**CROP PROTECTION PROGRAMME**

# Accelerated Uptake and Impact of CPP Research Outputs in Kenya

**R8454 (ZA0678)**

**FINAL TECHNICAL REPORT**

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## Abbreviations

| | |
|---|---|
| AVDRC | Asian Vegetable Development Research Centre |
| AIRC | Agricultural Information Resource Centre |
| COSTEC | Tanzania Commission for Science and Technology |
| AFC | Agriculture Finance Corporation |
| CRC | Catholic Relief Services |
| CABI | CAB International |
| CABI-ARC | CAB International Africa Regional Centre |
| CBO | Community Based Organisation |
| CD | Compact Disk |
| CPP | Crop Protection Programme |
| DFID | Department for International Development, UK |
| FAO | Food and Agricultural Organisation of the United Nations |
| FFS | Farmer Field School |
| ICIPE | International Centre for Insect Physiology and Ecology |
| IFAD | International Fund for Agricultural Development |
| IPM | Integrated Pest Management |
| IPPM | Integrated Production and Pest Management |
| KARI | Kenya Agricultural Research Institute |
| KENFAP | Kenya National Federation of Agricultural Producers |
| KBC | Kenya Broadcasting Corporation |
| NGO | Non Governmental Organisation |
| NRI | Natural Resources Institute |
| NAADS | National Agricultural Advisory Services |
| PPRI | Plant Protection Research Institute |
| RPK | Resource Project Kenya |

## Acknowledgements

Many people have taken part in this project in different ways. They are too numerous to mention by name, but we would like to record our sincere and grateful appreciation to the following:

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- The field school facilitators who introduced the new technologies to the farmers, and also helped in some of the data collection.
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- The leaders and scientists of CPP and other projects and programmes who provided reports, materials and advice, and allowed us to adapt and reproduce their dissemination products.
- RNRKS programme managers, especially CPP, who put us in touch with the relevant projects.
- The staff of the Agricultural Information Resource Centre who produced the radio and video programmes.
- The staff of Regional Reach and Kenya Broadcasting Corporation who assisted with airing the programmes.
- Those involved with the design, testing and production of the other dissemination materials.

## Executive Summary

This project followed on from one (R8299) which addressed the bottleneck that occurs between generation of research outputs and their application by the farmers they are intended to benefit.

The previous project promoted the uptake of CPP research outputs in Kenya, focusing on crops prioritized by participating farmers: maize, sorghum, beans, sweet potato, kale and groundnuts. This project focussed on tomato, again as requested by the farmers. The purpose of this project was to promote pro-poor strategies to reduce the impact of key pests, and improve yield and quality of crops produced by small scale farmers in East Africa. There were three outputs:

- CPP and other research outputs on tomato adopted and evaluated in Kenya
- CPP research outputs widely promoted and disseminated to intermediary institutions
- Success stories promoted through mass media

Research outputs were promoted to farmers in Western Kenya through a network of farmer field schools (FFS) already established by an ongoing IFAD-funded regional project. Farmers specified the constraints they face in tomato production, and technologies for addressing those constraints were collated from CPP research and other projects. The technologies were introduced to the farmers by trained FFS facilitators, and farmers chose the technologies they wished to try out. Over 1000 farmers were directly involved in 58 field schools.

Farmer evaluation and surveys showed beneficial impacts of the technologies tested in the FFS. 95% of farmers reported some yield increase, with an average increase of 50.9%. This was attributed to use of improved varieties, improved pest and disease control, and greater use of inorganic and organic fertilizer. 86% of farmers reported an increase in marketable surplus, but given poor market access how this translates to increased income is not clear. Farmers highlighted the need for improved market channels to avoid gluts on the local market. 90% of farmers reported improved access to essential information as a result of the project.

A resource CD containing source files of all the printed materials was compiled and 100 copies distributed to intermediary organisations. One hundred and fifty manuals, 220 posters and 615 leaflets were printed and distributed. Dissemination materials were sent to organisations in Uganda, Tanzania and Zimbabwe as well as Kenya.

Six 15-minute radio programmes in Kiluhya and six 5-minute programmes in Kiswahili were produced and aired on national and regional radio respectively in Kenya. The programmes focus on farmers telling their stories of the benefits of adopting crop protection technologies in kale, beans, sweet potato, maize and tomato, and the approaches they used to test them. Two 15-minute videos on a similar theme were produced titled “Maendeleo Kwa Kushirikiana”, and aired by

Regional Reach, and organisations which screens videos in 200 rural market centres in 10 districts of Kenya, reaching nearly 40,000 viewers a day.

## Background

This project was based on the successes achieved in the project "Accelerated Uptake and Impact of CPP Research Outputs" (R8299) which immediately preceded this one. The purpose of that project was to promote pro-poor strategies for reducing key pests, and so improve yield and quality of crops produced by small scale farmers in Kenya. Research outputs were promoted to farmers in Western Kenya through a network of farmer field schools (FFS) already established by an ongoing project funded by IFAD.

The process was demand-led: farmers specified the crops they wished to work on each season, and indicated the constraints experienced in each crop. Technologies were collated from CPP and other research programmes, and presented to the FFS facilitators during three training workshops. The crops covered were beans, sweet potato, maize, sorghum, kale and groundnuts. The facilitators introduced the technologies to the FFS, and farmers chose the technologies to try out in their own and/or group managed plots. Approximately 3600 farmers were directly involved in the FFS with a further 1800 attending 30 FFS open days to learn from their colleagues, along with nearly 400 representatives of intermediary and other local organizations.

FFS members were surveyed for their preferences on the content and format of dissemination materials. Relevant existing materials were collated, and adapted and modified where necessary, while new materials were also created. Twenty two dissemination products were reproduced and disseminated to intermediary organizations as well as through the FFS. One of the products was a CD containing the source files for all the materials, allowing intermediaries to develop or reproduce further materials as required.

Surveys and farmer evaluations indicated positive impacts of the technologies tested by farmers. Farmers reported 10-15% yield increase in maize, sorghum and kale, and over 80% felt their food security had been improved. Increased marketed surplus was also reported in the same crops, contributing to improved farm incomes. Pesticide use did not increase, but fertilizer use increased in all crops except sweet potato where none was used. In all crops farmers reported an improvement in the content and timeliness of the crop production information they had received as a result of the project.

This project adopted a similar approach, but focusing on tomatoes. Thus the targeted outputs were:

- CPP and other research outputs on tomato adopted and evaluated in Kenya
- CPP research outputs widely promoted and disseminated to intermediary institutions
- Success stories promoted through mass media

The project added value to both the previous project (R8299) and to a number of other CPP projects. Farmers had requested information on tomato production, and various CPP research projects have researched pests and diseases on the crop (including R7403, R7472, R8041, R8296). Research outputs on tomato were

introduced to existing field schools where farmers were facilitated to try out and adapt the research outputs to their own needs. At the same time dissemination materials were prepared on tomato IPPM.

Three categories of organisations and groups were targeted by the activities. Most important were the farmers, who are the ultimate beneficiaries of many of the CPP research projects. The second category of beneficiaries was the intermediary organisations working with farmers. By providing dissemination materials that they can use or adapt and modify, they are better equipped to achieve their objectives. Third, the research organisations who have generated the research outputs have benefited from having their work taken up by farming communities. By acknowledging the organisations on dissemination materials, their achievements and research becomes more widely known and recognized.

The PMF for R8299 listed evidence of the demand and need for the activities and during that project maize, bean, sweet potato, sorghum, groundnuts and kale emerged as the top priorities. But farmers also requested information and technologies for local vegetables, tomatoes, soyabean, cassava and sesame. Other crops with much lower demand included banana, onion, green gram, millet and bambara nut. Of the higher priority crops not previously addressed, tomato provide the best opportunity for promoting uptake and adoption of CPP research outputs, as it has been the subject of considerable research, and farmers in all three participatory districts requested its inclusion.

The previous work also collected information on farmers' views on different sources of information. In focus group discussions farmers noted they receive information through various routes, including printed materials (posters, leaflets, calendars), personal contact (neighbours, extensionists, barazas, field schools, exchange visits) and mass media (radio, press). Different methods have different merits, so no one method is preferred over the other. Printed materials are popular, particularly with colour photographs and in appropriate languages. Radio provides wide coverage, particularly through the Kenya Broadcasting Corporation, which also has regional services in different parts of Kenya. Face to face communication with extensionists and field school facilitators provides opportunity for dialogue which increases understanding. Visits to other farms are also appreciated, such as field school open days while visits or study tours are popular but expensive in terms of the number of direct beneficiaries.

The possibility of an extension to the previous project was discussed at a field school facilitators' training course, and tomato was confirmed as a crop of interest. As well as the dissemination channels already listed, video was also found to be popular. Videos in which farmers share their experiences were felt to be particularly valuable. Thus there was clear demand for the three types of materials produced; print, radio and video.

## Project Purpose

The purpose of the project was to promote pro-poor strategies to reduce impact of key pests, improve yield and quality of crops, and reduce pesticide hazards in high potential systems in Kenya. New knowledge was being sought on how outputs from research funded by DFID and others could generate benefits for poor people by application of new technologies on crop protection in tomatoes. The project addressed ways of producing and distributing demand driven dissemination materials to intermediary organisations and the general public, and ways to document the impact on farmers' yields and livelihoods from adopting the new technologies.

## Research Activities

### Activity 1.1 Participatory identification of tomato production constraints and options for adoption

A priority setting exercise was conducted for the short rain season of 2005 to identify priority tomato production constraints and intervention options. The approach used was a combination of a survey questionnaire, simple group ranking and focus group discussions using a checklist. Six farmer field schools (two from each of the participating districts) were visited for focus group discussions to complement the information from individual interviews. During the individual interviews and focus group discussions farmers were asked to indicate the constraints and how they addressed the constraints (see Annex 1).

### Activity 1.2 Tomato IPPM training for field school facilitators

During the priority setting exercises farmers identified different tomato production constraints, many of which they had no technological options for coping with. Technical experts from the lead institute and collaborators collated the problems and identified relevant technological options and CPP research outputs. These were used as the basis for a week long training course provided to FFS facilitators. The training exercise was conducted for 33 farmer field school facilitators from Bungoma, Busia and Kakamega Districts (see Annex 2).

### Activity 1.3 Season long field schools

Fifty eight season long field schools (see Annex 8) were run by the facilitators after they had received their technical training on prioritised tomato issues. The facilitators included the learnt technologies (see Annex 3) in the FFS curriculum implemented through weekly meetings at the tomato field school study plots. KARI supplied the tomato seeds and other inputs. During the field school season, the facilitators distributed tomato information and dissemination materials to farmers and

intermediaries. Other activities included collection of baseline IPPM data and evaluation of the technologies.

### Activity 1.4 Farmer evaluation and assessment of the tomato IPPM methods

The evaluation and assessment of tomato IPPM methods was undertaken in three steps: a pre-adoption survey to establish farmers' situation and views on tomato production, farmer participatory evaluation of new IPPM technologies and a post-adoption survey to assess the impact of new IPPM technologies on target farmers. In the pre-adoption survey, five farmers from each of the participating field schools were interviewed using a structured questionnaire to collect data on socio-economic characteristics (see Annex 4). Six farmer field schools were randomly selected for the evaluation of IPPM technology that involved a combination of group discussions and simple matrix scoring (see Annex 5). The same five farmers from each field school interviewed during the pre-adoption survey were interviewed for the post-adoption survey but a different questionnaire was used (see Annex 6).

### Activity 2.1 Production of dissemination materials

Selection and production of information materials was based on farmers' priority information needs based on key tomato production constraints identified during the focus group discussions at the start of the season. The formats and channels used for disseminating information were also based on farmers' preferences. Accordingly requests were sent to leaders of relevant CPP funded projects who had been involved in research work on the constraints, as well as to other relevant projects and institutions that were known to have information on technologies that address the constraints. In a few cases materials were adapted to the local situation with permission from the authors/publishers.

### Activity 2.2 Distribution of disseminations materials and resource CD

The information materials were disseminated to intermediary organisations working in research, extension and development sectors in the project area as well as to the FFS. The resource CD was disseminated to intermediary organisations in the project area, organisations that contributed the materials, project partners, development organisations involved in agriculture in Kenya, development partners and collaborators in Uganda, Tanzania and Zimbabwe. Other copies were disseminated to participants attending a DFID dissemination workshop for Southern Africa held in Harare in September 2005 (see Annex 9).

### Activity 3.1 Preparation and airing of a success stories radio series

Twelve radio programmes were prepared through collaboration between the project partners and the farmers who participated in the project. Technical support to record

and edit the programmes was provided by the Agricultural Information Resource Centre (AIRC), a unit of the Ministry of Agriculture (Kenya) which specialises in producing and disseminating agricultural information to farmers, extension and other stakeholders through the mass media. Volunteer farmers were interviewed and their stories recorded for the radio programme production (see Annex 7). Airing of the radio programmes was done through the Kenya Broadcasting Corporation (KBC), the national radio service.

### Activity 3.2 Preparation and airing of success stories videos

Video shooting (one video with two parts) was done more or less concurrently with the interviews by the same technical team but different volunteer farmers in the farmers' fields (see Annex 7). The videos were screened through Regional Reach, a one-stop rural advertising and promotion company, and KBC Television.

## Outputs

### Output 1: CPP and other research outputs on tomato adopted by farmers in Kenya

### Participatory identification of tomato production constraints and intervention options

Through a participatory approach, the constraints in the production of tomato were identified in Busia, Kakamega and Bungoma. Identification and prioritization of constraints revealed that the most serious constraints were pests and diseases followed by marketing and input costs (Table 1). The control methods were not adequately understood by the farmers and at the same time the costs for controlling were prohibitive in certain instances. Markets were sometimes oversupplied and the means of transport was also a problem given the high perishability of the tomato crop (see Annex 1).

**Table 1. Priority constraints and current farmer interventions in tomato production**

| Constraint | Intervention options (control method) | % using inter-vention |
|---|---|---|
| **Pests:** | | |
| 1. Bollworms | Pesticide use (diazinon, karate and bulldock) | 52.3 |
| 2. Cutworms | Physical destruction<br>Application of ash<br>Staking | 21.0<br>41.2<br>5.3 |
| 3. Aphids | Apply ash<br>Pesticide use | 38.1<br>43.0 |
| 4. White fly | None | |
| 5. Nematodes | None | |
| 6. Spider mites | None | |
| 7. Thrips | None | |
| **Diseases:** | | |
| 1. Blight | Fungicides<br>Roguing | 47.4<br>37.5 |
| 2. Bacterial wilt | Roguing<br>Crop rotation | 38.3<br>15.8 |
| 3. Blossom-end rot | Staking<br>Mulching | 21.0<br>30.5 |
| 4. Leaf spot | Improve soil fertility<br>Apply foliar feed | 26.3<br>26.3 |
| 5. Leaf rust | Remove affected leaves | 10.5 |
| 6. Mosaic virus | None | |
| **Other constraints** | | |
| 1. Marketing | Early planting,<br>sell at low prices and/or sell on credit | 30.0 |
| 2. High cost of inputs | Use small quantities | 43.8 |
| 3. Low technical know-how | Seek advice from other farmers | 30.0 |
| 4. Hail storms | Timing planting | 10.4 |
| 5. Low soil fertility | Apply fertilizer<br>Apply manure | 21.0<br>26.3 |
| 6. Low quality seeds | Buy from recognized stockists, read labels | 15.8 |

The key pest constraints in tomato production in terms of effect on the crop were bollworms followed by cutworms (Table 2). The available interventions were application of pesticides, use of ash and roguing. Among the diseases identified by farmers blight was reported to be the most serious in terms of effect on the crop followed by bacterial wilt (see Annex 1).

**Table 2: Ranking of tomato pests and diseases based on effect and available intervention**

| Constraints | Rank depending on effect on crop | Intervention options | Rank based on available intervention |
|---|---|---|---|
| **Pests** | | | |
| White flies | 4 | None | 2 |
| Aphids | 3 | Apply ash<br>Pesticide use | 5 |
| Cutworms | 2 | Physical destruction<br>Application of ash<br>Staking | 4 |
| Bollworms | 1 | Pesticide use (diazinon, karate and bulldock | 3 |
| Thrips | 6 | None | 2 |
| Nematodes | 5 | None | 1 |
| Spider mites | 7 | None | 2 |
| **Diseases** | | | |
| Blight | 1 | Fungicides<br>Roguing | 2 |
| Bacterial wilt | 2 | Roguing<br>Crop rotation | 3 |
| Blossom-end rot | 3 | Staking<br>Mulching | 4 |
| Leaf spot | 4 | Improve soil fertility<br>Apply foliar feed | 5 |
| Mosaic virus | 5 | None | 1 |

**Pre-adoption situation and tomato production practices by practicing farmers**

Overall 23.0% of farmers grow tomatoes in Western Kenya (Table 3). The main tomato varieties grown are Cal-J, money maker, fortune maker and Roma. Tomato production is undertaken on about 7.7% of the cultivated land (see Annex 4).

**Table 3. Tomato production and input usage in Western Kenya**

| Production characteristics | All Districts |
|---|---|
| Farmers growing tomatoes (%) | 23.0 |
| Average area under tomatoes (acres) | 0.3 |
| Farmers using fertilizers (%) | 20.4 |
| Average quantity of fertilizer used (kg/acre) | 28.9 |
| Farmers using hired labour (%) | 5.7 |
| Yield of tomatoes (Crates/acre) | 15.9 |
| Price per crate (Ksh.) | 762.2 |
| Farmers using pesticides (%) | 21.8 |
| Farmers using manure (%) | 12.7 |

In general, only 20.4% of the farmers use fertilizers in tomato production. The main fertilizer used is diamonium phosphate (DAP), which is applied to the soil during transplanting and also in the nursery. An average of 28.9kg of DAP per acre is used. There is almost no top dressing with calcium amonium nitrate (CAN) or any other nitrogenous fertilizers. A relatively small proportion (12.7%) of the farmers use manure on tomatoes (Table 3).

**Technologies disseminated**

For the identified tomato production constraints, potential options for addressing the constraints were sourced (see Annex 3). The sources of the technological options included CPP funded projects while others were collated from a range of other research work (Table 4). Scientists from the lead Institute and collaborators presented the different technologies to thirty three field school facilitators during the training of trainers course that was conduct in July 2005 (see Annex 2). The trained FFS facilitators introduced the technologies to the farmers through season-long field schools. Farmers selected what they decided were most appropriate technology options for testing out of the ones disseminated.

**Table 4. Summary of tomato technologies disseminated (R number denotes DFID project number) see Annex 3 for further details.**

| Problem | Source of technology |
|---|---|
| Blight (early and late) | AVRDC<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe<br><br>R7403 Pest management in horticultural crops; an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya |
| Bacterial wilt | AVRDC<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Fusarium wilt | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Verticillium wilt | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Septoria leaf spot | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Blossom end rot | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Tomato mosaic virus (ToMV) | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Common pests of tomato and their management | |
| Bollworm | Dudutech, ICIPE<br><br>R7403 Pest management in horticultural crops; an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya |

| | |
|---|---|
| | R7813 Sustainable control of the cotton bollworm, *Helicoverpa armigera*, in small-scale cotton production systems. |
| Cutworms | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Red spider mites | ICIPE<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Whitefly | R8041 Sustainable integrated management of whiteflies as pests and vectors of plant viruses in the tropics: Phase 2 - Network Strengthening, Pest and Disease Dynamics and IPM Component Research. |
| Thrips | ICIPE, Dudutech<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Aphids | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe<br><br>R7403 Pest management in horticultural crops; an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya |
| Root-knot nematodes | R 7472 Integrated management of root-knot nematodes in Kenya<br>R8218 Production of *Pasteuria penetrans* to control root-knot nematodes (*Meloidogyne* spp.).<br><br>R8296 Promotion of sustainable approaches for the management of root-knot nematodes on vegetables in Kenya. |

## Farmers' perceptions of the new technologies

The key criteria used by farmers to evaluate the technologies were yield, pest and disease resistance and the cost of control process. The varieties promoted by the project included Cal-J, Kentom, Fortune Marker, Monyalla and Eden F1 Hybrid. Farmers rated Fortune Maker the best variety especially due to its resistance to bacterial wilt. Cal-J was the poorest. Although pesticides were indicated as very effective in the control of aphids, farmers preferred a companion planting of tomato with deterrents (garlic and marigolds) which was reported to be less expensive. While compared with normal level planting, triangular planting on raised beds was perceived to produce higher yields and be less labour intensive. Farmers reported that handpicking and chemical control of pesticides performed equally well but they preferred handpicking since it was a non-cash intervention cost (see Annex 5).

## Impact on input usage by the farmers

The use of fertilizers, pesticides, manure and hired labour increased but with different magnitudes (see Annex 6). There was greatest increase in the number of farmers using fertilizers (Table 5). Increased use of fertilizers by farmers could be due to the drive to obtain higher yields from the improved varieties.

**Table 5. Use of land and fertilizers by the farmers**

| Period | Owned land cultivated (acres) | Rented land cultivated (acres) | Fertilizer use (Kg/acre) |
|---|---|---|---|
| Before | 2.8 | 1.0 | 28.9 |
| After | 2.9 | 1.0 | 75.0 |

## Impact on Pest and disease management

There was an increase in the percentage of farmers attempting control of the different pests and diseases of tomatoes (Table 6). Ninety four percent of the farmers reported that there was improvement in their pest management. This indicates farmer appreciation of the new technologies.

**Table 6. Farmers (%) reporting presence of specified pests and diseases and interventions to control them**

| Pests and diseases | Present | | Intervention | |
|---|---|---|---|---|
| | Before CPP | After CPP | Before CPP | After CPP |
| Bollworms | 61.3 | 61.0 | 78.8 | 95.9 |
| Aphids | 44.8 | 81.4 | 88.4 | 96.8 |
| Cutworms | 54.8 | 55.0 | 73.7 | 74.1 |
| Chafer grubs | 17.4 | 21.4 | 63.2 | 66.5 |
| Crickets | 26.1 | 24.2 | 65.1 | 66.4 |
| Nematodes | 30.0 | 18.6 | 55.0 | 77.4 |
| Blight | 63.5 | 24.6 | 80.0 | 83.0 |
| Blossom-end rot | 54.3 | 32.2 | 38.5 | 92.2 |
| Bacterial wilt | 38.0 | 86.4 | 63.2 | 97.1 |
| Mosaic virus | 25.3 | 38.1 | 32.8 | 91.1 |

Over eighty percent of the farmers reported fewer incidences of pests and diseases. This may be because the project has sensitized the farmers regarding the importance of pests and disease control (see Annex 6)

**Benefits of the new technologies**

Farmers reported that there were improvements in their livelihoods, which they attributed in part to the use of improved crop protection practices that lead to high tomato yield. Ninety two percent of the farmers reported that they felt their nutritional status had improved. The broad benefits reported by the farmers included acquiring knowledge on pest and disease control, different tomato varieties and their yield potentials, knowing the difference between insecticides and fungicides, and tomato production practices. Eighty two per cent of the farmers reported that there were increases in income due to the use of CPP technologies. There was a yield increase of 50.9% (see Annex 6).

**Adoption rates of the technologies**

The technologies that were disseminated by the CPP project included improved varieties, pest and disease resistant varieties, planting on raised beds, and use of vertical sticks around the tomato stems. Adoption rates are based on intentions expressed by farmers in the end-of-season evaluation. There were differences in the levels of adoption of the various varieties that were tried by the farmers. The adoption rates were 89.9%, 81.4%, 80.5%, 45.0% and 38.1% for Fortune Maker, Eden F1 Hybrid, Cal-J, Kentom and Monyalla respectively. Fortune Maker had the highest adoption rate because of high yields, pest and diseases resistance. About 90% of the farmers reported that they would adopt vertical sticks for the control of cutworms. The vertical sticks would be adopted because they are less costly compared to the pesticides. Planting on raised beds was adopted by 60% of the farmers. The reason for adoption is high water retention capacity and high plant population. About 89.8% of the farmers reported that they would adopt onions/garlic, which serve as repellents in the control of aphids. Pesticides were adopted by 82%

of the farmers. It was reported that despite being expensive pesticides would be very effective in the control of pests (see Annex 6).

**Impact on information availability**

Over eighty six percent of the tomato farmers reported that there was an increase in timeliness, content and reach of crop protection information. Ninety six percent of the tomato farmers noted that access to information was important (Table 7). The information and the accompanying technologies enabled the farmers to achieve successful pest and disease control and high tomato yield (see Annex 6).

