and woredas of origin of the labourers.



Women cleaning seed



Labourers cooking their food

7.5 Governmental institutions can do more for sector transformation

Critical review of performance indicators for enabling environment

Based on evidence and experiences, the SBN support programme, in collaboration with stakeholders, has seriously tried to suggest options for “creating a more enabling environment to enhance the performance of the Ethiopian sesame sector”. Four, related intermediary outcomes were expected to contribute to achieving this primary outcome: Evidence-based information gathering and sharing; Stakeholder capacity development; Enhanced stakeholder collaboration; and Strategic sesame sector innovation. Below, the performance indicators that are related to these intermediary outcomes are assessed and discussed.

Sesame sector stakeholders develop, maintain and use information databases (+/-)

A lot of work was done to improve the availability and quality of information: action research on specific topics, surveys, databases, planning and monitoring and evaluation system. A digital information system, adapted to the sesame sector, was developed and piloted in four kebeles.

The actual use of databases and information can be much improved. This requires the design of a planning, monitoring and evaluation system for the BoAs and clear formats to be used by woreda and kebele agricultural offices at different levels. Investments in computer hardware and staff training are also required.

Stakeholders share information and experiences through different communication channels (+)

The range of communication channels (field guides, training modules, brochures, posters, website, newsletter, social media, films, radio, ..) testimony that the SBN support programme has shared a lot of information to farmers and within the stakeholder network. Because of the size of the sesame zone, the reach was large and the costs per user were relatively low. The unit cost of the attractive 20 steps production guide was for instance only 20 dollar cents.

Continuity of these effective communication materials and channels is not ensured now. As the information is about all dimensions of the complex sesame sector, it would be most appropriate to have a platform secretariat mandated by the member stakeholders to take care of the communication. A levy system, which is feasible for a commercial crop like sesame, could provide sustainable funding.

Developing and updating training and extension materials (++)

Field guides have been developed, shared and used for sesame and rotation crops (sorghum, soy and mung beans and cotton). These are very good examples of translating research results in easy to understand guides for farmers. For each of these, thousands of copies were printed and availed to farmers and extension workers. In addition, training and extension materials on other subjects were developed and shared (financial literacy, loan management, pest and disease control ...). All these materials have been an inspiration for other actors both within and beyond the sesame sector.

It is important to keep the existing materials updated and to add additional training and extension materials.

Stakeholders deliver training and coaching services through a cascaded approach (+)

The system of training of trainers, who then deliver training to targeted audiences has been quite successful. Many more people than originally planned were reached. This is mainly due to trustful collaboration with different stakeholders, based on clear collaboration agreements. Most agronomic training sessions were organised according to the traditional top-down approach that is prevailing in Ethiopia, with priority given to instruct large numbers of farmers. Yet, the cascaded ToT system of SBN, the production guides, the training modules, the attractive extension materials, radio programmes and films have had an impact on the perception of training delivery. The same holds for the collaboration with farmers for scaling trainings (farmer trainers).

Development programmes do not need to deliver training (or other) services themselves; it is better to do this through partnerships. Changing the traditional top-down training approach to participatory methods and providing demand driven training is still a major challenge. Much more attention can be given to training needs assessment, the training and coaching of farmer-trainers, farmer-to-farmer extension services, farmer field schools and accessible and affordable ICT tools (SMS messages to farmer trainers, information telephone services for answering farmers' questions, use of tablets, ...).

More than 50 per cent of the DAs in the targeted sesame production zones contribute to the scaling of recommended agricultural practices and 25 per cent of those DAs advice farmers on crop rotation, climate adaptation and nutrition-sensitive agriculture (+)

In many more kebeles than was foreseen (263 instead of 100), the development agents (DA), of whom one third was female, trained, coached and monitored farmers, for the scaling of recommended agricultural practices. The integration of financial literacy training in the national extension programme extended the scope of DA involvement. Development agents have provided advice on rotation crops. This was part and parcel of the regional agricultural extension programme and integrated in demonstrations at kebele level farmer training centres. Attention for climate adaptation was mainly through weather forecasts and attention for drought or waterlogging resistant crop varieties. The number of DA's involved in the promotion of home gardens and nutritious food was more recent and modest.

