

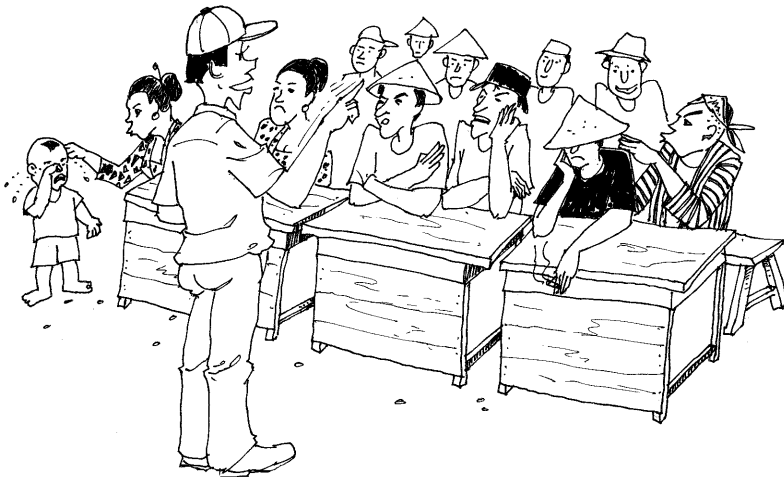
Part I

*An introduction to the
Farmer Field School for
Integrated Crop
Management*

1 Background

The aim of agricultural extension in many countries is to promote technology packages developed by research institutes to a farmer audience. Extension methods usually involve farmer group meetings or demonstration plots, however, small-scale resource-poor farmers rarely implement the new technology promoted by the agricultural extension messages that they receive. Why is this?

Farmers often say that technology promoted by extension services is not fully suitable for their farms. If they try extension recommendations at all, farmers must often adapt them to suit their particular conditions. With such an enormous diversity of small-scale farm enterprises in tropical areas, it is difficult, if not impossible, to generate recommendations that are broadly applicable. Technology guidelines must fit varying local conditions that depend on soil fertility, water availability, household economic realities, and the objectives that farm families wish to achieve.



Inappropriate extension methods are often as much a part of the problem as unsuitable technologies. Farmers spend a good part of their time working in their fields. They may feel uncomfortable sitting indoors listening to extension officers lecturing about a new technology. A demonstration plot managed by outsiders may not convince a farmer to try something new. Farmers need opportunities to experiment with new technologies, to learn how to evaluate different options more 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. Learning by doing adds to farmers' knowledge and experience, and improves their capacity as farm managers in a way that the passive experience of exposure to extension messages cannot. The "Farmer Field School" model is a farmer training approach which is based on these principles of adult education.



Farmer Field School

Farmer Field Schools (FFS) were first developed in Indonesia for training rice farmers in Integrated Pest Management (IPM). Nowadays, IPM FFSs have been implemented in many countries, especially in Asia, and in crops other than rice. For application in other regions, countries and crops, the rice IPM FFS model requires adaptation to suit specific environmental, agronomic and socio-

economic conditions. A field school for sweetpotato was developed in East and Central Java, Indonesia, over a three-year period, and launched in 1997. The first step in developing the field school was a diagnostic study of sweetpotato cultivation practices and problems over two cropping seasons. Farmers and researchers worked together to analyze problems related to sweetpotato cultivation within the context of the whole farm enterprise. They concluded that pests and their management were not the main problems facing sweetpotato growers, even though pests caused considerable losses in some seasons and in some locations.

It was realized that research institutes and agricultural extension services give the crop a low priority relative to other food crops. Important gaps in basic agronomic information were identified, particularly in nutrient management for the crop. Partly because the Indonesian extension service has not provided sweetpotato fertilization guidelines, farmers were fertilizing the crop the way they fertilize rice, not realizing that root crops and grains have very different nutrient requirements. The diagnostic study in Indonesia showed that there is great potential to improve sweetpotato cultivation through Integrated Crop Management (ICM). A field school for the crop should have an ICM orientation including all the relevant aspects of the sweetpotato farming enterprise, from soil preparation to processing and marketing the final product.

