Case study

Seed companies and the Tanzanian horticulture sector

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Contents

Introduction

This case study looks at the potential value of horticulture for farmers in Tanzania, and the contribution of the seed sector to the growing Tanzanian horticulture sector. It is intended for all those working in horticulture, in Tanzania and elsewhere, to stimulate thought and discussion on how to foster a vibrant sector with widespread benefits.

The case study was developed by Wageningen University & Research and RCO, with extensive practical support from SEVIA and East-West Seed (EWS). EWS cofunded the case development.

East-West Seed's mission is to "provide innovative products and services that will help increase the income of vegetable farmers, and promote the growth and quality of the tropical vegetable sector". This case study is one way for EWS to explore the extent to which they meet their own mission in Tanzania, and to share these findings. SEVIA and EWS reviewed the draft version for accuracy.

A wide range of people shared openly and willingly from their own experiences, so that others might benefit. Asante sana to all!

Horticulture in Tanzania

The horticulture sector in Tanzania has two major crop groups: introduced vegetables grown commercially for trade to fresh urban markets and traditional African vegetables. This can be further divided into the domestic market (95% or more) and the export market. The top commercial vegetables grown for domestic markets are tomato, cabbage, onion, and hot pepper.
The export markets also target the high-end produce of these crops, as well as more exotic crops such as French beans and avocados.

AIV

Traditional African vegetables (AIV) include those native to Africa, as well as introduced vegetable crops that have been integrated into local food cultures and become indigenized. Popular AIVs in Tanzania include: African eggplant, amaranth, mustard, okra, roselle, spider plant, jute mallow, celosia, cowpea leaf, and African nightshade.

Demand for vegetables

The demand for vegetables, particularly traditional vegetables, is currently very low. This is largely a problem of low consumer awareness. In Tanzania, negative perceptions of AIVs has even led to a reduction in their proportion (from 20% to 11%) of total value of food in diets. Research shows that undernutrition is particularly high among low-income Tanzanian households, mainly because they consume carbohydrate-rich staple-based diets that are low in minerals and vitamins. Consumption of staple foods provides more energy to householders, but cannot adequately improve nutritional outcomes if not consumed together with micronutrient-rich foods, such as beef, fish, poultry, fruit, and vegetables.

Production

Vegetable crops in Tanzania, both commercial and traditional, cover 9% of all cultivated land area. Despite their nutritional benefits and high farm-gate values per unit of land, the production and marketing of traditional vegetables in Tanzania and other countries in sub-Saharan Africa are constrained by factors such as poor quality seeds, lack of appropriate market information and support systems, and lack of consumer awareness of their nutritional importance. The more farmers know about nutritional value, the more they tend to grow African traditional vegetables when production conditions are suitable. The larger the farm, the greater the focus on commercial crops, since these have better markets, better production, and better seeds and inputs.

Export

TAHA, the national horticulture association, sees horticulture as an export-oriented subsector because of the inclusion of flowers alongside vegetables. Ten years ago, the value of horticulture exports was approximately USD 64 million; today it is USD 700 million. The total value of the domestic market is not known. Horticulture for export is one of the fastest growing agriculture subsectors in Tanzania, growing at 11% per annum versus about 4% per annum growth in the agriculture sector in general.

Seed Companies

There are currently about 54 seed companies, of which some 30 vegetable, operating in Tanzania; almost all part of the Tanzanian Seed Traders Association (TASTA). The current value of the vegetable seed sector (excluding maize) is estimated to be USD 25 million, with anticipated growth to USD 65 million in the coming 5 years.

The tomato value chain

Vegetables are an important cash crop for many Tanzanian farmers, for two reasons. One is that they are more profitable than most other farming options. The other is that they particularly provide income in times when there are no other major crops being cultivated.

To get a sense of the potential of the horticulture sector, this case study focuses on the tomato chain in Tanzania. Tomatoes are one of the higher value crops. Any income improvements that can be seen for this sector point to the higher end of what can be feasibly achievable by farmers with horticulture production. For seed companies, the tomato sector is beginning to widely adopt the use of improved seeds. For EWS in particular, the Imara tomato hybrid variety is one of their strongest growing varieties. For them, too, the business case can be clearly inferred from this sector.

Markets

The tomato value chain is largely shaped to supply urban markets with fresh produce: this accounts for 80% of all production. Fresh local markets (10%), fresh export (5%), and processing (4%) make up the rest. Wholesalers in Dar es Salaam, working with national traders, are the main actors governing the market. They have a sophisticated knowledge of both supply and demand, and organize collection and transport to match the two and ensure low prices for consumers. Key quality criteria for tomatoes are ripeness and colour, thickness of skin, and absence of damage and blemishes. Flavour, suitability for different uses, and presence of residues are not relevant.

Figure 1: Tomato producers and markets in %

Interview with Vivian Minja, large-scale commercial grower

"I started this farm in 2018. Last year I didn't plant Imara, but I planted a different seed. Later I heard about a person in Ilula that had planted the Imara seed from East-West. I visited him on his demofarm and I saw that it was really doing well, that it had many fruits, so I decided to take Imara.

On this area I planted one and a half acres. And the one I am already harvesting from has two acres. And I have seen it truly it is a plentiful harvest, for example on the sixth of this January, I harvested 145 crates.

There is a big difference with last year, I did not reach that level of production then. I have loved it so much, and I will continue. Right now I am raising seedlings in the nursery for another harvest coming up.

On the previous tomato crops, I also did trellising. But in terms of diseases, this variety is resistant. The fruits do not get spoilt, they're all good, and I harvest well.

My neighbours are copying it. They come here and they would like me to teach them how I have done it. Therefore I teach them, and many of them have already gone to plant Imara.

Also Imara seed is cheap compared to other hybrid seed. It's just that we're afraid that seed companies are going to increase the price, because we know from experience that seeds do well the prices go up.

Because now the price is fluctuating, we keep it at maximum like 20,000 shillings per crate. There is usually a better price at other times, and then we can sell at 50,000 a crate. Maybe because other provinces are harvesting well - for example Arusha and Tabora - it has caused a price drop for us people of Iringa.

I sell to buyers from Dar es Salaam and Zanzibar who depend on the big market in Dar es Salaam. They usually come to us to buy. They decide the price.

Costs

Per acre, starting from when you plant until tying the rope, fertilizer trellising until harvest, it takes 5 million shillings. And we have received 10 million per acre.

Agriculture is for everyone. You just have to decide that this is what you want to do. You must give yourself goals and you will succeed in agriculture."

