

Integrative, farmer-participatory methodology for poverty-sensitive research: Sweetpotato Integrated Crop Management in Southeast Asia.¹

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Abstract

A methodological framework for integrative, participatory research and development is presented as a methodological example for designing, conducting and evaluating research and development projects targeting poor farmers. The framework was developed in the context of the International Potato Center's (CIP) sweetpotato Integrated Crop Management (ICM) program in Indonesia, and adapted and applied for sweetpotato ICM program development in Vietnam and potato IPM work in Indonesia. The framework is characterized by farmer-participatory and integrative approaches, and includes the following research and development phases: (1) problem, needs, and opportunity assessment, (2) applied technology development, (3) farmer training development and institutionalization, and (4) monitoring and evaluation. The methodological issues are illustrated by practical experiences, outputs and measured impact of the sweetpotato program in Indonesia. Suggestions and experiences are provided for application of the framework in other situations based on lessons learned.

Introduction

For decades, agricultural research, development and extension has been biased to the better-off, more progressive farmers (e.g. Chambers *et al.*, 1989; Röling, 1988). It is widely acknowledged that, for instance, the Green Revolution in Asia resulted in a tremendous production increase of rice, but also in an increased gap between resource-full and marginal farmers. Technologies developed often require investment to purchase inputs or equipment that the poor farmers cannot make. In other cases technologies do not provide a solution to the real problems of marginal farmers who grow their crops under conditions totally different from those at experiment stations. Heterogeneity in the agroecosystem, as experienced and even exploited by farmers in marginal areas, is considered a serious obstacle in scientific research, and therefore often avoided (De Steenhuijsen Pijters and Fresco, 1997). When poverty alleviation, however, is one of our overall goals, as it is within the CGIAR system, we will have to target, hence work with and under the conditions of the poor farmers. Participation of farmers in planning and implementation has greatly enhanced the effectiveness of research efforts in addressing the needs of the poor (e.g. Chambers *et al.*, 1989; Scoones and Thompson, 1994; Haverkort *et al.*, 1991). A second important focus for poverty-oriented work is an integrative nature of methodologies, to ensure congruity of analytic, disciplinary research with farmers'

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holistic perception to their farm management, and to needs and opportunities for improvement (Van de Fliert and Braun, 1999).

This paper presents a methodological framework for integrative, participatory research that forms the base model for CIP's IPM/ICM work in Southeast Asia. Its different phases are described, and implications for poverty-oriented research are given. Activities, outcomes, and short-term impact of the Sweetpotato ICM Project in Indonesia are presented as a case study, after which experiences in other projects are shared and suggestions for application of the framework in other situations are provided.

A framework for integrative, farmer-participatory research

The framework for the integrative, farmer participatory research for sustainable agriculture presented here was partly developed as a framework for project design and evaluation in the context of the CIP- and UPWARD²-supported "Sweetpotato Integrated Crop Management (ICM) and ICM Field School Development" project in Indonesia (Van de Fliert and Braun, 1999). The project was designed according to an initial version of the framework, and the framework developed as the project advanced. It should not, however, be considered something fixed and final. 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 integrative, farmer participatory research.

Our experiences are specific for the context of sweetpotato and potato IPM/ICM development 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.

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. 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:

- Research and development.
- Extension and implementation.
- Monitoring and evaluation.

² User's Perspective With Agricultural Research and Development, a CIP-affiliated network of Asian researchers conducting participatory R&D in rootcrop systems.

