Trip Report: Mozambique & Lesotho

28 February – 16 March 2013

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University of Tennessee

**Purpose:**
1. Observe CleanStar, Mozambique soil fertility and cassava variety sites at Dondo, Beira and Savane, and potential sites in Inhambane;
2. Observe CIMMYT / IIAM maize demonstration sites, Manica province;
3. Observe Phoenix Seed company, Vanduzi;
4. Assess maize plots and service Bowen’s ratio carbon units in Maphutseng, Lesotho
5. Meet with partners at the National University of Lesotho

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

**Description of Activities**

*Summary*
In Mozambique, we conducted field visits of our cassava and maize research, and also demonstration sites with partners in Sofala and Manica provinces. We also evaluated soils near Inhambane for cassava production potential, and met with personnel from the U.S. Embassy in Maseru.

In Lesotho, we met with our key partners and checked on this season’s NPK 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: Cleanstar (Dondo), Phoenix Seeds (Vanduzi), CIMMYT (Harare) and IIAM.
Discussions we held with Cleanstar personnel regarding the cassava NPK trial that was established in Dondo and close to the plant manager’s residence in late 2013. Clean (virus-free), planting materials were used for the trial. Problems were identified with both sites that may compromise the use of any of the data. At the Dondo site waterlogging appears to be a significant problem on some of the plots. At the manager’s residence the team that fertilized the plots in late January did not follow the research protocol.

Plans were made to repeat this trial at Savane and Mille Quatorze. The site at Mille Quatorze was planted the week of March 4, 2013.

Cleanstar has now started to process fresh cassava from local growers, produce ethanol and sell it for cookstoves in the capital Maputo.

There is a need to find suppliers of legume seed to be used in the CA rotations. An afternoon was spent with Kevin Gifford, a commercial grower (originally from Zimbabwe) who also runs a seed business (Phoenix Seeds) in Vanduzi with seed imported from Zimbabwe, Zambia and South Africa. Some of the seed that Phoenix produces include 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 (from the coast at Sofala to the border in Manica).

Visits to the CIMMYT/IIAM/SANREM maize research and demonstration plots were made in Manica province March 4th to 8th, 2013. Research trials at the Sussendenga research station include:

- Long-term CA trials
- A new population x nitrogen study with 3 plant populations and 4 rates of nitrogen as urea
- Maize variety trials: different high potential CIMMYT hybrids, as well as shorter maturing open pollinated varieties
- Residue management looking at effect of different rates of residue cover on CA
- Termite management trial using different intercrops and termite resistant plants

Farmer preference for different planting methods varies, depending on the soil type and access to animals for traction. At the farmer demonstration plots at Namatiquite (near Sussendenga) farmers expressed a preference for the oxen ripper over the jab planter. At other sites where the ripper was not used (due to lack of livestock) farmers preferences depended on soil type and soil texture. Basins did not work very well in sandy soils, whereas jab planters clogged up easily on the heavier soils. In these locations, there appeared to be a preference for a simple dibble stick.

Farmers at the Namatiquite, Musaremba, Malongwe, Gondola and Lamego sites expressed a preference for the shorter season varieties to combat the recent dry spells. Many recognized the higher yield potential of the hybrids, but were concerned about the need to buy seed every year, because of the lack of fertilizers and recent dry spells in February which coincide with maize pollination. It was reported that in the past, February used to be a wet month, but not in recent
years. January is now the wettest month and coincides with the pollination of the shorter season varieties.

At several of the demonstration sites, discussions were held with the farmers about scaling-up of CA to include more farmers. After four to six seasons being involved with CA demonstrations, many farmers now have a good concept of the management practices and technologies that need to be implemented. The supply of inputs for weed control remains an issue in some sites. At the Lamego site where farmers have access to herbicides from the nearby sugar estate, it was reported that up to 30 farmers (or 20 percent) in the area were using CA. Many farmers expressed a willingness to work with local Extension personnel to train more farmers in CA. Scaling-up will be explored in greater detail when the CIMMYT / IIAM groups have their next round of planning meetings in August, 2013.

At Malongwe in Barwe district (near Catandica) farmers have begun experimenting with growing soybean. There are still issues with finding a market for the relatively small quantities of the seed that is being grown at the moment.

The best demonstration was observed at Mussianharo in Barwe district, a community that ECA (Empresa de Comercialização Agricola) is working with to give farmers access to inputs in exchange for a market for surplus grain. The legume crop used in this demonstration was soybean, with seed provided by Phoenix seed.

We also visited the cassava production area around Inhambane to evaluate the cassava production potential as well as the established cropping systems. During this visit, we met with agronomist Jojo Laina at the IIAM research Center outside of Inhambane and evaluated a soil transect from the coast to 20 miles inland. In Maputo, we met with Angela Hogg and Almeida Zacarias who are US Embassy personnel and updated them on our USAID SANREM CRSP research goals and progress. We met with Federico Vignati who represents UNWTO/STEP in Mozambique regarding our research plans and how they might mesh with his organizations objectives and programs.