**Table 7. Percentage of farmers reporting change in access to crop protection information**

| Change variable | Access improved | Access unchanged | Access essential |
|---|---|---|---|
| Timeliness | 88.1 | 11.9 | 96.3 |
| Content | 87.3 | 12.7 | |
| Reach | 86.4 | 13.6 | |

**Output 2: CPP research outputs widely promoted and disseminated to intermediary institutions**

The group discussions on prioritisation of information requirements served to identify the key topics on which farmers most urgently needed information, the preferred sources of this information, channels for disseminating it as well as the preferred formats. Identified formats included: farmer field schools, extension, radio, seminars, and print material. The preferred language was Kiswahili and Kiluhya, a local language used in the project region. A resource CD containing all the information materials disseminated during the project was produced. The aim of the CD was to ensure wider and faster access to the materials and the possibility of printing on demand any number of materials required. In total one hundred and fifty manuals/handbooks, 219 posters, 614 leaflets and 100 copies of a resource CD were produced. To obtain the materials, requests were sent to leaders of relevant CPP funded projects in the first instance and then to other relevant projects and institutions. Where the materials were not available, we developed them. In every instance, permission was obtained to use or adopt the materials to the local situation and due acknowledgement was made (see Annex 9).

**Disseminated products**

The information materials were disseminated to 58 Farmer Field Schools under the project and to 26 intermediary organisations working in research, extension and development sectors in the project area. The resource CD was disseminated as follows: 38 copies to intermediary organisations in the project area, 13 copies to organisations that contributed the materials, 10 copies to project partners, 17 copies to development organisations involved in agriculture in Kenya, 22 copies to development partners and collaborators in Uganda, Tanzania and Zimbabwe. In Zimbabwe, 8 of the 22 copies were disseminated to participants attending a DFID dissemination workshop for Southern Africa held in Harare in September 2005 (see Annex 9).

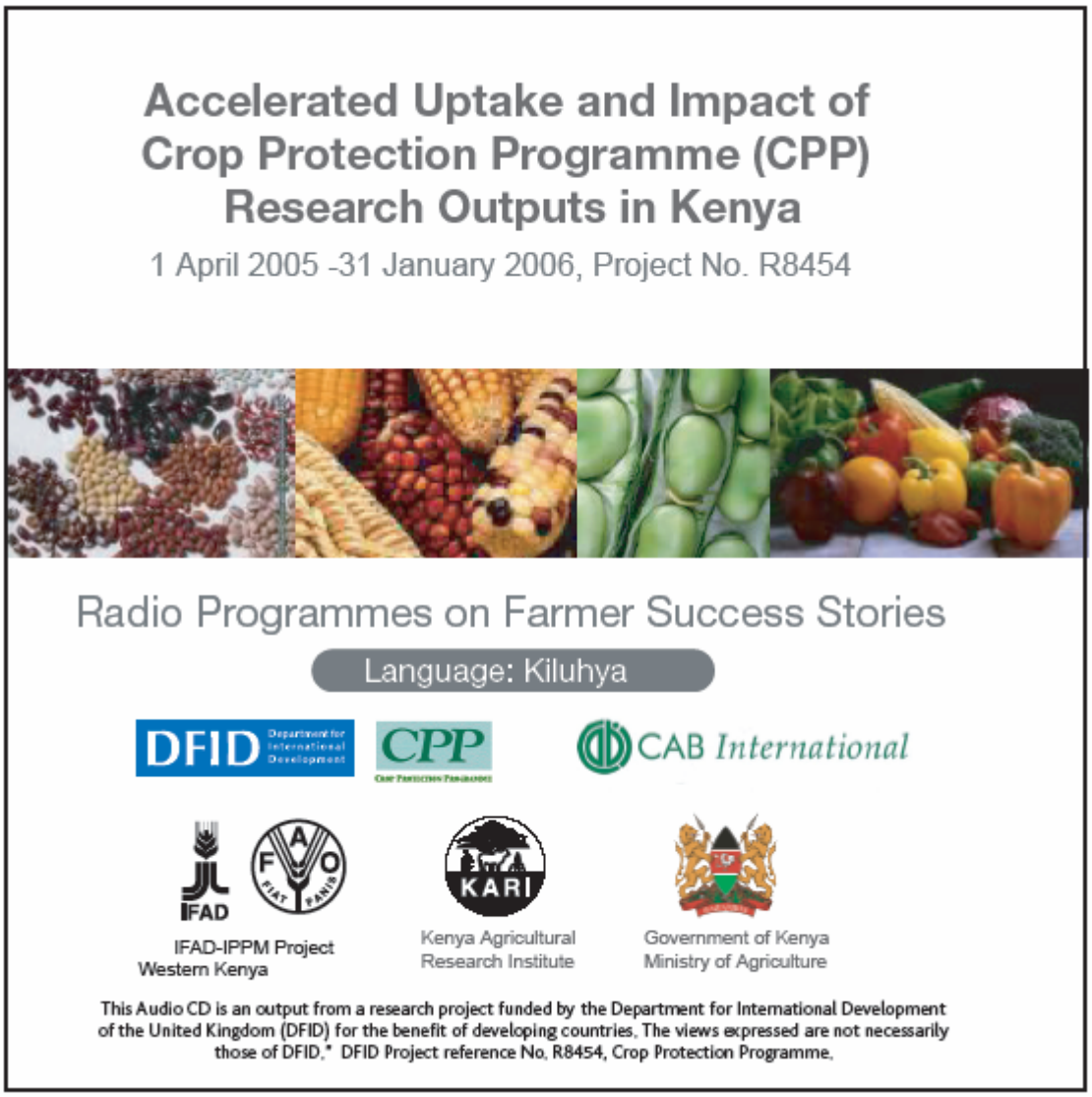


Figure 1. Cover of the Kiluyha radio programme CD

**Output 3: Success stories promoted through mass media**

**Radio**

A set of twelve radio programmes, six in Kiswahili (5 minutes) and 6 in Kiluhya (15 minutes), was produced. The programmes titled Kushirikiana and Khurecheresanie in Kiswahili and Kiluhya respectively, focus on farmers telling their stories of the benefits of adopting crop protection technologies in kales, beans, sweet potato, maize and tomato. The stories also highlight the merits of participatory approaches and use of dissemination materials such as posters in promoting learning and adoption of technologies. Farmers highlight the benefits of Farmer Field Schools (FFS) in fast tracking technology dissemination. They commend the collaboration between extension and research under the CCP Uptake project. The programmes are available on audio tapes and on CD (Figure 1) for project partners and on broadcast quality tapes for use by media houses (see Annex 7).

The Kenya Broadcasting Corporation (KBC), a national radio service with a coverage of 20 million people started airing the farmers' success stories during the second week of January 2006. The Kiswahili and Kiluhya programmes are being aired on the KBC Kiswahili service and regional channels, respectively, once a week for 6 weeks during prime time when the listenership is expected to be at its peak (Thurs 8.00 -8.05 pm for Kiswahili programs and Saturday 2.30 -2.45pm for Kiluhya programs). Prior to going on air, the programmes were promoted on other KBC programmes (Table 8).

**Video**

A two part video (15 minutes each part) titled "Maendeleo kwa Kushirikiana" (development through collaboration) was produced. The videos depict success stories as told by farmers who participated in the project. The stories were shot in the farmers' fields and homes and show the actual crop protection technologies in kale, maize, beans, sweet potato and tomato that were disseminated and adopted. They also show how farmers are already reaping the benefits of these technologies in terms of increase in crop yield, income and improved nutrition (see Annex 7).These programmes are available on VHS tapes, on DVD for project partners and on DV-CAM tapes for use by media houses.

Airing of the videos started in the third week of January 2006 through Regional Reach. The company provides free public viewing of educational, informative and entertainment videos in 200 rural market centres located in 10 districts of Kenya, including Kakamega, one of the project areas. Regional Reach has an average of 39,500 viewers per day and an estimated 1.2 million viewers per month (The Steadman Group, 2005). In addition, wider dissemination would be achieved through screening of the videos on KBC Television that has a viewership of 14 million people country-wide during prime time. KBC TV is also a preferred channel taking a viewership of up to 95% of the population who have access to TV in Bungoma, one of the project areas (Table 8).

**Table 8. Schedules for Airing Radio series on KBC and screening videos by Regional Reach Limited**

| Programme/ type | Language | Channel | Date | Time | Coverage |
|---|---|---|---|---|---|
| *Kushirikiana* (Radio) | Kiswahili | KBC | 19, 26 Jan. 2, 9, 16, 23 Feb. 2006 | 8.00 pm | Countrywide |
| *Khurecheresanie* (Radio) | Kiluhya | KBC | 21, 28 Jan. 4, 11, 18 and 25 Feb 2006 | 2.30 pm | Western region |
| *Maendeleo kwa Kushirikiana* (development through collaboration) (Video) | Kiswahili | | From Jan 28 to 18 Feb 2006(daily) | 8.00 pm | 10 Districts (Meru, Nyeri, Muranga, Kiriyaga, Nakuru, Kisumu, Vihiga, Kisii/Nyamira, Kakamega, and Keiyo/Koibatek. |

## Contribution of Outputs to Development Impact

The project achieved all the outputs, so the purpose was realized and contributed to the goal of delivering benefits to poor people. New knowledge in crop protection from CPP research outputs and other projects was applied by rural smallholders in Western Kenya, who were provided with the information they requested, and through farmer field schools were enabled to apply it in their own farming context.

Through the wide dissemination of information in printed and digital format to intermediary organizations working with rural communities, the new knowledge will indirectly reach tens of thousands of farmers who will have the opportunity to apply it. The video, radio and TV airing of success stories from the previous project will have reached hundreds of thousands more farmers, again contributing to the application of new knowledge.

The farmers directly involved with the project reported a number of benefits. Of the farmers interviewed in the survey at the end of the season, 95% reported that they had achieved higher yields as a result of the project. Based on farmers' estimates the average yield increase was a fraction over 50%, although the yields in two of the districts were particularly low before the project started.

The baseline survey indicated that farmers grow tomatoes for both home consumption and for the market, so increased production contributes to food security. In addition 86% of farmers reported an increase in marketable surplus. This suggests there is also an increase in income, though additional inputs were used, so the net return to farmers is not known. Furthermore, farmers reported access to markets as a constraint, so producing yield that is surplus to home consumption requirements does not necessarily improve income.

The farmers taking part in the project showed an appreciation of the value of information. Almost all felt that access to good crop protection information is essential for their farming, and nearly 90% reported improvement in access to this information as a result of the project.

The contribution of outputs to development impact observed during this project is of course short term, and we cannot say to what extent the observed gains will continue. In the future additional gains might be expected as technologies are more widely taken up and adopted, or farmers might find shortcomings that were not apparent in the one season trial. During the season the number of farmers using fertilizer and pesticides on their tomatoes doubled to just over 50% and 40% of those interviewed respectively. The quantity of fertilizer used more than doubled, though usage was low prior to the project, perhaps due to a predominance of farmers growing for home consumption. If the increased inputs and outputs are to be sustained, improved market opportunities will be required.

The wide range of dissemination products developed and distributed by this and the preceding project provides for ongoing dissemination opportunities to promote wider uptake and impact. In particular the radio and TV programmes have been aired on national and regional channels, but additional video and audio tapes of the programmes could be produced and distributed for use by CBOs and other

organizations. The CD containing source files of print materials has already been widely distributed, including to FFS projects in Tanzania and Uganda.

Farmers themselves noted the need for follow up action in some areas. Accessibility of preferred varieties continues to be a constraint, and as noted above, access to markets for selling surplus also needs to be improved, particularly when local markets are oversupplied. Through the ongoing IFAD FFS project this is already being addressed, including investigating options for post harvest processing to add value.

## Publications

The following internal reports have been prepared during the project.

MUSEBE, R.O.; KIMANI, M.; ODENDO, M.; ASABA, J.F.; KHISA, G. AND AJANGA, (2006) Participatory identification of tomato production constraints and options for adoption

MUSEBE, R., KIMANI, M., ASABA, J., ODENDO, M., KHISA, G. and AJANGA, S. (2005) Assessment of pre-adoption socio-economic situation and production practices of participating farmers. CAB International, Africa Regional Centre, Nairobi, Kenya

MUSEBE, R.O.; KARANJA, D.; NKONU, M (2005) MUSEBE, R., KHISA, G., ODENDO, M., AJANGA, S., KARANJA, D., INZAULE, S., NKONU, M.; OTIPA, M. (2005) IPPM technologies for tomatoes. Report on training workshop 25-29 July 2005. CAB International, Africa Regional Centre, Nairobi, Kenya.

SIMONS, S. (2005). Project Progress Report. Report on project progress 14 September 2005. CAB International, Africa Regional Centre, Nairobi, Kenya.

SIMONS, S. (2005). Project Progress Report. Report on project progress 15 December 2005. CAB International, Africa Regional Centre, Nairobi, Kenya.

The following is a list of the dissemination products produced during the project.

1. CAB INTERNATIONAL (2005) Root-knot nematodes (Meloidogyne spp) and their management in tomato fields, 150 copies. CAB International, Africa Regional Centre, Nairobi, Kenya [Poster] [Field] [English]
2. CAB INTERNATIONAL (2005) Underground menaces: Root-knot Nematodes, 150 copies. CAB International, Africa Regional Centre, Nairobi, Kenya. [Leaflet] [Field] [English]
3. CAB INTERNATIONAL (2005) Hatari Chini ya Ardhi: “Nematodes” wa Vifundo vya Mizzi, 150 copies. CAB International, Africa Regional Centre, Nairobi, Kenya. [Leaflet] [Field] [Swahili]
4. INADES FORMATION TANZANIA/ ZONAL RESEARCH & EXTENSION LIAISON OFFICE (2003) (modified with permission) Kuzuia Wadudu wa Nyanya, 160 copies. CAB International, Africa Regional Centre, Nairobi, Kenya. [Leaflet] [Field] [Swahili]
5. INADES FORMATION TANZANIA/ ZONAL RESEARCH & EXTENSION LIAISON OFFICE (2003) (modified with permission) Magonjwa ya Nyanya na Udhibiti, 160 copies. CAB International, Africa Regional Centre, Nairobi, Kenya. [Leaflet] [Field] [Swahili]

6. DOBSON, H., COOPER, J., MANYANGARIRWA, W. and CHIIMBA, W. (2002) Integrated Vegetable Pest Management: Safe and sustainable protection of small-scale brassicas and tomatoes, 70 copies. NRI, Chatham, UK [Handbook] [Field] [English]
7. CAB INTERNATIONAL (2005) Kushirikiana. Kenya Broadcasting Corporation. 19 January 2006, 26 January 2006, 2 February 2006, 9 February 2006, 16 February 2006 and 23 February 2006 (08:00) 5 mins each. Kenya. [Radio series] [National] [Kiswahili]
8. CAB INTERNATIONAL (2005) Khurecheresanie. Kenya Broadcasting Corporation. 21 January 2006, 28 January 2006, 4 February 2006, 11 February 2006, 18 February 2006 and 25 February 2006 (14.30) 15 mins each. Kenya. [Radio series] [Local] [Kiluhya]
9. CAB INTERNATIONAL (2005) Khurecheresanie. Regional Reach Rural Advertising and Promotion Company. January 2006, (18.00) 15 mins each. Kenya. [Television program] [Local] [Kiluhya]
10. CAB INTERNATIONAL (2005) *Maendeleo kwa Kushirikiana*. 15 mins each. 3 copies (for broadcasting) Agricultural Information Resource Centre, Nairobi, Kenya [Video] [Field] [Kiswahili]

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**BOURNE, J.M., KARANJA, P.K., KALISZ, H., KARANJA, D.K., MAUCHLINE, T.M. and KERRY, B.R. (2004)** Incidence and severity of root-knot nematodes (Meloidogyne spp.) and the isolation and screening of the nematophagous fungus, Pochonia chlamydosporia, from some of the main vegetable growing areas in the Eastern, Rift Valley and Central provinces of Kenya. International Journal of Nematology 14, 111-122

**Garforth, C. (2001).** Enticing the Uptake and Adoption of Crop Protection Research. Unpublished report of the CPP Task Force on Uptake and Adoption.

**Hainsworth, S.D and Eden-Green, S.J (2000).** Sustaining Change: Proceedings of a workshop on factors affecting uptake and adoption of DFID CPP research outputs. NR International, Chatham. 153pp.

**KARANJA, D. K. (2004)**. Studies on integrated management of root-knot nematodes (Meloidogyne spp.) on tomato in Kenya. Ph.D. Thesis, University of Reading. 200pp.

**Khisa, G., Thomas, J. and Okoth, J. (2002).** East African Sub-Regional Pilot Project for Farmers' Field Schools.
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**Loevinsohn, M., Meijerink, G., Salasya, B. (1998).** Developing Integrated Pest Management with Kenyan Farmers: Evaluation of a Pilot Project. ISNAR Discussion Paper 98-13, presented at the International Seminar on Assessing the Impact of Using Participatory Research and Gender Analysis, Quito, Ecuador, 6-9 September, 1998. ISNAR, The Hague, Netherlands.

**Okoth, J., Khisa, G. and Thomas, J. (2002).** The journey towards self financed farmer field schools in Kenya. Paper presented at the International Workshop on Farmer Field Schools: Emerging Issues and Challenges. 21-25 October 2002, Indonesia.

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**Simons, S. & Oduor, G., (2001)**. Report of an experiment comparing the performance of tomato varieties from AVRDC Arusha, Tanzania.

**Simons, S. (2005)**. Accelerated Uptake and Impact of CPP Research Outputs in Kenya. Final technical report [R8299 (ZA0571)]

**The Steadman Group. (2005)**. Report on a survey on TV and Radio stations in Kenya.

# Annexes

## Annex 1: Report of participatory identification of tomato production constraints and options for adoption

### ACCELERATED UPTAKE AND IMPACT OF CPP RESEARCH OUTPUTS IN KENYA

### Activity 1.1: Participatory identification of tomato production constraints and options for adoption

Musebe, R.O.; Kimani, M.; Odendo, M.; Asaba, J.F.; Khisa, G. and Ajanga, S.

### 1.0 Introduction

Uptake and impact of CPP research outputs has already been achieved for beans, sweet potatoes, maize, sorghum, and kales. These generated enthusiasm among farmers for promotion of similar outputs in respect of tomatoes. Promotion of pro-poor strategies is expected to reduce the impact of key pests, improve yield and quality of crops, and reduce pesticide hazards in high potential systems in East Africa. This is undertaken in collaboration with the farmers because most farmers have well developed knowledge of their environment, crops and cropping practices. It is also the case that small scale farms are an integration of multiple enterprises that require the management of diverse household resources to meet a range of subsistence, income, and community goals. Farmers' criteria and goals were included when setting the priorities. Identification of tomato production constraints and options for adoption was conducted by farmers who are members of farmer field schools. The tomatoes were grown during the short rain season beginning August 2005.

### 2.0 Objectives

Identify tomato production constraints and options for adoption

### 3.0 Methodology

Farmer field school facilitators visited all the farmer field schools at the start of the short rain season, and those that wished to participate were identified. A survey questionnaire (Appendix 1) was administered to all the participating farmer field schools. Six farmer field schools (two from each of the participating districts) were also visited for focus group discussions to complement the information from individual interviews. A checklist (Appendix 2) was used to execute the focus group discussions. All the farmers that participated in the focus group discussions were assembled by the farmer field school facilitators. The discussions were meant to confirm the constraints and options for addressing the constraints. During the individual interviews and focus group discussions farmers were asked to indicate the constraints and how they addressed the constraints. This involved first listing the constraints and appending a rank for each constraint. Simple group ranking was used during interviews in the farmer field schools and focus group discussions.

## 4.0 Tomato production constraints and interventions

Identification of constraints was preceded by discussions on objectives for tomato production. The key objectives cited by the farmers were income generation, consumption, both income and consumption, and seed production. The criteria for measuring the objectives were yield, income, pest and disease resistance and costs of production.

Identification and prioritization of constraints revealed that the most serious constraints were pests and diseases followed by marketing and input costs (Table 1). Pests and diseases cause crop damage due to the inability to detect early and lack of the means to control. The control methods were not adequately understood by the farmers and at the same time the costs for controlling were prohibitive in certain instances. Markets were sometimes oversupplied and the means of transport was also a problem given the high perishability of the tomato crop. Due to over supply in local markets farmers were sometimes forced to sell at very low prices, which led to low income from the tomatoes. Accessibility to alternative markets was not easy due to lack of market information and the transport costs. Input costs were also reported to be high especially fertilizers, seeds and crop protection chemicals. The priority pests and diseases were as in Tables 1. Based on the reported pests and diseases CABI and KARI scientists in collaboration with other organizations collated various CPP and other research outputs that could address the farmer constraints (Appendix 3). Farmer field school facilitators were later trained on these options for adoption.

Table 1: Priority constraints and current farmer interventions in tomato production

| Constraint | Severity | Intervention options (control method) | *Evaluation of intervention* | | | |
|---|---|---|---|---|---|---|
| | | | Avail-ability | Efficacy | % using inter-vention | Problems/ risks of using intervention |
| **Pests:** | | | | | | |
| 1. Bollworms | *** | Pesticide use (diazinon, karate and bulldock) | ** | *** | 52.3 | Lack of money, high cost<br>Lack of sprayers |
| 2. Cutworms | ** | Physical destruction<br>Application of ash<br>Staking | ***<br>***<br>*** | ***<br>*<br>** | 21.0<br>41.2<br>5.3 | Labour intensive<br>Washed away by rain<br>Sticks are hard to find |
| 3. Aphids | ** | Apply ash<br><br>Pesticide use | ***<br><br>*** | **<br><br>*** | 38.1<br><br>43.0 | Labour intensive, less effective<br>No money & no sprayers & lack of technical know-how on good pesticides |
| 4. White fly | ** | None | | | | |
| 5. Nematodes | ** | None | | | | |
| 6. Spider mites | * | None | | | | |
| 7. Thrips | * | None | | | | |
| **Diseases:** | | | | | | |
| 1. Blight | *** | Fungicides<br>Roguing | ***<br>*** | ***<br>*** | 47.4<br>37.5 | Costly, lack of know-how<br>Low plant population |
| 2. Bacterial wilt | ** | Roguing<br>Crop rotation | ***<br>*** | ***<br>** | 38.3<br>15.8 | Reduces plant population<br>Difficult to determine rotation sequence |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. Blossom-end rot | *** | Staking<br>Mulching | **<br>** | ***<br>*** | 21.0<br>30.5 | Labour intensive<br>None |
| 4. Leaf spot | ** | Improve soil fertility<br>Apply foliar feed | *<br>* | ***<br>*** | 26.3<br>26.3 | Lack of money<br>Lack of money |
| 5. Leaf rust | ** | Remove affected leaves | *** | ** | 10.5 | Labour intensive |
| 6. Mosaic virus | ** | None | | | | |
| **Other constraints** | | | | | | |
| 1. Marketing | *** | Early planting, sell at low prices and/or sell on credit | * | ** | 30.0 | Oversupply, low prices low returns and occasionally no payment |
| 2. High cost of inputs | ** | Use small quantities | *** | * | 43.8 | Limited effectiveness |
| 3. Low technical know-how | | Seek advice from other farmers | * | * | 30.0 | Inadequate information |
| 4. Hail storms | *** | Timing planting | * | * | 10.4 | Hail storms are unpredictable |
| 5. Low soil fertility | *** | Apply fertilizer<br>Apply manure | *<br>** | **<br>*** | 21.0<br>26.3 | Lack of money<br>Labour intensive |
| 6. Low quality seeds | ** | Buy from recognized stockists, read labels | - | - | 15.8 | None |

Key: Intervention: *** = High ** = Medium * = Low
Severity: ***=Very severe, **=severe, *=not severe

The key pest constraints in tomato production in terms of effect on the crop were bollworms followed by cutworms (Table 2). Farmers had no interventions for thrips, whiteflies, spider mites and nematodes, but rated nematodes as the most serious in terms of availability of interventions. The available interventions were application of pesticides, use of ash and roguing. The pesticides costs were prohibitive thereby making it difficult for most farmers to use the intervention. Ash was labour intensive and roguing reduced the plant population, and subsequently the output per unit area. Among the diseases identified by farmers blight was reported to be the most serious in terms of effect on the crop followed by bacterial wilt. Farmers had no interventions for tomato mosaic virus and the costs for controlling other diseases were considered to be high.

Table 2: Ranking of tomato pests and diseases based on effect and available intervention

| **Constraints** | **Rank depending on effect on crop** | **Rank based on available intervention** |
|---|---|---|
| **Pests** | | |
| White flies | 4 | 2 |
| Aphids | 3 | 5 |
| Cutworms | 2 | 4 |
| Bollworms | 1 | 3 |
| Thrips | 6 | 2 |
| Nematodes | 5 | 1 |
| Spider mites | 7 | 2 |
| **Diseases** | | |
| Blight | 1 | 2 |
| Bacterial wilt | 2 | 3 |
| Blossom-end rot | 3 | 4 |
| Leaf spot | 4 | 5 |
| Mosaic virus | 5 | 1 |

Appendix 1: Questionnaire for tomato constraints and options for adoption

District ----------
Name of farmer field school ----------
Name of facilitator ----------

A. Farmer objectives for tomato production
1……..
2……..
3……..

B. Criteria that farmers use to measure whether any of these objectives are met (put criteria under each objective)
Objective 1……..
……
Objective 2……..
……..

