Project Soil Health Myanmar

Introduction

The agricultural sector in Myanmar is of central importance from a strategic development and poverty reduction point of view, with a predominantly agricultural economy. Myanmar was ranked among the poorest (161 of 180 countries) by the International Monetary Fund. It ranks 149 of 187 countries on the United Nation human development index, placing lowest in East and Southeast Asia. Some 26% of the population lives in poverty.

In addition to being the core means of livelihood for the great majority of the population, improvements in agricultural productivity is critical to raising the livelihoods of the rural population. The government of Myanmar places the highest priority on development of the sector and sees it as the basis for food security and increased employment.

Soils in Myanmar are in general low in nutrients and organic matter. Soil erosion is also a big issue in multiple areas, especially in places in the dry zone.

The governments of Myanmar and the Netherlands signed a MoU in the field of agriculture on May 19th 2015. The focus of Myanmar's government is in developing agribusiness by improving access to research and knowledge and stimulating foreign companies to invest and enter the Myanmar market.

Soil Health project partners

The soil health project is managed by Alterra/Wageningen University and Research Centre (WUR) and commercial organisation SoilCares from The Netherlands. WUR is one of the biggest agricultural universities worldwide with an outstanding record on agricultural development. SoilCares aims to provide farmers (small and large scale) worldwide with practical knowledge so they can improve their yields. SoilCares aims to bring knowledge literally into the hands of the farmers in a very comprehensible, easy and affordable way by using smart sensors and big data. SoilCAres aims to give access to specific knowledge about many things that influence yield improvement, by starting at the bottom with soil analysis.

Objectives of Soil Health project mission

The Dutch government recognizes the potential of the agricultural sector of Myanmar and wishes to support the transition towards sustainable and competitive agriculture by developing and facilitating of total concept solutions. In the current project such concepts based on soil fertility are developed together with local and international stakeholders comprising of commercial, governmental and research organizations.

From 9 -17 May a fact finding mission took place in Myanmar by representatives of SoilCares and Alterra/Wageningen University and Research Centre.

Objectives of this mission were to gain insights in i) the current practices of soil fertility management, ii) Myanmar agricultural market, iii) potential solutions for soil fertility improvement iiii) opportunities for potential partnerships with companies and institutes explored.

Insights gained by mission

I) current practices of soil fertility management:

Farmers do use fertilizers before planting, but have no means to measure what input is needed. Fertilisers are mainly sold by Birmese fertiliser companies, but also via (mostly illegal) import form China. Quality of Chinese blends is often poor and not checked.

If we look at farming practices; farmers were at present preparing their land for the monsoon season. They plough in advance or, when the soil is too hard, after the first rains. Ploughing is done by oxen or a tractor is rented for 6000 MMK/acre. Seeds are bought from local suppliers or, more frequently, were stored from the previous season. The dry season is least productive and farmers indicated that if the previous seasons have produced sufficiently, the land is left fallow in season 3.

To gain some grip on the situation a first estimation of net profits, nitrogen (N) and organic carbon (C) balances was made for a simplified slope system of potato-cabbage-fallow. For this calculation the variables listed in Table 1 were used.

Table 1. Estimation of variables in calculation of profit, N balance and C balance.

Variable	Value	Remark
Mineral fertilizers	4 bags (50kg) of compound fertilizer at a price of 38000 MMK/bag	Price based on farmer interviews. Assumed compound fertilizer 15/15/15
Application rate of organic matter	10 tonnes/ha with N content of 1% at a price of 960000 MMK/tonne	Farmers repeatedly confirmed the high application rates and costs of compost
Traction	6000 MMK/acre	Farmer interview
Potato yield	25 tonne/ha at a price of 260000 MMK/tonne	Farmer discussion groups
Cabbage yield	35 tonne/ha at a price of 130000 MMK/tonne	Farmer discussion groups

All other variables (e.g. N and C contents of crops) were taken from secondary data sources, e.g. MonQI background data. With the data listed in Table 1 profit, N balance and C balance was estimated (Table 2).

Table 2. Estimated cash balance, N balance and OC balance (ha^{-1}).

