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Consultancy Report: The Seed Component of OFPEP Uganda
Uganda: On-Farm Productivity Enhancement Program
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CONSULTANT'S REPORT ON

THE
SEED COMPONENT
OF
OFPEP UGANDA

FOR WINROCK INTERNATIONAL & ACDI

BY
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Most importantly I have been touched and impressed by the patience, hospitality, and warmth of the women and men of the villages where we had discussions. They have enthusiastically carried out the demonstration plots which illustrate their self motivation. I hope that I have helped OFPEP be of greater benefit to them.

LIST OF TERMS

ACDI Agricultural Cooperative Development International

CCF Christian Children Fund

CIAT Centro International de Agricultura Tropical

IITA International Institute of Tropical Agricultural

MTEA Multi-purpose Training and Employment Association

NARO National Agricultural Research Organization

OFPEP On-farm Productivity Enhancement Program

OFSP On-farm Seed Project

WI Winrock International

EXECUTIVE SUMMARY

Since the previous consultancy in October 1993 OFPEP Uganda has aggressively developed seed activities with groups at the village level. Demonstrations at 21 villages in the Iganga and Tororo districts include improved varieties of maize, sorghum, beans, soybeans, and cassava as well as soil fertility and spacing treatments. During this consultancy

o Demonstrations in 20 villages were visited and review with the farmers. Farmers have show great interest in new varieties in the demonstrations: Longe 1 maize, Seredo sorghum, Nam 1 soybean, and MCM5001 bean. Plots of mosaic resistant cassava varieties were established at a 7 sites with mixed results. The manure treatment showed superior yields and inoculation showed positive results at many sites. Recommended spacing showed higher plant population and yields than the traditional spacing. Technical results of the demonstrations will be provided in a report by OFPEP East Africa staff.

o Participatory seed training was provided at the demonstration site and/or in village meetings to 245 women and 407 men in 20 villages. The training focused on plant selection at harvesting, post harvest handling, and storage. Previously trained groups showed a remarkable recall and adoption of principles provided in earlier training sessions.

o A training of trainers workshop was conducted in Iganga with OFPEP staff and key collaborators that reviewed technical aspects of seed production, extension approach of OFPEP, lessons learned from current demonstrations, and planning of future demonstrations.

Overall the OFPEP program has developed significant momentum due to the support from ACDI, work of OFPEP staff and collaborators and the dedication of the village groups to improving their agriculture.

INTRODUCTION

The On-farm Productivity Enhancement Program (OFPEP) uses a participatory approach to assist PVOs/NGOs and the Peace Corps to develop and implement seed and soil fertility activities with small farmers in Senegal, The Gambia and Uganda. The participatory approach of OFPEP was developed during the On-farm Seed Project(OFSP) 1987-1992 in Senegal and The Gambia. The OFSP worked with a variety of NGOs and the Peace Corps in seed-related activities. The OFPEP in Uganda is based on the Biological Nitrogen Fixation work which has been going on for about five years. There it was desirable that the West African OFPEP/OFSP share some of its experiences in on-farm seed with the East African OFPEP in Uganda. There was an earlier consultancy in October 1993 that established the groundwork for seed activities in OFPEP Uganda. This consultancy was requested to provide a review of the seed activities that had been implemented during the rainy season of 1994 and training to farmers and OFPEP field staff and collaborators.

SCOPE OF WORK

The purpose of this consultancy was to follow-up on the previous consultancy of Oct-Nov 1993 that spearheaded the development of the seed component of OFPEP Uganda.

1. With the OFPEP staff, collaborators and farmers review OFPEP demonstrations in Iganga and Tororo districts. This review will focus on technical aspects of the demonstrations, and reactions/feedback from the farmers.

2.Conduct farmer training at the village level using the demonstration plots and group discussions with farmers.

3.Conduct a training of trainers with OFPEP staff and collaborators to review the program achievements,appropriate seed technical topics, and planning of future activities.

REVIEW OF OFPEP UGANDA FIELD ACTIVITIES

During the current rainy season there has been a flurry of activity in OFPEP Uganda. OFPEP staff now include a field extension supervisor/extensionist Ezra Okoth in Iganga district and Nathan Koteki in Tororo district. With the increased extension capability, an ambitious program of training and demonstrations have been initiated in both districts. The review of field activities included:

- o Discussions with OFPEP staff and collaborators
- o Observations of the village demonstrations
- o Feedback from farmers on the demonstrations
- o Farmer training in seed
- o Soil fertility surveys by Dr Onim

DEMONSTRATIONS

Based on the previous demonstrations during the short rains of 1993 and the information gathering in October 1993, demonstrations were planned and implemented during the April-July rainy season. There was a need to test a wide variety of technologies during one season in order to quickly determine the potential directions of future activities. The basic design of the demonstrations is described below though there were variation from site to site and between districts. Plot size was 4x6m (24m2)for each treatment. This sections is not a technical analysis of the demonstrations but a general extension review since field data is not available for all the plots. The technical analysis will be provided by the OFPEP Uganda staff and the OFPEP East Africa coordinator in a separate report.

Crops

Maize

Longe 1 maize: a recently released variety from NARO and IITA that is earlier maturing than traditional varieties and tolerant to maize streak. Most farmers have not tried this variety.

Soybeans

Nam 1 soybeans: a recently released variety that has not been diffused to farmers. It is earlier maturing than traditional varieties. Additional characteristics include more pods per

plant, non-shattering, and senescence of leaves that hasten drying of the pods and facilitates harvest.

