

# Stepping Stones and Stumbling Blocks in Capacity Development of Sweetpotato ICM Farmer Field School Facilitators<sup>1</sup>

Elske van de Fliert<sup>2</sup>

## Summary

Developing capacity of trainers requires a methodology consistent with the approaches future trainers are expected to apply. For farmer field school (FFS) facilitators, this means that trainers should preferably be trained in an FFS setting. Research projects aimed at developing tailored FFS protocols for a specific crop or constraint area, often plan training of trainers to prepare for large-scale implementation by national programs, but they seldom have the resources to conduct a season-long training. Linking up with existing FFS programs provides access to well trained and experienced cadres of facilitators, but needs and mechanisms will have to be identified to upgrade them on the particulars of a specific curriculum and target group. Experience in Indonesia and Vietnam showed that linkage with and utilization of well trained and experienced cadres of FFS facilitators from the national IPM (integrated pest management) programs provided obvious advantages to institutionalize and implement sweetpotato ICM (integrated crop management) FFS programs. More time and funds, however, should have been allocated to build stronger networks of high quality trainers. By discussing methodologies and experiences of the Indonesian and Vietnamese sweetpotato ICM FFS projects, with regard to capacity building of FFS facilitators, this paper offers some suggestions on ways to anticipate opportunities and constraints when planning specific FFS implementation programs.

## Introduction

The goal of most agricultural research projects is to contribute to improving the livelihoods of farm families. Various mechanisms are used to achieve this: from publishing research results in scientific journals only, in the hope that one day a development organization will put into practice the knowledge or technologies generated; to intensive development and implementation of farmer capacity development activities by the project itself. Participatory research projects tend to have a proactive approach to achieving impact, because user participation in the research process confronts project teams directly with needs and expectations for follow-up of the participating communities.

Making an impact requires both qualitative change (e.g., farmer capacities, practices, collective action, support system) and quantitative change (e.g., many people reached and much income generated) (Van de Fliert and Braun, 2000). For sustainable agricultural approaches, such as integrated crop management (ICM), which are complex, knowledge-intensive and location-specific in nature, intensive training of farmers is needed to enhance farmers'

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<sup>2</sup> Sweetpotato IPM project Leader/Coordinator Working Group for Participatory Research and Learning, International Potato Center, Regional Office for East, Southeast Asia and the Pacific (CIP-ESEAP), Bogor, Indonesia

knowledge and skills required for successful implementation (Röling and Van de Fliert, 1998). This has strong implications for the design of dissemination mechanisms, in that cadres of qualified trainers are needed. To effect the qualitative and quantitative change in farmers' cultivation practices towards large-scale ICM implementation, trainers need to know their subject matter well, and be available in sufficient numbers in target areas.

The farmer field school (FFS) is an approach that was originally developed in the late 1980s for rice integrated pest management (IPM) training in Indonesia by the FAO (Food and Agriculture Organization of the United Nations) inter-country rice IPM program<sup>3</sup> (Kenmore, 1991; Matteson, *et al.*, 1994); it is currently being used for IPM and ICM education in many countries and cropping systems all over the world, by government and NGO programs alike. The FFS is based on principles of experiential learning and farmer empowerment, and is characterized by a season-long, field-based curriculum (Van de Fliert, 1993). FFSs provide farmers with opportunities to observe, discover, experiment, discuss, and organize themselves. To guide these processes successfully, the FFS trainer should act as a facilitator of the learning and empowerment process, rather than as a lecturer or instructor.

The International Potato Center's regional office for East and Southeast Asia and the Pacific (CIP-ESEAP) has conducted sweetpotato ICM FFS projects in Indonesia in 1994–1999<sup>4</sup> and in Vietnam since 1996. The projects had four major phases: (1) needs and opportunity assessment, (2) ICM technology development, (3) FFS curriculum development, and (4) FFS implementation, monitoring and evaluation. Participatory approaches were applied in both countries. In Indonesia, project partners in the research phases included a core group of farmer researchers, Mitra Tani (a local NGO), the national Research Institute for Legumes and Tuber Crops (RILET), and the Duta Wacana Christian University; the extension phase was under the responsibility of the national IPM program and thirty local NGOs with support of the Directorate of Rootcrops<sup>5</sup> of the Ministry of Agriculture. In Vietnam partner research institutes included Hanoi Agricultural University (HAU), Hue University for Agriculture and Forestry (HUAF), College for Agriculture and Forestry (CAF) in Ho Chi Minh City, the Thanh Binh District Agriculture and Rural Development Bureau in Quang Nam Province, and the Vietnam Agricultural Sciences Institute (VASI). An extension phase is currently being piloted by the national IPM program with support of the FAO's Community IPM Program.

