# Tanzania NAFAKA Project - Summary Trip Report

## May 8 - May 20, 2012

## Evaluation of System of Rice Intensification (SRI) Program

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Rice in Tanzania (Rice Sector Strategy 2009, <u>http://www.rldc.co.tz/docs/Rice.pdf</u>

- Rice is the second food and commercial crop in Tanzania after maize
- Cultivated area is about 681,000 ha, represents 18 % of Tanzania's cultivated land
- 71 % of the rice is grown under rainfed and 29% of under irrigated conditions.
- Yields are very low, between 1-1.5 tons per hectare. Cultivation methods are traditional with little improved practices.
- In the Central Corridor, rice is extensively produced in the three regions Tabora, Shinyanga and Morogoro with favorable growing conditions, where 48 % of the country's cultivated rice land can be found, with about 230,000 smallholder farmers.
- The country has a high rate of self-sufficiency, which has been relatively constant in the high 70% to low 80% range.
- With large amounts of suitable, unfarmed arable land, the high rate of selfsufficiency and current low yields, the Government of Tanzania wants to increase rice production and become a large net-exporter of rice for the region and for Africa.

### The NAFAKA project and KPL partnership

The Tanzania Staples Value Chain (NAFAKA) project aims at improving the productivity and profitability of the maize and rice value chains for smallholder farmers and expanding the benefits from this growth to women, youth and other vulnerable groups. The five-year project (2011-2015) is implemented by ACDI/VOCA and is funded by the U.S. Agency for International Development (USAID) under the Feed the Future (FTF) initiative.

NAFAKA is in partnership with Kilombero Plantations Ltd (KPL), a company that plans to produce rice on its >5000 ha farm. KPL also collaborates with farmers on SRI in an out-grower scheme, and plans to reach 5000 smallholder farmers with SRI.

#### SRI in Tanzania

- SRI was introduced to Tanzania by KPL, who invited Dr Vinod Goud from WWF-ICRISAT Project, Hyderabat, India, to spend two weeks at the KPL farm in December 2009. Vinod established SRI demonstration plots and trained KPL staff and farmers. Since Vinod left, no additional SRI training was done or technical assistance received.
- Farmers reached by KPL:
  - o 2009/2010: 15 farmers
  - o 2010/2011: 148 farmers (or 250?) in 6 villages
  - o 2011/2012: 1350 farmers: with 59 demonstration plots in 10 villages
  - Next year: 2700 farmers will be targeted

In 2011/2012: the NAFAKA project extended the SRI intervention zone to Mlimba, Ifakara North (all is Kilombero District) and to Dakawa in the Mvomero District, with about 40 additional demonstration plots (see below).

## Trip objective, trip program, people met and field visit program

<u>Objective</u> of this trip was to evaluate the results from the first season of SRI activities implemented under NAFAKA project (NAFAKA and KPL activities) and to provide recommendations for strengthening the SRI program going into the second year.

<u>Annex:</u> following documents can be found in the Annex:

- The trip program, people met (A1)
- Field trip program (A2)
- Scope of work (A3)

### **Observations from field visits**

### Rainfed rice cultivation in Morogoro

- In Kilombero district, 95% is rainfed rice, and only 5% of rice is irrigated.
- Farmer practices are traditional, with very little knowledge and application of improved practices
- Soil fertility restoration is based on fallows; farmers use soil fertility depleting practices such as burning of straw, remove crop residues as well as weeds from plots, plow after each crop, no (or very limited) fertilization (organic matter or chemical), Farmers keep few animals –thus manure is not used for fertilization.
- Fertilizer were subsidized for the past 4 years; they arrived most often late at the farm gate thus when applied late, fertilizer effects were not satisfactory thus farmers hesitate to use fertilizer.

- Yields are decreasing in general as soil fertility of the land declines
- Seeds are broadcast
- Traditional varieties: tall, risk for lodging with heavy winds and rains, thin and weak tillers due to high plant density. Traditional varieties are preferred for good taste and can withstand flooding better than shorter varieties.
- No improved varieties available. Shortage of seeds (also for other crops such as legumes)
- Weeding by hand depending on weed pressure (1-4 weeding necessary)
- No (or hardly any) improved soil moisture/water management
- Rice crop is mostly grown by women (food crop)

### Irrigated SRI demo-plots in Dakawa

The only irrigated SRI plot visited during this visit was the Masterfarm in Dakawa – as road conditions were too bad to see farmers' irrigated demo-plots. Issues with land leveling, irrigation water availability and fertilizer application were observed. It might be better to sub-divide larger plots, level them better and incorporate fertilizers into the soil. Organic matter sources need to be identified. Application of Urea Deep Placement should be seriously considered under irrigated conditions.