Beans

MCM5001 beans: a new variety from CIAT that is being tested with farmers. It is longer maturing than traditional varieties. It is vigorous and a creeping type but it has excellent yield potential. MCM5001 is known to have a good culinary characteristics. Local varieties K 20 and Kanyega were used for comparison.

Sorghum

Seredo sorghum: an improved variety that was developed in the early 70s but still has not been diffused to farmers. It is shorter, earlier maturing and it has a higher yield potential than most traditional varieties.

Groundnuts

Local variety were used in the demos.

Cassava

IITA has a collaborative program with Uganda for the development and screening of mosaic resistant/tolerant cultivars. Two cultivars Nase 1 and Nase 2 established in plots at 4 sites in Iganga district and 3 sites in Tororo district.

Treatments

Soil fertility

Control: nothing was added to the plot to provide a comparison to the other treatments.

Manure: 150-200kg of manure was added to the plot.

Inoculation: the legume seeds of soybean and peanut were inoculated just prior to planting to enhance nitrogen fixation.

Callanderia: Single or double hedge rows of this leguminous tree were planted besides the plot. When it reaches 2-3 meters it is cut and the branches placed on the plot as mulch. Since it was recently planted in most cases the effects of this treatment are not yet apparent.

Spacing: Crops are usually intercropped so that the spacing in very wide. This demo showed the response of the plants to a narrow stand.

Maize: Traditional spacing is 1.0-1.8m between rows x 60-90cms in the row. The improved spacing is 75cms between rows and 50cms in the rows.

Sorghum: Traditionally sorghum is broadcast. Recommended spacing is 60cms between rows and 50cms in the row

Soybean: Traditional spacing is 60 cms between rows and 30-50cms in the row. Recommended spacing is 60cms between rows and 10 cms in the rows.

Beans and groundnuts: Traditional spacing is broadcast with 30 cms between plants. Recommended spacing is 60cms between plants and 10cms between plants.

DEMONSTRATION FEEDBACK FROM FARMERS

Discussions were conducted at the demonstration sites and semi-structured group interviews away from the demonstration site. Knowledge of the demonstrations varied between 50-100% of the farmers present. A non-directive approach was used to obtain feedback on the following questions:

Theme: To compare with their own varieties and practices with the new varieties, practices, and treatments.

THE NEW VARIETIES: What are the differences they notice?
HEIGHT
MATURITY
PLANT COLOR
INSECT ATTACK
DISEASES
TASTE & COLOR
SIZE OF SEED
YIELD

THE SOIL FERTILITY PRACTICES: What are the differences they notice?
COLOR OF PLANTS
HEIGHT
SHAPE: BUSH OR VINE
YIELD

MODIFIED PRODUCTION PRACTICES: What differences did they notice between their traditional spacing and the recommended spacing?
NUMBER OF PLANTS IN THE PLOT
EASE OF PLANTING
EASE OF WEEDING
YIELD

FOR CROPS ALREADY HARVESTED:

HOW BEING DRIED OR STORED
MOISTURE CONTENT
SIZE
DISCOLORATION
INSECT DAMAGE

VARIETAL PURITY
YIELD

INDICATION OF THE FARMERS WILLINGNESS TO TRY THE NEW VARIETIES AND PRACTICES ON THEIR OWN FIELDS
MEN WOMEN
WHICH VARIETIES AND PRACTICES WHY

GENERAL RESPONSES FROM FARMERS

DISTRICT OF IGANGA

DATE	VILLAGE	ATTENDING W	M	DEMO SITE SHORT R93	DEMO SITE LONG R 94	CASSAVA DEMO
12/7	KAMUKAMU	14	6		+	
12/7	ISIKINO	14	27		+	
13/7	KASIGO	6	11		+	+
13/7	KALUNGAMI	12	36	+	+	
14/7	MAGAMAGA	10	8		+	
15/7	BUNANGWE	15	31		+	+
15/7	BUNABALA	14	9		+	
16/7	BUSALAMU	3	16	+	+	+
16/7	WAIRAMA	8	3		+	
18/7	KISOWOZI	9	6		+	+
18/7	BUGWE	4	20		+	
19/7	KITAGWALA		1		+	
19/7	BUGABWE	8			+	
19/7	BUDHWAGE	9	12		+	
TOTALS	14	126	186	4	14	4

The demonstration plots performed differently from one site to another but there were general trends in the responses of the farmers. The number of plots and treatments sometimes caused confusion as to the treatment. In a few cases women and men carried out demonstrations in their own fields trying the varieties and practices used in the demonstration plots. Since yield data was still not available for most plots estimates of yield was subjective.

CROPS & TREATMENTS

MAIZE

o Farmers most appreciated that Longe 1 was earlier maturing than the local cultivars since it provides food to them during the hungry season.
o They were interested in the closer spacing in the plot for monocropping rather than traditional intercropping of maize. The
o They all noticed the plots with the manure were taller greener and had larger cobs. They didn't know if they had enough manure or the labor to spend on their entire field
o They all expressed interest in growing Longe 1 on their own fields despite the fact that their own maize sometimes looked better.

BEANS

o They appreciated the MCM 5001 as being taller with profuse flowering and pods even though it was later maturing than the local varieties.
o MCM5001 is viny and there was a mixed review of intercropping with maize so it could climb the maize.
o These plots were already harvested and the MCM5001 yield was comparable or better than the traditional varieties.
o Though few farmer had tasted this variety they were interested in incorporating it into the number of beans that they grown.