			Inputs				Outputs		
			Cash (1000MMK)	**N (kg)**	**OC (kg)**		**Cash (1000MMK)**	**N (kg)**	**OC (kg)**
Season 1	Fallow								
season 2: June-september	cabbage	seeds	312	6		harvest	4550	112	7000
		Crop residues		0[1]	7000				
season 3: Oct-jan	potato	seeds	390	5	1	harvest	6500	80	5000
		mineral fertilizer	152	30	0				
		organic fertilizer	960	100	4000				
		traction	15						
		pesticides	15						
		Crop residues			5000				
Total			**1844**	**142**	**16001**		**11050**	**192**	**12000**

[1] inputs due to mineralization of crop residues only apply to C, because C originates from an external source (atmosphere). It does not apply to N because N is released from sources within the system boundaries.

Table 2 shows that profit and N balance were negative, whereas the OC balance was positive. The soil N balance of approximately -50 kg/ha is severe, but not unrealistic.

However, one needs to keep in mind that the N and C balances of Table 2 do not include hard to quantify flows like atmospheric deposition, erosion, leaching and denitrification. Yet, the losses of these flows are expected to (largely) exceed the gains. Based on the geomorphology (slopes, well drained) and rainfall intensity, N losses due to natural processes are estimated at least 100 kg N/ha. Table 2 is a very first draft estimate, but at first sight seems to confirm the need for interventions to maintain and improve soil fertility.

ii) insights in Myanmar agricultural market

Agricultural accounts for about 70% of the employment. The agricultural sector can be characterized by small enterprises ( ) with scattered plots of typically 1 acre (0.42 ha).

During our field visit to the fields around Heho the following agro-ecological conditions were observed:

- In the low plains of Heho. valley the soil was peaty with a sandy topsoil (circa 40 cm). Farmers complained about compaction and told that they apply compost to improve the soil texture. Also wind erosion.
- On the hillslopes deeply weathered (litisols?) were observed. These are well drained soils but have a low pH (farmers mentioned a pH of 4.5) and are P fixing.
- At the hilltops dolomite and severe erosion were observed .

This topo-sequence is visualized in Figure 1.

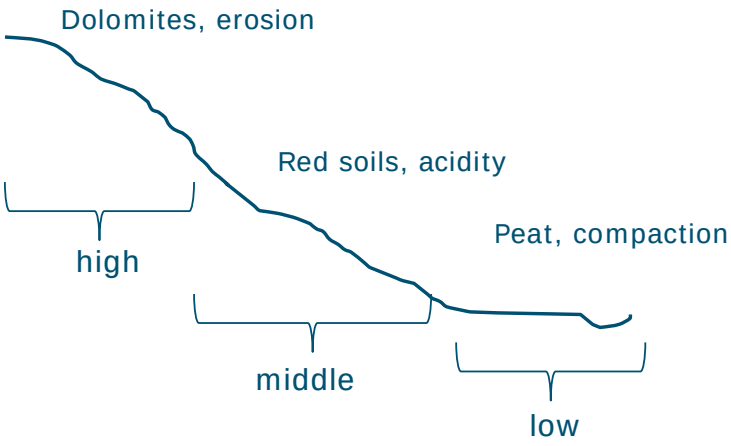

Figure 1. Topo-sequence around Heho and constraints related to soil quality.

For land on slopes the production system was subsequently determined by the presence of irrigation water. This specifically applied the slope lands, because the lowlands were always irrigated and none of the hilltops were irrigated. At the high altitude site perennials were dominant and consequently, eventually 10 different farming systems were distinguished as is shown in Table 3.

Table 3. Different farming systems based on season, topography and irrigation system.

Topography	Irrigation	Season 1 (dry) jan-may	Season 2 (monsoon) june-sept	Season 3 (residual) oct-dec
Low	irrigated	Potato, cabbage	Paddy, sugar cane	Sugarcane
Slope	Irrigated	potato	paddy	Maize, vegetables
	Non-irrigated	fallow	Potato	Vegetables
High	Non-irrigated	Perennials (charoef, coffee, fruit)		

Vegetables included amongst others garlic, onion and cabbage. Note that farmers typically have 4-6 plots and different crops are grown on the different plots. Farmers prefer to have plots on different topographic locations (low, slope, high) for risk aversion.

