Facilitators' FFS Manual

DRAFT

Regional Integrated Pest Management Programme in the Near East

GTFS/REM/070/ITA

PART I

A training resource manual on planning, organizing, implementing and evaluating Farmers Field Schools for Integrated Pest Management in the Near East.

Food and Agriculture Organization of the United Nations

October 2004

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Acknowledgements

Many people have been involved in developing this FFS Field Guide, and their contributions are gratefully acknowledged. In particular, I would like to thank the following facilitators and/or National Project Coordinators: Mr. Hossein Heydari (Iran), Mr. Youssri Hamid Hussein (Egypt), Mr. Amjad Almughayyar (Palestine), Mr. Imad Nahhal (Lebanon), Mr. Zakaria Mussalam (Jordan), Mr. Mohammad Ezzedin Al-Sayed (Syria), and technical staff from FAO: Dr. Alfredo Impiglia (FAO regional project coordinator) and Ms. Marjon Fredrix (FAO AGPP, Rome). These colleagues contributed ideas and information based on their field experience, reviewed this manual and offered suggestions for improvements.

Dr. Kevin Gallagher (FAO TCOS, Rome), and Dr. Elske van de Fliert (FAO Vietnam) kindly granted us permission to use and adapt parts of their IPM training documentation developed for other FAO IPM programmes. References to these materials can be found in the reference list. However, any errors in this guide are our responsibility.

Other valuable inputs came from the facilitators group working in the 2004 season of the IPM project. With critical questions, good suggestions and creativity they inspired us to be accurate and practical. [photos?]

Much of the content of this guide is based on several decades of experience in implementing Farmers Field Schools in Asia, and more recently, in Central and Eastern Europe. In addition, examples are used from Egypt and Iran, who have build up a strong expertise working in IPM FFS during earlier programs.

The writing of this manual has been inspired by [visits] to IPM training sites, and discussions with farmers and IPM facilitators in Syria, Lebanon, Jordan, Palestine, Egypt and Iran.

The resulting document is a group effort.

Frederike Praasterink
October 2004

1 Why this guide?

This guide is a reference manual on the principles of IPM and organizing Farmer Field Schools (FFS). It is written for current and future facilitators involved in organizing and implementing FFSs in the Near East. Much of the content of this guide is based on IPM FFS experiences from Asia, Eastern and Central Europe, and other parts of the world. It also contains interesting experiences from our project partners Iran and Egypt.

Part I of this guide provides practical information and guidelines for the training of facilitators, FFS curriculum development, and will serve as a reference manual throughout the FFS planning, implementation and evaluation stage.

The annexes to part I provide detailed background information, sample forms, etc.

Part II contains details of commonly used practical field exercises for FFS. These exercises can be used for inspiration, but need to be adapted to fit the crop and local conditions.

Please note that throughout this guide:

The term "field" should also be read as "greenhouse".
The term "crop" should also be read as "orchard" or "plantation".

Other Acronyms used in this guide:

FAO	United Nations Food and Agriculture Organization
FFS	Farmer Field School
IPM	Integrated Pest Management
NE	Near East
NFE	Non Formal Education
NPC	National Project Coordinator
TOF	Training of Facilitators
TOT	Training of Trainers

2 About Integrated Pest Management

2.1 What is IPM?

"IPM" in the very traditional sense usually refers to Integrated Pest Management: a biologically intensive method of managing pests. But today, for thousands of farmers, "IPM" is more of a movement cry for local control over scientific principles that can be applied in individual fields. IPM is location specific, based on local field ecology and socio-economic conditions. IPM is not a centrally defined "packaged technology" that must be taught to farmers. Farmers need skills to define a local optimum of management practices that result in the highest economic yield, without destroying the environment and health of the community.

Other terms like ICM (Integrated Crop Management) or IPP (Integrated Plant Production) are also common. We choose to use "IPM" throughout this guide.

"IPM training" is a means for farmers to gain more local control over plant protection through community based activities. IPM in our program means a lot more than just "pest control", and some of the principles and contents will be described below.

2.2 The principles of Integrated Pest Management

Sustainable agriculture requires that today's production needs are met while *improving* the production resource base for future generations. IPM, as a corner stone of sustainable agriculture, seeks to improve farmer practices in order to create higher profits while *improving* environment quality and community health. In order to do this IPM implementation is based on four practical principles:

* Grow a healthy crop
* Conserve natural enemies
* Observe fields regularly
* Farmers become experts

These principles describe the main actions of IPM implementation. Specific processes that take into consideration the variation of each field and farm family backup each principle, so that management is able to be done on a field-by-field, season-by-season basis. Each principle is described below:

Grow a Healthy Crop means using varieties resistant to major pests and diseases but well adapted to the local environment. The principle also includes using proper fertilizers (chemical and organic), irrigation, and soil management which are critical for healthy plants. A healthy crop can *resist* diseases and *compensate* for damage caused by diseases and insects so that plant injury does not always lead to yield-losses. A robust healthy crop is the first step in IPM methods, and foundation for an optimal yield.

Conserve Natural Enemies. In all agricultural ecosystems, there are predators, parasites and diseases which attack eggs, larvae, nymphs, pupae, and adult stages of insect pests. These "natural enemies" often occur naturally in fields and they are the "friends of farmers" because they can biologically control insect pests. Learning to recognize and manage these natural enemies is one major focus of IPM training so that they are not destroyed by unnecessary applications of herbicides, insecticides and fungicides but are allowed to work for the farmer's benefit.

The focus crops in the NE project are not indigenous to the region. This means the natural ecosystems are not as stable as for indigenous crops, and there may not be indigenous natural enemies that are effective enough to keep pest populations low. This especially applies to greenhouse crops. Pest management strategies in this project will therefore often be based on "informed intervention", for example by releasing natural enemies or biocontrol agents. In addition to *conserving* natural enemies, IPM strategies in our project will focus on effective and economic *release* and -possibly- augmentation of natural enemies.

Observe Fields Regularly is necessary to assess crop development, insect pest and natural enemy populations, diseases, weeds, and weather or climatic conditions. In most cases, an experienced IPM farmer does this observation during a short time while carrying out other crop maintenance activities. Observations should determine how the crop is growing and if there are pests or diseases causing yield-loss; remembering that not all injury causes yield-loss.

Proper assessments must be made to effectively and profitably manage the use of inputs such as labour, quality seed, resistant varieties, fertilizers, drainage or irrigation systems, community organizing and pesticides in order to ensure profitable production. Observation skills and decision making skills are a key to becoming an expert IPM farmer and require field level practice for most farmers and extension staff.

Farmers Become Experts is a necessity for a modern agriculture in which farmers are responsible for farm level management. Future gains in yields, profits, and sustainability will be the result of farmers making better use of available and new technologies and (limited) resources. More emphasis in all agriculture programs must be placed on the ability of farmers to make better decisions, increase their own efficiency, and become better managers. The future of food production and food security will depend on how well farmers can innovate and manage systems. IPM is implemented by farmers and thus requires an emphasis on farmers' skills and knowledge.

2.3 Basic Concepts and Assumptions

The reader should be aware of some of the basic concepts and assumptions that are adhered to throughout this guide:

- IPM is not a "packaged technology" that is "adopted" by farmers. IPM is a process of decision making and farming which is gradually improved with greater ecological knowledge, and observation skills.
- IPM skills and concepts are best learned, practiced, and debated in the field. The field is the best teacher. Stay away from energy intensive multi-media lecture halls!
- Season-long training courses allow all plant, insect, disease, and weed development processes and management to be observed and validated over time. IPM training must be carried out over all crop stages.
- Farmers must be allowed to actively participate and share their experiences during training to achieve maximum interest and effectiveness. Local or indigenous knowledge of the environment, varieties, pests, etc. must play a major role during decision making.
- Trainers must not lecture, but should facilitate a process of learning. Trainers do not convince farmers, but rather provide structured experiences so farmers can test IPM methods and convince themselves about which are useful and which are not.
- Young trainers must have a method of working in a respectful manner in groups that often include person older and more experienced than themselves.

The content of IPM training programs for extension staff and farmers is not limited to the traditional "plant protection methods" (e.g. mechanical, biological, cultural, mechanical, and economic threshold levels) but also includes the following:

- Crop development and physiology
- Agronomic methods for a healthy and profitable crop
- Varietal impact on pest management
- Soil fertility management
- Water management (irrigation, drainage)
- Pest insect, disease, and weed biology and damage impact
- Natural enemies of insects and diseases
- Field observation skills
- Pesticides, including environmental, health and handling issues
- Economic management skills

2.4 Rational for season-long training

The season-long nature of training is required for several scientific and social factors including:

- Pest problems are specific to each stage of crop so training should be carried out over all stages of the crop.
- Population dynamics, disease epidemics, plant compensation, and crop development are processes which develop over the course of the cropping season and need to be observed completely.
- The results of management decisions made during one crop stage are observable only at a later crop stage, and most often at harvest (e.g. profitability, yield and crop quality components). For some perennial crops, the effects of management decisions sometimes become apparent only in the next season. [For example, mechanical removal of affected branches of mildew on young shoots of apple.] This would plead for a continuation of field activities over at least two seasons.
- Farmers are often isolated from scientific and social advisors and therefore must be able to solve most problems without outside assistance. A longer field based training provides these skills.

2.5 Rational for experiential learning: the principles of non-formal education

The basic educational concept of the FFS is drawn from adult non-formal education. Non-formal education is a training method based on the assumptions of adult learning.
Adults differ from children in the way they learn. Adults already have a lot of experience, knowledge and skills. They have their own beliefs, values, convictions, and their own perceptions, biases and feelings. This makes adult learners a very rich resource in the learning process, and that is why it is important that the learning is participatory, so that each learner can input his/her "resources" into the training.

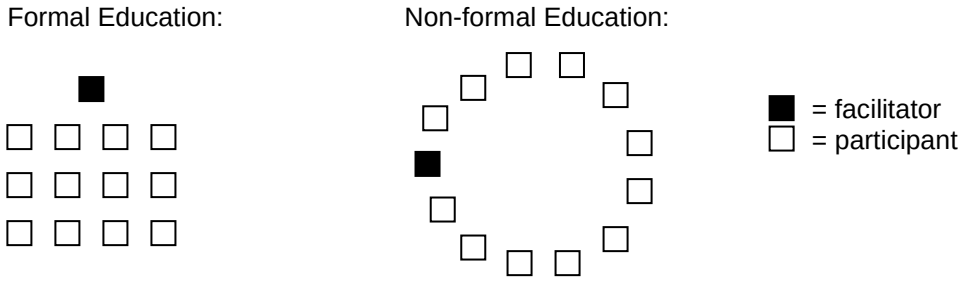
Farmers need opportunities to experiment with new (IPM) technologies, to learn how to evaluate different options systematically and to decide for themselves which are worthwhile. This realization can be found in the principles of adult education, which recognize that adults learn best from direct experience and when the topic they are studying is related to their everyday activities. Learning by doing adds to farmers' knowledge and experience, and improves their capacity as farm managers. Knowledge obtained this way is more easily internalized ("owned") and put into practice after the training is over. Passive exposure to more general extension messages is not as powerful as the discovery-based learning in FFS.

I hear and I forget
I see and I remember
I experience and I understand
I discover, I own

Some differences between formal and non-formal education from the viewpoint of the facilitator include:

Formal education	Non-formal education
• Teacher, not facilitator • Trainees have to listen to the "teacher" • Information 'push' (teacher decides what trainees are being taught) • Hierarchy (teacher is the "boss") • Teacher has to prepare all sessions • Teacher forced into being 'expert' • Teacher lectures trainees. • Trainees are passive receivers of information	• Facilitator • Participants can give inputs • Information 'pull' (focus on actual information needs) • Learning objective is identified by group • Informal, open exchange; equal chance to participate • Active cooperation and collaboration from all participants • Facilitator is a group member • Facilitator can rely on inputs of the group • Questions from the group can be answered BY the group (discussion/sharing of experiences, setting up experiments, inviting resource persons, etc.) • Working in small groups

Non-formal education can already become apparent in small things such as the setting of chairs for a meeting:



Please refer to section 5.4 for information on how to apply non-formal education into the practice of an FFS.

2.6 Annual and perennial crops: different FFS approach?

In our project, countries have both annual (tomato, cucumber) and perennial (citrus, apple, grape) crops. Basic concepts for planning and implementing an FFS are the same!

One could only argue that in order to establish a full IPM system in perennial crops such as apple, more than 1 season is needed. In perennial crops, less disturbances occur in the ecosystem (i.e. the complete crop is not removed like in annual crops).

[more?]

2.7 Open field and greenhouse: different FFS approach?

Similarly, the basic concepts for planning and implementing an FFS are the same for an open field FFS and a greenhouse FFS. However, in greenhouses the spontaneous occurrence of natural enemies controlling insect pests or diseases can be considered very low. In almost all cases, natural enemies have to be released on purpose. To some this is an advantage: a "man-made" ecosystem, but unfortunately this doesn't hold for several insect pests which miraculously turn up!

In addition, organizing a field study for greenhouse crops may imply some more organization. For example, if a comparison is made between IPM and conventional practice, it is recommended to use a separate greenhouse for each treatment.

[more?]