2 Objectives

This training manual was designed specifically as a manual for sweetpotato ICM farmer field school facilitators. During their training of trainers, the future Sweetpotato ICM FFS facilitators will discuss all the materials and conduct all the activities described in this manual, and also learn by doing so that they can replicate the activities with farmer groups. Both ICM guidelines and FFS activities were developed by farmers, extension and community development specialists, and agricultural scientists experimenting together in the context of intensive farming systems under wet tropical conditions of the irrigated rice-bowl areas of Java, Indonesia. Although the manual is biased culturally and technically towards this context, we believe it can serve as a starting point for others who wish to develop an ICM field school for sweetpotato or for another crop. The major objective of the ICM FFS is to enhance farmers' problem-solving and decision-making skills. Therefore, FFS activities all contain elements of observation, analysis and experimentation. In addition, the ICM concept familiarizes farmers with ecological processes they utilize in crop cultivation. These skills can benefit farmers everywhere and are transferable to any crop and any technology. Participatory evaluation of both technology and the FFS process is an integral part of the field school. Consequently, this manual can also serve as a resource for others working in farmer participatory research and extension.

3 ICM Farmer Field School design

3.1 What is an ICM Farmer Field School?

Adults learn best through hands-on experience and when the subject matter they are studying is related to their everyday experiences and activities. In a field school, farmers are encouraged to explore and discover for themselves.

Knowledge obtained this way is more easily internalized and put into practice after the training is over. All the sessions take the abilities, knowledge and experience of the participants as their starting point, and FFS activities are designed to



deepen them. The FFS should have access to a field throughout the season in which the participants can do observations, analyses and experiments. Farmers work in small workgroups of optimally five people to encourage the learning process.

The focus of the ICM FFS is health: environmental health, soil health, seed health, and crop health. A healthy crop is a prerequisite for achieving a high yield. Seed, soil, and environmental health are prerequisites for crop health, and for sustainability of the farm enterprise.

The field school is a season-long event conducted in the field. The activities follow the different developmental stages of the crop and their related management practices. The training activity schedule developed in Indonesia is

presented in Section 3.3, but may need to be adapted to conditions in other locations. In areas where farmers plant two consecutive crops, the ideal time to initiate activities is after farmers have harvested the first crop but before they have prepared new fields for the second crop. Under these conditions participants can:

- Assess the extent of pest sources in the field and its surroundings.
- Practice field sanitation, if necessary.
- Experiment with basal fertilizer application, particularly organic fertilizers, to ensure that plants grow well, storage root formation is favored, and that soil fertility and texture is maintained.

If sweetpotato is planted following another crop such as rice, the FFS should be initiated at field preparation time. In Indonesia, sweetpotato field schools are conducted once a week during the first ten weeks after planting (from crop establishment phase to fertilization), and once every two weeks thereafter.

3.2 *Farmer Field School activities*

A FFS meeting is designed to cover in principle the following eight activities:

1. Field observation (about 30 minutes).
2. Charting the growth and development of the crop (5 minutes).
3. Agroecosystem analysis (30 minutes).
4. Presentation of results and discussion (30 minutes).
5. Economic analysis (10 minutes).
6. Observing insect behavior (10 minutes).
7. Group dynamics exercise (10-30 minutes).
8. Special topic (30-60 minutes).

Some of these activities are only appropriate when the crop has reached several weeks of age, and hence are gradually incorporated. Conduct of the total set of activities are recommended from the sixth meeting onwards. Each of the eight activities is explained in detail below. In addition to these routine activities, participants may choose to conduct additional experiments on the

FFS field. These experiments are designed by the farmers themselves at the second FFS meeting. For more detail see Section 5.4 (Experimentation in the Farmer Field School field).