Note from editor: one crate contains 40 kg, there are 7 to 10 harvests per crop cycle

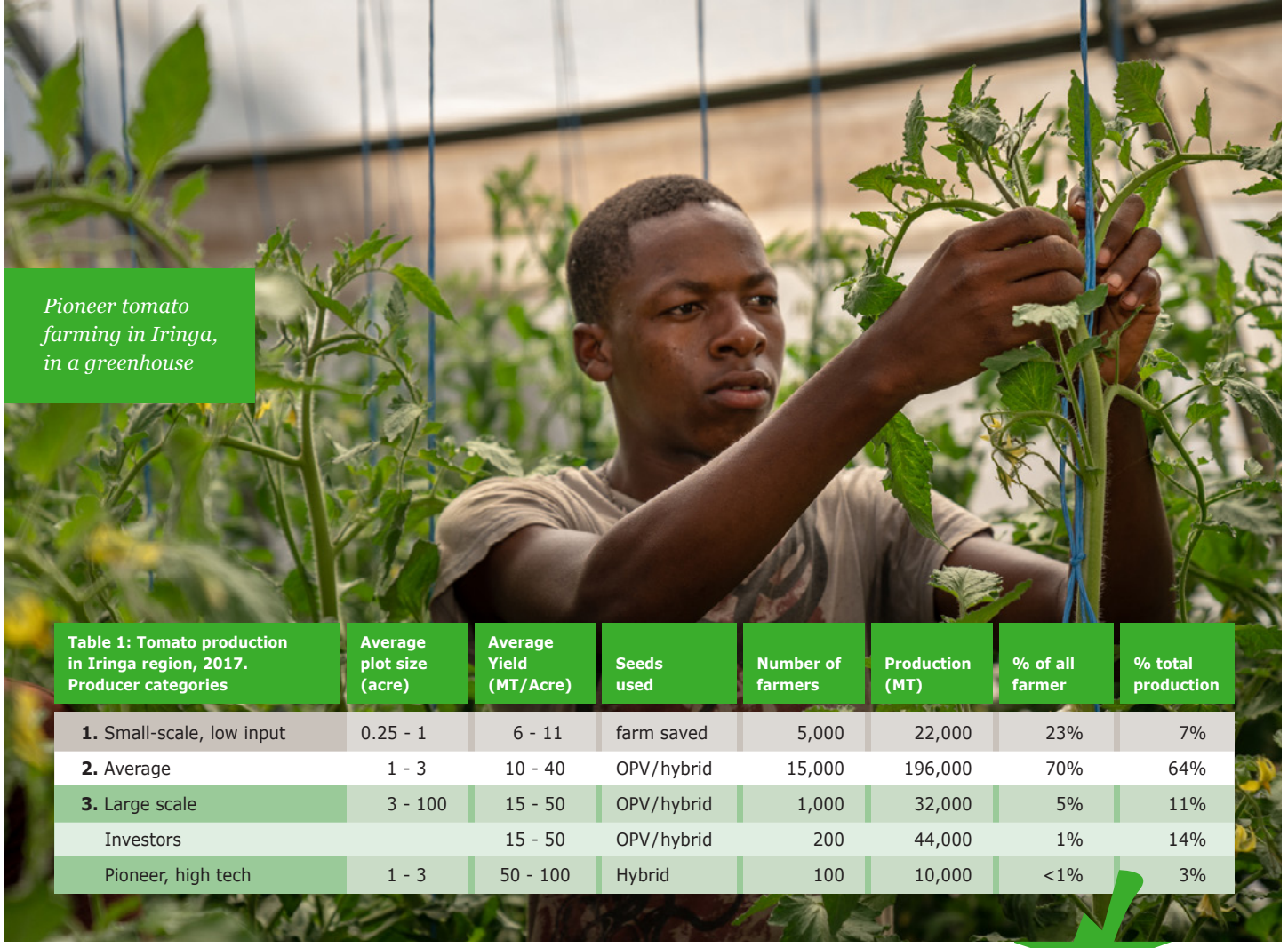
Production

There are three main categories of producers (see table). Most produce is produced by 'average farmers': commercially oriented, able to make some investment and take some risks. Their produce is sold mainly to regional and national fresh markets through middle-men and traders.

Small-scale producers who cannot invest much in production or risk-taking and have small plots make up almost a quarter of all farmers, but only produce about 7% of all tomatoes. They sell primarily to local fresh markets when possible, with home consumption as a secondary goal.

The reverse is true for the third category, consisting of three farmer segments that invest heavily in their own production or rely on informal contract farming: while these make up only 7% of the total number of farmers, they produce over a quarter of all tomatoes. The bulk of their production also goes to regional and national fresh markets. They also supply the small high-end and export markets.

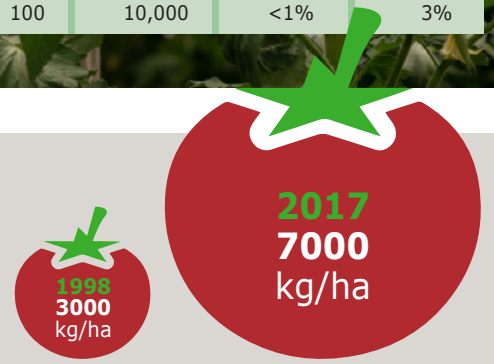
The 2012 National Census of Smallholder Agriculture indicates there are just over 85,000 tomato farmers in the long rainy season, and 50,000 during short rains. Other studies indicate each farmer generates three seasonal jobs.

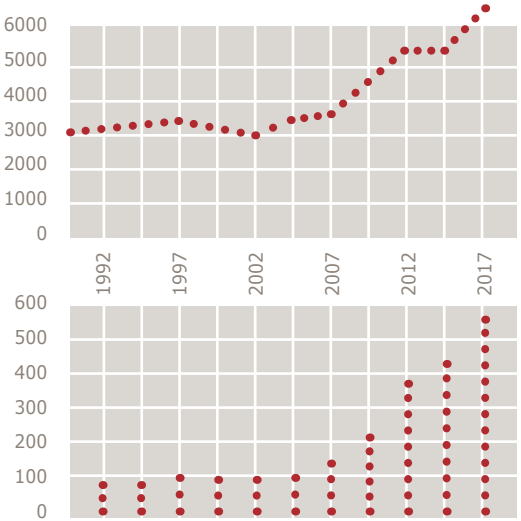


Pioneer tomato farming in Iringa, in a greenhouse

Table 1: Tomato production in Iringa region, 2017. Producer categories	Average plot size (acre)	Average Yield (MT/Acre)	Seeds used	Number of farmers	Production (MT)	% of all farmer	% total production
1. Small-scale, low input	0.25 - 1	6 - 11	farm saved	5,000	22,000	23%	7%
2. Average	1 - 3	10 - 40	OPV/hybrid	15,000	196,000	70%	64%
3. Large scale	3 - 100	15 - 50	OPV/hybrid	1,000	32,000	5%	11%
Investors		15 - 50	OPV/hybrid	200	44,000	1%	14%
Pioneer, high tech	1 - 3	50 - 100	Hybrid	100	10,000	<1%	3%

FAOSTAT figures show that after decades of consistently very low yields, there has been a rising trend in productivity since 2007. The National Census refers to average yields of around 12 T/ha in 2012, FAOSTAT indicates 7 T/ha in 2017. While this case study cannot draw conclusions regarding exact causes, in all probability a combination of availability of quality seeds of improved varieties and inputs, better extension, and growing market demands have acted as the major drivers of improvements.