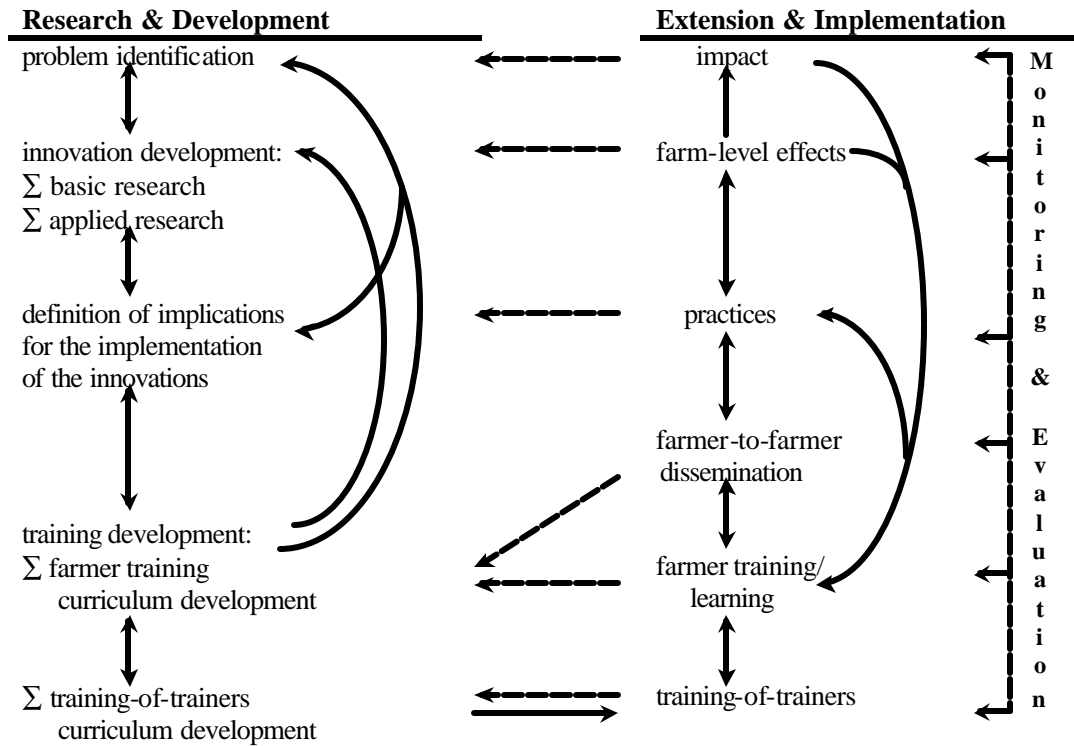


Figure 1: Framework for integrative, farmer participatory research aimed at impact.

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.

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).

"Development" (within the context of research and development) is defined here as 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—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.

Farmer participation at all stages

Farmer participatory research projects aim at achieving tangible impact by encouraging farmer involvement. Achievement of impact is an ambitious goal, requiring both qualitative change (e.g., effect on farmer capacities, practices, collective actions, or support systems) and quantitative change (i.e. on a considerably large scale). Careful planning at each project stage to ensure (1) appropriate problem definition and establishment of objectives, (2) successful generation of applicable information or innovations, and (3) appropriate development and use of dissemination mechanisms and their effective implementation, can contribute to the

achievement of this kind of impact. The level of farmers' participation should be determined by their interests and capacities and by the nature of the work. In such a collaboration, farmers provide the holistic perspective, explain what works and what needs to be improved in the current system, set the evaluation criteria for innovations in accordance with their objectives for farming, and test possible innovations. Technical scientists contribute new technological information that may provide options for improvement, and methodologies for testing the various options. Social scientists help identify the constraints and opportunities in the support system, seek ways to reduce the constraints and enhance the opportunities, and translate technological innovations into farmer learning objectives.

Foci for poverty-oriented participatory work

An integrative, participatory approach to agricultural research and development does in itself not guarantee that impact will be achieved among those who need it most. In certain cultural settings, the implicit dominance of the better-off in a community may cause problems: Often, the wealthier community members are perceived to have a higher social status, preventing the use of a truly participatory approach, especially when the methodology involves community-level meetings. Therefore, prior understanding of local power and communication structures are important when designing project methodology. Targeting the needs of the poor implies giving more weight to their opinions. To compensate for this, a variety of methods should be used during needs assessment activities to ensure input from all layers of the community. In addition, various “tricks”, as described in textbooks on participatory methodology (e.g., Van Veldhuizen *et al.*, 1997) can be used to prevent biases.