3.2.1 Field observation

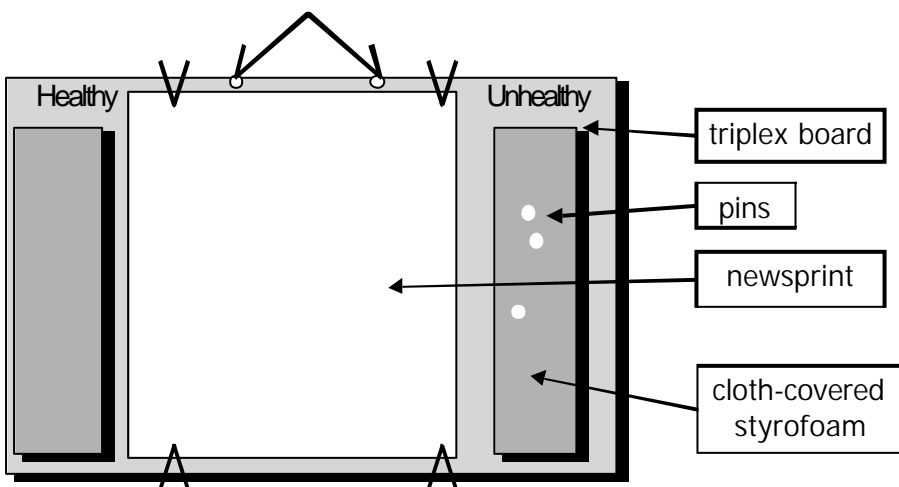
- For this activity each workgroup splits into two smaller subgroups. Each subgroup samples five locations in the field, so that each workgroup evaluates a total of 10 locations.
- Each location consists of an area 0.5 m wide by 0.5 m long, if the crop is planted in wide beds; or a 0.5 m-long segment, if the crop is planted on narrow ridges.
- Observations are made at each location of:
 - ⇒ Soil conditions (from the first meeting onward).
 - ⇒ Plant health status, based on leaf color and presence of water and nutrient deficiency symptoms (from the fourth meeting onward).
 - ⇒ Plant development, based on measuring the growth of the vines and observing the size and number of storage roots.
 - ⇒ Pest and disease attack symptoms, number and types of pests and natural enemies (from the sixth meeting onward).
- The age of the crop is noted and general observations are made of:
 - ⇒ Weather conditions.
 - ⇒ 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 stoppered containers and taken to the FFS meeting site for further observation and identification.

3.2.2 Charting the growth and development of the crop

Weekly observation and charting of the growth of the vines and development of the root system is suggested as an activity to enhance farmers' knowledge on ecophysiological processes and their analytic and decision-making skills. The activity does not require much extra time during the crop observation exercise, but an evaluation discussion on the topic should be planned at the end of the season. For more details see Field Guide 7 in Part II.

3.2.3 Agroecosystem analysis

- Conducting an agroecosystem analysis is learned gradually over the first five FFS sessions. Each workgroup pools the information gathered at their sampling sites and discusses the observations, differentiating between positive and negative elements for crop, field and environmental health.
- From the sixth FFS meeting onward, a full agroecosystem analysis is carried out by each workgroup. To facilitate the analysis, a special board could be provided as follows:



- Samples or elements that contribute positively to health are pinned on the left. Unhealthy elements are displayed on the right. Explanations, drawings, comments, questions and conclusions related to the samples or to any of the field observations are written on the sheet of newsprint paper clipped to the center of the board.
- Participants should be encouraged to make a drawing of a sweetpotato plant as observed to illustrate the developmental stage of the foliage and the storage roots. The purpose of making the drawing is to analyze whether plant development has proceeded adequately given the age of the crop, and whether the crop is vigorous enough to withstand stresses

caused by pests, diseases, water shortage or nutrient deficiency. Drawing also helps to focus the discussion.

- Each workgroup formulates a summary of their observations and draws conclusions about the state of crop health, after taking into account the balance between healthy and unhealthy elements.

3.2.4 Presentation of results and discussion

- Each workgroup in turn presents their results to the entire group.
- The other workgroups ask questions and raise discussion points.
- After all the workgroups have finished, the FFS facilitator guides the group as they formulate an overall summary of field and plant conditions, and draw conclusions and recommend actions (crop management practices) to be implemented during the upcoming week(s) until the next FFS meeting.

3.2.5 Economic analysis

A main objective of FFS is to develop the analytical skills of the participants. If farmers can determine which factors influence the profitability of their sweetpotato enterprise, they can make better informed decisions about the relative merit of management options. A “Sweetpotato Cultivation Record” form is distributed to each participant to keep a record of the sweetpotato enterprise on their individual farms (see Appendix II for a sample form). Collectively, the group keeps a record of all the activities, inputs and outputs for the FFS field. Field Guide 5 in Part II explains the economic analysis exercise in detail.

Economic analysis is introduced at the third FFS meeting. At each of the subsequent meetings, the participants complete the FFS field record together, and they discuss any problems that may have arisen in record keeping for their own fields.

3.2.6 Observing insect behavior

The purpose of this exercise is to provide opportunities to farmers to discover the ecological roles of insects, particularly the difference between herbivores and natural enemies. From the fifth FFS meeting onward, each workgroup keeps a stoppered container for observing the behavior of insects. Insects

collected from the field are placed in the container with what is believed to be their food. Each week one participant is responsible for taking the container home, and for making daily observations of the insects within. The volunteer reports her or his observations at the next FFS session. Detailed information on this activity is available in Field Guide 8.

