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**DEVELOPMENT OF PROTOTYPE MOBILE SEED DRESSING APPLICATORS  
SUITABLE FOR AFRICAN COUNTRIES**

US/RAF/88/273

**Technical report: Findings and recommendations\***

Prepared for the Governments of the Republic of Zambia and the United Republic of Tanzania  
by the United Nations Industrial Development Organization

*Based on the work of J. E. Elsworth,  
Chief Technical Adviser*

Backstopping Officer: B. Sugavanam, Chemical Industries Branch

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\* This document has not been edited.

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**Report on 8th Visit. Nairobi, Kenya;  
Arusha, Tanzania;  
Lilongwe, Malawi;  
Lusaka, Zambia.**

**March 25th to April 28th 1995.**

**Author: J. E. Elsworth, Project C.T.A.**

## **1. Background**

The mainstay of the economies of the PTA countries is agriculture. Regional and national strategies accord the highest priority to attaining self sufficiency in food. The policy on pest control is to use Integrated Pest Management, of which Seed Treatment is an important component.

The project is to develop a mobile Seed Treating machine to be available to rural farmers for effective, safe and affordable treatment of their home saved seed. Initially, it is focusing upon Zambia and Tanzania.

The first visit by the C.T.A. was made in Sep / Oct 92 for familiarisation of the context for the machine. Broad recommendations for the design approach were made during that visit.

The second visit was in Nov / Dec 92, to coincide with the Zambian planting season, for the treatment of trials seed. A European machine - the 'Rotostat' P500 - had been imported into Zambia as a basis for the project and to test the recommended principle with local seed varieties. Other aspects of the project were also progressed in both countries, particularly the choice of manufacturer.

The third visit was in March / April 93. A second European machine - the Hege - had been imported into Tanzania for the same reasons. This machine was demonstrated to enable seed to be treated for three purposes. Other aspects of the project were progressed in both countries, including the attending of the first project workshop in Arusha and an inspection of the Zambian trials.

The fourth visit was in Oct / Nov 93. Trials were conducted in Zambian villages on the P500, and the prototype machines from the European Contractor, and Zambian Engineering Institute. A start was made on Market Research. Plans were made for trials in Tanzania in Feb / March 94.

The fifth visit was to Tanzania only, in Feb / March 92, and was to conduct trials on the prototype from the Tanzanian Engineering Institute, and a second prototype from the European Contractor.

The sixth visit was to check on results and to plan the next phase in Tanzania, to plan for trials in Malawi, and to check progress, plan trials and attend the second review meeting in Zambia.

The seventh visit was to attend the PTA Trade Fair in Maputo, and to check on progress and assist with planning the next phase in Zambia, Malawi, and Tanzania.

The current visit - the 8th in the series - was to arrange the procurement of chemical, to check on and assist with the manufacture of pilot batches of machines, and to plan for semi commercial trials during the forthcoming harvest.

## 2. Summary.

In Nairobi, three chemical companies were visited for discussions on both the short and longer term procurement of chemical products. No company was able to offer a guaranteed supply of product to the specification desired at the time required. However, TriChem offered to try to find a supply of 'Fernasan' D - the preferred product.

In Tanzania, the design of a pilot production batch of tractor driven machines was finalised, and plans were made for training of operators, for the selection of proving sites, and for further biological trials.

In Malawi, preliminary tests were conducted on the contractors prototype machine in preparation for the proving trials needed before field work can be authorised.

In Zambia, the three locally built prototype machines were examined. Considerable shortcomings were noted and recommendations for rectification made. An different NGO to that originally intended was selected for co-operation on commercial farmer trials.

### **3. Recommendations.**

- 3.1 That 500kg of 'Ferasan' D be purchased from TriChem for the Tanzanian harvest season.**
- 3.2 That the intended purchase of 'Thirasan' M be shelved because the new co-operators appear to have their own supplies.**
- 3.3 That 50kg of 'Ferasan' D be purchased by Chitedze via the shortest practical route, which may mean from a stockist in southern Tanzania.**
- 3.4 That TDAU carry out rectification work on the two machines in their possession, broadly to the design recommended in the previous report.**
- 3.5 That the author return to Africa in June to assist with the training programme in Tanzania, and to assist with the field trials taking place in all three countries during the harvest period. This trip would also take in the 1995 Review Meeting.**

### **4. Acknowledgements.**

Once again, thanks are due to Mr Msolla, to Mr Kazembe, and to Dr Kwendakwema for facilitating the project during the visit to their respective countries.

