Crop Protection Programme

Promoting adoption of integrated pest management in vegetable production

R8341 (ZA0059)

FINAL TECHNICAL REPORT

1 September 2003 -31 March 2005

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Date FTR completed 29 March 2005

"This publication is an output from a research project funded by the United Kingdom Department for International Development for the benefit of developing countries. (Crop Protection Programme R8341) The views expressed are not necessarily those of DFID".

Executive summary

This project focussed on dissemination of information on vegetable pest management, including that generated by projects in the Crop Protection Programme. It developed training materials and piloted an effective system to disseminate knowledge and skills, via a two stage training programme. The project objective was to enable farmers to use IPM methods to grow safe and healthy crops in a profitable and sustainable way. It was achieved by creating a mixture of information transfer materials and then using these as the basis for carrying out a series of training courses.

Horticulture provides employment for around 2m people in Kenya (Kariuki 2003) but there is scope for expansion and improvement. Many horticultural crops are susceptible to pests and diseases, and farmers often rely on chemical sprays to maintain and increase supply to an increasing urban population. They want easy, rapid and reliable crop protection but a common perception is that pesticides are the modern (and hence desirable) solution for successful farming. This training and dissemination-based project explored ways to wean growers away from existing practices that include overuse of pesticides and wrong choices of product leading to poor efficacy. Consequences include operator exposure with associated health risks, contamination of the environment and loss of useful biodiversity. Over reliance on pesticides also leads to secondary problems such as higher inputs costs, residues in produce, build up of resistance and poor control of pests.

It was recognised that the mix of traditional and newer control techniques, important in integrated pest management (IPM) can reduce reliance on pesticides and improve sustainability, but there was little appropriate and scientifically sound information, advice or training material relating to IPM. The project addressed this issue.

While some of the more benign pest management technologies promoted by the project have been developed or improved by DFID/CPP-funded research projects, other innovations came from the commercial horticultural sector. The mix of beneficial genetic, cultural, biological and chemical pest management practices that could enable horticulture to achieve greater developmental impact needed to be promoted more effectively.

Information was incorporated into a series of training aids comprising a Trainer's Manual, a comprehensive training kit and various targeted dissemination resources. These kits provided the foundation for a two level course design that enabled the project to train 17 specially chosen trainers, who themselves trained over 500 farmers. Monitoring and feedback comments showed that the project achieved its objectives, and helped to identify needs for the future.

Background

The *Purpose* of the Peri-urban Production System is to bring benefits to poor people by application of new knowledge on crop protection. This was addressed through promotion of pro-poor strategies to reduce the impact of key pests and diseases, improve yield and reduce pesticide hazards. The production system is characterised by intensive land use, often high and excessive use of pesticides, and typically produces high value crops such as vegetables. There is an urgent need to manage pests more effectively through the use of alternative technologies, enhancing natural regulatory processes in the cropping ecosystem, as well as the safer and more judicious use of pesticides.

This project was a collaboration between members of the Sustainable Agriculture Group in NRI, who led the project, and personnel from the Real IPM Company (Kenya). It was one of three commissioned by the CPP in 2003 (see Fig 1 below) to initiate dissemination of outputs from previous research and ensure that the beneficial impact of the work is maximised.

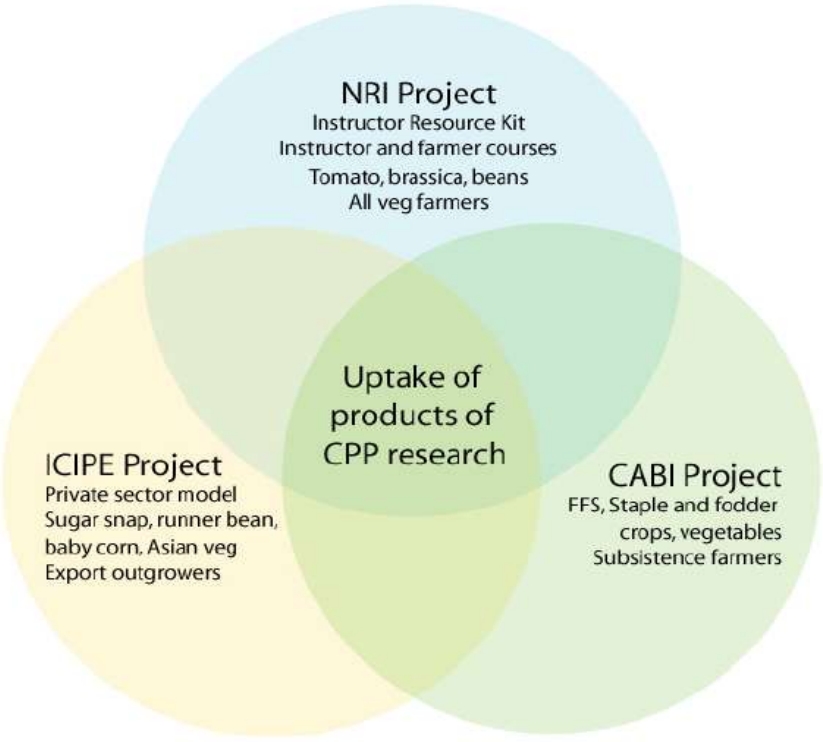


Figure 1. Synergies and distinctions between three sister CPP promotional projects based in Kenya

Horticultural crops – both for local consumption and export – are important in Kenya, They are recognized for their health and nutritional benefits and cash income. Horticulture also provides employment for around 2 million people in Kenya (Kariuki 2003). One tenth of vegetables in Kenya are grown for export. The total area under horticultural crops is estimated at 245,920 ha of which approximately 100,000 ha is under vegetable production (HCDA 2002).

Production of vegetables in Kenya, especially for the expanding domestic market, is still limited by major pest and disease-related problems and lack of information and knowledge of improved technologies to address these major constraints.

The majority of smallholder vegetable farmers rely heavily on spraying pesticides to reduce the damage from pests and diseases. These farmers pay little attention to many of the cultural pest management methods or the potential role of natural enemies. Farmers want easy, rapid and reliable crop protection but a common perception is that pesticides are the modern (and hence desirable) solution for successful farming. Pesticides are marketed aggressively, but there is little objective, appropriate and scientifically sound information, advice and training on how to minimise their use or how to use them sustainably. The cost of pesticides absorbs a significant proportion of farmers' income but without information on cultural and biological technologies, the farmer is faced with few alternatives. In fact the mixture of traditional and newer techniques that comprise integrated pest management (IPM) can reduce reliance on pesticides and improve sustainability. The project set out to develop tools to promote an understanding of IPM and encourage its adoption.

Further challenges exist for growers in the region, especially those who export crops to Europe, where many pesticides are being withdrawn as standards governing production and handling of fresh produce become stricter. Fewer pesticides and very low permitted residue levels will give farmers no choice but to adapt by more rational use of carefully chosen pesticides, integrated with use of alternative pest management strategies. This pressure for change coincided with the aims of the project and probably made stakeholders much more open to new ideas.

Project Purpose

Under the wider heading of 'Promotion of pro-poor strategies to reduce impact of key pests and diseases, improve yield and reduce pesticide hazards in peri-urban systems', the primary project purpose was to promote improved methods for the control of pests and diseases affecting the quality and production levels of vegetables in Kenya, both for domestic and export markets. A secondary purpose was to develop and field test a training strategy and resources, designed to achieve the primary purpose.

