To participate in and monitor 'Small-scale farmer utilisation of diatomaceous earths during storage' project activities in Tanzania

14/10/02 – 13/12/02

Tanya Stathers

Background

The 'Small-scale farmer utilisation of diatomaceous earths during storage' project (R8179) began in mid June 2002. This project builds on the findings of our work in Zimbabwe which showed that diatomaceous earths (DE) offered an alternative to organophosphate insecticides and were effective in controlling post-harvest insect pests in maize, sorghum and cowpeas stored for >8 months, enabling households to increase their food security and control over grain sales. The current project was developed in response to requests from the Tanzanian Ministry of Agriculture and Food Security to trial DEs in semi-arid regions of Tanzania where producers have constantly prioritised storage losses, and where the devastating larger grain borer is endemic. Apart from commercially available DEs, local sources of DEs will also be evaluated for their potential as sustainable low cost sources of DE. New knowledge will be promoted using the information pathways specific to the different user groups.

Objectives

1. To assist the DE registration discussions
2. To participate in the 16 week grain sampling and analysis at all trial locations
3. To coordinate project implementation with project partners
4. To participate in initial post-harvest information flow studies
5. To assist in obtaining samples of local diatomaceous earth

Achievements

Objective 1. To assist the DE registration discussions

1.1 Unfortunately immediately following my arrival in Tanzania, William Riwa was informed that as funds had finally been released he would have to attend numerous task force meetings and training courses for the following four weeks. This was disappointing given that we had planned our itinerary long before these meetings were planned. However despite this, we managed to discuss and plan our presentation for the Pesticide Approval and Registration Technical Subcommittee (PARTS) of the National Plant Protection Advisory Committee (NPPAC), undertake the 16 week sampling and analysis at Mlali village Kongwa together and arrange for William to meet both Mike Morris and Brighton Mvumi on their arrival in Tanzania.

1.2 Riwa arranged a meeting in Morogoro on the evening of Thurs. 17th Oct, following his task force meeting which had been looking at delineating responsibility for different work areas following the amalgamation of Tropical Pesticide Research Institute (TPRI) and the Plant Health Services (PHS). Riwa, Rachel, myself and Mr Rwazo (Registrars office TPRI), Mrs Mary Macha (in charge of pesticide inspectorate services), Mr Mabibu Maharanga (pesticide inspector TPRI), who are all involved in pesticide registration attended the meeting. During their task force meetings the issue of adulteration of Actellic Super dust (ASD) had arisen numerous times and they were keen to learn about potential alternatives to ASD. They mentioned there are three products currently being registered as new grain protectants in Tanzania (including Stocal Super – Balton (T) Ltd., Shumba Super - EcoMark Ltd). Following a brief presentation I gave on DEs and the Tanzanian trials, there were many questions. They were under the impression that given that DEs were registered in other countries, and that they are natural products with low mammalian toxicity and might be present in Tanzania they could be treated in a similar
fashion to neem which does not require a formal registration procedure. They agreed that it would be best if we gave a short presentation on DEs to the next PARTS meeting.

1.3 The PARTS meeting dates were rearranged several times while they waited for the funds to be released, and it was only at the last minute members were informed. As requested I delivered the paper to the members, and was given a time for the presentation. Later I was informed that the committee had now decided it was not the correct forum to discuss DE registration in Tanzania, so the presentation was cancelled. Riwa has since suggested that he could organise a workshop involving TPRI staff, researchers and private agrochemical representatives to discuss DEs in Tanzania using his division's awareness creating funds.