SOYBEANS

o Nam 1 was appreciated for it earlier maturing, heavy pod set, non shattering and the senescence of leaves for pod drying. Local cultivars were still green and growing while the Nam 1 was ready for harvest or already harvested which was a dramatic illustration of the earlier maturity compared to the local variety.
o They all noticed that the manure and the rhizobia treated plots were taller and had a heavier pod set.
o The recommended spacing showed a much higher plant population than the traditional wide spacing.

SORGHUM

o The earlier maturing heavy heads were noticed and appreciated by farmers since it will be a supply of food during the hungry season. Shot fly attack at several sites due to late planting had a devastating effect. In several sites they were concerned about the bird attack.

GROUNDNUTS

o The manured and inoculated plots were clearly noticed by farmers as providing a higher yield.

CASSAVA: The farmers at the few sites that have the plots of Nase 1 or 2 notice that it is infected. Other groups and sites express interest in new cassava varieties that have resistance to mosaic since they depend on cassava as a food crop and a cash crop.

In general it was the first time these farmers had see the new varieties of maize, beans, soybeans, and sorghum. They were very interested in trying all the new varieties.

DISTRICT OF TORORO

DATE	VILLAGE	ATTENDING W	M	DEMO SITE SHORT R93	DEMO SITE LONG R 94	CASSAVA DEMO
20/7	ABUR	12	22	+	+	
20/7	POYAMERI	11	50	+	+	
21/7	BUSABA	1	24		+	+
21/7	ADHOLA	22	33	+	+	+
22/7	BUHENYE	43	53		+	+
22/7	BUYENGO	30	39		+	
22/7	BUHWAMA				+	
TOTALS	7	119	221	3	7	3

Demonstration plots that were visited during the short rains last October were failures due to the drought and a general crop failure. The demonstration plots performed differently from one site to another but there were general trends in the responses of the farmers. As compared to Iganga there were fewer crops in the demonstrations.

CROPS & TREATMENTS

MAIZE: Farmers like the earlier maturing characteristic of Longe 1 but they thought at several sites that its yield potential is not as good as the local varieties. Nevertheless for the short rains it could offer promise due to its early maturity whereas the local variety may not be able to produce a crop. Manured plots looked taller and healthier that the control though farmers expressed doubt about using manure on their own fields due to labor and sufficient quantities.

SOYBEANS: Noticeably Nam 1 has been harvested and the local variety is still growing so the farmers are interested in this earlier maturing variety. Manured fields were higher yielding than the control. Recommended spacing was meant higher plant populations and higher yield per unit area.

SORGHUM: Unlike Iganga sorghum is a major crop throughout this district. Farmers were very interested in the short stature, earlier maturing, and higher yielding Seredo. Seredo did not lodge and will be easier to harvest than the local variety. At some sites the local variety was uniform and looked like it would provide a yield equal to Seredo.

Overall farmers were interested in the new varieties though their local varieties of sorghum and maize looked very good. Nam 1 soybeans was clearly earlier and higher yielding that the local variety. CCF had introduced P224 millet to farmers with good results.

FARMER TRAINING

During the visits to the farmer groups, training was also conducted with a total of 245 women and 407 men. The training used a participatory approach in which the demonstration plots or crops that had been harvested were used for discussion ro the training was an exchange of ideas based on practical examples. The participatory training approach allows us to discuss concepts and observations with farmers. In addition farmers were able to learn from other farmers. We particularly took advantage of the maize and sorghum that was ready to harvest to examine plant selection for seed. Harvested soybean and beans were used to discuss seed quality seed drying storage and seed selection/sorting before planting.

The topics covered varied depending on previous training with the group, practical examples available and feedback from the farmers.

Training outline

Theme: Seed for planting requires special attention in order to have high quality seed for planting the next season.

A. Plant selection for seed in the field:

1. Cross pollinated crops of maize and sorghum based on height, maturity, size of ear, disease free, husk fully covers the ear, ear droops.

2. Avoiding mixtures of varieties at harvest with self pollinated crops like beans and soybeans and groundnuts by rouging out offtypes.

B. Disease identification specifically of maize streak, smut, and maize blight which should be avoided in plant selection for seed.

C. Storage Pest Identification maize weevils, Sitrotoga, bean weevils all of which infest the seed in the field and are then brought into the store.

D. Weed identification:
Striga is a parasitic weed in poor soils that should be removed before the seed are shed to avoid spreading.
Wild types of sorghum that can cross with sorghum.

E. Prompt harvest(and threshing where appropriate): to avoid loss of seed quality due to insect infestation, bird damage or weathering

E. Drying: Seed crops require thoroughly dried to minimize deterioration during storage.

F. Storage: Seed should be protected from insects and rodents. Storage sanitation and inspection are necessary. Ash can be used on bean seed to reduce weevil infestation.

G. Sorting/Selection of seed at planting: After storage seed should be sorted to remove small shrivelled, diseased, off color broken/damaged seed and offtypes.

ASSESSMENT OF PREVIOUS FARMER TRAINING

There were 2 groups in Iganga and 3 groups in Tororo that total 60 women and 157 men that had previously been trained. The participatory training approach allowed the farmers to express what they had learned in previous training. There was an overwhelming positive response from farmers previously trained on plant selection and that they were doing it on their own fields. This reenforces the effective of the OFPEP participatory training methodology.

TRAINING OF TRAINERS WORKSHOP

A training of trainers workshop was designed and conducted at the OFPEP IGANGA office on JULY 25-26, 1994. The initial idea has been to focus training on farmer leaders. However, it was decided to use this opportunity to concentrate on OFPEP staff, NGO collaborators and Ministry of Agriculture extension staff so they can train farmers and farmer leaders.