By working together with BoA, the reach of the SBN support programme was much larger than expected. The high turnover of DAs is a challenge though. DAs often stay for one or two seasons only. Basic salaries are very low and not related to performance. It is recommended to revise the incentive structure for DA's in such a way that performance, to be assessed by farmers, is rewarded. Practical options are: farmers providing a piece of land or working on the plot of the DA or DAs sharing in the harvest of the farmer field school.

Improved performance of supported cooperatives, according to selected externally assessed performance indicators and to member self-assessment (+/-)

SBN has collaborated with more than 100 cooperatives and 10 unions during the roll-out of the financial literacy training. Collaboration was most intensive with 22 cooperatives involved in the marketing credit support scheme, for which cooperatives were assessed with a specific assessment tool. These cooperatives were intensively trained and monitored and their performance improved.

At hindsight, much more could have been done with farmers' organisations. It is recommended to use a rapid assessment tool for assessing the performance level of cooperatives. Cooperatives could be classified according to internal governance, professional management, own capital and proof of collective action already undertaken. Capacity development and targeting of activities could be aligned to the different categories of cooperatives. More emphasis can be given to exchange visits between farmers' organisations or the use of documentaries on cooperative activities that can inspire others.

Stakeholders (in sesame production zones) improve their interaction and collaboration at kebele, woreda and zone level, leading to better coordinated and more effective action and outputs (+/-)

In 50 kebeles, stakeholder collaboration improved as a result of the KAEP. Planning and evaluation meetings, trainings and field days contributed to stakeholder collaboration at local levels, especially at woreda level.

Stakeholders better know of each other's activities and recognise the importance of stakeholder collaboration. Alignment of stakeholder plans is however not a reality yet. This requires a fundamental change of the planning methodology that is adopted in a zone or region. In fact, a top-down decision to institutionalise bottom-up multi-stakeholder planning is needed. Key actors who need to plan and work together are farmers and their organisations, kebele/woreda administration, office of agriculture, ARCs and relevant local financial institutions.

SBN stakeholders address strategic issues and engage in dialogue at decision-making levels (+/-)

Every year, regional stakeholder meetings were organised, during which the marketing and production seasons were evaluated, key issues discussed and plans made. Over the years, zonal and regional field days became occasions for stakeholders to discuss strategic challenges. Many thematic meetings and workshops were organised, but effective decision-making for structural change often did not follow. At regional level, the value chain meetings of ACC could become strategic regional bodies, but this potential could not be harnessed in 2020.

Although some strategic decisions have been taken and there is widespread consensus that SBN support programme has been instrumental for giving more attention for the sesame sector, the current level of performance is not likely to improve without important decisions for sector transformation. It is not easy to get higher level officials together for taking the decisions that are required for system change. Delegated staff cannot take decisions and the directors are busy, also because of the current situation in the country. Leadership change in different organisations and limited commitment continued to be challenges.

SBN contributes to policy changes and reforms in the sesame subsector (+)

The SBN support programme has been an evidence-based opinion developer in the sesame zone, for a broad range of subjects (GAP, rotation crops, integrated soil fertility and pest management, mechanisation, lease financing and machinery rental services; weather forecasting, input finance, marketing credit, training modules and methods, extension materials, communication and social media, ...). Experiences were shared and proposals made for policy changes and reforms.

Some strategic challenges that were raised have been addressed: controlling the inflated ECX sesame price, change of grading parameters, tax exemption for agricultural machinery, credit amount per hectare and ceiling per farmer, involvement of banks in the sesame sector.

There is a need for a high level sector-oriented platforms, both at federal and regional level, that are able to discuss key challenges and take and implement decisions. In fact, there is a need for sesame business networks. The ACC value chain meetings could become the regional platform. The regional president is the chair of these meetings, the regional BoA is the vice-chair and ATA is the secretary.

Conclusions, lessons learned and orientations for way forward

Has the Ethiopian sesame subsector enhanced its performance as a result of a more enabling environment? The answer is: “to a certain extent, but that extent is still too limited”. Compared to what is needed, the structural change is too limited. This is disappointing as there is huge potential for bringing the Ethiopian sesame subsector to the next level. Failure to do so is costing farmers thousands of ETB, and the country millions of dollars per year.

Stakeholders are quite unanimous about the main strategic challenges of the sesame sector, as well as the necessary change. The problem is that necessary decisions for sesame sector transformation are not taken. Because of the centralised decision-making in Ethiopia, there are only a very few people who can take far reaching decisions. These people are very much solicited and give priority to other subjects than agricultural sector development.