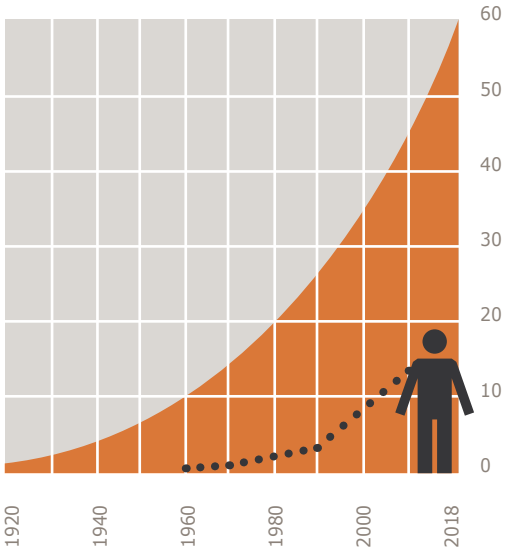


Source: FAOSTAT

< *Figure 2: Tanzania average yields in kg/acre/year*

< *Figure 3: Tanzania total production in 1,000 tons/year*

Figure 4: Total population in Tanzania (x millions), between 1920-2018 Urban population (19 million in 2017)



Market development

Interestingly, the monetary value of the tomato sector is well below that of export horticulture. Taking an average price of TSh 20,000 or USD 8.50 per typical 40 kg crate, this equals a market rate of USD 0.21/kg. This works out at around USD 125 million market value in 2018.

The growth in production is naturally a response to growing demand. The combination of the rapidly growing urban population and an increasing average income is a key driver of vegetable demand. While the growth is impressive, it translates to only 10 kg of tomato per person per year or 25 grams per person per day. Given that even less AIVs are consumed, a large growth in vegetable consumption is still needed to reach international norms for a healthy diet of 250-300 g/person/day. Farmers do not need to worry about their market for the coming decades.

Innovation

Of all the actors in the tomato sector, seed companies are the ones that drive innovation the most in the sector. They are continuously developing new varieties to meet the needs of farmers and markets. By increasing tolerance to diseases such as tomato curly leaf virus and bacterial wilt, by improving yields over longer periods, or by imparting greater tolerance to water stress, risks are greatly reduced and potential productivity is increased.

Extension

Seed companies are also the element of the value chain that put most effort into getting these innovations to the farmer, through advice on GAP to optimise the seeds' potential. Agrovets only ensure the supply of seeds and inputs, but are neither qualified nor motivated to provide supporting information. Middlemen, traders, and wholesalers focus on the logistics, but do not seem to push for change in crop choice or production methods.

Costs and benefits

The costs and benefits of tomato production are clearly distinct in the three categories of farmers. It is both profitable and unpredictable for all categories: farmers suffer major losses on average once every five years. This can be due to production pressures (disease, pests, water), but also due to price volatility. Bumper crops lead to major price reductions, which turns tomatoes from being highly profitable to loss-making. It is not clear if farmers save in good years to cover the bad years, but all but the smallest earn enough to be able to do so

For the large majority of farmers (category 2, 'average' farmers), tomato production offers the possibility of earning a decent income. From the table below, it is clear that even with only one acre, they can earn a living income from tomato production alone, at least in good years. Tomato production offers those with more land a larger income that should also allow them to deal with major crop losses once every five years without dropping to a lower income level.

Small plot field demonstrations by SEVIA show that the switch from OPVs to hybrid seeds can increase yields by a factor of 3 to 5. Even allowing for inefficiencies in replication at scale, it is clear that doubling yields is readily achievable. While the cost of production for OPV-based farming versus optimising hybrid seed based production is roughly double (1.7M Tsh/acre compared to 3.1M Tsh/acre), it can increase sales by 6M Tsh/acre.

For the top segment (category 3) of producers, there is no need to question the very high income potential of tomatoes and other high-end horticulture crops. Investing in tomato production makes good business sense, even with the threat of regular crop losses. Even though Wageningen University data estimates profits for large farmers at 9M Tsh/ha/year, demonstrating the uncertainty, this is still very profitable.

It is mainly the very small farmers (category 1) with the lowest productivity for whom tomato production alone does not offer a pathway out of poverty. Tomato production only covers 15% of a living income, and is risky. However, it can play a valuable role in spreading income over the year as part of a household income strategy. Three key factors need to be in place to take each step from category 1 to 2 to 3: land, knowledge, and capital. Firstly, farmers need to have access to land. They then need to know how to make more effective use of high-quality seeds, water, and agrochemicals to achieve potential yields. Finally, they need to have the capital (owned or borrowed) to make the necessary investments, and they need to be able to bear the risk of losing those investments.

Discussing tomato prices at Arusha market

Living income

In 2017, Wageningen University & Research used field data to estimate that a living income for an average male adult in Tanzania was about 2650 TSh a day, or 3.9M Tsh a year for an average household of two adults and three children.

While this living income is not very large, it does cover essential expenses. It can be converted to USD using the World Bank 2017 price point parity rate of 834 TSh/USD. The living income is an internationally recognised measure of the real cost of living.

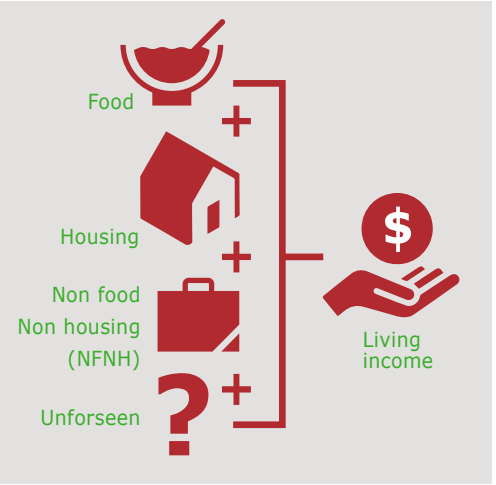


Table 2: Farmer profitability (SCL tomato study)

Small-scale, low input tomato farmers	
Total cost per acre	960,000
Of which inputs	660,000
Total sales	3,000,000
Simplified gross profit (SGP)/acre	2,040,000
Average area planted with tomato (acres)	0.25
Average household SGP from tomato	510,000
Total household income	3,800,000
Tomato as % of total HH income	20%
Income gap	-69,000

Large-scale tomato farmers	
Total cost per acre	6,200,000
Of which inputs	2,500,000
Total sales	25,000,000
Simplified gross profit (SGP)/acre	18,800,000
Average area planted with tomato (acres)	10
Average SGP from tomato	188,000,000

Pioneer farmers in high-tech greenhouse production	
Total cost per acre	8,000,000
Of which inputs	5,000,000
Total sales	27,000,000
Simplified Gross Profit (SGP)/acre	19,000,000
Average area planted to tomato (acres)	1 - 3
Average SGP from tomato	19 M - 54 M

Note: there is a large bandwidth in profitability calculations, figures above are indicative averages from the SCL tomato study.

"Average" tomato farmers | Cost and returns using OPV	
Total cost per acre	3,400,000
Of which inputs	1,100,000
Of which hybrid seeds	23,000
Total sales	6,600,000
Simplified gross profit (SGP)/acre	3,200,000
Average area planted to tomato (acres)	1 - 3
Total profit from tomato	3.2 M – 9.6 M

Cost and returns using hybrid seeds	
Total cost per acre	3,650,000
Of which inputs	1,350,000
Of which hybrid seeds	250,000
Total sales (doubling yields)	13,000,000
Simplified gross profit (SGP)/acre	9,350,000
Average area planted to tomato (acres)	1 - 3
Total profit from tomato	9.4 M - 28.2 M

Interview with TAHA's director Jackie Mkindi

"The horticulture sector is the fastest growing sector."