2.8 Economic Threshold Levels

Economic threshold levels (ETLs) are not used for field level decision making throughout most of this Field Guide. The ETLs are replaced with the Agro- Ecosystem Analysis methods that integrate more decision making parameters. The main reasons for not using ETLs are explained here.

The first and greatest problem of ETLs is the variability of parameters used for ETL computation. The three main parameters of the ETL are management costs ($/ha), the commodity price ($/kg), and the damage coefficient which is the rate of yield loss per damaging factor (e.g. kg/ha loss per degree of soil drought, or kg/ha loss per density of insects no./plant). Management costs depend on the type of compounds used (cheap or expensive), access to tools (owned or rented), labour costs (own or hired), differences between regions (near cities or far from cities), and many other conditions. Commodity prices can be stable in some areas, but often fluctuate by a factor of ten over the year depending on local markets. Finally, the damage coefficient will vary according to the variety, water availability, weediness of

the field, nutrient levels, weather, farmer competence in growing the crop, stage of the plant, plant spacing, etc. More important is that not all injury leads to yield loss. In the case of over-compensation displayed by some crops (e.g. cotton), some injury actually leads to an *increase* in yields*. In almost all cases, published ETLs do not apply to the field situation at hand. The computed ETL applies only to the situation used in the computation; not the local situation (e.g. local costs, prices, weather patterns, plant responses, etc.).

Crop compensation in tomato: a case from Asia
Defoliation studies on tomato (to simulate damage of leaf-damaging insects) in Vietnam showed that tomato yields were not significantly reduced when up to 50% of the leaves were cut off the plant, at 15, 30 and 50 days after transplanting, as compared to the undefoliated control.
See exercise [ ] in part II.

The second major problem is that the ETL is too simple-minded. Farmers deal with very complex systems such as produce marketing, crop planning, and supplying inputs at the right time during the year even though income is not constant throughout the year. A published ETL figure is not an acceptable guide for making a crop protection decision by farmers that understand the role of natural enemies, plant compensation, and weather effects.

Lastly, ETLs only compare costs and benefits of a very specific pest problem and the hoped for outcome (control in the first action). The ETL computation does not consider the farm or family budget and the relative benefits that could be gained with alternative investment of (scarce) financial resources of farmers. The ETL is only a partial analysis of the only one potential economic gain on the farm or in the family. Other investments of (scarce) capital may have more beneficial or safe returns or be more socially attractive.

The ETLs are replaced with the Agro-Ecosystem Analysis method that integrates more decision making parameters, as is shown in the table below.

ETL
- cost of control
- harvest value of crop (estimation)
- loss of income due to pests (estimation)

Agro-EcoSystem Analysis (AESA)
- growth stage of the crop
- weather conditions
- crop development factors (incl. compensation ability)
- type and number of insect pests
- type and amount of diseases
- type and number of natural enemies
- type and amount of natural disease control agents (if applicable)
- type and amount of weeds
- water availability (irrigation, drainage)
- soil fertility status
- fertilizer applications
- activities in the field since last week
- other observations

3 The Farmer Field School

3.1 What is a Farmer Field School?

A Farmer Field School (FFS) is a season-long training event conducted in the field. The activities follow the different developmental stages of the crop and their related management practices. There are different models for an FFS, but the process is always learner-centred, participatory and relying on an experiential learning approach. Some of the basic elements of our Farmer Field Schools include:

- A group of farmers is involved;
- The FFS is field-based and lasts for one cropping season (from seeding/transplanting to harvest in annual crops, and from the first activities in spring (e.g. ploughing in grape) to harvest in perennial crops);
- The FFS participants have regular meetings during the cropping season;
- In an FFS, participants conduct a study comparing elements of an IPM strategy versus conventional practice;
- An FFS often includes other field studies, based on local field problems;
- An FFS includes special topics that deal with specific issues selected by the participants;
- Each meeting includes at least an agro-ecosystem analysis activity conducted in the field;
- FFS educational methods are experiential, participatory, learner-centred, and based on non-formal education.
- The FFS group is guided by at least one facilitator offering experiential learning opportunities, rather than delivering top-down instructions.

3.2 Philosophy and principles of Farmer Field Schools

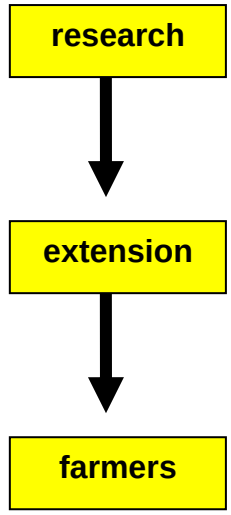
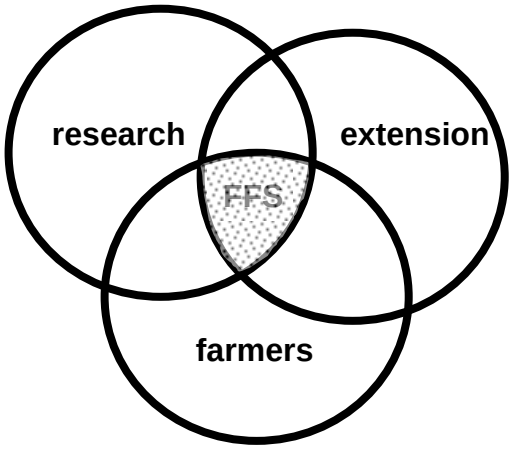
Since many years, farmer field schools (FFS) have been the platform in many countries for educating farmers on integrated pest management (IPM) and an increasingly broader range of topics.

The concept of FFS was originally developed in Asia for rice. Since then, the FFS model has been adapted to various other crops, other countries and continents. There have been lots of variations to the model, but the process has been the same: learner-centred, participatory and relying on an experiential learning approach.

In a traditional research and extension system, research stations study topics and -in theory- deliver "answers" to the extension agencies which, in turn, have to pass on the information to the farmers. In this system, farmers are passive receivers of "packaged technology" which is not necessarily related to their actual field problems.

The FFS model links the expertise of various sources (farmers, research, extension but also other partners) into one platform: the FFS. In the FFS, all parties are equal partners in providing locally adapted crop management practices. In an FFS, farmers are not just the passive receivers of technical knowledge, but they are provided with an opportunity to actively learn and achieve greater control over the conditions that they face every day in their fields. Farmers are empowered by FFSs. In FFSs, farmers can master the ecological principles needed to implement IPM in their fields, become experts in IPM, and apply what they have learned to develop new initiatives and gain greater control over local conditions.

This process is visualised in the following figure.

The "traditional" Research and Extension model	The Farmer Field School model
	

3.3 Other names for a Farmer Field School

Some farmers resist the idea of having to go to a "school" because they feel a school is something for children. There is no problem with using other names. For example, Lebanese participants preferred the term "Farmer Field University". Egypt has "Farmer Learning Groups". In Asia, the term "IPM club" has been used. In the Netherlands, this type of activity is called "Farmer Study Group".

No matter what the name is, important is that the training follows the principles and process of FFSs. Throughout this guide, the term Farmer Field School, FFS, is used.

3.4 The general FFS objectives

The FFS has several objectives:

1. It provides a means to develop IPM expertise among farmers in a farming community.
2. The FFS provides for development, validation and adaptation of IPM methods to local conditions thereby leading to an evolution of farming practices that include IPM methods.
3. An FFS offers the opportunity to form farmer groups working together on many other farming related subjects such as marketing.
4. An FFS can be a platform to initiate community action on a range of topics.
5. The FFS provides an opportunity to influence local and/or national policies. For IPM programmes to be successful, policy support is essential. These include policies on pesticides (subsidies, bans on dangerous pesticides, etc), support for research (ecological versus conventional/pesticide-based agriculture), support for advisory services to farmers, etc. When invited to an FFS, (local) officials can see for themselves that farmer with IPM experience can reduce dependence on pesticides and maintain yields. This is as important as other objectives because it may lead to a change in local or national policies mistakenly supported by local officials "convinced" that pesticides increase yields, or that pesticides are the only option to control pests.

4 Developing a sustainable IPM programme

By the end of this project, the following results will have been achieved:

- Community empowerment: participation of local communities in the entire process of development and implementation of IPM. Farmers within the communities strengthen knowledge and skills on ecology to come to better field decision making, and contributing to sustainable agriculture.
- Reduced environment and health risks: reduced occupational and public health risks to farmers and consumers associated with pesticide use and sustainable and cost effective horticultural production.
- Better access to local and international markets: high quality crops and products that meet food safety requirements for local markets and that meet the quality standards to allow access to international markets.
- Increased sustainable and cost effective horticultural production with emphasis on preservation of local agro-ecological environment as a result of the above project results.

In order to reach these results, the project organizes (amongst other activities) Farmers Field Schools to develop, in close collaboration with farmers, cost effective integrated pest management strategies in the field whilst testing the FFS as a locally suitable training methodology.

4.1 Steps in developing an IPM programme

In a regional facilitators workshop in June 2004 in Jordan the following elements to develop a participatory IPM programme were identified:

- Needs assessment
- Curriculum development
- Training of facilitators
- Farmer Field Schools
- Follow-up activities

All of these elements will be discussed in this guide.

4.2 Sustainable IPM implementation: from FFS to community IPM

Experience in implementing IPM programmes over the years, shows that for IPM programmes to be sustainable more is needed than just doing 1 FFS in a community. The reason for this is the following. The activities done in an FFS generally focus on:

1. Enhancing knowledge about:
    - Biophysical facts (plant physiology, biology and ecology of pest insects, natural enemies, information about diseases, weeds, fertilizer composition, etc);
    - Ecological principles for agro-ecosystem management (better understanding of the role of biotic interactions in the crop ecosystem);
    - Sustainable, ecologically sound crop management practices (e.g. variety selection, crop rotation, cultural practices, biological control, informed and minimum use of pesticides, etc);
    - General farming information (e.g. marketing matters, record keeping, etc).

2. Strengthening decision making skills and problem-solving skills:
    - Agro-ecosystem analysis;
    - Problem identification;
    - Experimentation (e.g. how to set up an experiment);
    - (Farm) economic analysis;
    - Accessing information.

3. Organizing collective action:
    - Farmer-to-farmer dissemination of IPM principles, information and skills;
    - Conservation of the agro-ecosystem and surrounding environment;

- Collective management of certain pests and diseases;
- Increasing local public concern and awareness on specific issues;
- Local policy development and influencing national policies;
- Marketing (sharing information, cooperative development);
- Paying for advisory services to the group, raising a fund for activities by the group.

These three components should be sufficiently mastered and implemented by trained farmers for IPM to become adequately embedded into the community. Only then can IPM be expected to lead to a more sustainable form of agriculture with tangible impacts relating to food security, income, human and environmental health for the entire farming community.

In a new FFS, the focus of attention often is on the first two components while the third one comes later. Even for tomato FFS in our project, lasting of 1 year, it is likely that not all components can be sufficiently covered. Therefore, it is very important to follow-up. See chapter 12.

The broader goal of independent and sustainable IPM implementation is *community IPM*, which is defined as a process in which IPM is mastered, planned and implemented by the community. The community includes all linkages to government, NGOs, private companies, and other organizations.

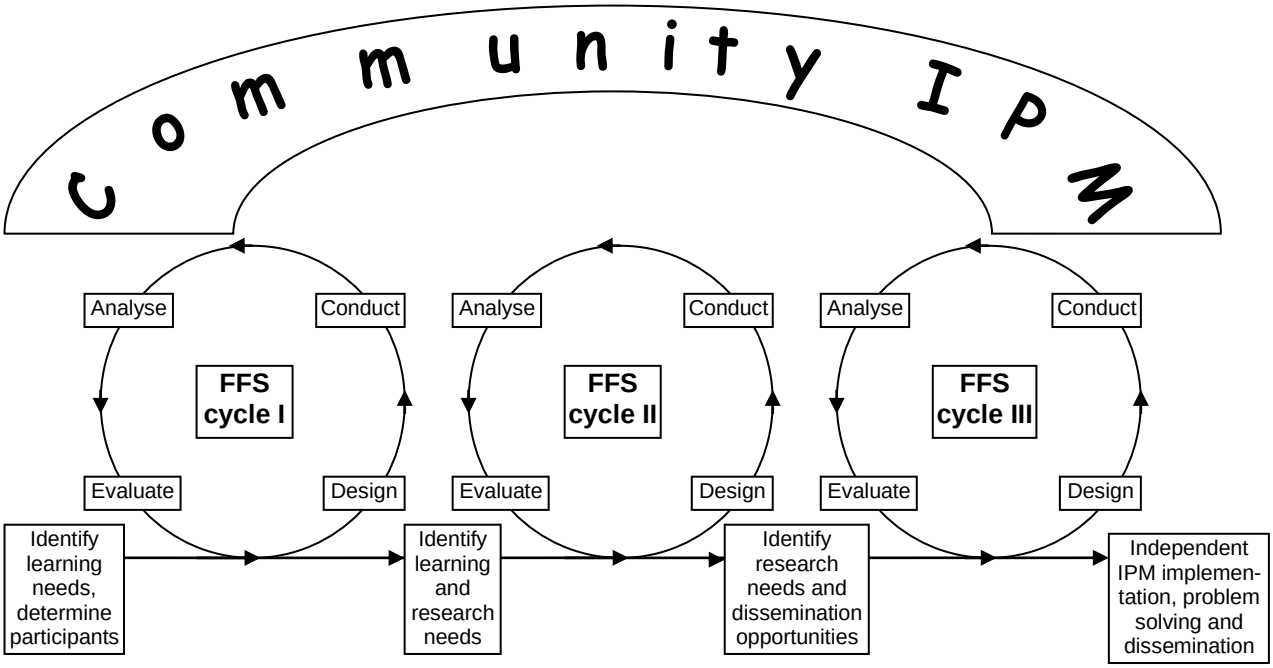
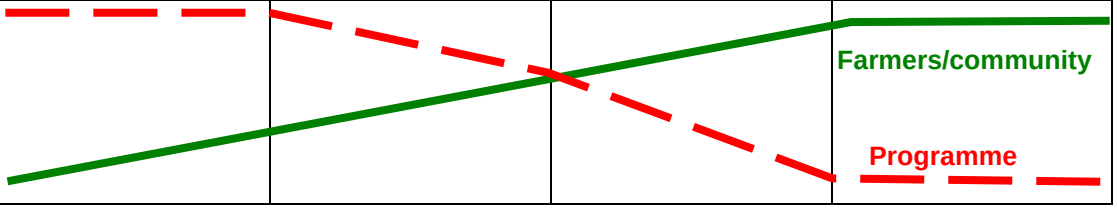