PARTICIPANTS:

Nathan Koteki OFPEP Uganda Field staff Tororo District
Izimba Peter Ag Extension agent Bukooma subcounty Iganga Dist.
Mukama Steven Ag Extension agent Nakigo subcounty Iganga Dist.
Owor Jag Adrian CCF project administrator Tororo district
Owor Peter Minor MTEA Iganga District
Mabale Balam CCF Farm Manager Busaba Tororo District
Yasini Kauta MTEA Iganga District
Ezra Okoth OFPEP Uganda Field staff Iganga District

OBJECTIVES:

1. REVIEW TECHNICAL ASPECTS OF SEED PRODUCTION: The main point of seed production with special emphasis on the crops of Uganda, certified seed production and potential for village level seed production. Additional information will be provided on seed storage principles, storage insects and how to improve.

2. Village level seed production: What are the different strategies and what are the possible roles of OFPEP and its collaborators?

3. OFPEP PARTICIPATORY EXTENSION: What are the various extension approaches and what is the approach of OFPEP.

4. Experiences and lessons learned from this seasons activities.
Overall demo design,crops and treatments
Planning and implementation,
technical lessons and difficulties.

5. Proposed activities for next season:

Preparation for next season(short rains, long rains)

Roles in activities: OFPEP staff, collaborators,
village level leaders,

logistics: seed, inoculation, transportation

information standardization
rates of adoption

Anticipated demo design
objectives indicators

Standardize policy on seed inputs, etc

SCHEDULE

MONDAY July 25

0910-0915 Welcome (Ezra Okoth)

0915-0945 Review/Overview of OFPEP(Moses Onim)

0945-1130 Seed training: (Tom Osborn)
Seed Quality
Harvesting: Timing, Plant Selection
Drying: Moisture measurement
Seed Cleaning/Conditioning
Storage: concepts,

1130-1145 Break

1145-1300 Storage Pests, Analysis of Storage structures
(Tom Osborn)

1300-1430 Lunch

1430-1500 Village level seed production (Tom Osborn)
Certified seed production: village contract growers
Improved seed production:
Groups/ Individuals
Farmer saved seed for him/herself

1500-1600 OFPEP extension methodology (Tom Osborn)
Conventional extension vs participatory extension

1600-1700 Review of preliminary demonstration data(Moses Onim)

TUESDAY July 26

0845-1130 Discussion of current demonstrations (Tom Osborn)

1130-1300 Discussion of next seasons activities (Tom Osborn)

1300-1400 Lunch

1400-1545 Next steps (Tom Osborn)

1445-1500 Departure of participants

1500-1600 Meeting of OFPEP Uganda staff with OFPEP East Africa

coordinator and OFPEP advisor

The Workshop was an opportunity for OFPEP Uganda staff and collaborators along with the OFPEP East Africa coordinator and the OFPEP advisor to discuss technical topics, review field activities, plan future activities, and develop policy for the program. Significant decisions were made concerning the following topics that will be presented in more detail in the next section:

- o Village level seed production
- o Future Demonstration activities
- o Standardize policy on financial arrangements with the farmers

LESSON LEARNED AND RECOMMENDATIONS

DEMONSTRATIONS LESSONS LEARNED AND RECOMMENDATIONS

The overall demonstrations

The successful implementation of the demonstrations by OFPEP staff, collaborators and farmers has been a major success of the program. The demonstration have been very effective to show farmer new technologies and a classroom for participatory training with farmers. The farmers were responsible for maintaining the demonstrations. We have found that the demonstration have been used by Ministry of Agriculture extension staff for farmer training. There is evidence that World Bank officials also visited demonstration plots.

o Time of planting: Several demonstrations were planted late which will be reflected in poor results. Field staff are aware of the problem but in several cases the village insisted that the demonstration be planted anyway.

o Protection: Animals feeding on the demonstration was a problem at several sites. It is difficult to eliminate animals without fencing but planting of boarder rows can reduce the problem.

o Site selection: There were several excellent sites along roads with high visibility. OFPEP signs also assisted in identifying of the demonstration sites. In some of these cases road traffic have been examining the plots and the local government extension services has used the demonstration site for training. In other cases the sites were a bit isolated.

o Observations by farmers: The participation of farmers in the implementation of the demonstrations and periodic observations varied greatly. Efforts should be made to use the demonstration as a teaching tool on a regular basis. There should be an effort to document dates and numbers of participants that visit or use the demonstrations especially when OFPEP staff aren't present. . A simple visitor's book would help quantify the use of the site.

o Number of plots and treatments: There was an impressive array of crops and treatments in these demonstrations that was necessary for an initial screening of technologies. At the same time a complex demonstration can be confusing for the farmer and the extensionist. Future demonstration should be simplified and show clear differences. Labels on plots and leaving a plot layout with a local representative would also help to dispel confusion.

Crops

Maize: Longe 1 is a technical disappointment under farmer conditions. In most cases, the farmers field looked much better than the Longe 1. Under higher levels of fertility it appears to perform acceptably. The only characteristic that could make it of interest to farmers is that it is earlier maturing. Longe 1 displayed high rates of infection with maize streak even though it is suppose to be tolerant/resistant. This problem may be due to seed quality problems or varietal weaknesses. This issue was discussed with the maize section at NARO and it appears there is a seed quality problem. They have offered OFPEP a limited quantity of high quality Longe 1 for demonstrations to see if this seed will perform better than the seed that was used this season.

Beans: MCM5001 offers promise even though it is later maturing that local varieties. Preliminary yield data suggests that it has higher yield than local varieties. Its marketing potential is still unknown. Farmers seem to be interested in adding it to the varieties that they now grow.