## Difficulties for rainfed rice production

- Water availability for crops is not guaranteed: Rainfall distribution can be very irregular including drought spells and flooding periods, with negative impacts on yields.
- Soil fertility depleting practices contribute to low soil organic matter content (low nutrient and water holding capacities of soils), resulting in low production level of farmers' fields. (Mlimba has sandier soils, Mgenta has heavier clay soils)
- Farmers knowledge about improved practices is limited; Lack of technical options available at farmers' level
- Socio-economic constraints (labor, capital) for sustainable intensification and marketing

### **Opportunities/potentials**

- Rice is primary crop for people in Kilombero; 100% of farmers have a rice plot; thus interest in the crop by farmers is high
- Yield levels are very low (below 1t to 2t/ha), thus potential from doubling to quadrupling yields is high.
- Technical approaches for sustainable crop intensification exist for small-scale, resource limited farmers to improve crop productivity: SRI, conservation

agriculture, IPM, water-harvesting methods among other agro-ecological approaches.

- Availability of inputs will improve with KPL and NAFAKA's presence and the establishment of local agro-dealers. If good training is provided, improved decision making of input use by farmers will be possible.
- KPL provides a market for farmer to sell rice.

## **Observations on NAFAKA and KPL Demo-plots**

About 100 demo-plots of <sup>1</sup>/<sub>4</sub> acre in size, about 60 in KPL zone, 19 in Mlimba and Ifakara North zone, and 20 in Mvomero zone.

- KPL plots: one large SRI plot– no treatments or control
- NAFAKA plots: a set of treatments tested:
  - Fertilizer (NPK, Urea, with fertilizer/without fertilizer)
  - Varieties (TxD 306, TxD 85, TxD 88, local varieties)
  - SRI planting practices (number of plants/hill, distance, direct seeding/transplanting)
- The NAFAKA plots serve as observation plots for farmers and technicians, combining new technical options and ideas for farmers. It allows evaluating performance of various treatments and identifying suitability for farmers' adoption.
- All of the visited plots were technically well established and managed excellent work!
- <u>Adoption farmers</u>: A number of farmers adopted SRI with or without fertilizer on their own farms, after they learned about it at the demonstration plots. We visited 4 farmers in all cases, farmers expect significantly better yields with their SRI adoption plots compared to their conventional practice.
- <u>Progressive farmers</u>: SRI plot establishment at the larger scale (1-6 acres!), with 1 acre being a seed plot to multiply high yielding variety seeds.
- <u>Data monitoring</u>: A datasheet was developed with NAFAKA staff to collect essential data and information from the 100 demonstration plots.

## Training of KPL and NAFAKA staff on May 15, 2012

NAFAKA training – 17 staff (from 9am-1pm and from 2pm to 5:30pm)

Morning session

- Overview: what is SRI?
- World Bank Institute Instructional Video

Coffee break

- Focus sessions on
  - Seed production
  - Soil fertility management

- SRI for other crops
- SRI appropriate use of tools and mechanization options

Afternoon session

- Observations from the field trip: Presentation of a photo slide show (photos taken during field trip) discussion on demo-plot performance and associated issues.
- Presentation and discussion on key parameters to be collected for end of season data collection on demo-plots.
- Discussion on harvesting methodology
- Inputs from each participant: i) how to move forward next year? ii) what was learned today?

### Recommendations

- It is advised for the project to provide a menu of technical options (see below under technical focus) for farmers; provide farmers with good training to allow them to make informed decisions and not to develop finished packages of technologies to be transferred.
- The logic of a circular, iterative outreach approach should be adopted rather then a technology transfer approach.
- Recommendations on two main topics: i) program approach and ii) technical focus

## Program Approach:

Continue with innovation development – i) use demo-plots to test new ideas, ii) follow farmers to see how the innovations are taken up in the farmers' fields, and iii) instill curiosity and initiatives among farmers/technicians to undertake tests on their farms (this should be voluntary, and not paid for).