A critical element of methodology design and preparation is site and participant selection. The sites and participants should have characteristics representative of all major target group(s). For example, if smallholder farmers under marginal conditions are targeted, research must be conducted with such farmers in marginal areas, even if this entails difficult logistics (e.g., transport to remote areas). Research should preferably be conducted in relatively remote communities where no other current or recent projects have been conducted.

Another important component in the process of participatory research is to ensure that there is continuous feedback among the various actors in the process. Joint reflection on the findings of research activities ensures better consistency across components, and mutual compatibility with new components and adequate existing practices. This can be done, for instance, by organizing regular evaluation and planning workshops at the project sites, involving representatives from all stakeholder groups.

The issue of risk is a tricky one in participatory research. By definition, research entails risk, since treatments with unknown effects are tested, sometimes under new conditions. This is compounded by the fact that participatory research partners are usually poor farmers, who are generally risk-averse since they cannot afford great losses. The problem is often solved by guaranteeing compensation to farmers for possible loss. The side effect of financial compensation, however, is that participating farmers tend to lose ownership, and as a result often responsibility.. In

this situation, experience dictates that the expectations and roles of all partners in all stages of the process must be established during initial interaction, and clarified throughout the project. Intensive farmer involvement in needs assessment—from data collection to analysis—should create a mutual understanding that it is the farmers who have a problem and that the project exists to facilitate appropriate solutions to it. The issue of risk can be discussed and solved together, most likely through concessions on both sides.

The case study: Sweetpotato ICM development

Developing an Integrated Crop Management approach for sweetpotato in Indonesia was not an original goal of the International Potato Center (CIP) when it assigned its first Integrated Pest Management (IPM) Specialist to the ESEAP region in 1993. CIP planned to conduct IPM research that conformed to work being conducted at headquarters on the sweetpotato weevil and its control. Diagnostic surveys and a participatory needs assessment in major sweetpotato-growing areas in Indonesia, however, soon revealed that farmers did not perceive the sweetpotato weevil as a major problem in sweetpotato cultivation. Therefore, in collaboration with a local NGO and research institute and with joint funds from UPWARD, CIP conducted a three-year (1995-97) project in Indonesia to develop a sweetpotato ICM approach and a tailored Farmer Field School (FFS) curriculum. A national cadre of trainers was trained, and for two more years (1998-99) progress and impact in the field were measured.

Problems and opportunities

The participatory needs assessment conducted in four major sweetpotato growing areas in Java, Indonesia, revealed that farmers perceived strongly fluctuating market prices as the main factor determining the output of their sweetpotato enterprise. Farmers acknowledged that pests such as weevils and aphids contributed to yield reduction under certain conditions, but considered the problem manageable compared to other threats to their livelihood, such as inadequate marketing. Further analysis of sweetpotato crop management practiced in the study areas showed that large variation existed among farmers in terms of practices, yields, and net profit obtained. Fertilization practices in particular ranged widely, and in the majority of cases reflected inefficient or improper use, causing inevitable damage in terms of the incidence of pests and disease. The range in practices and outputs indicated room for improvement, even during seasons when prices were low. Increased yield through better crop and pest management, and reduced expenditures were seen as two potential areas for improvement. Based on this belief, a joint research agenda was set, aiming to develop a sustainable sweetpotato cultivation system and an effective training approach.

Research scope and activities

Identifying problems and research needs required investigation of a wide scope of crop and farm management practices, referred to collectively as Integrated Crop Management (ICM). For the purpose of this project, ICM is defined as a crop

cultivation approach in which a balance between ecological and economic aspects of farm management is continuously sought to ensure sustainability of the enterprise. ICM considers management practices throughout all stages of crop development and utilization, from soil preparation and seed selection to harvesting, marketing, and processing. In this interpretation of ICM, integrated pest management and integrated nutrient management are considered integral parts of integrated crop management. Since ICM emphasizes location-specific decision making and management, it is in principle applicable to all types of farms and farmers.