## 5. Kenya.

### 5.1 Procurement of Chemicals.

The main object of the visit to Nairobi was to discuss chemical procurement with potential suppliers, who have their East African regional offices there. The preferred product would be 'Femasan' D.

The requirement for the forthcoming harvest season is calculated, based on the machine availability, as follows:

|  | Pedal machine | Tractor machine | Total |
|--|---------------|-----------------|-------|
| Availability:                                    |               |                 |       |
| Zambia:  | 3             | 0               |       |
| Malawi:  | 1             | 0               |       |
| Tanzania:  | 5             | 3               |       |
| No of days working:                              | 50            | 50              |       |
| Amount of seed treated per day (kg):             | 200           | 1000            |       |
| Rate of application (kg product per tonne seed): | 3             | 3               |       |
| Hence requirement (kg):                          |               |                 |       |
| Zambia   | 90            | 0               | 90    |
| Malawi   | 30            | 0               | 30    |
| Tanzania   | 150           | 450             | 600   |

Note: This would change if the chosen product had an application rate other than 3kg per tonne of seed.

The required time for the start of usage of this product is early May for Zambia and Malawi, and early July for Tanzania.

### **5.1.1 Twiga Chemical Industries Ltd.**

Zeneca manufacture 'Fernasan' D - our preferred product. There are no significant stocks available currently, and the next production planned will be too late. However, TriChem, one of Zeneca's distributors in Tanzania, has offered to find 500kg from the supply chain. This cannot be guaranteed but the indications are that the product will be forthcoming.

An alternative strategy is to manufacture a special batch of product using captan instead of thiram. Captan is a very similar chemical to Thiram, and has experimental registration in Tanzania. Stocks of formulated captan are held at the Zeneca factory in Nairobi.

The first option is the recommended one.

### **5.1.2 Bayer East Africa Ltd.**

Bayer have two products in registration trials in Tanzania. 'Raxil' is a straight fungicide, and costs about 2.5 times the price of 'Fernasan'. 'Gaucho' is an insecticide and costs more than 50 times the price of 'Fernasan'. Neither is a serious option for us because we need a combined formulation, because of the cost, and because there would be too many unknown factors.

### **5.1.3 Rhone Poulenc Kenya Ltd.**

Rhone Poulenc have a dry powder product called 'Murtano', containing the same ingredients as 'Fernasan'. It is not recommended for application as a slurry. Samples were given to the author for slurry testing, and this test was later conducted at TPRI in Tanzania. It indicated that a slurry made from the product is not stable over a period of hours. This is not considered satisfactory because frequent agitation by the user cannot be guaranteed and the effect of under and over dosing of the seed could be serious. Application as a dry powder is also not an option since the powder could not be controlled and would represent an inhalation risk.

'Murtano' is almost 4 times the cost of 'Fernasan' D.

## **5.2 FAO**

A discussion with Dr H Norton of FAO indicated that the Kenya Seed Company is still thriving and supplying the majority of the seed requirement of the country. This could change because the current assistance the company receives from the Kenyan government is likely to end soon. At present, the need for a rural farmer's machine does not appear to be high.



## **6. Tanzania.**

### **6.1 TEMDO**

Mr W. Baytani, the engineer assigned to the project had left TEMDO and the project is now assigned to the new chief designer, Mr R. Elimringi.

#### **6.1.1 Tractor driven machine.**

The suggested changes to the existing design had been worked into a new detailed design. Further suggestions were made and a slightly revised detailed design was agreed. TEMDO plan to build 2 machines to this revised design.

The existing prototype had been displayed at an exhibition in Mto Wa Mbu. The offer price was TSh950,000. (Approx US\$1,800 at the current exchange rate.)