This paper reports on the philosophies, methodologies, experiences and impacts of the Indonesian and Vietnamese sweetpotato ICM FFS projects with regard to capacity building of FFS facilitators. It discusses the pros and cons of various models for training FFS facilitators, shares and compares experiences from the two projects, and provides some conclusions on ways to anticipate opportunities and constraints when planning specific FFS programs.

### **The way we learn is the way we teach**

In traditional extension systems based on the training-and-visit model, research and extension are linked through so-called subject-matter specialists, who receive information about research outputs from research institutes, and pass this information on to extension officers during regular subject-matter training sessions. As an additional separate activity, extension officers are trained

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<sup>3</sup> Presently, the fourth phase of this program is conducted as "Program for Community IPM in Asia". For more information see <http://www.communityIPM.org>

<sup>4</sup> This project was partly funded by UPWARD

<sup>5</sup> Previously called the Sub-Directorate of Non-Rice Cereals and Rootcrops, Directorate of Food Crops Production

in extension and communication methods. No link is made between the nature of a technology and specific requirements for suitable, consistent ways of promoting it. The subject-matter specialist decides how to convey the information to the extension officers, who in turn decide what methods to use to convince the farmer about the specifics and relative advantage of the innovation. In Indonesia, extension officers would typically organize a two-hour meeting in the village center attended by a group of contact farmers (representing about 10% of the farming community). During this meeting the extension officer gives a lecture, might demonstrate a product, and answers questions.

Experience shows that lecturing is not an effective way of educating farmers, particularly when complex issues are involved and implementation of the innovation implies thorough knowledge and skills. However, extension officers who have normally attended 12–15 years of formal schooling will automatically replicate teaching methods that were used to educate them, unless they are taught differently. Therefore, in preparing a farmer training program, we must first design the methods for training the farmers, before designing the methods for training-of-trainers methodology, which should be exactly the same. Only then we can expect trainers to break through the habits of replicating the ways they were taught in school.

Particularly for the FFS, where trainers are supposed to facilitate a discovery learning and empowerment process, many traditional teaching habits need to be unlearned. Instead of giving straightforward answers, FFS facilitators should try to raise questions to let farmers think and discover answers for themselves. Instead of classroom teaching, trainers should set up activities and experiments in the field; this requires thorough planning and accurate season-long implementation and monitoring. Instead of determining the training content, trainers should listen to farmers' analyses, conclusions and needs, and react flexibly. Instead of assuming an expert role, trainers should consider farmers the experts and build on the farmers' existing knowledge and experience. Therefore, trainers need to experience how it feels to learn by discovery, by hands-on field activities, and by building from existing knowledge. They need to go through the experience of carrying out all cultivation practices themselves, and in fact become farmers themselves, in order to build respect for farmers and enhance their own self-confidence in their interaction with experienced farmers (The Indonesian IPM Program, 1996).

To achieve this level of competence among FFS facilitators, season-long training is an absolute requirement for candidates who have not been previously exposed to the FFS methodology. In a season-long training of trainers, the future trainers can grow their own crop, and go through all the field activities they will later conduct with farmers. Only by learning through discovery will they be able to facilitate learning through discovery.

## **The stepping stones: models, considerations and experiences**

### *Tested models*

The above-mentioned FAO IPM Program, by far the lead program for IPM FFS capacity building, has invested extensively in training trainers in its twelve program countries in Asia. Over the past decade several models for training trainers have been tested (Van de Fliert *et al.*, 1995), taking into consideration varying requirements for scaling up FFS implementation, safeguarding quality, and complying requirements for consistency with existing extension systems.

