Sustainable Agriculture and Natural Resource Management
Collaborative Research Support Program

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Trip Report: Mozambique & Lesotho

24 June-13 July 2012

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Purpose of Trip: 1. Follow-up with contacts made at ECA and Mozambique Fertilizer in Chimoio;
2. Develop strategies to integrate project with other private sector partners to enable farmers to access inputs and credit and have a market for their commodities;
3. Broaden scope of CA systems to include cassava in crop rotation; harvest maize plots in Maphutseng; confer with partners at the National University of Lesotho

Sites Visited: Biera, Chimoio, Catandica, Mozambique
Roma, Maseru, Maphutseng, Lesotho

Description of Activities

In Mozambique we are planning to up scale the adoption of CA by training more farmers, and linking farmers to credit services and local commodity markets. Visits were conducted with partners in Sofala and Manica provinces. In Lesotho we met with our key partners, briefed the US Ambassador on our progress to date, harvested this season's maize experiments in Maphutseng, and overhauled and serviced the Bowen's ratio (carbon) units.

On-farm demonstration sites in Sofala and Manica, Mozambique
During this trip meetings were held with the following: Clean Star (Dondo), IFDC, Beira Agricultural Growth Corridor, Empreza Comercializacao Agricola (ECA), Phoenix Seeds (Vanduzi) and Green Belt Fertilizer (Beira).

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Discussions were held with Clean Star personnel regarding the cassava NPK trial that is planned for Dondo. The experimental design and plots have now been prepared. Clean (virus-free), planting materials for the trial are currently being multiplied by IIAM in Maputo. The plan is to also replicate this trial at Savane and Mille Quatorze. Clean Star has now started to buy and process some fresh cassava from local growers.

A meeting was also held with Eric Schmidt, country representative for the International Fertilizer Development Corporation (IFDC) in Mozambique and representatives from the Beira Agricultural Growth Corridor to identify areas of mutual interest and possible future collaboration. IFDC has done some fertilizer work on cassava, as well as maize in Mozambique and has some interest in conservation agriculture (CA). Recently a baseline survey of cassava was conducted in Nampula province where cassava is considered to be a major food as well as cash crop. There would appear to be significant opportunity to not only increase production through the use of fertilizer but also to develop CA systems for the crop.

We spent a day with the ECA to learn their operation and model for working with growers to increase production and provide farmers access to credit and to markets. The objective was to learn how the SANREM-CRSP project could collaborate with the ECA to train farmers in CA. ECA expects to purchase at least 2,000 tons of maize from 937 growers this season (about US$385 per grower), with all growers being paid on the spot with a mobile bank at the buying center in Catandica. They have established 22 smallholder “clubs” at 5km intervals along the N7 road, 50 km north and south of Catanadica. They have supplied the materials for each club to construct simple thatch-roofed warehouses that act as focal points for farmer training, demonstrations and the collection of maize. Each club has a loan provided by the Banco Oportunidade to enable them to buy inputs. The loans are guaranteed by the ECA who in turn purchases the maize from the club to repay the loans. This year all loans were repaid. Inputs that were supplied to farmer included improved seed (open pollinated varieties only), seed plus 200 kg urea (as top dressing) or seed plus a 200kg 12.24.12 as basal fertilizer and 200 kg urea. They recommend farmers use a 90 cm x 45 cm spacing (3 seeds per station, thinned to 1). Average yields expected to be around 2 to 3 tons per ha compared to about 0.5 tonnes per ha without inputs. Currently the ECA only has two field technicians each servicing about 500 growers. They have plans to expand to 2,000 growers next year. The organization also has plans to purchase other crops that farmers may grow (e.g., pigeon pea, cowpea, soybean, etc).

In addition to fertilizers, there is a need to find suppliers of legume seed to be used in the CA rotations. A morning was spent with Kevin Gifford, a commercial grower originally from Zimbabwe who also runs a seed business (Phoenix Seeds) in Vanduzi. His seeds are imported from Zimbabwe, Zambia and South Africa. Some of the seed that Phoenix has access to includes soybean, sunhemp, pigeon pea and cow pea. There is a need to test some of the imported varieties alongside some of the local genetics, as well as to test it at different agro-ecological zones (i.e., from the coast at Sofala to the border in Manica).

A short meeting was held with Dr. Johan Bremmer and Dr. Joop Harmsen (both from Wageninen University) while at Vanduzi. They have been invited by the Dutch Embassy to conduct a study on the feasibility of setting up a soils lab for soil testing during the dry season.

Soil testing and sampling services exist through Green Belt fertilizer, a fertilizer blending and marketing company that recently set up operations in Beira. Soil sampling is a service that Greenbelts Agronomy offers to its commercial customers. Analysis is free to the customer if s/he buys fertilizer. Samples are sent to a commercial soils lab in South Africa (Agricultural Services, in the Western Cape). They use the Bray 1 extractant for phosphorus.

