OUTPUT 1. PARTICIPATORY RESEARCH APPROACHES ANALYTICAL TOOLS AND INDIGENOUS KNOWLEDGE THAT LEAD TO THE INCORPORATION OF FARMERS´ AND OTHER END-USERS´NEEDS IN INTEGRATED AGROECOSYSTEM MANAGEMENT, DEVELOPED FOR INTERESTED R&D INSTITUTIONS

Milestones

- ✴ Moving from constraint to opportunity
- ✴ Procedure of Monitoring and Evaluation developed to be evaluated and disseminated in some Countries
- ✴ Procedure for participatory selection of cassava varieties, analyzed

Learning from PME experiences in Latin America: A strategy to capture the results of development changes at the community level

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Highlight:

Successful strategy for obtaining M&EP results-chain has been developed.

Abstract

Farmer groups have tested several ways to verify expected community results from the Participatory Monitoring and Evaluation (PME) process in Latin America. In some cases, however, these have failed to identify and measure short-term results (outputs), medium-term results (outcomes) and long-term results (impact) efficiently at the level of farmers' groups. It has now been recognized that there are problems that limit facilitators' abilities to interpret and find appropriate indicators for measuring those results. Conceptualization of monitoring, evaluation, participation and indicators and developing a strategy to explore in depth the meaning of those terms at the community level could be a successful way to resolve those problems. This article, based on the author's experience in Cauca Colombia, describes some alternatives for resolving these barriers. More importantly, the author explains how these apparent obstacles in the process can actually be exploited as opportunities to enhance the PME process and thus result in benefits for farmers' groups and scientists.

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Introduction

Participatory monitoring and evaluation (PME) has a dual purpose: It is a management tool that enables people to improve their efficiency and effectiveness. It is also an educational process in which participants increase awareness and understanding of the various factors that affect them (Stephens, 1988). This means participation by the target beneficiaries in decision-making and planning throughout the implementation process and in sharing benefits. Hence monitoring and evaluation (M&E) demand an in-depth comprehension of the processes, a strong commitment to develop the PME systems further themselves, and an efficiently strategy for understanding information generated during the process.

Research questions

These barriers pose serious constraints to an effective PME process and must be resolved by answering the following research questions:

- How to obtain a better understanding of the M&E process
- How to reach short-term results (outputs), medium-term results (outcomes) and long-term results (impact)

This paper draws on the author's experience of working with farmers' groups to discuss ways of moving from constraints to opportunities in PME in order to improve the information obtained. The purpose of this paper is to promote a better understanding of PME results through a useful strategy for taking information and teaching the process. It is targeted toward facilitators and farmer groups involved in the PME process.

Case study and directions

The strategies proposed here are based on the author's involvement in experiences with PME in Cauca, Colombia. The author analyzed a sample of 9 CIALs with an established PME process (La Unión 1 and 2, San Isidro, Carpintero, El Pinar Mujeres, La Esmeralda 1 and 2, and Las Lajas). The preliminary results of this analysis permitted testing the following procedure:

Understanding key concepts

- *Strategy1 and directions*. Farmers and facilitators of PME should have a clear vision of the process. Without a clear vision of what PME hopes to achieve, it is difficult to define results clearly (Stephens, 1988). Consequently, we should explain, "What does participation mean within a PME process? In other words, farmers need to understand that PME has been found especially valuable for small farmer development. This means that PME requires the involvement of communities members in:

- Planning the general and specific objectives at the community level and the areas to monitor and evaluate
- Deciding the activities that permit reaching those objectives
- Selecting indicators
- Collating and tabulating data
- Analyzing the results
- Sharing information with others members of the communities
- Using PME information for their own purposes.

This proposal consists in designing a step-by-step procedure, describing relationships in each one (using graphics is the best way). Figure 1 describes a sequential process and introduces the cycle concept.

- *Strategy 2 and directions*. There are different levels of results that seek to capture the development changes that occur: Short-term results or outputs, medium-term results or outcomes, and long-term results or impact (CIDA, 2000). PME has similar results linked to what is commonly referred to as a "results chain," so it is possible to find the cause-effect relationship of results as follows: Objectives, specific objectives, outputs, outcomes and impact should be defined as the "results chain." From the overall objective it is possible to derive specific objectives and then outputs, outcomes, impact and indicators can be identified as shown in Table 1.

1. Planning objectives
(key question: why are you grouped as a CIAL?)

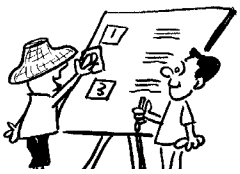
7. Using PME information

2. Deciding activities

Cycle

6. Sharing information

3. Selecting indicators



5. Analyzing the results.

4. Collating and tabulating data,

Cartoons adapted by the author.

Source: Cartoons drawn by Dave Daniel In: "Developing forage technologies, with smallholder farmers" Werner and Peter Horne. ACIAR Monograph No. 8

Figure 1. How to reach ours goals? (procedure designed by author)

At the beginning of the process, build up the overall objective and then break it down into specific objectives. For each specific objective, find strategies (activities or actions, conditions and criteria) and indicators (see the sequential order proposed in the following list).

- Overall objective
- Specific objectives
- Outputs or short-term results and indicators
- Outcome or medium-term results and indicators.
- Long-term impact and indicators

Preliminary information from the PME process in the CIALs in Cauca, Colombia (La Unión 1 y 2, San Isidro, Carpintero, El Pinar Mujeres, La Esmeralda 1 y 2, and Las Lajas) has been used to identify the following common objectives in all the CIALs in Cauca:

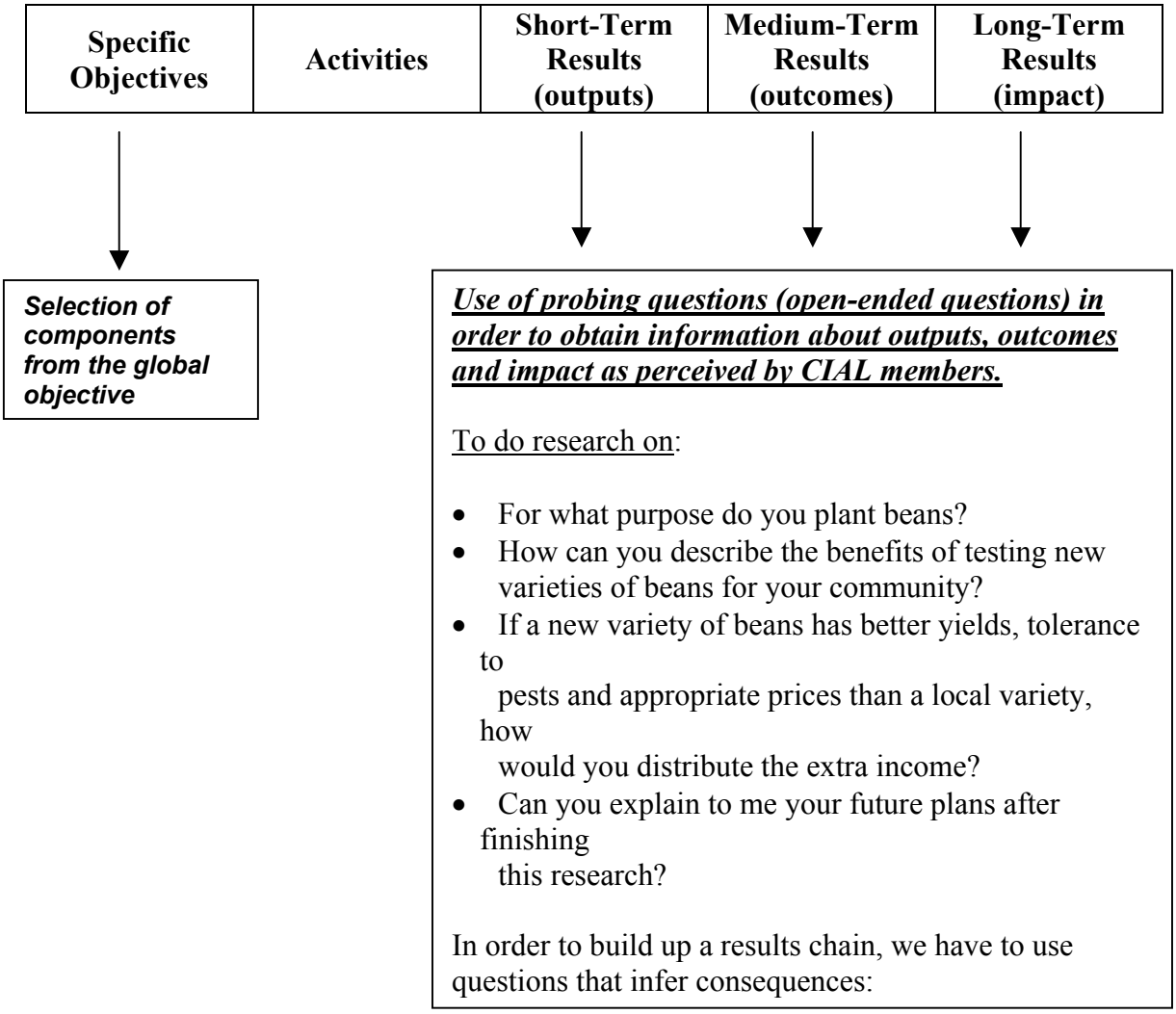
- Do research in: common beans, maize, cassava, sugarcane, potatoes, etc.
- Look for funds
- Improve the CIAL's organization
- Manage projects
- Develop rural agroenterprises

Based on this information, the author developed a proposal of the "results chain" for two specific objectives (Table 1).

