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Critical Analysis of a
Participatory Procedure Applied to
Cassava Breeding

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Introduction

Participatory research for cassava breeding (PRCB) was first developed as a procedure that was applied to the evaluation of cassava clones (*Manihot esculenta* Crantz). With the collaboration resource-poor farmers in the Department of Cauca and the Atlantic Coast Region of Colombia in 1986-1991. It was created by the International Center for Tropical Agriculture (CIAT, its Spanish acronym) in collaboration with the Colombian Corporation of Agricultural Research (CORPOICA). The procedure was based on existing participatory methods and techniques, and certain new components, arranged sequentially for easier use by farmer and researchers (Hernandez 1993).

Various national institutions in Latin America have tried and adopted it in their breeding programs not only for cassava (Fukuda et al. 1994, 1997; Hinostroza et al 1988; Iglesias and Hernandez nd) but also for other crops.

PRCB was developed when the participatory research approach was gaining credibility among agricultural researchers and was beginning to be applied to crop improvement 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 et al, 2000). This project has used several modalities and methods of participation. Together, they comprise 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 critically analyze the PRCB procedure and its components in terms of what has been learned from its application and considering the lessons that could be derived from the multitude of experiences in PPB worldwide in the last 20 years.

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

Outline of the PRCB Procedure

Despite the existence of several documents that deal with the PRCB procedure, its application in several countries, and the training given on it, the procedure per se has, so far, not been documented in sufficient detail to permit critical analysis of its components and steps. This is partly because the PRCB was developed during the implementation of a breeding project in the Atlantic Coast Region, Colombia. Its development began with some modifications to conventional methods that had been used until then by both the national program and CIAT. Consequently, other breeding programs that have wanted to apply PRCB have had to deduce practices and steps that perhaps had not been contemplated during the Colombian project, 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, that is, those elements that we consider as our own or unique to the Colombian context in which the procedure was developed: and suggested steps, which must be implemented to replicate the procedure, regardless of context.