#### **6.1.2 Pedal driven machine.**

TEMDO plan to build 4 machines to the design made by the contractor. A similar promotion had been made with an offer price of TSh450,000. (US\$850)

#### **6.1.3 Chemical handling system.**

A design for a metering pump working on the peristaltic principle, was proposed. This, together with a slurry mixing tank, proposed on a previous mission, would minimise the necessary handling of chemical. However, the cost would mitigate against it's use for the pedal powered machine.

#### **6.1.4 Plans for placement and training of users.**

A meeting was held between TEMDO and TPRI to agree on a strategy and plan for the placement of machines and the training of operatives.

A list of categories of users was drawn up, with some suggestions for actual sites within those categories. These were:

|  |                        |
|--|------------------------|
| Agricultural Training Centres                              | Tengeru                |
| NGOs   | ACT at Mto Wa Mbu      |
| Co-operative Unions  | Sakila village         |
| Missionary Centres   |                        |
| TFA Branches and Agents<br>(Tanzanian Farmers Association) | Caratu                 |
| Seed Growers   | (Consult with Tanseed) |
| National Service Farms                                     | Makuyuri               |
| Village Market Places (Entrepreneur)                       | Kikatiti               |
| Big Farmers  | Sanya Joo area         |
| Prisons  |                        |

Dr Uronu agreed to take responsibility for the liaison with these institutes, and for those that agree to co-operate, the nomination of a group of operators who will be trained in the safe use of the machines and in the handling of the chemicals.

The agreed training strategy was to train a set of 4 trainers at each of the participating institutes, i.e. 4 people from TEMDO and 4 from TPRI would become familiar with all aspects of the operation of seed treatment in the machines. At the beginning of the actual commercial trial, teams of two people, one from each institute, would physically deliver both the machine and a supply of chemical to the co-operating site and train the chosen operatives in all aspects of their use.

The training of trainers should take place in late June, with placement of machines following immediately since the harvest is likely to have started in some areas. The CTA will endeavour to be present at that time.

A draft training plan was tabled by the CTA and this will be further developed by Mr R Elimringi of TEMDO and Mrs D. Matemumu of TPRI. A suggested equipment list was also tabled.

Dr Uronu informed the meeting that he understood the project had been chosen for exposure at the May Day exhibition / conference in Mbeya, as an example of efforts to help the small holder farmer. The meeting agreed that the prototype machines should be exhibited there.

## **6.2 TPRI**

Discussions were held with Dr Uronu on the following subjects.

### **6.2.1 Field Trials - 1994**

The raw data from the trial has been sent away for processing. Until the processed data is sent back, no firm conclusions can be drawn. The indications from the raw data are that a significant yield increase was achieved by treating the seeds. No indications were made for the comparison between machines.

### **6.2.2 Field Trials - 1995**

A short rains trial was made. The beans had been planted late and did not do well. However, the treated plants suffered less bean fly damage than the untreated. The maize is not yet harvested.

A long rains trial, similar to the previous year, was in progress. The maize had been planted, but not the beans. Treatments were: tractor machine (5kg batch), SRI pedal machine (5kg batch), Hege machine (2.5kg batch), and untreated control. Chemical application in each machine was over an 8 sec period.

### **6.2.3 Trial on Storage Chemicals.**

Since the previous visit, some revisions had been made to the planned protocol. These involved additional treatments on clean grain, subsequently contaminated with a known quantity of live insects of both types.

In view of the additional cost of the grain, it was decided to omit the composite maize type, retaining only the hybrid.

Certain apparatus would be needed which is not available at TPRI, notably a battery powered scale of 0.1g resolution, and some weigh dishes.

### **6.3 TriChem Ltd.**

This company are one of two distributors of Fernasan D. Although nominally there is no product available, they consider that they can find 500kg for the project from stock in the supply chain.

TriChem are interested in the project, and in the possibilities for their future sales of 'Fernasan' D. They are a possible dissemination vehicle, and were willing to display the prototypes in their showroom.