Table 1. Chain results (adapted by author, 18 July). Source Cauca CIALs.

Specific Objectives	Activities	Short-Term Results (outputs)	Medium-Term Results (outcomes)	Long-Term Results (impact)
Do research on:				
Beans, maize, cassava, sugarcane, potatoes or varieties	Planting new alternatives under farmers' conditions (technological supply)	Preliminary selection of new alternatives	Farmers interested in novel alternatives	Improve the quality of life in terms of living conditions (e.g., food security)
Indicators:		Level of knowledge as regards new technological options, through Informal interviews (community members)	No. of varieties planted under community's conditions Level of satisfaction related to research progress	Level of well-being as perceived by local population % in assets of specific community
Look for funds	Hold raffles Hold bingos Have football games Hold festivals	Increase CIAL's funds Income and debits balance	Increase loan rates among CIAL members	
Indicators:		Monthly reports of income.	Level of satisfaction of beneficiaries (at present they are able to solve some problems).	Members of communities in Cauca will have improved their well-being in terms of education and health (need benchmark study for this). No. of communities in Cauca with self–financing.

Strategy 2. The cause-and-effect relationship of results.



Example where Strategy 2 was implemented: Esmeralda II

Overall objective

"CIAL group strengthened in order to create an agroenterprise of maize to improve income and quality of life of community members"

CIAL members

Demetrio Aranda
Esmeralda Hurtado
Diego Cifuentes
José Thomas Aranda
Martha Lucía Mera
Aura Lucía Hurtado
Diego Fernando Cifuentes

Procedure (chain questions)

Probing* questions, consequence questions, questions about activities and indicators (* in order to explore in depth the meaning of some term or saying used by farmer (Guerrero et al., 1993)

Q: ***What does*** "CIAL group strengthened" ***mean***?
(probing question)

A: That means that we have to improve the group in two ways:
(1) First we ought to increase participation, and (2) simultaneously we should search for funds.

Q: ***If you*** improve participation***, then*** what happens? ***(probing questions)***

A: ***"If*** we improve participation, ***then*** *new motivated members* will be able to increase plots of maize (the goal is at least 15-20 members).

Q: How do you hope to reach that? (**questions about activities**)

A: Well, we have to show the CIAL's results at the community level (first way), and we can also organize raffles, bingos, "tamales"; simultaneously (second way), as a support to interested people so that will allow us to increase areas and plots of maize in the Esmeralda community.

Q: How do you measure greater participation through those activities described above? (**question regards qualitative indicators**)

A: We can measure it if people have greater spirit, better knowledge about the CIAL's activities, increased levels of satisfaction and also the number of people associated (**qualitative indicators**). We have to assign responsibilities creating a commission in charge of recording all the information.

Q: How do you measure success in searching for funds? (**question regards quantitative indicator)**

A: We can measure it with our income and debits balance sheet (assessment of results).

Q: ***If you*** increase production areas of maize, ***then*** what happens?

A: As a consequence, ***we will have better production,***
then we are going to establish a process for functioning legally.

Q: What kind of action do you need to function legally

A: To find out information at the Chamber of Commerce.
To look for a consultant's office to organize the group (activities)

Q: What is the best indicator that you are working in that way?

A: (1) Increasing level of group knowledge about legal process (**qualitative indicator**), (2) license for legal functioning.

Q: When you obtain a bigger production and legal functioning, what is the next step?

A: We are going to buy a machine for threshing maize (for the maize company and its byproducts) and after that, some members of the community will be able to raise chickens, hens, and probably they will sell surplus maize to other members of the community. We need to identify different markets and potential clients (**activities**).
Probably we would like to support other maize producers, selling their production or offering services like a rotating fund and technical handling of maize crop.

Q: What are your expectations in terms of income, **if** you achieve the goals mentioned before? (**questions about impact**)

A: In the future, we are going to improve income, health and quality of life in terms of subsidies of health, home orchards, change in the nutritional diet, improvement of the house. We also could generate new jobs.

Q: How can we measure that?

- Numbers of subsidies
- Changes in the nutritional level of the diet (people sell eggs to buy rice)
- Numbers of houses improved

Q: If you had a better income, how would you spend this money?

A: I would like to invest this money in health, housing and paved roads in my community.

Synthesis of information

The challenger is to find outputs, incomes and indicators from the answers.
Following the chain results described in Table 1, it is possible to classify the answers as follows:

General objective

"CIAL group strengthened in order to create an agroenterprise of maize to improve incomes and quality of life of community members"

Outputs
Short- term results

Improved participation

Indicators: No. of people participating (15-20)

Better knowledge of the CIAL operation

Outcomes
Medium-term results and indicators

Increased areas of maize

Increased capacities of farmers in terms of maize production

Indicator: No. of hectares planted in maize

Jobs generated

Impact
Long-term results

Improve the quality of life in terms of health, housing and routes of the
Esmeralda II , located in

Conceptualization of the results chain

Correlations between time (axis X) and overall objective of communities (axis Y) across different levels of goals are presented in Figure 1. At the beginning, communities start with minimum values near the origin (X and Y) in both variables. In the first steps farmers take advantage of the CIAL's research results.

The initial step is the first component of the overall objective, where they identify potential activities in order to reach each component. It is assumed that with increasing trust and knowledge, farmers find opportunities and solutions, and can then can solve problems with new options. Finally, farmers obtain useful feedback to develop and drive development of specific goals responding to farmers' conditions and expectations. Impact assessment is possible at the end of the process. This graphic synthesizes specific objectives and indicators to select relevant moments to verify the accomplishment of the objectives.

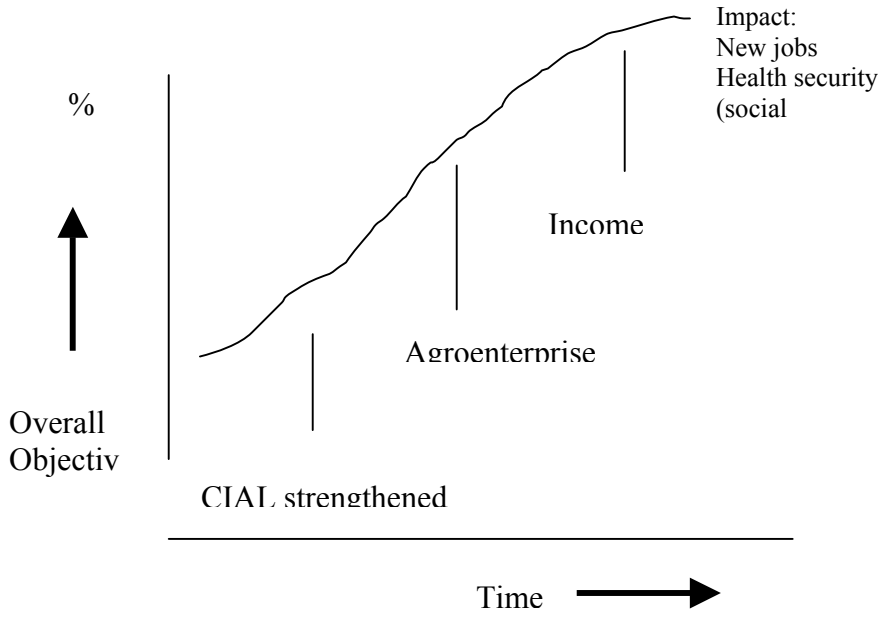


Figure 1. Levels of the overall objective (author's hypothesis)

Conclusions and lessons learned

- Farmers need to understand that PME has been found especially valuable for small farmer development. This means that PME requires the involvement of communities members in:

  - Planning the general and specific objectives at the community level and the areas to monitor and evaluate
  - Deciding the activities that permit reaching those objectives
  - Selecting indicators
  - Collating and tabulating data
  - Analyzing the results
  - Sharing information with others members of the communities
  - Using PME information for their own purposes.

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Experiences in the establishment of community-based participatory monitoring and evaluation systems (PME) with CIALs in Colombia

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Hightlight:

Procedure of Monitoring and Evaluation proposed to be evaluated and disseminated in some Countries

Overview

In the search for a process to empower and support rural communities in their decision-making process, IPRA has been developing mechanisms for establishing and supporting community-based participatory monitoring and evaluation systems (PME) with the Local Agricultural Research Committees (CIALs). The Participatory Research Approaches project (IPRA) of the International Center of Tropical Agriculture (CIAT) began a process of establishing community-based PME systems in Cauca in 2002 (IPRA, 2002). In 2003 IPRA extended the lessons and tested the approach with the second-order association of CIALs in Cauca Province: CORFOCIAL.

The purpose of this paper is to strengthen the knowledge and experiences with establishing and applying community-based PME systems with grassroots groups.
Lessons learned during the process of establishing PME systems in the CIALs of Cauca Province, Colombia, are reviewed.

Background and CIAT experience with PME

PME fulfills basic functions in any development effort because once established, it helps identify problems, measures the progress made toward the objectives, and evaluates the results (FAO, 1996). One of the results expected in the medium and long term is to promote people's potential through their participation in decision-making and the mobilization of this social responsibility and accountability in favor of sustainable human development and capacity building (UNDP, 1997).

PME contributes to the development of rural communities' capacities to identify and solve problems. It is oriented so that the grassroots groups can gather the information needed to evaluate the progress of their projects. In this way PME becomes an instrument to help these groups strengthen their capacity for decision-making and accomplish greater autonomy, which is translated into empowerment of their processes, self-reliance and sustainability.