- <u>Demo-plots</u> can be used to test new ideas (CA approaches with rotations, miminum till etc), fine-tune crop management practices for SRI, test varieties, test fertilization concepts. Demo-plots should continue showing a variety of technical options. The tests change from season to season, as new ideas and questions are coming up, or to deepen the understanding on certain technical aspects (e.g. plant spacing x variety).
- <u>Farmer fields</u>: Beyond demo-plots, emphasis should be given to follow farmers' plots, check how new techniques are taken up or not by farmers, identify constraints and potentials, identify new ideas coming from farmers. This allows evaluating technical improvements directly with farmers.
- <u>Integrate farmers in innovation development together with the field</u> <u>technicians</u>. Instill 'the expert' within farmers and technicians. This could be encouraged for instance by a competition among field agents to achieve best numbers of: farmer adaptation plots, unexpected and new

observations/lessons learned from farmers' fields, number of innovations identified with farmers etc. Farmers should participate out of interest and on a voluntary basis, and be paid.

- <u>Get away from free incentives</u> and move towards (purely) knowledge sharing (or on the other side develop access to credits) when working with farmers. Providing too many incentives does not allow evaluating a technique for its adaptability and feasibility in the local farming environment.
- <u>Farmer field days:</u> organized periodically, open for anyone to participate. Reach out to other demographics then the farmer groups the project works with.
- <u>Training and training materials</u> should be developed that respond to local conditions. Training materials can be fine-tuned over a period of 1-2 years.
  - Technicians: in English with in-depth information
  - Farmers: in Swahili including technical booklets, simple brochures, posters etc. for wide distribution in rural areas
- <u>Monitoring of progress</u>
  - Data collection guidelines and data sheets, for technicians but also farmers, training on data collection
  - Surveys to be undertaken periodically to understand the dynamics of adoption (which should go beyond the farmer groups the project works with)
- <u>Reporting on progress and success</u>
  - Radio shows, training through radio
  - o Videoclips, TV
  - Newspaper articles, farmer stories for the web etc.
  - Solid reporting using collected data

## **Technical focus**

Technical focus for improving the rice cropping system with the SRI methodology:

- <u>Soil fertility management</u>
  - Organic matter (OM) management and fertilizer use must go hand in hand; fertilizers should not be used/recommended if OM management is not addressed at the same time.
  - Identify technical options for increasing soil organic matter (Manure, compost, cover crops, rotation with legumes etc)
  - $\circ~$  Move towards CA approaches: rotations, soil cover, minimal soil disturbance
  - Testing of urea deep placement (UDP) in association with OM additions and SRI other tests can be done with lime, P fertilizers according to location.
- <u>Water management for the crop</u> (water storage or water drainage)
  - (Rain)water storage in the field (through bunds, earthen structures, soil preparation, mulching etc), or drainage options in case of floods.

Many methods exist and should be integrated in training, and tested in demo-plots and on farmers' fields.

- Early, quick and healthy plant establishment
  - Seed selection
  - Seed soaking to eliminate non-viable seeds
  - Seeding techniques/transplanting
- <u>Optimal plant population</u>: depends on soil fertility level, soil water availability, variety, plant establishment methods etc.
  - Test of number of seeds/hill x spacing

## Other technical foci

- <u>Tools and machines</u>: can have a large impact on adoption rate and surface area under SRI
  - <u>Dryland weeder</u>: For rainfed SRI it is important to develop a rainfed weeder that works well on dry soil. The rotary weeder currently distributed to farmers does not work well when the soil is dry. The designs can be obtained from India, weeders to be tested, and then multiplied in local shops.
  - <u>Markers</u> can be made by farmers out of wood, very cheap and simple, facilitates seeding operation
  - <u>Seeding machine</u>: it would be ideal to have a simple seeding machine that drops seeds with precise spacing (some models in India are under development but not yet readily available)
- <u>Seed production</u>: formal and informal seed production training with SRI methods. This allows farmers to maintain good quality seeds.
- <u>Develop a guide to varieties:</u> including high yielding new varieties and indigenous varieties.
- <u>Continue variety testing under SRI (improved and indigenous)</u>
- <u>Others</u>

### **Recommendations for KPL**

- Support the development of prototype tools and machines: small-scale mechanization
- Write up the history of SRI in Tanzania, use the so far collected data to create a solid report.
- For next year: Integrate a few treatments into the SRI demonstration plot
- Undertake surveys to understand how farmers adopt SRI practices and what can be improved.

#### Other recommendations

Develop stronger links with other rice programs in Tanzania (e.g. World Bank funded EAAPP program, which is working on rice), Ministry of Agriculture, Sokoine University, etc.