### **6.4 Selian**

A discussion was held with Dr Ampofo on the control of soil insect pests of beans. The bean fly is a particularly important pest and can be controlled by treating seed with Carbosulfan or Lindane. (Endosulfan is banned in Tanzania.)

### **6.5 Sisu Tractors Tanzania Ltd.**

Are able to supply plough discs for the manufacture of rotors for seed treaters, and potentially other components. A number of addresses of primary suppliers were given.

### **6.6 T.F.A.**

The Tanzanian Farmers Association are potential disseminators of the seed treaters. They are also distributors of 'Fernasan' D. The suggestion of a test site at Caratu was made.

### **6.7 CUSO**

The director of this Canadian Development Agency promised to send literature on the seed treaters to the managers of his projects around Tanzania, with a request that they contact TEMDO for any follow up. Money could be found if the use of a machine is thought to be commercially viable.

### **6.8 Cargill Hybrid Seeds.**

Cargill are active in all three targeted countries and do not, generally, feel threatened by the current project. Seed treated by the current machines should be a distinct colour to differentiate it from certified seed. This might imply some other colour since the green colour in 'Fernasan' D is not dissimilar to the Cargill product.

## **7 Malawi**

The harvest in Malawi was just beginning at the time of the visit (2nd week April). Predictions over the country were said to be patchy; good in some areas, but very poor in many others, e.g. lakeside.

### **7.1 Chitedze Agricultural Research Station.**

The first instalment of the reimbursable loan had not been received although a visit to the UNIDO office revealed that it had been received there a fortnight earlier.

One of the Zambian prototype machines had been sent to the research station. The author inspected it and found several poor features which, between them, rendered the machine unfit for its purpose.

The following tests were made, using the SRI prototype machine.

#### **1. Inoculant on soybeans.**

- a) A 4.7kg batch of soya was treated with 7g of inoculant and 10g of sugar, previously slurried with 100ml of water. Treatment was good but the seed was very wet. The current method used at the research station was demonstrated: the same slurry mixed with the seed in a large bucket by hand. The hand mixing was inferior in distribution because free slurry at the bottom of the bucket was poured over the seeds as they were discharged onto a drying mat.
- b) The same inoculant and sugar was applied dry, after wetting the seed with 25ml of water. The treatment was again good, with the seed much less wet. A recommendation was made that further tests should be made with even less water to determine the minimum practical.

Test will be conducted to determine the effectiveness of the inoculant when applied by these alternative processes.

#### **2. Copper oxychloride applied to beans. (Variety: Bat 477)**

- a) At the request of Mr Charles Chikopa, working on the CIAT bean programme, the first test was a dry treatment. 4kg of seed was placed in the mixer with 12g of chemical sprinkled on top. The pedals were turned for about 10 seconds. At the beginning of pedalling, some powder was lost through the gap between rotor and rotor ring. After pedalling, there was a lot of free dust both in the atmosphere and inside the machine.

b) A second test was then conducted using slightly wetted seed. 5ml of water was applied to 4kg of seed in the machine, with about 3 sec application time, and 12g of powder then sprinkled on top of the seed. After 10 sec of pedalling, the powder was well treated onto the seed and the load appeared to be a lot higher than the dry application. Still a small amount of dust emerged from the rotor edge at the start of pedalling, but the atmospheric contamination was almost eliminated, and the machine contamination completely so.

### 3. Actellic dust applied to maize.

a) A dry application of 2g of Actellic dust was made to 5kg of maize. The chemical was not visible on the seed, but its presence could be detected by smell.

b) A further application of 2g was made to 5kg of pre-wetted maize, as in 2b above. Water application was 10ml on the 5kg. This time the powder was visible at the soft point of the seed.

### 4. Thiram applied to maize.

A slurry was made from 9g of 80% thiram powder, approximately 300mg of Malathite Green dye, and 20ml of water. This was applied to 5kg maize in the normal way, with results comparable to the commercially treated seed.

All these tests are preliminary to some tests which will be conducted in conjunction with various biological experts at the research station, which will enable them to confirm the machine for field trials later in the harvest period.

