DE project teams' notes to TVE

A brief description of the project just a couple of paragraphs with some background information and a description of what you are doing, how this works, where it takes place, what the benefits are and who the beneficiaries are.

Background information

'Small-scale farmer utilisation of diatomaceous earths during grain storage' project.

Diatomaceous earths, are soft whitish powders formed from the fossils of tiny organisms (planktons) which live in oceans, rivers and lakes. When diatomaceous earths come into contact with insects they absorb the wax from the skin of the insect, the insect then looses water, dehydrates and dies. By mixing diatomaceous earths with grain, we can kill the insects that try and attack the grain. Diatomaceous earths have extremely low toxicity to mammals and are therefore very safe to mix with food.

Following the finding that diatomaceous earths were effective grain protectants against insect damage for small-scale on-farm storage systems in Zimbabwe, further work to evaluate these fossil dusts was initiated in Tanzania where the larger grain borer is already widespread. The larger grain borer (LGB, *Prostephanus truncatus*) is the most destructive of the storage insect pests, causing storage losses of up to 40%. *P. truncatus* is believed to have arrived in Africa from Central America in a food aid shipment in the 1980's. The pest multiplied rapidly and caused such destruction to farm stored maize that farmers in Tanzania marched on parliament demanding help. *P. truncatus* has now spread throughout many countries in East, West and Southern Africa, but to date has not yet reached farmers stores in Zimbabwe. So although the field trials in Zimbabwe showed that diatomaceous earths could offer protection against insect attack for periods longer than 8 months, this was not in the presence of *P. truncatus*.

Farmers throughout Tanzania are known to suffer serious losses to their stored produce due to insect damage. For many people these losses threaten household food security or undermine market returns, which drives them to seek improved but affordable treatment options for their grain during storage.

In addition to many of the traditional storage protectant practices such as admixing with ash or plant materials, and funds allowing they can purchase synthetic chemical pesticides. The main one is Actellic Super dust, an organophosphate-pyrethroid cocktail (pirimiphos methyl and permethrin, respectively). *P. truncatus* is not killed by the organophosphate alone, and insects such as *Sitophilus* spp. are not killed by the pyrethroids so the cocktail is used to control the full spectrum of insect pests.

Unfortunately, since the distribution of this product was privatised, farmers have experienced widespread adulteration problems. One farmer in Shinyanga region actually managed to breed *P. truncatus* in what had been sold to him as Actellic Super dust. The government and the supplier have been working together to try and reduce these problems.

In response to farmers' demands for alternative grain protectants, a collaborative research project - *Small-scale farmer utilisation of diatomaceous earths during storage* - was launched in June 2002. The collaborators include the Tanzanian Ministry of Agriculture and Food Security, the UK Natural Resources Institute, the University of Zimbabwe, the Zimbabwean Institute of Agricultural Engineering, EcoMark Ltd, and Diatom Research and Consulting, and the project is funded by the DFID Crop Post Harvest Programme.

More information about our project is available from the projects website: www.nri.org/de/

What we are doing, how and where and who the beneficiaries are

Community-based researcher-managed trials were set up in three regions of Tanzania (Shinyanga, Dodoma, Manyara) to explore, identify and promote safe, effective and affordable grain protectants for rural households, including those in LGB-infested areas. Some of the data collected during the 2002/3 storage season and farmers assessments of the grain treatments is shown on the projects website www.nri.org/de/. During the 2003/4

storage season, the treated commodities included maize, sorghum and beans; the treatments were:

- the commercially available DEs, Protect-It® and Dryacide® at two concentrations of 100g/100kg and 250g/100kg;
- Protect-It® (100g/100kg) in combination with permethrin (2mg/kg);
- Actellic Super dust (100g/90kg);
- Stocal Super dust (100g/90kg);
- a traditional treatment, which varies between locations but is typically an admixture of animal dung ash or dried plant material;
- a local Tanzanian DE from the Nyakanyasi rocks, Kagera river deposit (250g/100kg);
- and an untreated control

In Zimbabwe, on-station trials using small-scale farm stores, were set-up at Hatcliffe farm, Harare. The treatments which were applied to maize, included: a local Zimbabwean DE from Chemutsi deposit in the Zambezi Valley at 3 concentrations of 100g/100kg, 200g/200kg and 250g/100kg; Protect-it 100g/100kg; Actellic Super dust 50g/100kg; and Untreated control.