Objective 3……..
…….

C. Score of criteria based on importance to farmers (lowest score is 1 and the highest score is 10)

| Criteria | Score |
|---|---|
| | |
| | |
| | |

D. Identify the tomato priority constraints and interventions (rank on a scale of 10 with the highest getting 10 and the lowest 1))

| Constraint/ problem | Rank | Intervention options |
|---|---|---|
| | | |
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Appendix 2: Focus group discussion check for tomato production

1. Describing the tomato production system
   - Tomato production calendars (activity, time, constraints, who does it, agronomic practices, specifications)
   - Input use, pest and disease control
   - Production statistics for tomatoes under different management strategies (monocroped/intercropped, with/without manure or fertilizer, different varieties etc)
   - Resource endowment (what they consider a rich, medium or poor person should have)

2. Constraints and current interventions
   - Confirming the priority constraints and their rank in importance –in terms of effect on crop, available interventions etc
   - Interventions currently being carried out to solve these constraints
   - Proportions of farmers using interventions
   - Evaluation of interventions
     - ✓ Determine evaluation criteria
     - ✓ Evaluate current interventions based on these criteria (*** high **medium * low score)

3. Alternative interventions (technologies, information etc)
    - Which constraints still require alternative interventions?
    - Possible alternative interventions (resistant varieties, chemical control, IPM, biological control, cultural control etc)
    - Key considerations for adoption of these potential alternatives
    - Key information requirements
    - How to measure success of the interventions-how will we know whether it has worked or not?

| Intervention | Possible constraints to use/adoption |
|---|---|
| | |
| | |
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| | |

## Annex 2: Report of the training course and the course program

### Tomato IPPM training for FFS facilitators, Kakamega 25th – 29th July 2005

**R. Musebe, D. Karanja and M. Nkonu**

### Introduction

Tomato IPPM training for farmer field school facilitators was conducted as one of the activities for the project: "Accelerated uptake and impact of CPP research outputs in Kenya". This project will introduce research outputs on tomato to field schools by facilitating farmers to try out and adapt the research outputs to their own needs. At the same time dissemination materials will be prepared on tomato IPPM. The field school facilitators were given training on tomato IPPM focusing on research outputs that address the priority constraints identified by the farmers.

### Purpose & Objectives

- Provide the priority setting results so that they form the basis for future project activities
- Train the farmer field school facilitators on participatory research, participatory monitoring and evaluation
- Train the farmer field school facilitators on methods of addressing the prioritized pests and diseases

### Summary

The training was organized by CABI, KARI and the National Coordinator of the farmer field schools.

The training exercise was conducted for 33 farmer field school facilitators from Bungoma, Busia and Kakamega Districts. The training exercise was meant to equip the facilitators with the technologies for addressing the key constraints prioritized by the farmers in tomato production. The resource persons had experience in the technologies for addressing the tomato constraints. The resource persons included Sammy Ajanga (Plant Pathologist), Inzaule Salim (Agronomist), Martins Odendo (Socio-economist), Godrick Khisa (National Coordinator), Miriam Otipa (Entomologist), Mike Nkonu (Information Scientist), Daniel Karanja (Plant Pathologist) and Richard Musebe (Socio-economist). During the training the facilitators were given an overview of the priority setting results and focus group discussions on tomato production constraints, and the results of the baseline survey for the previous season. Facilitators were also trained on participatory monitoring and evaluation, data collection and basic analysis. This was meant to instill discipline in data collection especially after having received ideas on the expected results and procedures for obtaining the results.

Besides the socio-economic issues the facilitators were introduced to tomato varieties and tomato agronomy. These were followed by training on bacterial, fungal and viral diseases of tomatoes and their management as well as the common pests of tomato and their management. There was also training on physiological disorders of tomatoes and their management. Information dissemination materials were also discussed and a consensus reached on how they could be refined. At the end of the training, there was a planning session during which the facilitators indicated the activities that they were going to undertake. These included budgets for the inputs

(seeds, pesticides and fertilizers), commencement of the farmer field activities and baseline survey.

## Course program

| | 8.30-10.30 | 10.30-11.00 | 11.00-1.00 | 1.00-2.00 | 2.00-3.30 | 3.30-4.00 | 4.00-5.30 |
|---|---|---|---|---|---|---|---|
| **Monday 25/07/05** | Registration. Introduction to objectives of the workshop (S. Ajanga and G. Khisa) | **Tea** | Results and reflection of baseline survey. Defining processes, indicators and expected results (R. Musebe/M. Odendo) | **Lunch** | Introduction to tomato varieties and tomato agronomy (S. Nzaule) | **Tea** | Bacterial diseases of tomato and their management (S. Ajanga) |
| **Tuesday 26/07/05** | Fungal diseases of tomato and their management (M. Otipa/D. Karanja) | | Fungal diseases of tomato and their management (M. Otipa/D. Karanja) | | Viral diseases of tomato and their management (S. Ajanga) | | Physiological disorders of tomato and their management (S. Ajanga) |
| **Wednesday 27/07/05** | Common pests of tomato and their management (G. Kibata/M. Otipa) | | Common pests of tomato and their management (G. Kibata/M. Otipa/D. Karanja) | | Field visit (S. Ajanga/G. Khisa) | | Field visit (S. Ajanga/ G. Khisa) |
| **Thursday 28/07/05** | Participatory monitoring and evaluation framework. Data collection and analysis (R. Musebe/M. Odendo) | | Validate/refine information dissemination materials (J. Asaba/M. Nkonu) | | Planning session (D. Karanja/S. Ajanga/ G. Khisa) | | Wrap up and close (D. Karanja /S. Ajanga) |
| **Friday 29/07/05** | Develop protocols for end of project evaluation (R. Musebe/M. Odendo) | | Develop protocols for end of project evaluation (R. Musebe/M. Odendo) | | | | |

## Annex 3: List of tomato technologies disseminated

| Problem | Technologies disseminated | Source |
|---|---|---|
| Blight (early and late) | - Plant certified disease-free seed<br>- Remove and destroy plant residues e.g. old crop after harvest<br>- Stake plants to keep them off soil and mulch to reduce splashes<br>- Improve soil drainage<br>- Regulate watering<br>- Minimise plant injuries<br>- Avoid planting tomatoes next to solanaceous crops e.g. egg-plant and potato<br>- Remove solanaceous weeds e.g. *Solanum nigrum*<br>- Plant resistant varieties where available e.g.<br>- During wet weather, apply fungicides e.g. Mancozeb (Dithane M 45), Metalaxyl/mancozeb (Ridomil MZ), Cymocanil/propineb (Milraz WP 76), Provalicarb (Melody duo) | AVRDC<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe<br><br>R7403 Pest management in horticultural crops; an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya |
| Bacterial wilt | - Avoid growing tomatoes in soil where bacterial wilt has occurred before<br>- Rouging of wilted plants to reduce disease spread<br>- Prolonged flooding to reduce disease level in soil<br>- Growing varieties with | AVRDC<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |

| | | |
|---|---|---|
| | tolerance/resistance to bacterial wilt e.g. Kentom (1) F1 Hybrid<br>- Control water runoff to reduce disease spread<br>- Avoid planting solanaceous crops e.g. Irish potatoes, Capsicums<br>- Control root-knot nematodes because they may help the disease to establish and spread | |
| Fusarium wilt | - Use certified disease-free seed<br>- Uproot and destroy wilted plants<br>- Avoid water logging<br>- Crop rotation of 5-7 years<br>- Avoid locating seed beds on land where Fusarium wilt has occurred before<br>- In acidic soil, raise soil pH by applying Lime or Farm Yard Manure<br>- Control root-knot nematodes<br>- Grow resistant/tolerant varieties e.g. Roma VF<br>- Drench seedbeds with fungicides e.g. Bavistin 50 DF, Terachlor 75 WP or Monceren 47 WS | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Verticillium wilt | - Plant certified disease-free seed<br>- Plant resistant/tolerant cultivars e.g. Roma VF<br>- Avoid locating seedbeds in land where Verticillium wilt has occurred before | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |

| | | |
|---|---|---|
| | - Uproot and destroy diseased plants<br>- Avoid alkaline soils<br>- Control root-knot nematodes<br>- Avoid planting tomatoes in field with current or previous cotton plants (alternative host) | |
| Septoria leaf spot | - Plant certified disease-free seed<br>- Plough crop residues deeply<br>- Remove weeds<br>- Rotation with non-host crops | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Blossom end rot | - Addition of calcium related fertilisers<br>- Reduce Nitrogen usage<br>- Avoid growing susceptible cultivars<br>- Keep constant moisture levels in soil especially during flowering and fruiting period | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| Tomato mosaic virus (ToMV) | - Plant resistant cultivars e.g. Kentom (1) F1 hybrid<br>- Plant certified disease-free seed<br>- Removal of infected plant debris and the eradication of infected plants around the field, help to reduce virus inoculum and hence disease spread<br>- Isolation of crops may be an option in some circumstances<br>- Isolation of nursery beds where the highly susceptible transplants are raised from mosaic virus infection sources to ensure virus free seedlings | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |

| | | |
|---|---|---|
| | - Maintain weed free farms<br>- Sterilize farm implements using jik (sodium hypochlorite)<br>- Avoid smoking of taking of snuff when working in tomato fields<br>- Control insect vectors using Dimethoate or Karate (L-cyhalothrin) | |
| Common pests of tomato and their management | | |
| Boll worm | - Scouting and handpick the larvae<br>- Crop rotation<br>- Destroy and burn infested plants<br>- Use natural enemies parasitoids (*Trichogramma*) –<br>- Spray using: Thuricide (*Bacillus thuringiensis*), Neem (Azadirachtin), Dursban (chlorpyrifos), Talstar (Bifenthrin), Decis (Deltamethrin), Match (Lufenuron) | Dudutech, ICIPE<br><br>R7403 Pest management in horticultural crops; an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya<br><br>R7813 Sustainable control of the cotton bollworm, *Helicoverpa armigera*, in small-scale cotton production systems. |
| Cut worms | - Early land preparation to eliminate weeds<br>- Use vertical sticks around seedling<br>- Dig up and destroy larvae<br>- Wood ash<br>- Spray pesticides e.g. Talstar (Bifethrin), Ambush (Cyperthrin), Decis (Deltamethrin), Tracker | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |

| | | |
|---|---|---|
| | (Tralomethrin) on soil in the evening to expose night feeding cutworms | |
| Red spider mites | - Field hygiene e.g. destruction of old crop or weeds, cleaning of staking material with soap and water, visit infested field last while working in tomato farm to limit accidental spread of mites<br>- Natural enemies e.g. predatory mites<br>- Intercropping with garlic and onion<br>- Resistant varieties<br>- Insecticides: Amitraz (Mitac), Acrinathrin (Rufast), Bifenthrin (Talstar)<br>- | ICIPE<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |
| White fly | - Neem tree seed extract<br>- Insecticides e.g. Actara, Cruiser (Thiamethoxam), Applaud (Buprofenzin), Talstar (Bifenthrin), Karate (L- cyhalothrin)<br>- Natural enemies parasitoids e.g. *Encarsia* spp., *Eretmocerus* spp.<br>- Predators e.g. Ladybird | R8041 Sustainable integrated management of whiteflies as pests and vectors of plant viruses in the tropics: Phase 2 - Network Strengthening, Pest and Disease Dynamics and IPM Component Research. |
| Thrips | - Biocontrol agents e.g. *Metarrhizium anisopliae* , Entomopathogenic nematodes<br>- Insecticides e.g. Actara (Thiamethoxan), Talstar, (Bifenthrin), Decis (Deltamethrin) | ICIPE, Dudutech<br><br>R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe |

| | | |
|---|---|---|
| Aphids | - Avoid planting tomato near aphid-infested crop or where a recently infested crop has been removed<br>- Spraying with soap and water solution (1:20 soap/Water)<br>- Planting garlic, onion or parsley (act as repellents) near tomato crop<br>- Use of natural enemies e.g. hover fly larvae and ladybird beetles<br>- Spray using insecticides e.g. Karate (L- cyhalothrin), Pirimor (pirimicarb) | R6764 Environmentally acceptable crop protection strategies and adoption of IPM strategies by smallholder farmers in Zimbabwe<br><br>R7403 Pest management in horticultural crops; an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya |
| Root-knot nematodes | - Plant resistant/tolerant varieties e.g. Monyala, Nemonetta<br>- Plant gall-free seedlings<br>- Remove crop debris and volunteer plants<br>- Use of biopesticides e.g. *Pasteuria penetrans* and *Pochonia chlamydosporia*<br>- Use of botanical extracts e.g. derived from Neem (azidarachtin), Mexican marigold<br>- Use nematicides e.g. Fenamiphos (Nemacur), Dazomet (Basamid), Metham sodium (Vapam) | R 7472 Integrated management of root-knot nematodes in Kenya<br><br>R8218 Production of *Pasteuria penetrans* to control root-knot nematodes (*Meloidogyne* spp.).<br><br>R8296 Promotion of sustainable approaches for the management of root-knot nematodes on vegetables in Kenya. |

## Annex 4: Report of pre-adoption survey to to establish farmers' situation and views on tomato production

### ACCELERATED UPTAKE AND IMPACT OF CPP RESEARCH OUTPUTS IN KENYA

### Activity 1.4a: Establish farmers' pre-adoption situation and views on tomato production

Musebe, R.O.; Odendo, M.; Kimani, M.; Asaba, J.F.; Khisa, G. and Ajanga, S.

### 1.0 Introduction

Crop production constraints, particularly pests and diseases, result in smallholder farmers achieving yields well below potential. CPP research has produced an array of new knowledge concerning weeds, diseases, insects and rodents. However, farmers do not have the information and knowledge they need to reduce the effects of pests and diseases in order to improve crop production and yield. Improving farmer accessibility to appropriate technologies is therefore crucial. It is also important to quantify the effects of efforts aimed at improving farmer access to technology for improving crop production.

### 2.0. Objectives

1. Examine the characteristics of farmers involved in tomato production
2. Assess tomato production in terms of resource use and output
3. Identify the tomato production constraints and interventions

### 3.0. Methodology

We aimed at selecting five farmers from each of the participating farmer field schools for individual interviews but this was not always possible. The participating farmer field schools were identified in August 2005 at the start of the short rain season. Individual interviews were conducted for the selected farmers using structured questionnaires (Appendix 1). The number of participating farmer field schools was 8, 16 and 34 from Kakamega, Bungoma and Busia Districts respectively. Two hundred and thirty farmers participated in the pre-adoption assessment exercise. These included 80, 121 and 29 farmers from Bungoma, Busia and Kakamega Districts respectively. Data was collected on socio-economic characteristics, input usage in tomatoes, yield, tomato production constraints, tomato pests and diseases and their management.

### 4.0 Socio-economic conditions in production of tomatoes

#### 4.1 Household characteristics of tomato farmers

The average age of the farmers interviewed was 43.3 years. Own cultivated land was an average of 2.8 acres, while rented cultivated land was an average of 1.0 acres. A majority of farmers were men and less than half of the farmers had above primary level of education (Table 1).

Table1: Household characteristics of tomato farmers

| Characteristic | Bungoma District | Busia District | Kakamega District | All Districts |
|---|---|---|---|---|
| **Average age (years)** | 42.6 | 43.5 | 44.6 | 43.3 |
| **Sex**: Male (%) | 63.8 | 67.8 | 51.7 | 64.3 |
| Female (%) | 36.3 | 32.2 | 48.3 | 35.7 |
| **Family size**: | | | | |
| Adult male (> 14 yrs) | 2.2 | 2.3 | 2.4 | 2.3 |
| Adult female (>14 years) | 2.0 | 1.9 | 2.2 | 2.0 |
| Children (≤ 14 years) | 3.2 | 3.1 | 2.1 | 3.0 |
| **Average land (acres):** | | | | |
| Owned land cultivated | 3.0 | 2.8 | 2.3 | 2.8 |
| Rented land cultivated | 1.3 | 0.9 | 0.7 | 1.0 |
| Non cultivated land | 1.3 | 1.9 | 0.8 | 1.5 |
| **Education of farmers (%)** | 2.5 | 14.9 | 13.8 | 10.4 |
| None | 1.3 | 0.8 | 13.8 | 2.6 |
| Non-formal | 43.8 | 46.3 | 41.4 | 44.8 |
| Primary | 47.5 | 36.4 | 31.0 | 39.6 |
| Secondary | 5.0 | 1.7 | 0.0 | 2.6 |
| Tertiary | | | | |

### 4.2 Tomato production in Western Kenya (FFS)

Twenty three per cent of the farmers grow tomatoes in Western Kenya (Table 2). The main tomato varieties grown in Western Kenya and the corresponding percentage of farmers involved are Cal-J (15.7%), money maker (3.5%), fortune maker (2.6%) and Roma (1.2%). Cal-J was preferred by farmers because it produces fruits with preferred colour and shape. Cal-J is however low yielding. Indeed the tomato yields in the area were reported to be low; an average of 15.9 crates of 60 Kg each per acre, although there was much higher yield in Bungoma District.

The average area under tomatoes is 0.3 acres. Tomato production is undertaken on about 7.7% of the cultivated land. The farmers are involved in production of several crops to guard against the high risk in agricultural production.

There was limited use of improved farm inputs. Only 20.4% of the farmers use fertilizers in tomato production. The main fertilizer used is diamonium phosphate (DAP), which is applied to the soil in the nursery and also during transplanting. An average of 28.9kg of DAP per acre are used. There is almost no top dressing with calcium amonium nitrate (CAN) or any other nitrogenous fertilizers. The expectation would have been that the limited use of inorganic fertilizers would be complemented by the organic compounds such as manure, but again a relatively small proportion (12.7%) of the farmers use manure on tomatoes. Use of fertilizers on tomatoes was most widespread in Kakamega District where 42.9% of the farmers used fertilizers but the amount used was lower than in other districts. Only 6.6% of the farmers used fertilizers in tomato production in Busia District, which was the district with least use

of fertilizers. The high amount of fertilizer use in Bungoma District could be because most of the farmers grow tomatoes for commercial purposes as opposed to Kakamega where tomato production is mainly for domestic consumption.

Table 2: Tomato production and input usage in Western Kenya

| Production characteristics | Bungoma District | Busia District | Kakamega District | All Districts |
|---|---|---|---|---|
| Farmers growing tomatoes (%) | 37.5 | 9.1 | 41.4 | 23.0 |
| Area under tomatoes (acres) | 0.3 | 0.3 | 0.2 | 0.3 |
| Farmers using fertilizers (%) | 33.8 | 6.6 | 42.9 | 20.4 |
| Quantity of fertilizer used (kg/acre) | 40.3 | 8.8 | 7.1 | 28.9 |
| Farmers using hired labour (%) | 3.8 | 3.3 | 21.4 | 5.7 |
| Yield of tomatoes (Crates/acre) | 23.1 | 8.4 | 6.3 | 15.9 |
| Price per crate (Ksh.) | 696.0 | 625.0 | 991.7 | 762.2 |
| Farmers using pesticides (%) | 35.0 | 8.3 | 42.9 | 21.8 |
| Farmers using manure (%) | 20.0 | 4.1 | 28.6 | 12.7 |

### 4.3 Tomato production constraints and interventions

A diverse range of constraints hinder tomato production. These include pests, diseases, lack of quality seeds and marketing. The major pests across all the districts were bollworms, cutworms and aphids, while the major diseases were blight, blossom-end rot and bacterial wilt (Table 3).

Table 3: Farmers affected by specified tomato constraints in Western Kenya (%)

| Constraint | Bungoma District | Busia District | Kakamega District | All Districts |
|---|---|---|---|---|
| Bollworm | 65.0 | 60.3 | 55.2 | 61.3 |
| Aphids | 46.3 | 40.5 | 58.6 | 44.8 |
| Cutworms | 56.3 | 51.2 | 65.5 | 54.8 |
| Chafer grubs | 25.0 | 13.2 | 13.8 | 17.4 |
| Crickets | 18.8 | 32.2 | 20.7 | 26.1 |
| Nematodes | 37.5 | 24.8 | 31.0 | 30.0 |
| Blight | 61.3 | 62.0 | 75.9 | 63.5 |
| Blossom end-rot | 58.8 | 53.7 | 44.8 | 54.3 |
| Bacterial wilt | 36.7 | 38.8 | 37.9 | 38.0 |
| Mosaic virus | 31.6 | 21.5 | 24.1 | 25.3 |
| Marketing problems | 17.5 | 21.1 | 3.4 | 8.3 |
| Lack quality seeds/ improved varieties | 23.8 | 33.9 | 58.6 | 33.5 |

There were varied degrees of intervention regarding the constraints across the districts. There were relatively high levels of interventions for the various pests and diseases. Highest intervention was reported for aphids followed by bollworms, while the lowest intervention was reported for nematodes (Table 4). The low intervention

rate for nematodes could be because they attack the roots and farmers have little knowledge about nematodes. Incase of the diseases the highest intervention was reported for blight, possibly because it is the most serious disease in the area, while the lowest intervention was reported for the tomato mosaic virus. Viral diseases were reported as being difficult to control and this may be the reason for the low intervention for tomato mosaic virus. Low levels of intervention incase of both pests and diseases may be attributed to lack of technical know-how, limited financial capacity and lack of clear understanding of the pests and diseases scenarios.

Table 4: Farmers attempting any intervention for tomato constraints (%)

| Constraint | Bungoma District | Busia District | Kakamega District | All Districts |
|---|---|---|---|---|
| Bollworm | 86.6 | 72.0 | 78.1 | 78.8 |
| Aphids | 86.4 | 89.9 | 88.2 | 88.4 |
| Cutworms | 71.0 | 82.2 | 52.6 | 73.7 |
| Chafer grubs | 46.8 | 87.9 | 50.0 | 63.2 |
| Crickets | 66.5 | 69.3 | 33.3 | 65.1 |
| Nematodes | 37.1 | 73.4 | 55.5 | 55.0 |
| Blight | 83.7 | 78.7 | 90.9 | 80.8 |
| Blossom end-rot | 38.2 | 46.4 | 38.4 | 38.5 |
| Bacterial wilt | 41.4 | 76.8 | 63.6 | 63.2 |
| Mosaic virus | 36.0 | 54.0 | 14.1 | 32.8 |
| Marketing problems | 36.0 | 11.8 | 93.2 | 47.0 |
| Lack quality seeds/ improved varieties | 47.5 | 68.1 | 70.6 | 63.6 |

The main intervention method for both pests and diseases was use of crop protection chemicals (Table 5), which are relatively expensive. The high cost of the crop protection chemicals may be another reason for the low levels of intervention for some pests and diseases. Alternatives to chemical control include application of ash, roguing, and application of solutions generated from a mixture of Mexican marigold, pepper and tithonia. Roguing reduces the plant population, which leads to low yields. Ash was reported to have low efficacy. The number of alternatives to chemical control and the level of use indicate that the farmers do not have many alternatives. Inspite of the reliance on chemical control farmers did not have a clear understanding of the differences between pests and diseases control chemicals.