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The PME approach applied by CIAT builds on the concepts and ideas developed by the Institute of Development Studies at University of Sussex (Estrella et al., 2000; Guijt & Gaventa, 1998) and the PIM concept developed by Germann et al. (1996). The PM&E system, which was developed as part of an action research process, was initiated by a student, Kirsten Probst (2002), as part of her PhD dissertation research.

Applying lessons from this earlier work, a strategy was developed in 2002 to build capacity in the CIALs in Cauca Province. They were selected as a learning ground to test this approach because of their proximity to CIAT. In addition, it was envisaged that these processes would help strengthen social cohesion, management capacity, learning and reflection, thereby empowering these groups.

Objectives

The overall goal is to establish community-based PME systems that will enable CIALs and their second-order associations to evaluate the progress of their projects and strengthen their capacity for decision-making and accomplish greater autonomy. The specific objectives are to:

- Test, evaluate and adapt the methodology for establishing community-based PME with second-order associations of CIALs
- Analyze and document lessons and experiences and then develop guidelines and principles to enable the large-scale expansion of these approaches in other second-order associations in other contexts

Research questions

This work will address the following research questions:

- What is the impact of CORFOCIAL on the sustainability and effectiveness of the CIALs?
- How will M&E contribute to enhancing the accountability of the second-order association CORFOCIAL to the CIALs?
- Can the second-order associations to develop timely solutions to their problems and make necessary adjustments to their plans and activities use the information generated by PME?
- Can PME identify quantitative and qualitative indicators of results, effects and impact?
- Does PME promote the sustainability of CIALs?

Progress in the PME process in the CIALs in the Cauca

The goal of establishing the PME systems is to cover all the CIALs that are grouped under CORFOCIAL, which currently number 39. As can be seen in Figure 1, PME systems were partially established in 12 CIALs in 2002; and this year the work was finished, with PME systems being established in another 10 CIALs, for a total of 22 CIALs in Cauca. Annex 1

shows some of the CIAL groups, where the PME systems have been established, with their objectives, activities and indicators.

In 2003 the goal was to have a higher number CIALs from CORFOCIAL with PME systems established, but there were some difficulties that made it impossible to reach that goal. Therefore, we conducted an evaluation with a few CIALs to understand the challenges in the establishment of PME systems.

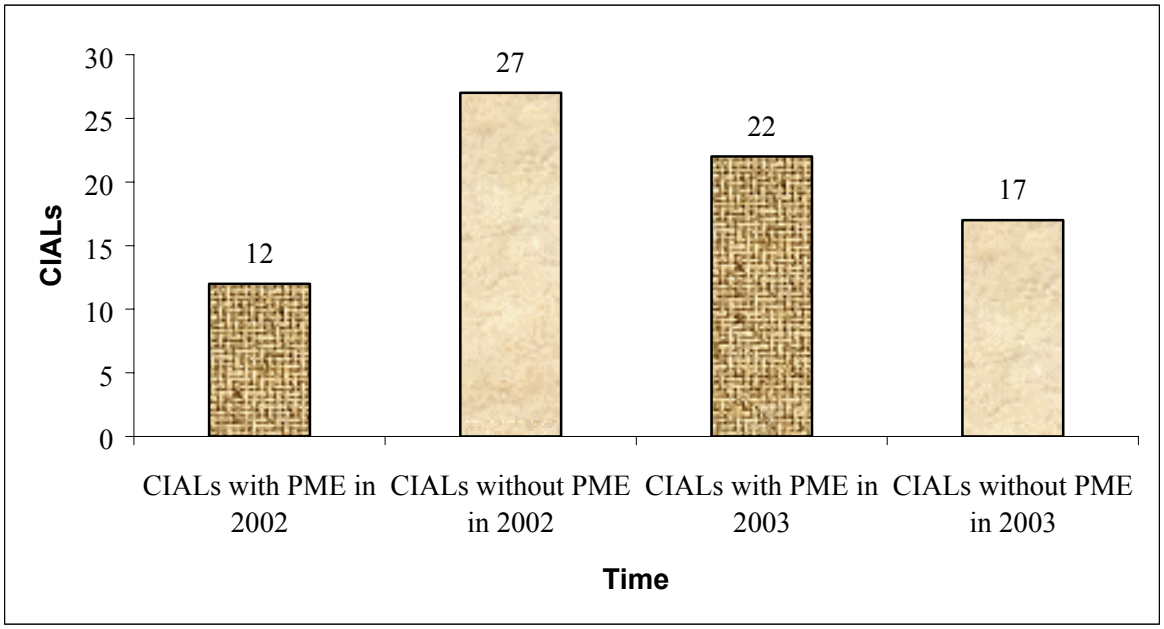

Figure 1. CIALs in Cauca with PME systems in the years 2002 and 2003.

Problems identified in the establishment of PME systems in Cauca

- ***The CIAL group feels somewhat united but weak***. Some of the CIALs feel weak as a group because there is little commitment in the execution of the activities that are programmed; and the recording of the information and the responsibility fall on a few people, not on the whole group.

- ***Lack of union between the CIAL and the community.*** In the majority of the cases, there is little communication and collaboration between the CIAL and the community. As a result of this, there is little collaboration of the community in the group's activities. This occurs because there are no programmed feedback meetings to the community about the results of the work done by the CIAL.

- ***Recording of the information.*** In the CIALs visited the people in charge of recording the information have not developed the skill sufficiently nor the habit of keeping records, which requires their being accompanied very closely by the supporting entities to ensure the recording of the information. As a result, there is little information

recorded by the groups. In some of the cases the groups record the information in notebooks or their field books, where they mix data from the PME work and the CIAL research, in addition to information on work that they are carrying out with other organizations that work in the community, which makes the organization and the analysis of said information all the more difficult.

- ***PME perceived as extra work for the CIAL***. One of the reasons why this happens is that the establishing of the PME processes was done after the CIALs were started. Thus the members of the group consider it as something additional to the work they have been doing all along.

- ***The role of the people responsible for the PME.*** Although some people were selected to be in charge of filling out the formats and motivating compliance with the activities proposed in the PME system, at the time of carrying out the activities, the people who were supposedly responsible and their specific duties in the PME process were not clear, which meant that the programmed activities were not done and the key information that this CIAL is generating was not recorded.

- ***Perception of the benefits of a PME system.*** The people of the CIAL do not perceive any immediate benefits that can be obtained from carrying out the activities and recording the indicators that measure the change towards achieving their objectives. This makes it necessary to backstop the process very closely until the people of the CIAL adopt the system, put it to work and take advantage of its benefits.

- ***Accompanying the process.*** Given that the team of facilitators establishing the PME process in the CIALs was very small, the latter were left alone for extended periods of time. The people in these groups expressed their need for more contact with the technicians (CIAT-CORFOCIAL) to explain some aspects of the activities to be done and the recording of the information that was not sufficiently clear to them. Moreover, going back to topics that had been developed previously left them out of context, and it was necessary to repeat the process of conceptualization, the formulation of the objectives, etc., in order to be able to bring the group up to date on the topics being dealt with, which meant that the work was delayed considerably.

- ***Continuity in the PME workshops.*** In some of the groups the people that attended a meeting for establishing PME did not attend the following one and sent an alternate or simply did not attend. This meant that the topic dealt with previously had to be explained again in order to place it in context for the new people that had just entered the process and this required much more time than had been programmed.

- ***Situation of social unrest***. Some CIAL groups are located in zones where there was social unrest for a time and so it was not possible to achieve the desired continuity, and for that reason, the process of establishing the PME system took longer; e.g., the CIAL El Placer in El Tambo, where it has not been possible for the team to go in order to establish the process.

- ***Institutional paternalism.*** In the zones where the CIALs are working, there are other governmental and nongovernmental institutions. In some cases there have been groups that will work only for donations or where they manage a budget to start their production projects and not in processes such as this, which are based on training people from the grassroots group to achieve sustainability and enhance their capacities.

- ***Factors external to the process.*** There are certain times of the year, such as the onset of the rains, when the farmers hire a lot of labor or they travel to other villages and even provinces in search of the "bonanza" of seasonal work as, for example, the harvesting of coffee, and so they dedicate less time to the activities programmed by the CIAL.

- ***No mechanism for obtaining qualitative indicators of effects and impacts.*** When the PME systems were established, only indicators of the results of the activities programmed by the CIAL in the short term in relation to the proposed objective were taken into account; therefore there were no indicators of intermediate or long term results, which in addition to measuring the results, also measure the effects and the impacts of the process undertaken by the CIAL in the community. Besides, there were no mechanisms for identifying indicators that were qualitative in nature. This made the later analysis difficult when it came to identifying the effects of the PME process undertaken by the CIAL in the intermediate term and the impacts in the long term.

Actions undertaken to solve problems presented in establishing the PME systems in Cauca

- ***Formation of a team of PME facilitators.*** Given that at the onset of the process of establishing PME in the CIALs there were problems because the training team was very small and could not handle the number of CIALs where these systems were being set up, it was decided to train a team of facilitators to support this process. Alfonso Truque and Bolívar Muñoz, who are the farmer-technician and the administrator of CORFOCIAL, respectively, and 6 CIAL Guides to provide continuity to the meetings and later accompany and follow up the process formed the team. It is important to note that this group of PME facilitators was trained in both the theoretical part of the workshops with the aid of exercises and tools, as well as in the practical aspects of the CIALs as a direct support to the Facilitator of the IPRA Project at CIAT. This group has the responsibility of establishing the PME systems in the CIALs that are in their charge and those that are near their zone of influence. An agreement was reached with CORFOCIAL, whereby the Guides would work in establishing the PME for 2 days per month and that they would be paid the equivalent of one day of the legal wage established for each day worked and supported by a report.

