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United Nations Economic Commission
for Africa (UNECA)

International centre of
Insect Physiology and
Ecology (ICIPE)

Project Title: Reduction of Food Losses Through Insect
Pest Management And Use Of Small-Scale
And Low-Cost Farm Equipment

Progress Report
For the Period 1st July-31st December, 1988

ICIPE
Mbita Point Field Station
P.O. Box 30
Mbita, Kenya

Project Summary

Project Title : Reduction of Food Losses through
Insect Pest Management and Use of
Low-Cost Farm Equipment

Duration : 3 Years

Funding Source : Belgium

Total Cost : US\$ 576,500

Actual Expenditure:
January-December, 1988 Submitted in February, 1989.

Activities Undertaken From July-December 1988

Background Information

1. UN Economic Commission for Africa (ECA), the Ministry of Agriculture, Kenya and the International Centre of Insect Physiology and Ecology (ICIPE) have undertaken to test the methodologies developed and information generated for the management of insect pests of maize, cowpea and sorghum in certain farming communities in Oyugis and Kendu-Bay Divisions in Nyanza Province of Western Kenya. The long term objective of this project is to assist resource-poor farmers to adopt more productive and less wasteful agricultural and food systems and to improve their quality of life.

2. In order to achieve this, a pilot scheme is being implemented with an aim to prevent and reduce food losses and provide participating farmers with low cost equipment and machines. The pilot scheme demonstrated that the project is technically sound under the existing resource constraints; easily manageable and sustainable at the village level.

Activities Undertaken

3. The following activities were undertaken in line with project objectives:

(a) Continued monitoring and supervision of agronomic practices on long rainy season crops, farming operations and effective use of the supplied farm equipments;

(b) Continued two-season observations were made on the incidence of pests, damage and losses due to crop borers in Oyugis Division, however, observations were only made during the long rainy season in Kendu-Bay Division;

(c) Investigation of the agricultural practices and the cost-benefit analysis on the post-harvest and marketing outlets;

(d) Monitoring of the implementation of the IPM technologies and inputs, management of risks and trade-offs and;

(e) Continued participatory training of the farmers and the the Government of Kenya's extension workers on the adopted IPM methodologies.

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(c) Investigation of the agricultural practices and the cost-benefit analysis on the post-harvest and marketing outlets;

(d) Monitoring of the implementation of the ICIPE technologies and inputs, management of risks and trade-offs;

(e) Continued participatory training of the farmers and the Government of Kenya's extension workers on the adopted ICIPE methodologies.

4. The land area provided during the short rainy season was 1/2 acre and upto a maximum of 1 acre. The crop cultivars selected included Maize V37, and KRN1 (from ICIPE) and Hybrid 511 (commercial cultivars) and; cowpea ICV2 and sorghum varieties 87LRB8 and 87LRB5 (from ICIPE).

5. These varieties were planted by the farmers and the planting patterns included monocrops and intercrops of ICIPE varieties KRN1 and V-37 with ICV2. Hybrid maize was mainly planted as a monocrop. Small portion of ICV2 monocrop was planted for comparison. The progress made in respect of the above mentioned activities is highlighted below.

6. Short rainy season crop was grown by 23 farmers adhering to the schedule of the Project Implementaion Plan (PIP) in performing operations such as land preparation, planting weeding and thinning, in time.

7. Multiplication of enough seed of V-37 and KRN1 maize for planting in 1989 was undertaken.

Training and Demonstrations

8. Extension staff of the project continued training the farmers on integrated pest management methods. This training has extended to some non-participating project farmers as well.

9. In collabotation with the "on-farm grain storage project", managed by the United States Agency for International Development (USAID) and the Kenya Government's Ministry of Agriculture, all project farmers were trained at Homa Bay Farmers' Training Centre from 13-16th November 1988 (Kendu Bay farmers) and from 20th-23rd November 1988 (Oyugis farmers).

12. The training coverd aspects on proper grain harvesting, processing and storage including efficient use of maize shellers.

13. Field visits to neighbouring Divisions of Migori and Rongo of South Nyanza District were also undertaken to open up the challenge and expose farmers to commercial agriculture.

Continuing Activities

14. The cropping calendar for short rains in Oyugis continues into 1989, and therefore monitoring of farming operations, entomological observations and socio-economic activities will be continued to January 1989. Similarly,

construction of improved grain storage structures will continue into January 1989.

Equipment

15. The following equipment were given to each farmer during this period:

- . 2 hand hoes
- . 1 hand operated maize sheller
- . 1 existing storage structure on each farm is being improved (for effective produce storage)

Observations

Stem Borers

16. The following observations were made on the different varieties of both Maize and sorghum cultivars: Busseola fusca and Chilo partellus were the main stem borers recorded in Oyugis and Kendu Bay Divisions. During long rains in both Divisions, a higher incidence of Busseola fusca was recorded, while during the short rain a high incidence of Chilo partellus was observed in Oyugis Division.

17. The percentage attack by stem borers on non-resistant commercial and traditional crop cultivars of maize and sorghum was higher compared to ICIPE's sorghum and maize cultivars. Intercropping of pest resistant cereal/legume helped further in lowering the stem borer damage to cereals.

18. Monitoring of adult Busseola fusca population using synthetic pheromone for trapping males continued but the catches declined in Kendu Bay during the off-season. Highest catches were recorded in one of the 4 traps in Oyugis Division in both long and short rainy seasons of 1988-1989.

Birds

19. There was no attack by birds on both sorghum cultivars 87LRB8 and 87LRB5. The early maturing maize V-37 has well covered compact cob which resist attack by birds.

construction of improved grain storage structures will continue into January 1982.