Table 5: Main intervention methods for tomato production constraints

| Constraint | Intervention method |
|---|---|
| Bollworm | Chemical control (diazinon, antracol, karate, ambush, dimethoate) (60.9%), hand picking (6.8%), indigenous technical knowledge (ash, Mexican marigold) (9.6%), pluck off affected fruits (1.5%) |
| Aphids | Application of ash (28.8%), chemical control (antracol, diazinon, dimethoate, karate) (39.3%), ash/chemical control (6.4%), indigenous technical knowledge (paw paw and soap solution, Mexican marigold, neem) (10.3%), crop rotation (3.6%) |
| Cutworms | Chemical control (furadan, karate, rindomil) (39.1%), application of ash (14.0%), indigenous technical knowledge (pepper, Mexican marigold) (4.0%), ash/chemical control (1.6%), scouting and hand killing (mechanical destruction) (11.9%), use of small vertical sticks (3.1%) |
| Chafer grubs | Chemical control (34.5%), hand killing (mechanical destruction) (14.9%), indigenous technical knowledge (tithonia and solutions of other herbs) (11.5%), application of ash (2.3%) |
| Crickets | Chemical control (karate, diazinon) (34.5%), indigenous technical knowledge (mix seeds with paraffin, Mexican Marigold, regular weeding) (14.2%), application of ash (5.0%), hand killing (mechanical destruction) (10.0%), crop rotation (1.4%) |
| Nematodes | Chemical control (23.0%), crop rotation (15.3%), plant resistant varieties (1.4%), roguing (15.3%) |
| Blight | Chemical control (antracol, milraz, sancoze, dithane M45, karate, rindomil) (66.3%), rouging (4.6%), timing of season (2.5%), using clean and certified seeds (3.3%), crop rotation (4.1%). |
| Blossom end-rot | Chemical control (antracol, milraz, rindomil) (16.8%), rouging (uproot affected crop) (5.3%), use certified seed (2.4%), watering regularly (1.5%), fertilizer application and field hygiene (2.8%), mulching (2.2%), pluck off affected fruits (4.4%), crop rotation (3.1%) |
| Bacterial wilt | Chemical control (antracol, milraz, karate, rindomil) (25.3%), rouging (25.3%), use certified seed (2.4%), crop rotation (10.2%) |
| Mosaic virus | Chemical control (antracol, milraz, diazinon, dithane M45, actellic) (16.2%), crop rotation (1.6%), use certified seeds (3.2%), rouging (8.3%), apply ash (3.5%) |
| Marketing problems | Seeking for markets outside the area (26.6%), distribute the excess to friends (4.8%), sell as a group (4.8%), sell at throw away prices (10.8%) |
| Lack quality seeds/ improved varieties | Purchase from reputable stockists (17.9%), purchase from Kenya seed company (10.1%), buy from other farmers (17.0%), use own seed (8.0%), ask stockists to stock (2.4%), buy from KFA (4.3%), plant different varieties (1.2%), seek advice from extension officers (2.7%) |

## 5.0 Conclusions

The farmers had low levels of education meaning that increased farmer participation would be necessary in order to improve adoption of the new technologies. Tomato production was undertaken on small land parcels, representing a small proportion of the cultivated land. Tomato yields were relatively low due to pests and diseases infestation, low resource use, limited technical know-how and marketing constraints.

The main tomato production constraints were pests and diseases. Many farmers were attempting control of pests and diseases. The relatively high proportion of farmers attempting control indicates that they are aware of the losses attributed to pests and diseases infestation. The main control method reported by the farmers was use of crop protection chemicals. Farmers appeared not to know the difference between pest and disease control chemicals. There was limited use of alternatives to chemical control. Alternatives such as ash were reported to be less effective. Roguing reduced the plant population and hence the yield of tomatoes. The widespread use of chemical control alone indicates that the farmers are less aware of other control methods. Diversification of control methods is likely to improve the effectiveness of control and possibly a reduction in costs of controlling pests and diseases. Farmers need to know a diverse range of control methods and a distinction between pest and disease control methods. Intervention in pests and diseases may also be influenced by farmer capacity, lack of the required technology, limited understanding of the pests and diseases and the farmers' perception of the seriousness of the damage caused.

## Appendix 1: Baseline data collection

**(Please interview each farmer separately)**

Name of field school……
District……
Division……..Location……..Village……
Name of facilitator……..……..…….
Farmer Name…….
Date of interview…….

**A. Background information**

1. Age of household head……Years
2. Sex: a) Male …….. b) Female……
3. Education level of farmer
   a) None b) Primary c) Secondary d) Tertiary e) Non-formal
4. For those with no or non formal education, what is the literacy level (circle appropriately-may have multiple answers)
   a) Can read Kiswahili b) Can understand Kiswahili c) Can write Kiswahili
5. Household size: Adult male (>14 yrs)…….
   Adult female (>14 yrs)……..….
   Children (14 yrs and below)…….
6. Total land under cultivation
   a) Owned…….……acres b) Rented……..……acres

7. Total land not cultivated……..acres
8. Sources of income other than farming……

**B. Crop Production**

9. Crop production statistics (starting with the most important)

| Crop | Land area (acres) | Variety comm only grown | Use of inorganic fertilizer (Yes/No) | If yes, state type and quantity | Use of pesticides (Yes/No) | Use of manure (Yes/No) | Use of hired labour (Yes/No) | Yield estimates (specify units) | Unit price |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

**C. Pest and disease management**

9. Pest and disease management in tomatoes

| **Did you have any of these problems** | **Yes or No** | **Intervene Yes or No** | **What type of intervention did you take?** |
|---|---|---|---|
| Pests: | | | |
| 1. Cutworms | | | |
| 2. Bollworms | | | |
| 3. Aphids | | | |
| 4. Chafer grub | | | |
| 5. Crickets | | | |
| 6. Nematodes | | | |
| 7. | | | |
| Diseases: | | | |
| 1. Blight | | | |
| 2. Blossom-end rot | | | |
| 3. Bacterial wilt | | | |
| 4. Tomato mosaic virus | | | |
| 5. | | | |
| 6. | | | |
| Other problems: | | | |
| 1. Lack of quality seeds | | | |
| 2. Inadequate capital | | | |
| 3. Lack of improved varieties | | | |
| 4. | | | |

NB: Interventions do not necessarily have to be control methods. They can be practices aimed at reducing the pest or disease such as selection of planting material, rotation etc

## Annex 5. Report of farmer participatory evaluation of tomato IPPM

### ACCELERATED UPTAKE AND IMPACT OF CPP RESEARCH OUTPUTS IN KENYA

### Activity 1.4b: Farmer participatory evaluation of new IPPM technologies

Musebe, R.O.; Odendo, M; Kimani, M.; Asaba, J.F.; Khisa, G. and Ajanga, S.

### 1.0 Introduction

Farmer evaluation of the IPPM technologies was undertaken to gauge farmers' views about the technologies. The evaluation criteria were determined at the onset of the tomato cropping season in August 2005. The evaluation exercise was conducted in collaboration with farmer field school facilitators who had been trained on focus group discussions, scoring, ranking, and evaluation of IPPM technologies based on farmer criteria. Scoring and ranking was used to explore farmers' perceptions, elicit criteria, understand their choices and decision making. The evaluation was also meant to establish farmers' preferences, priorities, and criteria for evaluating changes to their farming systems.

The objectives of the evaluation were to:

1. Identify farmer criteria for technology evaluation
2. Rate each of the identified criteria based on relative importance
3. Rate the performance of each of the technologies based on farmer criteria

### 2.0 Methodology

Two farmer field schools were randomly selected from each district, that is Bungoma, Busia and Kakamega, and focus group discussions conducted. A total of six farmer field schools participated in the evaluation exercise. The discussions concerned the tomato technologies that had been identified to address the tomato production constraints especially pests and diseases. Simple ranking, matrix scoring and weighting were used to accomplish the evaluation process.

In the group discussions farmers were asked to indicate the criteria for technology evaluation and then rate each of the criteria/characteristics. Open and free discussions were conducted to elicit total participation of all farmers present. Scoring was undertaken followed by ranking to determine the relative importance of each of the characteristics. The highest score, which was taken to be equivalent to the total number of characteristics, was given to the most important characteristic and the next highest score to the next most important characteristic until all the characteristics were finished. The scores from each farmer were then picked and

tallied on a master sheet. The total scores for each characteristic were used to develop a ranked list of characteristics, indicating the order of importance.

Matrix scoring of the technologies was undertaken by asking all the farmers to assign a score for each technology with respect to each characteristic. The highest score, which was taken to be equivalent to the total number of technologies, was given to the technology that had the best capacity to supply the specified characteristic. The next highest score was given to the next best technology in terms of supplying the characteristic until all the technologies were finished. Scores for the technologies were tallied on a master sheet. The exercise was repeated for all characteristics for all technologies. The scores reported in the results tables are averages for all the sampled farmer field schools. The total scores are obtained as a summation of the product of the score of criteria/characteristic importance and the individual technology scores. The technology with the highest score was then considered to be the best.

## 3.0 Evaluation of the technologies

The technologies disseminated include planting resistant varieties (R6764[1]) to control bacterial wilt, tomato mosaic virus and blight, improving soil drainage on raised beds (R6764) to control blight, using vertical sticks to control cutworms (R6764), using pesticides and onions/garlic to control aphids (R6764) and application of pesticides and hand picking to control bollworms (R7403[2]).

### 3.1 Farmer evaluation of resistant varieties

The varieties planted by the farmers were Cal-J, Fortune Maker, Kentom, Monyalla and Eden F1 Hybrid. These varieties were evaluated for resistance to bacterial wilt. The farmer criteria for evaluation included yield, labour requirement, maturity period and disease resistance (Table 1).

Table 1: Evaluation of the bacterial wilt resistant varieties

| Criteria | Score of criteria importance | Cal-J | Kentom | Fortune Maker | Monyalla | Eden F1 Hybrid |
|---|---|---|---|---|---|---|
| Yield | 3 | 2 | 1 | 3 | 3 | 1 |
| Disease resistance | 3 | 1.5 | 3 | 3 | 2 | 3 |
| Pest resistance | 3 | 2 | 2 | 3 | 3 | 3 |
| Drought resistance | 2 | 1 | 3 | 3 | 2 | 1 |
| Ease of marketing | 2.5 | 2 | 2 | 3 | 3 | 2 |
| Maturity period | 2.2 | 2 | 2 | 3 | 3 | 2 |

[1] Environmentally acceptable crop protection strategies based on the improved use of pesticides and adoption of integrated pest management strategies by smallholder farmers in Zimbabwe

[2] Pest management in horticultural crops: an integrated approach to vegetable pest management with the aim of reducing reliance on pesticides in Kenya

| | | | | | | |
|---|---|---|---|---|---|---|
| Length of harvesting | 3 | 2 | 3 | 3 | 3 | 3 |
| Labour requirement | 1 | 2 | 1 | 3 | 2 | 3 |
| Seed availability | 2.3 | 1 | 3 | 2 | 1 | 1 |
| Price of seed | 3 | 3 | 2 | 2 | 2 | 2 |
| Germination rate | 2 | 2 | 1 | 3 | 2 | 2 |
| Total score | - | 50.2 | 59.3 | 66.7 | 65.4 | 56.7 |

Fortune Maker has many leaves, fast maturity and good germination compared to all the other varieties. Assessment of all varieties based on farmer criteria indicated that Fortune Maker was the best variety, while Cal-J has poorest performance.

### 3.2 Farmer evaluation of raised beds by triangular planting

The technology of planting on raised beds was meant to improve soil drainage and thereby control tomato blight. Farmers were trained to plant on raised beds using the triangular method. This technology was rated against planting on the normal ground level (low level planting). The criteria used in the evaluation included plant vigour, plant population and labour requirement (Table 2).

Table 2: Evaluation of planting on raised beds to control blight

| Criteria | Score of criteria importance | Planting on raised beds | Planting on low level ground (normal practice) |
|---|---|---|---|
| Yield | 3 | 3 | 1 |
| Plant population | 2 | 3 | 1 |
| Plant vigour | 2 | 3 | 2 |
| Labour requirement | 1 | 3 | 2 |
| Disease resistance | 3 | 3 | 2 |
| Pest resistance | 3 | 3 | 2 |
| Drought resistance | 2 | 3 | 2 |
| Total score | - | 48 | 27 |

Planting on raised beds using the triangular method has several advantages as reported by the farmers. Among the advantages are high plant population, high plant vigour, requires less labour, increases soil depth leading to deeper root penetration and high moisture retention. Farmers were also advised to use fungicides especially during wet weather.

### 3.3 Farmer evaluation of vertical sticks to control cutworms

Vertical sticks were pushed in the soil close to the stems of the tomatoes. This approach was meant to stop the cutworms from coiling around the stems in order to cut the tomato plants. Farmer evaluation of the vertical sticks indicated that they

were effective in the control of cutworms compared to non-use of vertical sticks (Table 3). Farmers gave same scores for labour required while using vertical sticks and without using vertical sticks. However in the discussions they noted that the problem with vertical sticks was the time and costs involved in looking for the vertical sticks and the labour required to place the sticks around the tomatoes

Table 3: Evaluation of vertical sticks around and close to tomato stems

| Criteria | Score of criteria importance | Use of vertical sticks | Non-use of vertical sticks |
|---|---|---|---|
| Yield | 3 | 3 | 2 |
| Cost involved | 3 | 1 | 3 |
| Labour requirement | 1 | 2 | 2 |
| Pest resistance | 3 | 3 | 1 |
| Length of harvesting | 2 | 2 | 1 |
| Total score | - | 27 | 20 |

### 3.4 Evaluation of pesticides and planting onions/garlic to control aphids

Onions and garlic were planted near the tomatoes to act as repellants of the aphids. Other farmers used Mexican Marigold, which also produces an oduor that repels aphids. This method was assessed vis a vis the use of pesticides (e.g. L-cyhalothrin and pirimicarb) to control aphids in tomatoes (Table 4).

Table 4: Evaluation of pesticides and onions/ garlic

| Criteria | Score of criteria importance | Planting onion/ garlic | Use of pesticides |
|---|---|---|---|
| Yield | 3 | 2 | 3 |
| Labour requirement | 1 | 1 | 2 |
| Efficacy (Pest control) | 2.5 | 2 | 3 |
| Availability | 3 | 2 | 1 |
| Costs (price) | 2.7 | 2 | 1 |
| Risks (Side effects) | 3 | 2 | 1 |
| Ease of use (application) | 1 | 2 | 2 |
| Total score | - | 31.4 | 29.2 |

Farmers reported that the use of onions/ garlic was better than the use of pesticides because it was less expensive and the onions could either be sold or used for domestic purposes. There are however no significant differences between planting onion/garlic and the use of pesticides. This means that depending on circumstances the two technologies can be used interchangeably. The pesticides had one key

advantage of being very effective in the control of aphids but failed to compete on the basis of the other criteria such as costs, availability and side effects.

### 3.5 Evaluation of pesticides, scouting and hand picking in the control of bollworms

Bollworms were reported to be among the major pests of tomatoes in all the districts. Among the methods available for their control were scouting and hand picking and the use of pesticides. Farmer evaluation revealed that they would prefer to scout and pick the bollworms by hands (Table 5). The difference between scouting and use of pesticides was not large meaning that either of the methods could be used depending on the financial capacity of the farmer.

Table 5: Evaluation of pesticides, scouting and hand picking

| Criteria | Score of criteria importance | Use of pesticides | Scouting and hand picking |
|---|---|---|---|
| Yield | 3 | 3 | 3 |
| Labour requirement | 1 | 3 | 1 |
| Efficacy (Pest control) | 3 | 3 | 2 |
| Availability | 2 | 1 | 2 |
| Costs (price) | 3 | 1 | 2 |
| Risks (Side effects) | 3 | 2 | 3 |
| Ease of use (application) | 1 | 2 | 3 |
| Total score | - | 34 | 38 |

### 4.0 Farmer perceptions of the technologies

Farmers had different views regarding the technologies being promoted under the CPP project. Farmer views related mainly to the limitations regarding the technologies and what they considered to be the main advantages of the technologies. Farmers reported that the costs of production would be high where pesticides were used. The new varieties' seeds were costly, especially Monyalla, and packaging of seeds is in large quantities which cannot be afforded by some farmers. Kentom variety has good resistance to bacterial wilt but had low germination rates. In some instances the planted Kentom variety had off types meaning that it was not pure, in which case the packaging process had to be reviewed. The Kentom, an indeterminate variety, required significant staking but there is scarcity of staking sticks. There is high demand for mulching material especially for Fortune Maker and Cal-J. One problem that is not directly related to the technologies is the marketing problem. The price of tomatoes is low in the markets, possibly due to excessive supply during the harvesting period. There is also limited accessibility to pesticides and pumps in cases where chemical control is to be undertaken. Despite the efforts undertaken blight still appears to be a major problem.

The benefits reported from the technologies are better disease and pest control methods, ease of consultation through the farmer field schools, community cohesion and sharing of information and ideas. Information is easily disseminated to many

people. The technologies disseminated especially those that are not chemical based such as the vertical sticks are less expensive and cost effective. Farmers derived much experience from the training received from the farmer field school facilitators, and there was also a matching of theory and practical farm work.

Farmers benefited from the CPP project in terms of technical know-how, mulching using grass, diseases and pest control know-how, trash burning to control pests and diseases, importance of early land preparation, and how to improve soil fertility. Ploughing in of trash to soil, use of compost and farm yard manure to reduce acidity in the soil would improve soil fertility.

Farmers indicated that some improvements would be necessary for sustainable use of the technologies. Marketing support and credit provision is a prerequisite. Formation and registration of farmer groups is required to enhance dissemination of the technologies further to other farmers. Farmer group cohesion should be encouraged through the formation of rotating savings and credit associations (ROSCAs), which would be involved in the purchasing of expensive farm inputs. Seeds need to be packaged in quantities that can be afforded by most farmers.

## 5.0 Conclusions

Farmers are now aware that they need to use specific and improved technologies for the control of pests and diseases in order to improve tomato production. As a consequence of this, they are able to identify criteria, rank criteria and use the criteria for technology evaluation.

The key criteria used were yield, pest and disease resistance and the costs of the control processes. Many technologies were disseminated for the priority constraints in tomato production. Yield was the most important characteristic and was used in evaluation of all technologies. There was preference for the technologies due the effectiveness in pest and disease control. Among the technologies disseminated, farmers preferred the non-pesticide technologies. This is an indication that farmers would prefer to be exposed to more alternatives to chemical control of pests and diseases. Regarding the varieties, a key constraint was the non-availability and high costs of some of the seeds, together with packaging in quantities that could not be afforded by some farmers. Packages for seeds and even crop protection chemicals need to consider the capacities of small scale farmers and where possible smaller packages need to be considered.

## Annex 6 . Report of post-adoption survey to assess the impact of new IPPM technologies on target farmers

### Accelerated uptake and impact of CPP research outputs in Kenya

### Activity 1.4c: Post adoption socio-economic survey to assess impact on target farmers

Musebe, R.O.; Odendo, M; Kimani, M.; Asaba, J.F.; Khisa, G. and Ajanga, S.

## 1.0 Introduction

A study on the impact on target farmers was conducted in Bungoma, Busia and Kakamega Districts of Western Kenya. The impact assessed is in respect to the changes that farmers perceive to have occurred as a result of the project. It is meant to show benefits to the individual farmers that participated in the project, in terms of tomato yield, benefits of the new technologies, input usage, pest and disease interventions, and extent of adoption of the technologies.

The present study is an ex-post impact study meant to show how farmers have used research outputs, provide measures of the adoption and indicate benefits accruing from the technology. This study was also meant to assess the farmers' access to the information and knowledge they need.

The farm level impact of adopting the new technologies was assessed using a before-and-after analysis. 'Before' refers to the period preceding the introduction of the CPP technologies, while 'after' refers to the time the farmers were trying the CPP technologies but assessed at the end of the crop season. The impact assessed was that occurring over the short life of this project, but it is noted that longer term impacts could be different.

## 2.0 Objectives

The broad objective of the study was to assess the impact of the CPP research outputs that the participating farmers had been introduced to and opted to experiment with. The specific objectives were to:

1. Examine the changes in levels of input use
2. Assess the adoption rates of the new CPP technologies
3. Determine the farmers' access to information on CPP technologies
4. Determine the benefits from the CPP technologies

## 3.0 Methodology

Individual interviews were conducted with selected farmers in the participating farmer field schools by trained farmer field school facilitators. The interviews were conducted using a structured questionnaire (Appendix 1). Five farmers were selected from each of the farmer field schools (FFS) for the interviews. The facilitators ensured diversity in terms of gender, age and farm size, when picking the farmers. At the end of the tomato crop season all the participating farmer field

schools were visited for individual interviews. The same farmers were interviewed before and after the introduction of the

CPP technologies. The data collected include resource endowment, usage of farm inputs, production statistics, output prices and changes in livelihoods, during the season beginning August 2005. In order to gauge the impact of the technologies, the situation before the CPP project was compared to that after the CPP project.

## 4.0 Input usage by the farmers

The use of fertilizers, pesticides, manure and hired labour increased but with different magnitudes. There was maximum increase in the number of farmers using fertilizers and least increase in the numbers of farmers using hired labour (Figure 1). Widespread use of fertilizers by farmers can be due to the drive to obtain higher yields from the improved varieties.

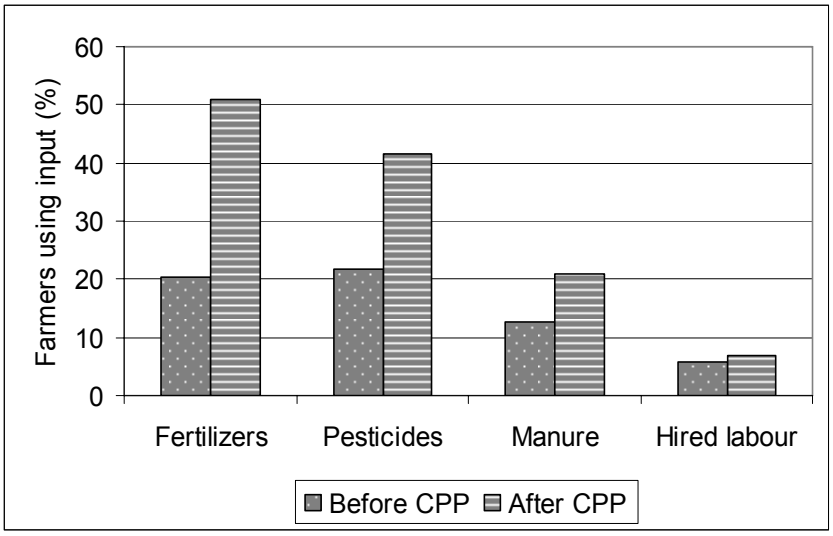


Figure 1: Use of farm inputs by tomato farmers

Diamonium phosphate (DAP) was the main fertilizer that was used by the farmers. The quantity of DAP fertilizers used increased by 46.1 kg/acre (Table 1).There was also an increase in the size of owned land cultivated. Owned land cultivated was used for other crops although tomato was the prioritized crop for the season. Diversification of crop production is meant to guard against production risks.

Table 1: Use of land and fertilizers by the farmers

| Period | Owned land cultivated (acres) | Rented land cultivated (acres) | Fertilizer use (Kg/acre) |
|---|---|---|---|
| Before | 2.8 | 1.0 | 28.9 |
| After | 2.9 | 1.0 | 75.0 |

## 5.0 Benefits of the new technologies

The CPP project disseminated technologies that included tomato production practices, varieties, and pest and disease control. The technologies promoted targeted mainly pests and diseases. The broad benefits reported by the farmers included acquiring knowledge on pest and disease control, different tomato varieties and their yield potentials, knowing the difference between insecticides and fungicides, and tomato production practices. Farmers indicated that they noted the effects of the technologies on pest and disease control, yields, income and food self sufficiency. There were increases in yield and income of the farmers (Table 2). Average income is obtained as a product of the average area, yield and price. The value of tomato is used as a proxy for income because the farmers reported that they obtained more marketed surpluses due to the use of CPP technologies. Farmers could not indicate the exact marketed surpluses of tomatoes. Eighty two per cent of the farmers interviewed reported that there were increases in income due to the use of CPP technologies.

Table 2: Impact of the technologies on tomatoes and farm income per acre

| | Area (acres) | Yield (crates/acre) | Price (Ksh./crate) | Income (Ksh.) |
|---|---|---|---|---|
| Before | 0.3 | 15.9 | 762.2 | 3635.7 |
| After | 0.3 | 24.0 | 900.0 | 6480.0 |
| % Change | 0.0 | 50.9 | 18.1 | 78.2 |

The average area used for tomato production remained unchanged. There was a yield increase of 50.9%, while the corresponding increase in income was 78.2%.

Farmers were also asked to indicate whether there were any increases in area, output and marketed surplus of the tomatoes without stating the actual values. This was for purposes of cross checking. There were no increases in area under tomatoes. Ninety five percent of the farmers reported increases in output of tomatoes, while 86.1% reported that there had achieved increases in the marketed surplus of tomatoes. The percentage of farmers reporting increases in marketed surplus was less than the percentage reporting increase in output. This indicates that some of the crop output was used for increasing food self sufficiency at household level. Farmers reported that there were improvements in their livelihoods, which they attributed in part to the use of improved crop protection practices that lead to high tomato yield. Ninety two percent of the farmers reported that they felt their nutritional status had improved.

## 6.0 Pest and disease management

There was an increase in the percentage of farmers attempting control of the different pests and diseases of tomatoes. The greatest increases were reported for the diseases and also nematodes (Table 3). Ninety four percent of the farmers reported that there was improvement in their pest management. This indicates farmer appreciation of the new technologies. The percentages of farmers attempting interventions for pests and diseases in tomatoes are as reported in Table 3.