3.2.7 Group dynamics

Group dynamics exercises develop group cohesiveness and problem-solving skills, and encourage collaboration and creativity. These activities generally begin with an introduction by the facilitator who sets up a problem or challenge for the group to solve. Many are physical and active, while others are brain teasers. The exercises should be fun while providing experience of using teamwork to solve specific problems. This manual contains detailed descriptions of a series of group dynamics exercises that have been used successfully in FFSs in Indonesia (see Section 3.3 above and Appendix I). Other exercises can be adapted or developed as needed.



In order to get the most out of group dynamics exercises, FFS participants should evaluate each one, discussing what they learned from the exercise. They should identify the processes they used to solve the problem posed during the exercises, paying special attention to the role of creativity and cooperation.

3.2.8 Special topic

Special topics support the agroecosystem analysis by delving more deeply into specific issues relating to the agroecology, crop development, IPM or ICM principles, and provide training in basic experimentation methods. After the

facilitator introduces the topic and explains the steps to be used in the process, the participants assume the active management of the experiment or activity. Data collection and analysis are emphasized.

A list of special topics to conduct during an ICM FFS season is proposed in Section 3.3 and each topic is described in detail in a Field Guide contained in Part II of this manual. The topics and activities, however, should be adapted as necessary in order to address local problems and issues. Each Field Guide describes a problem, and formulates the objectives for the session designed to foster the learning related to that problem and its possible solutions. Then activity steps are elaborated to help the field school facilitator initiate the process of problem analysis, experimentation and evaluation. A list of materials needed to conduct the session is provided, as well as information about where to find more technical background information on the topic, as contained in Part III of this manual.

3.3 A basic sweetpotato ICM Farmer Field School schedule

A basic schedule for a sweetpotato ICM FFS, based on cultivation activities and problems occurring under normal conditions of a crop with a growth duration of 4.5 months, is provided below. An adapted schedule, however, needs to be made for each planned ICM FFS, considering specific local conditions. The schedule should be flexible for adjustments throughout the season, when unexpected problems occur at certain stages of crop development. In addition to the activities and special topics presented in the schedule below, each FFS session should contain the routine activities described in Section 3.2.

<i>Wap</i> *	<i>Ses-sion</i>	<i>Farm calendar</i>	<i>FFS activities and special topics (ST)</i>	<i>Group dynamics exercises</i>
-2	0		<ul style="list-style-type: none"> ▪ Preliminary meeting(s) 	
-1	1	Field preparation: hoeing, fertilizing, ridging	<ul style="list-style-type: none"> ▪ Pre-test ▪ Field sanitation ▪ Field preparation and fertilization ▪ ST-1: Introduction to the sweetpotato ICM Farmer Field School ▪ ST-2: A healthy soil 	<ol style="list-style-type: none"> 1. Line up 2. Family members

0	2	Preparation of cuttings and planting	<ul style="list-style-type: none"> ▪ Preparation of cuttings and planting ▪ ST-3: Experimental methodology ▪ ST-4: Healthy seed 	3. How many squares?
1	3		<ul style="list-style-type: none"> ▪ ST-5: Observing the environment ▪ ST-6: Economic analysis of the sweetpotato enterprise 	4. Family reunion 5. Nine dots
2	4		<ul style="list-style-type: none"> ▪ ST-7: A healthy crop 	6. The snake sheds its skin
3	5		<ul style="list-style-type: none"> ▪ ST-5: Observing the crop and its environment ▪ ST-8: Natural enemies: the farmers' friends 	7. Know yourself
4	6		<ul style="list-style-type: none"> ▪ ST-9: Sweetpotato pests ▪ ST-10: Defoliation experiment 	8. Knotty problem
5	7		<ul style="list-style-type: none"> ▪ ST-11: Sweetpotato diseases ▪ ST-23: Sweetpotato storage 	9. Follow me
6	8	Soil preparation for fertilizer side dressing	<ul style="list-style-type: none"> ▪ Soil preparation, fertilizer application ▪ ST-12: Weeds: friends or foes? 	10. Trust each other
7	9		<ul style="list-style-type: none"> ▪ ST-13: Aphids and other tiny insects ▪ ST-14: Pesticides: medicine or poison? 	11. Drawing together
8	10	Apply fertilizer and reform ridges	<ul style="list-style-type: none"> ▪ Apply fertilizer and reform ridges ▪ ST-15: Fertilization 	12. Play the rope
10	11	Vine lifting	<ul style="list-style-type: none"> ▪ ST-16: Vine lifting ▪ Vine lifting ▪ ST-17: Field area measurement 	13. Mirror game
12	12		<ul style="list-style-type: none"> ▪ ST-18: Sweetpotato stemborer ▪ Defoliation experiment 	14. Drawing a house
14	13		<ul style="list-style-type: none"> ▪ ST-19: Sweetpotato weevil 	15. Guide the blind