Read the complete interview transcript

TAHA

"TAHA is a private sector, member based organization and we are advocating for the growth and competitiveness of the horticulture industry at large: floriculture, vegetables, foods, spices and herbs and roots and tubers. Horticulture is an export-oriented subsector and what we export is mainly vegetables and flowers, especially to international markets.

Our vision and mission is to make the horticulture industry more competitive and profitable and participating in actually driving the nutrition and food security agenda in the country.

We are addressing three tricky strategic objectives, these are:

- **Technical capacity building**

We have agronomists who are paid by TAHA and they work with farmers in the rural areas and also in urban areas driving technologies for improving production and productivity.

- **Market access**

We invest a lot in that [broadening market access] because without a reliable and profitable market, you know, even if you promote production and farmers have increased the productivity, you have not actually helped them in sorting out their problem. So we link farmers to domestic, regional as well as international markets.

- **Business enabling environment**

When I talk about the private sector, I am referring to farmers who are the majority player in the value chain, but also to exporters, processors, input suppliers or service providers. So our responsibility there is to make sure that the environment is truly conducive for these companies, to survive and thrive. Be it a policy issue, regulatory framework issue, operational issue, they all come to our table and we find the space within government systems to actually find solutions for such issues in a way that is a conducive environment.

TAHA's structure

We have two divisions. A commercial wing and development wing. The development wing is basically the association; it is not for profit. In this wing or division, we ran quite a number of projects and programs with our development partners.

The other wing is commercial. We formulate our business to address a particular gap. The industry was suffering a lot from how to get their produce to the international market. So we started TAHA Fresh as a very small entity addressing only the air freight agenda.

Today, the company has grown and we have almost five business lines within the company. We are doing sea and air freighting, but we also do cargo handling, cargo management and consolidation at the ports and airports. We also do what is called quality trucking. Now we are now building another entity, it's a new comer in the sector focusing on orange-fleshed sweet potato production and export, but we are also targeting domestic market. We are investing in that area simply because of like the nutritional and commercial value of that crop.

Poverty alleviation

We do have lot of evidences that horticulture is a major contributor towards poverty alleviation but also towards attaining the right levels of food and nutrition security as well as income generation. This can be measured in how farmers are able to access quality education for their children, access better health facilities for their family and better utilize quality food. A good example is Zanzibar. In 2013 Zanzibar was importing 80% of what it was consuming in terms of food and vegetables. Today, as we speak, Zanzibar is exporting fruits and vegetables to mainland. Its hard to believe but it is actually in the data of the Ministry of Agriculture. It came in the report of Ministry of Agriculture of Zanzibar.

Hybrid seeds

If you give them comparative information, you find that most of the farmers who have graduated from our classes, go hybrid and they won't feel the extra cost, because they are actually gaining back what they've invested initially. So yes, there are quite a number of issues and my experience is, when you pick an issue and you identify the right button to press in the government, you will get a solution to that problem. But if you face the problem and you lament, complain, or lose hope, you will not get answers or solutions.

Government role

For any industry or sector to develop, it must be driven by the private sector and enabled by the government. So the key role of the private sector in the transformation of horticulture is sitting in the driving seat. As they say, those who wear the shoe know where it pinches the most. You do not sit and complain, the government is not doing this, is not doing that. You have to drive it forward.

Government has two roles, a regulatory role and a trading facilitation role. In our case as an industry, we have been helping our government strike that balance not only by informing the government on what is transpiring in the sector. We also build the government system capacity to understand the industry well. So yes, there are quite a number of issues and my experience is, when you pick an issue and you identify the right button to press in the government, you will get a solution to that problem. But if you face the problem and you lament, complain, or lose hope, you will not get answers or solutions.

Extension services

If you would ask me to mention one serious gap in our government system, I would say it is extension. We do not have horticulturalists working in the government to extend services to the sector. We as TAHA try for example to build the capacity of some of them. You train them but they cannot go to the field, because you have to facilitate them to go to the field. They are not mobile for example. So it is one of the areas that really needs to be reinforced. It's a serious challenge. So the only system working in the horticulture industry in this country now is private sector extension, only private sector.

Price fluctuation

We are trying to address price fluctuations in the sector by training our farmers to produce off-season. So every year we produce a brochure that shows how most common crops trended that year. The brochure also summarizes the right time to put the seed in the soil and the right time to harvest and it also gives an indicative price depending on the information we gain the previous year.

So we have this program and it has helped quite a number of farmers. However, for you to follow that kind of program, you really have to have a reliable supply of water because you ought to grow outside the rainy season. But tomato farmers, they suffer a lot because most of them put their seeds in the soil at the same time before the rainy season, expecting irrigation from rain."

Eggplant harvest near Iringa

The case for seed companies: East-West Seed

Operating in Tanzania since 2008, EWS runs a flower seed production and vegetable seed sales pillar. This case study deals with the vegetable seeds. Initially there was collaboration on breeding with Rijk Zwaan, since 2012 they have amicably chosen to focus on their distinct markets. EWS focuses on higher-volume lower-margin seeds for smaller scale producers growing mainly in open fields for local or national markets. Rijk Zwaan focuses more on greenhouse production for high-end local and international markets.

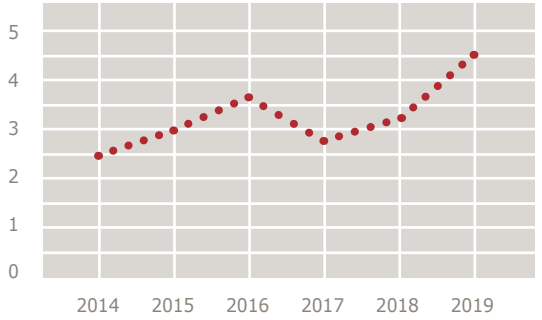
EWS has introduced 28 new varieties to the market in recent years and aims to release about four new varieties every year. Varieties are bred in Asia but final stage of product selection and development is performed in Tanzania to ensure suitability for the local market. EWS seed is sold throughout the country through a network of agrovet dealers.

The healthy growth in its annual turnover over the past five years has validated the long-term investment strategy of EWS. Initial investments in building up an appropriate offer of varieties, brand recognition, and sales networks are leading to growing sales, with an increase of 25% in 2018, and projection of over 35% in 2019. (2017 is an anomaly due to altered internal procedures.) This growth is also seen for Rijk Zwaan, which started from a much smaller turnover and has seen a near ten-fold increase over the past seven years. EWS is currently one of the larger players in the market.

A staff of about 20 is dedicated full-time to product development, promotion, and sales. As with all commercial seed companies, EWS has its own team of promoters across the country. Seed companies know that there are almost no other players able to reach farmers with sound information and reliable demonstrations, and that farmers only invest in change they have seen, making field demonstration a must. Seed companies, most of which are foreign, see tremendous long-term potential for the Tanzanian and African horticulture sectors and are investing for the long term. They are fully aware that their own success depends on a vibrant horticulture sector with farmers making a good living. This explains their willingness to invest in the precommercial conditions that help ensure the sector as a whole thrives.