Soybeans: Nam 1 is one of the most promising technologies across all sites and it has drawn the attention of farmers. It is earlier maturing, high yielding, and non-shattering.

Sorghum: Even though Seredo has been around for 20 years it has drawn the interest of farmers in many sites because of it early maturity and high yield. Because it is earlier than the local variety it can be attacked by birds. In addition late planting induced problems with the shoot fly.

Cassava: Thus far the mosaic tolerant cassava Nase 1&2 have been a disappointment since high levels of mosaic infections have been detected at several sites. This issue was discussed with the cassava section at NARO. These varieties should display some level of infestation but the cassava should still produce a crop. The cassava program is extending an appropriate technology growth chamber for cassava that could be extended to the farmers groups so they could produce their own cassava seedlings.

Treatments

Soil Fertility

Manure: 150kg/24m2 is the equivalent of 62.5T/HA which is an excessively high rate. Rates of 30T/HA, 15T/HA or even 5T/HA may also shown an a positive response. The response on poor soils was dramatic and not very noticeable on more fertile soils. This rate could be drastically reduced in future demonstrations and perhaps still show an equivalent response and give farmers a more realistic concept of applications rates. The question becomes establishing an optimum application rate and determining

the residual effect of various rates. There is also a need to make farmers aware of the quality of manure depends on moisture content, age, and how it has been kept. This is one of the factor that can make a difference in the response of the crop to manure application.

Inoculation: On very poor soils there was very limited response to inoculation and therefore it should not be a recommended technology in those areas. Conversely on the more fertile soils it showed an equivalent repone to the manure and it would be an extremely cost effective input under those circumstances.

Callanderia: Since it was recently planted in most cases the effects of this treatment are not yet apparent. In fact it requires management to prevent shading of the plot and trimming to the proper height.

Spacing: Recommended spacing always resulted in higher plant population than the farmer's spacing and therefore resulted in higher yields. Farmer spacing is usually based intercropping at various spacing depending on the crops and soil fertility. Monocropping may or may not be something that the farmer will do even if they see that it will increase yields. This treatment requires more feedback from the farmers to see how they might want to alter spacing based on what they have seen in the demonstrations.

Future Demonstration Activities

The demonstration are not an end unto themselves. The purpose is to introduce the technologies to the farmers so that the farmers will gain interest to adopt or adapt the technologies. Secondly the demonstration require substantial effort by village groups/individuals that leads to the request for compensation. In the TOT workshop it was decided that district OFPEP staff will have discussions collaborators and farmers concerning:

Demonstrations: Review and determine what should be continued and what should be dropped. Where clear advantages of the new technologies have been demonstrated and understood by farmers those plots will be discontinued for example manure or recommended spacing.

Adoption plots: Determine what farmers want to try the technologies on their own field (on a larger scale that the demonstration plots) in such a way that there can be a comparison of the new technologies with traditional technologies. Field staff will assist-the farmer and monitor the results so that data can be collected and it can use for farmer training.

Extension of new seed: There has been a universal request from farmers for new seed. Determine the request at the village so that small quantities of seed 1-2Kgs can be sold to farmers. Farmer numbers will be recorded and discussions with farmers will solicit their feedback on the new varieties. It should be clear to the farmer that a portion of the harvest should be selected and saved for seed and OFPEP is promoting seed production not a source of seed each year.

This approach should be used for the upcoming short rainy season and evaluated at the end of the season to insure that the combination of demonstrations, adoptions plots and extension of seed will meet the objectives of the program. Numbers of demonstrations and field activities will be based on the capacity of OFPEP field staff, NGO collaborators and farmer groups. The concern is to maintain the quality of field activities.

FARMER TRAINING LESSONS LEARNED AND RECOMMENDATIONS

o The most effective training should be done at the demonstration site or in a farmer's field rather than discussions/meetings. Practical examples examined with farmers should be the basis of farmer training so observation can be shared and both the extensionist and the farmers learn.

o Farmers training should be oriented to problem solving with the farmer. Follow-up is necessary to determine the impact of the training ie adoption, rates of adoption, adaption during subsequent meeting with farmer groups and observation in farmers fields.

TOT LESSONS LEARNED AND RECOMMENDATIONS

o Periodic training of OFPEP field staff and key field collaborators is recommended to fill technical gaps, for team building, and to provide an opportunity for exchange of information. Cost effective training of 1-2 days can be very useful.

o Attention should be given to improving the skills of field staff through simple means. Visits to NARO at Namulonge and Kawanda by the OFPEP team would offer the opportunity to share with researcher how their technologies performed in the field and to obtain technical feedback from researchers.

o Field staff need technical resource materials. Some materials exist in Kampala. An effort should be undertaken to establish a simple resource center (a bookshelf of materials) at the OFPEP

office in Iganga because of its central location. With additional resources small resource centers at Tororo and other locations could be considered.

o There need to be TOT workshops for farmer leaders so they can gain a better understanding of the technologies and provide training to farmers and monitor OFPEP activities at the village level.

PROGRAM LESSONS LEARNED AND RECOMMENDATIONS

OFPEP Uganda has displayed an impressive level of activity during 1994. Staff are in the field and there is a positive momentum.

o Village level seed production: Seed production is a component of OFPEP. Discussions with OFPEP collaborators at the TOT provided clear direction for seed production activities. The approach that collaborators believe can work for the present is encouraging farmers to save their own seed rather than going to a contract grower approach. This approach implies that OFPEP should monitor:

-Farmers receiving seed
-Farmer adoption of the new variety: adoption rates
-Farmer diffusion of the new variety to other farmers

Additional information on why the farmers adopted the variety and yield comparison with local varieties would also be helpful.

o Standardize policy on financial arrangements with the farmers

The history of government, donor, and NGO involvement at the village level has led to the expectation of gifts, money, tools etc. It is extremely difficult to escape this perception by farmers even by making it clear that OFPEP concerns itself only with training and technical assistance. Therefore a clear and uniform policy with collaborators and farmer groups is necessary.