*Wap = Weeks after planting

Wap*	Ses-sion	Farm Calendar	FFS activities and special topics (ST)	Group dynamics exercises
16	14		<ul style="list-style-type: none"> ▪ ST-20: Cropping pattern ▪ ST-21: Variety selection 	16. Collector's items
18	15		<ul style="list-style-type: none"> ▪ ST-22: Harvesting and marketing ▪ ST-7: A healthy crop (analysis) 	17. Wayward whispers
20	16	Harvesting	<ul style="list-style-type: none"> ▪ Harvesting ▪ ST-22: Harvesting and marketing (yield assessment contest) 	
21	17		<ul style="list-style-type: none"> ▪ Field sanitation ▪ ST-24: Sweetpotato utilization ▪ ST-25: Evaluation of the sweetpotato ICM FFS ▪ Closing ceremony 	

*Wap = Weeks after planting

3.4 Scheduling the time of the FFS meeting

The day of the week and time of the day to held the FFS meeting should be discussed and agreed with the participants to suit their schedule. However, the participants should understand that morning is the best time to conduct a field school. Insects and other animals are more active while it is still cool, and are more likely to be observed in the morning. It is usually easier to gather farmers together for a meeting early in the day, before they start their routine activities. Although farmers are busy people, and often work their fields in the morning, participating in a field school is a choice that requires a certain level of commitment. A field school meeting lasts about three hours and takes place once every one or two weeks.



4 ICM Farmer Field School preparation

4.1 Preliminary meetings

Experience has taught that farmer field schools are more effective if the participants are from a single village. This way a core group of ICM farmers is established in a community, increasing the chances that they will continue ICM practices after the field school season ends, and extend it to more farmers in the community. Both IPM and ICM are more effective when practiced on a large scale, since the ecological balance in the ecosystem expands over individual fields. Preliminary meetings are therefore desirable to inform the community about the objectives of the ICM FFS, motivate them to participate, and determine together who are the appropriate participants.

Ideally, a request for a field school should come from a farming community. Farmers who request training themselves are usually more motivated and responsible than those appointed by some authority from above. To trigger such requests, field schools can be promoted by conducting a field day where farmers can observe the achievements and process of a previous field school. New requests for field schools are much more likely to arise if farmers see the benefits others are reaping. In areas where field schools are a complete novelty, interest can be elicited by working through a convinced local leader. He or she can help arrange one or more preliminary meetings for interested farmers.

A first preliminary meeting is supposed to be of an informative nature to introduce the ICM and FFS concepts and raise interest for participation. The timing of such a meeting is important. It should be convenient for potential participants to attend. A promotional video¹ that outlines sweetpotato cultivation problems in Indonesia, presents ICM as a possible alternative, and

¹ A video entitled "Learning Integrated Crop Management for Sweetpotato" is available in English and Indonesian. To order copies, or make arrangements for soundtracks in other languages, contact: CIP, ESEAP Regional Office, P.O. Box 929, Bogor 16309, Indonesia. Phone: +62-251-317-951; Fax: +62-251-316-264. Email: cip-bogor@cgiar.org.

describes the field school as a way to learn about ICM, is available to be shown at preliminary meetings. Whether or not the video is shown during this meeting, it is useful to identify and analyze agricultural problems the community is facing, provide information about the objectives and activities of the ICM FFS, and give farmers the opportunity to ask questions. This process can be complemented by mapping exercises to better outline the problems, and a gender analysis to better identify potential participants. An example of the procedures and activities conducted during preliminary meetings by the Indonesian National IPM Program is given in Box 1 below.

During the same or a consecutive meeting, FFS participants are selected by the community itself, and the farmers are invited to prioritize the activities proposed for the FFS. They can also discuss problem-solving ideas and compare these with potential solutions originated outside the village. This process is supposed to result in the preparation of a realistic workplan for conducting an ICM FFS in the village. The workplan should specify:

- The date and time of the weekly FFS meeting.
- The location of the field study site.
- The list of FFS participants.
- A weekly schedule of activities for the entire season.
- Designs for field experiments.