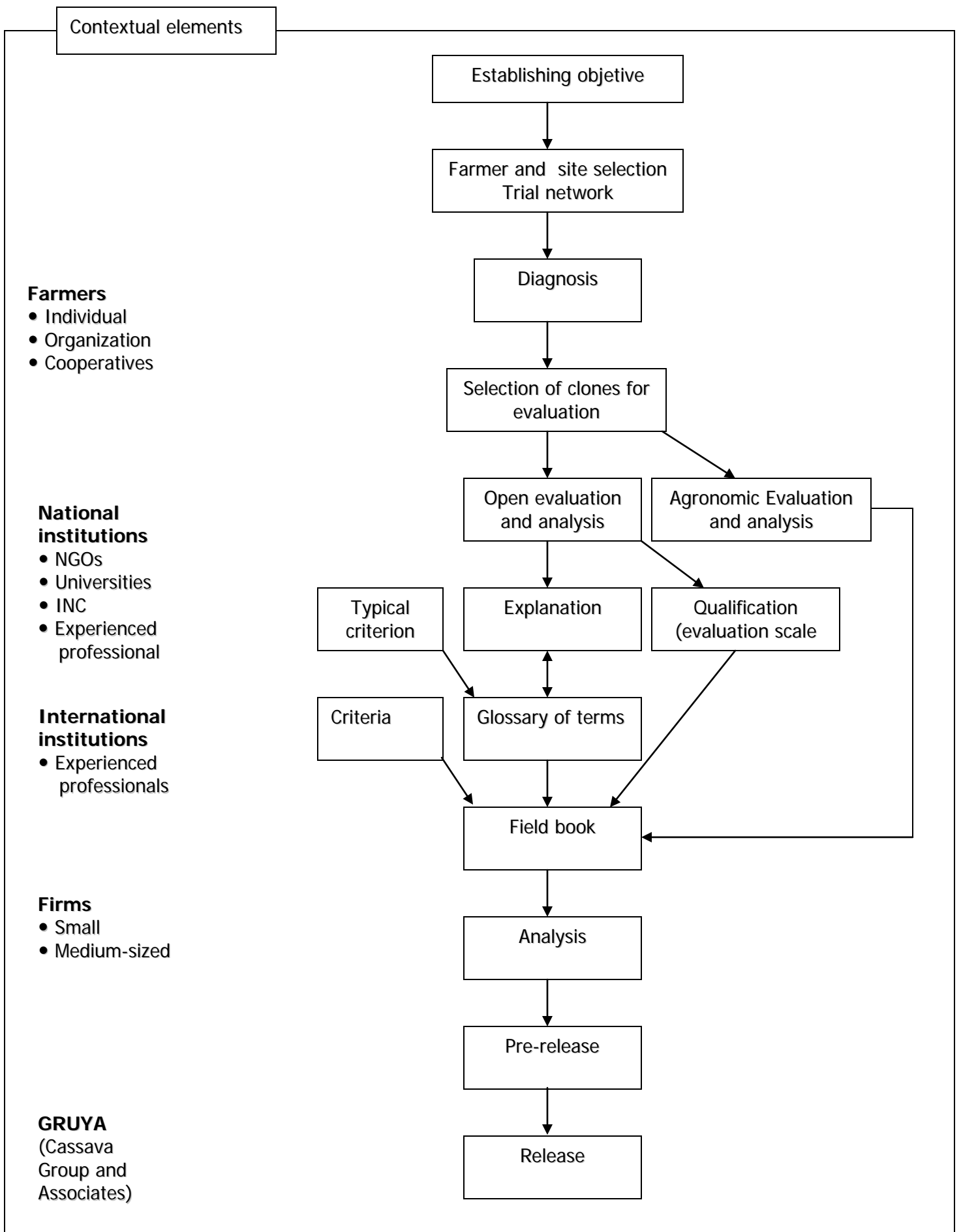


Figure 1. Procedure flow chart for participatory research for cassava breeding (PRCB).

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 project, the most important contextual elements were the actors and the corp.

The actors

In the Colombian project, the different actors included agricultural research institutions (national and international), universities, cooperatives, NGOs, small cassava-processing industries, small farmers, and the Cassava Group and Associates (GRUYA, the Spanish acronym). GRUYA is a group of professionals from different institutions and specializations with experience in the cassava crop. They meet periodically to share experiences, plan activities, and provide mutual support on different topics related to the crop. Gruyeres operation greatly facilitated the work and ensured that no important aspects of the crop were left out in the project's implementation. It also facilitated interaction with farmers and ensured that trials had sufficient geographic coverage (interinstitutional agreements, as a topic, are analyzed below).

Not only is the identity of the main actors an important contextual element, but so are their relationships with each other, their mandates, principles, objectives, and modes of work. In the Colombian context, CIAT, one of the entities initiating the project, had as objectives the establishment of procedure for PPB, and helping their partners to develop a capacity to replicate the procedure. Such objectives involved activities and strategies like the continuous training of professionals interinstitutional linkages, hiring a person specifically to prepare and document the procedure, establishing a budget, centralizing information, beginning work within the conventional scheme, using materials advanced stages of breeding that were highly significant in the Colombian project, but not necessarily in other countries, and modifying the procedure for other crop.

The identity of farmers is also an important contextual element. Although farmers can be seen as an intrinsic element of the procedure, which the suggested step "farmers selection" implies, their identity and socioeconomic situation vary according to context. As explained below, most of the farmers living in the region where the project was established were smallholders whose farms each averaged 0.5 to 1 ha in size. The average farmer was male, with considerable experience in cassava production. The crop was grown mostly for on-farm consumption and the fresh root market. Although other subregions and other socioeconomic profiles existed within the region, the project targeted only small farmers, given the mandates and objectives of the project's 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” (PRCB) suggests that the procedure was developed specifically for the cassava crop, which it was, for circumstantial reasons.