Maize plots, Maphutseng, Lesotho
On July 3rd the team of Dr. Forbes Walker and Dr. Neal Eash met in Johannesburg. We were joined by four University of Tennessee students, Deb O'Dell (MS student), Scott Hannah, Hillary Gleason and Lindsay Smith, and three undergraduate students from the University of Tennessee Global Studies program. We were in Maphutseng, Lesotho from July 5th to 10th harvesting this season's research plots. Neal Eash and Deb O'Dell worked on the Bowen ratio units during this visit. Forbes Walker oversaw the maize plot harvests with the undergraduate team, as well as a visiting a team of students from Stellenbosch University, South Africa.

We harvested the maize nitrogen, phosphorus and potassium plots, as well as a plant population study and a cover crop study. Our results from our harvest demonstrate that planting maize early, at a much higher plant population than is common (44,000 plants per hectare), and at the proper planting depth can result in significant yield increases. This past year the zero nitrogen plots yielded more than 3 tons while our plots with 100 kg nitrogen, 60 kg phosphorus, and 20 kg potassium yielded more than 8 tons per hectare (about 130 bushels per acre). Planting cover crops during the winter on the fields increased maize yields by more than one ton. Those same cover crops suppressed approximately 90% of the winter annual weed species. In addition to the agronomic research our outreach program had approximately 70 on-farm trials comparing conservation agriculture practices with common local practices and more than 3,000 farmers have attended training through our NGO partner.

Prior to our arrival the unreplicated *likoti* (basins) demonstration that had been established with volunteers from the Mennonite Central Committee was harvested. This demonstration compared the use of NPK fertilizer (1 tablespoon of 6.2.1 per basin), with cattle manure (1 cup), compost (1 cup) and biosolids from Mohale'sHoek (1 cup). The NPK fertilizer produced a yield of 6.49 tons per ha and biosolids of 5.38 tons per ha compared to 3.25 tons per ha for the unfertilized control. The cattle manure produced a yield of 3.05 tons per ha and the compost only 1.13 tons per ha.

Observations were also made of the weed control from the cover crops (wheat/grazing vetch) that have now been established in several demonstration fields at Maphutseng. The grazing vetch that was first sown three years ago continues to thrive and re-seed itself each year.

It should be noted that last season was a dry year for Lesotho and that the national maize yield was below expectations.

National University of Lesotho, Roma, Lesotho
The University of Tennessee team visited Dr. Marake and others at the National University of Lesotho. We met with the dean of agriculture as well as Dr. Sharon Siverts, vice-chancellor, NUL.

Meeting with US Ambassador, Maseru, Lesotho
Prior to leaving Lesotho we met with Ambassador Michele Bond, at her residence. We briefed her on some of the results from the project. Following our meeting we shared copies of some of the recent SANREM reports. Ambassador Bond has since shared them with the Prime Minister Thabane. We have been requested to keep them informed of future visits to Lesotho and hope to coordinate a trip to Maphutseng to share our results with the Prime Minister and Minister of Agriculture.

Suggestions and Recommendations

1. Continue to develop partnership with ECA to develop and expand CA demonstration program with ECA growers for next season.
2. Explore more options for partnering with Phoenix Seeds and other seed suppliers to identify legume varieties to integrate into CA maize and cassava systems.
3. Develop plans for Maphutseng research for next season to look at the effectiveness of cover crops, use of biosolids, effectiveness of the Chinese-made no-till hand held planter, and development of the NPK recommendations on degraded soils.

List of Contacts Made:

Name	**Title/Organization**	**Contact Info (address, phone, email)**
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Appendix I:

Trip Log for Mozambique and Lesotho Trip, June/ July 2012

Monday 25th June Arrive Johannesburg on flight from Atlanta. Overnight in Johannesburg.

Tuesday 26th June Fly to Beira, Mozambique. Meeting with Clean Star Mozambique, IFDC, Mozambique and Beira Agricultural Growth Corridor.

Wednesday 27th June Visit to Clean Star operations at Dondo. Visit to cassava production and variety evaluation trials in Sevane.

Thursday 28th June Drive to Chimoio.

Friday 29thJune Visit with Grant Taylor, ECA, Chimoio. Travel to Catandica to learn about ECA operations. Meeting with Kevin Gifford, Phoenix Seeds, Vanduzi.

Saturday 30th June Meeting with Kevin Gifford, Phoenix Seeds, Vanduzi; discussions with Wageninen, consultants regarding setting up soil testing lab in Mozambique; travel to Beira.

Sunday 1st July Beira

Monday 2nd July Visit to Clean Star operations at Dondo and Savane with Clean Star agriculture extension team.

Tuesday 3rd July Travel to Johannesburg. Meet with UT team. Spend night near Heidelburg, South Africa.

Wednesday 4thJuly Travel to Roma, Lesotho by car. Meeting with Dr Marake, National University of Lesotho.

Thursday 5thJuly Meeting with Dr. Marake, dean of Agriculture and vice-chancelleor, National University of Lesotho. Travel to Maphutseng research site, Maphutseng, Lesotho.

Friday 6th to Tuesday 10thJuly Harvest maize research plots at Maphutseng: population study, nitrogen study, phosphorus study, potassium study and cover crop study.

Wednesday 11th July Travel to Roma for meeting with Dr. Marake. Meet with US Ambassador to Lesotho. Spend night near Ladybrand, South Africa.

Thursday 12thJuly Drive back to Johannesburg en route back to USA.