Research activities and Outputs

In planning how to reach a large number of farmers it was necessary to use a two layer training strategy as a multiplier. We prepared and provided a train the trainer (ToT) course and Trainer's Resource Kit to 17 selected people who were already associated with the industry. Then these new trainers carried out their own level 2 courses in which around 20 farmers per day were trained. The people to be trained intensively on the level 1 ToT course needed to acquire a wider range of knowledge than they would pass on to

farmers. In this way they would have sufficient information and confidence to train farmers effectively and be able to respond to their questions.

The following 4 activities and outputs are presented in accordance with the original logframe structure.

Output 1. A new vegetable IPM Instructor's Resource Kit to be used by IPM Instructors in conjunction with existing dissemination resources such as handbooks and posters. It will contain guidance on course planning and delivery of sessions, practical training exercises, interactive games and graphics for projection via overhead projector or for distribution as handouts. The manual will cover tomato, brassicas and green beans.

Output 2. A team of trained vegetable IPM instructors taken from the private, government and NGO sectors.

Output 3. Target farmers trained in, and adopting vegetable IPM techniques (incorporating technologies developed under CPP research): at least 500 in total, including some outgrowers and some small scale domestic growers.

Output 4. Options for further dissemination identified and impact assessed.

All outputs were delivered on schedule through activities as detailed below:

Output 1:A new vegetable IPM Instructor's Resource Kit to be used by IPM Instructors

Activity 1.1 Curriculum development for Instructor-level training and for growers

Curriculum development within the training manual was at two main levels; the detailed and relatively advanced material (level 1) for the project staff instructors to present to the trainers over the six day ‘train the trainers’ course, and the less complex information (level 2) that the trainers would use when they themselves trained farmers on their short courses of 1 to 2 days.

Within the manual, the level 1 curriculum for the trainers needed to provide information on issues at a more detailed level than they would be likely to need for their subsequent farmer training. These detailed modules enabled trainers to understand the issues more fully, providing confidence to respond to feedback and questions the farmers might bring up, but also gave a more fundamental understanding of the wider technical and philosophical pest management principles.

The topics to be covered at the two levels were developed on the basis of lessons learned and needs assessments in Kenya and Zimbabwe over the last 8 years. See Appendix 1 for the original module plan.

Activity 1.2 Drafting and producing the Instructor's Resource Kit.

A Vegetable IPM Trainer's Resource Kit, housed in a strong, lockable pilot's case, was developed and supplied to the 17 trainee IPM Trainers. The core of the kit is a Trainer's Manual covering programmes at two levels; a training of trainers course and a farmer training course. The manual contains guidance on course planning and delivery of sessions, practical training exercises, interactive games and materials that can be used in courses or issued as handouts. It focuses on pest management in tomato, brassicas and green beans – see Appendix 2 for the table of contents of the Trainer's Manual. We considered it useful within the manual to provide session summaries for the ToT course itself, so that this primary course could be replicated in the future if needed, as well as session plans and summaries for farmer training, and step by step exercise sheets for both levels. The manual also included reference materials, which consisted of illustrated background information that could not be covered within lessons, such as lists of resistant varieties and additional worked examples. A4 sized copies of the informational pest management cartoons were also put into the training manual with the intention that they be used as themes for farmer lessons. The cartoons can be removed and photocopied as required.

Kits also included posters, books, calendars, calculators, spray equipment and a hand len - see Appendix 3 for a list of contents. A feedback form asked trainers to rank the usefulness of the different components following their farmer training. Usefulness of the individual components was rated very highly - Appendix 4 summarises their responses.

Activity 1.3 Drafting and producing supplementary dissemination resources.

Several supplementary dissemination resource materials were produced, including an IPM calendar and two posters that were translated into Kiswahili. The images for the calendar were based on pest management themes considered by the project team to the key issues in IPM. This and the posters were printed in Nairobi. The planned print run of 1000 was doubled following negotiations with the printer. Having 2000 of each resource enabled them to be widely distributed to stakeholders who included the two other CPP dissemination projects on IPM promotion (through CABI and ICIPE) and many horticultural and export companies, outgrowers and organisations with a training mandate in the horticultural industry. All of the farmers (>500) trained by the project received a calendar of IPM and at least two posters.

The images for the calendar were drawn by Gado, the cartoonist from the Kenya Daily Nation newspaper, based on themes developed by the project team. See Appendix 5 for the images and captions in English. The process consisted of identification of key messages then developing ideas for visualisation of these messages. These were documented and then

discussed in a preliminary meeting with the artist. Several alternative visualisations were proposed and discussed, and these ideas were taken away by the artist, who later prepared and sent rough draft images by email to UK for editorial assessment. Suggested changes were incorporated by the artist who sent back re-worked images. A second meeting involving the artist and project team provided an opportunity for final adjustments before the images were finalised. The last stage in development was for colour to be added by the artist. When the final coloured versions were received, the captions were written and translated. Both languages were included in the calendar. Final images and other material were then given to the printer, who produced 'roughs'.

A series of further meetings with the printer allowed errors to be corrected and layout improved before the final print run took place. This process of correcting drafts was foreseen, but became more time-consuming than anticipated. It was needed for all the printed materials.

In meetings with staff in sister CPP dissemination projects it became clear that additional copies of the printed resources would be welcomed, so the original print run of 1000 copies of each was doubled to 2000. This was achieved within the existing project budget after negotiations with the printer (Majestic, Nairobi) led to very competitive rates being agreed.

The additional 1000 copies of each allowed very wide dissemination of both the posters and calendars as detailed in Appendix 6.

Activity 1.4 Instructor feedback workshop.

A two-day workshop was held to learn from the experiences of the Instructors so that the training materials and techniques can be further improved. The full report from this workshop is in '*Report on visit to Kenya to observe secondary training and hold a Post-training Workshop, November 9th to 17th 2004'* which contains detailed feedback from both farmers and trainers, including the following comments.

From trainers (after they had carried out secondary training)

- *"I feel like quite a trainer"*
- *"Training went very well and farmers were able to appreciate scouting, reading labels, nozzle types, proper land preparations, use of hybrid seeds, use of manure, mulching and crop rotation, etc."*
- *"Use of cartoons is a unique idea that contributes to refreshing of the mind and grasp concepts better"*
- *"The calendars as a reward to farmers is good because they are a summary of IPM concept and are things to look at every day"*

From farmers

- *"We are better than we were"*
- *"Calendar has put ideas into heads – to understand IPM"*
- *"I would have sprayed the 'farmer's friends before the course"*
- *"those farmers who did not attend will have missed a lot"*

Output 2. Vegetable IPM instructors trained

Activity 2.1. Instructor training course.

This was a 6 day course training 16 appropriately qualified and experienced personnel selected by invitation. Efforts were be made to ensure a gender balance and to select people employed by NGOs, Government, parastatals, privates companies or development agencies who have direct access to, and a stated aim to train farmers – see Appendix 7 for a participant list and Appendix 8 for the course programme. Trainees were issued with a certificate of attendance.

Figure 2. Group photograph of trainers and trainees at the primary ToT course

More detail can be found in "Report on the training course held in Juja, Thika, Kenya, at the African Institute for Capacity Development (AICAD) training facility in Jomo Kenyatta University of Agriculture and Technology (JKUAT), from 4th to 9th October 2004", which includes the feedback from an anonymous course assessment form completed by the trainees, on how they think the course was run and how useful the knowledge and training techniques would be. This anonymous survey (see Appendix 9) indicated a high level of satisfaction.

Output 3. Vegetable farmers trained in and adopting IPM

Activity 3.1 Farmer training courses.

Each trainer held 2 one-day vegetable IPM courses with around 20 participating farmers, details given below. Throughout the ToT course the need had been stressed to involve farmers, rather than standing and talking to them. This was emphasised during the teaching practice sessions which the trainees carried out within the course.