Figure 1: Multiple learning cycles for IPM learning and problem solving

In order to become independent IPM implementers and effective managers of the agro-ecosystem, both as individuals and in groups, farmers will need to go through a process of multiple learning cycles (as illustrated in Figure 1). The same group of farmers would build and enhance their capacity over a period of several cropping cycles (not necessarily three!), during which the participants get exposed to learning and are involved in problem solving throughout the various seasons (and crops) on a particular field. The number of cycles depends on the farmer group and local conditions. The focus of capacity development should, over the consecutive seasons, shift from more discovery-based learning to problem solving and socialisation of IPM within the community. Similarly, ownership over the process, roles and support by farmers on the one side and programme staff on the other side will gradually shift in correspondence with growing capacity and commitment of the farming community. The chart below depicts a possible model of how FFS emphasis and farmer/programme roles may shift over time:

	1st cycle FFS	2nd cycle FFS	3rd cycle FFS	Independent IPM implementation problem solving and dissemination
Emphasis	• Learning ecological principles, knowledge, skills, alternative practices through discovery learning • Introduction to experimental methodology	• More advanced learning • Experimentation for adaptive research purposes • Farmer-to-farmer dissemination	• More advanced learning • Experimentation for innovative research purposes • Farmer-to-farmer dissemination • Collective action	• Experimentation for innovative research purposes • Farmer-to-farmer dissemination • Collective action
Ownership/ role/support				

5 The FFS facilitator

5.1 The role of the facilitator

The role of the facilitator is crucial in an FFS. In general the facilitator:
1. Organizes the field school,
2. Facilitates the activities associated with the meetings of the field school,
3. Takes care of basic administrative issues,
4. Maintains constructive communications with local government officials, NGOs and other agencies in the area where the FFS is located.

In the follow-up stage of the IPM program, the IPM trainer will facilitate community based actions to raise funds and implement further programs as desired by the FFS participants.

1. Organizing an FFS requires a facilitator to:
- Determine the site for the FFS;
- Plan timely conduction of a baseline assessment (also see point 3 below)
- Conduct preparation meetings;
- Identify potential participants;
- Identify (with the FFS participants) a study field -preferably a field that belongs to one of the FFS members;
- Determine (with the FFS participants) local endemic problems to be treated by the FFS;
- Determine an outline for the FFS curriculum (to be further specified with FFS participants);
- Plan meetings (with the FFS participants);
- Invite resource persons when necessary;
- Determine needs for materials and organize timely procurement;
- Determine and apply local traditions and habits (e.g. public holidays).

2. Facilitation
A facilitator in an FFS guides the process, offering experiential learning opportunities, rather than delivering top-down instructions. Facilitation is not "teaching farmers", it is creating learning opportunities. In general, the facilitator introduces an activity, clarifies the process, sets participants to work, asks open-ended and "what if" questions as groups make their presentations. He/she summarizes presentations underlining the important points that were learned during the exercise, and divides action points/responsibilities over the participants. The facilitator has an eye for participants with leadership capacity, who might be interested to take up some of the facilitation work for future training activities. See section 5.4 for more details on facilitation skills.

3. Administrative issues
Administrative activities depend in many cases upon the needs of the organization taking responsibility for the implementation of the FFS. In general, some administrative activities that help show how well the FFS implementation is going, and how the facilitator is doing, could include:
- Interview a number of participants before the start-up of the FFS about their pre-FFS farming practices. This data could be used as baseline data to determine changed practices based on the FFS experience. See also section 7.4 and annex 2 for an example baseline form.
- Collect and report basic bio data of FFS participants such as name, age, gender, education, access to land, form of ownership or rental contract, etc.
- Report results of pre- and post-test, if applicable. This data can help document increased knowledge on the part of participants and provide a record for reference (see section 11.3).
- Save weekly results of agro-ecosystem analysis (see section 7.10).
- Prepare activity plans for each FFS meeting with a short record per meeting that contains comments on implementation (e.g. what went well, what needs improvement, and how to implement those improvements, or "Progress, Problems, Planning"), data on attendance, and relevant notes on field conditions. This helps the facilitator to review FFS meetings and prepare and improve future meetings.
- Keep good linkage with the facilitator network for exchange of experiences, and practical information such as joint purchase of materials.

- Keep a basic financial administration related to the FFS (e.g. purchase of materials, his/her own travel and communication costs, etc).

4. Communications

Constructive communications with local leaders and supporting agency staff essentially means that the facilitator needs to keep these persons informed about what is happening in the FFS. Simple steps to good communications with local leaders include inviting them to FFSs, visiting their offices and possibly taking them to see the FFS study fields. A field day, an activity late in the FFS schedule, is meant, in part, to let these leaders see the results of an FFS.

Communications with local newspapers or local radio/television may also help for the FFS activities to become more visible to a larger public.

5.2 Selection of facilitators

The facilitator is the key to success in an FFS. Selection of facilitators should therefore be very carefully considered.
IPM facilitators should come from agencies that work at field level with farmers and/or from the farming community itself (farmer-facilitators). These IPM facilitators should be able to spend several hours per week on IPM activities for at least three seasons. In the follow-up stage of the IPM program, the IPM facilitator will facilitate community based actions to raise funds and implement further programs as desired by the FFS participants.

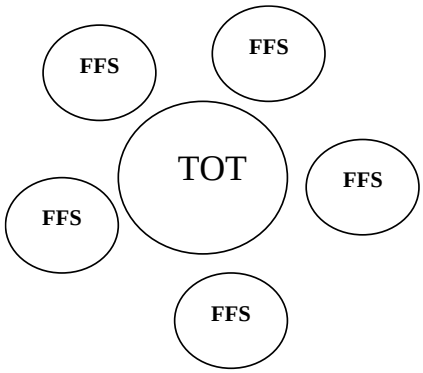
5.3 Training of facilitators

A training of facilitators (TOF) is required for field facilitators to become proficient in the principles of growing a crop, in implementing IPM, and in learning how to implement IPM training through the Farmer Field School model. A TOF should build a team of facilitators that can operate far from "headquarters" in a predictable way.

By the end of a TOF, trainees should be able to:

- Know the main principles and problems of growing a crop.
- Understand, explain and apply NFE methods, processes and group dynamics.
- Understand, explain and apply experiential learning processes.
- Make effective plant protection field decisions dealing with insects and disease pests, vertebrate pests, and weeds, while considering local ecological, social and economic situations.
- Solve new problems presented in the field.
- Initiate training farmers using the Farmer Field School education model.
- Have basic knowledge about budgeting necessary to organize and conduct FFS in their own districts/counties.

In the history of FAO IPM programmes, several models were developed for training of trainers/facilitators. One main model used in [Egypt and] Iran is a season-long training of trainers with regular (e.g. weekly) meetings of about 25 future facilitators. Like in FFSs, the learning approach is non-formal and based on experiential learning. After 2 months (Iran) of basic training, the TOT participants form sub-groups of about 5 persons and these sub-groups organize and implement FFSs on the side. Planning and running of the FFSs is prepared and evaluated in the TOT. The picture on the right illustrates this process.



Model for training of trainers with attached FFSs.

Other models for training of facilitators tested e.g. in Central and Eastern Europe are:

- Co-facilitator: one new facilitator or farmer assists the main facilitator during a full season in 1 or more FFSs (on the job training). The co-facilitator will run his/her own FFS next season.
- Training (workshops) before start of season and/or multiple training sessions of 1 - 2 days during the FFS season for current facilitators.

This IPM project has formed a core group of facilitators by intensive regional training workshops and on-the-job training with (FAO) back-stopping visits during the running of the first season of pilot FFSs in all member countries. The core facilitators will validate the FFS model and content in the season 2004-2005.

☑ ***Whatever the TOF model, important is that TOF graduates are able to perform the duties listed in sections 5.1 and 5.3. Due to different starting conditions, countries may have a different TOF model and different TOT-training content.***

5.4 Facilitation of discovery-based learning

An FFS trainer or facilitator is <u>not</u> a teacher or an instructor. He or she plays a complex role as a guide, a questioner, an organizer, and a coordinator. In addition to the responsibilities listed in section 5.2 above, some qualifications and duties of a facilitator include:
(read "her" and "she" in addition to "his/he")

- His motivation for guiding the FFS is based on a wish to improve his own abilities and those of others. If motivation is based solely on a desire to earn more or attain a higher status it is unlikely that the facilitator will be successful in the long term.
- He always explains the objective and the process before initiating an activity.
- He observes and analyzes the condition of the FFS study field with the participants, encouraging them to make in-depth observations by asking relevant questions.
- He is systematic. This implies progressing from the simple to the more complex and from the known to the unknown when trying to help people understand something new.
- He makes every effort to enliven the discussion and to keep it flowing. Participants are welcome to share any opinions as long as they are related to the topic of discussion. Sometimes the facilitator has to let people know that when someone is speaking, the others should be listening and paying attention. To restart a stagnant discussion, he can ask questions like: "Is there anyone who still hasn't given an opinion?" He can also give his own opinion. If the discussion is not lively enough, the facilitator can ask a difficult question or voice a controversial opinion to elicit a reaction and to make people think.
- He encourages discovery based learning activities by setting up small experiments with or by the participants to find answers to questions or to solve problems.
- The facilitator should pay close attention to the involvement of all participants, ensuring that no one dominates the discussion, and encouraging silent ones to take part.
- When participants cannot answer a question from their own observations and discussions, the facilitator should be able to articulate his own opinion or experience clearly.
- He gives reminders about the time, so that the FFS remains on schedule. Changes to the schedule should be agreed upon by all participants.
- He always shows respect for all participants and their opinions.

☹ Certain behaviors of facilitators hamper the learning process. Some examples are:

- The facilitator seems uninterested, impatient or is unable to focus his attention.
- His explanations are sketchy or unclear.
- He assigns a task that is not clear.
- He gives incorrect or inaccurate information because he does not want to admit that he does not know the answer.
- He shows off with academic knowledge regardless of whether it is relevant to the topic.

- He uses inappropriate methods and/or activities.
- He is disorganized and does not work step-by-step.
- He manages time poorly.
- He seems confused, and hesitates to take decisions.
- He has a negative attitude towards the participants.
- He corners the participants.
- He lacks self-confidence.
- He refuses to discuss problems regarding the FFS with the NPC or fellow facilitators.
- He is directed (forced) to join the program by the NPC or another authority.
- He has no idea how to make an FFS sustainable.

[cases on how to guide the process…e.g. leading a discussion on technical topics??]

A list of **quality indicators for IPM FFS**, and a **self-evaluation matrix** were developed. See annex 3 and 4. Both forms mainly refer to the training process and facilitation. They are very useful tools for facilitators to both assess their own performance as a facilitator (after every FFS meeting!), and to assess other facilitators (cross-monitoring).

5.5 Supporting and backstopping

It is recommended that national coordinators (in cooperation with the regional project coordinator) develop a national system for facilitator backstopping support. This is especially useful for facilitators running an FFS alone. Proper support should be provided on technical, methodological and administrative issues regarding the implementation of the FFS. The support may consist of regular telephone or email contact, visits from the coordinator, national facilitator meetings to exchange experiences, and backstopping visits of experienced (international) IPM resource persons.

Facilitators should meet at least twice per season to exchange experiences, discuss progress, problems and planning. These meeting can be combined with additional facilitator training.

5.6 Farmer exchange visits and cross-monitoring visits

For both farmers and facilitators it can be very useful to visit another FFS, possibly in one of the surrounding countries. A different FFS organization, a different facilitation style, innovative ideas on pest management, interesting discussions with colleagues, or simply noting that this FFS is part of a large regional network for IPM. There are many good reasons for exchange visits.

For facilitators, it can be very inspiring to visit colleague-facilitators to monitor the process and content of another FFS. This is "cross-monitoring". Ideas, problems, suggestions for improvements can be exchanged to the mutual benefit of both visiting and hosting facilitator.

6 FFS preparations

6.1 Selection of location for the FFS

In general, it is recommended to form clusters of FFSs in the same area rather than spreading a low number of single FFSs over a country. A cluster of FFSs stimulates building a critical mass of FFS groups that can interact and thus strengthen farmer networks.