- ***Formats designed so Guides could record general results of the PME in the CIALs.*** In order to be able to obtain uniform information, to verify the work done by the Guides, and to learn the progress made in establishing PME in the CIALs, some formats were designed to gather the general information on this process, which covers all its aspects such as the exploration of knowledge on PME, the formulation of the CIAL objectives, activities programmed, indicators for measuring the progress of the

process, formats designed by the CIAL and people in charge of carrying out PME in the CIAL (Annex 3).

- ***Execution of a common PME agenda between CIAT and CORFOCIAL.*** In order to synchronize the work of establishing the PME systems in the CIALs, work schedules were prepared jointly, coordinating the remaining activities for establishing PME in the CIALs where it was incomplete and to begin establishing it in the CIALs that haven't begun the process yet.

- ***Prioritization of CIALs where PME will be established in 2003.*** In the prioritization of the CIALs where PME will be set up, it was necessary to agree upon the CORFOCIAL personnel such as the Guides and Technicians. It was also necessary to take into account factors such as the situation of security in the zones where the CIALs are located, the ease of traveling there (CORFOCIAL and CIAT teams) and the willingness of the CIAL group to participate. Given the level of the commitments, it was decided to establish the PME systems in 22 of the 39 CIALs of CORFOCIAL.

- ***Accompanying the PME process in Cauca.*** The CIAT IPRA Project is also accompanying the CORFOCIAL technicians, Guides and CIALs in order to strengthen their capacities and overcome inconveniences related to said systems.

- ***Modified methodology for establishing PME in the CIALs.*** Given the fact that in the initial stages of establishing PME systems in the CIAL groups required up to five 4-hour meetings per group, it was necessary to adapt the strategy, taking into consideration farmer's limited time. The adapted strategy of a "cascade" of questions that begin with the question, "**What are the objectives that you wish to reach as a group?"** From there, the conceptualization of what a PME system is and what it means with respect to the accomplishment of the proposed objectives are derived. Afterwards, the activities to achieve each objective are formulated, as well as what the community and the group expect to accomplish with each of these activities. To strengthen the conceptualization, graphs or drawings that reflected scenes from the farmers' daily lives are used. Figure 2 illustrates this cycle diagrammatically.

- A significant accomplishment with this methodology is that the entire process can be a completed 2 to 3 meeting per group. This means less time is required to establish it.

- ***Strategies for identifying outcome and impact indicators.*** The adjusted methodology also allows for the identification of indicators for monitoring the process (participation in group activities), outcomes (short-term effects) and impacts (long-term effects). Additionally, the methodology also helps identify both qualitative and quantitative indicators. Table 1 summarizes the information obtained in a CIAL when using this methodology. Afterwards, the formats or forms for recording the information are designed so that those responsible for the PME of the group can do this task easily and rapidly.

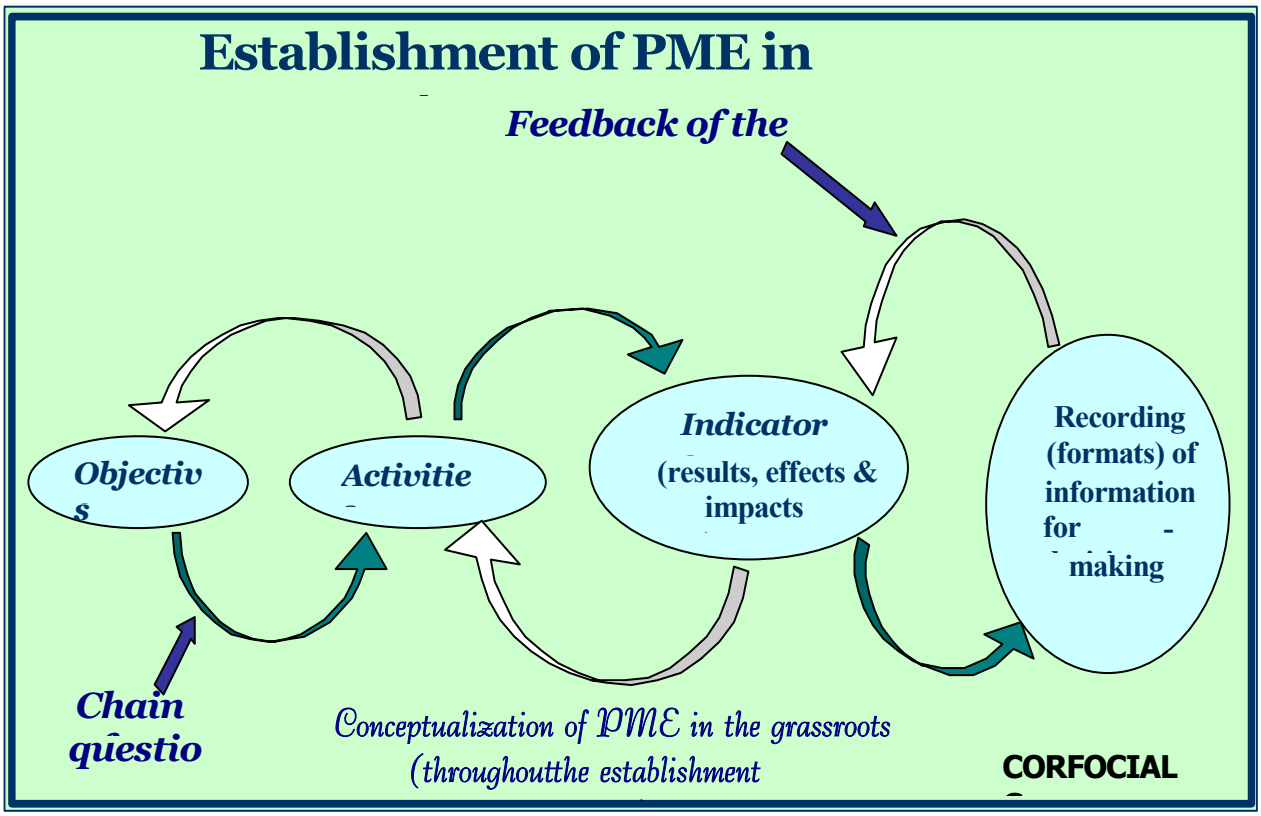

Figure 2. Revised methodology for establishing PME in grassroots groups.

Table 1. Information obtained with the modified methodology for establishing PME in the CIAL La Esmeralda 2.

General Objective	Specific Objectives	Activities	Indicators
Strengthen the CIAL group to create a business for processing maize to improve the income and the quality of life in the community	**Strengthen the group**	✓ Hold meetings with community to show benefits of working with CIAL ✓ Show CIAL trials to the community	Level of community knowledge on CIAL's work (qualitative indicator)
			No. of people who know the group and work with them (more hectares planted to maize) (quantitative indicator)
	Identify economic resources	✓ Raffles, sale of food, festivals ✓ Voluntary contributions of the members	Bookkeeping records of the CIAL entries, expenditures and balance (quantitative indicator)
	Acquire machinery for processing maize	✓ Present projects to entities to get the machinery	Projects formulated by the CIAL
			Projects implemented by the CIAL to purchase machinery
	Sell the maize	✓ Training in basic principles of marketing ✓ Identify clients ✓ Promote the product	Level of knowledge on marketing
			Level of participation in the process of marketing products
			No. of people in group working on marketing
	Generate employment		No. of people employed (indicator of effect)
			No. of person-days paid (indicator of effect)
	Improve the quality of life	✓ Organize a committee that works for health ✓ Implement home gardens	<u>Health</u> (impact) • No. of subsidies • No. of home gardens established
			<u>Nutrition</u> • Improvement in diet
			<u>Housing</u> (impact) • No. of houses in process of improvement

Lessons learned

- PME can be established in groups that have different "stages of maturity"; that is, it does not matter whether they are in the process of formation, if they have been functioning for some time, or whether it is a group that wants to reformulate its work or even in those cases where the group had fallen inactive if they are motivated to work towards their objectives.

- PME systems stimulate the grassroots groups' capacity for analysis, identifying problems, proposing and implementing possible solutions.

- The group itself decides which aspects of their work they are going to monitor and evaluate, as well as with what frequency they are going to do it.

- Groups that were discouraged have been reactivated as can be seen in the projection of their work.

- Once the PME systems are established, the CIALs should be accompanied in the process as in the majority of cases, there are questions on the part of the people who are responsible for implementing it in relation to how the system functions. Some of these questions are:
  - ✓ What is the first thing that we have to do in order to reach the objective that we set?
  - ✓ How should we fill out the formats that were designed to record the information generated by the group?
  - ✓ Who is the person responsible for gathering and recording the information on these formats?
  - ✓ How often should we fill out the formats?
  - ✓ When should the information be presented to the CIAL and the community?

- Regular backstopping is one of the factors that makes the difference between success or failure of PME, given that it can strengthen the grassroots groups in those aspects where they feel weak and it also serves to stimulate the execution of the activities oriented toward fulfilling the objectives.
- In the future it is important that at the moment of creating the structure of the CIAL, PME be included from the onset so that it be considered as a routine part of the CIAL's work and not viewed as an additional work load.
- It can be affirmed that using probing questions in a sort of chain, where all the links are the CIAL's work in function of the time and of the expected results, it is possible to obtain indicators that can measure the effects and the impacts of the process undertaken by the grassroots group.