The author recommended that as soon as the machine is released, it should be placed at a particular site, previously chosen in consultation with ATC, and left there for as long as it is doing useful work. This is preferred to the alternative of moving it on after a short time at each site, because the longer term acceptance of a farming community can be assessed. It will also mean that one team of operators can be trained in the safe use of the machine and then left to offer a service to the farmers without the supervision of the research station. However, the station should visit the machine regularly to monitor progress and to help with any difficulties being encountered.

## 7.2 Agricultural Trading Company (ATC)

A visit was paid to ATC to buy the thiram and Actellic chemicals. Both the branch manager, Mr Mkwate, and the general manager expressed interest in the project, and the general manager invited Mr Kazembe to a meeting to discuss dissemination further.

ATC is considered the lead option for an organisation to disseminate the technology.

## **8 Zambia**

The harvest in Zambia should have been starting, but in more than half of the country the rains stopped during December and January, and the crop is extremely poor.

### **6.1 TDAU**

#### **6.1.1 Prototype Machines.**

The mixing chamber seen on the previous visit had been built into a complete machine. This one used the rotor supplied by SRI and therefore had a diameter of 500mm. Three additional machines had been made with a diameter of 440mm. One of those three had been sent to Malawi and is reported on in section 7. The other two were inspected in more detail. A number of problems were identified which gave rise to worries about the effectiveness of the machines. These included the rotor, boss, bearing arrangement, pulley fitting, and jockey pulley. In addition, it was found that the two machines inspected were made to different designs, and no working drawings were available to determine which was the correct one. The poor design of the bearing arrangement was particularly disappointing because the author had put forward a design proposal, in writing, including a schematic drawing, at the time of the previous visit. (See Appendix B of previous report.)

Remedial action was recommended and will be taken on the two machines at TDAU. This includes a shaft of 20mm dia, with appropriately sized ball bearings both ends, as originally recommended, machining a rotor hub with a standard transitional fit, using keys and keyways of standard size, and using a new disc harrow disc, rather than a used one. It is also expected that the discharge door will give problems and a design which avoids the use of a loose part would be preferred.

No arrangements were made for the machine in Malawi, but it may be possible to change it for one of the rebuilt machines at the time of the forthcoming review meeting in Malawi.

#### **6.1.2 Visits to Other Institutes.**

The TDAU project engineer, Mr M Mwanza, accompanied the author on all the visits listed below.

## 6.2 Mt. Makulu.

A visit was made, in the company of Mr Sichilima of COMESA at a time pre-arranged by Mr Sichilima. Mr Chalabesa was not present but the past and future trials were discussed with Mr Malenga. At this late stage in the project, two thirds of the way through, Mt. Makulu have still not received any money from UNIDO.

Mr Malenga suggested three trials for the forthcoming season.

1. The sorghum treated during the visit of Dr Ramdas with 'Thirasan' M from a variety of sources, plus thiram and malathion. This will be planted quite soon at Golden Valley, and irrigated. There will also be a parallel irrigated wheat trial.
2. Split fields farmers trial. At this trial, at least 12 farmers in each of the three agro-ecological regions of the country (south - dry, middle - medium, north - wetter.)  
In this trial, half of a farmers field would be planted with treated seed and half with untreated seed from the same stock. In the view of the author this would be a valuable type of trial.
3. Verification trial of the one conducted during the 1992 / 3 growing season.  
No verification trial was conducted in the 1993 / 4 season.

Later, a meeting was held at COMESA to try to clear the miss-understandings that had resulted in disenchantment on both sides. Mt. Makulu was represented by Mr Chalabesa and Mr Malenga. The system of automatic payment of the first instalment was discovered, and the actions necessary by the recipient institute to retrieve this money from the UNIDO office in Lusaka were discussed. An action plan was drawn up which included an immediate visit to the UNIDO office, together with submission via Mr Opio of the report of the trial conducted in the 92 / 93 season and an invoice so that the second stage payment could also be recovered. This would enable the above trial programme to be executed. (The current rules governing Mt. Makulu precluded any work being done without some agreed source of funding.) Mt. Makulu were acknowledged for having conducted a complete trial without having received any funding at all, and their apparent lack of enthusiasm for further unfunded work was understandable.