- Develop topical training modules and a training approach tailored to NAFAKA project.
- Modules can be (among others): SRI, soil fertility management, water management in rainfed and/or irrigated agriculture, conservation agriculture in combination with SRI, other agro-ecological approaches that can be associated with the Morogoro rice farming systems.
- Provide quality training to NAFAKA and KPL staff (training of trainers)
- Collaborate on training material development for farmers with NAFAKA staff
- Develop a monitoring approach and train NAFAKA and KPL staff
- Provide assistance to project staff with data collection, monitoring, evaluation, data analysis and reporting

Date	Program	Person met	Organization			
8-May	Travel Ithaca- New York - (London)					
9-May	Travel London - (Nairobi)					
10-May	Nairobi - Dar - Drive to Morogoro (3.5 h)					
	NAFAKA office	Martin Mason	NAFAKA			
	Drive from Morogoro to Ifakara (4 h)	Joe Tindwa (Field visit guide)	NAFAKA			
11-May	Field visits Ifakara North area (2 plots)					
	Visit KPL offices meet with	Graham Anderson David Lukindo	KPL KPL			
	Field visit KPL and Mngeta (5 plots)					
	Drive to Mlimba					
12-May	Mlimba field visits (7 plots)					
	Farmer meeting in Kalengakelu (ca 20 farmers)					
	Farmer meeting in Mlimba (ca 10 farmers)					
		Rueben Mfanga	NAFAKA			
		Aloyce L Masanja	Rufiji Basin Dev. Authority			
13-May	Drive from Mlimba to Morogoro (9 hours) Field visit (1 plot)					
14-May	Field visits (4 sites)					
15-May	Staff training on SRI	17 KPL& NAFAKA technicians	KPL, NAFAKA			
16-May	NAFAKA office, Morogoro	Johnathan Mpuya	NAFAKA			
		Debriefing Martin Mason	NAFAKA			
	Drive from Morogoro to Dar (4h)					
17-May	Meeting in Dar es Salaam	Katrin Plesner	NAFAKA			
		Graham Anderson	KPL			
		Eric Johnson	USAID			
18-May	Meeting in Dar es Salaam	Hussain A Mansoor	Ministry of Agriculture			
		Donald Mitchell	SERA Project			
19-May	Meeting in Dar es Salaam	Patrick Sayer	Aga Khan Foundation			
20-May	Depart Dar es Salaam					

## Annex 1: Trip program (May 8 - May 20, 2012)

## Annex 2: Field visit program (May 10 – May 14, 2012)

	Program	Field Plot Visits	Туре	Village	District	Region
10-May	Arrival in Dar - Drive to Morogoro (3.5 h)					
	Drive from Morogoro to Ifakara (4 h)					
11-May	Field visits Ifakara North area	1. Sabina Misana, progressive farme Progressive F		Mofu - Kisegere	Kilombero	Morogoro
		2. Demo plot Secondary School	Demo plot	Nakaguru	Kilombero	Morogoro
	Field visit KPL farm and Mngeta village	3. KPL officer Adoption plot	Adoption plot	KPL farm	Kilombero	Morogor
	Meet with G. Anderson, D. Lukindo (KPL)	4.5.6. Three demo plots	Demo plot	Mngeta	Kilombero	Morogoro
		7. Demoplot Udagadji	Demo plot	Udagadji, Mlimba	Kilombero	Morogoro
	Drive to Mlimba					
12-May	Mlimba field visits	8. Songambele Group	Demo plot	Kalengakelu	Kilombero	Morogor
		9. Tupendane Group	Demo plot	Kalengakelu	Kilombero	Morogor
	Farmer meeting in Kalengakelu (ca 20 farmers)			C		0
		10. Raphaela Genelo Seed plot,	Progressive F	Kalengakelu	Kilombero	Morogor
	Farmer meeting in Mlimba (ca 10 farmers)		C C	Ū.		0
		11. Mr Sanga	Adoption plot	Mlimba	Kilombero	Morogor
		12 Mr and Mrs Evaristo Mhonda	Adoption plot	Ngalimila	Kilombero	Morogor
		13 Justine Mbwilo Seed Farm	Adoption plot	Mpanga	Kilombero	Morogoro
		14 Christina	Progressive F	Mpanga	Kilombero	Morogoro
13-May	Drive from Mlimba to Morogoro (9 hours)		Ū.			Ū
		15 Demoplot Udueni Association	Demoplot	lfakara North	Kilombero	Morogoro
14-May	Field visits					
		16. Nafaka Model farm	Demo, seedplot	Dakawa	Mvomero	Morogor
		17. Progressive farmer	discussion	Dakawa	Mvomero	
		18. Mwingano group	Demo, Varieties	Milama	Mvomero	Morogor
		19. Midea group	Demo, Fertilizer	Milama	Mvomero	Morogor