Table 3: Farmers (%) reporting presence of specified pests and diseases and interventions to control them

| Pests and diseases | Present | | Intervention | |
|---|---|---|---|---|
| | Before CPP | After CPP | Before CPP | After CPP |
| Bollworms | 61.3 | 61.0 | 78.8 | 95.9 |
| Aphids | 44.8 | 81.4 | 88.4 | 96.8 |
| Cutworms | 54.8 | 55.0 | 73.7 | 74.1 |
| Chafer grubs | 17.4 | 21.4 | 63.2 | 66.5 |
| Crickets | 26.1 | 24.2 | 65.1 | 66.4 |
| Nematodes | 30.0 | 18.6 | 55.0 | 77.4 |
| Blight | 63.5 | 24.6 | 80.0 | 83.0 |
| Blossom-end rot | 54.3 | 32.2 | 38.5 | 92.2 |
| Bacterial wilt | 38.0 | 86.4 | 63.2 | 97.1 |
| Mosaic virus | 25.3 | 38.1 | 32.8 | 91.1 |

Over eighty percent of the farmers reported fewer incidences of pests and diseases (Table 4). This may be because the project has sensitized the farmers regarding the importance of pests and disease control. About five percent of the farmers reported higher pest infestation while 3.4% reported higher diseases incidence levels. This category of farmers may have had a slow start in application of the new control methods or it could be due to factors beyond their control. However, aphids and bacterial wilt were reported to be much higher in the season than before. In all cases it is not possible to separate the impact of the interventions from seasonal differences.

Table 4: Farmers reporting pest infestation and disease incidence after CPP (%)

| Farmers reporting specified levels | | | | | |
|---|---|---|---|---|---|
| Pests | | | Diseases | | |
| More | No change | Less | More | No change | Less |
| 4.7 | 10.2 | 85.1 | 3.4 | 16.1 | 80.5 |

## 7.0 Adoption rates of the technologies

The technologies that were disseminated by the CPP project included improved varieties, pest and disease resistant varieties, planting on raised beds, and use of vertical sticks around the tomato stems. At the end of the tomato cropping season farmers were asked to indicate whether or not they would wish to use the new technologies. The farmers' intention to adopt is used as a proxy for adoption.

The tomato varieties tried by the farmers under the CPP project had higher yield potential and better disease resistance. Technologies other than the improved varieties had better capacities to control pests and diseases. The disadvantages of improved varieties were high costs of the seeds especially for Monyalla. Kentom was

reported to have low germination rates. There were differences in the levels of adoption of the various varieties that were tried by the farmers. The adoption rates were 89.9%, 81.4%, 80.5%, 45.0% and 38.1% for Fortune Maker, Eden F1 Hybrid, Cal-J, Kentom and Monyalla respectively. Fortune Maker had the highest adoption rate because of high yields, pest and diseases resistance. Although Cal-J was ranked low in the evaluation, farmers would still adopt it because of high germination rate, ease of obtaining seeds and the fact that it is better known to the farmers. Monyalla would be the least adopted despite its good performance, because of the high cost of the seeds.

Use of verticals sticks was labour intensive, while the insecticides and fungicides had high costs. About 90% of the farmers reported that they would adopt vertical sticks for the control of cutworms. The vertical sticks would be adopted because they are less costly compared to the pesticides. They were however quick to point out that it would not be applicable for large scale farms because it is labour intensive and time consuming.

Planting on raised beds was adopted by 60% of the farmers. The reason for adoption is high water retention capacity and high plant population. It was considered less attractive because of high labour requirement. About 89.8% of the farmers reported that they would adopt onions/garlic, which serve as repellants in the control of aphids. The onions and garlic would cater for other subsistence needs of the farmers and are easy to manage. Pesticides were adopted by 82% of the farmers. It was reported that despite being expensive pesticides were very effective in the control of pests. Disease control especially blight would be accomplished effectively using fungicides.

## 8.0 Access to information

There were improvements in access to crop protection information in terms of timeliness, content and reach of the information (Table 5). Timeliness means provision of information at the time that it is needed; content refers to the message communicated; reach refers to the number of people that have access to the information. Reach was obtained by asking the farmers to indicate whether or not they thought many people had access to information because of the project activities. The number of farmers using the information increased and similarly the content of information and timeliness improved. The increase in number of farmers using the information indicates appreciation of the CPP technologies in terms of their effects on tomato production.

Over eighty six percent of the tomato farmers reported that there were increases in timeliness, content and reach of crop protection information. Ninety six percent of the tomato farmers noted that access to information was important. The information and the accompanying technologies enabled the farmers to achieve successful pest and disease control and high tomato yield.

Table 5: Percentage of farmers reporting change in access to crop protection information

| Change variable | Access improved | Access unchanged | Access essential |
|---|---|---|---|
| Timeliness | 88.1 | 11.9 | 96.3 |
| Content | 87.3 | 12.7 | |
| Reach | 86.4 | 13.6 | |

## 9.0 Conclusions

Farmers had preference for the IPPM technologies for pest and disease control. The farmers' technical know-how and tomato production information improved. There was an increase in the timeliness, content and reach of crop protection information.

The level of input use increased especially fertilizers indicating improvements in crop husbandry practices. Farmers now have access to a diverse range of pest and disease control methods. The adoption rates were variable for the different technologies. This means that there are relative differences in farmer perceptions of the effectiveness of the technologies. The percentage of farmers attempting control of pests and diseases increased. This may be because the farmers many have been having limited technology options and are now trying the new the IPPM technologies. The new IPPM technologies enabled some farmers to obtain better yields and earn more farm income. Longer term impact assessments would be necessary to discern the longer term effects of the technologies.

Farmers had several suggestions for improving the IPPM technologies. The new varieties' seeds need to be made available to the local stockists in specific areas and packages should be such that they can be afforded by all socio-economic categories of farmers, especially small packages. More printed materials, audio and visual information on new technologies have to be made available to the farmer field schools. All the new technologies should be accompanied by extension back-up either from the government or private organizations.

Appendix 1: Socio-economic survey to assess impact on target farmers

Name of farmer field school……
District…… Division……..…..
Location…….
Village…….… Date of interview
……..
Name of facilitator……..……..……....
Farmer Name…….……..

**A. Background information**

**1**. Age of household head……Years
**2**. Sex: a) Male …….. b) Female……

**3**. Education level of farmer

a) None b) Primary c) Secondary d) Tertiary e) Non-formal

**4**. For those with none or non-formal education, what is the literacy level (circle appropriately-may have multiple answers)

a) Can understand Kiswahili b) Can read Kiswahili c) Can write Kiswahili

**5.** Household size (total number of household members) ……

**6**. Total land under cultivation

a) Owned…….…….acres b) Rented……..……acres

**7.** Total land not cultivated…….…..acres

**8**. Sources of income other than farming (rank the sources in order of importance)

……

**B. Crop production: changes farmers have observed since inception of the project**

9. **Tomato input usage statistics**

| Type of input | Fortune Maker | Kentom | Cal-J | Monyalla | Eden F1 Hybrid |
|---|---|---|---|---|---|
| Seeds: **used (yes or no)** | | | | | |
| **Quantity (kg)** | | | | | |
| **Price (Ksh/kg)** | | | | | |
| Fertilizers used: | | | | | |
| DAP: **used (yes or no)** | | | | | |
| **Quantity (kg)** | | | | | |
| **Price (Ksh/kg)** | | | | | |
| CAN: **used (yes or no)** | | | | | |
| **Quantity (kg)** | | | | | |
| **Price (Ksh/kg)** | | | | | |
| **Other fertilizer (specify)** | | | | | |
| **used (yes or no)** | | | | | |
| **Quantity (kg)** | | | | | |
| **Price (Ksh/kg)** | | | | | |
| Manure: **used (yes or no)** | | | | | |
| **Quantity (kg)** | | | | | |
| **Price (Ksh/kg)** | | | | | |
| Pesticide: **used (yes or no)** | | | | | |
| **Quantity (kg)** | | | | | |
| **Price (Ksh/kg)** | | | | | |
| Hired labour: **used (yes or no)** | | | | | |
| **Quantity (man days)** | | | | | |
| **Price (Ksh/man day)** | | | | | |

## 10. Tomato production statistics

| Tomato variety | Acreage | Output (kg) | Yield (kg/acre) | Price (Ksh/kg) |
|---|---|---|---|---|
| Cal-J | | | | |
| Fortune Maker | | | | |
| Kentom | | | | |
| Eden F1 Hybrid | | | | |
| Monyalla | | | | |

## 11. Pest and disease management

| Pests and diseases | Present (yes or no) | Intervention (yes or no) | Type of intervention |
|---|---|---|---|
| Cutworms | | | |
| Bollworms | | | |
| Aphids | | | |
| Thrips | | | |
| Spider mites | | | |
| Nematodes | | | |
| White flies | | | |
| Blight | | | |
| Bacterial wilt | | | |
| Mosaic virus | | | |
| Blossom end rot | | | |
| Leaf rust | | | |
| Leaf spot | | | |

How do you rate the following situations compared to the time before the CPP project?

Pest infestation (less or more or unchanged) ----------

Disease incidence (less or more or unchanged) ----------

## 12. Access to Agricultural Information

Please specify the type of information you consider most important and the changes that have occurred to its access due to the project

| Type of information | Preferred source | Preferred format | Timeliness * | Content * | Reach* | Help from information ? |
|---|---|---|---|---|---|---|
| Crop production | | | | | | |
| Pest & disease control | | | | | | |
| Suitable varieties | | | | | | |
| Post harvest mgt. | | | | | | |
| Marketing | | | | | | |
| Other (specify) | | | | | | |

Note * 1=improved, 2=No change, 3=worsened. Timeliness means provision of information at the time that it is needed; content refers to the message communicated and reach refers to the number of farmers that have access to (use) the information. Source of information include: research, extension, FFS/ fellow farmers. Preferred format include: printed and non printed, audio, visual and audio-visual. Help received from access to information: Yes=1, No=2

## 13. Change in livelihoods (welfare indicators)

Have you experienced changes that can be attributed to this project? (Use table below)

| Livelihood Change | Improved | No improvement | Deteriorated |
|---|---|---|---|
| Feeding/nutrition | | | |
| Food security | | | |
| Food self sufficiency | | | |
| Income status (wealth) | | | |
| Other (specify) | | | |

## 14. Farmer perceptions about the new technologies

Are there improvements in your management of pests and diseases? Yes/No ----------

What are the present levels of pests and diseases? (More or less or unchanged) ----------

Has there been an increase in acreage of tomatoes due to CPP technologies? Yes/no ----------

Has there been an increase in output of the tomatoes due to the new technologies? Yes/no ---------

Do you sell more or less or same now? ----------

Are there any increases in your farm income due to the new technologies? Yes/No ----------

What are the constraints to using the new technologies? ----------

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---
---
---
Please list the benefits that you have received and/or expect from the new technologies
---
---
---
---
---
---
Are you likely to adopt any of the new technologies in the future?

| **Technology** | **Adopt (Yes/No)** | **Reason for non adoption (if applicable)** |
|---|---|---|
| Use of pesticides | | |
| Use of fungicides | | |
| Mulching to control blight | | |
| Kentom | | |
| Cal-J | | |
| Fortune Maker | | |
| Eden F1 Hybrid | | |
| Monyalla | | |
| Fertilizers to control blossom end rot | | |
| Vertical sticks to control cutworms | | |
| Planting garlic or onions to control aphids | | |
| Wood ash to control cutworms | | |

Please provide suggestions for improvement of the new technologies
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**Annex 7 - Scripts for Radio and TV Programs**

**Kiluhya (6 Programs) - KHURECHERESANIE**

**YITSE KHURECHERESANIE No. 1**

**Sigtune.....0.15”....Fadeout.**

1. PRES 1. Mulembe muno omuluhya wanja ourecheresinjia khubise bia bulano buno.Elira lianje bananganga mbu Jared Okoti Mukarebe nendi halala nende omukhana wefwe,

2. PRES 2. Josephine Mudenyo, siesi khandi esangala mbu khube ninawe mushipindi shino eshiyiakha eshia balanganga mbu “Yitsa khurecheresanie mubulimi bwefu”! Noyanza olachweya nga okhukhurecheresia tawe shichira abandu bohulire nibalangwa mbu CABI yabo bali nende omwoyo kwokhurera obulamu mubulimi bwefu.

3. PRES 1. Omukanda kwa Cabi yuko kweyunga halala nende emikanda chindi mana bali nende omwoyo kwokhuhambana halala nende okhurecheresania mana babe nende lichomo elala.

4. PRES 2. Lichomo ero! Nokhukhola ikasi halala nende omulim nibamwechesia nibamwechesia mubulimi bubwe mana omulimi oyo anyole emebalo a kanyala okhuchingula obulimi bubwe mana obulimi obo bube obwokhurera inganga khumulimi.

5. PRES 1. Emikanda echo echilimananga nende Cabi chiamala okhuchaka okhukhola ikasi mu tsidistrict tsia Kakamega, Bungoma nende Busia yaani ebuluhya yebukwe tsayosi.

6. PRES 2. Nibashiri okhuchaka okhukhola ikasi eyo,bekhala mana nibafuchirisania mbu injira indayi yokhulimasia abalimi nende okhubechesia ni mutsisukuli tsiabalimi.

7. PRES 1. Omwami Simo Kubasu niye ofisa ousinjiriranga tsisukuli tsiabalimi mudistrict yefu ya Bungoma. Khwamureba mbu akhubire khwo mbu nobulai shina obwabalolanga mutsisukuli tsiabalimi shinga injira indayi yokhwechesia abalimi.

Tape Band 1. Cue in.....Injira ino.....
Cue out.....tsiene etso.
Duration.....0.34”

8. PRES 2. Lakini lirebo! Bamanyanga barie obutinyu nomba eshiabalimi benya okhwechesibwa? Omwami Simon Kubasu.

Tape Band 2. Cue in.....Eshiakhukholanga.....
Cue out....tsiene etso.
Duration.

9. PRES 1. Eh! Tsinyanga tsino lero nabalimi ababolanga akabenya okhwechesibwa okhulondana nende obulimi bwabo. Omukhana wefu Ruth Apondi ni mulala khuyabo abechesinjia abalimi mudivision yefu ya Lurambi mudistrct ya Kakamega. Khwamureba akhubolere khwo yabo abababahambananga ninabo nende eshiabuli mukanda kukholanga.

Tape Band 3. Cue in.....Khushirikiananga.....
Cue out....abalimi befu.
Durationa....0.21”

10. PRES 2. Namanji akemikanda echo chikholanga nenakhutsiririre okhukaulira mubipindi bitsanga. Lakini khandi khwenya okhumanya khwo mbu olwa babetsango mutsisukuli tsiabalimi , bechesibungwa shina? Ruth Apondi.

Tape Band 4. Cue in....Abalimi.....
Cue out...tsinyanya.
Duration...0.24”

11. PRES 1. Eeh! Josephine, paka siesi ekhaba isikuli yiri ahambi wandamenya ndieche khwo amakhuwa ako omanyire obulimi nabulamu bwefu okhushira muna ebuluhya wefu yino.

12. PRES 2. Ewe lekha! Obolanga mbu wenya okhuchaka? Baliho abalimi abamala okhwiyunga nende tsisukuli etso. Mulala khubo ni Omukhongo Vincent Makokha Mutinye!

13. PRES 1. Arulanga hena?

14. PRES 2. Arulanga ahabalanganga mbu Eshinoyi mudivision ya Lurambi

15 PRES 1. Ooh! Aundi ni mulala khubalimi ba ofisa oulia oulangwa mbu Apondi abolirenje mbu yechesia no?

16 PRES 2. Ewelekha mberio! Lekha omwene akhubolere khwo mbu nashiri okhwinjira musukuli yabalimi ? Yalimanga ariena?

Tape Band 5. Cue in....Haswa.....
Cue out... Chino.
Duration.....0.39.

17. PRES 1. Nebulano olwayeyunga nende Isikuli yobulimi, obulimi bwe bwachenja khwo?

18. PRES 2. Ewemuulirisie!

Tape Band 6. Cue in.....Obulimi bwefu.....
Cue out....lionyene.
Duration.....0'.31"

19. PRES 2. Vincent Mutinye yanyolanga likunia elala khueka ne bulano anyolanga amakunia munane. Nemanyire mbu khandi ketsa okhumetekha olwa atsiririranga okhumeta amachesi.

20. PRES 1. Oyo Ni Vincent Mutinye yani yatinywa amabolo kosipe karulamwo! Lirebo likhongo ni Ewe ninasi Khunyolanga amakunia kenga? Noba nashikonanga nimakhuwa ko! Bukha! Fwesi khutsie khutinywe khwa shinga Mutinye fwesi khuchache okhufuna khwo ebiokhulia ebinji mumikunda chiefu.

21. PRES 2 Aundi oparanga mbu ni Mutinye yenyene aunyolanga obukhala mubulimi bubwe. Lekha ekhurerere khwo omukhaye Beatrice Magenga yesi akhubolere khwo shinga olwayeyunga musikuli ya balimi ewabo yiria yani Bungoma habundu halangungwa mbu.....

Tape Band 7. Cue in....Eeh barera.....
Cue out....nende kamakanda.
Duration....0'.14"

22. PRES 2. Omukhaye Beatrice Magenga ye yaula Lisukuma nende amakanda.

23. PRES 1 Khobulanolisukuma neliomundu yakhabola mbu alimanga?

24 PRES 2. Rulayo ewe okorirwe eshiobolanga, lekha omwene akhubolere khwo shinga olwa limukhonyanga.

Tape Band 8. Cue in....Eeh.tsinyenyi.....
Cue out...mukenya mwosi

Duration....0’.15”

INSERT MUSIC.....0.15”

25. PRES 1. Olwimbo lwokhuheresia abalimi omwoyo. Nitoto kenyekha obulimi bwefu bube obweinganga. Hano omwami Simo Kubasu ahana amebalo.

Tape Band 9. Cue in....Balimi.....
Cue out...omwene.
Duration....o’.40”

26. PRES 2. Nabo yabo abashiri okhwiyunga nende omukanda nomba isikuli yokhweka obulimi, omulimi Vincent Makokha Mutinye ababolera mbu.

Tape Band 10. Cue in.....Shinga eshikundi.....
Cue out....maendeleo amalai.
Duration.....

27 PRES. Eh! Josephene endolanga fundi wefu wemitambo niyanjinjira omukhono yenyanga shina? Nomba shali omulimi tawe?

28. PRES 2. Awe yesi nomulimi butswa lakini abolanga mbu ebise biefu biwere mustudio muno.

29. PRES 1. Batse abayie bikhawere birie nikhushiri okhubolera abakhurecheresinjia lisanduku liefu lietsibarua.? Khababolere bwangu nashiri okhwanza amakhuwa keke yako.

30. PRES 2 Lisanduku liefu lietsibarua ni 66730 Nairobi x2

31 PRES 1. Lano banyala okhukhuhandichira naekhandi khusoma tsibarua tsiabo. Khulwe inyanga yino khuleshere habwenaho. Basi Josephine khasebula yabu abakhuhulirisinjia khandi obabire mbu na khwakane lichuma litsa inyanga nende ebise bia bulano buno.

32. PRES 2. Abakhuhulirisiyenje mulindwe nisie Josephine Mudenyo Nyasaye amulinde khandi khwakane

33. PRE 1. Atse shobabira khwo elira lianje tawe?

34. PRES 2 Nomwene shobola bakhuboire omunwa?

35. PRES 1 Elira lianje Nisie Jared Okoti Mukarebe Mulindwe bana befu.

**OKHURECHERESANIA PROG . NO. 2**

**SIG TUNE..0.15" FADE DOWN AND OUT.**

1. PRES 1. Mulembe muno khandi oyo yesi ourecheresinjia eshipindi shino ebise bia bulanao buno. Esie ekhupira tsa Nyasaye mbu ario muno khandi okhulinda yiwe ninasi okhukhusia khunyanga yino. Nyasaye ashichamire mbu khurecheresanie khwo khandi mubulimi bwefu. Elira lianje nisie Jared Okoti Mukarebe oukhurereranga eshipindi shino halala nende omukhana wefu owelira mbu,

2. PRES 2. Josephine Mudenyo. Liwichi liabere khwahulira shinga olwa abalimi bashiefu beuliranga mubulimi bwabo paka mulala nakhubolera khwo shinga olwa yamanya okhureka tsifikho mumapwoni.

3. PRES 1. Ni toto khane oshitsuliranga Jasephine. Kata embara mbu yabo abahulira eshipindi esho bulano tsifikho tsiabatirire netsinyinji tsiamakana. Lakini obabire mbu nibatira khwo tsa eishiri inamu bambire omanyire mbu ifukho yanula sana?

4. PRES 2. Rulayo nawe lekha obukhalukha bweimbia eyo.

5. PRES 1. Tawe kalakhusinya tawe, nikaba kario bulano babolere khwo akaliho inyanga yino olwa olobire aketsifukho.

6. PRES 2. Omanyire mbu abalimi mutsisukuli tsiabo bechesibungwa okhwikhonyera injira ya IPPM okhwira nomba okhwikalira ebikukule nomba tsisolo okhusasia ebirache biabo?

7. PRES 1. Oooh! Kweli khane wamanya IPPM! Yaani mbu omulimi yekhonyere tsinjira tsiosi etsiri ho okhulinda nomba okhuhonia ebirache bibie! Anyala okhwikhonyera omuteko, Anyala okhuhamba nikaba shinga amatete,Okhulasa nikaba amayoni nende kata okhwikhonyera emisala chikulungwa mumaluka.

8. PRES 2 Ni habwene yako koosi pe omulimi anyala okhwikhonyera okhuyinia khwo tsa mbu shalekhonyera emisala eminji chiokhwira ebikukule tawae shichira echindi chinyala okhwikhola isumu mumibiri chiefu nomba okhwononi emuya chia khuheranga.

9. PRES 1. Khandi bekhonyere nibalonda amalako karebwaho khulwokhwikhonyera emisala echo.

INSERT MUSUC KANUNI ZA IPPM.

10. PRES 2. Yabo nabalimi bo musikuli ya khulia mumbako Bechesibwa amalako ka IPPM Shinga olwa oulire nibemba. Olwa khwabere nikhuchenderanga abalimi mutsisukuli tsiabo khwanyolire balala khubo nibekhonyeranga tsinjira tsindai okhwikaliira emimera chiabo okhwononibwa nende ebikukule.

11. PRES 1. Mulala khubalimi yabo ni bwana Timothy Fuoti. Arula mudistrict ya Bungoma halia ahabalanganga mbu ndengelwa ne nomwechi musikuli ya balimi ilangungwa mbu Bulabusia.

Tape Band 1. Cue in....Khubitutu biremanga.....
Cue out....Sikhakhala ta.
Duration.....0.27”

12. PRES 2. Eyo ni injira yokhwikalira ebikukule bi khalakanga ebisina mumakabiji mutsinyanya nomba kata tsingoye mulubukusu yani emilabi chiamapwoni. Lakini biliho ebilakhalakanga tawe ebiamanga khwo butswa shinga obukukhuna bekaliranga barie?

Tape Band 2. Cue in .....Engira ndala.....
Cue out....bitungu.
Duration.....0.30”

13. PRES 1. Okhurulana nende isikuli yabalimi omwami Timothy Fuoti nende omukhaye we lano bekhoyeranga obulimi bwabo. Khwamureba omukhaye we Magaret mbu nobulai shina obwalolanga mubulimi?

Tape Band 3. Cue in....Esese bulai....
Cue out....nendia bulai.
Duration....0.20

14. PRES 2. Lolakhwobutswa! Obulimi bwamurusia mubumanani nekhandi alitsanga obulai.

INSERT MUSIC ESE NANGOKHO ESAKALIRA AMAKULU KHONDALIA.

15. PRES 1. Yabo balangungwa mbu nangokho! Basakalira amakulu khobalia. Nabandi nabo belanganga mbu Khulia mumbako! Nikhurula ebweneyo bulano khukalushe

khwo khandi mudistrict ya kakamega halia Eshinoi ewabarecheranga tsifukho ipilipili nomba omusala kwa tefurosia.

16. PRES 2. Hee! Lakini omanye mbu shikhwenya tsifukho tawe. Khwenya khuhulire khwo shingala bekhonyeranga injira imbiakha okhuraka amapwoni okhurula khu mulimi Vincent Makokha Mutinye.

Tape Band 5. Cue in.....Tsinjira tsiokhuraka.....
Cue out...amalai saidi.
Duration.....0.30”

17. PRES 1 Mutinye anyolanga amapwoni amakali amalai mana khandi amanji! Khwa mureba mbu amapwoni amanji ako amalanga akayire hena?

Tape Band 5. Cue in.....Khwamala.....
Cue out...efienefo.
Duration...0,27”

18. PRES 2. Noba noshiri okhuliakhwo ikeki nomba ichapati yamapwoni hulirira habwenaho!

19. PRES 1. Abanji khwanala tsa mbu amapwoni amateshe nomba amasambe kakhusambiranga mumakokha mumikunda nikhulima! Tema opile khwo tsa ikeki yelipwoni! Sholikalukha okhusamba khwo khandi tawe!