The workplan should also contain explicit arrangements for:

- Provision of a field that will be used as a field laboratory by the FFS participants. The owner of the field should agree to contribute labor for field preparation and inputs such as fertilizer. The planting material for the field and the labor for observation, fertilization, vine lifting and harvesting will be provided by the FFS participants as a group.
- Financial matters. If the costs of conducting the FFS are to be borne by the village, it should be clear where the funds will come from for materials, for transportation and possible honorarium of the field school trainer and who will be responsible for providing refreshments. If the costs are to be borne by a national or local program, the details of what will be provided should be specified.

BOX 1

The Farmer Field School Preparation Process

Source: Kingsley, Mary Ann and Sri Suharni Siwi. 1995. Increasing Women Farmers' Access to IPM Activities: Final Report of Gender Study I, November 1995. FAO Technical Assistance

Activity	Timing	Objectives
Preparation meeting with local officials and village leaders.	Before the planning meeting	<ul style="list-style-type: none"> ▪ To organize a meeting for planning the field school. ▪ To discuss women's involvement in local agricultural activities and gain local officials' support for women's participation in the planning meeting.
Preparation of a base map of the <i>hamparan</i> ¹ with 2-3 farmers.	Before the planning meeting	<ul style="list-style-type: none"> ▪ To prepare in advance for planning meeting. ▪ To get a preliminary understanding of <i>hamparan</i> conditions.
Mapping of the <i>hamparan</i> ²	At the planning meeting	<ul style="list-style-type: none"> ▪ Learn specific conditions of the <i>hamparan</i> from farmers and understand farmers' practices. ▪ Identify and discuss problems, their causes, solutions already tried, and new ideas for solving problems.
Division of labor matrix ³	At the planning meeting	<ul style="list-style-type: none"> ▪ Understand the division of work and decision-making between men and women in agricultural and household activities. ▪ Identify and discuss the appropriate participants for IPM farmer field schools.
Discuss and agree on a Learning Contract , a plan for the field school	At the planning meeting	<ul style="list-style-type: none"> ▪ Agree on special topics for IPM field school curriculum based on results of discussion from the mapping exercise. ▪ Agree on participants for field school based on results of discussion from the matrix exercise. ▪ Agree on time and location of IPM field school using the map and matrix as a reference.

¹ A *hamparan* is a contiguous area of fields belonging to a village.

² The mapping exercise assists in visualizing agricultural conditions and problems in the *hamparan*. The farmers' *hamparan* map can be revised and referred to throughout the field school season, and can be used as a tool to begin focusing field school participants' efforts on the management of the *hamparan*, eventually leading to development of their own IPM follow-up activities based on spread of IPM throughout the *hamparan*.

³ The preparation of a matrix on the division of labor and decision-making helps to illustrate how women and men are involved in local agricultural activities and their management. Based on this gender analysis, appropriate participants for the field school can be identified. The matrix also helps to identify constraints to women's participation related to their workload. Some adjustments in the field school schedule or location may be necessary to enable women farmers to participate. This should be considered during process of defining learning contract.

4.2 Participant selection

Sweetpotato ICM FFSs are designed for about 20-25 participants. Larger groups tend to become either chaotic or passive. Discussions and sharing of experiences may not develop well in smaller groups. For certain FFS activities such as the agroecosystem analysis farmers work in small workgroups of five. The full group reconvenes to compare results. Experience has shown that 20-25 farmers can constitute a reasonable critical mass in support of further ICM development in the village.

Selection of participants should take place at the first preliminary meeting, attended by all interested farmers from a village. Members should not be selected unilaterally by extension workers or local leaders because this increases the likelihood that some participants are not active farmers or are not motivated to learn about ICM.



Candidates for participation in a sweetpotato ICM FFS should fulfill the following requirements:

1. They should be sweetpotato farmers.
2. They should have an active interest in learning new things.
3. They should be able to attend FFS regularly over an entire growing season.
4. They should be willing to disseminate what they learn to other farmers.
5. Literacy is not required.

If women are involved in cultivating sweetpotato, they should be encouraged to join FFS. In many places agricultural training activities are perceived as the province of men only. Customs and beliefs change slowly, and FFS can contribute to the process of change by promoting the participation of women.

4.3 ICM Farmer Field School requirements

The following are required for conducting a (sweetpotato) ICM FFS:

- One or two facilitators who graduated from a training-of-trainers course for sweetpotato ICM FFS. The facilitators can either be farmers or officers.
- Land that is ready to be cultivated. If a second crop of sweetpotato is to be planted, the FFS is initiated before preparing the soil. If the land was previously planted to another crop the FFS is started afterward.
- The land owner prepares:
 - ⇒ Manure and chemical fertilizer (if needed, see Field Guide 2) for the first FFS meeting.
 - ⇒ Labor for making the beds or ridges, before the third FFS meeting.
 - ⇒ Urea and KCl (if needed, see Field Guide 15), at the tenth FFS meeting.
- Sweetpotato cuttings provided by FFS participants.
- Drinks and snacks for each FFS meeting.