The most widely applied model involves season-long (or longer) training in so-called Field Training Facilities (FTF). FTFs were distributed across major target areas of the program in a

country to facilitate location-specific activities implied by IPM. In Indonesia, for instance, twelve FTFs located in existing agricultural in-service training centers were maintained as regional centers for IPM training in the eight provinces involved. The FTFs provided classroom, field and dormitory facilities, and regional teams of master trainers ran the program on a ratio of about one trainer to five trainees. The trainees, who were pest observers rather than extension workers, began each day by attending the crop(s) they were growing on the study field, and then conducted field-based learning activities conform the FFS curriculum for farmers. Most FFS facilitators in Indonesia spent more than one year at the FTF, undertaking one season of training in each of rice IPM, secondary food crops IPM, and FFS methodology. In addition, they spent a season of training on a university related crop science program, which allowed them to obtain a diploma and to be promoted in salary scale. For the FFS methodology training, the trainees actually conducted four field schools in their home areas through the Rural Extension Centers. By replicating in farmer field schools what they had learned at the FTF, the trainees learned-by-doing to become IPM facilitators. Two extension workers from the respective Rural Extension Center were assigned per FTF trainee as apprentice trainers, each assisting in two field schools. The FTF trainee/extension worker teams together formulated a workplan for the field school implementation. While assisting in the field schools, extension workers learned about IPM and the facilitation approach. The FTF master trainers supervised the learning process of FTF trainees and extension workers in the field. They paid unannounced visits to the field schools to observe the performance of trainers and farmers. Twice during the extension season, the trainees returned to the FTFs for one-week workshops, to exchange experiences and evaluate the field school implementation. Generally, this model generated strong cadres of primary FFS facilitators, but the impact on extension workers' capacity was variable, depending on their personal interest, personality, and involvement in other, sometimes conflicting, agricultural promotion programs.

A second model emerged out of the need to expand beyond areas covered by the pest observers as primary FFS facilitators, and to involve more extension workers, who by far outnumber pest observers in the Rural Extension Centers (REC), in FFS implementation. In this REC model, all extension staff of an REC, on average fifteen persons, were trained in rice IPM in an farmer field school setting. They met once a week throughout a full rice-growing season. Training activities took place at the REC and in observation fields close to the REC. District-level master trainers and graduated pest observers were the facilitators of the training at the REC, while province-level master trainers supervised the REC training. On another day of the week, extension workers in groups of 5-6 persons repeated the same IPM field school activities with a selected farmer group. After the training season, the trained extension workers were supposed to conduct IPM field schools with farmer groups in their jurisdiction as part of their routine farmer training. These FFSs had to be organized and funded by the RECs or local governments. Training of trainers according to this model was conducted for only one season due to the non-availability of master trainers in following seasons. Additionally, simultaneous farmer training had proven to be ineffective, since the extension workers-in-training had no overview of what would happen throughout the season, and therefore did not master facilitation skills yet. This experiment shows the importance of experiencing the whole process of capacity development first before high-level performance can be expected. An improvement to this model was found by training all REC staff and other sub-district agricultural officers in rice IPM throughout a whole rice-growing season in an FFS setting close to the REC. The FTF graduate (the pest observer) was the facilitator. Rather than conducting farmer IPM FFS simultaneously, the extension workers were supposed to repeat the FFS implementation in the following seasons with farmer groups in their jurisdiction, assisted and

supervised by the FTF graduates. In this so-called institutionalization model, rapid multiplication of FFS facilitators can be achieved, although in practice dilution of quality was observed.

A third major model was found through building capacity of farmers as trainers. Farmers who had already participated in IPM farmer field schools and displayed leadership capacity, were invited in a five-day training of farmer trainers and sometimes in additional regional program planning workshops. During these events, farmer participants learned more about communication and facilitation skills, and program management. They reviewed all activities involved in a field school so that they understood both how and why activities were conducted. Additionally, they designed sets of IPM related activities using a logical framework planning approach. They presented these activity designs in seminars to local government officials, so that officials would know what had been planned. In the majority of cases these seminars generated resources dedicated to the support of these planned activities. Although only an estimated 30% of Indonesian farmer trainers is presently considered competent to run quality IPM FFSs by themselves (pers. comm. Alifa Sri Lestari, Community IPM Program), the presence of IPM farmer trainers in communities is the key to sustained, community-based IPM learning and implementation (Dilts, 1999). In Vietnam, trained farmers organized themselves in IPM clubs, which are highly supported by farmer trainers who received just that little bit of additional training on group processes and organization. Farmer competence to learn, implement, teach and organize IPM and ICM provides a solid base for sustainable farming.