### **6.3 Manufacturer**

A visit was made to the intended manufacturer, BMS Engineering. The manager had visited TDAU and inspected the prototypes, and had drawn up some price indications. These were:

1. For a machine as built by TDAU - \$1,200
2. With an alternative rotor housing, made from a fabrication - \$965.

There is some uncertainty about the price because the current system of sales tax is about to be replaced by a VAT system, and it is not known if the machine will be exempt from this tax. If it is, then the given price could be lower.

BMS are willing to manufacture the first machines when they have orders for them.

### **6.4 Programme Against Malnutrition (PAM)**

PAM had been instrumental in finding Riverside Development Agency as a potential co-operator. This year, Riverside were not expected to be able to help because of the drought in their area, and PAM were again asked to suggest alternative co-operators. Two names were suggested, but one of them was in the extreme north of the country - two days drive away. The other one, Mpongwe Development Trust, was located in the Copperbelt province, three hours drive from Lusaka, and appeared to offer merit. A third agency, The Holy Saviour Parish is located at Kafue and operate a revolving loan scheme.

PAM operate largely through NGOs like Riverside Development Agency and Mpongwe Development Trust, and distribute a free monthly newsletter to NGOs, government ministries and donor agencies. The author was invited to submit a brief article on the seed treatment technology being developed, for inclusion in the next issue. (See Appendix B)

### **6.5 Mpongwe Development Trust.**

Mpongwe is in the Copperbelt province where rain has been normal and a good crop of maize is expected. A discussion was held with the director and his agronomist on the uses to which they could put the machine. They were enthusiastic about the concept and would be able to use a machine for treatment of groundnut seed and local farmers varied crops. Termites are a problem in many crops and 'Fernasan' D had provided a degree of control to the extent of a 40% improvement in establishment in wheat. An agreement was made in principle that TDAU would take one of their prototype machines, plus the P500 to Mpongwe and provide training to the staff at the Development Trust.

A manufacturing organisation is being set up in Mpongwe called Small Agricultural Mechanised Services. This will be a resurrection of the agricultura! department of the now broken up parastatal manufacturer mentioned in earlier reports, Lenco. It will be managed by the same man, Mr Haijboer.

### **6.6 Riverside Development Agency.**

Two visits were made, and discussions held with Mr P Kabugu, and Mr Ian Cox. The harvest is so poor in the area of Riverside that the farmers will not be able to save any for seed. They will need both food grains and seed from the government if they are to avoid starvation on a wide scale. Unfortunately, Mr A Aho, the principal contact, was not available at either meeting.

### **6.7 Holy Saviour Parish.**

A very brief meeting was held with two of the priests. The revolving loan system had ground to a virtual halt because the poor crop meant that farmers were generally unable to repay. Previous experience has been of 90% + repayments.

### **6.8 Africare.**

This organisation is successfully disseminating village oil presses and is introducing new varieties of sunflower which yield more oil than the current Zambian varieties. They require some seed treating machines and are evaluating the TDAU type in parallel with some others. (e.g. revolving drum.) The advantages of the TDAU type were emphasised, and it was suggested that Mr Mwalusaka, the Agribusiness Training Specialist, visit TDAU to witness a demonstration on sunflower seed, using slurry as opposed to the dry dressing possible in the revolving drum.

## **6.9 FAO**

A discussion was held with the leaders of both the Rural Seed Multiplication Programme, and the Legume Enhancement Programme. Both were enthusiastic about the role that the machine could potentially play in their programmes. Their mode of operation is often to "seed" the market for a new technology by buying a small number of a new machines for use in demonstration areas so that farmers can see in their own localities the advantages offered. This could possibly apply to the seed treater.

## **6.10 ZNFU**

The project was explained to the President of the Zambia National Farmers Union. A congress of the various farming sectors was to be held shortly, and arrangements were made for TDAU personnel to meet the leaders of the relevant sections to acquaint them of the machine. Mr Ian Smithies of TDAU attended the congress and found a great deal of interest.