- Farmers should not be paid for doing demonstrations
- Seed should be purchased by farmers not given on grant or loan

We realize that this may cause some groups or individuals to drop out but we want participation in the program based on genuine interest and self-improvement rather than for the expectation of financial reward. This policy will be implemented for the upcoming short rainy season. It impact will be evaluated and modifications to the policy can be made as necessary.

o Planning and coordination of OFPEP activities could be improved through monthly meeting of OFPEP staff and key collaborators along with ACDI staff. The in-country advisory council needs to meet atleast several times a year.

o Friction is being felt by OFPEP field staff from the district extension staff of Ministry of Agriculture. Attention should be given to this issue through NARO or the Ministry of Agriculture remembering that OFPEP operates through NGO collaborators not on its own.

o ACDI needs to insure that OFPEP has a base in Kampala with adequate level of administrative support in view of the closure of the CAS project.

o The field staff of OFPEP are an major resource and have provided the means for the dynamic growth of activities. Now that activities are being established OFPEP field staff should increasingly train and turn over responsibilities to the farmer groups and key collaborators so that their technical/management capacity is increased. Training workshops for farmer group leaders should be undertaken by OFPEP district field staff and collaborators to develop a clearer understanding of OFPEP, develop technical and management skills and more clearly define their role in OFPEP.

o The OFPEP team has focused on field activities. Documentation exists in the notebooks of field staff but not in a format that is standardized. Field staff don't have ready access to typewriters or computers which further hampers documentation. I encourage the development of a simple system of forms for monitoring field activities. Copies could be delivered to Kampala where they could be typed and complied at the OFPEP office.

CALENDAR OF ACTIVITIES

WEEK 1

7/10 SUN MEETING WITH FRANCIS OCHING TO FINALIZE TOR AND SCHEDULE OF ACTIVATES.

7/11 MON MEETING WITH VIC AMANN COP ACDI

TRAVEL TO IGANGA

MEET WITH EZRA OKOTH

7/12 TUES FARMER MEETING/TRAINING KAMUKAMU

FARMER MEETING/TRAINING ISIKINI

7/13 WED FARMER MEETING/TRAINING KASIGO

FARMER MEETING/TRAINING KALUNGAMI

7/14 THUR VISIT OFPEP DEMO MTEA IGANGA

VISIT HYBRID MAIZE TRIALS IGANGA

FARM VISIT WITH MTEA FARMER LEADER SWAGA MWAMADI

FARMER MEETING/TRAINING MAGAMAGA

7/15 FRI FARMER MEETING/TRAINING BUNANGWE

FARMER MEETING/TRAINING BUNABALA

7/16 SAT FARMER MEETING/TRAINING BUSALAMU

FARMER MEETING/TRAINING WAIRAMA

RETURN TO KAMPALA

7/17 SUN REPORT WRITING

WEEK 2

7/18 MON TRAVEL TO IGANGA

FARMER MEETING/TRAINING KISOWOZI

FARMER MEETING/TRAINING BUGWE

7/19 TUES FARMER MEETING/TRAINING KITAGWALA

FARMER MEETING/TRAINING BUGABWE

FARMER MEETING/TRAINING BUDHWAGE

TRAVEL TO TORORO

7/20 WED FARMER MEETING/TRAINING ABUR

FARMER MEETING/TRAINING POYAMERI

7/21 THURS FARMER MEETING/TRAINING BUSABA

FARMER MEETING/TRAINING ADHOLA

7/22 FRI FARMER MEETING/TRAINING BUHENYE

FARMER MEETING/TRAINING BUYENGO

RETURN TO KAMPALA

7/23 SAT PREPARE FOR TRAINING WORKSHOP

7/24 SUN PREPARE FOR TRAINING WORKSHOP

TRAVEL TO IGANGA

WEEK 3

7/25 MON TRAINING WORKSHOP IGANGA

7/26 TUES TRAINING WORKSHOPS IGANGA

RETURN TO KAMPALA

7/27 WED REPORT WRITING

NAMULONGE RESEARCH STATION VISIT

BUA ANTHONY CASSAVA PROGRAM

SYLVESTER DICKSON BAGUNA MAIZE PROGRAM

7/28 THURS INTERVIEW FOR GENDER SPECIALIST POSITION

DEBRIEFING

7/29 FRI DEPART

TECHNICAL HANDOUT FOR TOT WORKSHOP

TIMING OF HARVEST

1. Early harvest -

   a. more immature seed in the lot
   b. seed moisture content is high
   c. plants are not dry

2. Late harvest -

   a. shattering occures when seed falls out of the spikes or panicles
   b. weathering causes seed deterioration (as noted by vigor and standard germination tests)
   c. rainfall promotes disease development
   d. bird attacks
   e. peanut pegs begin to break
   f. lodging

Harvest Maturity is determined by;

   a. number of days from anthesis to maturity
   b. plant characteristics
   c. seed moisture content

Plant Selection Systems:

   a. plant size
   b. color
   c. head-panicle size
   d. disease free material
   e. maturity date for that variety

Where does one select plants (seeds) in a field?

Cross-pollinated Crops:

   a. Isolation Method - select heads or panicles on plants from the center of the field which is most isolated (longest distance)
   b. Grid Method - select plant material from each square in a grid layout in the field. This make the selection process less biased

Self-pollinated Crops:

a. select seed from plant material randomly in the field or wherever plants resemble the parent material.