20. PRES 2. Khandi tsichips tsirimwo tsindai tsiamakana! Nomanyire khwo mbu abandi babakalanga kome tsa ka! Shinga emioko nebaira muluchina okhusia, obusera bulimwo obulai bwamakana! Eshipindi shino nishishitsiririranga lekha khumuhulirisiekhwo Ruth Apondi ofisa wokhwechesia abalimi mudivishoni ya Lurambi yebalire khwo abalimi shinga olwabakhoyire okhutsiririsia obulimi.

**Tape Band 6. Cue in...Abalimi befu...**
**Cue out...nende amatuma.**
**Duration....0.12”**

21. PRES 1. Oulire shinga abolire? Abalimi befu babushe! Batsiririre nende obulimi obwokhukhumalira inzala halala nende okhurera amapesa mumifuko chiefu.

22. PRES 2. Yaani bachachie obulimi bwobukhala! Omulimi nachaka okhulima amanye mbu yehandiche omwene.

23. PRES 1. Yaho olihabwene kabisa. Kenyekha mbu omulimi amanye mubulimi bubwe arere mwoshina ne ayiniye

mwo shina? Lima obulimi bweisabu! Noramwo tsishilingi amakhumi karano, noyinia mwo tsishilingi tsimia tsirano nomba noraka omukorokoro mulala ne ofuna emikorokoro amakhumi kataru. Obo nibwo obulimi bweinganga.

24. PRES 2 Basi yaho niho ahakhwakamira khulweinyanga yino.Noba nelirebo nomba likhuwa lindi liosiliosi no khuhandichira. Lisanduku liefu lietsibarua ni 66730 Nairobi x2

25. PRES 1 Tsibarwa tsirumwe khu?
26. PRES 2. Ousinjirire eshipindi shia khurecheresanie mubulimi bwefu! Elira lianje nisie Josephine Mudenyo halala nende omusiani wefu,
27. PRES 1. Jared Okoti Mukarebe

28. PRES 2 Ousinjirire eshipindi. Olindwe khwakane lichuma litsa!

FADE ING CLOSING SIG-TUNE

**OKHURECHERESANIA NO. 3**

SIGTUNE.....0.15....FADE DOWN AND OUT.

1. PRES 1. Nebise bindi khandi ebiokhuhulirisia eshipindi shishio eshia khulanganga mbu “YITSA KHURECHERESANIE MUBULIMI BWEFU”! Oubolanga ninawe shinga bulinyanga mushipindi shino nisie Jared Okoti Mukarebe.Ne halala ninasi ni

2. PRES 2. Josephine Mudenyo> Nendi nende obuyanzi obunji mbu khandi khunyole okhurecheresania mubulimi.

3. PRES 1. Lichuma liawere khwasunjire nende abalimi nibakhwinosinjia khwo shingala bekhoyeranga obulimi bwabo obweinganga.

4. PRES 2 Balala khubo nibakhusunjira khwo shinga olwabekaliranga ebikukule nomba tsisolo okhwononia ebirache biabo nibekhonyeranga tsinjira tsiaukhane etsiabalanganga halala jumla mbu IPPM.

5. PRES 1. Nitoto nditsulira mulala khubalimi yabo niyenosinjia shinga olwa batsomokhanga akhasala mushisina okhwikalira ebikukule bikhalakanga amakabiji nomba tsinyanya paka siesi olwandabere ingo, amakabiji kanje kosi noenga mubisina, nebisala ebiolola mwo. Ewe omulimi, noba noshiri okhumanya okhutsomokha

eshisala mushisina, tsia musikuli yabalimi nomba chendera iofisi yobulimi yiri ahambi ninawe.

6. PRES 2. Nyangayino,khwitsa okhubola khwo nende omulimi oulangwa Arthur Inzofu Sechere okhurula Ebutsotso yiria ahabalanganga mbu Eshimichini.

7. PRES 1. Lakini nikhushiri okhutsia habwenaho, khwanyolire mbu abalimi abanji abakhwachendere mushipindi shino barakanga amapwoni. Khulwesho khwenya okhumanya khwo mbu eshifune nishina nekhwamanya mbu efwe abaluhya paka khurache amatuma shichira eshiokhulia shiefu eshikhongo nobusuma.

8. PRES 2 Khulwokhukhabirisia eshifune esho khwachachira Bungoma yiria habundu halangungwa mbu Ranje Sinoko. Yaho aliho omulimi owabalanganga mbu Peter Malomba. Khwanza okhumureba eshifune shiachira niyaula amapwoni kano.

Tape Band 1. Cue in ...Amapwoni kano.....
Cue out...onyala.
Duration.....0.35”

9. PRES 2 Okhurula khale emilabi chiakabanungwa khwo butswa! Lakini lerochiyetsire echikusibungwa tsa shinga itsahabu. Nikhushiri tsa Ebungoma bweneyo khwamala khusita khwo tsa ahabalanga mbu Ranje Sirekeresia Sinoko! Yaho naho aliho omukhaye oulangungwa mbu Karolina Waswa. Omukhaye oyo yakhukanira khwo shingala bali nibaleka amapwoni nibashiri okhumanya obukhonyi bwakalininabo.

Tape Band 2. Cue in...
Cue out..tawe.
Duration..0.55”

10. PRES 2 Nebulano olwarakanga tsa amapwoni anyolanga arie efiokhulia findi? Shichira shonyala tsokhulitsanga amapwoni konyene tawe.

Tape Band 3 Cue in....Mbukulanga.....
Cue out...afya endai.
Duration.....0.16”

11. PRES 2 EeH! Kanonamatinyu kokhusubira. Nenikabakario, omundi aba nalime tsieka tsinga etsiamapwoni kho akusie anyole amatuma kahera okhulia munzu? Khulwesho khwamureba mbu acherasie khwo obulimi

bweiheka ndala eyamapwoni nende iheka ndala eyamatuma.

Tape Band 4 Cue in...Mulimi wa kamatuma.....
Cue out..nende efaida.
Duration 0.25”

12. PRES 2 Eeh!, Eeh! Nikweli tsishilingi 150,000 khuheka shitsinyala okhucherasibwa nende tsishilingi tsielefu ekhumi natsibiri tawe. Nekhandi khacherasia khwo ikarama yokhuraka amapwoni nende amatuma khandi tsa khuheka.

Tape Band 5. Cue in....Kamaindi....
Cue out...sindi ta.
Duration....0.29”

13. PRES 2 Karolina Waswa! Anyala okhukhuyinia omwoyo khukhuraka amatuma.

INSERT MUSIC.....0.35”

14. PRES 2 Nikhurula Ebung’oma eyo khwamala khucherere paka Ebutsotso mushijiji shieshimichini. Yaho Jared Mukarebe yanyola ho omulimi mulala oulangwa,

Tape Band 6. Cue in ...Arthur Inzofu Sechere.....
Cue out....likabiji tawe.
Duration....4’.08

15. PRES 2 Oyo shingala oulire nomulimi webindu ebinji lakini ebiayarakhwo omwoyo, ni tsinyanya nende Amakabiji. Eshifune shishie eshikhongo mbu nifio efiabandu bayayananga mushiro.

16. PRES 1. Kata nemba esie nekhola tsaendio shichira paka orache eshionyala okhukusia. Basi eshipindi shiefu shiakamira habwenaho. Lijuma litsa nakhukhurere amanji khubulwale bwononinjia amatuma obulangwa mbu Grey leaf spot yaani efidonda fieshikoshekoshe khumasafu kamatuma. Oriomuno okhukhuhulirisia, lisanduku liefu lietsibarua ni,

17. PRES 2. 66730 Nairobi! X2

18. PRES 1. Olindwe nifwe abenyu Jared Okoti Mukarebe halala nende,

19. PRES 2. Josephine Mudenyo nikhubola mbu olindwe nyasaye akhulinde.

**KHURECHERESANIE NO. 4**

**Sig tune-0.5”-fade down and out.**

**1.PRES 1.** Mulembe muno oukhuhuulirisinjia khubise bia bulano buno.Neinyanga yindi indayi eya nyasaye akhukasirie mbu khandi khuteme okhuhulirisamia khwo khandi.Oubolanga ninawe nisie ouwo Jared Okoti Mukarebe. Ne khandi shinga buli lwosi endi halala nende omukhana muluyia omuwanga owelira mbu.

**2.PRES 2.** Josephine Mudenyo.endi nende obusangafu obunji okhuba ninawe mushipindi shino.Mushipindi shiabere eshiokhumalirikha khwakhusebula nende indakano mbu inyanga yino khula khurerera amanji khubulwale bwononinjia amatuma obulangwa mbu Grey leaf spot yaani eshitonda nomba ebidonda bieshikoshekoshe khumasafu kamatuma.

**3.PRES 1**. Obulwale bwebidonda bieshikoshekoshe buliho khandi bwononinji amatuma mumikunda chiabalima lakini abalimi abanji bashiri okhubugundua.

**4.PRES 2.** Mushipindi shino khwitsa okhubolakhwo shingala omulimi anyala okhumanyirisia obulwale obo khumatuma keke nende shinga olwa bwononinjia amatuma.

**5.PRES 1.** Hasara yobulwale obo bureranga inyala okhuba ikhongo okhulondokhana nende shinga olwa buba nibutirire amatuma mumukunda kwo mulimi.Abalimi bakosinjia okhwanzira amakunia amakhumi kabiri kata okhula amakunia amakhumi kasasaba khumia

**6PRES 2**. Nikhushiri okhukhurerera shinga olwa onyala okhumanyirisia obulwale buno khumatuma koko khunyole iripoti yobulwale buno mushialo shiefu okhurula khumusiani wefu Vincent Odhiambo

**7.VINCENT**. Obulwale bwebidonda bieshikoshekoshe khumasafu kama tuma bwaranjirira okhulolekha mushialo shiefu shino omwaka kwa 1995.Yabo abakholanga ikasi yokhukhabirisia nende okhumanyirisia shinga obulwale buchendanga,omwaka kwe 2002 bachendera emikunda chiabalimi nenibanyola mbu obulwale obo bwamala okhwinjira mutsisehemu tsiosi tsikhongo etsia khurakanga mwo amatuma okhushira muno ebuluyia wefu yo mumbo!

**8.PRES 2.** Obulwale bwo buliho lakini abanji khushiri okhumanya shinga olwa bufwananga khumatuma tawe.

**9.PRES 1**. Eshipindi shia yitsa khurecheresanie mubulimi fwefu shiarecheresanie nende daktari wemimera oulangungwa mbu Zachary Kinyua wa Kari.Khwongana ninaye paka mudistrict ya Busia mumukunda kwa Peter Ekesa.Hano daktari Kinywa abola nende omulimi

**Tape Band cue in... sasa kwa hii.....**
**cue out... wadudu**
**Duration 0.21**"

Q1. Opara mbu khumatuma ko kano obulwale obo bunyala okhunyolekha khwo?
A1. Khumatuma kano bunyala okhunyolekha khwo.
Q2. Manyia khwo ahabuli?
A2. Lola ndala shinga.....
Q3. Ooh okhufunikha khuno?
A3. Lakini shilolekhana shinga eshikukule.

**10.PRES 2**. Omukunda kwa Peter Ekesa kwanyolekhamwo obulwale obo.Lakini okhulondokhana nende shinga olwa Daktari yorebe omulimi kalolekha mbu omulimi oyo shamanyire obulwale obo tawe.Khulwesho Daktari yamala nabukula obwiyango bwo khwibalira abalimi baliho shinga olwa obulwale obo bufwananga khumasafu kamatuma.Lano hulirisia khwo tsa shinga olwa yebala.

**Tape Band 1 cue in....ugonjwa wa GLS....**
**cue out**
**Duration**

Obulwale bwa madoa keshikoshekoshe khumasafu kamatuma buchakanga nende efilolero shinga fino.Lisafu lianza okhulolekha nende efidonda biokhulala.Ebidonda ebo bitsiririra paka lisafu liosi lianze okhulolekha liri nende ebidonda ebinji khandi ebikhongo paka lisafu litonye tsa nende tsisehemu tsinditi etsia chani.Okhula habweneho bulano lisafiu tsa liosi lilolosia tsa okhulala.Nikakhola habwenaho bulano lituma shilinyala okhwikhonyera obulafu bweliuba okhumbakha nomba okhwitsusia tsinyuma tsie lituma tawe.Yaho niho ahonyolanga omulimi anyola efisokore firi nende orutuma orunialu.

**11.PRES 1.** Nolola amadoa keshikoshekoshe shinga olwa Daktari abolire omanye mbu shetani yamala okhunjira mumukunda!

**12 PRES 2.** Nekata kario kalikho amakhuwa ako mulimi anyala okhukhola mumukunda kwe okhwikalira obulwale yibo!Malala khuko ni shinga;

**13 PRES 1** Okhufuna amatuma katirirwe nende obulwale bwangu nikashiri okhubola.

**14 PRES 2.** Okhulima obulai omukunda noyabira amakhamara kamatuma kalikhwo obulwale bweshikoshekoshe.

**15 PRES 1**. Omulimi yekhonyere okhuchenjia nomba okhukalukhasia emimera mumukunda yani olakalushira okhuraka amatuma ahawarachire omwaka kwawere tawe.

**16 PRES 2.** Alekhonyera amakhamara kamatuma kalikhuwo obulwale obo okhusalasia mumukunda a hambi a harachire amatuma tawe.

17 PRES 1**.** Raka imwo yamatuma eyilatirungwa nende obulwale bweshikoshekoshe tawe shinga Hybrid ya Kakamega no.634A,Hybrid 614,SC Duma nomba SC simba 61

.

18 PRES 2. Yako ni malala khumatuma ka resachi yefu yakhabirisia mana niinyola mbu shikatirungwa nende obulwale yibo tawe.

19 PRES 1. Mubwimbichiti yako niko akomulimi anyala okhukola okwikalira amatuma keke okhutiswa nende obulwale yibo.

20 PRES 2 Okhushira muno recheresania nende abalimi bashio halala nende balimu bobo bobulimi.

21 PRES 1 Balibo abarecheresania mubulimi bwabo nebulano bahuliranga obulai mubulimi bwabo!Nikhushiri okhubahulira khuerecheresiae olwimbo.

**INSERT SONG. IMWO.**

22 PRES 2 Noulira nibemba bario shibembangatsa eshikhaya tawe.Bali nende eshiabanyolanga mubulimi bwabo.

23 PRES 1. Bali nende amakanda kabo akabarakanga akabayanza!Bakalanyanga mbu mamatosha.

24.PRES 2. Khwareba mulala khubo Mary Nafula Okello mbu akhubire khwo eshiachira nabaula imwo yamakanda balanganga mbu mamatosha eyo.

**Tape Band 3Cue in...Kano marakwe.....**
**Cue out..mama tosha.**
**Duration...2.30.**

25..PRES 1 Siesi paka khandi ekaracha khwo omwaka kuno! Yaani kebulananga saidi ya mara kumi. Noraka omukorokoro mulala nonyola emikorokoro ekhumi

26.PRES 2. Ebise biefu bimalire okhula khushiakamo khulwe inyanga yino. Khulwesho eshitonyire no khubola mbu olindwe nisie ouwo Josephine Mudenyo halala nende omusinjiriri weshipindi,

27. PRES 1 Jared Okoti Mukarebe olindwe nyasaye akhulinde khandi khwakane.

**Cross fade Sigtune**

**KHURECHERESANIE NO. 5**

**SIG TUNE.....0.15".....FADE DOWN AND OUT.**

1. PRES 1. Biakhola ebise bindi ebiokhurecheresia eshipindi shiefu shia khurecheresanie mubulimi bwefu. Abakhurereranga eshipindi shino nisie Jared Okoti Mukarebe halala nende omukhana wefu,

2. PRES 2. Josephine Mudenyo. Mushipindi shielichuma liahwere khwasunga amanji okhulondana nende obulwale bwamatuma bulangungwa mbu ebidonda bieshikoshekoshe khumasafu ka matuma.

3. PRES 1. Esubira mbu ewe shinga omulimi bulanao omanyire efilolero fiobulwale yibo. Kata bulano nobulola khumatuma koko nabumanya.

4. PRES 2 Inyanga yino, khwitsa okhubola khwo nende abalimi bakhubire khwo shinga batsiririranga nende obulimi bwabo.

5. PRES 1. Lakini nikhushiri okhula habwenaho, Ababoli abanji abakhwsunjire khwo ninabo mushipindi shino okhuchachira khubaofisa mana paka abalimi,betsominjia tsisukuli tsiabalimi.

6. PRES 2. Kata kario tsiosi tsiri khwo nende obutinyu bwatso. Omwami Simon Kubasu niye ofisa ousinjirire tsisikulu tsiabalimi mudistrict ya Bungoma. Khwamureba mbu akhwinosie khwa mbu nobutinyu shina obwabalolanga khwo mutsisukuli tsiabalimi?

**Tape Band 1. Cue in..Butinyu buho.....**
**Cue out..tsinyishi.**
**Duration.....0.45”**

7.PRES 1. Shibulaho eshilai eshilalikhwo nende amatinyu kasho tawe. Lakini tsisukuli tsiabalimi tsiakhonya abalimi abanji po!

8. PRES 2 Mama Gladys N. Wanyama nomukhaye omulekhwa ne nomusomi musukuli ya Sipala famers field school Bungoma. Khwamureba akhubire khwo mbu nobukhonyi shina obwanyolanga okhurulana nende okhwiyunga nende isikuli yabalimi.

Tape Band 3 Cue in....Esese khulondokhana.....
Cue out..luno ta.
Duration....0.17”

9. PRES 1. Okhuyinia khwo okhunyola obwikhonyi bwo munzu shirikhoho shiosi shiosi eshianyala okhubola mbu ashikholanga nomba ya shikhola okhurulana nende obulimi?

**Tape Band 4. Cue in.. Ngasiendi.....**
**Cue out..mama.**
**Duration..0.24”.**

10. PRES 2. Noba niwikhalanga butswa, nimakhuwako!Gladys N. Wanyama, Nomukhaye omulekhwa ,newakhaulira nakhusunjira mbu asominjia abana be musekondari paka muyunibasiti okhurula mubulimi bubwe.

**INSERT MUSIC. Balireba bidii yakhola shi?**

11. PRES 2. Kata wesi khandi wakharebwe! Mbu wakhola khwoshi?! Abalimi mutsisukuli tsiabo bechesibungwa amakhuwa amanji. Nabanji abekhoyeranga obulimi bwabo sana. Jared Mukarebe yanyola khwo obwiyango obwokhubola

khwo nende mulala khubalimi bekhoyeranga obulimi bwabo! Bwana Javan Baraza nomulimi okhurula mu district ya Busia mudivision ya funyula. Jared yanza nende okhwenya okhumanya ewayanyola amachesi kayekhonyeranga mubulimi bubwe.

**Tape Band 5.** **Cue in....Amarifa kano.....**
**Cue out..maharakwe.**
**Duration...3.40"**

12.. PRES 2 Omusomi omulimi wesikuli ya balimi khandi ouli nende obuyanzi obunji mubulimi bubwe. Omwoyo kwokhulimira halala kwenyekha kube mubalimi halal nende mutsisukuli tsiabo. Tsisukuli tsiabalimi tsilimasibungwa halala mushiama shilangungwa mbu famers field schools Umbrella net work. OmwamiAbakuk Khamala niye oweshisala shiomukanda oko mudistrict yefu ya Kakamega. Hana yebala khwo ikasi yeshiama esho shikholeranga abalimi.

**Tape Band 6.** **Cue in...Ekasi yefu.....**
**okhukusia.**
**Duration.....0.12"**

13. PRES 2. Omukanda kwokhulimasia tsisikuli tsiabalimi mudistrict ya kakamega. Nakhuhulire amanji okhulondana nende omukanda oko mushipindi shino shilonde khwo.

14. PRES 1. Niyako akokhubere ninako mushipindi shieinyanga yino. Olachweya okhurecheresia eshipindi shielichuma litsa tawe. Olindwe nisie Jared Okoti Mukarebe ousinjiriranga eshipindi shino nendi halal nende,

15. PRES 2. Josephine Mudenyo, olindwe khandi khwakane nyasaye nayanza liwiki litsa.

**Cross fade signature tune.**

## KHURECHERESANIE NO. 6

**SIGTUNE.....015'.....FADE DOWN AND OUT.**

1. PRES1.1 Mulembe muno oyo yesi ourecheresinjia eshipindi shia "yitsa khurecheresanie mubulimi bwefu". Shino nishio eshipindi shiokhumalirikha mubipindi bino.

2. PRES 2. Kata kario olafwa omwoyo tawe shichira khwitsa okhubetsanga halala nende abalimi okhushira muno mutsisukuli tsiabo ni khukhaba amanji akanakhucherere ninako mubipindi bindi khandi.

3.. PRES 1. Khulwesho eshipindi shishiwere tawe halali shitsia mumahulukho. Elira lianje nisie Jared Okoti Mukarebe halala nende omukhana wefu,

4. PRES 2. Josephine Mudenyo.

**INSERT MUSIC.**

5. PRES 2. Shinga olwa oulire nibemba bario bali musukuli, yabalimi khandi bakhonyananga mumakhuwa kosi akomubulimi bwabo.

6. PRES 1. Nibali halala bario abulaho ounyala okhukora tawe shichira amaparo kabo baretsanga halala ne khandi bahera okhukhonyana munganakani.

7. PRES 2. Yitsulira khwo tsa mbu yabo boosipe! Abawahulirenje nibabola mushipindi shino babolirenje tsa shingala batsiririranga obulahi mubulimi bwabo.

8. PRES 1. Omupango oko okwokhwechesia abalimi kutsiririranga obulai. Chiriho emikanda echieyunga halala ne iministry yobulimi. Omwami Simon Kubasu niye ofisa ousinjirire tsisikuli tsiabalimi mudistrict ya Bungoma. Hano yenosia khwo emikanda chia bahambananga ninachio mukhukhonya abalimi.

**Tape Band 1Cue in.....Khuli nende....**
**Cue.....out ...ako konyene..**
**Duration.....0.55”**

9. PRES 2. Abalimi nibakhung’anire bario nende okhwiyunga halala nende emikanda chiosi banyolanga inganga mubulimi bwabo.

10. PRES 1. Mushipindi shielichuma liawere khwakhubolera mbu kuliho omukanda okukhung’asinjia tsisikuli tsiabalimi halala. Omukanda oko kulangungwa famers field schools network.

11. PRES 2. Khandi khwakhubolera mbu omukanda oko nikwo okukhabiranga abalimi eshiro shiabanyala okhukusiakhwo ebindu biabo khubei indayi.

12. PRES 1. Omwami Abakuk Khamala niye oweshisala shiomukanda oko mudistrict yefu ya kakamega. Khwamureba mbu bamanyanga barie ewaibei iba niyiri indayi.

**Tape Band 2. Cue in...Kace ni.....**
**Cue out...fulani.**
**Duration...0.58”**

13. PRES 2 Eeh! Nobulayi okhumanya ibei yeshindu noshiri okhukusia! Omukanda oko, kwenyeranga abalimi okhunyola inganga mubulimi bwabo. Omwami Abakuk Khamala akholanga ikasi nende eshiama esho eshiokhulimasia tsisikuli tsiabalimi. Khwamureba mbu abalimi banyala okhukhola bariena kho banyole okhutsiririra mubulimi bwabo.

**Tape Band 3Cue in...Eshindu eshikhongo....**
**Cue out...afadhali.**
**Duration.....1.15”**

14. PRES 1. Naye omulimi bwana Peter Malomba yesinomulimi weyunga nende isikuli yabalimi mudistrict ya Bungoma mana atsiririranga obulai nende obulimi bwe. Yaruka tsing’ombe tsiamabere ne khandi alimanga emimera chiaukhane okhushira muna amapwoni shichira kalimwo inganga inyinji. Khwamureba eshiomulimi anyala okhukhola okhwikalira amalwale mumumera chichie.

**Tape Band 4. Cue in..mukhulima khuno.....**
**Cue out..ebiorachire.**
**Duration...0.30”**

15. PRES 2 Ahambi nende wa Malomba yaho yaani ahabalanganga mbu Mukholi area mudivision ya Sang’alo yemulambo aliho omulimi oulangungwa mbu Vincent Makokha Magenga. Yesi ali musukuli yabalimi. Khwamureba mbu akhubolere khwo ni lina olwa yachaka obulimi bubwe.

**Tape Band 5. Cue in...Mwaka wa 2002.....**
**Cue out..ndikhwo nima.**
**Duration..0.31.**

16. PRES 1. Vincent Magenga aukanga khwo tsa shinga olwayamanyire amakhuwa kobulimi amani nikawere.

Abola mbu alabakhwo tsa niyanyola isukuli yabalimi khale, khane aba ali ehale wamakana.