The breeding strategy, type of selection, structure of replications, experimental design, time, space, and resources required for the procedure are specific to the cassava crop and will naturally vary for other crops. The sequence of steps suggested for the procedure has been, and can easily be, applied to other crops.

The crop is significant in the Colombian context because it is a subsistence crop, and is widespread and traditional in the project’s targeted areas. The farmers of the Atlantic Coast Region have considerable experience and knowledge of this crop. Such farmers greatly facilitated the establishment of the participatory procedure. Working with crops for which farmers have no experience (e.g., pastures grasses or ground covers) and where the benefits of the new technology cannot be seen qualitatively over the short term (e.g., soil conservation or protein digestibility and content in forages) present different, and more difficult, challenges for the researcher.

Steps in the procedure

The steps of the PRGB procedure are given as follows:

- ✓ Establish objectives. In PRCB, objectives are established by the participating entities before the participatory procedure is begun.
- ✓ Select farmers and sites (and establish a network of trails). Participatory techniques are used to orient farmers selection according to several criteria established by the entities
- ✓ Conduct the participatory diagnosis. The diagnosis will first define the problem, or constraints, and objectives of the participants.
- ✓ Select material to be evaluated, that is, select the technology supply. This is initially based on the description of the “ideal” variety and, after the first cycle, on farmers’ criteria.
- ✓ Conduct open-ended evaluation (i.e., obtain subjective information) and agronomic evaluations (i.e., obtain quantitative information). These evaluations are used to gather data for analysis.
- ✓ Determine criteria and prepare the glossary of terms, using evaluation formats and subjective analyses of information.
- ✓ Use the field books as formats for tables of frequencies to determine the relative importance of the criteria given by farmers.
- ✓ Statistically analyze the information obtained, using regression analysis for nonparametric data.
- ✓ Define the pre-release phase. The research entities do this.
- ✓ Release the varieties developed according to the regulations of each research entity.

Discussion

Four key areas within participatory research (PR) are analyzed: selecting participant, establishing objectives, analyzing information, and drawing up interinstitutional agreements. The following aspects are examined: What does the existing respective documentation on PRCB suggest? How was it dealt with in the Colombian project?

What aspects were not considered? And finally, how can the procedure be refined in light of the experiences and lesson learned in PPB at the international level during the last 20 years?

Selection of farmers and communities

The selection of farmers in Colombian communities was coordinated by research institutions that had staff who were familiar with local production system. The staff selected farmer experts from communities where cassava is a priority crop in the edaphoclimatic zone similar to the experiment station (Iglesias and Hernández 1994).

The participatory procedure recommended that farmers be selected at each site according to the following criteria:

- ✓ They are recognized by their community as experts in the cassava crop
- ✓ They show interest in the trials
- ✓ They have available the necessary area for conducting trials
- ✓ Their farms are in easy access to the markets in the region
- ✓ They possess communication skills, that is, a capacity and willingness to express their thoughts
- ✓ Their production systems are representative of small cassava farmers in the region

One recommendation that was followed was where, for each evaluation cycle, the farmers responsible for the trails were replaced by others who were also selected using the same parameters, for example, neighbors who showed interest and could establish participatory trials on their farms in later cycles. The idea was to (1) increase the number of experimental environment to ensure broad adaptation of the clones, and (2) involve members from the gamut of end-user groups involved in cassava production in the region, thereby ensuring the clones will be accepted by all groups, not just some.

Even so, the group of end-users from which most participants were drawn was the group of small farmers. Most farmers in the region belonged to this group and had also figured within the mandate of the project's executing entities.

In the Colombian project, more than 500 farmers (all men) participated in 90 trials on 15 to 20 farms per cycle. Participants included buyers for cassava-drying plants (cassava chips), starch producers, and members of cooperatives. These groups were invited to the evaluations at the end of the cropping cycle, that is, at harvest. But the largest percentage (70%-80%) was a core group of small farmers dedicated to growing cassava as a subsistence crop for household consumption. They participated throughout the entire cropping cycle. The resulting information from evaluations with different en-user groups was therefore separated to prevent confounding the results.