Table 1. Farmer training course dates.

Name	Organisation	Ist	2nd
John D M Ndungu	Sunripe (1976) Ltd	after 16 Nov	
Benson Murage Maina	MOOF Africa	03-Nov	04-Nov
Jacob Otieno On'gow	Animal Draft Power Programme	09-Nov	10-Nov
Peter Kibe Waweru	Osho Chemicals Industries Ltd	05-Nov	06-Nov
Lydia Njuguna	HDC - Fintrac	11-Nov	12-Nov
Ben K Mutuku	Serengeti Fresh Ltd	10-Nov	11-Nov
Patrick Ukumu Mulumu	Vegpro (K) Ltd	26-Oct	28-Oct
Fredrick Ochieng	HDC - Fintrac	08-Nov	09-Nov
George Kariuki	Hygrotech (EA) Ltd	27-Oct	28-Oct
Grace Anyango Oloo	HCDA	02-Nov	03-Nov
Regina Wacera Kabiru	Agribusiness	25-Oct	26-Oct
Emmanuel Mutua Kavumbu	Reach the Children	03-Nov	04-Nov
Jefferson K Muasya	Reach the Children	02-Nov	03-Nov
Sharack Karuri Wanderi	EAGA	28-Oct	29-Oct
Bernard Nthiwa Mulei	World Vison Kenya	11-Nov	12-Nov
Wilson Mwangi Kimwea	SACDEP-Kenya	09-Nov	10-Nov

Project personnel visited around a third of these courses to see how they were being carried out and judge the level of participation by farmers (a measure of the training proficiency). Our impression of the farmers' courses was that they were competently taught and very well received Full details of the secondary courses are in *Report on visit to Kenya to observe secondary training and hold a Post-training Workshop, November 9th to 17th 2004*

See Appendix 10 for a summary of Trainer feedback from these courses.

Activity 3.2 Farmer feedback

An anonymous form completed by farmers at the end of their training assessed their perception of the utility of the course and provided an opportunity to identify any outstanding gaps and gather any comments. Their training feedback responses are given in detail in Appendix 11. Their comments commonly included that training had been useful (but too short) and that IPM was going to help them with; decision making, scouting, spraying, crop rotation and the value of resistant varieties.

Output 4. Options for further dissemination identified and impact assessed

Activity 4.1. Impact assessment and planning for the future.

During the training workshop a discussion was held on how to scale up the training. At least half of the trainers have a training role within their jobs and this will help to spread the information very much more widely, particularly as their training technique improved during the ToT course. The pressure on outgrower farmers to comply with European residue standards and production standards is a stimulus and a reason why there is a demand for IPM practices to be adopted, and why the information found such a ready audience.

The trainees represented among the trainers included NGOs such as Reach the Children, Sustainable Agriculture Community Development Programme (SACDEP) and World Vision are in a particularly strong position to reach rural farmers. Others working for companies such as East Africa Growers, Serengeti Fresh, Sunripe, Vegpro and Agribusiness Kenya have direct linkages with outgrowers and a mandate to adopt improved and compliant pest management practices.

The additional copies of the printed materials allowed them to be distributed much more widely than originally planned including exporters and NGO groups as well as the two sister CPP dissemination projects led by CABI-ARC and ICIPE (see Appendix 6). This will strengthen their capacity to disseminate CPP-generated technologies and messages, and will broaden the reach of this project.

Several comments during the workshop indicated the hunger for further printed resource material, particularly suitable for farmers. Several of these have informed the extension phase (a 1 year addition from April 2005 that has now been agreed for funding). These include:

- Vegetable IPM Farmer Pocket Book
- IPM field cards.
- Farmer Trainer course programme and briefing sheets.

Several impact assessment visits were made to farmers who had attended IPM courses run by PIPM Trainers 2-3 months previously. The aim was not a systematic survey, more an informal appraisal of the success of the training

programme so far and an opportunity to gather information that would inform the design and approach of the follow-on phase of the project to 2006. A questionnaire was not used, and we did not take notes during discussions, with the aim of maintaining an informal dialogue and avoiding the impression of testing farmers or evaluating individual trainers' performances.

However we had an agreed series of questions in mind as below, and noted the pooled feedback from these and other questions immediately afterwards.

- What topics were you trained in (to help them cast their minds back and also to verify that the Trainers had followed the suggested course content)
- What parts were useful and what were not useful (to assess the relevance of the course content and materials)
- What have you changed in your farming since the course (the bottom line)
- Have you passed the knowledge and skills to other farmers (to gauge secondary impact)
- What other things do you need to help you train others (to identify resource needs)
- What is the best way to bring IPM knowledge and skills to farmers (to assess perception of effectiveness of media used and explore whether there are better alternatives)

Further details of the findings are shown in Appendix 12 but in summary, farmers felt that face to face practical training was the only effective way to provide guidance on IPM methods, and there were instances where farmers had passed the training on either formally or informally to others within or outside their farmer groups. The principle areas of improvement in their practices following the training were: scouting rather than calendar spraying; identifying, appreciating and encouraging natural enemies; choosing more appropriate pesticies, calibrating properly and spraying more safely.

During the course of these impact assessment visits, the merits of the different sectors as 'homes' for the training skills were considered. In addition to being technically competent, an effective trainer needs various other attributes. For example, he/she needs to have an incentive, to be available, to have access to farmers (transport and farmer contacts) and have no powerful ulterior motive that might subvert the IPM messages. The different sectors are ranked in the table shown in appendix 12 With private sector input suppliers and NGO trainers seeming the most appropriate conduits for IPM messages – each with their own specific advantages and disadvantages.

Contribution of outputs to developmental impact

The project goal was to promote improved methods for the control of pests and diseases affecting the quality and production levels of vegetables in Kenya, both for domestic and export markets.

The planned outputs were achieved, and in the case of the printed material,

numbers exceeded those planned. The project has contributed to the information and capacity to respond to the groundswell of food safety, human safety and environmental protection, measures that are increasingly affecting the horticultural industry. This industry, already vitally important to the region by providing food, employment and foreign exchange, could expand further, but one of the limiting factors is the ability to control pests safely and sustainably. This project has helped to address this directly on a small scale and indirectly on a larger and longer term scale.

DFID supports long-term programmes to help tackle the underlying causes of poverty. Horticultural farming can help to do this provided that it is done in a way which does not threaten the future. While the 500 or so farmers whom the project reached are only a small proportion of the production base that consists of many thousands, the training manual will be a major resource in the longer term. Used to carry out courses at several levels we expect the numbers trained to eventually far exceed the sixteen trainers already reached by the project. Thus the project has contributed to the wider objective, that is Promotion of pro-poor strategies to reduce impact of key pests and diseases, improve yield and reduce pesticide hazards in peri-urban systems',

Project outputs align with five of the eight millenium development goals agreed by experts from the United Nations Secretariat and IMF, OECD and the World Bank. The knowledge and information disseminated by the project will help to improve health by better nutrition and empower women who wish to grow vegetables (Goals 5 and 3respectively). More specifically it will help in particular with goals 1, 7 and 8 (below) by providing jobs that reduce rural poverty and promote international trade partnerships in a way that allows horticulture to go forward with minimal environmental damage -Goal 1, Eradicate extreme poverty and hunger. Goal 7, Ensure environmental sustainability. Goal 8, Develop a global partnership for development.