Stakeholders who are highly involved in the sector impatiently ask for leadership to address the persisting challenges:

- Stagnant production, whereas doubling the production and turnover of the sesame sector is possible. Key decisions relate to input finance and mechanisation.
- Separation of producers and buyers, who do not even know each other. Key decisions relate to the revision of the market system, quality incentives and creating a level playing field, with equal chances for value chain operators.
- Insufficient financing of the sector. The agri-finance challenge needs to be addressed in an integrated manner, combining financial literacy training, well-coordinated bottom up planning (KAEP), input finance, lease financing and marketing credit for cooperatives.
- Information management and communication. There is interest and demand for a digitalised information system (BoA, Unions and cooperatives) and all existing communication products are appreciated. A commercial sector like sesame could mobilise resources for developing a professional information and communication system that is based on a levy system.

- For capacity development, the key elements for the way forward are: focus on farmer-to-farmer training, adaptation of incentive systems for local DAs, local farmer field schools and farmer business schools, focusing on outcomes rather than outputs, supporting training sessions with modern information-communication-technology (ICT).
- To tailor training, input provision and input finance, bottom-up planning, based on the collaboration of stakeholders, should be the building for regional planning.
- The ACC-VC meeting could evolve into a regional sesame business network or platform. The MoANR can take the lead in establishing a national sesame platform or board.

7.6 Evidence for an agenda for action

In the past eight years, it has been shown that important change, which can lead to many multiplier effects, is possible. This evidence is summarised in the box below. If only part of this potential is realised, the 7 million Euro SBN support programme would have had great value for money.

Evidence for an agenda for action- It is possible to:

1. Improve research-extension linkages by translating (action) research results in to user-friendly extension messages
2. Reach all farmers with attractive, yet low-cost production guides for different crops grown
3. Double sesame yields by applying good agricultural practices
4. Promote integrated farming systems and reduce risks of mono-cropping
5. Produce high quality sesame that responds to the demand of several high-value markets
6. Locally develop, produce, multiply and use quality seeds for sesame and rotation crops
7. Tailor ISFM and IPM recommendations to local realities, with due attention for both agronomic and economic considerations
8. Develop appropriate mechanisation in the sesame lowlands: machineries are tested and accompanying measures such as lease financing and machinery rental services are suggested
9. Reduce harvest and storage losses of sesame and rotation crops
10. Promote the production of pulses, fruits and vegetables for improved diet
11. Provide reliable weather forecasts to all farmers, and using these for agricultural advice and for adapting to climate change
12. Have farmers keeping records of their farm enterprise and increasing their savings, improving their eligibility to bank loans and developing a more entrepreneurial attitude
13. Move towards a more participatory, farmer-oriented extension system;
14. Tailor training and coaching services to different groups (training of trainers, specific training sessions for women and youth)

15. Sensitise labourers and their employers about labourers' rights and minimum standards for working and living conditions
16. Have and use a digital information management system
17. Have professionally managed cooperatives that act as farmer-owned enterprises, engaging in collective action (input supply, storage, grading, cleaning, product development and/or marketing), for the benefit of their members
18. Improve the internal capitalisation, hardware and collateral of these farmers' organisations
19. Raise the interest of financial institutions in the sesame sector and to develop trust-based relations between financial institutions and farmers' organisations
20. Improve farmers' access to finance, both through input finance and through internal on-lending within cooperatives
21. Eliminate the practice of informal money lending
22. Develop business of small, medium and large enterprises (seeds, cleaning, oil extraction, mechanisation, new food products, ...)
23. Support the emerging industry for food, textile and edible oil production through improved soya, cotton, sesame and sunflower production
24. Arrive at contract farming arrangements between companies on the one hand and farmers and their organisations on the other hand
25. Have a level playing field for exporters and unions
26. Plan the activities and priorities for a new season from the bottom-up, instead from the top down
27. Share information on a sector-specific website and keep it up-to-date and to regularly inform sector stakeholders through newsletters
28. Collaborate with mass media agencies for producing and broadcasting radio programmes and documentaries
29. Mobilise stakeholders to rapidly and regularly assess the prevailing situation and detect urgent measures for action
30. Establish stakeholder collaboration and networks at different levels.