1.4 While in Arusha we took the opportunity to visit TPRI, it was surprising how unused many of the labs and equipment were. We also met with Mrs Macha, Mr Rwazo again, and spoke to the Registrar Mr Jonathan Ak'habuhaya <TPRI@habari.co.tz>. It appeared that Mr Ak'habuhaya while acknowledging the importance of alternatives to ASD for Tanzania, found it strange that we were doing research on DE's but would not be wanting to register a DE product ourselves. He felt we were doing the private sectors work for them, there appears to be an unusual combination of commercial roles for TPRI in generating the trial data as well as assessing submitted data for registration. Discussions about local deposits of DEs and mining rights and how this might affect farmers indigenous knowledge rights also proved interesting. We were given a product registration application form, it appears that a technical report on the first storage seasons data should be sufficient for submission for experimental (temporary) registration of DEs, although the application would need to be submitted to TPRI by the private sector. Pesticide registration regulations can be accessed via the government web site www.kilimo.go.tz. Action point: Project team to increase contact with interested private sector companies and ensure they are kept updated on the trials progress. Tanya to start completing the pesticide registration application form (which is similar to the one I completed for Zimbabwe).

Objective 2. To participate in the 16 week grain sampling and analysis at all trial locations

2.1 Mlali maize storage trial: Riwa, Rachel Mosha and myself visited the Mlali farmers involved in the trial and took the 16 week grain samples, we were accompanied by Bwana Isere (village agricultural extension officer), Damion Gassana (Zonal co-ordinator for the plant protection issues in the Central Zone), Mr Watter (District Extn Off.) and Mr Mabuga (Zonal Plant Protection Off.). It interested and impressed all that the control and traditional (animal dung ash) treatments could be identified so easily by the number of Sitophilus zeamais crawling on the outside of the sacks. Despite all the sacks being stacked on top of each other very few if any insects were evident on the outside of the sacks of the DE and synthetic pesticide treatments. The farmers also studied the samples taken in clear plastic bags, which facilitate easy observation of damage. We analysed the samples at the Kurasini plant quarantine lab in Dar. The data supported visual observations that insect damage in the untreated control and traditional protectant is increasing more rapidly than in the DE and synthetic pesticide treatments. These early results are encouraging and it is likely that as the storage season continues the differences between the treatments will increase.

2.2 Visual photo noticeboards: I had prepared the English version of these for each of the trial sites, however due to busy work schedules little progress had been made on the Kiswahili or Kisukuma translations. Rachel Mosha and colleagues managed to finish the swahili version following my arrival in time for the Kiswahili posters to be completed and then carried by Mike Morris. The Kisukuma translation was not completed until December. The noticeboards (see attached document on A1051 NRI PID) which summarise the trials and contain photos of the communities during the setting up of the trials were welcomed by the communities, extension officers and project staff. Action point: Tanya to complete the Kisukuma poster versions by February.

2.3 Project flyer: A flyer (in English) was developed which summarises the project activities including information on the use of DEs and is intended for dissemination amongst a wide range of stakeholders. This material, which was widely distributed during this visit, has prompted considerable interest. (see attached document on PID)
2.4 **Babati - Arri (maize) and Singe (beans) storage trials:** As for the Mlali maize trials, insects were seen crawling over the untreated control sacks, causing one of the farmers to comment ‘surely you are going to add a protectant to those control grain sacks now’. Unfortunately the mini vihenge were not finished and despite having left the funds in July none of the lids had been plastered, so the grain was still in sacks. We have now developed a system where all payments are detailed on four forms, which are kept by village administration, district extension, local project staff and project leader. We visited the Arri trial with the Farm Africa farmer research group (FRG) co-ordinator Mr Kasindei, who has been involved with farmers groups in Arri for some time. Juma the chairman of the Arri FRG showed us some of the storage trials he had set up in September at his homestead using botanicals and ash (e.g. neem, pyrethrum, animal dung ash, rice husk ash, giri giri mo and animal dung ash). Another very interested farmer (Peter Modest) described how he used sisal ash which protects maize grain for >10 months storage. At Singe, the beans are stored in small 10kg jute sacks in a village godown, the community are not very involved in the trial in comparison to the other sites. Sample analysis proved difficult due to problems accessing a suitable balance we eventually hired the Tengeru seed unit one for the evening. In future Mungara will travel to the Kurasini lab for sample analysis. We organised for a TPRI lab to conduct the moisture content analysis. As at Mlali the Arri data is very encouraging with much lower damage levels and insect number in the DE and synthetic pesticide treatments. To date no damage is visible in any of the bean treatments, although the presence of bruchid eggs on untreated beans suggests this might have changed by the next sampling. **Update:** Arri vihenge were completed and grain loaded into them in early January. **Action:** Tanya to investigate cost of digital balance.