During five seasons between 1995 and 1997 we worked with a group of eight farmer researchers on developing ICM components by testing new information and technologies, and consolidating these with farmers' practices and experiences proven to work under local conditions. The issue of fertilization required thorough research. Through testing and adaptation of recommendations obtained from the literature review, the farmer researchers found they could improve yield with increased doses of organic manure and potassium and reduced levels of nitrogen fertilizer. Though farmers were convinced that they could manage the sweetpotato weevil well with good water management, alternative control methods were tested in both farmers' fields and at the experimental station. The methods, which included sex pheromone trapping and improved sanitation practices, were tested as additional technology options during periods of water shortage. Other experiments included verification of the effect of cultural practices such as vine-lifting and planting methods, which were identified as potentially favorable by analyzing successful farmers' crop management. Experiment results were consolidated with existing farmer practices that were considered effective in terms of ICM, tested in a Farmer Field School setting, and documented in a technical manual. The manual contained background information on all aspects of cultivation and agroecosystem management (from soil preparation to marketing); broad guidelines for cultivation, to be refined or adapted by farmers in their individual fields; and problem-solving methodologies, for enhancing skills.

Along with technology development, a Farmer Field School curriculum was designed and modules were developed. Since IPM and ICM are relatively complex, knowledge-intensive, location-specific approaches, improving the farmers' capacity for problem solving, decision-making, and platform building is critical. Training to enhance this type of knowledge, skills and organization, therefore, requires an approach different from the traditional linear, content-oriented approaches, which are often pre-packaged in the form of diffusion materials and have not proven effective for the more complex processes inherent to the development of sustainable agricultural systems (Matteson *et al.*, 1994). The Farmer Field School (FFS), successfully implemented for rice IPM training in Southeast Asia since 1989, applies a field-based, experiential learning approach focusing on this type of capacity building. Therefore, it was chosen as the appropriate model for training farmers in sweetpotato ICM. Another advantage was the fact that Southeast Asia, particularly Indonesia and Vietnam, had large cadres of highly qualified IPM FFS trainers, an asset that would facilitate future, broader-scale applications of the project. The sweetpotato ICM FFS curriculum design consisted of 17 sessions that could be implemented flexibly throughout the growing season. A field guide was written for each topic, describing the objectives, materials, and systematic process of experiential learning activities. The FFS model design was field-tested, evaluated

with farmers, and revised. The field guides were compiled with the technical guidelines to produce a manual for training trainers.

Institutionalizing output

Two mechanisms were identified as potential means for institutionalizing the sweetpotato ICM FFS model: (1) the National IPM Program (NIPMP), and (2) local NGOs. These systems were mobilized through separate training-of-trainers events. Due to the NIPMP's bias toward rice-growing systems, selected implementation sites included areas in Java with irrigated water supply, where sweetpotato is grown in rotation with rice. Six sweetpotato ICM FFS were conducted in these areas. Unfortunately, there was no expansion of the project during successive seasons due to the phasing-out of the National Program and the lack of local funds during Indonesia's economic crisis in 1998-99.

The training for NGOs targeted farmers in rainfed areas, particularly those outside Java. Participants came from 13 provinces, representing 30 NGOs that had implemented their programs with local communities, mainly in non-irrigated and marginal areas. Therefore, follow-up activities for the training-of-trainers sessions included a wide range of initiatives in which ICM FFS principles were adapted to local needs. Participants reported implementation of seven ICM FFS in either sweetpotato or other crops including rice, cabbage, soybean, and potato. Other activities included ICM FFS orientation for the staff of participating organizations, experimentation on ICM components for sweetpotato, and other crops.

After a year of field implementation by the NIPMP, a third mechanism emerged when the head of the Sub-directorate of Non-Rice Cereals and Rootcrops of the Directorate of Food Crops Production in the Department of Agriculture became interested in the project during an evaluation workshop. Realizing the temporary nature of the NIPMP and acknowledging the model's potential and demonstrated impact, the sub-directorate proposed a three-year Sweetpotato ICM FFS Program. The proposal included the utilization of all the resources developed by CIP and its partners (including training staff and materials) to conduct 490 Farmer Field Schools with 12,250 potential farmer participants. Approval for this program approval is still pending.