Also, decision criteria for selection of FFS locations are based on administrative boundaries. The more a farmer is dependent on farming, the more likely he or she will be interested in the FFS and the more he or she will participate in it. Conversely, part-time farmers may well turn out to be part-time participants in an FFS. Thus, it makes sense to locate FFSs in areas where farmers are more likely to be full-time farmers and full-time participants.

Another important criterion for selecting an FFS location is the travel distance for the facilitator (the closer the facilitator lives to the FFS location, the better), especially because many of our facilitators run an FFS in addition to their regular jobs.

6.2 Selection of participants

Obviously, participants should be interested to learn more about IPM and other crop production topics in order to become active FFS participants. As mentioned above, the more a farmer is dependent on farming (full-time), the more likely he or she will be an active participant in an FFS.

In addition to this, it is advisable to form FFS groups with participants coming from a similar crop production background. Do not mix large estate farmers with farmers tending to small subsistence fields, or farmers with greenhouse production with open field farmers. These farmers usually have different training needs.

During a regional training workshop in Amman, Jordan (July 2004), facilitators identified the following criteria for selection of participant in addition to the above:

- Should be (full-time) farmers and should grow the crop that the FFS will study
- Should be interested, motivated to join the FFS
- Should be able to learn, wanting to learn
- Should be decision makers
- Should have a common interest
- Should be cooperative

And in some cases it is preferred that:

- They have low education and poor skills (i.e. left out by regular activities and organizations)
- Participants should know each other
- Age is also a consideration

A good number of participants is 15 to 25. Larger groups tend to become either chaotic or passive. Discussions and sharing of experiences may not develop well in smaller groups. Experience has shown that 20-25 farmers can constitute a reasonable critical mass in support of further IPM development in the village. The IPM program in Egypt keeps groups of 8 to 10.

6.3 Gender issues

Generally women play a major role in a sustainable rural community and are important decision makers at household level. In an exercise done during a regional facilitator training workshop in Jordan (July 2004), Lebanese participants concluded that 42% of the labor in tomato production is done by women.

This pleads for active participation of women both as facilitators and as participants in FFS. Where mixed groups of males/females are not culturally accepted, separate women groups may be organized.

[more?]

6.4 Planning of an introductory meeting

Once a farmer group is interested the facilitator should organize an introductory meeting to explain:

- Basic information about the project objectives;
- The objectives of this FFS;
- The benefits for the participants*;
- What is required of participants in terms of time and labour involved;
- The participatory method and why it is different from the "traditional" extension method;
- Duration of the FFS, and meeting frequency.

It is highly advisable to involve local agricultural officers, or staff from extension agencies, NGOs, etc. that are active in this region in order to establish a basis for good communication and cooperation.

At the end of the introductory meeting, the facilitator can ask which of the group members would want to be participant in an FFS. A registration list with names, addresses and contact numbers should be made.

* Farmer benefits depend on the objectives of your FFS. See section 7.1 and also look at the FFS activities mentioned in section 4.2.

7 Designing the FFS curriculum

First, before the FFS curriculum can be designed, baseline information must be collected to determine the main problems and issues of your farmers and the area. With this information, the facilitator can select - with the farmer group- elements to study in the FFS.
Second, a set of learning objectives must be defined: What should FFS participants know, or be able to carry out after the FFS?
Third, the facilitator drafts a curriculum for the FFS, based on baseline information, learning objectives and the number of meetings planned.

All these steps, and more, are described below.

7.1 Learning objectives of an FFS

By the end of the Farmer Field School, the participants should be able to carry out the following:

- Describe the development of the crop.
- Identify and prioritize, with other participants, questions/problems to be addressed in the FFS.
- Identify the ecological function, life-cycle (and give the local name) of major insect pests and natural enemies seen in the field.
- Recognize symptoms, identify the (local) name and development factors of major diseases found that might cause yield losses in the field (if they exist).
- Describe plant compensation and give an example of the importance of plant compensation for insect pests, or disease management.
- Describe the toxicity of commonly used pesticides (herbicides, fungicides, insecticides) and methods to avoid exposure to pesticides.
- Describe the effect (or lack of effects) of pesticides (herbicides, fungicides, insecticides) on target pests, natural enemies, non-target pests, the environment and health of farmers and consumers.
- Describe the level of potential yield-loss given a particular field condition and compare with the cost of controlling yield-loss factors (decision making).
- Describe possible effects of management practices other than pesticides on pest population levels.
- Describe options for release of biological control agents for use in greenhouse or open field.
- Describe why and how to set up a field study.
- Describe the potential development of pests in the field given the field conditions (plant development and stage, weather pattern, plant resistance, water levels, pests, natural enemies, etc.) and compare to potential management activity costs (irrigation, fertilization, pest control practices) that could be undertaken to improve yields and reduce impact of yield-loss components (decision making).
- Describe the importance of record keeping.
- Work as a group.

When, after a full FFS season, the farmer group is interested to continue their activities, a second FFS may be organized. For such a second cycle FFS (see section 4.2) the participants will have to become more independent from the facilitator/project and will discuss and decide on topics to be included into the FFS curriculum.

All of the above listed objectives can and should be further strengthened in a 2nd cycle FFS! In addition, a ***second cycle*** **Farmer Field School** should be able to carry out the following:

- Identify and prioritize, with other participants, questions/problems to be addressed in the FFS.
- Make proper crop management decisions based on thorough field observations, and analysis (AESA).
- Understand and describe importance of proper soil management.
- Identify the ecological function, and life-cycle of major natural enemies seen in the field.
- Design an outline for an FFS curriculum.

- Design, implement, analyse and evaluate field studies (incl. economic analysis).
- Describe options for (and in some areas methods to use) biological control of pest insects.
- Strengthen networking amongst farmers.
- Use farmer networks to establish methods for collective action against certain pests or diseases, where appropriate (e.g. apple).
- Promote linkages with other agencies/institutions about IPM/sustainable farming.
- Keep appropriate farm records (e.g. for economic analysis).
- Describe socio-economic factors affecting farming.
- Describe basic elements of IPM strategies for their crop.

☑ ***Select or adapt learning objectives for your FFS. This is the first step into developing an appropriate FFS curriculum and it helps in evaluating the program at the end of the season!***

7.2 Elements of an IPM FFS curriculum

During the regional field training workshop in July 2004 in Amman, Jordan, it was agreed upon that an FFS in the Near East project should be season-long and have regular meetings. In addition, the following FFS-curriculum elements were identified:

- Field study (season-long)
- Agro-EcoSystem Analysis (AESA)
- Special topics
- Group dynamic activities

Details on what these elements contain, why they are important, and how they can be adapted to Near East conditions, are listed in annex 1.
Practical methods to implement these elements into an FFS are described in sections below.

7.3 Participatory curriculum development

Steps to developing an FFS training curriculum include:

- Determine field activities and learning topics (based on needs assessment/cropping calendar and problem identification/prioritization as in sections 7.4 and 7.5 below)
- Design field studies (how to design the field study)
- Plan number of meetings per season
- Plan "routine" activities during FFS (AESA, meeting schedule)
- Plan special topics
- Plan "less traditional IPM topics" e.g. subsidies, marketing, etc.
- Plan farmer exchange visits/cross-monitoring visits
- Budget planning (refer to section 7.12)

"Participatory" means that farmers, facilitators, and possibly participants from extension services, NGOs, etc. are involved, will share their expertise and experience, and will influence all steps of the curriculum development. They are <u>equal partners</u> and all contribute to decision making.

Note: a curriculum, no matter how carefully it was developed, is bound to change during the course of the FFS due to (unexpected) field conditions or other factors. Be <u>flexible</u>, that's one of the qualifications of a good facilitator…

7.4 Baseline information and needs assessment

What it is.
Baseline information: information about farmers' current practices, problems, and inputs/outputs in farming as well as general farm data. An example of a baseline survey form is found in annex 2.

Needs assessment: inventory of farmers' needs to support farming. Needs assessment is part of the "problem identification" as mentioned in section 7.5 below.

Often, needs assessment is done as part of baseline information gathering, because farming needs are an obvious next step after listing current practices.

Why is baseline information necessary?
1. To learn about problems and needs of farmers, in order to develop a training curriculum that meets farmers needs (see under "how to use…" below)
2. To obtain information about farmers' current practices for possible use in field experiments as control plot (the "farmers' practice").
3. To collect information about farmers' current practices for later use to measure impact from the training.

How to collect baseline information?
There are several methods to collect baseline information from farmers such as:
- Informal interview: informal meeting/open-ended discussion with one or more farmers, to collect baseline information. Some pre-planning by facilitator is needed to determine what information is relevant and comparable. The facilitator has the main points in his head, but asks open questions trying to get the information needed, and providing opportunities to get other relevant feedback from farmers.
- Formal interview with questionnaire: formal meeting, preferably with 1 farmer, following questions from a questionnaire. Alternatively, the questionnaire can be given to farmers to complete at home or individually during a meeting.
- Cropping calendar: usually group work with farmers to prepare a calendar to list the main activities, problems, opportunities and possible solutions per month/season. Example in exercise [ ] in part II.

When to collect baseline information?
Before the start of the season, when selecting locations and participants. Early collection of this information allows sufficient time to plan the FFS curriculum, field study, special topics, etc.

Who collects the information?
The facilitator, possibly together with other facilitators and/or with the NPC.

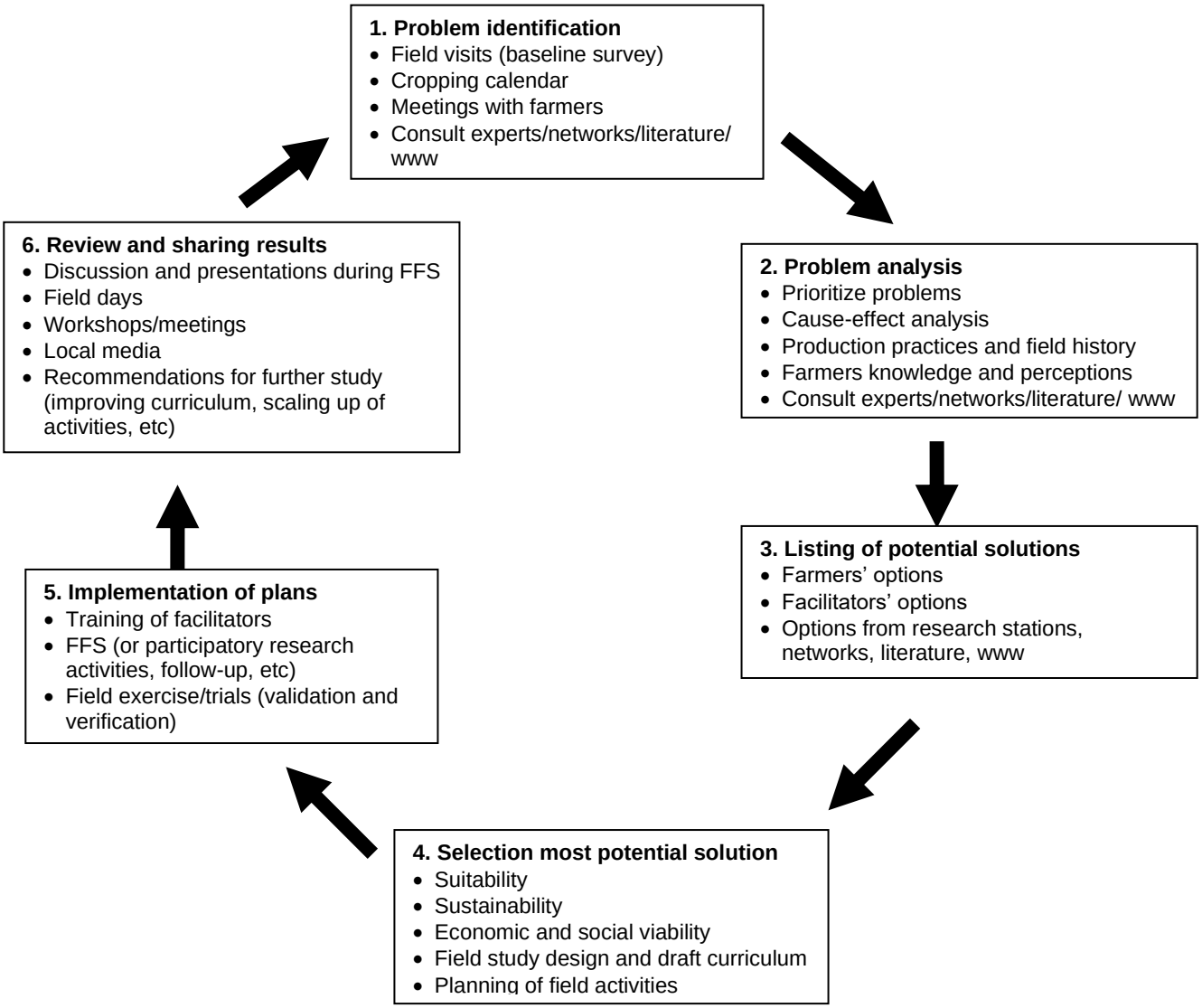
How to use baseline information?
In addition to the objectives listed above, in a session with the farmers group baseline information can be used to set priorities on the different needs identified, and to identify which topics can be addressed in the FFS. In addition, one of the topics can be selected to set up a field experiment. Other topics may be useful to include in the curriculum as small experiments or "special topics". The facilitator can plan and prepare these topics in time, and/or contact resource persons for specific sessions in the FFS.