Figure 5: Vegetable seed sales EWS (Tsh x 1 billion)

EAST-WEST SEED



Interview with Coen Everts, general manager of East-West Seed

"East-West started in 2008 with a flower seed production site in Moshi in Tanzania, and in 2012 we started our vegetable seed sale activities. I was appointed general manager in 2016, so I have been here for the last two years. We're trying very hard to bring the brand to the next level in Tanzania. The next step would be also to really breed for the African market and develop the perfect varieties for this environment, but currently we're strongly promoting and selling our existing portfolio of products, which are very suitable for the Tanzanian market.

Opportunities

I think the main opportunity is a total shift in the market from OPV to Hybrid. So it will see a significant growth in the hybrid seed sales and that's the segment of the market that we're mainly interested in. And we also sell OP seeds, but the future and all of our investments and efforts in promotion, go into the adoption of hybrid seeds. That market has rapidly developed over the last ten years.

Challenges

The biggest challenge is to convince the farmer that spending a little bit of extra money on a hybrid seed is actually a sound investment. We have a lot of stories that validate that statement … hybrid seeds in other continents, in Europe and Asia … are a no-brainer. Everybody has adopted hybrid seeds. In Africa, we still need to convince the farmer to invest a little bit of extra money, and work with the hybrid seeds.

OPV versus hybrid

As a farmer, it's a much better business case to work with hybrid seeds than with OPV. I mean, you have a little higher input but you have much higher yield. So it's an easy calculation. Our strategy is to show that to the farmers. We work with SEVIA as a local partner and their slogan is 'Seeing is Believing'. The farmer really needs to see the benefits of improved seed varieties and better farming techniques and irrigation. So through showing the farmer what can be achieved with the proper seed, we are targeting much higher sales for us.

SEVIA

We've engaged in the SEVIA project, which is a cooperation between the University of Wageningen, the Dutch government, Rijk Zwaan, and us. The aim is to uplift the potential, basically the technical skills, of Tanzanian farmers. So it's really a knowledge transfer principle of preparing the farmer to get ready for better farming techniques using hybrid seeds. SEVIA is all about knowledge transfer: they teach techniques to the farmers using comparison fields, one technique versus the other, or having spacing techniques or they compare sites to show the farmer what the effect of certain farming practices are. Their objective is really to teach farmers better farming skills.

EWS promotional farms

The promotion activities of East-West involve showcasing perfect demo sites of high-yielding varieties. And it's for a good reason, because promotion is really a sales activity,

whereas SEVIA and knowledge transfer is precommercial, as we call it. It's like a flagship demo where we show what the variety can yield to the farmer, under perfect conditions with proper management.

Developing the market

East-West is a patient investor. If we enter a market, we don't expect immediate yields or immediate profits. We know that uplifting the smallholder farmers takes time, but of course we are not a philanthropic company but a for-profit company. So, in the end, we need to make a profit in all markets we engage in, but that does not have to happen overnight. We have some time to prepare, develop and grow the market, and slowly we grow and benefit, as the farmers uplift their livelihoods

The future of EWS in Africa

We see that a lot of conditions that exist now in Africa are similar to the ones that existed in Asia, when we started in the mid-80s.
So yeah, there's a lot of countries that we are looking to develop markets in. The reason we started in Tanzania is purely because we had a production site for flower seeds and we added on the vegetable seeds business. But there's a lot of other countries in Africa where we're actively looking for markets to enter, and we've already entered a lot of markets like Nigeria, Uganda, Ethiopia, and Ghana.
I think there's a very bright future for East-West in Tanzania, because of the total market which continues to expand rapidly. There are estimates by TAHA that the market, because of hybridization, will grow with 15% in value per year from the current USD 25 million to USD 65 million in 2025, which is only seven years from now. So there's a substantial increase in the total market and, at the same time, I am truly convinced that we have an excellent portfolio of products. I personally believe that in seven years only a few truly good seed companies of the existing 25 - in 2018 there are 25 vegetable seed companies in this rather small market of USD 25 million - will remain, of course East-West being one of them."

Changing farmer practice through demonstration: SEVIA

Within Tanzania, there is extensive experience with demonstration-based capacity development for horticultural farmers. In the absence of a strong government presence, over the past ten years there have been at least six larger programs targeting horticulture. SEVIA is one such example that follows a similar logic and approach as many others, and which is typical in terms of what is achievable. One unique aspect of SEVIA is that it arises from two seed companies and a donor investing together in a collaboration with a university.

The range of activities undertaken by SEVIA shows the broad scope of most horticultural support programs: training centres, publications, variety trials, research demonstrations sites, and professional training. All of these focus on demonstrating to farmers under real-life conditions.

The big question is: how effective is this way of working? How much of it is actually adopted by farmers? The table below provides a credible indication of what can be achieved over a period of three years. Doubling the adoption of better production practices is within reach, and much larger jumps are also possible. A notable area of success is the leap in better pest and disease management: initially no-one did this, and now nearly half of farmers are consciously doing it. This gives much hope that the sector will grow in a responsible manner, if the right extension is provided. It will be necessary to keep tracking long-term adoption, and no doubt regularly providing refreshment training.

Table 3: SEVIA outputs

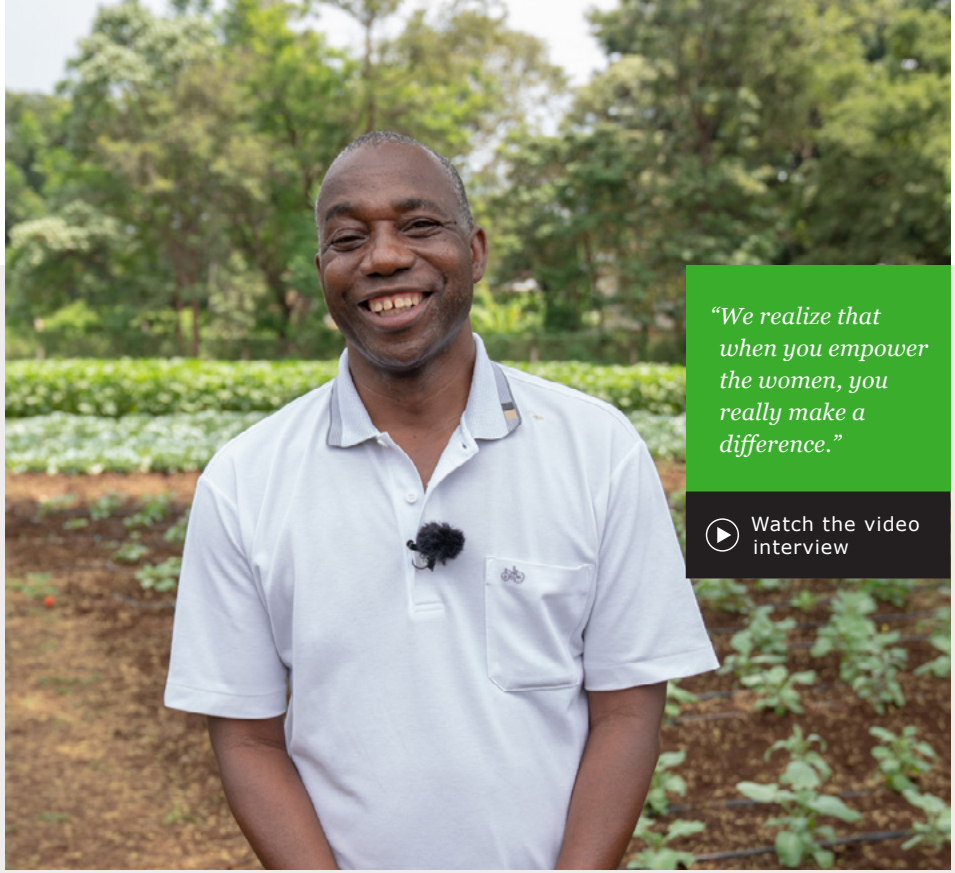
SEVIA outputs	Total 2014-18	Target 2020
Training centre set up	1	1
Farmers reached[1]	40,000	30,000
Demonstration sites[2]	980	1,000
Sector professionals trained[3]	1,040	1,000
Technology projects	42	50
Varieties tested[4]	144	100
Crop booklets, pamphlets	14	40