Equipment

The following equipment was given to each farmer during this period:

1. Hand weaver

1. Hand operated maize sheller

1. Improved storage structure on each farm (to be improved for effective produce storage)

Observations

Stem borers

16. The following observations were made on the different varieties of both maize and sorghum cultivars: *Bussacola fusca* and *Gilo partellus* were the main stem borers recorded in Oyo and Kogi States. During long rains in both divisions, a higher incidence of *Bussacola fusca* was recorded, while during the short rain a high incidence of *Gilo partellus* was observed in Oyo division.

17. The percentage attack by stem borers on non-resistant commercial and traditional crop cultivars of maize and sorghum was higher compared to IITA's resistant cereal cultivars. Inter-cropping of pest resistant cereals helped further in lowering the stem borer damage to cereals.

18. Monitoring of adult *Bussacola fusca* population using synthetic pheromone for trapping maize continued but the catches declined in Kogi and Oyo during the off-season. Highest catches were recorded in one of the 4 traps in Oyo division in both long and short rainy seasons of 1981-1982.

Birds

19. There was no attack by birds on both sorghum cultivars *Uba* and *Uba*. The early maturing maize V-33 has well-timed harvest and which caused attack by birds.

Stored Product Pests

20. Majority of farmers harvested their crops in time and further dried their produce before storage to reduce incidence of stored product pests.

21. An initial study on losses caused by these pests shows that stored product pests cause substantial yield losses varying in magnitude from farmer to farmer. Measures are being taken within the framework of the project to try and reduce losses caused by these pests.

Project Intervention Impact

22. The following observations were made in relation to assessing the impact of the project on the participating farmers:

(a) The low-cost farm equipment provided by the project included: 2 (two) hand hoes; 1 (one) hand operated maize sheller; an oxen plough and 1 (one) storage structure to each farmer. These equipment enabled 24 and 23 farmers from Oyugis and Kendu Bay respectively to prepare land early resulting in early planting. In marginal areas the crop utilizes all the available rainfall and the crops benefit from the nitrogen released at the onset of rains. By the time insects are ready to attack the plants the crops will have grown beyond the susceptible stage.

(b) The crops planted included V37 early maturing maize; KRN1 late maturing white seeded maize variety; sorghum tall white seeded 87LRB8 variety and; 87LRB5 short brown sorghum variety resistant to bird damage. All these cultivars are resistant to crop borers. Maize and sorghum mixed with cowpea reduce pest incidence by providing favourable micro-climatic conditions for natural enemies, confused signals, physical barriers etc.

(c) It was observed that intercropping combined with early planting together with the use of resistant cultivars which were developed and multiplied by ICIPE reduced crop borer infestation to the minimum.

(d) Significant increase in yields was noted and this has been attributed to the minimum borer attack, less bird damage on the two bird-resistant sorghum cultivars and the early maturing maize line V-37. The increase in yields was further boosted by the use of the hand maize sheller which minimizes damage of crops and the introduction of the improved storage structure which is hoisted on a raised platform to control rats and other enemies of the stored crop.

(e) Participatory training of the farmer and the extension workers also continued during this period, mainly in the areas related to identification of different crop borers, handling of the oxen-ploughs, different types of grain storage facilities and IPM methodologies.

(f) Attitudinal surveys, currently being conducted by the socio-economist, has shown structural change in the lifestyle of the participating farmers. This can mainly be attributed to the increase in crop yields. Farmers are able to generate extra income by selling some of their produce at the local markets and channeling the profit towards profitable investments. Intercropping of maize, cowpea and sorghum has also ensured adequate food supply and reasonable balanced diet throughout the year.

(g) Feedback obtained from the extension workers, during Field trips and Open days indicate that there has been significant diffusion of the IPM methodologies from the participating farmers to the neighbouring farmers who are well aware of the pest mangement practices being implemented. Requests from non-participating farmers are continously being received by project staff because non-participating farmers have observed project mobilization of the available resources, at the farm level, to produce enough food for themselves and selling extra to generate income.

23. The ICIPE's pest resitant cultivars of maize (V37), sorghum (87LRB8) yielded on the whole better than traditional sorghum cultivars in most farms; on few farms in Oyugis Division, especially at the higher altitudes more than 1600m, the sorghum did not perform well.

24. The yield of KRN1 maize compared favourably to the commercial hybrids, V-37 maize and good yielded. In Kendu Bay Division where second crop has been traditionally grown, some farmers are trying to grow V-37 due to its short maturity period.

25. Yields of cowpea were also good despite the heavy rains during the (March/April, 1988) long rainy season. ICV2 cowpea grew well when intercropped with V-37, KRN1 or sorghum 87LRB5; but tended to be smothered by the tall 87LRB8 sorghum, implying that wider spacing is needed for the intercropped cowpea to do well.

26. The general conslusion is that adoption of ICIPE's IPM package continues to be received positively by the participating farmers as shown by their willingness to practice the technologies given to them.

27. There is outward diffusion of the IPM technology from the participating farmers to the neighbouring farmers, who are well aware of the practices of pest management being implemented. Requests from the non-participating farmers are being received continuously by the project staff to join in the pilot project.

28. Structural changes are beginning to show in many farm households and extra income from farm produce are being channelled toward profitable investments. Farmers continue to mobilise the available resources at farm level, thereby producing enough for home consumption and selling the extra to generate income.

Constraints

29. There was an outbreak of animal trypanosomiasis which killed cattle, oxen and donkeys in the project area. Although this caused problems to the farmers, most of the participating farmers were able to use the income generated from the previous harvest to hire tractors for land preparation. The rest pooled their resources which consisted of: labour; ploughs; surviving oxen and; donkeys and were able to prepare their land in time.