**Maize plots, Maphutseng, Lesotho**

In late November / early December last year Dr Forbes Walker and Dr Neal Eash established a total of 220 soil fertility plots at Maphutseng, Lesotho:

1. Two N rate studies (N as LAN @ 0, 50, 100, 150 and 200 kg per ha plus 60 kg P2O5 and 30 kg K2O per ha) on an ultisol-type, red soil and a more fertile, mollisol-type, black soil under no-till
2. Two P rate studies (P2O5 as SSP @ 0, 30, 60, 90 and 120 kg per ha plus 150 kg N and 30 kg K2O per ha) on an ultisol-type, red soil and a more fertile, mollisol-type, black soil under no-till
3. Two K rate studies (K2O as KCl @ 0, 20, 40, 60 and 80 kg per ha plus 150 kg N and 60 kg P2O5 per ha) on an ultisol-type, red soil and a more fertile, mollisol-type, black soil under no-till
4. Two nitrogen rate studies using urea (0, 1, 2, 3 and 4 bags per ha) and LAN (0, 2, 4, 6, and 8 bags per ha) assessing the N rate responses in a oat / grazing vetch cover crop under no-till

5. One NPK plus LAN study (150 kg 6.2.1 per ha plus 0, 1, 2, 3, and 4 bags LAN per ha) and N (N as LAN @ 0, 50, 100, 150 and 200 kg per ha plus 60 kg P₂O₅ and 30 kg K₂O per ha) on a more fertile, mollisol-type, black soil under no-tillage

Observations were made on all these studies. All the plots are looking well managed, weeded and have a good yield potential.

Three days was spent servicing the four Bowen’s ratio carbon units in Maphutseng, Lesotho. This included replacing some of the vacuum pumping and gears, fitting replacement batteries and checking for problems with other components in the systems.

**National University of Lesotho, Roma, Lesotho**
The University of Tennessee team visited Dr. Marake and others at the National University of Lesotho (NUL). We met with Dr. Sharon Siverts, Vice Chancellor NUL and Sebehela Selepe, NULs Bursar.

**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

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**Appendix I:**

**Trip Log for Mozambique and Lesotho Trip, March 2013**

**Friday 1<sup>st</sup> March.** Arrive Johannesburg on flight from Atlanta. Overnight in Johannesburg.

**Saturday 2<sup>nd</sup> March.** Fly to Beira, Mozambique. Meeting with Clean Star Mozambique; visit cassava fertility plots at Dondo.

**Sunday 3<sup>rd</sup> March.** Meeting with Clean Star Mozambique agriculture extension team to discuss cassava fertility trials, Beira.

**Monday 4<sup>th</sup> March.** Meeting with Franziska Steinbruch, GIS specialist, Beira. Walker travel to Dondo and Vanduzi with Julius Mapanga. Meeting with CIMMYT team at Phoenix Seeds, Vanduzi to tour cover crop seed production. Night in Chimoio.

**Tuesday 5<sup>th</sup> March.** Visit to Sussendenga research station and CIMMYT / IIAM demonstration sites. Night in Chimoio. Eash to Inhambane via Maputo.
**Wednesday 6\(^{th}\) March.** Visit to CIMMYT / IIAM demonstration sites Lamago area. Night in Chimoio. Eash in Inhambane evaluating soils and cropping systems.

**Thursday 7\(^{th}\) March.** Visit to CIMMYT / IIAM demonstration sites Catandica area, Malongwe, Nhanizinga. Night in Chimoio. Eash in Inhambane evaluating soils and cropping systems.

**Friday 8\(^{th}\) March.** Visit to CIMMYT / IIAM demonstration sites Gondola area. Walker and Eash return to Beira. Eash has meetings in Maputo.

**Saturday 9\(^{th}\) March.** Field visits to CleanStar cassava sites at Dondo, Mille Quatorze and Savanne. Night in Beira

**Sunday 10\(^{th}\) March.** Wrap-up meeting with CleanStar agricultural extension team leader, Beira

**Monday 11\(^{th}\) March.** Flight to Johannesburg from Beira. Collect rental car and equipment in Johannesburg. Overnight in Heidelburg.

**Tuesday 12\(^{th}\) March.** En route to Lesotho by car. Overnight at Maphutseng, Lesotho

**Wednesday 13\(^{th}\) March.** Check on 220 NPK maize fertility plots at Maphutseng. Service Bowen’s ratio carbon units. Overnight at Maphutseng, Lesotho

**Thursday 14\(^{th}\) March.** Service Bowen’s ratio carbon units. Overnight at Malealea, Lesotho

**Friday 15\(^{th}\) March.** Travel to Roma for meeting with Dr. Marake and Vice-Chancellor, National University of Lesotho. Return to Johannesburg for flight to Amsterdam.

**Saturday 16\(^{th}\) March.** Return to Knoxville.