Although the project had specific objectives regarding who should participate in the process, no systematic strategy for selecting participants was carried out in the Atlantic Coast Region. Instead, it was simply left to

those who were interested (i.e., self-selection). We therefore could not pre-establish a representative balance among the different groups of end-user for data collection and, consequently, neither could we obtain representative decisions on which clones would continue in the selection process. Fortunately, however, this did not significantly bias the decisions as we discovered that the different groups had comparable objectives and similar preferences in relation to desirable varieties, even though they had specific criteria for each phase of production. Thus, the same varieties were selected by the different group, but for different uses (e.g., fresh consumption versus starch production). Nevertheless, in other contexts, where the differences in varieties and preferences among end-users are more notable, the lack of a strategy for selecting participants and ensuring representation and balance among different end-users could prove to be an important constraint. In such cases, separating information according to groups of end-users would be more important.

Reflecting on the process of selecting farmers in the Atlantic Coast Region, we must highlight the importance of also looking for unobvious end-users, that is, those who may not be readily seen or who do not self-select themselves. For example, in this case, women as a group of distinct users were not considered because they play a minimum role in obtaining planting stakes and managing the crop until its sale in the market. Nevertheless, a later project that specifically aimed to work with women found that, in this region, the women play a central role in selecting roots for marking and selling bollos¹ (IPRA Project-CIAT 2000). This market is managed exclusively by women. They use the income from it to buy basic family needs such as clothes for the children, school utensils, medicines, and sometimes transport. Because the project did not have the specific objective to seek “hidden” end-users, the researchers did not learn of this activity related to their project with cassava varieties. While sometimes the hidden end-users are women others can be a group of farmers at a lower socioeconomic level than most, or a group that supplies a market niche or a market specific to the region. So that these end-users are not overlooked, the PRCB could incorporate, within its diagnosis step, a “substep” for identifying “hidden” end-users.

1. These patties are prepared with cassava flour and cheese. They are cooked, wrapped in maize husks, and sold in the region’s urban centers.

For the Atlantic Coast Region, the entities elected to work with individual farmers who had conditions and cultural practices that were representative of the zone. The recommendation of the PRCB procedure is to work with no more than 10 people at a time. This facilitates data gathering and analysis. Other PPB projects have tried working with more farmers and previously established groups. In Northeast Brazil, for example, the researcher tried to work with entire communities and with cooperatives. They concluded, that it was too difficult to organize evaluation and handle data coming from so many people, except in the case of the cooperatives, which greatly facilitated the work by being already organized and used to working together.

Work with farmers’ group takes up different forms, for example, CIALs in Latin America which are community-based research services that conduct research in representation of their communities; farmer groups evaluating potato clones in Ecuador; or Farmer Field Schools in Bolivia. These experiences show that important accomplishments such as mutual support and motivation among farmers, diffusion of technologies among farmers’ group, distribution of risks and benefits, and continuation of the work after intervention by research entities is possible by working with groups. Nevertheless, the formation of groups specifically for a PPB project means dedicating much more time and, in some cases, having personnel with a background in

group dynamics. This also means that the project should be situated within the broader context of rural development, and not focused on a specific activity such as breeding.

In selecting farmer for a PPB project, the distribution of benefits must be considered. 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, farmers must be selected 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 who not only had representative conditions and practices, and good communications skill, but who also had farms that were well located easily accessible and could thus serve as “show windows” for neighboring farmers who walked past them and saw the new varieties planed. This simulated spontaneous or informal diffusion of promising varieties and ensured, to some 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 a groups depend on the project objectives and what is needed to accomplish them. For example if a project aims to ensure that the benefits of collaboration are distributed widely, it should look for participants who are recognized leaders in their communities. But if the objective is to incorporate farmers’ Knowledge in a varietal selection process, then it should involve local expert (PRGA Program 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 or her community, or the community leader does no have sufficient technical knowledge. Similarly, a PPB project can often have more than one ejective, which means that they must be prioritize 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 research many improve significantly because women are usually in change of domesticating wild species and, because of their knowledge of the germplasm, of selecting and maintaining seeds. Moreover, women’s preferences are often different from those of men even if they do not always participate directly in farming activities, as illustrated by the case of the Atlantic Coast Region.