A one year project extension to the project has now been approved. Within this period we plan to respond to some of the comments by trainers and farmers and to expand the portfolio of resources. One particular request was for handouts that trainers and extensionists can pass on to farmers, so central to the plans for the short term future is the preparation of printed materials aimed at farmers that embrace a range of integrated pest management information. The intention is that these will be made available to farmers by being cheaply photocopied. Getting the balance right between quality and impact of dissemination materials and the reach that the project can afford will be a challenge.

Hans Dobson, Natural Resources Institute, 29 March 2005

APPENDICES .

Appendix 1. Original design for modules at two levels

	Training Trainers	Training farmers
T1	What is IPM	**F1** What is IPM
T2	Hygiene and healthy soil	
T3	Choosing varieties	
T4	Recognition and control of brassica pests and diseases	**F2** Recognizing and controlling pests, diseases and weeds
T5	Recognition and control of tomato pests and diseases	
T6	Control of weeds	
T7	Recognition and control of bean pests and diseases	
T8	Recognition of natural enemies	**F3** Recognizing and encouraging natural enemies
T9	Encouragement of natural enemies	
T10	Scouting	**F4** When to use pesti-cides and choice of product
T11	Putting recognition and scouting into practice	
T12	Toxicity, safety and first aid	**F5** Safe pesticide use and First Aid
T13	Selective pesticide application	**F6** How to use pesticides (dose, technique, residues)
T14	Calibration and residue implications	
T15	Spraying techniques	
T16	Putting pesticide use into practice	
T17	Planning and targeting training	Not applicable
T18	Training techniques	
T19	Visual aids	
T20	Evaluation of training	
T21	Putting training into practice	

Appendix 2. Trainer Manual Contents

Appendix 3. List of training equipment issued to trainees in their Training Resource Kit

Leather pilot case
Training manual with:
- reference material
- session plans
- session summaries
- farmer lessons, see index in appendix
- full set of 16 new A4 IPM cartoons.

Books
- Vegetable Pest Management Book
- Farmers' Friends book
- Bean IPM book
- Calendar x 5

Posters:
Pesticide use 1
Pesticide use 2
Pesticide use 3
Winding Rd (English) x 1
Winding Rd (Swahili) x 25
Tomato and cabbage pests (Swahili) x 25
Farmers' Friends x 1
IPM ladybird x 1

General training resources
Calculator
Measuring cylinder
Tool kit (adjustable spanner, cross-head screwdriver, flat blade screwdriver)
Hand lens
Folder – 4 ring + coloured divider
Writing tools (pen, felt tips x 4, pencil, sharpener)
Clipboard
Notepad
Insect sample pot
Petri dish plus lid x 2
Selection of spray nozzles (hollow cone x 2, deflector, flat fan)

Personal protective equipment
- Overall
- Hat
- Gloves
- Goggles
- Face mask

Appendix 4. Usefulness ratings for items in the Training Resource Kits (11 responses)

Ratings: 1= not useful, 2= slightly useful, 3= definitely useful, 4= very useful

Item	Used Yes or No		Rating			
	Yes	No	1	2	3	4
Lockable pilot case	100%				2	9
Training manual						
reference material	100%				5	6
session plans	100%				6	4
session summaries	100%				7	4
farmer lessons	100%				6	5
16 A36% IPM cartoons.	100%				3	8
Equipment						
Calculator	100%			1	6	3
Measuring cylinder	100%				7	4
Tool kit (adjustable spanner, cross-head screwdriver, flat blade screwdriver)	36%	64%	2	3	3	
Hand lens	100%				6	6
Selection of spray nozzles (hollow cone x 2, deflector, flat fan)	100%				6	4
Personal protective equipment (overall, hat, gloves, goggles, face mask	100%				5	6
Insect sample pot	64%	36%		3	5	1
Petri dish plus lid	64%	36%		2	6	1
Writing tools (pen, felt tips x 36%, pencil, sharpener)	100%				5	6
Clipboard	100%				8	3
Notepad	91%	9			5	5
Books:						
Vegetable Pest Management Book	100%				1	10
Farmers' Friends book	100%					11
Bean IPM book	91%	9%			1	10

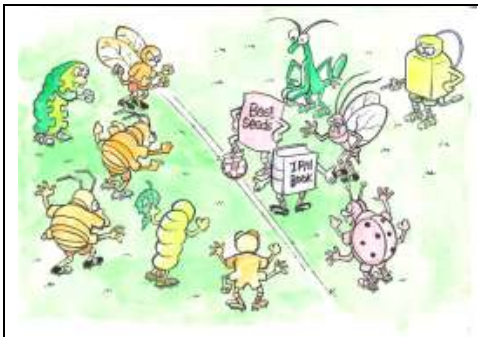
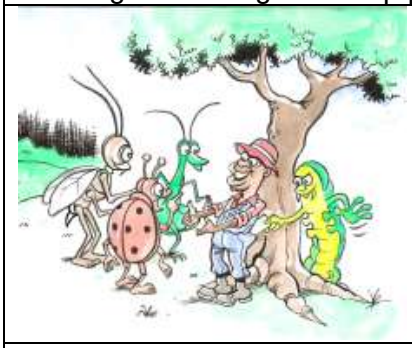
Ratings: 1= not useful, 2= slightly useful, 3= definitely useful, 4= very useful

Item	Used Yes or No		Rating			
	Yes	No	1	2	3	4
Posters and other dissemination resources:						
Pesticide use posters	100%				1	10
Spraying X 1	100%				5	7
Calibration X 1	100%				5	7
Winding Rd (Swahili)	100%			2	5	4
Tomato and cabbage pests (Swahili)	91%	9%		2	5	3
Farmers' Friends x 1	100%				4	8
IPM ladybird x 1	91%	9%		2	3	7
IPM cartoon calendar	100%					11
Laminated flash cards						
Pests	100%				2	10
Diseases	100%				4	8
natural enemies	100%				3	9

Ratings: 1= not useful, 2= slightly useful, 3= definitely useful, 4= very useful

Appendix 5. IPM calendar cartoons

	
Don't forget that pesticides are poisonous – take great care when using them.	Crop diseases can spread to other plants
	
Scouting is detective work – Inspect the crop very carefully before deciding whether to spray	Some crop varieties are resistant to pests and diseases and remain strong while others become sick.
	
Flowering plants provide food for Farmers Friends and will attract them	Produce may be dangerous if it is harvested before the Pre Harvest Interval PHI
	
Training is not always successful – people may need to practice, not just be told	IPM helps families to be healthy, wealthy and happy.

	
The IPM team has many star players for the tough match against crop pests	Calendar spraying is like shooting in the dark – only the bullet salesman benefits
	
Pests can rob you, but some insects are friends	Simple experiments help farmers choose better crop varieties for their farm
	
Spraying into the wind is dangerous	Pests will be frightened of well maintained sprayers
	
Don‘t use more spray than you need	Weeds are unwelcome visitors, taking food from the crop