2.5 **Shinyanga – Mwamakaranga (maize) and Kishapu (sorghum) storage trials** – the shelters the farmers had constructed over both sets of vihenge were impressive, although the arrival of the rains meant that the sides need additional protection. As at the other sites damage appeared to be greater in the untreated and traditional protectants and the farmers appeared impressed. The shorter sampling spears I’d had made were a great improvement. Damage analysis was done at the IPM lab, the heavily damaged sorghum grain is very time consuming and payments to the hired helpers have been increased to reflect this.

2.6 **Moisture content analysis:** Unfortunately moisture content (mc) analysis at all sites has been problematic, it appears that use of moisture meters results in a highly reduced mc value for any grain admixed with synthetic insecticide, ash or DE compared with untreated grain and this error is unacceptable. However, there are very few laboratories in Tanzania where an oven method of mc measurement is used, Govt Chemists charge 14,000TSh/ sample while the Tanzanian Bureau of Standards charge 7,000TSh/ sample. Given that we have 28 samples every 8 weeks from each of 5 trials sites the cost would be prohibitive. The most important criteria for the trials are number and weight of damaged and undamaged grains and insect species numbers, so mc analysis is an additional measurement that can be useful to help hypothesise if the DEs did not function well etc. (DEs are known to be less effective under high relative humidity). Given the problems we devised a temporary plan for mc analysis of samples every 16 weeks at various labs near each of the trial sites. **Action point:** Tanya to discuss with Andy Deveraux.

2.7 **Data management:** I entered all the current storage trial data into the computer and produced simple damage graphs in kiswahili and english, these were used in discussions with stakeholders and will be laminated and added to the photo noticeboards at the trial sites.

**Objective 3. To coordinate project implementation with project partners**

3.1 **Project staff changes:** In Aug/Sept 2003, Mathias was promoted to the position of National Co-ordinator of the newly formed Post Harvest Management Services (PHMS) of the Tanzanian Ministry of Agriculture and Food Security, unfortunately despite his personal interest in the project and the fact that the project still falls under his job description his line management were initially unwilling to release him to enable his continued collaboration with the project which caused some difficulties in project operations in Tanzania, but also highlighted opportunities for increased involvement of other officers (Rachel Mosha and Mungara). The PHMS are now established and are developing a post harvest strategy for the country, they have confirmed that they wish to be strongly involved in this important project, although Mathias’ involvement can no longer be on a day to day basis.
3.2 Brighton Mvumi (post-harvest specialist, University of Zimbabwe) and Mike Morris (institutional specialist, NRI) visit to Tanzania from 27 Oct-11 Nov. Due to the security situation in Zimbabwe, it was not possible for NRI staff to visit and so Brighton joined us in Tanzania to help with project activities and discuss plans for the Zimbabwean project activities. Mike Morris' involvement with the project focuses mainly on Outputs 3, 4, 5 and 6, he decided it would be beneficial for him to visit the project at the same time as the 16 week grain sampling at all sites enabling him to engage with the project and the technical activities, Mike's BTOR (V9365) is on the PID. Action point: Tanya to discuss appropriateness of sensory evaluation for DE treated grain consumer evaluation trials in Zimbabwe with Keith Tomlins, Brighton to locate the ICRISAT seed germination test information. Mike to communicate with Brighton regarding planned stakeholders workshop.

3.3 Internal reporting and project website: During the visit we decided that it would be beneficial to have a regular reporting strategy following each visit to the field site to highlight interesting issues and keep the team updated. This information will be incorporated into a project newsletter for circulation to the project team and interested stakeholders. The team also supported the idea of developing a project website. Action point: Tanya to put together first edition of DE project newsletter and website following submission of Q3 report.