17. PRES 2. Kata kario ashiri okhufwa omwoyo, amani nimatiti lakini ashilima tsa!

18. PRES 1. Olalinda okhuchelewa shinga Magenga tawe! Chachira tsa khale okhwikasa amani nikashiri mwo. Khuli khandi nende omulimi Patrick Ouma Nyapola okhurula Sibembe yemulambo. Musikuli yabo barakanga tsimbia tsinyinji tsiamapwoni. Khwenya akhubolere khwo bakholanga bario shichira shina?

**Tape Band 6Cue in....Bulimi bwefu**
**Cue out..Shiakhukhola**
**Duration....0.35.**

19. PRES 2. Obulimi bwetsinyanga tsino no bwokhwikhonyera amachesi! Kata abalimi bosi paka bateme okhukhaba imwo mutsimwo kho bayiniemwo eyibarereranga inganga nomba eyikholanga obulai mumikunda chiabo.

20. PRES 1. Abalimi abanji batsiririranga obulai mubulimi bwabo okhurulana nende amechesio kabanyolanga! Ewe oli hena? Olatong'a inyuma tawe wesi wirusie otsire halala nende abashio mubulimi noshiri namani orio! Lekha amaparo ka khale mbu omukunda kwalokwa.

21. PRES 2. Eshipindi shiefu shieinyanga yino shiakamira habwenaho.

22. PRES 1. Shinga olwa khubere nikhubolire, shino nishio eshipindi shiokhumalirikha mubipindi bia Yitsa khurecheresanie mubulimi bwefu".

23, PRES 2. Khutsia okhuhulukha nikhukhaba akandi akanakhucherere ninako mubipindi bindi khandi. Muriomuno okhukhurecheresia.

24. PRES 1. Olachweya nomba olalekha okhurecheresania mubulimi bubwo tawe. Okhubera wenyene shonyala tawe. Olindwe nisie ouwo Josephen Mudenyo halala nende,

25. PRES 2. Jared Okoti Mukarebe, nyasaye nayanza khandi khwakane ninawe mushipindi shindi khandi. Olindwe!

**Cross fade clossing sigtune.**

**Kiswahili Radio Programs (6 Programs)**

**PROG. No. 1 KILIMO CHA KUSHAURIANA TX.....**

**1**. PRES. 1. Hujambo msikilizaji na karibu kusikiliza kipindi chako "Kilimo cha kushauriana!

2. PRES. 2 Kipindi hiki kinaletwa kwako kwa hizani ya CABI wakishirikiana na wadao wengine kama Shirika la chakula duniani,Kari na wizara ya kilimo

3. PRES. 1 Kumbuka msikilizaji, ushirikiano huu wote ni kwa manufaa yako kama mkulima.

4. PRES. 2 Hawo wote wakiwa katika ushirikiano wao walishauriana na wakaamua kuwa shule za wakulima ndizo zinafaa zaidi kufundisha na kuhamasisha wakulima.

5. PRES. 2 Mashirika hayo katika muungano wao , tayari wanafanya kazi na wakulima katika mkoa wa magharibi hasa katika wilaya za Kakamega Bungoma na Busia.

6. PRES. 1 Baadhi ya wakulima tayari wameanza kufurahia matunda ya kazi yao.Kati yao tutaojiana nao katika mfululizo wa vipindi vitakavyo fuata.

**INSERT MUSIC.KILIMO NI BIASHARA**

7. PRES. 2 Lakini katika kipindi cha leo tunataka kuangazia ni kwa nini? Ushirikiano huu uliamua kutumia shule za wakulima kama njia mwafaka ya kuwafikia, kuwahamazisha na kuwa funza wakulima!

8. PRES, 1 Bwana Godrich Khisa ni mratibu wa kitaifa wa shule za wakulima. Kwanza, kulima kwa ushauriano kilitaka kujua maana ya shule za wakulima.

TAPE INSERT
Cue in ....Shule za wakulima.....
Cue out....decision making.
Duration...0.52

**9. PRES 2 Kujionea,Kujadiliana,Kuchunguza na kufanya uamusi wa pamoja.**

9. PRES. 1 Shule za wakulima ni vyombo vizuri vya ushauriano baina ya wakulima kwa wakulima, wakulima kwa

maafisa,wakulima kwa watafiti na pia wataalamu hushauriana. Lakini je? Ninani anae chagua miradi inayo endeshwa na wakulima? Bwana Simeoni Kubasu afisa wa shule za wakulima katika wilaya ya Bungoma.

TAPE INSERT.
Cue in.....Hizi miradi.....
Cue out....katika maisha yao.
Duration.....0.30.

10. PRES. 1 Mpango huu mpya wa kushirikiana na kushauriana katika kuwafunza wakulima unafanya kazi kivipi? Godrick Khisa mratibu wa kitaifa wa shule za wakulima

TAPE INSERT
Cue in.....Mpango wa FFS.....
Cue out.....shule za wakulima.
Duration.....1'.23"

11. PRES 1 Ubora wa shule za wakulima ni upi?

TAPE INSERT.
Cue in....Ni mtindo mzuri.....
Cue out.....Mawazo.
Duration.....0.47

12. PRES. 1 Baadhi ya wakulima tayari wameanza kubadili fikira zao juu ya kilimo na sasa wanaendesha kilimo cha kuwafaidi.Bi Gladys N. Wanyama, mama mjane anaeleza vile kilimo cha kushauriana kina muezesha kimaisha kwa sasa.

TAPE INSERT.
Cue in.....Saa hizi.....
Cue out.....kwa kilimo.
Duration....0.21"

13. PRES.2 Bi Gladys Wanyama mwanafunzi wakulabusia farmers field school katika wilaya ya Bungoma katika kata ndogo ya ndengelwa. Yeye ni mmoja tu wa miongoni mwa wakulima wanao endesha kilimo kwa faida kutokana na kuanza kilimo cha kushauriana. Wakulima wengi wamefaidika kutokana na mpango huu na katika vipindi vitakavyo fuata tutaongea nao ili kuaangazia mafanikio yao.

14. PRES 1 Mbali na kuongea nao pia tutajadili mbinu mbali mbali ambazo wemefunzwa na ambazo sasa zina wafaidi katika kilimo chao.Pia ugonjwa unao shambulia mahindi yaani grey leaf spot utajadiliwa!

15. PRES 2 Na sihayo tu msikilizaji. Kunamengi tutakayo jadili katika nyanja ya ukulima hasa jinsi unavyo weza kuzuia magonjwa na wadudu waharibifu katika mimea yako.Kumbuka kushauriana ni kubadilishana mawazo na tunapo badilishana mawazo, tunafaulu! Ufanisi wako ni furaha na ndio lengo la Cabi!

16. PRES 1 Kufikia hapo msikilizaji ndipo kipindi cha “Kulima kwa kushauriana” kimefika tamati kwa leo.

17 PRES 2 Lakini unaweza kutuandikia, anwani yetu ni SLP 66730 Nairobi.

18. PRES 1 Basi kwaniaba ya mtayarishi na fundi wa mitambo Jared Okoti Mukarebe, hawa ni wasimulizi wako Sally Githaiga na mwenzangu

19. PRES 2. Stephene Omondi

20. PRES 1. Sote tukisema kwaheri kutoka studio.

CLOSING SIG TUNE.

**KULIMA KW A KUSHAURIANA ep no. 2**

SIG TUNE.....

1. PRES. 1 Hujambo msikilizaji na karibu tena kusikiliza kipindi chako cha “Kulima kwa kushauriana”! Mimi ni msimulizi wako Sally Githaiga nikishirikiana na mwenzangu.

2. PRES 2. Stephen Omondi. Katika kipindi cha leo tutaongea na mkulima bwana Javan Baraza. Yeye ni mwana chama wa kigundi cha akina mama cha wekhonye development women group. Katika taarafa ya funyula wilayani Busia.

3. PRES 1. Lakini kabula ya kuongea naye kuna bwana Simeoni Kubasu afisa wa shule za wakulima katika wilaya ya Bungoma.Kwanza anaeleze ni mambo gani wakulima hufunzwa katika shule zao.

Tape Band 1 Cue in ....Tuna fundisha.....

Cue out....vizuri.
Duration.....1.00’

4. PRES 2. Wakulima wana fundishwa kutumia IPPM yaani intergrated production pest management. Na Je? Hii ni kumaanisha nini? Bwana Godrick Khisa mratibu wa kitaifa wa shule za wakulima.

Tape Band 2. Cue in.....IPPM.....
Cue out...magonjwa ama madudu.
Duration....0.40”

5. PRES 1. Ah! Wakulima watumie mchanganyiko wa njia za kuangamiza wadudu na magonjwa ya mimea. Lakini tuchunge tusitumie madawa kwa wingi yasije yakaadhiri afya ya wale watakao tumia bidhaa zetu kama chakula. Bwana Javan Baraza ni mmoja wa wakulima walio fundishwa kutumia njia hizo.Hapa anaeleza baadhi ya njia walizo fundishwa.

Tape Band 3. Cue in.....Ah! Tumefunzwa.....
Cue out....maharakwe.
Duration.....0.13.”

6. PRES 2 Pia tulimuuliza bwana Baraza, kabla ya kupata hayo mafunzo yeye alikuwa akilima kwa njia gani?

Tape Band 4. Cue in.....Mimi sana sana..
Cue out...faida zaidi.
Duration....0.20’.

7. PRES 1. Bwana Baraza sasa ameanzisha kilimo cha maharakwa kwa sababu yana mletea faida. Wengi wetu sisi wakulima tuna lima tu! Kama desturi bila kuzingatia matumizi na mapato katika kulima kwetu. Tulimuuliza bwana Simeon Baraza ikiwa hiyo ndio msimamo wao kama walimu wa wakulima.

Tape Band 5 Cue in.....
Cue Out.....
Duration.....

INSERT MUSIC KILIMO NI BIASHARA

8. PRES 2 Eh! Hata mimi sasa nakubali kuwa kilimo cha faa kiendeshwe kama biashara ile ingine yeyote.Tuli muuliza bwana Baraza ikiwa yeye bado yeye ana

bahatisha katika kilimo chake.na pia kutokana na mafunzo ikiwa ameweza kuimarisha mavuno yake.

Tape Band 5. Cue in....Sisemi.....
Cue out..nita pata.
Duration.....0.34'

9. PRES 1. Nivizuri kuwa na uhakika kama mkulima Javan Baraza. Lakini yeye? Alipataje kujiunga na watu wa Kari/ Cabi?

Tape Band 6. Cue in.....Ah! Watu.....
Cue out...hatujui.

10. PRES 2. Nakuhusu vile Cabi wamechangia katika kuimarisha kilimo chao alisema!

Tape Band 7. Cue in...Wametuletea.....
Cue out..inaingia.

11. PRES 1 Hata wewe na mimi tuna weza kufurahia ukulima wetu kama mkulima bwana Javan Baraza.

12 PRES 2 Kufikia hapo msikilizaji ndipo tunatia kigomo kwa leo ukiwa na swali, anwani yetu ni Mtayarishi kulima kwa kushauriana SLP ni 66730 Nairobi

13. PRES 1 Unaweza kutuandikia nasi tuta kujibu. Kwa niaba ya mtayarishi Jared Okoti Mukarebe na mwenzangu

14. PRES 2. Stephine Omondi

15. PRES 1 Nami Sally Githaiga. Sisi ni wasimulizi wako tukisema kwaheri kutoka studio.

CLOSING SIG.

**KUSHAURIANA EP. NO 3**

SIG TUNE>>>>>>>>>>>>>>>>>>>0.15" Fade under.

1. PRES1 Karibu tena msikilizani kusikiliza kipindi chacko kingine cha Kulima Kwa kishauriana. Mimi kama kawaida nimsimulizi wako Salome Githaiga. Nikishirikiana na mwenzangu.

2. PRES2 Stephene Omondi. Sote tukiwa tumejiandaa vilivyo ili kukusimulia Kipindi cha leo.

3. PRES1 Bila kupoteza wakati tunaanza! Na tunaanza na swali. Je? Unajua vile Unavyoweza wale wadudu wanao shambulia viazi

vitamu? Na Je? Yule Panya anaye shambulia viazi vitamu anayejulikana kama fuko?

4. PRES1 Hayo ni baadhi tu ya yale tutakayo yajadili katika kipindi cha le. Lakini kwanza tuna mpisha afisa wa kuwafunza wakulima katika taarafa ya Lurambi wilaya ya Kakamega. Bi Ruth Apondi. Kwanza tulimutaka aeleze jinsi wanavyo shirikiana na mashirika mbalimbali katika kazi ya kuwafunza wakulima na pia kuyataja baadhi yao.

Tape Band 1. Cue in.....Kwa majina.....
Cue out…….watu wa cip.
Duration…….0.27”

5. PRES2 Baadhi ya wale wanaoshirikiana nao ni CABI yaani Centre Agricultural Bureau International. Je? Mchango wa CABI katika muungano huu in Upi?

Tape Band 2 Cue in…….Watu wa CABI……
Cue out…….mimea kwa shamba.
Duration……0.21”

6. PRES1 Kutokana na hayo mafunzo ambayo amepata kutoka kwa watu wa CABI? Nimafunzo gain ambayo ameweza kuwafunza akulima wake?

Tape Band 3 Cue in…….Wakulima wangu……
Cue out…….research yetu.
Duration……0.30”

7. PRES2 Mtayarishi Jared Okoti Mukarebe aliongea na baadhi ya wakulima Ambao wamepata kufunzwa na Ruth Apondi kama.

Tape Band 4 Cue in……..Jina langu ni……
Cue out…….kuwa vizuri.
Duration……0.55”

8. PRES1. Na upande wa viazi hasa katika kuzuia wadudu na wanyama kama Fuko?

Tape Band 5 Cue in…….Upande wa viazi……
Cue out…….anakufa.
Duration……0.38”

9. PRES2. Haya! Kama wewe in mmoja wa kusumbuliwa na wadudu au Fuko
Wakuharibu viazi vyako basi tumia maarifa ya bwana Vincent Makokha Mutinye. Yeye ana ujuzi ulio tokana na kulima kwa kushauriana.

10. PRES1. Wiki ijayo tutazungumzia ugonjwa unao adhiri mahindi unao

julikana Kama grey leaf spot ama madoa ya kijivu kwenye majani ya mahindi. Ugonjwa huu hata ingawa hauja julikana sana na wakulima, unachangia Pakubwa sana katika upunguvu wa mazao yanayotokana na mahindi.

11. PRES2. Tutazungumzia dalili za ugonjwa na kiwango cha mavuno yanayo potea Kutokana na ugonjwa huu wa grey leaf spot.

12. PRES1 Naona fundi wa mitambo akinipungia mkono kuonyesha kwamba mda
Wetu hapa studio umeisha kwahivyo tutakomea hapo kwa leo.

13. PRES2. Lakini unaweza kutuandikia, anuani yetu in Mtayarishi kulima Kwa Kushauriana SLP ni 66730 Nairobi.

14. PRES1. Kwa niaba ya mtayarishi Jared Okoti Mukarebe sisi ni wasimulizi wako

15. PRES2 Stephene Omondi

16. PRES1 Na mimi Sally Githaiga tukikuaga kutoka studio tukisema lima Kwa Kushauriana ufaidike.

CLOSING SIG TUNE

**KUSHAURIANA EP. NO 4**

**SIGTUNE.....0.15".....FADE DOWN AND OUT.**

1. PRES 1. Karibu tena msikilizaji wetu wa kipindi cha "Kulima kwa kushauriana" Ni siku nyine tena tunafuraha kujumuika nawe katika kipindi hiki. Jina langu ni Salome Muthoni Githaika na mwenzangu,

2. PRES2. Stephene Omondi. Kipindi hiki ndicho cha nne katika mfululizo wa vipindi vyetu vya kulima kwa kushauriana.

3. PRES 1. Wiki iliyo pita tulikuahidi kuwa tuta zungumzia ugonjwa unao adhiri mahindi ujulikanao kama grey leaf spot ama Madoa ya kijivu kwenye majani ya mahindi.Ama sivyo Steve?

4. PRES 2. Ni kweli Sally Na ahadi ni deni lazima tulipe. Naona kwanza tumpishe Jared Okoti mukarebe na ripoti kuhusu ugonjwa huo.

5. JARED Ugonjwa huu wa madoa ya kijivu kwenye majani ya mahindi uliripotiwa mara ya kwanza nchini Kenya

mwaka wa 1995.Utafiti uliofanywa katika mashamba mwa wakulima wadogo mnamamo mwaka wa 2002 umeonyesha kuwa ugonjwa huu tayari umenea katika sehemu mhimu zinazo tegemewa kwa upanzi wa mahindi .Mkoa wa magharibi ndio uliadhiriwa zaidi.Ugonjwa huu unapatikana sana sana katika sehemu ambazo wakulima hupanda mahindi mara kwa mara bila kubadilisha na mimea mingine.madoa ya kijivu kwenye majani ya mahindi hupatikana sana sana katika nyanda za chini ambazo huwa na umande mzito wakati wa usiku.

5.PRES 1 Jared Mukarebe na ripoti juu ya ugonjwa.
Hivi majuzi wataalam wa magonjwa ya mimea hasa mahindi walitembelea baadhi ya wakulima ili kubainisha uwezo wao wa kutambua magonjwa.Bwanw Zachary Kinywa ni mtaalam wa magonjwa ya mimea kutoka kituo cha utafiti cha KARI Nairobi.Kulima kwa kushauriana kiliandamana naye hadi kwa mkulima Peter Ekesa wilayani Busia.Hapa bwana Kinywa anaongea na mkulima.

**Tape Band 1** **Cue in:sasa kwa hii.....**
**Cue out:.....wadudu.**
**Duration 0:21'**

6.PRES 2 Hapo hapo kwa mkulima Peter Ekesa kulikuwa na ugonjwa wa Grey Leaf Spot yaani Doa La Kijivu kwenye majani ya mahindi lakini mkulima hakuweza kutambua.

7.PRES 1. Hivyo bwana Zachary Kinywa akaamua kueleza wakulima waliokuweko vile ugonjwa huu wa madoa ya kijivu unavyoweza kutambuliwa kwa dalili zake na vile unavyoadhiri mmea wa mahindi.Kulima kwa kushauriana kilikuwa hapo.

Tape Band 2 **Cue in:..... wakulima.....**
**Cue out:.....haijazi vizuri.**
**Duration 1:15"**

8.PRES 2. Ni muhimu sana mkulima kutambua ugonjwa unao adhiri mimea yake maana hapo ataweza kuchukua hatua zifaazo.

9.PRES 1. Hata hivyo ugonjwa huu unaweza kuzuiliwa na wakulima kwa kuzingatia mambo fulani katika ukulima wao.Kwa mfano.

10. PRES 2. Vuna mahindi yalio athiriwa vibaya mapema kabla ya kuoza pamoja na kuondoa mabaki yote yalio adhiriwa.

11. PRES 1. Fukia mabaki yaliyo adhiriwa na ugonjwa mchangani ili kupunguza kukua kwa viini vya ugonjwa.

12. PRES 2. Zingatia ukulima wa kubadilishana mimea yaani crop rotation.

13. PRES 1. Epuka kutumia mabaki ya mahindi yalioathiriwa katandaza karibu na shamba la mahindi.

14. PRES 2. Panda mbegu zilizo pendekezwa kama KH634A,H614,SC DUMA41,SC SIMBA 61.

15. PRES 1. Huo ni mktasari tu wa mambo ambayo mkulima anaweza kufanya kujiepusha na ugonjwa

16. PRES 2 .Shauriana na wakulima wenzako,walimu wako wa kilimo na pia maafisa wataalam kama Kinywa na bila shaka utafaulu katika kilimo chako.

17 PRES 1. Muda wetu hauturuhusu kuendelea,hivyo basi tutakomea hapo kwa leo.

18. PRES 2. Kwa niaba ya mtayarishi Jared Okoti Mukerebe, Hawa ni wasimulizi wako Salome Githaika na

19. PRES 1. Steven Omondi.Kwaheri.
**Closing signature.**

**TUSHAURIANE NO. 5**

**SIGTUNE.....0.15".....FADE DOWN AND UNDER.**

1. PRES 1. Hujambo msikilizaji! Umefika wakati mwingine wakusikiliza kipindi cha "Kulima kwa kushauriana" Wasimulizi wako ni kama kawaida

2. PRES 2. Stephene Omondi.

3. PRES 1. Namie Salome Muthoni Githaika.

4. PRES 2. Wiki iliyo pita tulisikia mengi kuhusu ugonjwa wa mahindi ujulikanao kama Madoa ya kijivu kwenye majani ya mahindi.

5. PRES 1. Naamini kuwa msikilizaji kama mkulima, ulielimika na sasa unaweza kuutambua ugonjwa huo katika mahindi yako na pia unajua jinsi unavyo weza kuepusha mimea yako ya mahindi kuambukizwa ugonjwa huu.

6. PRES 2. Leo tutazungumza na mkulima mmoja ambae tunge penda atuambie siri ya ufanisi wake katika kilimo.

7. PRES 1. Lakini kabla ya hapo msikilizaji, mara kwa mara wengi wa wakulima na maafiza tulio ongea nao katika kipindi hiki wamehimiza ama kutilia mgazo, umhimu wa mkulima kuwa katika kigundi ama shule ya wakulima.

8. PRES 2. Bwana Godrick Khisa ndie mratibu wa kitaifa wa shule za wakulima katika nchi yetu. Kutoka kwake tulitaka kujua vile shule za wakulima zina mtayarisha mkulima kufanya uamuzi katika kilimo chake.

**Tape Band 1.** **Cue in...Ina mpa mkulima.....**
**Cue out.....kitu gani atafanya.**
**Duration.....0.23”**

9. PRES 1 Bila shaka wakulima wakijiunga katika shule za wakulima wataweza kufanya uwezo mwafaka wakufanya uamuzi bora ambao utawawezesha kuzalisha mazao kwa wingi. Lakini Je? Kuna mpango gani wakuwazaidi wakulima kuuza mazao yao?

**Tape Band 2.** **Cue in.....kama mashirika**
**Cue out...wana zaidia**
**Duration...**

10. PRES 2. Bwana Simon Kubasu akionge juu ya jinsi wakulima wanaweza kuunganishwa na mashirika au masoko mbalimbali kuuza mazao yao. Lakini hakuna kizuri kinacho kosa ubaya wake! Je? Kunayo matatizo yoyote yanayo tatiza uendelevu wa shule za wakulima? Bwana Kubasu.

**Tape Band 3.** **Cue in...Tatizo moja.....**
**Cue out..ni ngumu.**
**Duration.....0.31.**

11. PRES 1 Bwana Simon Kubasu ni afisa washule za wakulima katika wilaya ya bungoma.

12. PRES 2. Bwana Javan Baraza ni mkulima ambaye kwa sasa anajivunia kilimo chake kutokana na kujiunga na shule ya wakulima. Hapa ana siri ya ufanisi wake katika kilimo ambayo angependa kuwambia wakulima wenzake.

**Tape Band 4. Cue in..Naambia wakulima.....**
**Cue out...kwa gunia.**
**Duration.....1.02"**

13. PRES 1. Mtu hujifunza kutoka kwa mwingine. Maana sisi na vile tulivyo pamoja na yale tunafanya, ni jumla ya yale tume shuhudia na kuambiwa. Ndio maana kuna mwalimu na mwanafunzi katika kila jambo!

14. PRES 2. Tumefika mwisho wa kipindi chetu kwa leo. Wiki ijayo tutazungumzia umhimu wa wakulima kuendelea kukaa katika shule yao.

15. PRES 1 Kwaniaba ya mtayarishi na fundi wa mitambo Jared Okoti Mukarebe hawa ni wasimulizi wako,

16, PRES 2. Stephin Omondi.

17. PRES 1. Nami Salome Muthoni Githaika sote tuna sema kuheri kutoka studio.

**Cross fade clossing sigtune.....**

**TUSHAURIENE NO. 6**

**SIGTUNE.....0.15 .....FADE DOWN AND OUT.**

1. PRES 1. Karibu tena msikilizaji kusikiliza kipindi chako cha "Kulima kwa kushauriana"! Hiki ndicho kipindi cha mwisho katika mfululizo wa vipindi vyetu vya kulima kwa kushauriana.

2. PRES 2. Hata hivyo, usife moyo msikilizaji tuta kuwa pamoja na wakulima hasa katika shule zao ili kupata maoni na mawaidha mhimu yatakayo tuwezesha kurudi hewani, na vipindi vingine vitakavyo kufaa zaidi.Jina langu ni Stephene Omondi pamoja na dadangu,

3. PRES 1. Salome Muthoni Githaika.

**INSERT MUSIC.**

4. PRES 1. Wiki iliyo pita Steve? Nakumbuka tuliweka ahadi unaweza nikumbusha?

5. PRES 2. Hee! Nikweli ahadi yetu ilikuwa kwamba tutazungumzia umhimu wa wakulima kukaa katika shule zao.

6. PRES 1. Hiyo nikweli lakini kwanza tumegundua kuwa shule hizo zime wafaidisha na kuwabadili wakulima wengi! Kwa mfano, mkulima Margret Ngichabe kutoka wilaya ya Bungoma katika taarafa ya Kandui anasema.