Appendix 6. Distribution list for additional project training resources

Recipient	Calendar	Winding road poster	Tomato and brassica P&D poster
CPP	26	2	2
CABI	500	200	200
ICIPE	100	100	100
KARI	75	50	50
FPEAK Sicily Kariuki	3	3	2
HDC Steve New	7	5	5
K. Billing BSMDP	2	-	-
DFID Nairobi - Rachel Lambert	5	2	2
BDS David Knopp	5	5	5
HARDI	5	3	3
HCDA	25*	50	50
PCPB Dr Gachanja	5	5	5
TPRI Tanzania Alcherous Rwazo (Head)	1	1	1
AVRDC Arusha Tanzania, Dr Chadha	1	1	1
KEPHIS	5	5	5
Sunripe	10+1	1	1
Vegpro	2	2	2
EAG	23	2	2
Kakuzi Richard Collins	1	-	-
Gatanga Farmers Group	60	-	-
Bidi Farmers Group	5		
KHE	3	2	2
Everest	2	2	2
Woni Jane Mutiso			
EA Seeds	5	5	5
Simlaw Seeds	5	5	5
Kenya Highland seeds	5	-	-
INDU Christian Benard	10	3	3
GADO	1	-	-
AICAD	5	-	-
Regina Seeds	3	2	2
Kilihotex	3	3	3
Kilihotex	3	3	3
East Africa Growers	3	3	3
K.H.E	3	3	3
Magana Flowers	3	3	3
Gomba Estate	3	3	3
Homegrown (K) Ltd	3	3	3
Wamu Investments	3	3	3
Hillfarm Fresh	3	3	3

Produce Ltd			
Goodwood Properties Ltd	3	3	3
Greenlands Agroproducers Ltd	3	3	3
Homegrown	25	5	5
Woni Exporters Ltd	3	3	3
Myner Exporters Ltd	3	3	3
Tambuzi Ltd	3	3	3
Reach the Children	3	3	3
Sunripe (1976) Ltd	3	3	3
Shalimar Flowers	3	3	3
Avenue Fresh Produce	3	3	3
Tambuzi Ltd	3	3	3
Reach the Children Ltd	3	3	3
Myner Exporters Ltd	3	3	3
Homegrown (K) Ltd	3	3	3
Shalimar Flowers Ltd	3	3	3
HillFarm Fresh Produce Ltd	3	3	3
K.H.E Ltd	3	3	3
Gomba Estates Ltd	3	3	3
Magana Flowers (K) Ltd	3	3	3
Kilihortex Ltd	3	3	3
Wamu Investment Ltd	3	3	3
Sunfresh Fresh Produce Ltd	3	3	3
Greenlands Ltd	3	3	3
Myner Exporters Ltd	3	3	3
Goodwood Properties Ltd	3	3	3
Kandia FPs	3	3	3
Woni Veg-fru Ltd	3	3	3
Homegrown K Ltd	5	5	5
Sunripe (1976) Ltd	5	5	5
KHE (1977) Ltd	5	5	5
Vitacress K. Ltd	5	5	5
Green land agro producers	5	5	5
East African Growers Association Ltd	5	5	5
Magana Flowers Kenya Ltd	5	5	5
Kandia fresh produce supplies ltd	5	5	5
Tambuzi Ltd	5	5	5
Myner Exporters	5	5	5
Gomba Farm	5	5	5
Wamu	5	5	5

Green land agro producers	5	5	5
Woni veg-fru exp. Ltd	5	5	5
Sunripe (1976) Ltd	30	30	30
MOOF Africa	30	30	30
Animal Draft Power Programme	30	30	30
Osho Chemicals Industries Ltd	30	30	30
HDC - Fintrac	30	30	30
Serengeti Fresh Ltd	30	30	30
Vegpro (K) Ltd	30	30	30
HDC - Fintrac	30	30	30
Hygrotech (EA) Ltd	30	30	30
HCDA	30	30	30
Agribusiness	30	30	30
Reach the Children	30	30	30
Reach the Children	30	30	30
EAGA	30	30	30
World Vision Kenya	30	30	30
SACDEP-Kenya	30	30	30
Care Kenya	30	30	30
Myner Exporters Ltd	5	5	5
Additional resources requested by trainers at the workshop*	50	250	250
Total	799	947	947

Notes:
This list summarises distribution of some of the resources but is not comprehensive as several other individual organisational requests have been met but not recorded. Additional resources were distributed to participants on the Project course, and at least three courses organised as part of the EU Pesticides Initiative Programme. Large numbers were distributed to the two sister CPP promotion projects in the Kenya project cluster, led by CABI and ICIPE, and to KARI. Some groups such as HCDA had requested further copies, so the list is only provisional.

Appendix 7. Participants and contact details - Promoting IPM training of trainers course 4 – 9 October 2004, AICAD, Juja, Kenya

Name	Employer	Address	Telephone/fax	Email
John D M Ndungu	Sunripe (1976) Ltd	P O Box 41852 – 00300 JKIA, Nairobi	020 825232/4 FAX 020 352266	farms@sunripe.co.ke
Benson Murage Maina	MOOF Africa	P O Box 1053, Nanyuki	061 31187 0733 664103/0721 403294	moofafrica@todays.co.ke
Jacob Otieno On'gow	Animal Draft Power Programme	P O Box 534 – 40300, Homa Bay	059 22490/ 0733 876839 Fax 059 22598	anidrapo@yahoo.com
Peter Kibe Waweru	Osho Chemicals Industries Ltd	P O Box 49916, 00100, Nairobi	020 532939/650195/6/8 0722 790514 FAX 020 531429/650197	oshochem@oshochem.com
Lydia Njuguna	HDC - Fintrac	P O Box 3074, 00506, Nairobi	020 556728/556807 0721 761760 FAX 020 556804	lydia@fintrac.com
Ben K Mutuku	Serengeti Fresh Ltd	P O Box 12346, Arusha, Tanzania	+255 272502129	farm@serengeti-fresh.com
Patrick Ukumu Mulumu	Vegpro (K) Ltd	P O Box 1271, Naivasha.	0722 498267	
Fredrick Ochieng	HDC - Fintrac	P O Box 3074, 00506, Nairobi	020 556728/556807/ 0721 761761 FAX 020 556804	fred@fintrac.com
George Kariuki	Hygrotech (EA) Ltd	P O Box 1484, Delamere/Nakuru Highway, Naivasha	050 2020624/2020947, 0733 838057 FAX 050 2021277,	ma_kariuki@yahoo.com seeds@hygrotech.co.ke
Grace Anyango Oloo	HCDA	P O Box 1329, Machakos	044 20220	
Regina Wacera Kabiru	Agribusiness	Garton Ltd, P O Box 633, Thika,	0721 953944	rwacera2001@yahoo.com
Emmanuel Mutua Kavumbu	Reach the Children	P O Box 1818, Machakos	044 24183/ 0735 431681 FAX 044 20039	
Jefferson K Muasya	Reach the Children	P O Box 1818, Machakos	044 20053/ 0735848219 FAX 044 20039	
Shadrack Karuri Wanderi	EAGA	P O Box 781, Naivasha	0721 492158/ 0722 830895	Wanderi79@yahoo.com
Bernard Nthiwa Mulei	World Vison Kenya	P O Box 50816, Nairobi	020 883652/ 0722 352203	bernard_mulei@wvi.org
Wilson Mwangi Kimwea	SACDEP-Kenya	P O Box 1134, Thika	067 30541/7/ 0734 948934	sacdepkenya@iconnect.co.ke
Robert Waithaka Mwangi	Care Kenya	P O Box 43864 - 00100	020 2710069/ 044 3500059 020 2728493/ 0443500059	

Appendix 8. Programme for trainer course

Trainer Sessions (for 6 day course)