The number of topics selected by the farmer group should be discussed in relation to the number of meetings planned for the FFS season.

7.5 Participatory problem identification (steps in problem solving)

The following schedule (developed by IPM trainers from Asia) visualizes possible steps into solving a (technical) problem and can also be used to identify topics to be included into an FFS curriculum.
In bold, are the main steps and the bullets below are possible activities.
Please also refer to sections below.

Steps in problem solving:



7.6 Determine field activities and learning topics

In a session with farmers the baseline information collected earlier (or during that session) can be analysed and priorities set (step 2 in problem solving cycle). Listing of potential solutions and selection of most potential solution is done with the farmer group (steps 3 and 4(partly)). Farmers can give inputs and determine what major topics they would like to study in the FFS.

The group and facilitators determine which topic will be subject for a field study. It is recommended to have a field study comparing IPM practices versus conventional practice. Other topics may be useful to include in the curriculum as small experiments or "special topics".

In general, it is recommended to select only one season-long field study, with 2 or 3 variables. This allows the FFS participants to be divided into 2 or 3 sub-groups. Each sub-group will monitor and take assessments in one part (variable) of the study field.

7.7 Designing a field study

When topic and the learning objectives for a field study have been selected, the facilitator can work out the details, preferably with the farmers group. Typical elements of a field study include:

- Title of the study
- Background (why is this topic important for this farmer group)
- Hypothesis (ideas to be tested)
- Objective(s) of the study (both learning objective and technical objectives)
- Time needed
- Materials needed
- Procedure
- Assessments taken (incl. type, frequency, how and when to record and analyse data, etc)
- Guiding questions/points for discussion
- Suggestions for evaluation/economic analysis/conclusions

☑ ***Please refer to "Facilitating Scientific Method" as follow-up for FFS graduates in annex [9]. This manual provides very good technical information on both how to set up participatory experiments and how to facilitate these.***

Some practical suggestions:

- Make sure the study field is located at an easy travel distance for all participants.
- Good field studies usually have only 2 or 3 variables. The more variables, the more assessments need to be taken, the more complicated it becomes, and the more chance you have that in the end nobody knows exactly what it was that was being studied….☹
- Make good arrangements with the owner of the land before the FFS starts about financial compensation and logistics. Logistics include all management practices for that field (fertilization, ground working, labour, application of pesticides, time of harvest, etc). Also discuss with the owner of the field who gets the harvest and who decides on when to harvest. It may look obvious but many FFSs have lost valuable information due to miscommunication! Management of the study field must be done in close cooperation with the FFS group. It is the responsibility of the facilitator to ensure proper communication regarding field management.

7.8 Plan number and frequency of meetings per season

The number and frequency of meetings depends upon the:

1. participants & facilitator
How much time can participants spend, how many other duties has the facilitator?

2. crop (annual/perennial) + organizational arrangements for crop management
Meetings should take place at relevant times during the cropping cycle, for example before transplanting, at seedling stage, at xx-leaf stage, etc. Facilitator can use the cropping calendar (section 7.4 and exercise [ ] in part II) method to find key times in the season.
In Iran, grape FFS meetings continue after harvest to deal with post-harvest issues.
When FFS participants decide that the management activities for the study field are done BY the participants (common practice in Asia), more frequent meetings are needed to take action based on group decisions.

3. learning objectives of your FFS
When farmers are introduced to the FFS objectives and have voiced their needs for topics to be addressed in the FFS, the facilitator can discuss with the group how many meetings would be needed to cover all these topics. A long growing season like in greenhouse tomato with (bi-)weekly meetings, such as scheduled for the season 2004-2005 by Jordan, allows for many activities.
The more topics and objectives, the more meetings are needed.

In some regions, for example in Central Europe, farmer groups wanted to continue meetings during winter to talk about "general" farming topics such as marketing, subsidy systems, etc. Facilitators should encourage and help organize such initiatives.

7.9 Meeting Schedule for FFS

The following FFS meeting schedule is a sample for an FFS with 12 meetings. In general it will be necessary to adjust the content and schedule to local conditions, field problems and farmers' interest.

Pre-season	Meet with farmers in the FFS area to explain the FFS and to recruit participants. Be sure to clarify all obligations of FFS participation. Arrange for a study field within easy reach of the FFS participants. Do Baseline survey/needs assessment.
Meeting 1 (before planting in annual crops, and before start of season in perennial crops)	Opening ceremony with introductions, possibly pre-test (knowledge) and planning of field studies by FFS participants and facilitators. Possibly cropping calendar exercise to identify issues for inclusion as Special topics.
Meeting 2	Team building exercise Introduction to Ecosystem and Agro-Ecosystem Analysis
Meeting 3	Agro-Ecosystem Analysis (decision making) Special topic
Meeting 4	Agro-Ecosystem Analysis (decision making) Special topic e.g. natural enemies
Meeting 5	Agro-Ecosystem Analysis (decision making) Special topic e.g. weeds
Meeting 6	Agro-Ecosystem Analysis (decision making) Group dynamics Pesticides & Pesticide Toxicity
Meeting 7	Agro-Ecosystem Analysis (decision making) Group Dynamics Special topic, e.g. mapping
Meeting 8	Agro-Ecosystem Analysis (decision making) Brainstorming on follow-up activities Diseases or other topic
Meeting 9	Agro-Ecosystem Analysis (decision making) Special topic
Meeting 10	Agro-Ecosystem Analysis (decision making) Proposal Writing, Work plans, Budget Community Self-Survey
Meeting 11	Agro-Ecosystem Analysis (decision making) Field Day Planning
Meeting 12	Post-test Field Day/Harvest and Weighing of Field Trials Closing Ceremony with Certificates
Post-FFS	Inform FFS participants of pre- and post-test scores Evaluation of field studies, and training as a whole Make regular visits to follow-up activities, if applicable

In addition to this meeting schedule, the facilitator should plan the contents of every FFS meeting in more detail, listing time needed and responsible resource person. An example of one typical FFS meeting could be this:

Time	**Activity**	**Facilitator**
08.00 – 08.10h	Welcome and explanation of today's programme. Sharing of important issues from participants related to this training or from their own fields.	Main facilitator
08.10 – 09.00h	Field work: sampling the field, recording of field observations, preparing posters that include analysis of field data and necessary action (decision making).	One farmer facilitator for every subgroup
09.00 – 09.30h	Presenting field data of every sub-group to the whole group, discussion and conclusions.	Farmer facilitators

09.30 – 09.45h	Summarizing results and comparison with data of last meeting. Appointing members responsible for specific actions or follow-up if so decided by the group.	Main facilitator or farmer facilitator
09.45 – 10.00h	Group dynamic activity	Main, or Farmer facilitator
10.00 – 10.50h	Special topic	Main, or resource person
10.50 – 11.00h	Summarizing meeting, lessons learned, planning for next meeting and topics to be discussed then. Closing.	Main facilitator

7.10 Materials and standard forms needed during the FFS

Some materials useful during the FFS are:

- Flap-over, large papers, and marker pens.
- One notebook and a pen for each participant.
- 3 sets of color pencils.
- Traps (yellow sticky or pheromone) for monitoring specific insect populations.
- Plastic jars or bags to collect insects and/or to set up insect zoos (please refer to exercise [ ] in part II).
- Different cages to study life cycles, emergence of larvae, etc.
- Polystyrene (or other soft material) and needles to set up an insect collection.
- Colored rope to mark plants or traps in the field.

In some FFSs, facilitators use standard forms to collect field data for agro-ecosystem analysis.

7.11 Record keeping

During the course of an FFS, a range of data is produced.
Generally, it is the responsibility of the facilitator to keep records about the general course of the FFS (e.g. meeting schedule, attendance record, etc). Summary field data (e.g. data field study assessments (AESA)) can be kept by the facilitator and the FFS participants. These field data show population dynamics of pests (and diseases) at the various crop growth stages and will be used at the end of the FFS/field study for (economic) analysis.

Record keeping is also an important topic (special topic) in the curriculum of an FFS. It is important that farmers get used to keeping farm records, for those who do not do that already. Basic records allow for comparison of treatments, economic analysis, and are a helpful tool in comparisons and decision making over the consecutive growing seasons.

7.12 Budget planning for the Farmer Field School

Each FFS requires a budget to ensure that activities are supported. The elements included in the budget are normally:

- Materials for the FFS (papers, markers, pens, materials for insect zoo, etc)
- Field materials
- Compensation for the field used for studies
- Travel costs for the facilitators
- Incentive for the facilitators

For each item the facilitator should be able to provide details on how many units are needed for the activity, and the unit price. This will help to prepare the detailed budget. Each facilitator should make a budget at the beginning of the season. The NPC and the regional project coordinator will have additional information on the different budget items. They will consolidate the budgets at country level. They will also

make sure that funds for the training will be delivered timely to the field, and will explain what kind of administration the facilitator will need to provide to account for the expenditures.

Training is not free. This IPM project is assisting farmer groups to learn and practice IPM in their crops, and provides funds for these activities. When groups want to continue their FFS activities during a 2nd season, the facilitator should draw up a budget together with the farmer group, using a similar outline as above.

The facilitator can also discuss with the farmers whether they themselves could support some of the costs for the FFS. For example, each farmer in the FFS may pay a small contribution to be member of the group (this fund should be managed by the group), so the group has some funds to continue activities even if the support of the project is no longer available.
Another option is that net profit made from the study field harvest is put into a separate fund to allow continuation of the group activities.
Facilitators can also assist the farmer group to apply for other funds, e.g. from NGOs or other external sources. See the example from Iran in box below.

In the future farmers might be willing (or have) to pay for services and information that is of use to them and their farming. By making the budgets together, and discussing cost-sharing, farmers become more aware of costs, and are encouraged to raise funds as a group to have access to certain services.

Self-financed FFS follow-up: a case from Iran [what year??]

After graduating from a rice FFS, farmers asked the local Agriculture Organization, the Ministry of Agriculture, their representatives at Parliaments and others to provide funds for follow-up activities for this group. The reason for this request from farmers was that they found in the FFS that:

1. spraying pesticides was not effective against pests,
2. pesticides had a negative impact on their health,
3. production cost decreased,
4. benefits increased from fish and duck (duck-rice and fish-rice cropping system rather than rice only)

As the result, the Agricultural Organization approved 20 FFS in Mazandaran Province on rice where a project was ongoing on preserving the habitat of the Siberian Crane through IPM/FFS. Two FFS for district were funded. The government supports only facilitators and communities pay for tolls and other needs.

8 The implementation of FFS

The following activities are part of every FFS meeting:

1. Field observation and sampling
2. Charting the development of the crop and grouping field data
3. Agro-ecosystem analysis
4. Presentation of results and discussion
5. Economic analysis
6. Group dynamics exercise
7. Special topic

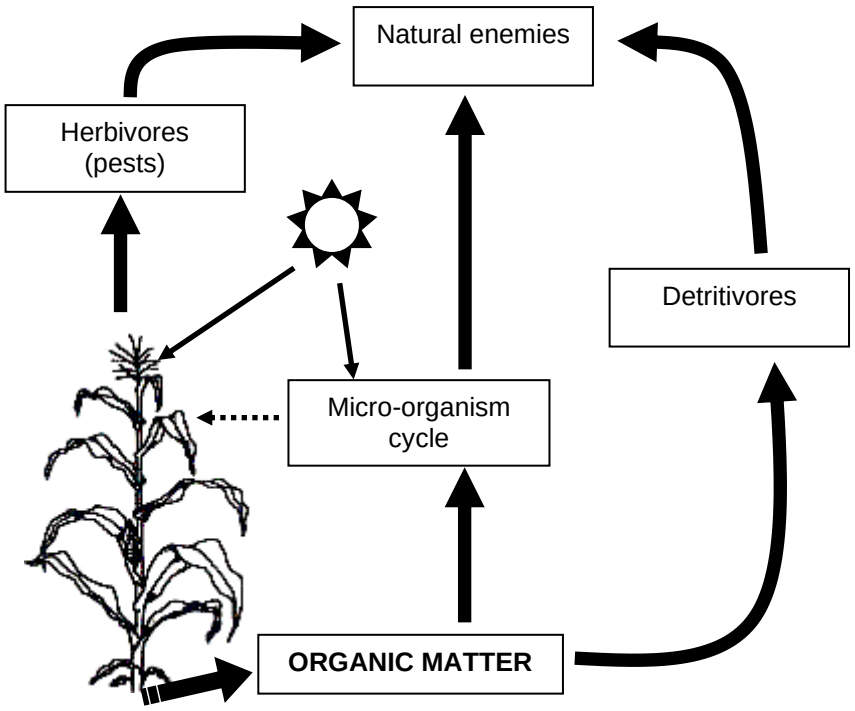
Some of these activities are only appropriate when the crop has reached a certain age, or growth stage. Then these activities are gradually incorporated into the FFS meeting schedule. In addition to these routine activities, participants may choose to conduct additional experiments on the FFS field. These experiments are designed by the group assisted by the facilitator. See section 7.7 for details.