Each facilitator receives a training materials package provided by the sponsoring program. For each field school package includes:

- This training manual.
- Four analysis boards made from plywood, styrofoam and black cotton cloth (see Section 3.2.3), 100 pins, and 20 clothes-pegs
- 150 sheets of newsprint paper; four or five boxes of crayons and black felt-tip markers (as many as the number of workgroups).
- 100 plastic bags of 1 kg capacity.
- Materials listed in the Field Guides for the group dynamics exercises and special topics (see Part II).

5 ICM Farmer Field School implementation

5.1 ICM Farmer Field School facilitation

A FFS trainer or facilitator is more than a teacher or an instructor. He or she plays a complex role as an experienced farmer, a questioner, an organizer, and a coordinator. The roles and duties of the facilitator in the ICM FFS are as follows:

- He investigates the main farming problems in the village before starting the FFS, so that he can plan topics to meet participants' needs.
- Her motivation for guiding the field school is based on a wish to improve her 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 arranges for a field to be used for observation and experimentation.
- She prepares all materials required for the special topics and group dynamics exercises before the start of each meeting.
- He always explains the objective and the process before initiating an activity.
- She observes and analyzes the condition of the ICM 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.
- She always 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, she can ask questions like: "Is there anyone who still hasn't given an opinion?" She can also give her 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.

- 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, she should be able to articulate her 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.
- She 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.
- Her explanations are sketchy or unclear.
- He assigns a task that is not clear.
- She gives incorrect or inaccurate information because she does not want to admit that she does not know the answer.
- He uses inappropriate methods and/or activities.
- She is disorganized and does not work step-by-step.
- He manages time poorly.
- She seems confused, and hesitates to take decisions.
- He has a negative attitude towards the participants.
- She corners the participants.
- He lacks self-confidence.

5.2 Pre- and post-tests

At the first and the last FFS meeting, the participants take a test to evaluate their knowledge level before and after FFS. The pre-test provides the FFS facilitator with some diagnostic information that he/she can use to adjust the FFS curriculum to the knowledge level of the group. The post-test results are an indicator of progress made during the FFS season.

The facilitator prepares each test by formulating ten questions that relate directly to local field problems. To answer the questions, participants choose among three alternatives. When possible, the alternatives should be live samples, for instance leaves with pest damage or nutrient deficiency symptoms, and insect and soil specimens. Each question and its answers are written on cardboard paper and placed in the field on a bamboo stake (see below). The pre- and post-test questions should be of similar difficulty, and in the local language.



FFS participants take turns answering each question by marking (ticking or punching) answer sheets provided by the facilitator (see Appendix II-A/B). After all questions are answered, the sheets are handed to the facilitator, who scores each test and tabulates the results on a form (see Appendix II-C for the form). The test results are shared and discussed among the participants.

5.3 Assignment to workgroups

Most FFS activities are conducted in small workgroups of five participants, which is considered the optimum number for effective group work and learning. Assignment of people to workgroups can be left to the participants themselves, or arranged through a group dynamics activity held during the first FFS meeting. Changes in the composition of the workgroups should be avoided once the field school is underway, unless a participant drops out early on and can be replaced by someone else.

5.4 Experimentation in the Farmer Field School field

During the FFS season, the participants conduct experiments in the ICM FFS field. The objective of this activity is to develop experimentation skills and to provide farmers with experience in the evaluation of ICM practices and alternatives. Three experiments that are suggested and described in detail in the Field Guides in part II are:

1. Manure experiment (see Field Guide 2).
2. Rapid seed multiplication experiment (see Field Guide 4).
3. Defoliation experiment (see Field Guide 10).

The participants should be encouraged to set up additional experiments that will give answers to their own specific questions. Alternative experiments are designed by the participants themselves with the help of the FFS facilitator during the preliminary meetings (see Field Guide 3). The selection of research questions for experimentation in the FFS should be based on farmer priorities revealed through a participatory diagnosis.