## **6.11 GTZ**

A meeting was held with the Head of the GTZ office in Zambia to acquaint him of the project and particularly the potentially useful links with the FAO projects on seed multiplication and legume enhancement.

## **6.12 Zamseed.**

It had been planned to buy 100kg of 'Thirasan' M from Zamseed to support the intended commercial trials. However, Mpongwe Development Trust have their own supply and would not need that input. Therefore, no chemical was purchased.

## **6.13 COMESA (formally PTA)**

The market survey being conducted by Mr Sichilima had covered Zambia and Malawi, but not yet Tanzania. No results were available.

**Appendix A P. 1**

**Kenya**

1. Twiga Chemical Industries Ltd  
Mr N. Mitchelmore Regional Marketing Manager.
2. TriChem (EA) Ltd.  
Mr S. Millar Managing Director.
3. Bayer East Africa Ltd  
Mr G. Nesbitt Technical Manager.
4. Rhone Poulenc Kenya Ltd  
Mr O. Kigotho Sales Manager.
5. FAO Dr H. Norton Resident Representative.

**Tanzania**

6. T.E.M.D.O. Mr G. Msolla, Director General. Contact person for the Project in Tanzania.  
Mr R. Elimringi, Project Engineer for the project.  
Mr Louer Workshop Manager.
7. T.P.R.I. Mr C. Mwangira, Deputy Director.  
Dr B. Uronu, Principal Scientific Officer.  
Mrs D. Matemua, Formulation Chemist.
8. Ministry of Agriculture.  
Mr Mwale District Agricultural Mechanisation Officer.
9. TriChem (EA) Ltd.  
Mr S. Millar Managing Director.  
Mr E Ndemasi Manager - Tanzania.
10. Tanzania Farmers Association.  
Mr Pishori Marketing Manager
11. Sisu Tractors Tanzania Ltd.  
Mr A. Rowan Arusha Branch Manager.
12. Cargill Hybrid Seeds  
Mr R. Banfield General Manager.

Appendix A P. 2

Tanzania. (cont.)

13. CUSO (Canadian NGO)

Mr J. Munuve. Director.

14. Selian Research Station.

Dr Ampofo Senior Entomologist.

Malawi

15. UNIDO

Mr V. Post JPO.  
Mr A. Bah Replacement JPO.

16. Chitedze Agricultural Research Station

Head

Dr J. Luhanga Deputy Chief Agricultural Research Officer,  
of Station and Head of Seed Technology  
Department within the Station.  
Dr C. Chimbe Entomologist in charge of Seed Storage Dept.  
Mr E. Kunkwenzu Senior Farm Machinery Research Officer.  
Mr H. Kazembe-Phiri,  
Farm Machinery Research Officer.  
Contact person for the project in Malawi.  
Mr C. Chikopa CIAT bean programme.

17. Agricultural Trading Company

Mr Mkwate Branch Manager.

Zambia

18. UNIDO

Mr A Brevig JPO

19. COMESA

Mr J E O Mwencha Director of Industry and Energy.  
Mr J.J.A. Opio Senior Industrial Expert. Project Manager.  
Mr M. Sichilima Statistician

20. TDAU

Dr N. Kwendakwema  
Manager  
Dr Tembo Asst Manager  
Dr J. Tambatamba Original project engineer  
Mr M Mwanza Project Engineer  
Mr I Smithies Project Engineer