Projection of PME work in Cauca

Given the experience accumulated over two years of work in establishing PME systems and as a response to the needs generated by the grassroots groups, the following activities are contemplated:

- ***Selection of CIAL models for PME*.** A number of CIALs are going to be selected as models in the implementation of PME in Cauca and Latin America, where much more emphasis will be placed on the accompaniment and strengthening of the PME system so that they can serve as an example and model for the other CIALs that are not so far along in the process. They will also attend tours and be motivators for PME in the CIAL groups and other community groups that have a direct or indirect relationship with them.

- ***Hold PME meetings*** among the CIALs of CORFOCIAL that have already established and implemented the PME system to share experiences and strengthen the process. Moreover, an international PME meeting among all the CIALs that have implemented PME systems in Colombia, Honduras, Bolivia, Ecuador and Nicaragua is being organized. Contacts are being made with entities such as the Foundation for Participatory Research with Farmers in Honduras – FIPAH (formerly IPCA) and the PROINPA Foundation in Bolivia.

- ***Workshops for recording Information*:** Due to the problems encountered in recording the information, some workshops will be held in the short term in order to reinforce the recording of information by the CIALs and also to strengthen the Guides in this topic so that they can support their groups better.

- ***PME in the CIAL methodology*:** The idea is to prepare a methodology where from the moment that the CIAL group is formed, the PME system is implemented in order to see the progress in their work and the fulfillment of their objectives.

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ANNEX 1. Results of some CIALs with PEM.

CIAL	General Objective	Specific Objectives	Activities	Indicators
La Unión 1	Conduct research on maize and manage projects to establish production that helps bring about food security in the zone	Integrate the CIAL with the community	✓ Visits of the community to the CIAL trials ✓ Feedback of the CIAL to the community	✓ No. of people that have visited the CIAL trials ✓ No. of people that have received feedback from the CIAL ✓ No. of people that have planted the varieties that the CIAL has studied
		Do research on common bean varieties	Planting trials	✓ No. of trials established and stage of research ✓ No. of varieties adapted to the zone
		Manage projects	✓ Small businesses in project management ✓ Write projects	✓ No. of people trained in project management ✓ No. of projects written by the community
La Unión 2	Conduct research on common beans and manage projects to establish production that helps bring about food security in the zone	Integrate the CIAL with the community	✓ Visits of the community to the CIAL trials ✓ Feedback of the CIAL to the community	✓ No. of people that have visited the CIAL trials ✓ No. of people that have received feedback from the CIAL ✓ No. of people that have planted the varieties that the CIAL has studied
		Do research on common bean varieties	Planting trials	✓ No. of trials established and stage of research ✓ No. of varieties adapted to the zone
		Manage projects	✓ Small businesses in project management ✓ Write projects	✓ No. of people trained in project management ✓ No. of projects written by the community
San Isidro – Men	Get resources to strengthen the research (cassava for fresh market and starch) with adequate soil management and manage projects to form small businesses to improve the level of income in the community	Get economic resources	✓ Organize a soccer championship with fair & dancing afterwards ✓ Hold festivals ✓ Hold raffles ✓ Hold bingos	✓ No. of activities to get resources ✓ Fund statement of cash position
		Strengthen the group and CIAL research	✓ Comply with steps of the research ladder (take the CIAL formats) (the whole project) ✓ Identify cassava varieties that are adapted and have good starch content ✓ Increase the no. of CIAL members ✓ Integrate CIAL's and community's objectives ✓ Invite the community to see the CIAL trials ✓ Present research results to the community	✓ No. of cassava varieties identified with high production and starch quality ✓ No. of people that are participating in the CIAL tasks ✓ No. of people that have visited the CIAL trials ✓ No. of visits of the CIAL promoter to the community ✓ No. of feedback meetings to the community
		Manage the soils adequately (due to deterioration produced by the cassava crop)	✓ Plant live barriers (short-term research) ✓ Establish dead barriers (short-term research) ✓ Green manure (T*itonia diversifolia*) (short-term research) ✓ Crop rotation (short-term research) ✓ Strips without plowing (short-term research) ✓ Meeting of cassava producers (leasers) with the landowners (lessee) to arrange the conditions of the lease	
		Manage projects	✓ The CIAL leads project management ✓ Small businesses formulate projects (short term because now there are good possibilities of getting resources with entities and politicians) ✓ Formulate at least one production project (medium term)	✓ No. of projects prepared by the CIAL ✓ No. of CIAL projects passed by the entities.
		Formation of small businesses	✓ Formation of small businesses (Guides who will multiply in the communities) (long term)	

CIAL	General Objective	Specific Objectives	Activities	Indicators
Carpintero	Improve the level of income by establishing maize crops, applying PR in the stages of production, transformation and marketing in the village of Carpintero	Do research on maize varieties with good production and adaptation	✓ Research on maize production (quality, type of planting) ✓ Project management ✓ Prepare a schedule of activities	✓ No. of maize varieties selected with good production and adaptation to the zone ✓ No. of research activities developed
		Planting and maintenance of crops	✓ Plant, apply manure, planting time, fertilization, control of weeds and diseases ✓ Prepare a schedule of activities	
		Project management	✓ Small businesses in project management ✓ Formulate production projects ✓ Present projects to entities	✓ No. of people trained in project management ✓ No. of projects prepared and approved
		Get resources	✓ Carry out activities (bingos, festivals, savings) ✓ Small accounting businesses ✓ Keep accounting records	✓ No. of activities held to get resources ✓ Current inventory of CIAL resources
		Formation of businesses	✓ Small businesses in marketing ✓ Marketing study ✓ Enter into trade agreements with the consumers (markets, granaries, farm supply stores, etc) ✓ Get adequate machinery ✓ Get installations for the machinery ✓ Promote the product ✓ Small businesses manage machinery (thrasher) ✓ Arrange means of transporting the product ✓ Conduct research on improving transformation	
El Pinar - Men	Conduct research on common beans and maize to increase the family income, improve the quality of their diets and create a small business (transformation and seed production)	Conduct research on common beans and maize	✓ Conduct ongoing monitoring of compliance of the steps of the CIAL research ladder ✓ Make schedule of activities ✓ Fill out formats to verify the compliance of the activities	✓ No. formats filled out for each step of the research ladder ✓ No. treatments selected ✓ No. lb harvested per treatment ✓ No. research activities carried out by the CIAL
		Get resources to strengthen the CIAL	✓ Visit entities ✓ Make requests to different entities or submit production projects to financial entities and those with a mandate to support the farmers such as the Agrarian Bank, Coffee Growers' Committee, the UMATA- Piendamó, CRC. (irrigation districts) (visit entities) ✓ Request authorization of the Communal Action Board to hold community activities (bingo, championship of typical game (*sapo*) similar to horseshoes, festival, bazaars)	✓ No. projects formulated, presented and approved ✓ No. visit made to the entities by the CIAL ✓ No. community activities held to get economic resources ✓ Profits generated by the activities to get resources (balance)
		Create small business (transformation and seed production)	✓ Increase the production of maize and common beans ✓ Select seed at end of production cycles to maintain competitiveness on the market (to prevent crosses during the cycles) ✓ Train in formation of small businesses ✓ Train in transformation of maize ✓ Train in seed production	✓ No. lb produced of the products studied (maize, common beans) ✓ No. lb of maize and common beans selected for seed ✓ No. training events on formation of small businesses (certificates, records)

CIAL	General Objective	Specific Objectives	Activities	Indicators
Santa Maria	Strengthen the group, continuing with the research, guaranteeing the seed production, and letting the community know about their activities	Strengthen the group itself	✓ Train in the crops that are being studied and on how to store seed ✓ Write up group regulations/norms ✓ Made a schedule of activities ✓ Hold group meetings more frequently (attendance)	✓ No. training events received (on the crops) ✓ No. people trained (in the crops) ✓ No. activities held of those programmed ✓ No. participants in the group's activities ✓ No. applications of the rules (stimuli and sanctions) ✓ No. applications of the training (for good of the community)
		Hold different trials (research)	✓ Follow the steps of the CIAL research ladder	No. trials conducted in the different research stages that the CIAL has
		Guarantee the seed production	✓ Get own lot (loaned, leased or own) "because the group does not have own land" ✓ Plant quality seed in good amounts and monitor crops ✓ Harvest on time	✓ No. kg seed planted by the CIAL ✓ No. of kg of seed obtained by the CIAL ✓ No. lots obtained for the research (legalized with contract)
		Let the community know about their activities	✓ Offer the CIAL's services to the community ✓ Present results of the work done to the community (in the meetings of other groups organized in the community Communal Action Board	✓ No. reports presented to the community ✓ No. training events held for the community ✓ No. people growing the products researched by the CIAL ✓ No. reports presented to the community
		Get economic resources to accomplish the general objective	✓ Get economic funds (raffles, present projects to entities)	✓ No. projects approved ✓ Amount of funds obtained by the group (to buy own lot) ✓ Amount of assets acquired ✓ Public deed in CIAL's name
El Uvo	Improve the organization of the group to continue with the research on common bean and maize varieties, the storage of seed and acquire their own lot to improve their level of life	Improve the organization	✓ Elect CIAL board ✓ Prepare a schedule of activities ✓ Establish commitments and responsibilities of the people that belong to the CIAL	✓ Board formed and active ✓ No. people or partners that participate in the CIAL activities ✓ No. of tasks or activities done by the CIAL
		Do research (common beans, maize)	✓ Do all the steps of the CIAL research ladder ✓ Hold a planning meeting to begin with the research on maize	✓ Formats of research trials filled out ✓ Planning meeting (format filled out)
		Get economic resources	✓ Hold bingos and raffles ✓ Train in how to present projects (INCORA and other entities) ✓ Present projects to entities	✓ Amount of funds collected (balance) ✓ No. people trained in how to present project ✓ No. projects presented to entities ✓ No. projects passed
		Acquire own lot for research and production	Get a lot and pay lease with the production	✓ Amount of funds collected ✓ Contract for leasing the lot ✓ Amount of seed sown
El Jardín	Increase the production of sugarcane for panela and maize in order to improve food security and form a small business to help improve the level of life in the community	CIAL formed and functioning	Increase the no. people in the CIAL and collaborators	✓ No. people participating in the CIAL's activities ✓ No. activities carried out to get resources
		Improve the organization of the CIAL	✓ Program visits of the community to the CIAL trials ✓ Hold field days for the CIAL to provide feedback to the community	✓ No. people that visit the CIAL trials ✓ No. people that attended the field days ✓ No. people from the community that have planted the varieties recommended by the CIAL
		Do research on sugarcane and maize varieties	✓ Identify sugarcane varieties that have good panela production and that are adapted to the zone, as well as good maize varieties ✓ Go through all the steps of the CIAL research ladder	✓ No. varieties of cane for panela and maize identified by the CIAL that have good production and are adapted to the zone
		Get economic resources	✓ Hold raffles, festivals and savings	✓ Keep an accounting book (entries, debits and balance)