6 ICM Farmer Field School evaluation

To identify the strengths and weaknesses of each FFS during the season, an evaluation should be conducted by the participants. The evaluation should focus on results, process and impact:

1. Result: What were the results of applying ICM and conducting experiments in the FFS field?
2. Process: How effective were the FFS activities to learn ICM?
3. Impact: What can participants accomplish by implementing ICM as learned during FFS in their own fields?

The evaluation is held at a special meeting after the ICM FFS field is harvested. The participants should determine the date, time and place of the meeting.

6.1 Evaluation of results

Evaluation of results is aimed at assessing the effectiveness of ICM technology, particularly for FFS participants who may still be skeptical about ICM's merit. The evaluation process can also provide inputs for improving ICM technology and the FFS learning process. Results are evaluated by weighing the yield of all the experimental plots in the FFS field, analyzing and evaluating the data, and conducting an economic analysis.

Yields need to be converted to standard units. The weight of roots per plant is determined by dividing the weight of the roots per plot by number of plants per plot. To calculate yield in tons per hectare (t/ha), the root weight per plot is divided by the area of the plot and multiplied by 10. Calculation formulas are as follow:

$$\text{kg/plant} = \frac{\text{kg/plot}}{\text{number of plants/plot}}$$

$$\text{t/ha} = \frac{\text{kg/plot}}{\text{area of block (m}^2\text{)}} * 10$$

The experimental methodology applied in the ICM FFS encourages farmers to use replications in their experimentation. To calculate the average yield produced by two replicate plots with the same treatment, we use the following formula:

$$\text{Average yield} = \frac{\text{yield of plot A} + \text{yield of plot B}}{2}$$

To calculate the total yield from all FFS plots, there are two alternatives as follows:

$$\begin{aligned} \text{Total yield (kg/field)} &= \text{average yield (kg/plant)} * \text{number of plants} \\ &= \frac{\text{average yield (t/ha)} * \text{area of field (m}^2\text{)}}{10} \end{aligned}$$

During a group discussion, participants compare the yields for each experimental plot and formulate conclusions about the treatments of the experiments and about the ICM technology in comparison



with farmer practice. The following questions could be raised by the facilitator to stimulate the discussion:

- How did the yield vary with the experimental management practices? Which practices were associated with a high yield?
- What were the production and labor costs (management costs) for each plot?
- What was the net income (gross income less management cost) for each plot?
- Which management practices were easy to apply? Which were difficult?
- How compatible is each practice with the overall farming system practiced by the participants?

6.2 Evaluation of process

The evaluation of process should assess how well FFS met the needs and expectations of the participants. Criteria for analyzing process include:

- The number of meetings held and number of participants present.
- Reasons for canceling meetings or for absenteeism from meetings.
- Congruence between the special topics covered in the FFS and the local field problems.
- Strengths of FFS: What were the most interesting, useful activities?
- Weaknesses of FFS: What was not interesting, useful? What could be improved? What should be added or deleted? How could the curriculum be improved?
- How did the facilitator perform?

The results of process evaluation provide input to the facilitator for planning subsequent ICM FFSs.

6.3 Evaluation of impact

Impact evaluation measures how far the ICM FFS process succeeded in improving farmers' knowledge of ICM for sweetpotato and increasing their capacity to apply it.

We can only measure progress in increasing farmer knowledge and improvement of their skills through a testing process, such as the pre- and post-test, and from their own opinions about the success or failure of the field school expressed during the evaluation meeting. Preparation and administration of the pre- and post-tests are discussed in Section 5.2. Further impact assessment would require follow-up field-level observations and/or interviewing of the FFS graduates.

7 Farmer Field School follow-up and sustained ICM implementation

After a FFS is over, we hope that participants will continue to practice ICM in their own fields, disseminate it to other farmers, and that the cooperation established among them will persist. Before adjourning the field school it is important to discuss what farmers plan to do with their new knowledge and skills. The planning process for ICM FFS follow-up activities should be based on the intentions expressed by graduating farmers, although the facilitator should encourage that attention is given to the following aspects:

- Implementation of ICM in individual fields.
- Group implementation of activities requiring collective action.
- Continuation of (individual and/or collective) experimentation to adapt ICM guidelines to local conditions.
- Farmer-to-farmer dissemination of the ICM guidelines and methodologies.

To foster dissemination of ICM, farmers who have not yet attended a field school can be invited to the FFS harvest. The invitees could include farmers and community leaders both from within the village as from neighboring villages. At this meeting FFS participants can demonstrate what they have learned during the season to their friends and neighbors. This exposure to the results of the field school will hopefully stimulate new requests for ICM FFSs.