Analysis of impact

Monitoring and evaluation activities are ongoing and include assessment of the training process in terms of its quality, output, and impact. Data on yield and income achieved by a group of trained farmers in Central Java, in comparison with several references, is depicted in Figure 2. This group attended the FFS during the dry season of 1998 and decided to pursue joint, self-supported experiments. Together, they rented a plot of land for several successive seasons and conducted ICM experiments. This triggered the development of women's and youth groups, who tested the ICM principles on a variety of crops.

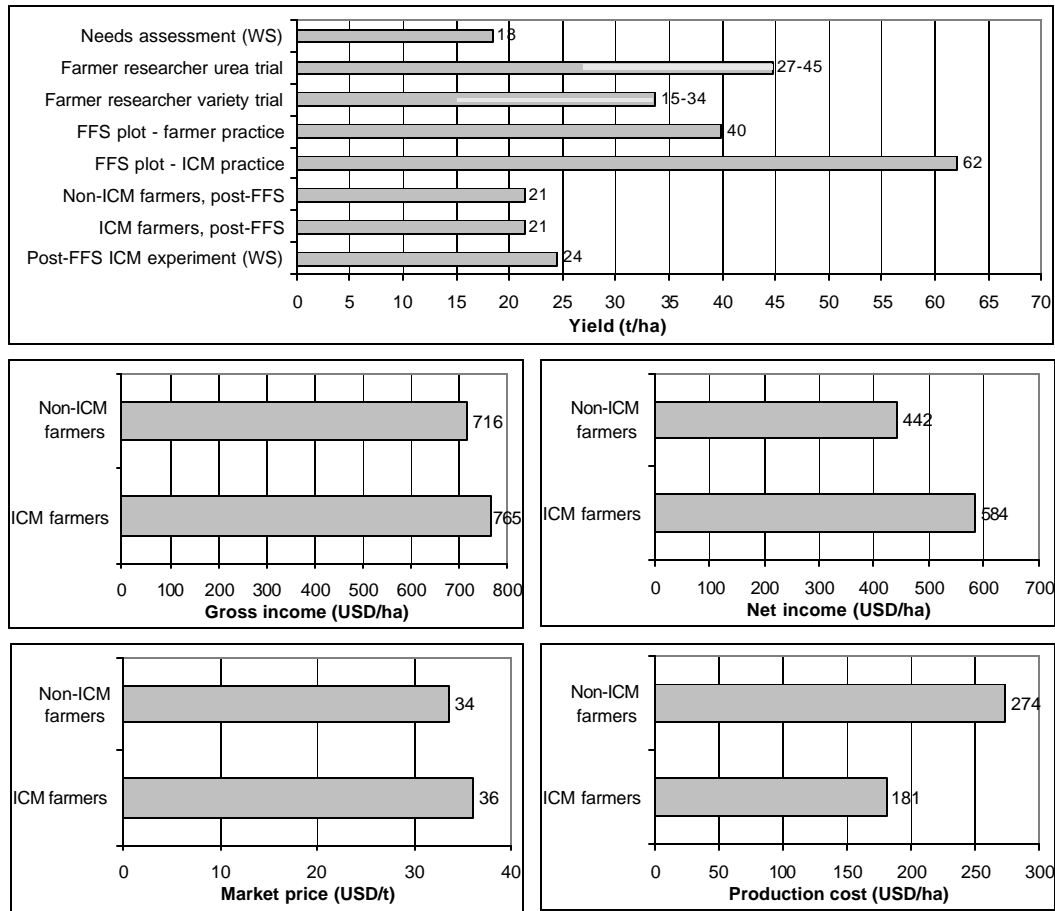


Figure 2: Yields, gross and net income, market price and production cost of sweetpotato cultivation by ICM trained and non-trained farmers in Karanganyar district, Central Java. Most data are from dry season crops (the optimal season for sweetpotato growing in this area), except those indicated with WS (wet season).