Format: Record of CIAL Group's Activities

CIAL: _____ Village: _____ Municipality: _____
Province: _____

Year: _____

Date	Proposed Activity	In Charge	Date Activity Carried Out	Participants					Entities Present in Activity	Comments
				Leader	Secretary	Treasurer	Promoter	CIAL Collaborators		

Format: Statement of Cash Position for CIAL Fund - San Isidro-Men

Date	Item	Responsible	Cash Receipts	Cash Disbursements	Balance

Format: Project Management

Date	Project Title	Sponsoring Entity	Responsible for Management	Projects Approved	Ongoing Projects

Critical analysis of a participatory procedure applied to cassava breeding

Researchers:*Luis Alfredo Hernández*[6]*, Nadine Saad*[7]

Highlights
Procedure for participatory selection of cassava varieties proposed to be evaluated and disseminated

Introduction

Participatory research in cassava breeding (PCB) was developed as a procedure, first applied to the evaluation of cassava clones (*Manihot esculenta* Crantz), with low-resource farmers from the Province of Cauca and on the Atlantic Coast of Colombia from 1986-1991. It was created by CIAT (International Center of Tropical Agriculture) in collaboration with CORPOICA (Colombian Corporation for Agricultural Research), based on existing participatory methods and techniques, as well as some new components arranged sequentially (Hernández, 1993). Various national institutions in Latin America have tried and adopted it in their breeding programs for cassava (Fukuda et al., 1994, 1997; Hinostroza et al.,1988; Iglesias & Hernández, in press) as for other crops.

PCB was developed during a time in which the participatory approach was gaining ground and credibility among agricultural researchers and was beginning to be applied to the improvement of crops under the name of participatory plant breeding (PPB). Since the 1980s the number of PPB projects has multiplied, with at least 75 cases documented in Asia, Africa and Latin America (Weltzien Smithet al., 2000). These projects have used several modalities and methods of participation; together, they are a source of experiences, lessons and key elements that can be consulted by researchers who wish to implement projects or refine their procedures. The purpose of this article is to analyze critically the PCB procedure and its components in relation to what has been learned from its application, considering the lessons that can be derived from the multitude of experiences in PPB worldwide in the last 20 years.

First of all, the PCB procedure is illustrated sequentially, explaining briefly its intrinsic and contextual components. Then four topics are analyzed in relation to the outcomes and the aspects that were not considered but that the overall experience of the PPB suggests can be refined or modified. It will be shown that several of the decisions with respect to key aspects of a participatory process such as the selection of participants or the stages in which the end-users are included are taken in function of the objective of the process and to the extent that the objectives vary so can these decisions.

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Scheme of the PCB procedure

Despite the existence of several documents that deal with the PCB procedure, its application in several countries and the training that has been given on the procedure, to date, the PCB procedure per se has not been documented in sufficient detail to permit a critical analysis of its components and steps. This is partly because the PCB was elaborated during the implementation of a breeding project on the Atlantic Coast of Colombia, beginning with some modifications to the conventional method that had been used until then in both the national program and CIAT. Consequently, some of the breeding programs that have wanted to apply PCB have had to deduce practices and steps that perhaps had not been contemplated during the Colombian experience, or if they were, were not documented.

The procedure based on the available documents and materials is outlined in Figure 1. The scheme is divided into *contextual elements* – elements that we have considered as our own or unique to the Colombian context in which the procedure was developed; and *suggested steps,* essential in the implementation that should be included in the replication of the procedure, regardless of the context.

Contextual elements

These elements change according to the context in which a participatory procedure is implemented and influence the mode of implementation of the suggested steps and the end results. In the Colombian experience the most important contextual elements were the actors and the crop.

The actors

In the Colombian experience there were several different actors: agricultural research institutions (national and international), universities, cooperatives, NGOs, small processing industries of the cassava roots and small farmers. In addition, there was GRUYA (Cassava Group and Associated), a group of professionals from different institutions and specializations with experience in the cassava crop, who met periodically to share experiences, plan activities and provide mutual support on different topics related to the crop. The existence of GRUYA greatly facilitated the work and ensured that no important aspects of the crop were left out in the implementation of the project. It also facilitated the interaction with the producers and the geographic coverage that was obtained with the trials (interinstitutional agreements is one of the topics that is analyzed later on).

In addition to the relationships among the entities, the identity of the main actors, their mandates, principles, objectives and modes of work are important contextual elements. It should be mentioned that in the Colombian context, CIAT, one of the entities initiating the project, had the objective of developing a procedure for PPB and creating the capacity within their member entities for replicating the procedure. Therefore, there were activities and strategies such as the continuous training of professionals, the Interinstitutional

linkages, the hiring of a person specifically to prepare and document the procedure, the availability of a budget, the centralization of the information, and the strategy of beginning the work within the conventional scheme and with materials in advanced stages of breeding that were highly significant in the Colombian experience, but not necessarily in in other countries and with other crops.

The identity of the producers is also an important contextual element. Although the producers can be seen as an intrinsic element of the procedure as the suggested step "selection of the farmers" implies, it should be noted that their identity and their socioeconomic situation vary according to the context. As explained later, most of the farmers that live in the region where the project was established are small farmers (average of 0.5-1 ha land), male, with a great deal of experience in the production of cassava, which is grown mostly for on-farm consumption and the fresh root market. Although there are other subregions and other socioeconomic profiles within the region, these were the target of the project, given the mandate and the objectives of the executing entities.

The crop

Much can be deduced from the name of the procedure that we are analyzing. The name Participatory Research for Cassava Breeding (PCB) suggests that the procedure was developed specifically for the cassava crop, which it was for circumstantial reasons. The breeding strategy, the type of selection, the structure of the replications, the experimental design, the time, the space and the resources required in the procedure are specific to the cassava crop and will naturally vary with other crops. The sequence of steps suggested within the procedure have been and can easily be applied to other crops.

The crop is also an important element in the Colombian context because cassava is a subsistence crop, common and traditional in the project areas. This facilitated the establishment of the participatory procedure as the farmers of the Atlantic Coast have a great deal of experience and knowledge on this crop. Working with crops where the farmers have no experience (e.g., in grasses for pastures or varieties used for ground coverage in some cases) and where the benefits of the technology cannot be seen qualitatively in the short term (e.g., the conservation of soils or protein digestibility and content in forages) can present different, more difficult challenges for the researcher.

Steps suggested in the PCB procedure

The steps suggested in the PCB procedure are, sequentially, as follows:

- **Establishment of objectives**. In PCB the objectives are established by the participating entities before beginning the participatory procedure.
- **Selection of farmers and sites** (and the establishment of a network of trials) is done through participatory techniques that orient the selection of producers based on several selection criteria established by the entities.

- The **participatory diagnosis** defines, in a first instance, the problems or constraints and objectives of the participants.
- The **selection of materials** to be evaluated (technological supply) is based initially on the description of the "ideal" variety; and after the first cycle, on the producers' criteria.
- **Open-ended evaluations** (subjective information) and **agronomic evaluations** (quantitative information) are used to gather data for analysis.
- The **criteria** are determined, and the **glossary of terms** is prepared, using evaluation formats and subjective analysis of the information.
- The **field books** are formats of tables of frequencies to determine the relative importance of the criteria.
- The **information is analyzed** statistically, using regression analysis for nonparametric data.
- The **pre-release** phase is defined by the research entities.

- The **varieties** are **released** according to the regulations of each research entity.

Discussion

Four key areas within participatory research (PR) are analyzed: the selection of participants, the establishment of objectives, the analysis of information and interinstitutional agreements. The following aspects are look at: what the respective documentation existing on PCB suggests, how it was dealt with during the Colombian experience, what aspects were not considered, and finally, how can the procedure be refined in light of the experiences and the lessons learned in PPB at the international level in the last 20 years.

Selection of farmers and communities

The selection of farmers in the Colombian communities was coordinated by research institutions through staff that were familiar with the farmers' production systems. The staff selected farmer experts from communities in edaphoclimatic zones similar to those of the experiment station and where cassava is a priority crop (Iglesias & Hernández,1994).