Table 4: Adoption rates of better practices

Area: Meru (sample 120 farmers)	# using technology before SEVIA	# using technology after SEVIA	% increase
Variety selection	34 (28%)	65 (54%)	211%
Fertilizer management	2 (1%)	30 (25%)	1067%
Cultural management practices	14 (47%)	47 (39%)	238%
Pest and disease management	2 (1%)	57 (47%)	960%
Farm records	5 (4%)	50 (42%)	1000%
Irrigation	8 (7%)	41 (34%)	973%
Green house production	1 (1%)	11 (9%)	1100%

[1] *Through training, field days, consultancy, and agricultural fairs*
[2] *19 districts in 11 regions*
[3] *Including training assistants (lead farmers), college students, agrodealers, and extension agents*
[4] *Cabbage, eggplant, tomato, sweet pepper, okra, Chinese pepper, onion, watermelon*

Interview with Elijah Mwashayenyi, director of SEVIA



Horticulture in Tanzania

"We see a lot of potential in horticulture in Tanzania for a number of reasons. If you look at this population of Tanzania at the moment, it stands at 55 million. Horticulture has a lot of potential for increasing not only production, but also productivity. So we see it in that sense - satisfying this big developing population.

Focus on smallholders

There are very few large-scale farmers in Tanzania. We assume they know where to get information. But the smallholder farmer needs support, and we feel by providing support, you actually get the change. At the same time, we at SEVIA are not really looking at the poorest of the poor. If you really work with the poorest, you might have a good demo but the adoption rate is low. So we look at those smallholder farmers who have the potential to raise agricultural productivity and production to the next level.

Women

We realize that probably more than 60% of the work done on the farms is actually done by women. So we have a special focus for women, not just as individuals but also in women's groups. We realize that when you empower the women, you really make a difference. 'Empower' in terms of the training in agricultural production, but also 'empower' in terms of market awareness.

If we look at the statistics for training, we find there are more men attending training than women. Basically because the husband will say to the wife, oh, there's training at SEVIA. I'm going for training. He is in control of the family and there's very little we can do about that. Yes, we do encourage women but those are some of the realities that you actually face.

Youth

When you look at agricultural production, historically it's always associated with the older generation, while young people want to go to the bright lights in town, hopefully looking for a job, but the jobs are also difficult to get. One thing we have noted about the youth is that technology attracts them. And so it is with vegetable production. When you talk about production with drip or production in greenhouses, it brings a new perspective to vegetable production and it tends to attract young people.

Training

There are farmers who will say they want to go into vegetable production on a commercial basis. Then we put them through complete training for a minimum of three days, maximum five days. We are really talking about someone who goes through training from the production planning to the necessary management, transplanting, fertilization, pest and disease management, post-harvest handling, and marketing.

That is contrasted with farmers who come for something very specific, like controlling tomato diseases. A lot of the training that we do here at the station is based on what the farmer requests.

Extension services

I think if you look closely at the different organizations offering extension services,

some of the things that we do are actually similar, but if you look at the number of farmers in Tanzania, we need more boots on the ground. So the more we are, the better.

We come with a small demo on 250, 300 square meters. Other projects come with a package and say, "we've brought you technology, follow this technology." Our approach in SEVIA is different. We bring technology, better varieties, and ask the farmer "you see what is best for you."

Our 'seeing is believing' strategy is not revolutionary as such, because others have also been doing it in their own way, but we are one of the organizations that is actually at the forefront of bringing that comparison to farmers.

Government role

I see that the government is in the right position to sustain what we are doing. That's why, for example, in our program, we train the government extension officers, because we know they are always going to be there. We include them, we collaborate with them, whether it's in our field days or trainings and so forth. So again, that actually brings the sustainability from the government's side.

Improved varieties

Among improved varieties, you will find hybrids as well, but you also have improved open-pollinated varieties. Rijk Zwaan focuses on hybrids. East-West focuses on both hybrids and open pollinated varieties. So we actually combine both. Naturally, within the improved varieties, the hybrids will tend to give you a higher yield and better disease resistance, so a farmer actually uses less chemicals.

Tomatoes

In Tanzania, tomatoes are probably the most important vegetable volume-wise in terms of sales. Tomatoes go with everything that you cook. If we are talking about the risk in terms of pests and diseases - oh yeah, tomato gets everything. You get a lot of pests, you get a lot of diseases, but there's the other story of the tomato. Every farmer wants to grow it because they know every household will need tomatoes in the kitchen. And hence that's why you find that, despite these challenges, farmers go for it.

Seed companies

I see seed companies as the foundation material for horticulture development, because without seed, we're stuck. Part of the lack of potential is because of poor-quality seed. We need those companies like Rijk Zwaan and East-West that can actually unlock that potential by providing farmers access to that quality seed.

Poverty reduction

It's very difficult for a six-year project, with a certain amount of funding, dealing with a certain range of crops, to come back and claim that we've reduced poverty. It takes more than just a project, but we feel SEVIA contributes for a number of reasons. One of the reasons is, you know, if there's one area that can really be improved, it's actually vegetable production.

Whenever we talk about food security and so on, we address malnutrition. When speaking about malnutrition, people unfortunately end up talking about maize and cassava. It's actually the vegetables that we need in order to fight the poverty and malnutrition that we are seeing and there's potential to improve that.

The next phase

Now, towards the end of the project, SEVIA finds itself in a re-orientation phase. Most of our agriculture team is going to be absorbed by our partners. The majority will continue working on knowledge transfer, but with our partners. There are others who will go to other organizers - that's still fine, because it doesn't matter whether they are in our partner companies or in another company, as long as they're still doing knowledge transfer. As for the centre, there is a general agreement that it should continue. Now we are in discussion about how to finance it.

As for the centre, there is a general agreement that it should continue. What's in discussion now is the financing of it."

Key opportunities

It is clear that the horticulture sector in Tanzania is growing rapidly and is generating great value for the country. It offers a growing supply of vegetables to help feed a fast-growing and increasingly urban population, and it helps a growing number of producers to generate a decent income. The following opportunities for the sector recur in many of the stories we heard.