7.7 Priority leverage points for transforming the sesame sector

A priority sector needs a strategic sector transformation action plan

The sesame sector is directly important for 200,000 sesame growing farming households and half a million seasonal labourers and indirectly for many others finding employment or small business opportunities. The sector has the potential to become the number one export earner for the country.

Sesame is among the top priority commodities of the Ethiopian Government, but, in comparison to coffee, horticulture and livestock, it does not receive much government and donor support. Although evidence abounds that innovation and improved performance are possible if fundamental challenges are addressed, the process towards further improvement is stalled due to structural constraints.

To change the situation, it is first of all essential to have a coherent sector transformation plan, which outlines an interdependent set of policy changes, priority actions, investments and related commitments of key stakeholders. The question is how to arrive at such a sector transformation plan. Having tried for many years, sometimes successfully, but mostly in vain, it seems that only a special conference could lead to a breakthrough. This should be a retreat of at least several days of deliberations, which involves all stakeholders and most importantly includes all relevant high-level decision-makers. Without a coherent strategic plan, which has the highest level of commitment, external donor support for sesame sector development is not likely to have much value. The requirement from donors to have a coherent plan can help bring decision makers together.

Most important leverage points for change

Based on experiences and lessons learned during the past eight years, the following are top priorities for real sesame sector transformation in the coming five to ten years.

- 1. Bottom-up agro-economic planning.** Apply the practical planning tool, which was piloted in 50 kebeles and got support at regional level. The main purposes are: training needs assessment, input use planning (seeds, fertiliser, chemicals), identification of input credit needs and selection of creditworthy farmers (ready to apply recommended farming practices and good credit repayment record). The bottom-up planning (from kebele to regional level) should expand to all sesame producing kebeles.

2. **Financial literacy.** Scale financial literacy training, which has been endorsed by the MoANR. Cost recording and cost-benefit analysis improve farm management, develop entrepreneurship and increase eligibility to credit
3. **Input finance.** An input finance master plan is of the highest priority. Without a structural solution for providing appropriate and affordable input finance, the adoption levels of good agricultural practices are not likely to increase. To reduce risks, a good selection of farmers and two disbursements per season are important. Internal on-lending of marketing credit within cooperatives can be part of the solution.
4. **Financing marketing credit for cooperatives.** Commercial banks can finance the marketing activities of cooperatives, as demonstrated by the 100 per cent repayment rate and ongoing banking relations. A guarantee fund modality can have an important multiplier effect. International financial partners could be ready to contribute to a well-managed guarantee fund. Cooperatives can provide internal loans to members for financing the final stages of the production season. This bonds members to the cooperative and reduces dependency on informal money lenders.
5. **Sustainable farming systems and diet diversity.** Considering the very low diet diversity scores, especially for labourers and poorest households, it is important to have woreda action plans for improving local food production and use. These can focus on crop diversification in fields (soya bean, mung bean, sunflower and cotton) and specific attention for the production of fruits and vegetables, especially in home gardens. More attention should be given to crop-livestock integration. Livestock is kept for different purposes: source of draft power, food, cash income, savings and manure.
6. **Weather forecasting, climate change adaptation and related advisory services.** Seasonal and weekly weather forecast services are in very high demand of farmer, who are ready to pay for the service. Farmers informed about weather and related choices to be made, are better farmers. The collaboration with NMA and Weather Impact, reaching 10,000 farmers, could be scaled to all sesame farmers (and beyond the sesame zone).
7. **Fertiliser debt relief unions.** Outstanding fertiliser debts of some unions created because of top-down fertiliser distribution system is paralyzing cooperative development.
8. **Private input supply services to farmers.** The private sector (local input shops, seed producers, rental services) can take over input supply functions, with facilitation, coordination and quality control functions of the government.
9. **Farmer-to-farmer extension.** Farmer-to-farmer extension can be organised via farmers' organisations. It can help to support farmers in areas that are currently not sufficiently reached and to have an extension system that is less sensitive to high DA staff turnover. Operational activities: cascaded approach

to train farmer-trainers (certificate of competence), establishment of farmer-owned farmer field schools and/or farmer business schools, voluntary farmer production clusters (FPCs), use of tablets, telephone lines, 'plant doctors' (...).