1.5 hour sessions

Module	***Session***	**Exercise**	**Who?**
T1	Registration, course opening, pre course assessment. What is IPM?	Winding road poster exercise	HD
T2 and T3	Choosing varieties and hygiene and healthy soil		JC
T7	Recognizing and understanding bean pests and diseases	Flash card exercise – bean pests	Real
T17	Learning cycle, learning styles, the training process	Water carrying learning cycle, learning styles	HD
T4 and T5	Recognizing and understanding tomato and brassica pests/diseases	Flash card exercise and pest and disease poster jigsaw	JC
	Continued	Short presentation	
T6	Recognizing and controlling weeds	Flash card exercise	Real
T18 **T8**	Target group profiles, Training Needs Analysis Planning, Objectives Recognizing and understanding natural enemies	Target groups and analysing training needs Setting objectives, Natural enemy poster jigsaw	HD Real
T9	Encouragement, introduction and establishment of natural enemies		Real
T10	Scouting techniques and decision-making	Simulated scouting exercise	Real
T11	Putting recognition and scouting into practice	Field scouting using recording form	Real
	Continued		
T13	Interventions to control vegetable pests and diseases – integrating pesticides into IPM systems	Developing selective application systems	HD
T12	Pesticide toxicity, safety and first aid	Mammalian toxicity calculations – a.i. and product	JC
T15 **T14**	Spraying techniques and record keeping Calibration and implications (efficacy, environment, residues)	Spraying demonstration and analysis Calibration calculations and field exercise	JC HD
T20 & T21	Participatory training techniques. How to use the farmer training tools and evaluating farmer training	training demonstration and analysis	NRI
	Preparation of training sessions		
T22	Delivery of training sessions	Delivery	HD
T22	Continued	Delivery	All
	Close of the course		All
			All

Appendix 9. Anonymous evaluation of the training course

Number of records of each assessment

PRACTICALITIES	Very bad	Poor	Good	Excellent
Accommodation (if relevant)			5	10
Food and drink			6	10
Training venue and facilities			5	12
Course organisation			8	8
DURATION	Much too short	A bit short	A bit long	Much too long
Length of the course	1	13	1	1
Length of each day		10	5	1
INSTRUCTORS	Very bad	Poor	Good	Excellent
Knowledge			5	11
Ability to train			4	12
Helpfulness			3	13
TECHNICAL CONTENT	Not useful	Limited use	Quite useful	Very useful
Training needs analysis			4	12
Aims and objectives			7	9
Planning farmer sessions			7	9
Giving training sessions			6	11
IPM methods			9	7
Pest and NE recognition in the field			6	10
Scouting/decision-making			7	9
Pesticide safety, toxicity First aid			9	7
Conserving natural enemies		1	9	6
Pesticide labels		2	6	8
Resistant varieties		2	8	6
Sprayers/nozzles/droplets			7	7
Calibration			5	11
Field visit to farm			9	7
Resources given out - equipment			3	13
Resources given out – posters			1	15
Resources given out - manual			1	14
FUTURE BENEFITS	Not at all	Only a little	Quite confident	Very confident
How confident are you that you can apply the knowledge and skills that you learned?			8	8

Suggestions for future improvements (compiled from all forms):

- Course content very good and comprehensive
- Well selected target group
- Practical persons
- Invite more ladies next time
- Need topic breakdown beforehand
- Such important training requires more time

- Future visit to organic farm, and export farmer
- Have review meeting after training
- Refresher training after some time to update learners on new technologies
- More time to be added – everything else seems excellent
- Train more people to reach large number of farmers
- We seemed to be brushing over so next time we need more time for more details
- Make course duration longer to allow for enough time to cover the topics thoroughly
- More field sessions if possible
- Generally course was quite well organised but need to deal with contentious issue of home made pest control extracts
- Your methodology in training was quite accommodating yet intensive. Keep up this approach

Appendix 10. Summary of trainer responses in reports compiled by trainers following their farmer courses

1. Where were courses carried out?

Wide range of locations extending as far as the lake, mainly rural or in small towns, in meeting rooms, church halls hotels and training rooms

2. What facilities were available at the venue

Ranging from chairs only, to having blackboards and writing tables. Commonly catering facilities and sometimes accommodation. Occasional access to photocopier. Company personnel had access to demo plots.

3. Who were the people being trained (please describe as fully as possible)

Farmers (men and women) or farmer group representatives or leaders (a group typically sent 1 to 4 representatives), mainly small scale farmers, who grow local vegetables such as cabbage, tomato and kales or export crops such as French beans, peas or Asian vegetables (sometimes suppliers of both local and export markets). Some extension workers and company colleagues have also been trained by the group since attending the CPP training, either as part of the farmer group or in separate training. This also extended to export company agronomists and supervisors in a small number of cases.

4. Were the people who you trained exporters

Mixed – some farmers supplied only the domestic market, while others supplied a proportion of their crops for export. Some few farmers associated with companies, were almost exclusively growing for export.

5. How many persons were trained

18 to 30 in the secondary courses. Additional people trained within companies outside the farmer sessions.

6. Was there any practical work within the course. If yes, please describe.

Winding road poster of IPM, pest identification, use of flash cards, scouting, distinguishing harmful insects from farmers' friends, demo of protective clothing, use of knapsack sprayer, calibration, safe use, nozzle choice, understanding labels, collection of insects from the field,

7. How did you use the training manual to help with lesson preparation

Planning and structuring helped training to run smoothly
Guide from which to add and incorporate more material
Lesson preparation – scope, coverage and timing guide
Management of session and points to be tackled
Helpful as reference
Helpful in extracting lesson notes
Materials from training manual synthesised and coupled with training aids and posters
Helped find some local names for pests and FFs, helped in preparing good and interesting lessons
Helped with preparation and evaluation
Used manual for theoretical preparation
Training materials very handy, cartoons enabled me to emphasis the important points, the manual was very useful

8. What other training aids were used (flash cards, posters etc)

Used books for reference and own charts
Cartoons, knapsack
Pesticide packs for label discussion
Knapsack, boots
Flash cards, posters, cartoons, samples of pests and diseases crops (mainly tomato), also IIBC poster
Nozzles, flash cards, PPE, measuring beaker, posters
Flash cards, posters, live specimens
Flip chart, cartoons, flash cards, posters
Flash cards, posters, spray gear, empty pesticide packs
Flash cards, posters, cartoon illustrations, writing paper, spray equipment
Flash cards, posters, cartoons, protective clothing, sprayers, samples of pests and diseases
Spraying equipment and protective clothing

What other training aids would be useful (which were not supplied) Please list

Knapsack sprayer for demo
Tape measure for calibration
Manilla papers
Pest samples (can be collected before class)
Whiteboard
Computer slides
Video
Summarised handout notes in English
Weed flash cards
Info on pesticides in the market, especially of bio origin
Gumboots
Poster of FFs
Pictograms
Lenses to give out to farmers
Life cycle of pests

9. Did you follow the lessons at the end of the training manual or modify the lessons (describe)

Yes, used training manual, added own illustrations to add weight to the points explained
Yes, selected areas to train
Yes, modified due to time shortage
Yes, modified using Gado cartons to explain in more detail
Yes, but modified especially 'what is IPM', scouting intertwined with identification – to reduce number of trips to field
Borrowed much of training topics from the manual but sought for appropriate titles
Yes, followed lessons but spent more time (than given in the plans)
Yes, lessons modified to suite short time available (farmers arrived very late day 1)
Modified but yes. Weather prevented manual sequence
Yes but order changed slightly
Yes, used flash cards instead of collecting samples in the field as time was limiting
Yes but allowed farmers to decide which areas they wanted to know more about

10. Which parts of the course were well received by the trainees

Scouting
Choosing right varieties
Weed control
Encouraging natural enemies
Pest and disease identification
FF identification
Calibration of knapsack sprayers
IPM concept
Winding road of IPM
Efficient spraying technique
Use of different nozzles
Spraying demonstration
Practical part of course
Cultural methods to control pests
Biological control methods
Pesticide safety

11. Which parts of the course were less well received

Calibration
Identification (Insects and weeds)
Theory part of course
Using chemicals to control pests