Farmers

Almost every farmer has the opportunity to make use of the better seeds, inputs, and production possibilities that are on offer. Steady and strong growth in demand, and reasonably effective supply chain connections, will ensure that farmers will also be able to sell their production increase, usually profitably.
The opportunities that apply to farmers depend on the segment they are in.

Farmers in Segment 1 (25% of all farmers) could all use commercial OPVs - in particular those with greater resistance to diseases and pests - and could all adopt a number of low-cost production technologies. Both can be done without much greater investment, and can help stabilise production while reducing costs.

Farmers in Segment 2 (70% of all farmers), who are small-scale but strongly oriented towards commercial production, increasingly use the available higher-quality seeds, combined with more sophisticated production processes. The higher investment costs involved are within their reach and their risk-carrying capacity, and can lead to significant production and income jumps.

The top category can target its investments to greater sustainability, in combination with greater productivity. Horticulture is a long-term game, and by pushing for safer, more efficient production practices, they can help build the long-term reputation of the sector. Their ability to spread planting and harvesting dates across their larger holdings can be of increasing value to themselves in profiting optimally from off-season production. In doing so, they can also help flatten peak supply and help stabilise prices for all.

For all farmers, there is much to be explored regarding how to commercialise traditional vegetables. In the coming years, there will be ever-growing interest in these vegetables from the government's side for the sake of healthy diets for the growing urban population. By figuring out now how to supply these lesser known crops, farmers can diversify their own long-term markets.

To ease the change, this can be done in three steps:

1. use high-quality OPVs,
2. adoption of improved production techniques, and
3. use of hybrid seeds and appropriate inputs for the most profitable crops.

Rijk Zwaan fieldday in Arusha

EWS

For EWS and other seed companies, there is a major market developing through the potentially large numbers of farmers moving to high-quality OPV and hybrid seeds. Seed companies are well aware of the markets and the production cycles of horticultural farming, and are developing and introducing appropriate high-quality seeds that allow year-round horticulture production of diverse crops for many farmers. This case study fully confirms the great potential growth of the horticulture sector in terms of volumes and its transition to ever higher-quality seeds.

Good collaboration with all farmer extension programs is clearly of great value. Seed companies can provide the right seeds that farmers need to be aware of, while the programs can cover the commercially difficult-to-justify costs of training large numbers of farmers. Joint collaboration on what crops and areas to focus on could support the effectiveness of such programs in reaching those farmers who are most likely to be able to adopt GAP based on high-quality seeds.

Seed companies should have a ten-year horizon, given the time that is needed to develop new varieties. Their current efforts to breed new varieties of traditional, nutritious crops connects well with the long-term need for food systems that produce healthier food.

Government

The government could support improvements in the vegetable sector in a deliberate manner, and thus ensure a more productive and profitable sector that can meet ever-growing consumer demand while generating valuable income tax. A targeted support program using proven demonstration approaches, such as that developed by SEVIA, and that draws on the commercial motivation and expertise of the private sector, could be supported nationally by the government. Over the coming decades, this could also ensure that the sector uses environmentally safe production practices.

The government will also need to play a leading role in the move to more nutritious food. The current focus on starchy foods, such as maize and rice, will need to be complemented by a strong push for more vegetables, next to more protein-rich food. The government can drive demand while also stimulating the precommercial investments that allow a largescale, viable, traditional vegetable supply chain to develop and become capable of feeding growing urban populations. A different strategy for small-scale producers, also focusing on traditional vegetables but with a low-risk approach, would do much to safeguard food and nutritional security, while really helping the very poorest.

The government can also play a role in supporting farmers to aggregate produce and be more easily accessible to traders. The current market arrangements will readily pick up from that point.

Key challenges

Farmers

Growing markets and the demonstrated profitability will inevitably lead to an expanding sector. It will be increasingly important to use chemical inputs and water both carefully and effectively. The current lack of knowledge about what pesticides, fungicides, and irrigation are needed when - especially when combined with the understandable fear of losing an entire crop - leads to their inappropriate and excessive use. This is costly to the farmers and costly to the environment.

Farmers will also need to work out how to avoid bumper crops and plummeting prices. This implies better spreading production throughout the year. It also implies introducing some kind of forecasting of markets, instead of the current norm, under which most people simply plant what did well last year. The current processing opportunities need to be more reliable and better priced to offer a real answer to production gluts.

Segment 1 farmers in particular cannot afford the current rate of major crop or market loss once every five years: they depend on a reliable income from vegetable production every year. In the longer run, diversifying into larger-scale production and selling of AIVs will help spread risk and income, since AIVs have a much longer and different cropping season.

EWS

Seed companies like EWS will need to carefully consider how to balance their marketing and demonstration efforts. Such companies will continue to play an important role in motivat ing farmers to make more use of better seeds, in the absence of effective government work in this area. However, these efforts are costly and must come out of the seed price. The tendency might be to focus mainly on variety promotion, since this gives a direct return on investment. However, they must remain involved in general improvement of profitable and sustainable practices - because they have deep expertise in these areas, and new varieties also implies use of more inputs - but need partnerships to co-fund these precommercial activities. EWS Knowledge Transfer program is a good example of both roles getting the necessary attention.

In developing their portfolio of new varieties, seed companies will need to continue to bal- ance a focus on high-return hybrid seeds while ensuring availability of good AIV varieties. This will serve the farmers' and consumers' needs and will help build broad brand credibility.

Government

The Tanzanian government has an essential role to play in providing effective, structural extension support to the horticulture sector. Farmers need neutral advice and support, in which the farmers' needs are central. A key challenge for the government is to build a targeted and effective extension program, starting from its current near absence. Segment 1 farmers in particular will need a dedicated and different kind of extension and marketing support than is now usual. Such support must fit the limited assets and risks of these farmers, and not push them to aim for unobtainable futures as commercial farmers. Home consumption of vegetables is also a higher need, and implies focusing on different crops and yield reliability, rather than on riskier yield maximisation of more commercial crops.

The government must also take care not to "kill the goose that lays the golden eggs" or to "pull up the high-yielding tomato plant". The temptation can be to heavily extract earnings from commercial farmers, seed companies, and other parties in the supply chain. While of course they all must pay reasonable taxes, they also need to see value for their payments such as irrigation or good extension. The government also needs to ensure that legislation and policy embraces everybody's active contribution to a strong horticulture sector. Seed companies play a key role in raising productivity and profit in the sector; they need a business climate that encourages them to continue with long-term investments that benefit the country.

Lessons learned

A (more than) decent income is possible for most farmers

Farmers with at least one acre dedicated to tomato production (70% of them) are commercially focused and invest in tomato production as a key income generating activity. A single acre of open field growing, following good agricultural practices and with optimal use of inputs, contributes significantly towards a living income. Once the farm grows in size, it becomes possible to make a good living from horticulture. However, the risk of crop losses and volatile prices does mean that farmers need to save for bad years.

For the small-scale farmers (25%), the tomato represents a valuable cash income at times when there is little other cash income. However, there is not much ability to take risks in tomato production. Small-scale farmers can only invest minimally in seeds and inputs but need to benefit maximally from them. The combination of low productivity with small land holdings means that such households achieve very low yields per acre.