**Tape Band 1. Cue in.....Mimi niko....**
**Cue out...naongea na wale.**
**Duration...0.22”**

7. PRES 2 Kutokana na kujiunga na kushiriki katika shule ya wakulima Margaret Ngichabe sasa anaweza kuzungumza na watu bila uoga wowote.

8. PRES 1 Sio wakulima peke yao ambao wameona manufaa kutokana na shule za wakulima! Hata maafisa wakuwafunza wakulima hawakuwachwa nyuma. Tulimuuliza mmoja wao ni jinsi gani amefaidika kutokana na mpango wa shule za wakulima hasa kutokana na ushirikiano wa Cabi katika mpango wa shule za wakulima?

**Tape Band 2. Cue in...Cabi wame.....**
**Cue out..reality.**
**Duration...0.35”**

9. PRES 2 Bwana Jared Wandete ni afisa wakilimo katika wilaya ya Bungoma katika taarafa ya Kandui, akieleza vile ushirikiano wa Cabi na mpango wa shule za wakulima , umerahisisha kazi yake!

10. PRES 1 Pia tulimuuliza bwana Jared Wandete aeleze tofauti iliyoko baina ya mtindo huu wa kuwafunza wakulima katika shule zao na ule wa kawaida wakuwatembelea na kuwa funza wakulima.

**Tape Band 3. Cue in..Hii kabla.....**
**Cue out ..fanyia kazi.**
**Duration...0.46”**

11. PRES 2. Ni kweli kabisa katika mpango wa shule za wakulima maafisa hujifunza pamoja na wakulima. Lakini ili wakulima waendelee kufaidika katika mpango huu , lazima waendelee kukaa ama kuwa pamoja katika shule

zao?. Bwana Godrick Khisa mratibu wa kitaifa wa shule za wakulima ana toa mwito.

**Tape Band 4. Cue in....ile mwito.....**
**Cue out...tuna kosea.**
**Duration...0.46"**

12. PRES 1. Na kwa maelezo hayo juu ya umhimu wa wakulima kukaa pamoja katika shule zao, ndipo tunaligunja jambi la kipindi cha kulima kwa kushauriana.

13. PRES 2 Kumbuka vile tumesema mwanzoni mwa kipindi, kipindi kitapumzishwa kwa mda.

14. PRES 1. Na basi kwaniaba ya mtayarrishi Jared Okoti Mukarebe hawa ni wasimlizi wako Salome Muthoni Githaika.

15. PRES 2. Nami Stephene Omondi tukikuaga kutoka hapa hadi wakati mwingine tutakapo rudi hewani.KWAHERI.

**Cross fade sigtune**

**TV SCRIPTS –**

**MAENDELEO KWA KASHIRIKIANA – FARMER SUCCESS STORY IN TWO PARTS (KISWAHILI)**

**Program 1**

Mama Beatrice amebahatika kupanda ekari moja ya sukuma wiki, ambayo ni kitoweo cha jamii nyingi nchini Kenya , Kwa minajili ya kuliwa na mauzo pia. Wengi wamejaribu kuipanda sukumawiki lakini wakalalamikia tatizo la kuoza kwa vijiti vya mmea huo.
Je yeye alifaulu vipi?

Ukosefu wa mbegu zinazo toa mazao mengi, kiwango cha chini cha rotuba kwenye udongo, mashamba madogo , na ukosefu wa pembejeo, huathiri mavuno sehemu nyingi humu nchini, huku wadudu waharibifu wakibaki kuwa kikwazo kikiubwa kwa wakulima humu nchini.

Shirika la CABI likishirikiana na washika dao wengine, wamewapatia wakulima teknologia za kuwawezesha kuzuia uharibifu wa mimea yao, ambazo mbali na kuleta ushindi, zimeimarisha viwango vya lishe bora kwa baadhi ya mimea yao.

Kupitia kwa ufanisi na faida inayotokana na mapato ya research , nyuso za wakulima sasa zimepata tabasamu na pia kuijaza mifuko yao na pesa . Je , huu mradi ulikuwa na lengo lipi ?

Kwa muda mrefu, viazi vitamu vimekuwa vikipandwa na wakulima wadogo wadogo ambao wana mashamba madogo, ajira adilifu , na ukosefu wa pesa, kwani gharama ya mimea ya upanzi ni ndogo sana.

Kiazi kitamu pia kina aina nyingi ya matumizi. Matumizi haya nikama vile kuliwa, matawi……
Mbegu isiyo ambukizwa na magonjwa, ilitolewa kwa wakulima kutoka KARI kakamega.

Kwa jamii ya Wekhonye kule Busia, wao walichagua maharagwe.

Wahenga walisema kuna njia nyingi za kuchuna ngozi ya paka, na ndivyo ilivyo na kuikinga mimea kutokana na magonjwa kwa hawa wakulima wa kakamega. Uzoefu wa waenyeji na maoni zao zilizingatiwa sana kwenye mradi huu.

Kundi hili pia linapanda nyanya kwa  kutumia mbinu tofauti.
Insert

Kuhakikisha kuwa mradi huu umewafikia wakulima wengi, CABI ilishirikiana na mradi wa FAO zenye shule za wakulima wa mkoa wa magharibi mwa Kenya pamoja na KARI.
Mradi huu umefaulu sana na ndiyo maana wakulima hawa wa sipala FFS wana msemo Khulia mmbango  yaani kulia kwenye jembe!

**Program 2**

SIG TUNE>>>>>>>>>>>>>>>>>>>>0.15” Fade under.

1. PRES1 Karibu tena msikilizani kusikiliza kipindi chacko kingine cha Kulima Kwa kishauriana.  Mimi kama kawaida nimsimulizi wako Salome Githaiga.  Nikishirikiana na mwenzangu.

2. PRES2 Stephene Omondi. Sote tukiwa tumejiandaa vilivyo ili kukusimulia Kipindi cha leo.

3. PRES1 Bila kupoteza wakati tunaanza! Na tunaanza na swali. Je? Unajua vile Unavyoweza wale wadudu wanao shambulia viazi vitamu? Na Je? Yule Panya anaye shambulia viazi vitamu anayejulikana kama fuko?

4. PRES1 Hayo ni baadhi tu ya yale tutakayo yajadili katika kipindi cha le. Lakini kwanza tuna mpisha afisa wa kuwafunza wakulima katika taarafa ya Lurambi wilaya ya Kakamega.  Bi Ruth Apondi. Kwanza tulimutaka aeleze jinsi wanavyo shirikiana na mashirika mbalimbali katika kazi ya kuwafunza wakulima na pia kuyataja baadhi yao.

   Tape Band 1. Cue in.....Kwa majina.....
   Cue out…….watu wa cip.
   Duration…….0.27”

5. PRES2 Baadhi ya wale wanaoshirikiana nao ni CABI yaani Centre Agricultural Bureau International. Je? Mchango wa CABI katika muungano huu in Upi?

Tape Band 2 Cue in…….Watu wa CABI……
Cue out……mimea kwa shamba.
Duration……0.21”

6. PRES1 Kutokana na hayo mafunzo ambayo amepata kutoka kwa watu wa CABI? Nimafunzo gain ambayo ameweza kuwafunza akulima wake?

Tape Band 3 Cue in…….Wakulima wangu……
Cue out……research yetu.
Duration……0.30”

7. PRES2 Mtayarishi Jared Okoti Mukarebe aliongea na baadhi ya wakulima Ambao wamepata kufunzwa na Ruth Apondi kama.

Tape Band 4 Cue in……..Jina langu ni……
Cue out……kuwa vizuri.
Duration……0.55”

8. PRES1. Na upande wa viazi hasa katika kuzuia wadudu na wanyama kama Fuko?

Tape Band 5 Cue in…….Upande wa viazi……
Cue out……anakufa.
Duration……0.38”

9. PRES2. Haya! Kama wewe in mmoja wa kusumbuliwa na wadudu au Fuko
Wakuharibu viazi vyako basi tumia maarifa ya bwana Vincent Makokha Mutinye. Yeye ana ujuzi ulio tokana na kulima kwa kushauriana.

10. PRES1. Wiki ijayo tutazungumzia ugonjwa unao adhiri mahindi unao julikana Kama grey leaf spot ama madoa ya kijivu kwenye majani ya mahindi. Ugonjwa huu hata ingawa hauja julikana sana na wakulima, unachangia Pakubwa sana katika upunguvu wa mazao yanayotokana na mahindi.

11. PRES2. Tutazungumzia dalili za ugonjwa na kiwango cha mavuno yanayo potea Kutokana na ugonjwa huu wa grey leaf spot.

12. PRES1 Naona fundi wa mitambo akinipungia mkono kuonyesha kwamba mda
Wetu hapa studio umeisha kwahivyo tutakomea hapo kwa leo.

13. PRES2. Lakini unaweza kutuandikia, anuani yetu in Mtayarishi kulima Kwa Kushauriana SLP ni 66730 Nairobi.

14. PRES1. Kwa niaba ya mtayarishi Jared Okoti Mukarebe sisi ni wasimulizi wako

15. PRES2 Stephene Omondi

16. PRES1 Na mimi Sally Githaiga tukikuaga kutoka studio tukisema lima Kwa Kushauriana ufaidike.

CLOSING SIG TUNE

## Annex 8: Farmer Field Schools that worked on tomato (Total FFS 58: Busia 34, Bungoma 16 and Kakamega 8)

| NAME OF FFS | MEETING DAY | FACILITATOR |
|---|---|---|
| **BUSIA DISTRICT** | | |
| **TOWNSHIP** | | |
| 1. Maduwa | Tuesday | Jane angana |
| 2. Lukonyi | Wednesday | " |
| **MATAYOS** | | |
| 1. Udongo Ni Asali | Tuesday | Charles Chweya |
| 2. Nabi x-tian | Friday | " |
| 3. Igero | Monday | Rose Ngoya |
| 4. Namikoye | Friday | " |
| 5. Amuka twende | Monday | George Otando |
| 6. Maendeleo | Friday | " |
| 7. Mukhweso Muungano | Tuesday | George Gare |
| 8. Ndalo FFS | Wednesday | " |
| 9. Luliba itendeke | Thursday | Godfrey Ooko |
| 10. Wamama Amkeni | Friday | " |
| **BUTULA** | | |
| 1. Bukhuma | Wednesday | Emma Obuya |
| 2. Banabefwe | Tuesday | " |
| 3. khwinulane | Thursday | James omemo |
| 4. Abakwana | Friday | " |

| | | |
|---|---|---|
| **NAMBALE** | | |
| 1. Jikaze | Thursday | Polycarp Ndubi |
| 2. Makongeni | Friday | " |
| 3. Neema | Tuesday | Joseph Netia |
| 4. Kalikhunyola | Wednesday | " |
| 5. Sidende | Wednesday | Simon Mwombe |
| 6. Kajoro Amkeni | Friday | " |
| **FUNYULA** | | |
| 1. Dadira | Tuesday | Josephat Bwire |
| 2. Mabukhia Nakandi | Friday | " |
| 3. Miti ni Afya | Friday | Conrad wafula |
| 4. Abecha Nyuma | Monday | George Akhulo |
| 5. Khuriba khutie combined | Tuesday | Antonina Oggema |
| 6. Okoa | Friday | " |
| **BUDALANGI** | | |
| 1. Bulisi | Thursday | Charles Oduori |
| 2. Igigo Dyke | Friday | " |
| 3. Bulala Mundere | Wednesday | Ochieno Pulton |
| 4. Mafuriko | Thursday | " |
| 5. Abakwana | Friday | Kizito Chweya |
| 6. Masaba Mema | Tuesday | " |
| **BUNGOMA DISTRICT** | | |
| **KANDUYI** | | |
| 1. Kimoi | Tuesday | Jared Wandete |
| 2. Makutano | Thursday | " |
| 3. Subila | | Lillian J Onkware |
| 4. Walala | | " |
| 5. Kitinda | Wednesday | Gregory Nalianya |
| 6. Khwamoka | Tuesday | " |
| 7. Muzabibu | Tuesday | Clement Waswa |

| | | |
|---|---|---|
| 8. Inyokha Elela | Thursday | " |
| **NALONDO** | | |
| 1. Ndilile | Tuesday | Richard Situma |
| 2. Bulala | Thursday | " |
| 3. Mapampano | Tuesday | Henry Mukongolo |
| 4. Makulukulu | Wednesday | Henry Mukongolo |
| **WEBUYE** | | |
| 1. Sinoko | Monday | John Muchende |
| 2. Khamoto | Tuesday | " |
| **CHWELE** | | |
| Khaka | Wednesday | Dan Orwa |
| Kimama | Thursday | " |
| **KAKAMEGA DISTRICT** | | |
| **LURAMBI** | | |
| 1. Esienyu Neshienyu | Monday | Arnest Maina |
| 2. Esokone | Wednesday | " |
| 3. Emuhanda | Wednesday | Ruth Apondi |
| 4. Maroon | Friday | " |
| 5. True vine | Wednesday | John Inganga |
| 6. Upadanisho | Friday | " |
| **NAVAKHOLO** | | |
| 1. Mentros | Wednesday | Pius Koko |
| 2. Mukhamba | Friday | |

## Annex 9. Lists of tomato information materials and recipients of the disseminated materials

### Tomato information materials

| | Title | Type | Organisation contacted/Source of materials/information |
|---|---|---|---|
| 1 | Farmers' Friends | Manual | NRI, PPRI (Zimbabwe), AfFORest (Zimbabwe), Imperial College, London |
| 2 | Helpful Dudus in the Shamba | Poster | NRI, PPRI (Zimbabwe), AfFORest (Zimbabwe), Imperial College, London |
| 3 | Wadudu Marafiki Mashambani | Poster | NRI, PPRI (Zimbabwe), AfFORest (Zimbabwe), Imperial College, London |
| 4 | Root-knot Nematodes (*Meloidogyne spp*) and their Management in Tomato Fields | Poster | CABI Africa Regional Centre |
| 5 | Underground menaces: Root-knot Nematodes | Leaflet | CABI Africa Regional Centre |
| 6 | Hatari Chini ya Ardhi: "Nematodes" wa Vifundo vya Mizzi | Leaflet | CABI Africa Regional Centre |
| 7 | Fuzuia Wadudu wa Nyanya | Leaflet | INADES Formation Tanzania/Zonal Research and Extension Liaison Office |
| 8 | Magonjwa ya Nyanya na Udhibiti Wake | Leaflet | INADES Formation Tanzania/Zonal Research and Extension Liaison Office |
| 9 | Integrated Vegetable Pest Management: Safe and sustainable protection of small-scale brassicas and tomatoes | Hand book | NRI, DFID-CPP |
| 10 | Accelerated uptake and impact pf CPP research outputs in Kenya, Project No. R8299: Information materials Disseminated (CD) | Resource CD | Produced under this project |

**Recipients of printed materials**

| | Name of Institution | Type of Institution | Town |
|---|---|---|---|
| 1. | Organic matter management network OMMN/ABLH | NGO | Kakamega |
| 2. | Anglican Church of Kenya Kakamega | Faith-based Organisation | Kakamega |
| 3. | District Secretariat Unit KAPP Coordinator | Government | Kakamega |
| 4. | District Agriculture Office Kakamega | Government | Kakamega |
| 5. | Provincial director of Agriculture | Government | Kakamega |
| 6. | District FFS Coordinator | Government | Kakamega |
| 7. | Resource project Kenya RPKN | NGO | Mbale |
| 8. | Kenya national Federation of Agricultural Producers, KENFAP | NGO | Kakamega |
| 9. | Kazi Mashambani Development project, KAMADEP | NGO | Kakamega |
| 10. | Kakamega FFS Network | CBO | Kakamega |
| 11. | Khasunire Sweet Potato group | CBO | Kakamega |
| 12. | CREADIS | NGO | Bungoma |
| 13. | Bungoma FFS Network | CBO | Bungoma |
| 14. | Kenya Maize Development Programme (KMDP) | NGO | Bungoma |
| 15. | SACRED AFRICA | NGO | Bungoma |
| 16. | Western Seed Company | Private Sector | Kitale |
| 17. | Anglican church of Kenya Bungoma | Faith-based Organisation | Kakamega |
| 18. | District Agriculture Office Bungoma | Government | Bungoma |
| 19. | District FFS Coordinator | Government | Bungoma |
| 20. | REFSO | NGO | Busia |
| 21. | Busia FTC | Government | Busia |
| 22. | Agro Farmers SHG | NGO | Nambale |

| | | | |
|---|---|---|---|
| 23. | ARDAP | NGO | Bar-ober |
| 24. | Busia FFS Network | CBO | Busia |
| 25. | District Agriculture Office<br>Busia | Government | Busia |
| 26. | District FFS Coordinator | Government | Busia |

**Recipients of the Resource CD**

| | **Name of Institution** | **Type** | **Region/Town** |
|---|---|---|---|
| 1. | Organic Matter Management Network<br>OMMN/ABLH | NGO | Kakamega |
| 2. | Anglican Church of Kenya<br>Kakamega | Faith –based Organisation | Kakamega |
| 3. | Bukura Agricultural college | Training | Bukura |
| 4. | District Secretariat Unit KAPP Coordinator | Government | Kakamega |
| 5. | District Agriculture Office<br>Kakamega | Government | Kakamega |
| 6. | Provincial director of Agriculture | Government | Kakamega |
| 7. | District FFS Coordinator | Government | Kakamega |
| 8. | Resource Project Kenya<br>RPK | NGO | Mbale |
| 9. | Kenya national federation of Agricultural producers, KENFAP | NGO | Kakamega |
| 10. | Kazi Mashambani Development project, KAMADEP | NGO | Kakamega |
| 11. | Kakamega FFS Network | CBO | Kakamega |
| 12. | CREADIS | NGO | Bungoma |
| 13. | Bungoma FFS Network | CBO | Bungoma |
| 14. | Kenya maize development programme (KMDP) | NGO | Bungoma |

| | | | |
|---|---|---|---|
| 15. | Kenya Agricultural commodity exchange (KACE) | Private company | Bungoma |
| 16. | SACRED AFRICA | NGO | Bungoma |
| 17. | Western seed Company | Company | Kitale |
| 18. | Anglican church of Kenya Bungoma | faith | Kakamega |
| 19. | AFC | Government | Kakamega |
| 20. | ACE AFRICA | NGO | Bungoma |
| 21. | AGMARK | Private Sector | Kisumu |
| 22. | District Agriculture Office Bungoma | Government | Bungoma |
| 23. | District FFS Coordinator | Government | Simon Kubasu P.O. box 33 Bungoma |
| 24. | REFSO | NGO | Michael odongo Busia town |
| 25. | International Christian Support Fund (ICS) | NGO | Busia |
| 26. | Christian Community Services (CCS) | Faith-based Organisation | Busia |
| 27. | Action Aid | NGO | Budalangi |
| 28. | World vision | NGO | Budalangi, Busia |
| 29. | Busia FTC | Government | Busia |
| 30. | KENFAP | NGO | Butula |
| 31. | ARDAP | CBO | Butula |
| 32. | Busia FFS Network | CBO | Busia |
| 33. | District Agriculture Office Busia | Government | Busia |
| 34. | District FFS Coordinator | Government | Busia |
| 35. | FAO IPPM FFS Busia Uganda | Govt. Project funded by FAO/UNDP | Busia Uganda |
| 36. | PFI/FFS Project Coast Region | Govt. Project funded by FAO/UNDP | Mombasa |

| | | | |
|---|---|---|---|
| 37. | PFI/FFS Project<br>Eastern Region | Govt. Project funded by FAO/UNDP | Eastern region |
| 38. | PFI/FFS Project<br>Rift Valley region | Govt. Project funded by FAO/UNDP | Rift Valley region |
| 39. | FAO IPPM FFS<br>Tanzania | Govt. Project funded by FAO/UNDP | Dar-es-Salaam |
| 40. | FAO IPPM FFS<br>Uganda | Govt. Project funded by FAO/UNDP | Kampala |
| 41. | FAO Regional Office for Africa | Govt. Project funded by FAO/UNDP | Accra |
| 42. | FAO Rome | International organization | Rome |
| 43. | FAO Rome | International organization | Rome |
| 44. | FAO IPPM FFS<br>Kenya | Govt. Project funded by FAO/UNDP | Kakamega |
| 45. | Crop Protection Program, KARI-NAL | Government | Nairobi |
| 46. | Cereal Growers Association (CGA) | NGO | Nairobi |
| 47. | Ministry of Agriculture Butere Division | Government | Butere |
| 48. | APPROTEC | NGO | Kisumu |
| 49. | KARI-Kakamega | Govt. | Kakamega |
| 50. | ACTION AID Kenya | NGO | Nairobi |
| 51. | Plan Kenya | NGO | Embu |
| | Kenya National Farmers Union (KNU+FU) | Private Sector | Nairobi |
| | Kenya Agricultural Commodity Exchange (KACE) Ltd | Private Sector | Nairobi, |
| 52. | Sustainable Agriculture Community Development Programme | NGO | Thika |

| | | | |
|---|---|---|---|
| 53. | CARE Kenya | NGO | Nairobi |
| 54. | Catholic Relief Services (CRS) | NGO | Nairobi |
| 55. | Association for Better Land Husbandry (ABLH) | NGO | Nairobi |
| 56. | Environmentalistes Sans Frontieres (ESF) | NGO | Nairobi |
| 57. | Resources Oriented Development Initiatives (RODI Kenya) | NGO | Ruiru |
| 58. | Kenya Agricultural Research Institute (KARI) | Govt./ Collaborator (Information source) | Nairobi |
| 59. | Kenya Agricultural Research Institute (KARI) | Govt./ Collaborator (Information source) | Machakos |
| 60. | District Agricultural Officer (DAO) Machakos | Government | P. O. Box 27, Machakos |
| 61. | CABI International Africa Regional Centre **(4 copies)** | International Research Organisation | Nairobi |
| 62. | Crop Protection Programme (CPP) DFID **(2 copies)** | Donor | London (UK) |
| 63. | Agricultural Information Resource Centre | Govt. | Nairobi |
| 64. | DFID Crop Protection Programme (CPP) | Donor | London (UK) |
| 65. | Natural Resources Institute (NRI) University of Greenwich | Research Inst./ Collaborator (Information source) | London (UK) |
| 66. | Plant Protection Research Institute (PPRI) | Research Inst./ Collaborator (Information source) | Harare, Zimbabwe |
| 67. | AfFOResT | NGO/ | Harare, Zimbabwe |

| | | | |
|---|---|---|---|
| | | Collaborator (Information source) | |
| 68. | Dept. of Biology Imperial College | Research Inst./ Collaborator (Information source) | London, UK |
| 69. | DFID Crop Post Harvest Programme (CPHP) | Donor | London, UK |
| 70. | International Maize and Wheat Improvement Centre (CIMMYT) | Research Inst./ Collaborator (Information source) | Nairobi |
| 71. | Eastern and Central Africa Bean Research Network (ECABREN) | Research Network/ Collaborator (Information source) | Arusha |
| 72. | International Centre of Insect Physiology and Ecology (ICIPE) | International Research organisation | Nairobi |
| 73. | International Centre for Research in the Semi-Arid Tropics (ICRISAT) | International Research Organisation | Nairobi |
| 74. | AT Uganda Limited | NGO | Kampala |
| 75. | Uganda National Farmers Federation | Private Sector | Kampala, Uganda |
| 76. | CARITAS Kampala | NGO | Kampala |
| 77. | Sengerema Multi-Purpose Community Telecentre | NGO | Mwanza |
| 78. | FADECO | NGO | Karagwe-Kagera Region |
| 79. | Tanzania Commission for Science & Technology (COSTEC) | Govt. | Dar-es-Salaam |
| 80. | National Agricultural Advisory Services (NAADS) | Govt. | Kampala |

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| 81. | National Agricultural Research Organisation (NARO) | Govt. | Kampala |
| 82. | Volunteer Efforts for Development Concerns (VEDCO) | NGO | Kampala |
| 83. | Nakaseke Multi-Purpose Community Telecentre | Telecentre (NGO) | Nakaseke, Uganda |
| 84. | IFAD/FAO IPPM FFS Kagera, Tanzania | Govt. | Dar es Salaam |
| 85. | IFAD/FAO IPPM FFS Soroti, Uganda | Govt. Project funded by FAO | Soroti, Uganda |
| 86. | Tanzania Plantation & Agriculture Workers Union (TPAWU) | NGO | Dar-es- Salaam |
| 87. | Participants at stakeholder workshop on Improving The Productivity of Smallholder Farmers in Southern Africa, Harare, Zimbabwe (8 copies) | Various - Govt, NGOs, Donors | Harare and various regions of Southern Africa |