Before providing details about all of the above listed routine FFS activities, we will explain a bit more about the agro-ecosystem because this is the basis for IPM decision making.

8.1 The agro-ecosystem

IPM is based on ecological interactions between the environment, plants, herbivores (diseases, insects, and vertebrates), and natural enemies of herbivores (spiders, ground beetles, parasitoids, etc.). The health of the plant is determined by the environment (weather, soil, nutrients) and the herbivores. The herbivores are balanced by their natural enemies.

A few basic variables and processes determine the dynamics of the ecosystem.



Trophic-level energy flow diagram for corn (modified from Settle et al, 1996).

Ecosystems are based on flows of energy, and have different levels called *trophic* levels.
Plants represent the first trophic level in an agro-ecosystem. They use water, sunlight and nutrients to grow and develop. Herbivores (pest insects) feed on the plant. They obtain their energy to grow and develop from the plants, and represent the 2nd trophic level in the agro-ecosystem. Then there are natural enemies that feed on or develop on the herbivores. Think of predators (e.g. spiders, ground beetles) and parasitoids (e.g. *Trichogramma* sp.). They represent the 3rd level in the system. Plants, herbivores and natural enemies have limited life-span. Micro-organisms and insects (detritivores) decompose organic matter that becomes available as nutrients again, for plants and insects. Some of these insects are food for natural enemies and help stabilize agro-ecosystems. The decomposers are the 4th trophic level in the agro-ecosystem.

Natural enemies -especially generalist predators- are not directly dependent on pest populations. Rather, there are three separate avenues for energy flows to natural enemy populations: 1) from organic matter via micro-organism cycles, 2) from organic matter via detritous-eating insects, and 3) from the plant via herbivores.

Understanding functions and interactions of the different elements of the agro-ecosystem is the key in IPM. The farmer, as a manager of the agro-ecosystem, is constantly interfering in the agro-ecosystem through crop management practices. Existing (delicate) balances in the ecosystem can easily be disrupted by such crop management practices. The balance between plant and soil is one. The balance between herbivore and natural enemy is another. Fertilizers can provide the plant easier access to certain nutrients, but pesticides can destroy natural enemies.

Indigenous versus non-indigenous crops
For an indigenous crop such as rice, grown for thousands of years in Asia, the ecosystem has been evolving into a -more or less- stable system. Therefore, rice ecosystems harbour a large and extremely biodiverse population of indigenous natural enemies. Pest management in rice is mainly based on "informed non-intervention", i.e. continue monitoring the field but do not apply pesticides. A complex of natural enemies will likely be able to keep pest insect populations low whereas healthy rice plants can compensate for major crop injury without yield loss.

Most target crops in our project are not indigenous to the region. This means that the crop ecosystems in general do not have a natural enemy population as abundant and diverse as in indigenous crops. The pest management strategy needed in such ecosystems is therefore frequently based on "informed intervention". Often, pest (and disease) problems will require appropriate and informed intervention to manage these problems. This is especially true for greenhouse crops.

Important in IPM (in all crops) is that we look at the crop ecosystem from the view point of maximizing profits without destroying the system. During IPM training, emphasis is given on building awareness of the complex relationships that exist in our fields. We should realize if one thing in the ecosystem is changed, it can influence all of the components of the ecosystem.

☺ ***When we understand the interactions and components of the agro-ecosystem, we are able to make better (intervention) decisions.*** ☺

Please refer to exercise [ ] in part II of this guide.

8.2 Field observation & sampling

The final goal of IPM is to improve decision making for better production and profits. Sampling is one of the first steps in the management methods.

Sampling has many goals depending on the person sampling. For a researcher, sampling usually must be very precise, and requires a lot of observation time. For Pest Observers, sampling should be sufficient to estimate the level of populations in specific fields. For a farmer, sampling should tell him/her if the population is above a damaging level, and if the population is increasing or decreasing. It is not important

for farmers to know the exact level of populations in the field, but they have to be able to make an accurate estimate.

Sampling for IPM is looking at a few plants in the field or greenhouse and estimating what is happening in the whole field/greenhouse. Good samplers must be good observers, consistent, and experienced.

The result of sampling will be used with other information such as thresholds, natural enemy ability, plant health, farm budget and weather to make an analysis of the field for decision making.

[photos]

Farmers and facilitators sampling greenhouse tomato – Lattakia FFS, Syria.

8.2.1 How to sample in FFS

FFS participants split up into two or more smaller subgroups. Each subgroup samples at least one location in the study field, usually one of study variables. Observations are made at each location of:

- Date, type of study field assessed, no. of days/weeks after sowing/transplanting (for annual crops) or growth stage (for perennial crops);
- Soil conditions;
- Weather conditions (open field) or climatic conditions (inside greenhouse);
- Plant development: plant height, and the size and number of leaves, etc. (for annual crops), growth stage (for perennial crops);
- Plant health status, based on leaf color (nutrient deficiency symptoms), etc.;
- Pest and disease attack symptoms, number and types of pests and natural enemies;
- Presence of pest insects in the soil, or soil-borne diseases;
- Presence of insects living on the soil (pitfall traps);
- Weed incidence;
- Environmental conditions around the field;
- Unknown insects, leaves with an unfamiliar appearance, with symptoms of unknown diseases, insect damage, or with other damage are collected into plastic bags or other containers and taken to the FFS meeting site for further observation and identification.

It can be useful to provide a form for sampling.

NOTE:

1. *Groups have to look for ALL insects that occur in the field at the time of sampling. Do not instruct the first group to look for species A, the second group to look for species B and another group for the next insect! Observe the whole ecosystem!*
2. *Traps, both pheromone and sticky traps, are useful to assess certain insects. However, do look at a number of plants in addition. Traps, especially pheromone traps, give an indication for the presence of specific insects in the field but are not representative for the actual field population! Be careful with interpreting trap data.*
3. *Be sure to carry jars or plastic bags to the field to collect insects or disease symptoms to be shown to all participants during processing of field data. Insects can be saved for the insect collection (see section 8.8.2 below).*

8.2.2 Insect collections

It is recommended that every FFS prepares a collection of insects and possibly diseases found in the crop. Making a collection motivates participants to observe the ecosystem more closely during sampling. Second, a good collection can be used for Field Days and other activities where it is not possible for visitors (policy makers and others) to enter fields. Insects should be separated into three groups: pests, natural enemies, and others (neutrals, crop visitors, decomposers).

8.3 Charting crop development and grouping field data

Data collected during field observation are written down on posters for analysis and presentation later. Preferably, the plant is drawn and numbers of insects, diseases, soil fauna etc are drawn. All elements of the ecosystem can be visualized in the drawing. This helps in discussing the results and making the analysis.

[photo]

Processing field data in small groups (Lattakia FFS, Syria)

8.4 Agro-ecosystem analysis

The goal of Agro-Ecosystem Analysis (AESA) is to assess what type of action will be needed to best produce a profit for the farmer.

Each subgroup pools the information gathered at their sampling sites and discusses the observations, differentiating between positive and negative elements for crop, field, environment, and personal health. The subgroup formulates a summary of their observations and draws conclusions about the state of crop health, after taking into account the balance between positive and negative elements.

Note: In the beginning, the analysis will take a lot of time. By the end of the season, however, you should be able to do a complete analysis while standing in the field. ☺

8.5 Presentation of results and discussion

- Each subgroup presents their results to the entire group.
- The other subgroups ask questions and raise discussion points.
- After all the groups have finished, the facilitator guides the group as they formulate an overall summary of field and plant conditions, draw conclusions and recommend actions (crop management practices) to be implemented during the upcoming week(s) until the next FFS meeting. One or more of the participants should be responsible for follow-up of the action points.

[photo]

Farmer presents field data to other Farmers (Lattakia FFS, Syria)

8.6 Economic analysis

Often, the main aim of evaluation of study results is assessing the cost-effectiveness of IPM technology. This can usually be done only at the end of the FFS, except for crops with longer harvesting periods such as greenhouse tomato.
The FFS group should keep a record of all the activities, inputs and outputs for the FFS field during the whole season. Try keep basic data about price fluctuations in the market. This may help determining crop planning for peak production at peak prices.

Results are evaluated by measuring the yield and quality (be sure to include quality – this is often overlooked in field study evaluation but obviously has dramatic effect on prices!) of products of all the experimental plots in the FFS field, analyzing different treatments, and conducting an economic analysis. Yields should be converted to standard units (tons/ha).
Exercise [5] in Part II explains the economic analysis exercise in detail.

Compare and discuss the study field data with all the FFS participants, and come to a general conclusion about the field study in a participatory way. Discussion can be facilitated by posing "guiding questions" that refer to your specific study. See exercise [] in part II for an example of a field study design, including guiding questions.

☺ **Make sure that all participants know the outcome of the study!**

As obvious as it may seem, participants are often busy harvesting their own fields in addition to the study field. In this case, better delay the economic analysis until after the main harvest period to ensure full attendance of FFS participants.

8.7 Group dynamics

Working with groups means dealing with people with very different characters, educational backgrounds, age, experiences etc. And that is not always easy…
Group dynamic exercises help a facilitator to work with a group and develop a true "Team" out of it.

The term "Team" is used here to emphasize that a group needs to work together with common goals for common interests and that teams often have structure. There are coaches, captains, and players with various positions. No team can work well without each team member, and the team succeeds more often when everyone works together while each improves individual skills and commitment.

Facilitators should build up a repertoire of activities that can used for interesting opening that help participants to become comfortable with each other ("Ice Breakers"), activities that boost the energy level of the group after visiting the field or after a break ("Energizers"), activities that are just fun to do in groups and make getting together a better time ("Team Fun"), and activities that build team capacity through learning techniques for planning, organizing, and action ("Team Skills").

During the cycle of the FFS over one season, energizers and team fun might be used more at the beginning of the season, with more emphasis on Team Skills near the end of the season, especially in preparation for community organizing.

Remember that training should be enjoyable for the facilitator and FFS members. Ask members of the group to lead other activities like warming up exercises at the beginning of each meeting, or other activity that they may have learned at another training program.

8.8 Special topics

Special topics support the agro-ecosystem analysis by dealing in more detail with specific issues relating to the agro-ecology, crop development, IPM principles, biology of insects, group dynamics, and provide training in basic experimentation methods. Often, special topics are identified during baseline surveys/needs assessment or during the participatory curriculum development. However, it is also possible to "extract" special topics out of a group discussion during which many (technical) topics are raised.

After the facilitator introduces the special topic and explains the steps to be used in the process, the participants assume the active management of the experiment or activity. Most special topics follow a structure similar to field studies. They have an objective, procedure, time needed, guiding questions, suggestions for evaluation/conclusion, etc. See section 7.7.

Special topics can be done in the field, by setting up small experiments or establishing monitoring tools (e.g. cages). They can also take place in a discussion room, for example after having done AESA during the FFS meeting. However, it is advised to base special topics on actual field conditions!

A number of examples of special topics can be found in exercise [ ] in part II.

Special topics can be handled by the facilitator, when he/she is familiar with the subject. In special cases, a resource person can be invited to the training.

8.8.1 Resource Persons

Resource persons like researchers, university professors, international visitors and experts, NGO representatives, or others can provide some refreshing inputs to the training of facilitators or to an FFS. However, it is important to provide some tips to these resource persons:

- Go to the field together for field walks where questions and answers can take place.
- Leave slides and lectures until after field interactions.
- Request the resource person to be as "participatory" as possible.
- Be sure that the resource person gives an address and other contact information for future reference by trainees/farmers.

8.9 The Field Day and Graduation ceremonies

At the end of an FFS, a "Field Day" will be organized to present the results of the FFS other farmers, agricultural staff, NGOs, and local government officials in the community. It would be good to invite colleagues, and superiors of the current facilitators to the Field Day. This will create understanding and support.
In addition, press can be invited to join the Field Day for extra publication in Agricultural magazines or local newspapers.

Field Days are organized before the crop is harvested. Visitors will be able to see activities in the field, e.g. different study treatments, traps, insect collections, etc. Field maps of the village can also be helpful to inform visitors (see section 8.9).

Graduation ceremonies can be held to award participants in the FFS with a graduation certificate, acknowledging their participation in the FFS. This may be done simultaneously with the Field Day or at the last meeting, with FFS participants and possibly family members.

9 Participatory mapping

Maps of a village, or an area, can be helpful tools in an FFS for several reasons. Mapping can be used to provide a historical overview of fields/cropping patterns in the village. This can be linked to pest insect or disease population levels to create awareness and stimulate a discussion in the FFS about where a specific pest or disease is predominantly present and why (history of crop rotations, crops grown on bordering fields, effect of other farmers' practices on pest populations, etc. etc.). This is useful because such maps can be used as basis for determining activities in the area of collective action and/or community IPM.

Make maps together with an FFS group. Determine together which information is useful and interesting to collect and summarize in a map. This is part of the education process!

Maps are important tools to help IPM farmers to think about how IPM/FFS activities that were conducted in their villages are connected (also at national and international level!) and mutually supportive. Participants and a larger audience who see the integration of these activities are able to create a common vision of where further IPM activities might lead. A field day (section 8.9) can be a good moment for this.

Maps can also be directly linked to previous FFS and IPM activities, for example number and sites of FFS that have previously been conducted, the number and location of Farmer IPM Trainers, sites of IPM studies that have been conducted, soil conditions, etc. This can be useful later on in the project, when the number of FFSs is growing. It may be helpful for impact assessment at a later stage.