The participatory procedure recommended selecting farmers in each location based on the following criteria:

- Recognition within their community as experts in the cassava crop
- Interest in the trials
- Availability of the necessary area
- Location with easy access to the markets in the region
- Communication skills (capacity and willingness to transmit their thoughts)
- Production systems typical of small cassava producers

It was recommended that in each evaluation cycle, the farmers responsible for the trials be changed, replacing them by others selected using the same parameters as before, involving neighbors who showed interest and had possibilities of establishing participatory trials on their farms in later cycles. The idea was to extend the coverage of experimental environments in order to ensure broad adaptation of the clones and involve members from the gamut of end-user groups involved in cassava production in the region, thereby ensuring acceptance of the clones within all the groups, not just one or two. Despite this, the group of end-users in which the selection of participants was emphasized was the group of the small farmers since this is the group to which the majority of the farmers of the region belong and also the ones that figure within the mandate of the entities that implemented the project.

In the Colombian experience more than 500 producers (all men) participated in 90 trials on 15-20 farms per cycle. Among the participants there were buyers of cassava for the drying plants (cassava chips), producers of starch and members of cooperatives. These groups were invited to the evaluations at the end of the cycle the harvest. But the largest percentage (70-80%) was a critical mass of small producers dedicated to growing cassava as subsistence crop for fresh root consumption. They participated throughout the crop cycle so the resulting information of the different groups of end-users in the evaluations was separated to prevent confounding the results.

Despite having specific objectives regarding who should participate in the process, the project on the Atlantic Coast did not systematize a strategy for selecting the participants. This was simply left to those who were interested (self-selection). Therefore it was not possible to pre-establish a balance among the different groups of end-users represented in the data collection and consequently in the decision of which clones would continue in the selection process. This did not bias the decisions much as it was discovered that the different groups had comparable objectives and similar preferences in relation to desirable varieties even though they had specific criteria in each phase of the production. Thus the same varieties were selecte by the different groups, but for different uses (fresh consumption and starch production). Nevertheless in other contexts, where the differences in varieties and preferences among end-users can be more notable, the lack of a strategy for selecting the participants and ensuring representation and a balance among different end-users could be an important constraint. In such cases the separation of the information according to the groups of end-users would be more important.

Reflecting upon the selection process of farmers on the Atlantic Coast, it is important to highlight the importance of also looking for the nonobvious end-users who may not be readily seen or who do not self-select themselves. For example, in this case the women as a group of distinct users were not considered as they have a minimum participation in getting stakes, planning and managing the crop until its sale in the market. Nevertheless, in a later work that had the specific objective of working with women, it was discovered that in this region, the women play a central role in selecting roots for making and selling *bollos*[8] (IPRA-CIAT, 2000). This market is managed exclusively by women, using the

[8] These patties are prepared with cassava flour and cheese. They are cooked wrapped in maize husks and sold in the urban zones of the region.

income to buy basic needs of the family such as clothes for the children, school utensils, medicine, and at times to pay for transportation. As the project did not have the specific objective to seek the "hidden" end-users, the researchers did not learn of this activity related to their project with cassava varieties. Sometimes the hidden end-users can be women, but other times it can be a group of farmers with a socioeconomic level lower than the majority or a group that supplies a market niche or one specific to the region. To prevent the omission of these end-users, the PCB could incorporate within its diagnosis step, a substep for identifying end-users.

In the experience of the Atlantic Coast the entities elected to work with individual farmers that had conditions and cultural practices representative of the zone. The recommendation of the PCB procedure is to work with no more than ten people at a time. This facilitates the data gathering and analysis. Nevertheless, other PPB projects have tried working with more farmers and previously established groups. In Northeast Brazil, for example, the researchers tried to work with entire communities and with cooperatives. They concluded, however, that it was too difficult to organize evaluations and handle the data coming from so many people, except in the case of the cooperatives, which greatly facilitated the work given the fact that they were already organized and used to working together (Fukuda & Saad, 2001).

The work with farmers' groups has taken different forms. For example, there is a lot of experience in Latin America with CIALs, community-based research services that conduct research in *representation* of their communities. There are also projects where the researchers have facilitated the formation of farmer groups such as the groups evaluating clones of potatoes in Ecuador or Farmer Field Schools in Bolivia. These experiences show that important accomplishments such as mutual support and motivation among farmers, the diffusion of technologies among farmers' groups, the distribution of risks and benefits, and the possibility of continuity of the work after the intervention by the research entities can be obtained by working with groups. Nevertheless, it has been seen that the formation of groups specifically for a PPB project means dedicating much more time and in some cases having personnel a background in group dynamis. This also means that the project should be situated within a broader context of rural development, not for a specific activity such as breeding.

In selecting farmers for a PPB project, it is important to consider the distribution of benefits. Generally the research entities have as their mandate to facilitate the rural development of the whole community or entire regions, not just a few selected farmers. For this reason it is necessary to select farmers who not only comply with the representative conditions, but who are also willing to share what they learn and discover in the research process. Thus the Atlantic Coast project selected farmers that not only had representative conditions and practices and good communications skills, but who also had farms that were well located and easily accessible and could thus serve as "show windows" for neighboring producers who walked by there and could see the new varieties planted. This stimulated the spontaneous or informal diffusion of the promising varieties and ensured, to a certain extent, "publicity" for the experimental clones.

The combined experiences with PPB worldwide show that the types of farmers, the number who participate and whether they participate individually or in groups depend on the project objectives and what is needed to accomplish them. For example, if a project has the objective to ensure that the benefits of the collaboration are distributed widely, it should look for participants that are recognized leaders in their communities. If the objective is to incorporate the farmers' knowledge in the varietal selection process, it should involve the local experts (PRGA, 2000). Sometimes the same people fill more than one of these profiles, but other times the local expert is not recognized as a leader in his/her community, or the community leader does not have sufficient technical knowledge. Similarly, a PPB project can often have more than one objective, which means that they must be prioritized and the participants selected accordingly.

With respect to involving women as participants, the combined PPB experience over the last years has shown that the quality of the research can generally be improved significantly as the women are usually in charge of domesticating wild species and of selecting and maintaining seeds due to their knowledge of the germplasm. Moreover, women's preferences are often different from those of the men even though they do not always participate directly in the farming activities as was the case on the Atlantic Coast.

Establishment of objectives

The objectives of the process implemented on the Atlantic Coast were established by the research entities after an initial exploration of the zone. Fully aware that there is great genetic diversity on the farms of small cassava farmers and that this is not static but changes over time, the researchers agreed to the fact that farmers have a selection process based on criteria that permits them to test new materials, observe them and eventually incorporate or reject them. They were interested in learning more about their criteria, with the idea of developing a formal procedure that would make it possible to implement this systematically in the development of technologies. This was the main objective of the project. Thus, PCB does not recommend the establishment of objectives as a suggested step within the procedure; rather it assumes that it is an activity that occurs before the farmers begin to participate.

The objectives established for a research process affect the determination of the steps and the activities to be implemented. When the objectives are established prior to the participation of the end-users, their priorities cannot be included in the initial conception and planning of the project. In the case of the Atlantic Coast, the participation of the farmers in the diagnostic phase made it possible to work with producers who identified cassava varieties as the main problem in their production areas. Nevertheless, the final objectives of the breeding itself were not discussed. Were the producers seeking varieties with specific or broad adaptation? Were they looking for one variety or several? Were they looking for varieties for on-farm consumption or multiple uses? Were they seeking to improve their cassava yields, or were they also interested in working with other crops at the same time? Were they seeking to conserve and/or improve their native varieties or did they want improved ones? The participants could not consider these and other options that breeding offers because the objectives had already been established.

In addition to the options with respect to cassava breeding, the participants could also have contributed their preferences with respect to their own participation. The combined experience of PPB worldwide shows that the stages of the research (or breeding) in which the farmers and other end-users participate varies. As mentioned, participation in the Atlantic Coast project began in the diagnostic stage. In other PPB cases, it began in the phase of setting objectives; while in others, participation is only at planting and harvesting. The PR literature and experience also indicate that there are different "degrees" of participation, ranging from a consultative to a collegial style. The documentation on the PCB procedure concludes that the preferable style of participation is the consultative one and that the initial stage recommended is the diagnosis; nevertheless, this is one way among many to implement PR.

We would suggest that the objectives of a PPB process could be established in several ways, depending on who is involved, the entities flexibility and the resources available. There are cases of PPB in which the objectives of the process were established jointly among researchers, farmers and other end-users (e.g., the CIALs working with crops such as potatoes in Ecuador). In such cases the researchers need to explain to the end-users the range of options available and what they can expect from breeding (and what not). It is also important that the researchers and their entities have the flexibility and the capacity to negotiate and modify their own objectives and assume some of the objectives of the end-users if these are different. There should also be some elasticity in the frameworks of formal research and therefore in the support of the higher levels of decision-making such as the directors of the institutions.

In the case of the Atlantic Coast project, it should be noted that given the objectives of the project, knowledge of the farmers' selection criteria was very important. To the extent that learning about their criteria has been an objective of the PPB, it has also been reported as a product of this approach, which in itself does not mean much. To have some meaning, the knowledge of farmers' selection criteria has to be incorporated in the breeding process, in the selection of parental for crosses and experimental clones. Besides, farmers' criteria are not static as appears when suggesting an objective is to establish knowledge of them. Although some criteria persist, others change from cycle to cycle and from one group of end-users to another. Numerous PPB projects have been frustrated by this fact.

Another of the principal objectives of the Atlantic Coast project was to select clones for pre-release and others for release. Although this is the objective of most PPB programs, experiences around the world show that the application of the participatory approach can have a broader range of objectives than the release of improved varieties for certain zones. Among the objectives that have been accomplished with this approach in crop breeding, the following can be mentioned: the conservation and enrichment of biodiversity, the organization of farmer groups, changes in policies for releasing varieties, multiplication of seeds, access to genetic materials, and the facilitation of learning by the farmers. When planning a PPB process, the researchers and other end-user groups could consider this approach as a very powerful tool for accomplishing multiple objectives (PRGA, 2000).