#### *Considerations in planning FFS trainer capacity development*

A project that plans to apply the FFS model should first identify whether implementation at the scale desired is feasible or not, before even beginning to develop the specific FFS curriculum. Existing mechanism for FFS program implementation or opportunities for establishing such mechanisms need to be identified, as well as funding sources, which may or may not come from the project itself. As stated above, season-long training of trainers is ideally the best possible approach to building FFS facilitator capacity, but it requires an enormous investment, which not all projects can afford. In such cases, other mechanisms have to be explored, either through adapted training models, which nevertheless allow the trainees to internalize the essential underlying principles of FFS facilitation, or through the employment of already experienced cadres of FFS trainers. Based on capital resources available, a project should at an early stage identify what human and institutional resources exist in a country, whether and how they can be utilized, and what it takes to develop candidate trainers into competent managers and implementers of a specific FFS program. In the case of sweetpotato ICM, for instance, all major sweetpotato growing nations in the ESEAP region have strong national IPM programs with extensive cadres of rice IPM FFS facilitators. Since sweetpotato is often grown in rotation with rice in these countries, the most appropriate scaling-up mechanism is found in linkage with the national IPM program. However, rice IPM facilitators will need to be upgraded on the particulars of sweetpotato cultivation and on the additional components of integrated crop management.

When the FFS curriculum is developed and the scaling-up mechanism determined, a next important aspect in the planning process of developing FFS trainer capacity is the identification and selection of the individual trainees. Considerations here include:

- Working area, making sure that trained facilitators operate in or near the project's target areas.
- Job responsibilities, in that the project activities are not in conflict with other duties, and vice versa.

- Sustainability and possibilities for expansion of FFS implementation, which might imply that master trainers and/or local policy makers have to be involved in the training of trainers.

Taking into consideration the particulars of the specific FFS curriculum developed for farmers, and the capacities of the candidates identified, the training-of-trainers curriculum needs to be carefully developed. Whether or not season-long, the training should allow the trainees to study and implement all the activities that they are supposed to conduct with farmers in an FFS, at the various growth stages of the crop. Special attention to facilitation techniques may or may not be needed depending on previous training and experience of the trainees.

The two sections below describe how these considerations were dealt with in the sweetpotato ICM FFS projects in Indonesia and Vietnam. In both countries, the project had no funds for large-scale FFS implementation, and only invested in establishing linkages with existing mechanisms for dissemination, developing the trainer capacity, and help design follow-up programs. Implementation of these programs was outside the responsibility of CIP and its research partners, although technical backstopping was provided when needed, and monitoring and evaluation activities were conducted for impact assessment purposes.

### *The Indonesia experience*

The majority of commercial sweetpotato production in Indonesia takes place in the irrigated, mid-elevation areas in Java, where the sweetpotato is grown in rotation with rice and sometimes other secondary food or vegetable crops. Outside Java, sweetpotato is typically grown under rainfed conditions and more for home consumption than as a cash crop. Although the agricultural extension system is widespread in most areas of particularly Java, their training does not include sweetpotato production. The national IPM program, with support from the FAO IPM Program, built an intensive network of FFS facilitators in major irrigated rice growing areas since 1989, but FFS implementation has been restricted to rice, soybean, maize and vegetables (cabbage/potato systems). Rainfed areas in and outside Java are served with IPM FFS or other participatory training approaches by several networks of local NGOs, but each organization generally represents only a small constituency.

The sweetpotato ICM FFS project worked intensively with farmers throughout all project stages, and originally envisaged to scale up farmer field school implementation from a small group of eight farmer researchers. These farmer researchers had been intensively involved in the technology and curriculum development process, and gone through a season-long (pilot) training of trainers. During this pilot training, which also served to pretest the curriculum and field guides, it became obvious that not all of the farmer researchers were as confident as trainers as they were as research partners. It was realized that with only a handful of core trainers it would be impossible to reach a critical mass of sweetpotato farmers throughout the country. Therefore, linkages with the national IPM program and the NGO networks were established to reach sweetpotato farmers in both the major irrigated and the more marginal rainfed production areas, and two separate trainings of trainers were designed and conducted.

#### a) The national IPM program

The training-of trainers for the national IPM program, held in June 1997, involved forty-one participants from six major sweetpotato growing districts in Java, per district including at least two farmer trainers, one province-level and one district-level master trainer, and one rice IPM FFS facilitator (a pest observer by position) and the agricultural officer of the sub-district where

the follow up implementation program was planned. The farmer trainers had all gone through one or more rice IPM FFS and enjoyed brief training of farmer trainers by the national IPM program. Some but not all had been involved in facilitating an FFS before. Master trainers were involved to allow for possible expansion of training-of-trainer events within the district or province. The purpose of involving the agricultural officers was (1) to help influence sub-district and district level policy makers to allocate funds for sweetpotato training, and (2) to backstop the IPM FFS facilitators on the broader production aspects of ICM.