Impact on Poverty

For semicommercial and fully commercial horticultural farmers (tomato growers categories 2 and 3), good horticulture is definitely a pathway out of poverty, and much more than that. However, this also depends on the production area. At the lowest end, smaller farmers with one acre of open field commercial production can earn a living income, and are in a position to make significant strides towards that goal with better practices and seeds. From two acres and up, it is possible to earn twice or three times the living income.

Yet land size is not the key limiting factor. Pioneer farmers adopting greenhouse production are demonstrating that making better use of less land can increase profit by a factor of six.

For the poorest small scale farmers, it is impossible to invest in more intensive, higher-risk tomato production. With incomes continuously below the living income, they cannot afford the risk of losing any larger investments. Vegetable production for local markets does offer value, but is not in itself a pathway out of poverty.

A viable and productive vegetable sector is essential to ensure sufficient, affordable nutritious food for all. A vibrant sector, such as tomatoes, creates the demand for and thus supply of high quality seed and other inputs needed to feed everyone.

A profitable, responsible sector meeting the national needs is possible

Multiple horticultural support programs have demonstrated that it is possible to provide high-quality training and support the numbers of farmers currently producing horticultural crops in a commercial or semicommercial manner. There is also a clear willingness to adopt better practices. A structural support program that is properly focused seems

both possible and affordable.

Better production knowledge enables farmers to take advantage of improved seed varieties with increased vigor and yields as well as tolerance to disease and stress. Products also better meet market demands. While there is clear benefit for local farming communities, there are no quick or direct wins for companies investing into precommercial activities. Multistakeholder partnerships and public investment are thus needed to scale needed to catalyse the development of Tanzania's vegetable market.

From the perspective of national food security, much can be gained easily in terms of total national production through a shift to better cultivation practices using high-quality seeds. Doubling, and even tripling, total production is readily if it becomes a focus of large-scale government support. Tanzania can certainly justify investments in the horticulture sector as a way to a) stimulate a healthy economic sector and b) ensure there is sufficient affordable vegetable availability for a rapidly growing and increasingly urban population.

The domestic market is key to large-scale growth. With 95% of produce being sold nationally, and with a growing domestic demand from urban populations, the greatest growth will lie in domestic markets. The export market is also a very strong growth sector, but it will be particularly of value for the small group of highest-end producers.

Reliable seed companies are critical to the vitality of the sector

The great potential for the horticulture sector to meet the needs of Tanzania in providing affordable healthy food to a growing population requires reliable, high-quality seeds (whether OPV or hybrid). The case has been clearly made that seeds that are more resistant and productive, while being marginally more expensive, help most horticultural farmers to substantially increase their income.

Seed companies play two roles that are critical to the vitality of the horticulture sector. Firstly, they are an essential source of innovation in the sector. New varieties with new possibilities push product and production innovation throughout the sector. This renewal is an on-going process driven by seed companies on-going investments in variety development.

A company like EWS, which is specifically building a portfolio of seeds suitable for smallscale producers, makes a very big difference to small-scale farmers. Secondly, for the time being, seed companies are among the more important sources of extension support for farmers. Apart from NGO programs promoting GAP, no other actor in the sector consistently invests in demonstrating what's possible, and what needs changing, to farmers throughout the company. All of this is obtained for farmers for less than 5% of their total production cost, while it makes it possible to double and triple yields.

Annex

Thank you

The willingness to share openly and thoughtfully by everyone we spoke is highly encouraging. Such a spirit of working together for everyone's benefit bodes well for the Tanzanian horticulture sector. Asanta sana to all we had the pleasure of talking with (in alphabetical order by first name):

Abdallah Salah, farmer; Alpha Mgimba, agrovet dealer; Bhimrao Ingole, Darsh Industries; Bob Shuma, TASTA; Coen Everts, EWS; Deodatus Temu, EWS; Dhivendra Gudka, agrovet dealer; Elijah Mwashayenyi, SEVIA; Eluiteli Mtule, farmer; Emmanuely Lyombi, SAGCOT; Epaphras Milambwe, SEVIA; Ferdinand Mgaya, SAGCOT; Gerald Sakaya, SAGCOT; Harald Peeters, Rijk Zwaan; Heleen Bos, Rijk Zwaan; Jackson Mfoi, farmer; Jacqueline Mkindi, TAHA; John Kazuba, EW; Jimmy Masasi, EWS; Lawrence Mgembe, SEVIA; Magreth Sanga, agrovet dealer; Michael Mfoi, farmer; Mlamke Farmers' Association; Mtokambalim Ngimba, AITVG; Prosper Tira, farmer; Ruben Yanis, Mboga na Matunda; Sampiya Munaje, Mboga na Matunda; Samson Mesha, EWS; Sarah Patrick, marigold farm worker; Selina Minja, farmer; Steven Mruma, Mboga na Matunda; Thomas Dubois, World Vegetable Centre; Vivian Minja, farmer.

References

Afari-sefa, v., S. Rajendran, r. F. Kessy, d. K. Karanja, r. Musebe, s. Samali and m. Makaranga, (2015). **Impact of nutritional perceptions of traditional african vegetables on farm household production decisions: a case study of smallholders in tanzania**. *Experimental agriculture 52 (2): 300-313*

Chagomoka, T., V. Afari-Sefab and R. Pitoroc (2014). **Value Chain Analysis of Traditional Vegetables from Malawi and Mozambique.** *International Food and Agribusiness Management Review 17 (4): 59-86*

Dinssa, F.F., P. Hanson, T. Dubois, A. Tenkouano, T. Stoilova, J. d'A. Hughes and J.D.H. Keatinge (2016) AVRDC - **The World Vegetable Center's women-oriented improvement and development strategy for traditional African vegetables in sub-Saharan Africa** *European Journal for Horticultural Science 81 (2): 91-105*

Everaarts, A.P., Putter, H. de and Maerere, A. P. (2015). **Profitability, labour input, fertilizer application and crop protection in vegetable production in the Arusha region, Tanzania. PPO/PRIreport 653.** Wageningen, Plant Research International, Wageningen University & Research.

Fintrac (2016). **Looking Beyond the Final Report: Evaluating Impact of Market Systems Development in Reaching Feed the Future's Goals. A Case Study: Tanzania Agriculture Productivity Program.** *Fintrac Topic Papers, Vol. 4, May 2016*

Sagcot Centre Limited, 2017. **Study on tomato supply chain analysis in Ihemi Cluster.** Dar es Salaam, 122p

SEVIA **Annual Narrative Report 2016-2017** and **2017 – 2018**

SEVIA (2016). **Mid-term evaluation report.**

United Government of Tanzania, 2012. **National Sample Census of Agriculture 2007/2008 Small Holder Agriculture.** *Volume II: Crop Sector – National Report.*

Valença, Anne de, Wytze Marinus, Eva Thuijsman, Gerrie van de Ven, Katrien Descheemaeker, Bernard Vanlauwe, Freddy Bajiukya, Mark van Wijk, Ken Giller, pending., **Living income benchmarking of rural households in less-developed countries.** *Wageningen, Wageningen University & Research.*

Colophon

Seed companies and
the Tanzanian horticulture sector

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