Production in Myanmar is very low, also compared to neighbouring countries, due to 50 years of non-investment by the former military government. The current Myanmar government aims at catching up 50 years of lag behind the rest of Asia and to produce efficient and diverse food for the growing and urbanizing population.

iii) potential solutions for soil fertility improvement

Lack of knowledge about soil fertility is the main obstacle preventing improvement of soil fertility. We have visited the department of Land use, responsible for soil analyses and soil mapping. They have a very outdated laboratory and were only able to perform a very limited amount of soil analyses.

Extension in Myanmar is not well developed, due to prohibitions to organise by the former military government.

Stakeholders who do reach farmer have different objectives and approaches. Table 4 lists the main stakeholders who reach to farmers to improve agricultural production methods, their interests and their approaches.

Table 4. Parties active in farmer dissemination.

Stakeholder	Interest	Approach	Impact
MALI	Improve agricultural sector, achieve food security and reach export market	Rules and legislation, policy guidance, infrastructure and institutional reform	Limited at farm level
Input suppliers	Sell agro-inputs to farmers	Local shops, experience sharing	Unclear, depending on capacity of supplier
Buyers	Constant high quality production	? contract farming	
Investors	Production at minimum costs	Land acquisition	?
NGOS	Improve livelihoods	Participatory projects, empowering farmers	?

During the scoping study two remarkable observations were made:

- None of the stakeholders mentioned in Table 4 could provide clear results. This was explained by the short time period since Myanmar opened up;

- The interaction between the different actors seems rather limited.

The observations of Table 4 are visually presented in Figure 1.

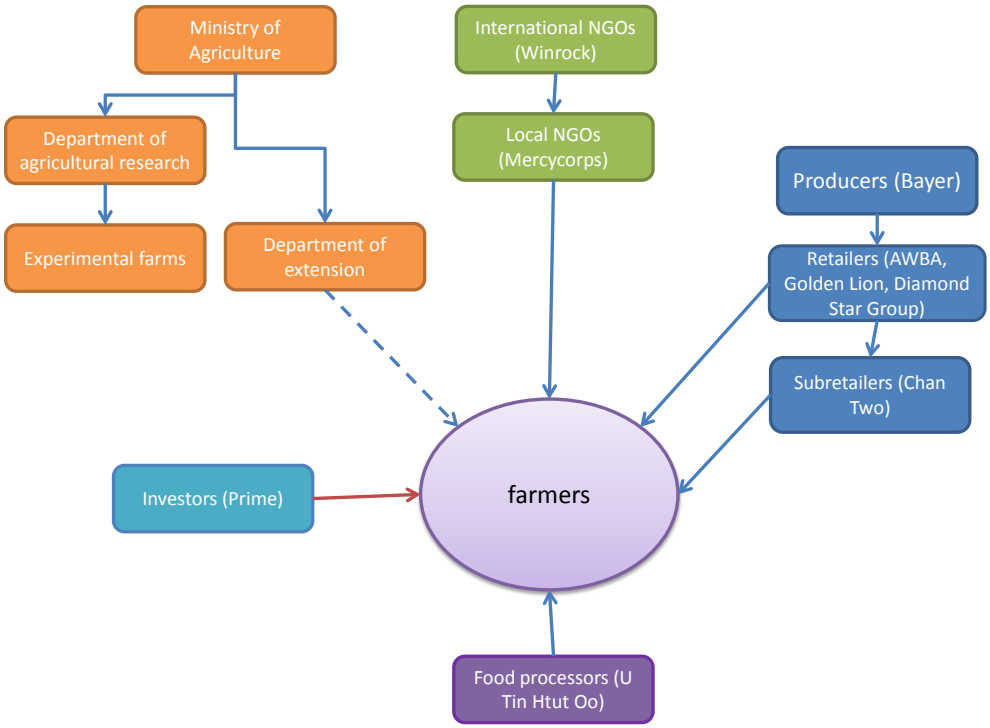

Figure 2. Outreach to farmers by different stakeholders. Dashed line indicates weak relation, red line indicates awkward relation.