Please refer to "Field Guide for Agroecosystem Areal Planning" developed by the FAO Programme for Community IPM in Asia (1998) available on www.communityipm.com.

[Syria: case of apple scab forecasting – is that relevant here? Other examples from the region?]

10 Marketing aspects

Cleaner products resulting from implementation of IPM technology will allow better access to domestic and international markets. Increased requirements for high quality products are mostly needed to comply with the strict European guidelines on Maximum Residue Levels of pesticides (MRLs) starting in 2001. Domestic markets will also increasingly require better quality and low pesticide residues in the products.

What is MRL?
For most pesticides the World Health Organization has established a Maximum Residue Level (MRL). With the current knowledge about the chemicals it is expected that food with residues below this MRL can be safely eaten. "Safe" fruits and vegetables are produce where residues do not exceed these MRL levels.

Syria, Jordan, Lebanon and Palestine will conduct a marketing study for this project in 2004/2005. [expected outputs?]

Most countries in our project do not have a national IPM certification system, except for Jordan.
In Jordan, to improve marketing of IPM products, an IPM certification system has been set up in cooperation with traders, retailers and Amman Central Market [ref. Prodoc.]
[Jordan: output from GTZ project 1995-2001: IPM certification system for marketing IPM products! Case??]

It depends on national governments if and how certification systems for IPM products will be established. There may already be an official organic product label. To certifying IPM products, precise guidelines/regulations are required e.g. on the kind of crop management practices (incl. brands, types, dosages, application methods of pesticides) allowed at what time in the cropping cycle. In addition, an inspection system that includes sampling for residues has to be established to ensure that IPM claims are justified and to correct farm procedures if necessary.

[case of organic citrus in Syria?]

Note that certification systems are not essential to access (export) markets.

Here are some activities that can be taken up by an FFS, which may help (prepare farmers to) accessing markets to obtain a better price.

1. Record keeping is an important element in any (future) certification schedule. Farmers will need to keep a log on (especially) inputs such as fertilizer and pesticide use and timing. This will provide "prove" on their compliance to IPM guidelines.
2. Grading of products after harvest is something to discuss in the FFS group, where applicable. Basic grading done at farm level may increase unit price for best quality versus selling in "bulk".
3. Packaging of products can get special attention in the FFS.
4. The facilitator or FFS members may contact export or trade companies, retail organizations, nearby hotels, local supermarkets, etc, to discuss options for sale of clean IPM products from the FFS members. Many of the bigger supermarkets are taking food safety very serious and will only buy products from farmers they can trust to produce healthy food. Inviting representatives to a Field Day is a good idea! See section 8.9. In some areas, farmers directly develop relationships with consumers built on trust and knowledge of their farming practices.
   Some of the IPM products can be labeled by the farmer groups themselves to certify that residue levels are expected to be below MRL.
5. The FFS can be a platform for sharing the findings of marketing studies (e.g. those conducted through this project) and discuss the opportunities and challenges lying ahead of marketing crops produced through IPM methods.

11 Evaluation of FFS training

Evaluating training has at least three steps. The first step is to evaluate each session with the goal of ensuring that each participant was able to learn some useful management skills, ecology, or other points that makes it worth the farmer's time to participate in the training programme.

The next level of evaluation is to consider the improvement that occurs during one season of training. These methods mostly consider changes in knowledge and field skills between the beginning and the end of the training; changes assumed to have taken place as a result of the training activities during one season.

The third and perhaps most important evaluation is check for impact of training. Farmers may improve their basic skills and knowledge, but this may not always lead to a change in field action or even to a desirable change such as changed crop management practices, reduction in toxic pesticide use, improved yields, or improved economic returns.

Always remember that the goal of an IPM programme is long-term impact. Our goal is not to "train everyone in the village". Training is one means to an end. There are other ways that should also be considered (policy changes, media, etc.) to achieve our long term goals.

Evaluation will help us know when we're arriving to where we think we are going.
☺☺☺

11.1 Evaluation during the FFS season: training quality

Basically, an FFS is build up of *content* and *process*. Content is *what* is done in an FFS; process is *how* it is done.

A list of questions, called the **Quality Checklist** (found in annex 3), can be used to assist an observer in examining the quality of IPM training in this IPM project. This list also helps the facilitator to improve the FFS during the season. The quality checklist identifies the key points in an IPM activity that must be present if the quality of the process of training is to be maintained. Most of the questions refer to process, assuming that the content of the FFS (the curriculum elements) are there. However, in new program such as this project, it is advisable to also check the technical content.

At the end of each FFS meeting, the facilitator should go through the Quality Checklist and Self-Evaluation Matrix given in annexes 3 and 4. These tools can be used by the facilitator as an individual or as a group.

The "T Chart" evaluation method given in section 11.2 is also useful for evaluation by the group, especially in the early weeks when facilitator and group are getting to know each other, and getting used to field training methods.

Evaluation with the participants is best done after two or three meetings, when participants are more familiar with the process and content of the FFS. It can be repeated every second or third meeting, depending on the group and the number of meetings.

Other indicators for evaluating the training quality are:

- The number of meetings held and number of participants present.
- Reasons for cancelling meetings or for being absent from meetings.
- Number of drop-outs from the training or number of additional people wanting to join the FFS during the season.

11.2 Evaluation at the end of the FFS training

It is important not to confuse the improvement in knowledge and skill from one training season with training impact (see next section). It is sensible that impact is more likely with more skills and knowledge, but we can not assume immediate changes from improved skills and knowledge. A good example is the following. After a training or media programme directed at smokers to help them learn about the effects of smoke on their and their neighbour's health, most smokers will score highly on an evaluation. Most will know that smoking is bad for them. This indicates the training program is working well to disseminate knowledge. But the impact of the training will only be found when we check how many smokers stopped or reduced smoking.

There are numerous ways for a facilitator to evaluate the progress of one training season. Remember that each FFS may have had general objectives, or a list of learning objectives. These can be used to assess the success of the training program.

Ballot Box evaluations are field based methods that use real specimens and field situations to test field abilities. Dried/pinned insects, insects on alcohol, or dried plant samples can also be used for the start of the season, when "fresh" examples are not available. The Ballot Box test should be given before and after training with levels of difficulty that are the same. The questions on the test should be developed before the beginning of the season and relate to the core objectives of the training. Questions should focus on:

- agronomic practices and plant compensation;
- recognition of pests, natural enemies, diseases;
- recognition of damage from pests, diseases, and others;
- management of pests, diseases, and other wildlife where applicable;
- other areas covered in the course.

The mechanism of the test is to write a question on a thick paper board and mount it on a stick in the field or connect it to the dried specimen. Questions should be multiple choice. At the start of season, you may have to use pinned insects, dried plant materials, or specimen on alcohol. At the end of the season, you may use a board and stick that are placed like a sign in the field next to a real condition or object that is being asked about in the question. For example:

1. What caused this damage?
A) white fly
B) aphids
C) virus disease
D) Poor fertilization

The sign should have a string connecting the sign to the plant part showing the damage. The participant will then mark A, B, C, or D on the answer sheet for question one. Alternatively, each farmer is given many small pieces of paper (Ballots) with the same number specific for him or her. One the sign envelopes or small containers marked A to D are present so the farmer can put in their Ballots. If the correct answer is A, then the person puts his number in the A container.

Twenty to thirty questions should be prepared for the test. After everyone has taken the test, the facilitator should walk with the group to each question and determine the correct answer. If the question or answer is not clear, the group or facilitator may decide to discard the question.

Written Exams (or a "quiz" – this sounds less threatening…) must be tested for clarity beforehand, and checked to ensure local applicability. Remember that knowing the name of something is not important for field management, but knowing its function and ecological attributes is important. Don't be academic about names. Also don't be academic about definitions. Be practical and keep tests focused on real issues, skills, and knowledge.

Give the test before and after training. After the test, always review together to determine the correct answer. Discard unclear questions.

Group methods include the "T Chart" and some visual forms given below.

- **"T Chart":** This can be done both at the end of the training and during the FFS training. On a large piece of paper, draw one line down the middle, and one across the top to form a "T". On the top of one column, write "Needs to be improved". On the top of the second column, write "Is good". Now ask the group to make a list of items in the training that fit under each title. Each point can be considered as they are given, or you may use it like a brainstorming session in which only phrases are written with no comments first, then go back and ask for clarification of each point with further discussion. The points under "Needs to be improved" should be discussed with the aim of finding solutions.

- **Before and After Picture:** Give a large piece of paper to each person (or group). Ask them to divide the paper in half. On one side draw something that represents your life before the training, and another item which represents your life afterwards. After drawing both, ask each person to explain their drawing. The facilitator should record the explanations.

- **Changing Roles:** Another interesting method is to organize a formal discussion, but in which the facilitator sits in the group, and a group leader (somebody assigned by the group) leads all discussions. The facilitator may speak, but only with the same rules as others in the group. The group leader may wish to ask each person to say something, facilitate one of the methods above, or other culturally appropriate method for that community. The basic idea is to take the facilitation away from the facilitator and give it to the group leader to stimulate inputs.

- **Evaluation form:** a matrix asking feed-back from individual participants. This can be done anonymously in order to avoid diplomatic answers. An example is:

	Good ☺	Moderate 😐	Weak ☹
Training contents			
Field study proposals			
Special topics			
Training method			
Participation			
Facilitation			
Relevance to your work			
Organization/logistics			
Etc			

Examples of evaluation forms for both individual farmers, and for groups, can be found in annex 5A and 5B.

It is important that the facilitator also prepares a detailed evaluation of his/her experiences in running FFSs.

The results of evaluation (both participants' and facilitators') provide inputs to the facilitator and the NPC for improving subsequent IPM FFSs.

11.3 Evaluation of impact

Evaluation of the training impact is very difficult. One major problem is the time of impact. Does one season of change represent an impact? Or must the change or benefit occur for several years after the training to be considered a successful impact? In the case of IPM, how can we define an "IPM Farmer"? Is one FFS with 8 meetings sufficient to become a real IPM Farmer? Do you need 15 meetings, 25, or two seasons?

Other problems include methodological obstacles (how to measure?), because of the range of immediate and developmental impacts (what to measure?), and different perspectives of stakeholders (who measures?). Consequently, there is no agreed conceptual framework for measuring impact.

In a study reviewing twenty-five impact studies, the table below lists examples of immediate and developmental impacts of the IPM Farmer Field School, arranged according to the technical, social and

political domain were identified (source: H. v.d. Berg, 2004; modified by F. Praasterink). Several of these impacts may also be applicable to our IPM project.

Immediate impact can usually be measured directly after the FFS training, for example by comparing pre- and post-tests/assessments. Developmental impact is usually more difficult to measure because it becomes apparent only in the longer term, and is usually measured with qualitative methods, and in some cases involving farmers in identifying and describing the impacts.

Domain	*Immediate impact*	*Developmental impact*
Technical	• Knowledge about ecology • Knowledge about biology of pest insects, diseases and natural enemies • Experimentation skills • Improved crop management • Pesticide reduction • Yield increase • Profit increase • Risk reduction	• More sustainable production • Improved livelihoods • Ability to deal with risks, opportunities • Innovation • More cost-effective production • Reduced water contamination • Reduced frequency of farmer poisoning • Reduced public health risks • Improved biodiversity • Improved marketability of produce • Poverty reduction
Social	• Group building • Communication skills Problem solving skills (incl. better access to information)	• Collaboration between farmers • Farmer associations • Community agenda setting • Farmer study groups • Formation of networks • Farmer-to-farmer extension • Area-wide action
Political	• Farmer-extension linkage • Negotiating skills • Educational skills	• Stronger access to service providers • Improved leverage position • Awareness campaigns • Protests • Policy change

In participatory evaluations, farmers identified what they most valued as impacts of training: an increase in creativity, independence, and collaboration, and lowered costs and improved incomes.

Conflicting factors to watch out for:
There are many factors which influence farmers and communities. The impact of training may be boosted by other inputs from other projects, neighbours, IPM-positive media campaigns, credit schemes, etc. Impact can also be altered by changes in pest complex, IPM-negative media campaigns, community pressure, etc. It is important to consider the impact of these other factors so that positive or negative change can be attributed to the correct source, if possible. The daily environment of a farmer is a flood of information and mis-information from extension, advertising, salesmen, media, and neighbours. One way to account for changes is to compare groups across sites and times. This method of group comparison is very dangerous because no group will be completely isolated or exposed to just one factor different (that's only in physics). Don't be too quick to reach conclusions about long-term impact without full consideration of other factors.

12 After the FFS: follow-up activities

As explained in chapter 4, follow-up activities are *very important* for sustainability of IPM implementation.

Experience has shown that FFS graduates often require follow-up training to develop their newly acquired knowledge and skills according to the local circumstances.

The type of follow-up activities depend on the region and the requirements of the FFS group. For this project, it can be expected that for perennial crops a second FFS cycle, focussing on strengthening decision making skills and community action would be useful. Graduates from a one-year FFS in greenhouse tomato may wish to focus on joint marketing activities.

Farmer studies is a key FFS follow-up activity; community-level planning is another important follow-up activity. Specific training on field study skills help farmers to conduct studies in an independent and sound manner. See annex 6 for details on facilitating farmer studies.