- 10. Financing and organising appropriate mechanisation.** The sesame zone is very suitable for mechanised farming. Farmers are very interested in row planting, efficiency of field operations and production cost price reduction. Many investors and cooperatives are ready to invest in machinery. Best options for mechanisation are known. The mechanisation process has to be accompanied by lease financing and private and cooperative machinery rental services.
- 11. Market liberalisation leading to value chain development.** Realistic domestic market prices can open doors for investments, value addition and new market relations, such as contract farming. This is the only way for Ethiopia to regain a competitive position on the sesame world market and get better prices. For pulses, sunflower and cotton there are perspectives both for local initiatives and for linkages with the emerging agrifood and textile industry.
- 12. Cooperatives as autonomous farmer-business organisations.** By working together, cooperatives can provide many services to their members. Through internal capitalisation they can strengthen their business activities, such as input supply, storage, cleaning, oil extraction and marketing of sesame and rotation crops. Own capital can serve as collateral for bank loans. A key priority is to create a level playing field (fair business climate) for cooperatives and unions: direct export and import (as exporters) and possibility to have a contract farming relations with companies (as investors). Operational activities: audit, profile and assess all cooperatives, tailor training and eligibility to loans according to cooperative performance level, tailor FCA modules to sesame zone realities.
- 13. Tailored services for different categories of farmers.** Support to farmers has to be tailored to the specific needs of large, intermediate and smallholders and to those of female and young farmers. Specific modalities for supporting and assessing the performance of investor farmers need to be defined.
- 14. Reach farmers and approach family farms as small enterprises.** Continue investing in attractive training materials and continue using complementary communication channels (field guides, training modules, brochures, posters, website, newsletter, social media, films, radio, ..) to reach farmers and stakeholders. Both are relatively low cost. Consider the different roles, responsibilities and vulnerabilities of men, women and youth. Target trainings based on household member tasks and needs. Give special attention to small business opportunities for women and youth.

- 15. Digitalisation.** Design a digital information, planning, monitoring and evaluation system, to be used from kebele up to regional level, based on the experiences of SBN support programme and others. Invest in computer hardware and staff training. Digitalisation is very important for supporting bottom-up planning and communication and preparing or more ICT solutions.
- 16. ICT solutions.** Much more use can be made of ICT solutions. Mentioned options are: weather forecasting, digitalisation of information management, planning, monitoring and evaluation, use of videos, radio and tablets for extension. Other options are: digital farm information for financial institutions, mobile banking, innovation recommendation mapping, use of satellites for monitoring of cultivated area or soil moisture measurement, traceability systems, communication of price information, ...
- 17. Connecting seasonal employment in sesame lowlands to poverty reduction and food production in mid- and highlands.** Give more attention to the condition of the large number of poor seasonal labourers, who descend to the sesame zone from nearby mid and highland woredas. More attention can be given to the relations between the commercial sesame lowlands and the food insecure zones and woredas of origin of the labourers.
- 18. Sesame sector platforms/networks at different levels.** Coalitions of collaborating partners are needed at all levels. At local level (kebele and woreda), collaboration between farmers, cooperatives, office of agriculture and financial institutions is especially important. At regional and national level, there is a need for specific sesame sector networks or platforms, which are attended by all relevant stakeholders and decision-makers.
- 19. Levy system.** With a small amount of ETB per quintal, a range of sesame network/platform activities can be sustainably funded: secretariat, website, newsletters, short documentaries, printing costs of training materials, field days, regional and thematic meetings, ...
- 20. Ongoing research and innovation.** Standstill is decline in business. A sector thus has to invest in on-going (technical, financial, digital and business) innovation. This is also best discussed in multi-stakeholder platforms.

If farmers earn, the country earns

Doubling yields requires farmers' investment of 6,000 ETB/ha. For 500,000 ha, this is an investment of 3 billion ETB (75 million USD). Investment could start with a revolving fund of 10-15 million USD, which can be used as a guarantee fund. This investment would translate in extra income per hectare for farmers and additional export earnings for the country, as shown in the table below:

ECX price (ETB/ 100kg)	Farmers' extra income	Additional export revenues to the country
4,000	10,000 ETB extra per hectare Break-even at 550 kg/hectare	$500,000\text{ha} * 400\text{kg} * 4,000 \text{ ETB} = 8 \text{ billion ETB (267 million USD)}$
2,500	4,000 extra ETB per hectare Break-even at 650 kg/hectare	$500,000\text{ha} * 400\text{kg} * 2,500 \text{ ETB} = 5 \text{ billion ETB (167 million USD)}$
1,500	Break even	$500,000\text{ha} * 400\text{kg} * 1,500 \text{ ETB} = 3 \text{ billion ETB (100 million USD)}$

It is important to observe that farmers would bear some production and market risks, as extra investments may not be earned back in years of low production and very low market prices.