None of the differences in Figure 2 are statistically significant (at $\alpha=0.05$) due to small sample size and large variation, but some visible trends are worth noting. Analysis of sweetpotato storage root yields throughout several seasons shows that the area has tremendous potential for sweetpotato cultivation. However, this potential is often not reached. Management practices, particularly fertilization, play an important role in determining output, along with soil composition and the location of the field. Experiments done by the farmer researchers on relatively good parcels of land resulted in yields for all treatments that were generally higher than the average yields reported during needs assessment and post-FFS seasons. During the post-FFS growing season, trained farmers did not obtain higher yields than untrained farmers. However, on their FFS plot, the trained farmers demonstrated for themselves that ICM practice could boost their yields. Moreover, the ICM FFS graduates obtained a slightly higher gross income and a substantially higher net income compared with the non-trained farmers, despite similar yields. The higher gross income was obtained through the somewhat better sale price the trained farmers received, which may indicate enhanced bargaining power as a result of the FFS. The additional difference in net income was caused by the FFS farmers'

relatively lower production expenditures, an output that conforms to predictions of the ICM FFS model. Similar trends of increased income were visible in other sites, where slightly increased yields were obtained by FFS graduates. Further yield increases are expected as farmers continue experimentation to refine the ICM guidelines according to site-specific conditions.

Learning from experience

The research and development framework presented here, applied in the sweetpotato ICM project in Indonesia was later used for sweetpotato IPM/ICM work in Vietnam as well as potato IPM work in Indonesia. In Vietnam, the process began with technical research focusing on sweetpotato weevil and stemborer management, scab control, fertilization, and some cultural practices. After the Indonesia sweetpotato ICM FFS model was piloted in the field, a participatory needs assessment was conducted in Vietnam as a base for adapting the Indonesian model, incorporating useful components that had emerged from the previous research. It also served to establish links with institutions that could provide potential mechanisms for scaling-up. A training-of-trainers event for the National IPM Program field staff is expected to take place next year as part of efforts to scale up. The potato IPM work in Indonesia was recently launched with a participatory needs assessment, with the output used as a joint agenda for technology development by CIP and its partners (farmers, NGOs, and some national research institutes). The needs assessment revealed strong interrelatedness of variables such as seed quality and availability, pest and disease occurrence, nutrient management, and marketing issues. Due to the complexity of problems in potato production, both from an ecological and an economic perspective, solid and integrative research for ICM component development is a prerequisite for developing training curriculum for farmers.

In general, the great diversity of ecological zones and farming systems requires a flexible approach in research and development. In addition, the complex and interrelated cultivation problems of small farming systems—within the context of the total support system—require cross-sectoral rather than strictly disciplinary research approaches. The need for a new direction in research and development is clearly demonstrated by the transformation of IPM over the past decade, when it evolved from an economic-threshold-oriented approach to a much broader, ecological approach. IPM's first principle—"grow a healthy crop"—conveys its focus on integrating a wide array of cultivation practices to prevent pest attack in an ecologically sustainable way (Van de Fliert, 1998). As described above, farmers participating in IPM development for sweetpotato in Indonesia, where pest pressure is low to moderate in most seasons, demanded less emphasis on pest control strategies and more emphasis on marketing strategies. Therefore, project focus was changed from IPM to ICM. This also occurred in sweetpotato IPM programs in Vietnam and Uganda (Braun and Van de Fliert, 1997). Integrative and participatory, co-creative approaches to research and development recognize the human factor as the core element to attain synergistic outputs and impact. The importance of determining and then reconciling the different perspectives of each of the stakeholder groups cannot be overly stressed.

This framework is presented as a tool to facilitate the simultaneous phasing of such research and development activities. The nature and severity of the problem will determine the extent of integration and participation needed to achieve the desired impact effectively and efficiently. This can be done only on a case-by-case basis by factoring information needs, potential solutions, records of experience, levels of expertise, and available funds into the model. When certain steps cannot be taken due to limited financial, institutional, or human resources, alternatives should be sought to guarantee the desired impact, or objectives should be adjusted. If used within condition-specific contexts, this framework will yield different output each time it is applied. And each new application of this framework—analyzing scenarios in different regions and/or different commodities—increases the potential scope of integrative, farmer participatory research and development, thereby optimizing research output and impact and better serving the needs of resource-poor farmers.

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