3.4 Finances and advances: Advances of TSH 1,000,000 were left with Katua at the Shinyanga IPM office, and TSH 160,000 with Mungara. The remaining balance of the project advance I had carried TSH 3,755,000 was paid into the PHS Quelea Quelea account. Receipts for the TSH 415,00 (the previous advance) were collected from IPM Shinyanga team. PHS Temeke are still experiencing large delays accessing project receipts from their accounts dept.

Objective 4. To participate in initial post-harvest information flow studies

4.1 Babati stakeholders: On our arrival in Babati the project team (Mungara, Rachel, Mike Morris and myself) sat down and discussed the project and all the outputs. Given the pressure we were under in July during the trial set up (and the fact that it was Mike's first physical contact with the project) it was important to ensure we all had a similar view of the activities and how they fitted into the overall project, it was also important that Mungara who is based at Tengeru feels confident enough about the project and ownership of aspects of it to discuss it with other stakeholders. Project staff changes and workloads mean that Mungara and Rachel will now both play larger roles than originally anticipated, which is very positive for the project from a geographical view point. We made follow up visits to the district extension officer (Mrs Msffe and Mr Maige) and the FARM Africa team (note Barbara O'Neill has resigned, we met the acting team leader Mr Ngowe and the FRG co-ordinator Mr Kasindei). FARM Africa have 6 key projects (village development plan; animal health; farmer participatory research; dairy goat; Babati agriculture and environmental education project, forest management) and have been very keen on collaborating since the projects inception. We also met and discussed the project with

- a Ministry of Agriculture irrigationist (Mr Mirisho) who is working with farmers who have previously tried to irrigate rice, he was interested in the potential of DEs on rice as farmers are keen to store rice rather than paddy to reduce the volume.
- the Land and Agriculture Management Project (LAMP) (Mrs Msffe – coordinator, Mrs Ulla-Mai Jern – development adviser) who reinforced the need for grain storage protection in the area and informed us that they are going to fund a TPRI post-harvest management proposal in the near future.
- the Babati district council executive director (Mr Raphael Mbunda (DED)) who gave the project his full support and said he would ensure his councillors were aware of the work.
- stockist – Tanganyika Farmers Association Babati (Mr Riwa) who was interested in hearing about other products, he had posters on the new Stocal Super, and also sells ASD and phostoxin tablets.
- DALDO (Dr Munro) who described the food relief activities in the area which are managed by WFP and the Diocese and seemed particularly concerned about storage protection for large scale producers, recognising that an admixed DE would not be practical.
The project team identified stakeholders and made a preliminary diagram to represent their roles, proximity to the project and interaction with each other.

4.2 **Shinyanga Grain Storage Stakeholders Workshop:** Prior to arrival I had informed the Shinyanga team that in addition to the field trial work we would also meet with locally based post-harvest stakeholders to learn about the flow of post-harvest information between different stakeholders and to update them on the projects progress. On arrival we decided to arrange a half day workshop to bring them together at the end of the week. Full details of the workshop and its outcomes will be given in a separate report when finalised (see attached documents on PID) and are therefore not repeated in this BTOR.

4.3 **Private sector contact:** Due to flight problems Brighton Mvumi was not able to join the team as planned, so we arranged that he would use the waiting time in Arusha to visit agrochemical companies and update them on the Zimbabwean work with DEs. His visits to *Monsanto*, Mukpar Ltd, *Twiga Chemicals* and *Balton* are detailed in a separate report (see attached documents on PID), Twiga and Balton appeared interested in the project. In Dar I also paid a visit, to *Balton Tanzania Ltd.*, who are an Israeli/English agrochemical company producing Stocal Super dust (which is now registered in Tanzania), it is the same formula as ASD but is formulated in France and then imported to Tanzania to try and reduce adulteration problems. It currently costs the same price as ASD and will be even cheaper next year when it is shipped as opposed to airfreighted to Tanzania. The packaging is remarkably similar to that of ASD. Balton Tanzania are also looking at introducing the volcanic cube. *SAPA Chemical Industries Limited* were not interested at all in grain protectants and only deal with tobacco and livestock pesticides. **Update:** Balton have since written to express their interest in being involved in the registration of Protect-It in Tanzania.