**Appendix A P. 3**

**Zambia (cont.)**

- |                               |   |   |
|-------------------------------|---|---|
| 21. Mt. Makulu                | Mr G. Mulenga<br>Mr A. Chalabesa                  | Plant Pathologist.<br>Entomologist.   |
| 22. BMS Engineering           | Mr D Stonelake                                    | Works Manager   |
| 23. PAM                       | Mrs F Luhila<br>Ms H Samatebele<br>Ms I Tembo     | Director<br>Deputy Director<br>Programme Officer (Central, Lusaka and Northern Provinces.)          |
| 24. Mpongwe Development Trust | Mr K Owen<br>Mr T Russell                         | Director<br>Agronomist  |
| 25. Riverside Farm Institute  | Mr P. Kubugu<br>Mr I. Cox                         | Horticultural Manager.<br>Assistant   |
| 26. Holy Saviour Parish       | Father Edy<br>Father Olinto                       |   |
| 27. Africare                  | Mr A. Mwalusaka                                   | Agribusiness Training Specialist.   |
| 28. ZNFU                      | Mr B. Kapita                                      | President.  |
| 29. GTZ                       | Mr P. Rhode                                       | Head of Zambia office.  |
| 30. FAO                       | Mrs E. Piri<br><br>Dr J. Mulila.<br>Mr F Jahavari | Head of Rural Seed Multiplication Programme.<br><br>Head of Legume Seed Project.<br>Legume project. |
| 31. Zamseed                   | Mr P. Lloyd<br>Mr P. Kabwe                        | Production Manager<br>Sales Co-ordinator  |

**Appendix B P. 1**

**Text submitted to PAM for their newsletter.**

**Rural Seed Production.**

The best seed for any farmer in the world to plant is "certified" seed - produced by experts to the standards laid down by the national seed authority. (In Zambia this is the Seed Control and Certification Institute in Chilanga.) However, farmers often save some of their crop for planting the following year. The motivation is usually cost although in Africa, the physical availability of seed at planting time is often another factor.

Almost all of the world's certified seed is treated with a fungicide, and some also with an insecticide. The farmer who "saves" needs access to this technology as well if his / her seed is going to have the best chance of producing a vigorous plant. Many farmers are serviced by mobile machines which visit the farms and treat the seed right there. Others take their seed to be treated in fixed machines.

A current UNIDO project aims to bring this technology of seed treatment to the rural African farmer, by developing manually powered and tractor powered machines which can be placed in appropriate places like NGOs, village centres, co-operative distribution points, etc. Zambia is a lead country in this project, and the Technology Advisory and Development Unit at UNZA, and Mount Makulu Research Station are co-operating on engineering and biological aspects respectively. They received two pedal driven machines from UK before embarking upon a design of their own, and the construction of four more machines. Of the total of six, two were sent to Malawi, leaving four available for commercial trials / market testing in Zambia. The aim is to demonstrate commercial viability and give confidence to potential dissemination agencies.

**Appendix B P. 2**

**Text submitted to PAM for their newsletter. (cont.)**

To achieve this, it is hoped to place at least one machine at an NGO this harvest time. The intention is that a team of about five people from the NGO will be trained in the safe use of the machine, including the safe handling of the chemical. They will then take the machine to locations within their areas to which farmers can bring their seed for treatment, just as they bring their maize for milling. The service can be for treatment of seed with both fungicide and storage chemical, and also application of storage chemical to food grains. In past demonstrations, the service was provided free, and the farmers queued up for it. This time, it is suggested that a charge of K80 per kg of seed is made, and we want to test the farmer's reaction. This outlay should be recovered by at least 10 times by the farmer, and still provide a good return to the user, provided sufficient seed is treated.

Another project concerned with seeds is the Rural Seed Multiplication Programme being mounted by FAO. This will aim to bring higher quality seeds to the rural farmer, but those seeds, produced within the rural areas, will still need treatment. It is hoped that the Zambian built pedal driven machine will be able to fulfil that need.

The currently estimated price of the machine is about K770,000 and it is expected to be available from BMS Engineering in Lusaka. Please contact the PAM office for further information.

JEE 19/4/95



UNIDO COMMENTS

The eighth report in the series clearly indicates that the project is going through an important phase in which both optimization of the machine performance and steps needed for commercialization are taking firm ground. While engineering research stations in Tanzania are well ahead with the objectives of the project, the Zambian and Malawian institutes still need additional strengthening to meet the requirement.

The interest on the prototype machines by various parties are a direct result of the project disseminating the information. The field trials and availability of chemicals need to be properly organized and still there should be greater reduction in the price of the machine for purchase by village cooperatives.

The next review meeting will have to finalize a number of issues for completion of the project as planned.