Increasing foreign currency earnings is an important government motivation. To make this a reality, the government should play an important role in promoting improved financing of the sector, among others through risk sharing mechanisms and innovative agri-finance solutions, such a lease financing, warehouse receipt systems and contract farming. This is a key lesson and a key message to decision makers.

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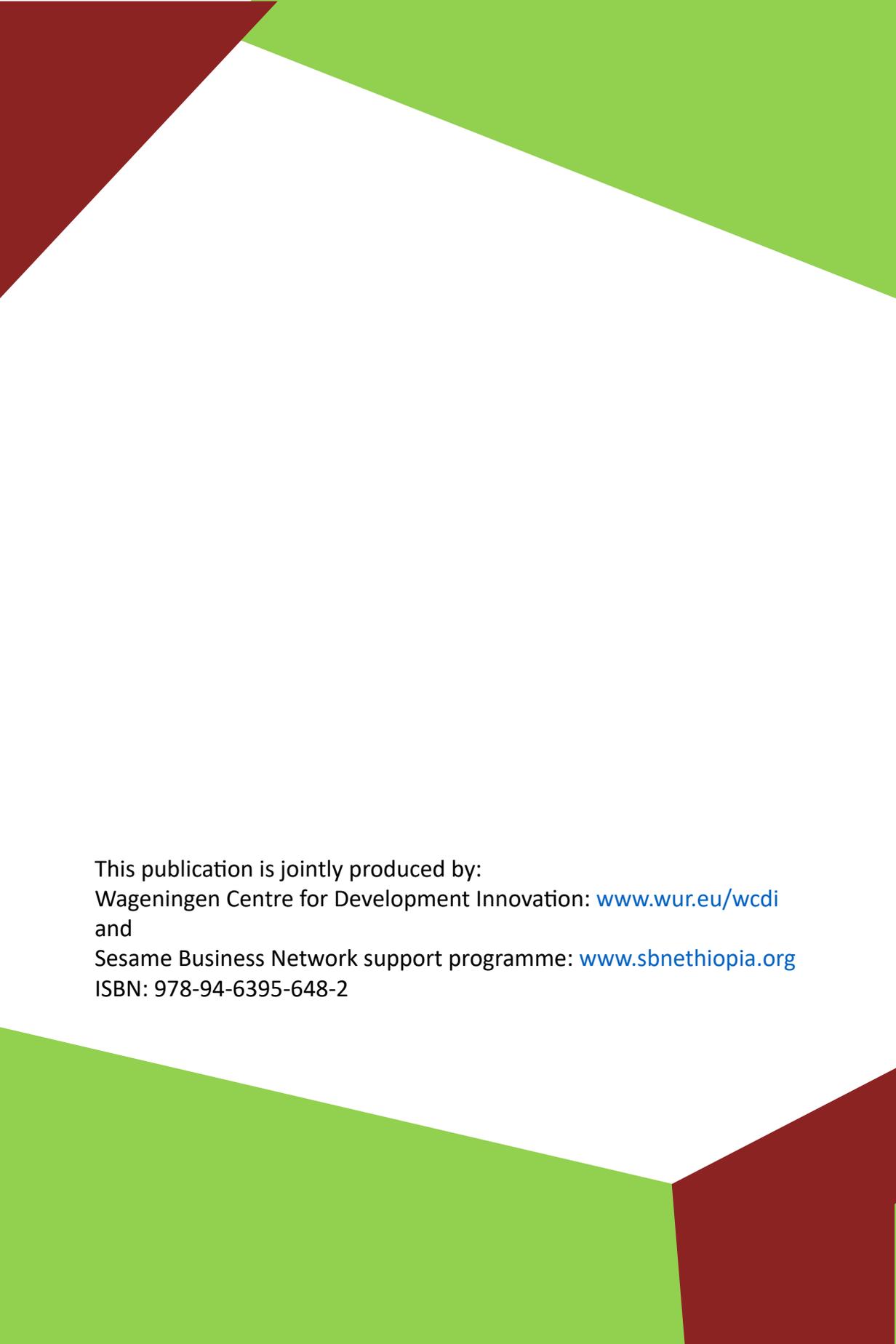
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