4.4 **Existing information dissemination:** I visited the ‘Ukulima wa kisasa’ (modern farming) office and met the incharge Mr H.L. Nyangi <fepu@twiga.com> to discuss existing post-harvest materials. The office is under the Extension Department of the Ministry of Agriculture and Food Security, and produce radio programs (2/week), videos and mobile video shows, the ‘Ukulima wa kisasa’ farmers magazine (15,000 copies/ issue sold for Tsh 200 each, 6 issues/year), the extension newsletter (in English, 300 copies/ issue distributed free to agricultural officers, 6 issues/ yr), swahili booklets, leaflets (12 titles/ yr freely distributed) at least one of which is on good storage practice (*Hifadhi bora ya nafaka*). Projects can have materials printed at cost there. I also visited the Information Management Development Unit (IMDU) at Temeke, storage pests are mentioned in the Tanzanian crop pests book they have, and they mentioned the forthcoming post-harvest materials from PHMS.

**Objective 5. To assist in obtaining samples of local diatomaceous earth**

5.1 **Local DE samples:** following numerous difficulties in obtaining information about and samples from Tanzanian DE deposits, Riwa went in person to the Dodoma Ministry office and collected from a chaotic store room diatomite samples from both Kagera and Singida. The Singida sample was surprisingly a hard grey rock, while the Kagera sample was in the more expected form of soft white absorbent powdery lumps. This sample will be sent to Korunic for further analysis. Riwa is still trying to track down the Bahi sample, but the Dodoma office can not yet locate it in their store room.

5.2 **Import of DE into Tanzania:** The Tanzanian Ministry of Minerals and Energy mentioned records of Cocacola importing large quantities of diatomite from Kenya, presumably for use in filtration. I visited the Cocacola factory in Dar and after considerable explanation managed to find out that following their change to South African ownership in 1996 they now use cartridge filters for syrup filtration where previously they used the Kenyan DE products Kensil Superfine and Kensil 90. Some of the Tanzanian Cocacola factories (e.g. Mwanza) are not under South African management and may still use DEs in their filtration process. It would be worth investigating further, as there may be economic advantages to using already mined regional DEs if the efficacy against storage insects is high.

**Miscellaneous**

- As mentioned in my previous BTOR (Visit 9169) the Tanzanian Ministry of Agriculture and Food Security have now established a Post Harvest Management Services Division with a head office in the Kilimo building at Temeke:
Six zonal coordinators have also been appointed:
Northern Zone (Arusha, Manyara, Kilimanjaro & Tanga) – Mr K.K. Mngara
Central Zone (Dodoma, Morogoro & Singida) – Mr Damion Gassana Rwabufigiri
Southern Highlands Zone (Mbeya, Rukwa, Ruvuma & Iringa) – Mr Emanuel Joo
Lake Zone (Mwanza, Mara & Kagera) – Mr Henry Kolowa
Western Zone (Shinyanga, Tabora & Kigoma) – Mrs Josepha Mapunda
Eastern Zone (Dar es Salaam, Coast, Lindi & Mtwara) – Mrs Flora Kapama

Currently PHMS are involved in carrying out an inventory of all post-harvest research work and dissemination materials that exist, this information is being amalgamated and translated into Swahili and will then be distributed free through the local government structure to farmers. They are keen to highlight the fact that post-harvest is not just storage, and that they are focusing on: pre and post harvest technologies; on-farm processing; transportation; preparation of produce prior to storage; storage management; storage structures and processing and packaging technologies including nutritional aspects. Many NRI information booklets are being used and they are keen to get hold of copies of any information we may have for their new resource centre. **Action point: Tanya to send flyer on Tropical Pest Management for Grain Storage electronic distance learning course and details on how payment can be made and info on MSc Natural Resources (PHT).**