SEED/GRAIN DRYING

- seed drying is very important. Reduce the seed moisture content if it is relatively high, because seed viability and storage life will decrease.

Methods:

A. Drying In the field
   1. easy to do
   2. farmer may have other crops he must harvest first

<u>Problems:</u>

a. insect pests cause damage
b. weather damage, sun, etc.
c. shattering
d. "vivipacy" = germination of seeds in the pod or on the ear before harvest
e. unfavorable weather conditions may break dormancy in some seeds resulting in a more rapid rate of deterioration
f. rodents and birds may eat seeds still resting in the field

B. Drying Near the home

a. cribs; give air circulation. Smaller amounts of seed dry faster then large amounts of seed
b. stacking
c. matts
d. drying on floors
e. on the ground

<u>Problems:</u>

a. animals, insects
b. moisture migration; from the inside to the outside to the seed. (Between seeds in a mass or lot)
c. stiring of the grain
d. thickness of layer

MOISTURE AND ITS MEASUREMENT

A. M% of seed is the most important factor in seed storage. It determines,
-storage life of seed (viability)
-attack by mold
-attack by insects
-linked to RH of the environment around the seed
(ex. that 70% RH and 27 deg. C Rice has 15% M.)

B. SEED MOISTURE CONTENT SCALE

%		
	35-60	Germination
	18-20	Grain Heating
	14 +	Mold Growth
	12-14	Ideal for insect activity
	8-9	Little or no insect activity, low respiration
	below 8	Too dry for some seed, cracking or splitting can occur

SEED PROCESSING

Purpose: of seed processing is to;

1.) condition seeds by removing contaminated seeds of -

a. other crop seed
b. weed seeds
c. inert matter; broken seeds, hulls and plant parts

2.) upgrade the seed lot by eliminating poor-quality seed.

Methods of Processing:

A. Traditional - by hand
a. hand selection
b. winnowing
c. hand screens sieves
d. water separation

When should seed be processed/conditioned

-before storage?

Why

-after storage?

Why

SEED STORAGE

DIFFERENCE BETWEEN GRAIN AND SEED STORAGE

Grain Storage
- maintain minimum quality needed for sale or consumption

Seed Storage
- maintenance of seed to an acceptable level germination and vigor is essential.

PURPOSE OF SEED STORAGE IN MORE DETAIL

Goal is to maintain physiological quality of seed for a stored period by minimizing the deterioration rate.

Deterioration
- can be defined as the loss of germination, vigor, viability and finally death of the seed

- can be changed but not stopped (irreversible)
- varies among and within a species
- length of storage period (i.e. can not store seeds too long. This, too, is determined by the variety and crop in question.)

FACTORS EFFECTING SEEDS IN STORAGE

- temperature
- relative humidity
- heat
- carbon dioxide
- oxygen

I. STORAGE PRINCIPLES

A. THE PHYSICAL STRUCTURE OF GRAIN

1. Seed Covering - Pericarp, seed coat
   -seed's protective layer-semi-permiable
   -excellent protection as long as it is undamaged
2. Food Reserves - Endosperm (monocots), cotyledons (dicots)

   -food supply of the embryonic axis -80% of seed

3. Embryo - develops into the new plant

B. SEEDS OF UGANDAN CROPS

Crop	Mono or Dicot	Family	Strength of Pericarp	Stora-bility
Peanut	Dicot	legume	w/shell strong w/o shell weak	poor
Millet	Monocot	grass	strong	good
Sorghum	Monocot	grass	strong	good
Maize	Monocot	grass	strong	good
Rice	Monocot	grass	strong	excllnt

C. WHAT SEED DOES

Respiration (see book for formula) leads to water and heat being produced.

Respiration rate determined by,

-moisture content of seed
-temperature

Moisture content (% moisture) of seed more important factor than temperature.

D. WHAT DETERMINES MOISTURE CONTENT OF SEED?

Relative humidity of atmosphere around the seed.
Because SEED IS HYDROSCOPIC.
High RH leads to moisture passing from air to seed
Low RH lead to moisture passing from seed to air until...

E. EQUILIBRIUM MOISTURE CONTENT is reached

- minimum movement of moisture between the seed and the air unless temperature or RH changes in the long run
- time dependent process, i.e. it takes a long time to happen.

Equilibrium Moisture Content at 70% RH, 27C (max. of safe seed storage;

	%
Peanuts	7.0
Millet	16.0
Sorghum	13.5
Maize	13.5
Rice	15.0

F. RESPIRATION: WHY IS IT SIGNIFICANT?

-Water produced
-heat produced
-CO_2 produced
-AND SEED DETERIORATES

G. NOW WHAT HAPPENS WITH A MASS OF SEED? (as opposed to with a single seed)

Major point, seed is an excellent insulator. With respiration comes air and water therefore ventilation (AERATION) is very important to prevent build-up of heat and water. Let's look at a mass of grain under the following conditions;

Strctr	Air Mvmt	INSECT PROTECTION	RODENT PROTECTION	COST	OBSERVATIONS
baskets	0	-	-	0	add cover
pots sealed	-	+	+	+	keep off floor
sacks	0	0	0	+	keep off floor
tins	-	+	+	+	
grainery	+	-	-	+	cleaning rat guards
hang up	+	?	+	-	maize only
pile	0	-	-	-	
drum	0	+	+	++	

Structures are rated on a +, 0, -, basis on each factor

H. MOISTURE MIGRATION Water movement in the grain mass caused by temperature changes (differences within and without structure). Why can it be a problem? Increased M% of the grain in certain areas can lead to spoilage.