iiii) opportunities for potential partnerships with companies and institutes explored

we have met during the mission:

Private companies:

• OrgaWorld Asia	Jullius de Jong
• Golden Lion	Nandar Soe
• NESAC	Tin Htut Oo
• Diamand Star	Aye Sander-Lwin
• Bayer	Jo Kuriki
• Awba	Martin Weiss
• Prime Investment	Daniel Bennet

Government:

- Myanmar Ministry of Agriculture
- Agriculturl department of Shan State

Institutes:

• Michigan State Univeristy	Duncan Boughton
• UM OPS/Worldbank	Sergiy Zorya

NGO's

- IFDC Josh de Wald
- Mercy Corps Siti Ichsan
- Winrock John Haydu

All persons we had meetings with were t decision making level. Information about soil fertility and means to measure soil fertility were very well received; all were very interested in soil testing solutions. Also the government was open to new solutions and showed a willingness to cooperate. Fertiliser industries (Awba, Diamond Star and Golden Lion) would be the most convenient parties to use SoilCares'soil testing solutions with their extensive network of farmers and dealers. Also NGO's with projects reaching many farmers were very interested in soil testing solutions and can be good prospects.

Annex 1: Scoping mission May 9-17 2016

Frank Wijnands

Christy van Beek

Robbert Ausems

Angelique van Helvoort

Paul van Hofwegen

Julius de Jong

U saw Jackson

Day/region	Time	place	Person	Who to speak to / organisation	Comments
9/5	16:30	Inya lake		Kick-off	
10/5 Yangon	8.45	Inya Lake	Julius de Jong	Clean myanmar/Orgaworld	
	09:30-10:45	Office	DOA Land use		
	11:30-12:30	Inya Lake	Duncan Boughton	Michigan State University	
	14:15-15:45	Office	Josh de Wald	IFDC	
	15:00-16:30		Nandar Soe	Golden lion	Possibly tentative dependent on Tin Htut Oo. Contact via Nandar Soe - request to follow up via Jackson
	16:00-16:45		Tin Htut Oo	Also chairman of the round table NL-Myanmar agriculture Chairman NESAC; National Economic & Social Advisory Council	Tentative - See white paper
	19:00-21:00 (diner)	Opera (italian next to Inya Lake	Josh de Wald Duncan Broughton	IFDC Michigan University	Dinner + Geert
11/5	8.30-9.00	Erwin Kingma			
	09:00-13:00	UNOPS Yangon	Launch of. Report	launch of the Analysis of Farm Production Economics.	World Bank
	13:30-15:00	Office M corps	Siti Ichsan	Mercy corps	Through Leo roosendaal
	15.30-17.30	Inya lake	John Haydu	Winrock (NGO)	Meeting with mission team first hour and separate meeting John Geert and Frank senior value chain officer

12/5	9:30			Minister of agriculture (tentatibve)	
	14:00??		Naing Kyi Win and Dr Su Su	Meeting with (delegates) from ministry Ag dept en	Workshop possible with DAR / AG and Yezin invitees (small presentations0 SEE BELOW
				Daw Kyi Kyi Thet Deputy Director International Relationship Section bv DAR	
13/5 Shan				field visit through field men suppliers	Frank through earlier contacts supllers. ACTION FRANK
	13:30-16:00	Heho-airport	Daniel Bennet	heho Prime investment	Tentatively
14/5 Shan		Field visit		Assistance through Diamond star and Awba	And Jackson
				farms to test monQi	How to organise
15/5 Shan		Field visit			App developer
16/5 Yangon	9:30-11:00		Aye Sandar—Lwin	Diamond star/Aventine	
	11:15-12:30		Jo Kuriki	Bayer	Luch also
	13:30-15:00	Office	Martin Weiss	Awba chief agronomist	
	15:00-16:30				
	16:00-17:30		Anne-Claire Degail	Winrock (NGO)	Meeting between Ann-Claire and Frank Extension coordinator