Considering the wide experience of the majority of participants in facilitating field schools, the sweetpotato ICM FFS training of trainer consisted of a ten-day intensive program with both field and class room activities. All FFS activities as described in the sweetpotato ICM FFS manual were implemented for which two different fields with sweetpotato crops at early and late growth stages, respectively, were used. Despite the extensive experience of most participants, the training was considered too short, particularly with regard to technical sweetpotato production aspects, and particularly for those who really had to be in charge of facilitating the sweetpotato ICM FFS later (the pest observers and the farmer trainers). It was therefore decided that the farmer researcher would be employed to provide technical backstopping during the first cycle of the follow-up program.

At the end of the training of trainers, the trainees planned six sweetpotato ICM FFSs in their areas of origin as part of the national Follow-up FFS Program with rice IPM FFS alumni. These six FFSs were conducted during 1997-98 and involved 161 farmers. Farmers' evaluation of the FFS and of the FFS facilitators was generally positive. The role of the farmer trainers, however, was not fully exploited in all field school, either because of dominance by the pest observer or of insufficient capacity, commonly as a result of personality. The farmer researchers provided a very positive contribution to all field school, both with regard to technical content and to experimental methodology. Expansion of sweetpotato ICM FFS using local funding sources was hampered by the serious economic crisis that hit Indonesia in 1997.

#### b) NGO networks

The purpose of the training of trainers for NGOs was to provide access to ICM training for farmers in rainfed areas where the national IPM program did not operate, particularly those outside Java. I purposely do not refer to sweetpotato ICM FFS here, because (1) NGOs seldom have a commodity focus in their programs, but rather work on a variety of issues that help communities improve their livelihoods, and (2) a farmer field school setting may not be the most feasible and appropriate setting for farmer training in NGO programs, where generally routine interaction between facilitators and community members occurs anyway and participatory learning approaches are often embedded in the program. Therefore, the NGO training of trainers focused on principles of ICM and principles of the FFS approach, but emphasized the opportunities and needs for flexible and adapted implementation of these principles in broader community development programs.

The training was conducted in April 1998 and lasted two full weeks. The forty-two participants originated from thirty organizations in thirteen provinces, most of which had community development programs in rainfed and marginal areas. Trainees included both NGO staff (81%) and farmer trainers (19%). The group was very heterogeneous with regard to technical knowledge, experience with the FFS approach, and learning needs relating to their diverse community development programs, which brought an additional challenge to the training. Sweetpotato was considered of varying importance in the areas where the participants

originated. Consequently, activities planned in the follow-up workplans of the individual organizations also varied largely, from sweetpotato ICM FFS, indeed, to for instance mungbean ICM experiments. Nevertheless, the workplans showed that the participants had understood the principles of ICM and ICM training. Particularly, for the people with little experience on FFS or related approaches, the two weeks were too short to master all the technical and facilitation aspects. However, their working environment allows them to experiment with the various approaches and principles and continue to learn and improve their skills.

### *The Vietnam experience*

Similar to Indonesia, Vietnam has an extensive national IPM program with a highly qualified cadre of FFS facilitators, and most sweetpotato is grown in rotation with rice. Therefore, the national IPM program was also here the most obvious choice to link up with for developing a national sweetpotato ICM<sup>6</sup> FFS program. During a preparatory workshop in October 1999, attended by sweetpotato researchers and farmers, and national IPM program staff and trainers, it was decided to adapt the Indonesian sweetpotato ICM FFS field guides and technical guidelines, which had already been translated into Vietnamese, by conducting pilot field schools and field studies in four different provinces across the country. In addition to testing and adapting both the technology and the FFS activities, the pilot field schools also served the purpose of training a group of master trainers on-the-job. During 1999-2000, two pilot sweetpotato ICM farmer field schools and one set of field studies were conducted per province. The activities were monitored and technically backstopped by CIP's research partners.

Although the evaluation workshop of the pilot cycle still had to be conducted at the time this paper was written, a preliminary monitoring report concluded that the FFS facilitators were very experienced in conducting the routine set of field school activities, but found it hard to cope with new issues and activities without having received prior training. They lacked the solid background knowledge about sweetpotato cultivation and general non-pest ICM components needed to conduct the activities and adapt them to local conditions. As a result of their extensive experience with rice IPM field schools – some of the trainers had a history of having done over 40 field schools within eight growing seasons – most trainers were conditioned in doing the routine activities, such as agroecosystem analysis, exactly the way they did it in rice IPM FFSs, by only focusing on pests and natural enemies instead of the overall set of healthy and unhealthy components in the environment. Although it was initially anticipated to train more trainers through similar field studies and pilot field schools, the possibility of a more formal and centralized training of trainers, focusing on the technical content of sweetpotato ICM and its implications for FFS facilitation, is now back on the agenda.

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<sup>6</sup> In Vietnam the term IPM instead of ICM is used for strategic reasons, because of its popularity at all levels and internalization in the Vietnamese language. The FFS curriculum, however, involves all crop management topics presented in the manual produced by CIP. In this paper, I will continue to use the term ICM for reason of consistency.

## **The stumbling blocks: Issues for adaptation**

### *From rice to sweetpotato*

As shown by the experience in Vietnam above, having excellent rice IPM facilitators does not necessarily mean that they are ready to run an FFS in sweetpotato or any other crop. When moving into another crop implying another set of technical issues, in most cases trainer capacity will need to be upgraded relating to the specifics of the crop of concern, such as host specific pest and diseases, nutrient requirements, cultural practices, post-harvest issues and so on. In addition, an adapted crop-specific farmer field curriculum is likely to contain new activities, which need to be practiced first before one can facilitate them. The sweetpotato curriculum, for instance, contains activities on rapid seed multiplication, vine lifting and yield assessment, to name a few, which are in no way comparable what is done in other crops.

A second set of concerns that emerge when developing a FFS program for a new commodity is whether national and/or local policies favor attention to that commodity. This is particularly important when planning to utilize government resources and mechanisms for scaling up. Sweetpotato, despite being the fourth most important crop in Indonesia when ranked by production, has hardly received research and extension attention up to now, and implementation of pilot ICM FFSs was even difficult in some areas because the provincial government would not provide the necessary permission to the facilitators to allocate their time to this crop. Since sweetpotato production in Indonesia is concentrated in certain sub-districts located at suitable elevations, provincial governments who have the authority to decide on agricultural development direction and funds normally do not consider this crop of major importance and, hence do not allocate the necessary resources. Only very recently with the establishment of a new Directorate for Rootcrops is central government pressure expected to influence local policies. This opens up opportunities for enhanced attention to sweetpotato ICM FFS programs.

### *From IPM to ICM*

Integrated pest management (IPM), as it has been promoted in farmer field school programs in Asia over the past decade, applies four principles as basic decision making tools for farmers, i.e. (1) grow a healthy crop, (2) conserve natural enemies, (3) observe fields regularly, and (4) farmers become IPM experts. Growing a healthy crop is the basis for natural resistance of the crop to pest attack and to compensate for incidental damage. Although this principle implies attention to the overall set of cultivation practices, the focus in rice IPM field schools has still been primarily on pest management. In the agroecosystem analysis, for instance, which is the core activity of each FFS session, pest populations are compared with natural enemy populations. Based on the ratio between the two categories of insects a conclusion is drawn on what management measures should be taken during the upcoming week.

Participatory needs assessment studies on sweetpotato cultivation in Indonesia and Vietnam showed that farmers would not be served by a focus on pest management only. Accordingly, the concept of integrated crop management (ICM) was introduced and a comprehensive sweetpotato ICM approach developed for the specific conditions in the major cultivation areas in these countries. The technical sweetpotato ICM guidelines include all possible topics from soil and seed preparation up to harvesting and marketing. Additionally, ICM requires several skills to support better crop management in general, such as experimentation,

land area measurement and yield assessment. For each new topic a concomitant activity was designed, whereas the agroecosystem analysis was adjusted to an overall assessment of healthy versus unhealthy elements in the crop environment. If not given additional training to practice and understand the activities and concepts implied by ICM, farmer field school facilitators will fall back into doing the same things as they are used to do in the rice IPM FFS.

#### *From doing experiments to learn to learning how to do an experiment*

The main characteristic of the farmer field school is that learning is done by discovery. Facilitators offer experiments instead of lectures for farmers to learn about ecological processes. Therefore, most experiments contained in IPM FFS curricula serve a learning purpose rather than a research purpose. These experiments are pre-designed and described as recipes (to conduct flexibly, though) in the FFS field guide. In training of trainers the facilitators learn how to prepare and conduct these experiments and how to facilitate analysis of the outcomes in such a way that the farmer receive the lesson intended.

ICM emphasizes the compatibility of all cultivation practices for improved and sustainable crop management, and therefore it is of utmost importance that farmers learn how to prove for themselves whether an innovation is working or how to adapt it under the prevailing conditions. This requires experimental skills. The farmer field school is an extremely suitable platform to teach such skills. Without risk involved on their individual farms, farmers learn to identify needs for experimentation and formulate a problem at the beginning of the season, design and conduct experiments at the FFS plot throughout the season, and collectively evaluate the outcome at the end of the season. Having gained these skills allows farmers to do further adaptive research to refine ICM guidelines and test innovations they receive from other sources in their own fields. FFS facilitators need specific skills themselves to facilitate this process, particularly since there are no recipe experiments involved here. They should learn to convey the principles of experimental methodology in an understandable manner to the farmers, and apply these principles to the specific problems for investigation identified by the farmers. Above all, they should understand and be able to convey the different objectives for the different types of experiments.

#### *From officer-led to farmer-led FFS*

The cadres of FFS facilitators originally trained by the national IPM programs in Indonesia and Vietnam consisted of officers from the Department of Agriculture. However, with the need to institutionalize IPM at the farm community level, the importance of the involvement of farmer trainers grew.

Particularly for FFS implementation in cropping systems or areas not directly served by the national IPM programs, the employment of farmer trainers seems to be one of the most feasible mechanisms for scaling up. Building capacity of farmer trainers might imply a different focus for training, which has to be identified on a case-by-case basis. The farmers will have more knowledge and experience on the specifics of the crop of concern, but need more thorough training on how to manage and facilitate an FFS. Being an FFS graduate should definitely be one of the selection criteria.

## Conclusions

When planning a specific FFS implementation program, solid investment in building trainer capacity need to be carefully considered in relation to available human and capital resources. It requires identification and analysis of existing mechanisms and possible ways of exploiting these, or an assessment of establishing new mechanisms. Existing capacity should be mapped to identify needs for additional training or upgrading. An appropriate and consistent training methodology should then be designed and conscientiously implemented, applying the same methods that the trainers themselves will use later with the farmers.

Experience with sweetpotato IPM FFS in Indonesia and Vietnam showed that linkage with, and utilization of, well-trained and experienced FFS facilitators from the national IPM programs provided an obvious advantage with regard to the (financial and time) investment needed to train trainers. It also helped to achieve institutional and political acceptance of FFS implementation in the sweetpotato crop. However, none of the training-of-trainers models applied provided a solid prototype for training effective sweetpotato ICM FFS facilitators. In Indonesia, both the training-of-trainers events were too short, considering diversity and background of the trainees. Technical topics could not be covered in sufficient detail for those with little experience in sweetpotato cultivation (particularly the extension officers and NGO staff), and attention to FFS facilitation and management was insufficient for those with little experience in this field (particularly farmers and staff from NGOs with no FFS programs). Nevertheless, sweetpotato FFSs were conducted successfully and evaluated positively by farmers, probably because both officers and farmers were used as facilitators in teams, and the two groups compensated for each others' weaknesses. This, however, is not a strong basis for expansion of the program to larger areas. In Vietnam, the learning-by-doing principle was inadequate because the FFS facilitators lacked basic background knowledge in sweetpotato cultivation and in some of the non-pest components of the ICM approach, knowledge that could not be gained just from reading the manual, and from the limited technical backstopping by the researchers. More technical training is definitely needed here.

Experiences so far have shown that, ideally, training of FFS facilitators should be in response to specific needs, both institutionally and individually, and should make use of specific opportunity in terms of mechanisms in place and available resources. Most research projects have limited funds, so large investment in training trainers may seem unfeasible. But no research investment will have much meaning if the output is not used by farmers. Hence we should realize the importance of early planning for investment in training of trainers during project design, and/or mobilizing funds from executing agencies through the establishment of linkages at the early research stages. In addition, research projects should aim to develop protocols for replication by national programs, rather than attempt large-scale implementation themselves. Once good capacity has been established at a small scale, successful examples of FFS implementation will help raise interest and funds for larger-scale capacity building and program implementation by those institutions that have the mandate and capability to do it.

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