It can happen due to,
-sun heating up one side of structure
-moisture coming up through dirt or cement floor and affect grain with which it is in contact

INSECTS OF STORAGE

A. Primary (internal feeders). capable of penetrating the seed covering. examples: weevils, grain borers, Angoumois grain moth.

B. Secondary (external feeders). Usually not capable of penetrating the seed covering. They attack the grain after initial attack by primary insects.

C. Variables to consider within each insect type that attacks seed in storage.

POINTS TO CONSIDER

Insect	source of infestation	life cycle	damage sign	control method	% loss by wt.
Caloso. malculatus	att. in field	30 days	round hole in cowpea	sand, insecticide	to 100
Sitotroga cerelella	Primary feeder	20-25 days	partially round hole	thresh seed,RH low	10-15 millet sorghum rice
Sitrophilus Zea mais, Oryzae		25 days	irregular hole		maize rice

Insect Cycle

adult

Pupa egg

larva

CONTROL OF STORAGE INSECTS

1. Prompt removal from the field
   - avoids infestations

2. Drying properly
   - must have low seed moisture content

3. Sanitation

   a. cleanliness of storage containers and structures
   - floors, walls, roof
   - clean and dry bags 5-10 days before refilling, poly bags are best (eggs slip off)
   - maintain sanitation

4. Traditional Methods

- sand
- ash

5. Sealed Storage

6. Insecticides

Pros -
a. low cost
b. very effective

Cons -

a. don't know what you are buying
b. expired
c. know label
d. resistant
e. highly toxic safety
f. over apply
g. environmental

Chemical Insecticides:

a. Actellic - pyrimiphosmephyl 2% active vapor action low toxicity III
b. Permethrine - low toxicity

SEED GERMINATION TESTING FOR FARMERS AND EXTENSION AGENTS

A farmer plants a field and only a few plants come up. If the problem was the seed you would know it with a simple germination test. It is very important to know the germination percentage of seed to determine their suitability for planting and to determine the planting rate. For example seed that germinates 85% to 90% or higher need not be planted as heavily as seed that germinates 65 to 70% . Seed that germinates below 50% should not be use as seed for planting without incresing the seeding rate or reselecting the seed to remove the low germination seed (damaged,immature,or discolored seed).

A seed testing laboratory is not necessary to conduct a fairly accurate germination test. You can perform this test using materials available in the village and provide a valuable service by verify the the seed germination before planting.

A. OBTAINING A REPRESENTATIVE SEED SAMPLE FOR TESTING

The number of seed tested should be at least 100 and not exceed 200. These seeds should be selected randomly from the seed to be planted. If more than one container (bag) of seed is to be used for planting one field, then some seed should be taken from each bag. One to three small handfuls of seed from one bag is usually enough. Push your hand into the open bag of seed, and take two or three small handfuls from different parts of the bag. If more than one bag is to be sampled, take one or two small handfuls of seed from each bag. Mix the small samples thoroughly in a small container, then count out the number of seed to be tested.

If seed are threshed or shelled just prior to planting take a few seed from several different heads of sorghum or millet or shell enough groundnuts to get enough seed to test. It is important to get seed from several different heads or from several different places in the groundnut storage because seed may not germinate the same in all parts of the stack, bundle or bag.

B. WHEN TO PERFORM THE TEST

Seed is often tested after harvest to verify quality before it is purchased as seed. For our purposés, testing is most useful 2-3 weeks before planting in the field.This is because even quallty seed can deteroriate dramatically during improper storage.

C. WHERE TO PERFORM THE TEST

The test can be performed in a container or in a garden or field. We recommend a container of sand since conditions of

moisture and pests are difficult to control in the field. A calabash, wooden tray, or large bowl can be used as the container. The container can be kept inside the house or outside but not in the sun. Make sure that there are holes in the bottom of the container to allow for drainage to keep the seed from getting to wet. The container should allow for a depth of 10-12 cm of clean sand.The container should be large enough to allow seed of maize and groundnut to be planted 2 to 3 cm apart and small seed such as millet, sorghum, rice or sesame to be planted about 1 cm apart. After the test, the container should be dumped out and allowed to dry out.

D.PERFORMING THE TEST

After the clean moist sand is placed loosely in the container and smoothed out the seeds should be planted in uniform rows using a small stick to make the hole for each seed. Large seed such as maize, peanuts or cowpeas, should be planted 2 to 3 cm deep; small seed such as millet, sorghum, rice, and sesame should be planted 1 to 1 1/2 cm deep. After planting, water the seed and check daily to be sure that the sand does not become too dry for seed to germinate. Keep the sand damp but not extremely wet. You amy want to cover the container to keep the sand from drying out. Seedlings should begin to emerge in 3 to 5 days after planting.

E.DETERMINING THE GERMINATION %

Count the number of emerged seedlings as they emerge. The speed at which the seedlings emerge is indication of the vigor of the seed. If some seedlings emerge rapidly and others much later the vigor fo the seed is mixed. Some seedlings may die within a few days after emergence. These seedlings would probably have died had seed been planted in the field.

Variety	First count	Last count
Rice	5days	14days
Millet	3days	7days
Cowpeas	5days	8days
Groundnuts	5days	10days

If you planted 100 seeds and 76 emerged then the germination % is 76%. If 200 seeds are planted and 180 emerge then the germination % is 90 %. Seedlings that emerge later than 2 weeks represent seed that is of lower quality than the earlier emerging seedlings.

Happy seed testing!

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