Introduction – what is IPM
Spraying exercise

12. Are you planning to give any courses in the future

Yes (common response)
Yes, many more
Yes, mainly to go deeper into the multiplication of beneficial insects
Yes, MOA extension staff, end of November, others in HDC and follow up on the farmer training
Yes, one November and two in December
Yes, will incorporate the IPM training into all my future training sessions on pest and disease control
Definitely
Yes if I would be funded
Yes on monthly basis

13. When will these future courses be run

Monthly
Subject to being funded
ASAP
This month
MOA extension staff, end of November, others in HDC and follow up on the farmer training
Early 2005
Every month one group will be trained
December and January
Throughout next year
Training in company is ongoing and this will be part of it
Very soon when resources available and farmers are informed

14. Where will these future courses be run

Naivasha, Kinangop,
various locations,
Kirinyaga, Marugua, Muranga, Nyeri, Central Province
Naivasha, Gilgil, Kinangop
Busia, Bungoma, Shiryalu, Kakanga, Kisumu, Masero
Kinangop, Nyanderua
Homa Bay, Rachwayo District, Nyanza Province
Institutional level and in field
Machakos, Lita
Mount Kenya region
Machakos district

15. What should we change for future courses

Use English for posters (not Swahili) (common response)
Try to train farmers of different regions
Allow more time
Incorporate EUREPGAP
Longer field visit (in primary course)
More time on ID of P&D
Incorporate specific crops, more posters on crops
Prepare handouts for farmers
Simplify courses to run one day, but with more practicals
Make training courses more frequent
Issue manuals to people who hold influential positions
Increase budget for secondary training to allow extension of course to 4 to 5 days
Issue farmers reference notes

16. Please add any other comments you have

Training was very well received and participants requested further training
Farmers friends posters to give out to farmers – farmers do not recognise them
Less words on printed materials – pictures have direct explanation
Longer courses for farmers to allow deeper coverage
Posters much better in English if only one language used (Swahili rarely written, so hard to read and interpret, and speakers of many languages do not know Swahili, and anyway the English is used in horticulture and agriculture (and is shorter and more precise). NB, some ICIPE poster had been translated inappropriately – diamond back moth was translated literally and did not relate to the local name for the pest – the worst of both worlds!
Farmers would like some notes or pamphlets to take away and read after the course
Use of cartoons is a unique idea that contributes to refreshing of the mind and grasp concepts better
The calendars as a reward to farmers is good because they are a summary of IPM concept and are things to look at every day
Training went very well and farmers were able to appreciate scouting, reading labels, nozzle types, proper land preparations, use of hybrid seeds, use of manure, mulching and crop rotation, etc.
Would be good to include peas in the course as some farmers (Vegpro) only grow this crop
Introduce a system of keeping up (contact) with trainees for getting updates and new information on IPM
Provide budgets for out of pocket allowance for course attendance/fares
Better certificates for farmers, issue of sprayer and additional posters would help future training
Increase reach and benefits by more training at both levels (T0T and farmer level)

Appendix 11. Farmer training feedback – summary of comments

Question	Answer
Was the training too long or too short?	Too short (almost universal responses)
Was the training useful?	Yes (universal response)
How will the practical work help you?	By introducing IPM, Not to waste money, Understanding very well By using available things Spraying Pest monitoring Reduce use of chemicals Scouting To be a good farmer Implementing skill learned To introduce farmers friends Improve shamba skills Improve farm and increase produce Applying IPM To know the amount of chemical Improve farming skill Identification of pests and diseases Maximum farm output
Which subjects were most useful?	IPM (common response) Knowing the group of our crops (rotation) All subjects Toxicity, safety, first aid, hygiene, recognising and controlling bean pests and diseases and weeds Encouraging beneficial insects, scouting and recognition Scouting and IPM All subjects Identifying P&D Calibration All especially calibration Identification of P&D All are useful How pests damage our crops Safety of sprayer
Which subjects were less useful?	None (very common response) Medicine (pesticide) All useful Calibration
What suggestions do you have	Longer (common response)

for improving this training?	More trips outside Sponsored (????) Work on our gardens (farms) More in future Books (to give out), French beans Certificates (note, many trainers issued certificates but some did not) Hold course on Saturdays More booklets (to distribute) Pictorial teaching aids, videos Visit our areas Samples of P&D in the classroom Repeat training after three months More teaching aids such as charts Longer day of training to allow more depth Regular training
Which printed materials (posters or calendar etc) will be the most useful?	All (common response) Calendars Posters Farmers friends Pests and diseases Pictures of pests Road to pest management Cartoons
What suggestions do you have for other printed materials?	Would be useful also To have more examples Provide booklets (VPM and FF) for everyone (common comment) Certificates (note, many trainers issued certificates but some did not) To print more More pictorial illustrations Use larger letters for people with eye trouble To be given to other farmers in local areas Pictures good even though English or Swahili may not be understood
What changes will you make to your farming practices because of this training?	Crop rotation We shall follow the methods that have been taught Cultural pest control To plant flowers which are important to maintain helpful ‘pests’, to use IPM, to clean garden Plant live fence, introduction of predatory mites and farmers friends Use less chemicals, plant more vegetation Better farming Implement IPM immediately Improve the environment by planting trees etc

	Intercropping, FFs, plant live fences Introduce IPM, use less chemicals, safe food and environment I will have flowering plants and fetch ladybirds I will improve my skills Avoid the use of broad spectrum chemicals, create an environment for farmers friends to thrive well
Do you need other training? If you do, which subjects?	Yes (common response) Fertiliser More about pesticides Making manure Maintenance of gardens Management of diseases of passion fruit Organic farming and fish farming All subjects Safe use of chemicals Identification and pesticides More on FFs More on IPM How to plant crops Diseases Identification FFs and pests Soil management and analysis First aid Biological culture and genetic methods of control Production of natural enemies Foliar feeds IPM programmes for specific crops Chemicals in depth Crop nutrition and environmental conservation Soil and water conservation

Appendix 12. Impact assessment findings

Site	***Interviewee***	***Role and location***	***PIPM Trainer***	***Impact assessers***
1	Richard Ng'ang'a Grace ??	Farmer, River Pool Farm, Lower Kinangop, 8 ha with snow peas and sugarsnap	George Kariuki, Hygrotech	Hans Dobson Henry Wainwright
2	Timothy Murega	Technical Assistant to Vegafric farmer group, North Kinangop.	George Kariuki, Hygrotech	Hans Dobson Henry Wainwright
3	George Ngana Murichigi Peter Mwingii Murichigi Paul Chege Murichigi	Vegafric Farmer Group Leader and brothers, North Kinangop. Sugarsnap	Peter Kibe Waweru, Osho Chem	Hans Dobson Henry Wainwright
4	Stephen Gitau Ng'ang'a, Julius Mwangi Kimani, Elijah Njoroge Kariuki, Peter Ng'ang'aMuiruri and Joseph Marua Njuguna	Farmer Group Leader and members. Passion fruit	Lydia Njuguna, FINTRAC/HDC	Hans Dobson Henry Wainwright Collins ???

Visit 1. Richard Ng'ang'a – River Pool Farm, Lower Kinangop. A mixed farm of 8 ha with peas, sugarsnap, snowpeas for sale through Indufarm.

Although the trainee, Mrs Ng'ang'a, was not present, two of her staff answered questions about their current practice. It was clear that messages about scouting (rather than calendar spraying), protective clothing, safe storage etc had been transferred successfully. There was a newly constructed store with three compartments – fertilizer and seed, protective clothing and sprayers/pesticides (the latter in a locked cage). There was also a newly constructed toilet block.