Farmer-managed trials which aim to enable the project team to develop a focused understanding of the factors which influence farmer decision-making with respect to grain storage technologies to better facilitate the uptake of DEs were set up in Tanzania and Zimbabwe during the current 2003/04 storage season. Team members have developed and are pre-testing and refining a methodology to explore the determinants of household post-harvest decision making.

In Zimbabwe a private company has applied for temporary registration of Protect-It as a grain protectant following the success of the earlier field trials. In Tanzania, awareness raising visits have been made to key stakeholders, and the private sector is already showing interest in registering DEs as grain protectants.

To optimise the eventual uptake of DEs and other effective grain protectant treatments, account is being taken of the manner in which different farmers (e.g. by storage technology use, gender, education, wealth) access and share storage knowledge, and of the capacity of intermediate agencies to share information with rural households and influence policy. Key grain storage stakeholders at the project locations have been identified, and a preliminary analysis of the quality and quantity of information networks and flows amongst intermediate users is planned

The project is keen to ensure that the knowledge generated is widely communicated and made available to end and intermediate users in forms they can utilise and adapt, and along with other materials, a project website incorporating much of this information has been developed (http://www.nri.org/de/).

What are the main elements of the work you are doing?
Village based, researcher and farmer managed grain storage trials in Tanzania and Zimbabwe.

[Development of the DE technology through research: notably use of storage structures (vihenge, sacks) containing grain treated with different protectants/concencentrations kept under constructed sheds or small-scale farmers homestead, regular monitoring of grain infestation and damage due to pest in the field by farmers and researchers including laboratory analysis by researchers and other stakeholders, evaluation of results by both farmers and reseacher at different times during and at the end of each storage season, dissemination of project outputs (preparation of written material eg. posters, flyers, newsletters, video tape for mass media etc)]

Are you introducing particular technologies that we could profile?
We are working with various stakeholders to assess the efficacy and acceptability of diatomaceous earths as grain protectants for small-scale tropical on-farm grain storage.

What activities would we be able to see and film?
Sampling of the different grain treatments used in the trials, evaluation of the different grain treatments by different wealth/ gender groups of farmers at the trial sites, discussion about

efficacy and acceptability of the protectants with farmers involved in the trials, different levels of insect infestation of grain samples.

Who are the key people involved?
The DE project team, the communities in the villages where the trials are happening, extension workers in the villages where the trials are happening.

What are the lessons that viewers could learn from your work?
The importance of post-harvest protection of grain in terms of food security, the factors affecting grain protection choices, the problems associated with grain protection at the farm level.

Is this transferable, could it be applied elsewhere?
This technology is transferable. Producers throughout the world could use it to help protect their produce during storage, as long as their produce can be dried sufficiently and not stored under high humidity conditions during the storage season. We have already been contacted by individuals from many different countries interested in carrying out similar work with farmers facing high post-harvest losses in their own countries.

Are there seasonal considerations to bear in mind when considering when to come? When would we be able to see the most activity? What time of year do you think would be best for us to come (considering weather conditions, seasonal variations, busy times, your own travel plans and schedules)?
A good time to come to Tanzania would be May 2004 (exact dates depending on projects timing of farmer assessment of grain protectant treatments following 10 months of storage) this happens to also be the cooler time of year and a time when farmers will be beginning to harvest crops, starting to dry some grain, replastering their storage granaries etc. Please note the storage trials are unloaded in May so from June onwards there would be nothing to film until the setting up of the trials for the following season, and really the most interesting visuals will be once there are differences between the treatments, so May is the perfect time for this.

We feel that given the current political situation in Zimbabwe, it would be unwise to attempt to enter and film inside Zimbabwe and so propose that visiting the projects work in Tanzania would be the better option.

How long does it take to travel to the location?

There are several airlines flying the London – Dar route including BA, Emirates, KLM, Kenya Airways etc its usually a 10-11 hours trip.

We have several field sites around Tanzania (Shinyanga – W. Tanzania; Babati – N. Tanzania, Kongwa – C. Tanzania), but for ease of travel and logistics we think it might be best to visit the site in at Mlali Iyegu village in Kongwa district, Dodoma Region, Central Tanzania. Which is about a 5 hour drive from Dar Es Salaam. You will need to organize hiring a vehicle etc as the project team members are likely to travel to the site in advance of your visit.