Other typical follow-up activities in Asia include FFS farmers training other farmers in the community, or studying IPM on another crop. In some communities, farmers also begin activities in other areas related to community development or establish their own associations (e.g. Vietnam's IPM Clubs, Sustainable Agriculture Clubs, etc.). In areas where water is an issue, water organizations have developed. Some farmers have even established credit unions, and marketing associations (IPM products demand a higher price). Local "Field Labs" can also be established to research local specific problems, and recruit expert resource persons from universities, NGOs, and research centers.

IPM facilitators should promote the independent establishment of farmer associations and assist in writing proposals and requests for local funding. Facilitators can provide technical backstopping in some areas, or be a regular association member. In some cases, local funding may allow facilitators to set up community programs to support FFS farmers to undergo special "Farmer Facilitator" workshops in which farmers learn facilitator skills and management skills to increase the efficiency of local organizations.

Whatever the interest or direction of follow-up,
FFS graduates and IPM facilitators should work together
to promote local study on local problems with local support
to develop local IPM programs.

13 Reference List

Berg, H. van den, 2004. IPM Farmer Field Schools: A synthesis of 25 impact evaluations. Wageningen University. Prepared for the FAO Global IPM Facility. Available on http://www.fao.org/ag/AGP/AGPP/IPM/gipmf/index.htm

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Gallagher, K., 1996. Community-based rice IPM Programme Development: A facilitator's guide. FAO Inter-country Rice Integrated Pest Management Programme for Asia. Manila, Philippines. Available on www.communityipm.org/downloads.html

Pontius, J.; Dilts, R.; Bartlett, A. (editors), 2002. From farmer field school to community IPM. Ten years of IPM training in Asia. FAO Community IPM programme. FAO Regional Office for Asia and the Pacific.

Further reading:
Several websites contain lots of information about IPM and Farmer Field Schools. For example:

http://www.fao.org/ag/AGP/AGPP/IPM/gipmf/index.htm
Website of the FAO Global IPM Facility. Includes many important publications and reports about IPM, Farmer Field Schools, and a list of useful links.

http://www.communityipm.org/downloads.html
This website has been the standard for IPM Farmer Field School Programmes in Asia and contains the largest collection of important documents on numerous aspects of training, impact, participatory research and conceptual documents!

http://www.ipmthailand.org/en/
Site of IPM project "IPM Danida" in Thailand. Provides IPM information for IPM trainers, extension workers and farmers but also for consumers. Some pages are included specifically for children and school teachers.

www.infed.org/biblio/b-nonfor.htm
Information on non-formal education.

www.leisa.info
Information on FFSs, Gender issues, marketing, etc.

www.fao.org/ag/ags/home/en/agsf.html
Information on marketing.

ANNEX 1. Developing a model for farmer participatory training activities. Key elements of farmer field schools. Output of Regional Field Training Workshop for Facilitators, Amman, Jordan, July 2004.

Elements of FFS	Group 1		Group 2		Group 3		Group 4	
	Importance	Adapt	Importance	Adapt	Importance	Adapt	Importance	Adapt
Season Long duration	Important, there is different plant stages and each one has its own problems	Yes	In fruit trees it might be extended after the season	Yes	Make use of plant different growth stages	Yes	Plants are subjected to infections the hole season and the changes in environmental conditions	Yes
Groups with periodical meetings	15 – 25 farmers, important to facilitate technology transfer	Yes	Important to globalize thoughts, make use of each other experiences, increase the effect of the group over individuals	Partially, depends on farmers locations, difficult to collect farmers in one place at one time	Facilitate knowledge transfer and build up FFS	Yes (10-12 farmers)	To exchange knowledge and opinions between framers	Yes, depends on location and crop
Study field	Should be at the middle of FFS site and easy to be reached	Yes	Agriculture is a practical activity, farmers must see to believe	Yes with some compensation in case of yield reduction	In order to apply what has been learned	Yes, in farmer field	To make comparisons and to know what new items are being introduced by the project	Yes, some difficulties in transportation and environmental conditions

Elements of FFS	Group 1		Group 2		Group 3		Group 4	
	Importance	Adapt	Importance	Adapt	Importance	Adapt	Importance	Adapt
Agro ecosystem analysis	Important to analyze agricultural observations	Yes	Important for making a decision, determine thresholds, recognize bio agents	Yes with one condition that is to increase farmer knowledge	To know environmental conditions around the plant pest, diseases, to observe, discuss, and get results	Yes	Important to be conducted through out the season	With difficult, no laboratories & meteorological equipments
Team building	important to facilitate technology transfer and find solutions	Yes	Important for sustainability of this efforts	Yes with the presence of pioneer farmers	To make working plans that will be performed by the groups according to agricultural practices	Yes	To initiate FFS publicity for its future sustainability	Yes, after practicing
Special topics	Important to draw farmers attention to resolve agricultural important issues	Yes	Different farmers interests (social, health, politics, …)	yes	Discuss farmers problems (production, marketing, …)	Yes	To follow up important issues through discussion and finding right solutions	Yes, can be done depending on members reactions

** English translation, of the original hand written posters, by Moh'd Qasim*

ANNEX 2. Example of a baseline survey form

General farm information 1. Location of farm 2. Total farm size (own/rented) 3. Number of people working here (males/females) 4. Basic educational level of farm manager 5. Linkages to organizations (e.g. cooperatives, extension service, marketing, retailers, etc) 6. What are the main sources of information about crop production for this farmer? 7. Main crops + acreage 8. Area under crop of FFS study 9. Hybrids, varieties used for this crop* 10. Crop* rotation practices	
Main problems in crop* production 1. … 2. …	
Current crop* management practices 1. Soil preparation practices 2. Soil treatment? 3. Fertilization practices 4. Pest management practices 5. Disease management practices 6. Weed management practices 7. Number of pesticides applications per season (split up into insecticides, fungicides, herbicides, etc) 8. Types of pesticides used (brands, dosages, mixtures) 9. Timing of pesticide applications 10. When does the farmer decide to spray?	
Yield, quality and marketing 1. Average yield per hectare 2. Grading done on-farm? 3. Quality grading if applicable (% grade A, % grade B, etc) 4. Packing done on-farm? 5. Where is the produce sold?	
Economics Average input costs: pesticides, labour, fertilizers, etc Average net profit per hectare.	

* NB "crop" here is the crop under FFS study. E.g. tomato, strawberry, etc.

During the interview, facilitators may wish to informally add questions about farmers' knowledge on biocontrol, etc.

ANNEX 3. Quality Checklist for FFS training

The following questions can be used to assist an observer in examining the quality of IPM training. These questions identify the key points in an IPM activity that must be present if the quality of the process of training is to be maintained. While most of these questions can be answered by "yes" or "no", don't stop there. Explain why you answered "yes" or "no". This checklist can also be of used as an outline for reports on IPM training.

"What's this?"

1. Are questions answered by further probing or leading questions?
2. Do probing questions concern functional relationships in the agro-ecosystem?
3. Are participants able to define functional relationships in the agro-ecosystem?

Agro-ecosystem Activity

1. Before the activity begins are participants told the goal of the activity and the process to be followed in the activity?
2. During observation do participants get into the field or greenhouse?
3. Do participants look at plants/trees in addition to looking at traps?
4. Do participants look at all parts of the plant/tree as part of their observation activity?
5. Do participants look at all insects, diseases and weeds that can be found on the sample plants?
6. Do participants take soil samples to look for insects/larvae, and look at the roots as part of their observation activity?
7. Do participants note down what they find?
8. Do participants collect specimens?
9. Are insect collections made?
10. Are observations summarized in the agro-ecosystem drawings or presentations?
11. Does the facilitator pose problems, ask questions relevant to the drawings, or use other methods to encourage participant analysis of the drawings?
12. Does discussion take place concerning field conditions?
13. Are "what if" scenarios posed by the facilitator and discussed by the participants?
14. Are previous agro-ecosystem findings used for comparisons to the situation this meeting?
15. Are field management decisions taken and critically examined before acceptance?
16. Are decisions based on levels of insect populations and analysis of their functional relationships in the field?
17. Do the participants appoint one or more members to be responsible for following-up management decisions?
18. Are participants active and working together in the small groups?
19. Can participants state the difference between pests and natural enemies?
20. Does the facilitator, by means of questions, help the participants to analyze the activity and what they have learned?

Field studies

1. Are participants able to explain the reason for doing this field study?
2. Are participants able to explain the different treatments of the study?

Special Topics

1. Before the activity does the facilitator explain the goal and process of the activity?
2. During the activity are participants involved and active?
3. Are group activities dominated by one individual?
4. Can participants present results stating or summarizing what has happened and why?
5. Can participants state what they have learned from the activity?
6. Does the facilitator ask open ended questions to: help participants examine what happened during the activity; generalize from the activity; apply what they learned to "real life"?

Group Dynamics

1. Are group dynamic activities done?
2. Before activity does the facilitator tell participants the goal and process of the activity?
3. Are all participants involved in the activity?
4. Does the facilitator ask open ended questions to: help participants examine what happened during the activity; generalize from the activity; apply what they learned to "real life"?

General

1. Is there a positive and enjoyable working atmosphere in the group?
2. Does the facilitator keep an attendance record per meeting?
3. Does the facilitator follow-up on participants not present at a meeting?
4. Are participants invited/encouraged to do part of the facilitation, either of sub-groups or in the whole group, or do a group dynamic activity?
5. Is the facilitator able to establish constructive communication with local leaders and supporting agency staff?

ANNEX 4.

Self-Evaluation Matrix for Facilitators

Facilitation Skill	Poor	Good	Better
1. Preparation.	None	Basics done	Extra preparation
2. Study site/Field	Hot/Cold/ uncomfortable	Comfortable	Extra preparation (signs, promotion)
3. Objective	None stated	Stated	Stated but varied (questions, shares, tells story)
4. Time frame	None stated	Stated	Discussed with participants
5. Introduction	None	Stated	Stated but varied
6. Steps/procedure	Not clear	Clear & complete	Ask for restatement for complex steps
7. Moves from group to group when in small groups	None	Little	In depth discussion
8. Response to questions	Direct	Direct & question	Varied and may return to group (who can answer?)
9. Time management	None	Announces time	Checks, adjusts, provokes, pushes as necessary
10. Asks questions	None	Few	Provokes critical thought, participation, analysis, challenges
11. Discussion	None	Little	Provokes critical thought, participation, analysis, challenges
12. Summary	None	Too brief	Varied style - does by self requested participant, etc.
13. Who's talking?	Self	Self and farmer	Mostly participants
14. Ongoing evaluation	None	Some	Always using various styles - questions, graphics, restatement
15. Overall evaluation	None	Too short	Varied: Informal, T chart, graphic, etc.
16. Next meeting organization	None	Announced	Follow-up contact before next meeting
17. Snacks	None	Some	Sufficient to keep alive training process
18. Enthusiasm	None	Some	Sufficient to keep alive training process
19. Courage	None	Some	Sufficient to keep alive training process
20. Politeness	None	Some	Sufficient to keep alive training process
21. Motivational	None	Some	Sufficient to keep alive training process

ANNEX 5A. EXAMPLE OF AN INDIVIDUAL EVALUATION QUESTIONNAIRE

(Excerpt from: "FARMERS FIELD SCHOOL FEEDBACK – A CASE OF IPPM FFS PROGRAMME IN KENYA" by *Khisa S. Godrick[1] and Wekesa k. Richard[2], April 2003)*

FFS FEEDBACK: INDIVIDUAL EVALUATION

Name of FFS attended: Year of Participation:

Name of Farmer: Gender: M F

Age:

Economic status (Self-determined): Below average/Average/Above average

As a result of FFS Participation, I feel that: (please circle where applicable)

	Disagree		Same	Agree	
My farming skills have improved	1	2	3	4	5
My yield have increased	1	2	3	4	5
My profits have increased	1	2	3	4	5
My risk have decreased	1	2	3	4	5
I would participate in another FFS activity	1	2	3	4	5
Others (Please specify below)	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

As a result of FFS activities in our community I feel the following improvements:

1.
2.
3.
4.
5.

3. Would you recommend FFS to other farmers? Yes No

What constraints can you identify about FFSs?

1.
2.
3.
4.
5.

[1] Ministry of Agriculture, Kakamega District, P.O. box 917 Kakamega Kenya
[2] Bukura Agricultural college, P.O. Box 23, Bukura, Kenya

ANNEX 5B: EXAMPLE OF A GROUP EVALUATION FORM

(Excerpt from: "FARMERS FIELD SCHOOL FEEDBACK – A CASE OF IPPM FFS PROGRAMME IN KENYA" by *Khisa S. Godrick and Wekesa k. Richard, April 2003)*

FFS FEEDBACK: GROUP INFORMATION

FFS Group name: Year of Participation:

What is the current status of FFS fund?

What activities has your group carried out since the end of the FFS?

1.
2.
3.
4.
5.

What are the planned activities of your group?

1.
2.
3.
4.
5.

Identify the constraints you faced in the FFS.

1.
2.
3.
4.
5.

What further activities would you like to see?

1.
2.
3.
4.
5.

ANNEX 6

Revised 16 November 2001

Facilitating Scientific Method[3]

AS FOLLOW-UP FOR FFS GRADUATES

[full text of this report – 12 pages]

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