It is difficult to attribute these changes entirely to the PIPM training since staff had also been trained in EUREPGAP compliance by Naomi Kahurani from RealIPM, with Indufarm assistance. However, the PIPM training had clearly contributed to the uprating of safe and sustainable practices on the farm.

Richard was hopeful of EUREPGAP accreditation in the near future, and stated clearly that Mrs Ng'ang'a's certificate from an IPM course would help

them achieve it. The way this works is that EUREPGAP requires that a ‘qualified person’ blah blah?? and there is also another clause that asks whether the farmer has training in IPM. So despite the lack of formal accreditation of this PIPM course, it has a significant beneficial effect on farmers’ ability to comply with export regulations.

When asked about appropriate media and methods for bringing about improvements on the farm, Richard felt strongly that direct training was the most appropriate approach. When pressed on other media such as radio, television, newspaper articles, he felt that they would be missed, or skipped, by most people, partly due to the number of radio stations to choose from currently, and that the necessary understanding would not occur even in those that did tune in. He felt that practical training, such as that organised by George Kariuki at Hygrotech, with the opportunity to demonstrate and try out techniques on Hygrotech’s demonstration plots, was ideal. The IPM calendar was up on the wall in the office.

Visit 2. George Ngana Mwichigi (and 3 brothers) – growing snowpeas on a 3 ha farm for sale through VegAfric. Also present was Timothy Murega – production coordinator for VegAfric (trained by George Kariuki) and Peter Kibe Waweru from Osho Chemicals who trained George.

Again, training appears to have been successful. When asked what they did differently now following the training, they listed wearing proper protective clothing, scouting before spraying, using the right quantity of pesticide. They also said they were now able to identify pests and diseases correctly.

In this area, farmer group leaders were trained and George is leader for a group of 30 farmers. He has not carried out any formal follow on training courses, but estimates that he has transmitted the information to around 15 other farmers in his group. He thinks these 15 will disseminate to some of the others, but that there are some who are not interested. His brother stated that he borrowed George’s hand-written course notes and learned also from the posters and calendar.

When asked about media and methods for this sort of information and skills, both George and Peter felt that formal training was the most appropriate. On radio programmes, Peter complained that it is difficult to understand something when you can’t see it. For radio and newspaper articles, the concern was that there was no opportunity to ask questions.

They stated the need for more pictorial material since some farmers are not literate, and also that where text was used, English was most appropriate for this sort of technical material.

Visit 3. Stephen Gitau Ng’ang’a, Julius Mwangi Kimani, Elijah Njoroge Kariuki, Peter Ng’ang’aMuiruri and Joseph Marua Njuguna.

They praised the training as very useful and did not identify any topics that were not relevant to them, although they would have liked more fieldwork and

a week-long course rather than two days. They said could have made time for this – perhaps something specific to passion fruit, since farmers often cannot devote long periods to training. They recognized the importance of calibration but would have liked additional training on this, together with regular training on many other topics.

Changes they have implemented since the training included using chemicals as a last resort (following scouting) rather than the calendar regime they had employed before. They recognized how much money they were now saving with this responsive system, and how much they were wasting before. They also now understand that some of the insects in the field are farmers' friends rather than pests and take steps to encourage them.

Without prior notice, they were able to recall some of the cartoons on the IPM calendar and commented that at first glance they just look like funny cartoons, but when you study them, the serious message is easily understood. They also stated how useful the pictorial material was – the flash cards and posters – and said they needed more of these materials. They specifically mentioned the need for a booklet on IPM, preferably with colour pictures. They also said they needed black boards and chalk. The resourcing of these Farmer Trainers is the main thrust of the follow-on phase of the promoting IPM project.

The secondary impact in this farmer group also appeared to be high – the trainees had organised training days for the other 30 or so farmers in the group on a variety of topics. This was verified by talking to farmer group members who had not been present at the time that the claim was made. This multiplier effect was not confined to their group - the day after our visit, around 100 farmers from another farmer group were due to come to their meeting place for a training day on IPM and EUREPGAP issues. There is no cost to the participants, rather it is a reciprocal arrangement whereby the neighbouring farmer group hosts them from time to time for training days on specific topics on which they have something useful to share.

When asked about information provision through other media such as radio, they said this would be good, but in addition to the training, not instead of it. However, there are now large number of commercial radio stations, so it might be difficult to get a large listening audience for such programmes. When pressed they thought that training in person was more effective.

Language on the training materials was discussed. They felt that, although the translation was good on the posters, Swahili was a difficult language to use for technical topics. English was preferred for such materials, or even local languages, in which they have proper words for the pests, diseases and other technical terms. However, this would mean producing materials in at least two languages, Kikuyu and Kicamba (spp??)

Visit 4. Farmer group at Gatanga – 18 farmers trained by Wilson ?? of SACDEP. This is a farmer group that has been set up 18 months ago due to the assistance and support being given by the SACDEP programme. Wilson

himself initiated activities by training them in forming groups and in managing group dynamics. Although the farmer group started our 30 strong, it is now around 16 with committed ones remaining. They grow export okra and chillies on the fertile soil of the banks of the Masinga dam, when the water levels recede to reveal them. Wilson provided them with a 2 day training course in IPM late in 2004.

Changes in practice they claim to have made since the training included:

- Carrying out scouting before deciding to spray
- Better identification of pests in the crop – this was verified with them recognizing the damage from caterpillars, and identifying white fly and aphids.
- Calibrating to apply the right amount – they are now saving money
- Paying attention to wind direction during spraying
- Choosing the right product instead of what is available (this claim was not really borne out by the fact that they use methomex almost exclusively on okra, the stated reason being that it has a one day PHI that suited their 3 times per week harvesting schedule
- Better understanding of natural enemies and how to encourage them
- Better field hygiene

The relationship between Wilson and the farmer group was clearly very productive with trust on both sides. They appreciated the training and stated that it was very useful. When asked whether a radio programme would be better, they insisted that not many people would listen or concentrate on a radio programme. They also could not ask questions of a radio programme. They felt that a face to face training course, with practical work, was the only way to learn IPM properly since people had to concentrate and there were no distractions.

They felt the training materials were very valuable and described and explained 6 of the calendar cartoons without looking at it. They requested a colour booklet for all farmers, with pictures to help identify pests and diseases, and also containing advice on how to control them, including which pesticides to use. They did not like the idea of loose flash cards since they would get separated and go missing.

Opinions were divided over which language to use on printed materials – the better English speakers preferred English, but others preferred Swahili for its universal comprehensibility.

The farmers requested more training on soil fertility, fertilizer rates and other agricultural issues, as well as requesting irrigation equipment.

Appendix 13. Ranking of different sectors for their suitability to deliver IPM training

Sector	*Example*	*Incentive*	*Fit with current activities*	*Availability*	*Access (transport and farmer contacts)*	*Geog reach*	*sustainability*
Agrochem company	Osho Chemicals	Pesticide/sprayer sales	M	M	H	H	H
Seed/fertilizer supplier	Hygrotech	Input sales	M	M	H	H	H
NGO	Reach the Children	TORs, ideals	H	H	H	L	H
Govt extension/para	MoA and Extension	TORs	H	M	M	L	M
Donor funded initiative	HDC	TORs	H	M	M	L	L
Export company	Vegpro	Quality+ market advantage	M	L	H	L	M
Private sector service provider	ICIPE	Fee, retail sales	H	H	M	M	M

H = high
M = medium
L = low

I confirm that the biometric issues have been adequately addressed in the Final Technical Report:

Signature:

Name (typed):

Position:

Date: