Participatory Approaches and Scaling-up[1]

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Introduction

The important role farmers can play in agricultural research, development and extension, if only given a chance, has become widely accepted (e.g., Chambers *et al.*, 1990; Haverkort *et al.*, 1991; Jiggins and De Zeeuw, 1992). Participatory research and development advocates the involvement of farmers as collaborators at all stages of the process, particularly at the early stages of problem definition and setting of research objectives. Benefits of such an approach include early definition of concepts of what technology users are likely to adopt, and adaptation of prototype technology to meet implementers' needs and preferences, hence, the likelihood of greater adoption (System-wide Program on Participatory Research and Gender Analysis, 1997).

Despite the growing recognition for participatory approaches, several criticisms are often fanned, among others relating to replicability and, hence, the potential for scaling-up. So far, there is little documentation of large scale replication of pilot successes. Participatory research networks do not relate effectively to established, conventional extension mechanisms, which are in many countries primarily designed to transfer standard technology packages in a linear mode from formal research centers to a select group of contact farmers. These extension systems have no way of dealing with location-specific technologies and the "transfer of processes" (experiential learning, experimentation), as required for sustainable agriculture (Van de Fliert, 1993).

This paper presents a methodological framework for participatory research and development aimed at achieving impact on a larger scale, and some hands-on experiences of participatory research and extension approaches, and of anticipating scaling-up. The framework has been developed and implemented within the context of sweetpotato Integrated Crop Management (ICM) and ICM training development in Indonesia by the International Potato Center and its local partners, as described in the following section, but is supposed to be applicable to sustainable agricultural system development in general. The sweetpotato ICM project in Indonesia was designed according to an initial version of the framework, and the framework developed as the project advanced and expanded to other countries and to potato Integrated Pest Management (IPM) research. Our experiences in these projects are specific for the context

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[1] Paper presented at the CIAT Workshop "Working with farmers: the key to adoption of forage technologies", 12-15 October 1999, Cayagan de Oro, Philippines.
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of sweetpotato and potato IPM/ICM systems in Southeast Asia, where we are dealing with highly diverse smallholder farming systems. IPM and ICM are complex concepts requiring location-specific, informed decision making and, under smallholder conditions, collective action. A predisposition of this framework is that, for achieving the overall objectives of enhanced problem-solving and decision-making capacity, and next impact at a larger scale, intensive farmer training is needed. It is emphasized here that this framework is provided not as a cookbook containing recipes to be followed rigidly, but rather as a systematic map for navigating farmer participatory research. This paper will specifically focus in how the use of a framework like this can help anticipate scaling-up of participatory research and extension approaches.

The context of the Sweetpotato ICM FFS project

During 1995-97, the International Potato Center (CIP) in collaboration with Mitra Tani (a local NGO), the national Research Institute for Legume and Tuber Crops (RILET) and the Duta Wacana Christian University (UKDW), implemented a project to develop a protocol for a sweetpotato Integrated Crop Management (ICM) Farmer Field School in Indonesia. The project strategy consisted of participatory approaches and methods at all stages: planning, implementation and analysis of a needs assessment, development of ICM components and integrated approach, development of a Farmer Field School protocol for extension purposes, training-of-trainers, and pilot program planning, implementation and evaluation. Project activities were implemented in major sweetpotato growing areas in East and Central Java, where crops are grown intensively throughout the year with fairly reliable water supply.

The Farmer Field School (FFS) model applied in this project is a training approach that over the past decade has been developed and applied as the predominant methodology for Integrated Pest Management (IPM) training in the majority of Asia's rice-growing countries. Having its foundation in nonformal education principles and initially being designed for rice IPM training, it emphasizes learning by doing, and empowering farmers to actively identify and solve their own problems (Van de Fliert, 1998). Participation, self-confidence, and collective action and decision making are fostered during the experiential learning process. This approach seems highly consistent with the requirements of active ecosystem management by farmers implied by IPM and ICM. An IPM farmer field school lasts for a whole growing season, involving a group of at most twenty-five farmers in weekly sessions of, on average, four hours. The trainer is a facilitator of the experiential learning process, not an instructor. Each training session contains a set of activities that foster farmers' analysis, decision-making and problem-solving, including:

- Field monitoring of observation plots in small groups, considering environmental factors, crop development, pest and natural enemy occurrence and interaction, and damage symptoms on the plants.
- Agroecosystem analysis, in which drawings of observation data are made, and conclusions about crop status and possible measures are drawn together.

- Presentation of the agroecosystem analyses, and discussion to come to a collective agreement on what crop management measures should be taken during the coming week.
- Special topics dealing with locally occurring field problems, or providing opportunities to discover processes, causes and effects of phenomena occurring in the field; the `insect zoo' (an enclosure) is a tool often used by farmers in the field school to study plant-herbivore-predator relations.
- Group dynamics exercises to enliven the school, strengthen the coherence of the group, and make the members better aware of the importance and dynamics of group processes.

The field school model is designed to allow farmers to learn to take informed pest management decisions based on their own observations and analyses. This ability often gives them more confidence in their own farm management skills, which, in turn, is reflected in an improved, overall farm management. A second important purpose of the field school is that farmer groups are stimulated to take collective action, which in certain cases may be indispensable for effective IPM implementation, particularly for pests such as rodents. A successful IPM field school often results in follow-up activities, spontaneously organised, and funded, by the field school graduates, such as IPM clubs in Vietnam (Eveleens et al., 1996). During these follow-up activities, the farmers may study newly occurring cultivation problems, organise collective control measures, and even get into wider aspects of community development, such as rice-fish culture and collective marketing of produce (Van de Fliert and Wiyanto, 1996).

In order to institutionalize the sweetpotato ICM FFS model and scale-up training and implementation, eighty-two farmer trainers and staff of the National IPM Program and thirty local NGOs were given training-of-trainers. Workplans were prepared for follow-up activities to be conducted on a self-supporting base. Mitra Tani initiated a second phase of the sweetpotato ICM project to monitor and evaluate these follow-up activities during a two-year period (1998-99). Documentation of the monitoring and evaluation outcomes is expected to provide an interesting case for other projects to learn from, and to contribute to the general appreciation of participatory research and development.

A framework for participatory research and development: cycling from problem to impact

The framework in Figure 1 presents a possible route from problem definition to impact within the context of sustainable agriculture development (Van de Fliert and Braun, subm.). Anticipating the various stages of this framework is considered important when aiming at large scale impact. The framework emphasizes iterative phasing or cycling of activities and a division of major responsibilities among the various stakeholders, distinguishing three main realms of activity: (1) research and development, (2) extension and implementation, and (3) monitoring and evaluation.

These three realms are strongly interconnected, and their respective activities will partly overlap in time and space. Additionally, the process is not limited to a linear set of sequential activities, but allows for cycling within and between the activity realms.

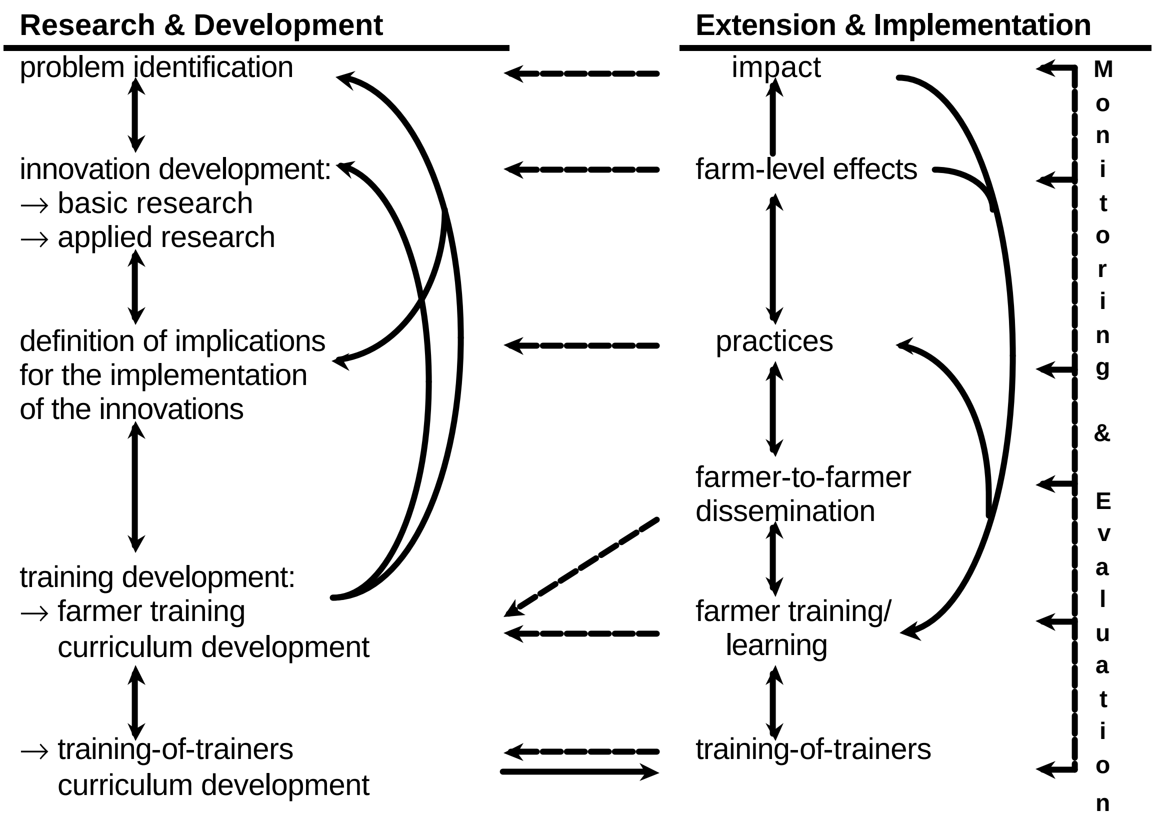

Figure 1: Framework for integrative, farmer participatory research aimed at impact.

Research and development

The research and development realm comprises co-creative processes to identify the problems, generate new information and innovations, consolidate them with adequate existing farming practice, and then translate them into learning objectives and activities for enhanced farmer performance. These processes are likely to be highly iterative and synergistic. Participatory research targeting the needs of poor farmers should begin with collaborative identification and analysis of problems, needs and opportunities, in an attempt to gain an understanding of the broad agroecological and socioeconomic context. This includes the identification of already existing alternatives to solve the problem(s), which may need to be tested under different conditions, and should eventually be consolidated with innovations. The problem identification phase should lead to the (participatory) priority setting and formulation of the overall project goals and specific research objectives. The final output is a prioritized research agenda.

Once the research agenda is set, innovation development follows. This phase is likely to include both a basic and an applied research component. Farmers' involvement in innovation development is particularly desirable at the level of applied research. Their role may vary from "analysts and evaluators" (Fano *et al.*, 1996) validating existing technologies to "research collaborators" determining and testing treatments in their own fields (Ashby *et al*., 1995; Braun and Van de Fliert, 1997). It is emphasized here that participatory technology development serves an essentially different purpose from extension. Research carries risk that we do not want to extend to larger groups of farmers attending extension activities with the expectation to learn something. Therefore, we involve only small groups of farmers in participatory research activities and clearly define the objectives and expected outputs of the exercise together with the farmers. On the other hand, experimentation can be used as an learning method in extension, but mostly serving learning and/or adaptation rather than technology generation purposes.

The development component in the research and development realm emphasizes the translation and validation of innovation development outputs in relation to the agroecological, socioeconomic and cultural conditions in target areas. The development process should not end with applied research, which is often considered the final step of research mandates. Applied research should be followed up by deliberate attention to training development. Experience has shown that linear, top-down research and extension, as practiced in conventional technology transfer models, often failed because of inappropriate technology and/or inadequate "packaging" of the messages (Röling, 1988). Moreover, consistency is needed between the nature of the innovation and that of the extension approach and methods applied to convey the innovation to farmers (Röling and Van de Fliert, 1997). Therefore, to ensure consistency, we should not only look at the innovations *per se*, but also define the capacities that practitioners need to implement them as well as the requirements for the support system (input supply, markets, etc.). This leads to an analysis and definitions of what a change in agricultural practice effected by the developed innovations implies for the farmers. What knowledge, attitudes and skills do they need to implement the new practices and ideas? Answering this question is central to the development of the applied technology, and a prerequisite for the development of training strategy. The process of defining the implications of the implementation of the innovations may provide new insights for problem identification and/or raise issues that need to be fed back to the phases of applied or basic research, or even problem identification.

Training curriculum development is the next component of research and development and therefore within the responsibility of scientists. Preferably, technical and social or extension scientists would share responsibility and farmers and extension officers would be involved in field-testing and validation. Training development implies designing activities, modules, and media for farmer training, carrying out pilot studies, and revising them accordingly. Once the curriculum for farmer training is set, a curriculum development for training the trainers can begin, preferably applying the same methods as those used for farmer training.

Extension and implementation

Extension and implementation encompass the phases when efforts are made—either in a formal or a non-formal settings—to share the innovation with larger groups of farmers who then test, evaluate and incorporate (or reject) them in their farming practices. Changing farming practices should ultimately lead to substantive impact.

Extension—defined here as a function of disseminating an innovation to a wider audience—is not usually considered part of the mandate of research institutions (Fano *et al.*, 1996). Therefore, suitable mechanisms and partners must be found to perform this function. To ensure that potential partners can carry out extension work efficiently, scientists can play an important role, contributing both technical and methodological skills. These skills may be complemented by those of GO or NGO extension workers, who have a comparative advantage as communicators at the village level. However, potential trainers must be trained themselves before they can be expected to run a curriculum according to the training model specifications . The participation of accomplished trainers is critical to success in the field.

In many developing countries, extension services lack the human resource capacity—in terms of both quantity and quality of staff—to reach a critical mass of their target audience effectively (e.g., Röling, 1988). Much of the information obtained by farmers is disseminated by other farmers, either directly by sharing experiences or indirectly through demonstrations of sample field practices and the resulting effects). Recent experience with IPM training in several Asian countries has shown the positive impact of involving farmers as trainers, and of enhancing farmer networks in order to support farmer-to-farmer dissemination deliberately (Eveleens et al., 1996; Braun, 1997). Farmer facilitators must be selected with care and given additional training on facilitation methods. Training programs must also address farmer interaction and horizontal communication requirements from start. i.e. during the planning stage.

The major actors in the implementation realm are, of course, the farmers. Farmers decide whether or not to implement, adapt or reject an innovation. Enhanced knowledge and skills—obtained through training, contact with fellow farmers or any other form of learning—are catalysts for change in farming practices. While much research has been devoted to studying the process of adopting innovation (Rogers, 1995), in terms of sustainable agriculture, *adapting* innovation—to farm-specific conditions—is considered a more valuable output particularly under the marginal conditions of poor farmers. The ability to adapt *guidelines* rather than follow a standard recommendation is evidence of farmers' enhanced capacity to experiment, analyze, evaluate and, finally, solve many of their own problems without having to depend upon external advice. Response mechanisms, however, are critical in this realm because farmers often receive contradictory messages from other sources (e.g., promotional campaigns by commercial companies sell alternate inputs), which could lead to confusion. Questions arising during implementation need to be addressed by trainers, whose role includes supporting the adjustment process and helping bridge communications between farmers and researchers.

When farmers' capacities and practices change, tangible effects at the farm level can be expected. These may include yield increase, reduction of expenditures, or more balanced ratio of pests to natural enemies in the field. When such changes occur on a larger scale, an even broader impact can be expected, such as the improvement of rural people's livelihoods and/or a healthier environment. If initial outputs prove beneficial to farm families, they will most likely be disseminated further, contributing to a general increase in the knowledge base of the farming community.

Monitoring and evaluation

The monitoring and evaluation realm forms a maze, overlapping with and collating the other two realms. Researchers must observe and measure what happens during training and implementation, and must relate and/or recycle the information back to the research and development realm for further adjustment or impact assessment. Systematic monitoring and evaluation of projects assures the capacity to make adjustments before it is too late, to learn from experiences and to justify the research investment. Rapid feedback is critical when farmers are presented with new variables (for example, a new variety, a new technology, or a more complex, integrated innovative approach). In participatory projects, monitoring and evaluation should be planned and implemented in conjunction with the farmers. Farmers should particularly be involved in defining indicators for evaluation, and in analyzing evaluation results. In the case of sustainable agriculture, evaluation indicators should always relate to the objectives and expected outputs of each phase. Within this context, well-defined indicators usually focus as much or more on people and the environment than on technology and economics (Van de Fliert, 1998). Monitoring and evaluation of clearly defined indicators should generate valuable feedback for adjusting current project methodology, improving future research and development, and providing examples for other projects.

In order to be able to justify the research and development investment, the monitoring and evaluation system should be designed to analyze the outputs in relation to the objectives set for each specific phase. This is depicted by the horizontal links in Figure 1, where the expected outputs of the activities and elements in the extension and implementation realm relate directly to the objectives of the activities in the research and extension realm at the same horizontal level. After the evaluation exercise, we should be able to answer the following questions: Is the impact of the activities consistent with the overall goal? Do the farm-level effects concur with the intended objective of the innovation (for instance, was there a reduction of pesticide load on the farm ecosystem as a result of IPM practices)? After training, have farmers' capacities and practices reached the levels required for implementation of the innovation? Do dissemination mechanisms result in effective farmer-to-farmer communication? Are the processes of farmer education and training-of-trainers compatible with the curriculum design? These horizontal links clarify the idea that in order to achieve positive impact, research and development teams should seek mechanisms for incorporating extension and implementation requirements when setting their objectives for research and development.

Scaling-up for impact

Impact as depicted in the framework in Figure 1 is the desired change relating directly back to the initial problem definition and, hence, overall goals of a project. Impact occurs as a result of effects at the farm level which in turn are induced by a change in farmers' management practices. Our understanding of actual impact of a project implies that the process of change occurs at a fairly large scale with regard to numbers of farmers, as opposed to potential impact as may have been demonstrated only on a pilot scale. This means that targeting for impact requires scaling-up. Particularly sustainable agricultural approaches such as IPM, where a more natural balance of the larger agroecosystems needs to be established for optimal effectuation of technology components, collective action of farmers within that agroecosystem, hence large-scale implementation, is required.

Change leading to impact consists of two important components. One is the internalization of (adapted) technology components in the farm management system – which is more than adoption of a technology only –, and the other, often neglected, component is the change in knowledge and skills leading to enhanced problem-solving and decision-making capacity of farmers. As predisposed in the framework above, achieving impact for sustainable agricultural approaches requiring enhanced problem-solving capacities calls for extensive farmer learning, which is mostly achieved through intensive training and effectuation of farmer-to-farmer dissemination. As experienced in IPM training in Asia, training using participatory, experiential learning methods, such as the FFS described above, have proven to be the most effective.

In order to provide quality training to reasonably large groups of farmers, a mechanism responding to the needs of a certain project needs to be installed. The "hardware" of such a mechanisms consists of the channels or institutions to be identified and mobilized, taking into consideration the desired coverage of training activities, expertise available with regard to approaches applied, and funds available. The "software" includes the training modules and curriculum that should contain elements guaranteeing replicability, and inducing motivation and capacity building of trainers for self-supported expansion, including farmer-to-farmer dissemination. Our experience is that deliberate attention should be given in training of trainers and training of farmers to importance and possible means and content of farmer-to-farmer dissemination to ensure it to happen in a satisfactory way. IPM training, for instance, is field-based and cannot be disseminated with the same level of effectiveness by talk only. As a result, farmers participating in IPM training should be provided with methods and ideas to effectively inform and teach their fellow farmers about IPM.

Scaling-up participatory processes

Farmer participatory research activities often result in good output with regard to both technologies developed, since they are more adapted to farmers needs and opportunities, and to enhanced problem-solving capacities of the farmers who have been involved in the process. The latter is a very valuable trait for farmers allowing for adapted technology implementation and internalization within the farm management system. However, extending this trait among more farmers should in most cases not be done by involving more farmers in participatory research activities, but rather by designing training/learning activities that enhance farmers' experimental and analytic skills. As the two-pier structure of the above framework suggests (research-development versus extension-implementation), participatory activities can occur in either realm but serve a different purpose. Concretely, participatory technology development does not serve the same purpose as training to enhance farmers' problem solving capacities for farm-level adjustment of technological guidelines. Any participatory activity should have clearly defined objectives – research versus extension – to begin with, not to raise false expectation among the partners in the process. We experienced that research activities, especially those carrying risk, should be limited to a small group of highly committed partners. Only when proven technology components have been developed can we think of scaling-up by sharing both guidelines and methodologies with larger groups of farmers through some sort of learning mechanism. Nevertheless, socializing participatory technology development activities and processes, for instance through community-level analysis workshops or field days, is considered important for inducing wider interest among communities for both participatory research and extension.

A main characteristic of the Farmer Field School (FFS) model is experiential learning about ecological processes by providing opportunities to farmers to discover and experiment. Experimentation, however, serves primarily a learning purpose in the initial model, although the FFS setting also allows for experiments to test and adapt technology components. In the Sweetpotato ICM FFS developed by CIP and its partners in Indonesia, the FFS model was extended by incorporating activities to familiarize experimental methodologies to the farmers and encouraging them to design, conduct and analyze their own experiments on the FFS plot. This has proven very effective and several alumni groups continued to do collective and individual experiments to further adjust the ICM guidelines to their farm conditions, and convince themselves of compatibility of the ICM components in their farming systems. Again, the purpose here is (large scale) adaptation for final implementation, and not (participatory) technology development which had long before been preceded by the FFS implementation in order to provide its technical content.

Anticipating participatory scaling-up

Aiming at wider scale impact calls for anticipation at a very early stage of project management. In addition to thorough project planning, an important factor in this is the early establishment of linkages with organizations or individuals that can provide mechanisms for future scaling-up. Identifying such mechanisms should preferably be part of the needs and opportunity assessment. Linkages can be established and strengthened by involving key persons in critical events during the various stages of project implementation, for instance by inviting representatives of certain organizations to needs assessment analysis meetings, or end-of-season evaluation and planning workshop of a participatory technology development team. When project development reaches the stage of institutionalization, roles, responsibilities and mandates of the various institutions involved should be made very clear. An analysis of expertise and capacities may help to determine whether there is a needs for additional input, such as training or provision of materials.

In the case of the Sweetpotato ICM FFS program, we originally intended to "scale-up" through the eight farmer researchers who had been involved throughout all stages of the project. The effort to train them as master trainers, however, failed, because they lacked the experience of having learned themselves through FFS methodologies, and therefore did not pick up the facilitation skills needed. As a result, the National IPM Program was selected as the major mechanism for scaling-up, since this program had an impressive, nation-wide cadre of very capable and well-trained FFS facilitators (Asmunati *et al.*, 1999). The selected trainers from major sweetpotato growing areas only needed upgrading with respect to (1) sweetpotato cultivation aspects since they only had experience in rice and soybeans, and (2) the particulars of ICM as opposed to IPM, including a range of crop management and methodological activities. It was also realized that the National IPM Program only operated in irrigated areas, indeed covering several major sweetpotato growing areas. However, in order to also reach farmers in rainfed areas who probably needed the ICM technology more, NGO networks working in the field of sustainable agriculture were involved as a second mechanism for scaling-up. Since NGO programs generally have a community rather than a commodity focus, the training-of-trainers for NGOs had to be adapted accordingly by emphasizing the principles of ICM and FFS approaches instead of focusing on ICM and FFS for sweetpotato, as was the case for the National IPM Program training-of-trainers.

Due to the wider scope of ICM, the project had involved the Directorate of Food Crops Production, in addition to the National IPM Program which falls under the Directorate of Plant Protection. Although the role of this Directorate was very minor throughout the project, the presence of the head of the Sub-directorate for Rootcrops during an evaluation workshop resulted in the preparation of a proposal for submission to the Directorate's Planning Bureau for a three-year Sweetpotato ICM FFS Program targeting for 490 FFSs potentially involving 12,250 farmers. At the time this paper was written, the decision for program approval was still pending. The experience, however, shows that through long-time acquaintance and involvement, albeit minor, possibilities for scaling-up opened up that would not have emerged without long-lasting, and initially seemingly fruitless, efforts.

Conclusions

When planning for scaling-up (participatory) project efforts, it should be clearly defined first what we want to scale up and what our objectives are, which globally could be categorized as either research or extension objectives. Do we need participatory technology development aimed at generating and adapting technological guidelines to be replicated in more, diverse places for a more widely adapted research output? Or do we want to extend research output, which may include both technological guidelines and experimental methodologies for location-specific adaptation of such guidelines, to larger groups of farmers. These two objectives call for a different scale of scaling-up, the second being much larger than the first, and require a different mechanism to be installed for scaling-up. In terms of the framework presented above, activities with research objectives takes place in the research and development realm, whereas scaling-up for extension purposes comes under the extension and implementation realm. The latter implies the development of learning protocols, training of trainers and organizing wide-scale implementation of farmer learning activities.

Attention to experimental methodology in farmer training to enhance farmers' experimental skills allowing them to verify and adapt technological guidelines under their specific farm conditions, is perceived to contribute greatly to the successful implementation of sustainable agricultural practices. The farmer field school model provides a good environment for teaching such skills, although modules adapted to the agroecological and social-cultural setting of a FFS program need to be developed. Teaching such skills to farmers requires strong trainer capacities, hence solid training of trainers, especially in countries with top-down extension systems primarily delivering preset recommendations to farmers. Selecting and preparing the right mechanism to achieve both quantity and quality in scaling-up is therefore of utmost importance. Setting clear objectives and anticipating implications for achieving these, in a participatory way, are necessary to build strong programs at the desired scale.

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