The results of the Atlantic Coast project are well known. It conformed to a participatory process that has been adopted and adapted in several Latin American countries. The farmers' selection criteria are known. Genetic diversity was expanded on their farms. In these terms, it can be said that the project was very successful. Nevertheless in the planning of the PPB experience on the Atlantic Coast, several important elements were not considered: a phase of mass multiplication of seed for the rapid diffusion of the more accepted clones, following up the process to fine tune the methodology, and study of the impact. After analyzing several projects that implemented the PCB procedure, it was discovered that these are steps ought to be included as they contribute significantly to the enrichment and impact of the work.

Quality of the information and its use

The quality of the data gathered and its use is another key issue in PR. The challenge is to obtain, combine and analyze both qualitative and quantitative data for making decisions in the research process. This is a challenge that has not yet been totally resolved in PR.

The Atlantic Coast project tested several statistical tools for facing the challenge of the quality of the information and its use. Principal components analysis (PCA) stands out because it reduces the number of variables and analyzes both quantitative and qualitative variables. The application of cluster analysis makes it possible to group varieties, criteria and regions, providing a global vision of the preferences. Nevertheless the most useful tool was logistic regression, which was adapted for analyzing preference rankings and simulating the acceptance of technology by producers. Perhaps the most important contribution of the Atlantic Coast experience with respect to information and its use is the fact of having found a way to make a technical interpretation of the subjective opinions given by the participants in the evaluations. This made it possible to establish an information link between the production systems on the Coast and the experiment stations.

The PCB procedure recommends preference ranking to compare degrees of acceptance of the different varieties in order to classify them from the most to the least acceptable. This process is based on techniques of open-ended evaluation useful for the knowledge of qualitative points of view, explanations and ideas about the reasoning processes of the producers and how they take decisions.

A sequence of the steps for analyzing the information recommended by PCB is as follows:

- Development of flowcharts to guide each activity (Ashby, 1992)
- Construction of lists of terms, local agricultural glossaries classified by region for local, regional and scientific interpretation
- Identification of criteria, differentiating them from descriptive aspects
- Integration of the reasons, rankings and criteria identified, differentiating between antonyms and synonyms
- Development of formats for systematizing the information

- Development of field books (Hernandez, 1993)
- Analysis of the information using several tools

Some of the results related to information, obtained with this process in the Atlantic Coast project, were the combination of efficient tools to obtain information (tables of relative frequencies, differentiating between synonyms and antonyms; electronic datasheets for transcribing the information directly in the field; scales for grouping ranges; matrixes with transformations of scales for the joint analysis of qualitative and quantitative information, and a matrix for classifying the preference rankings), the glossary of terms, the criteria, the reasons, the rankings, the field books, the technology profiles and the alternatives tested in the analytical process.

A method that has been adapted recently by Sall et al. (2000) in Senegal is quantification based on a quasi-arbitrary ordinal weighting system of the producers' perception of specific characteristics of a given technology. Tobit regression analysis is used, including variables that represent:

- The farmers' perceptions on the relative importance of the different characteristics that a material can have
- The presence and quality of those characteristics in the experimental material
- The characteristics of the producers and their farms

This method, the same as the one recommended by the PCB procedure, explains and predicts the adoption of improved materials.
In the data analysis it is important to consider its source and the relative weight that is given to each participant or group in deriving conclusions from the preference rankings. This can be seen as a process of voting, where each participant has the right to vote for his/her preferred clones. If the majority of the group of participants represents an interest within the community that is not necessarily the interest of the entire community, then the recommendations based on the preference ranking analysis can be very biased. Thus it is important, as mentioned previously, to select the participants of a participatory process carefully; or if this is not possible, separate the information obtained from the different interest groups so that the results reflect the community's (ies') preferences more precisely.

Another key consideration with respect to the quality of the information and its use is the amount of data gathered. Many PPB projects gather more information than they can manage, process and use. It is important in the planning of a PPB project to determine what information can be used and what not. As mentioned previously, a tool that the PCB procedure has suggested is the field book, which permits the collection of both objective and subjective data (quantitative/qualitative) and also limits the amount of information that can be noted.

Many PPB projects produce lists of the farmers' selection criteria. What happens with these at the end of the project? Until when/where are they relevant for other projects in the same areas? An interesting case of information management is the cassava breeding

project in Northeast Brazil, managed by EMBRAPA-CNPMF. Given the extensive collection of data and the magnitude of the project, the breeder Wania Fukuda had to create a database in order to store and manage the large volume of information. Although she felt that she might have collected too much information (pers. com., W. Fukuda), the database has been very useful in later phases of the project for suggesting experimental clones suitable for areas similar to the ones in the database.

Interinstitutional agreements

The project of the Atlantic Coast of Colombia was implemented in an interinstitutional framework where several entities of different types participated. As mentioned earlier, GRUYA, the group that in some ways personified these interinstitutional agreements, was important in technical, logistical and strategic aspects, given their composition, experience, coverage and participation in the decisions. In the first place, they made it possible to establish multidisciplinary discussion forums, where experiences were exchanged in each crop cycle, and the analysis and adjustment of the PPB component were facilitated. In addition the members of GRUYA had a network of trials in northern Colombia that brought together experiences of more than a thousand small cassava farmers for analysis in the forums. The interinstitutional agreements also helped the implementing entities to see different potential uses of cassava, incorporating elements/phases of the production change in the process that had not been contemplated at the onset of the project. Finally, the interinstitutional agreements provided the opportunity for the staff from the different entities to be exposed to the participatory approach. As a result of this experience, the PCB procedure recommends implementing interinstitutional projects, wherever possible.

The results of implementing the PPB project on the Atlantic Coast in an interinstitutional setting can be see in the broad geographic coverage of the work involving a large number of producers and the participation of professionals of different disciplines. Another very important result of the interinstitutional agreements (in particular, the association between ICA and CIAT) was the institutionalization of the participatory approach in ICA, which has been using the PPB as a routine procedure in cassava breeding and for some other crops such as yams (Discorea trífida L.) in the Turipaná regional office in Cordoba, Montería (pers. com., A. Lopez).

Despite the interinstitutional agreements during the implementation of the project on the Atlantic Coast, there were no joint actions. The participating institutions acted as advisors and links with the different sites where the trials were implemented; but the responsibility of implementing the project, analyzing the data and documenting the process was mostly assumed by CIAT. In this way no feedback was received in the documentation of the process and the analysis of the information from the entities, which would no doubt have enriched the work. What was not considered in designing the institutional arrangement was the distribution of resources, responsibilities and recognition of the different member institutions. This is indispensable for the motivation, active participation and the empowerment of the institutions associated in an activity and therefore in the possibilities of continuing such an arrangement. The idea of using the interinstitutional agreements to

reproduce the experience on a larger scale was not considered either. This would have required more commitment from the member institutions in a relation of belonging, where they could also expect resources.

Conclusions

With respect to the selection of farmers, it is recommended to have an explicit strategy based on the objectives of the collaboration, use specific criteria, involve members from a broad range of different groups of end-users (including women) both within the communities and in the production-marketing chain, seeking the hidden end-users and working with already established groups (if they exist in the area). The selection of farmers is a key element in the social impact of the work.

The establishment of the objectives in a PR process is perhaps the most important phase of a project as many of the decisions as to how to implement a procedure depend on the objectives. We suggest that, to the extent possible, the objectives be established together with the participants of the process and not beforehand. This can increase the relevance of the work for the end-users and therefore the impact. Besides, the participatory approach can be a vehicle for fulfilling a gamut of different objectives and does not have to be used just for developing new varieties. In the Atlantic Coast experience, it should be highlighted that two elements were not considered that have proven to be essential in later PPB projects:

- A phase of mass multiplication of seed of the clones accepted by farmers
- An impact study that includes considerations referring to the methodology per se and the process implemented.

Another key topic that is dealt with in this article is the quality and the use of the information gathered. In the Atlantic Coast experience, several alternatives useful for meeting the challenge of establishing a link between the analysis of quantitative and qualitative information were used. Logistic regression, adapted to the analysis of the preference rankings to simulate the acceptance of the experimental materials by the farmers, is recommended. The use of a field book, similar to the one developed during the Atlantic Coast project is also recommended in order to limit the amount of information gathered to what can really be used and analyzed. The incorporation of the information or of the conclusions of the analysis in making decisions about the clones to be evaluated, recommended and released is an essential step for that process to be considered participatory.

The PCB procedure was developed within an interinstitutional framework that provided several advantages to the Atlantic Coast project. Among them we can mention being able to interact with a wide range of professionals from both research and extension as well as merchants, and the availability of wider ranges of geographic coverage for the trials. Another advantage is the exposition of several institutions to a new research approach. Given that the institutional framework is a contextual element, on which the projects and their implementers do not have much influence and it is not a suggested step in the

procedure, perhaps it is out of place to make recommendations as to its form. Nevertheless, it should be mentioned that the interinstitutional collaboration can be highly advantageous for a PPB project and that in the event that there is such a collaboration, it is advisable that the members establish the objectives, the roles of each one in the collaboration and the corresponding responsibilities and obligations in a joint process.

The Colombian Atlantic Coast experience and the development of the PCB procedure were very successful. We need only to see the number of clones released and accepted among farmers and the adoption of the same procedure in several Latin American countries.

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