Establishing objectives

The objectives of the project implemented in the Atlantic Coast Region were established by the research entities after an initial exploration of the zone. Fully aware of the great genetic diversity found on the farms of small cassava farmers and knowing that such diversity is not static but changing over time, the researchers recognized that farmers had their own selection process based on criteria that permitted them to test new materials, observe them. The researches were interested in learning more about the farmers’ criteria, with the idea of developing a formal procedure that would make it possible to implement this systematically in the development of technologies. This formed the project’s main objective. Thus, the PRCB procedure does no recommended the establishment of objectives as a step within the procedure; rather, it assumes that it is and activity that occurs before farmers begin participating.

The objectives established for a research activity determine the steps and activities to be implemented. When objectives are established before end-users participate, their priorities cannot be included in the project’s initial conception and planning. In the case of the Atlantic Coast Region, the participation of farmers in the diagnostic phase resulted in working with farmers who identified cassava varieties as the main problem in their production areas. However, the final breeding objectives themselves were not discussed. What exactly were the farmers seeking? Varieties with specific of board adaptation? One o several varieties? Varieties for on-farm consumption or multiple uses? Varieties that would improve their cassava yields? Varieties that could be grown with other crops at the same time? Conservation and / or improvement of their native varieties or were

improved ones preferred? These and other options that breeding offers could not be considered by the participants 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 participated vary. As already mentioned, farmer participation in the Atlantic Coast project began with diagnosis. In other PPB cases, it began with setting objectives; in yet others, participation began only at planting and harvesting. Participatory research literature and experience also indicate that different “degrees” of participation exist, ranging from a facultative to a collegial style. Documentation on the PRCB procedure concludes that the preferable style of participation in the consultative one and that the most desirable stage for initiating participation is diagnosis. Nevertheless, this is one way among many to implement PR.

We believe that the objectives of a PPB activity can be established in several ways, depending on who is involved, how flexible the entities can be, and the resources available. In some cases of PPB, objective was established jointly among researchers, farmers, and other end-users (e.g., the CIAL working with crops such as potatoes in Ecuador). In this case, the researchers need to explain to end-users the range of option available and what they can expect from breeding (and what not to expect). The researchers and their entities must see as important their own capacities for flexibility, negotiation, modifying their own objectives, and assuming some of the end-users’ objectives if these are different. Some elasticity should also exist in the frameworks of formal research and, therefore, in the support from higher levels of decision making such as by the institutions’ directors.

In the case of the Atlantic Coast project, given the project’s objectives, knowledge of the farmers’ selection criteria was very important. While learning about their criteria is an objective of PPB, it is also a product-which in itself means little. To be meaningful, knowledge of farmers’ selection criteria must be incorporated into the breeding process, particularly the selection of parental materials for crosses and experimental clones. Moreover, establishing “knowledge of farmers’ criteria” as an objective makes farmers’ criteria look static. In fact, although some criteria persist, others change from cycle and from one group of end-users to another. Numerous PPB projects have failed through not recognizing this fact.

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

The results of the Atlantic Coast project are well known. It had conformed to a participatory process that has been adopted and adapted in several Latin American countries. The farmers’ selection criteria became known. Genetic diversity was expanded on their farms. In these terms, the project can be said to be very successful. Nevertheless, when the PPB activity in the Atlantic Coast Region was planned, several important elements were not considered: a phase of mass multiplication of seed for rapid diffusion of the more accepted clones, follow-up of the process to fine-tune the methodology and assessment of impact. After analyzing several projects that implemented the PRCB procedure, we discovered that these are steps that should be included as they significantly enrich the work and enhance its impact.

Quality of information and its use

The quality of collected data and their use comprise another key issue in PR. The challenge is to obtain, combine, and analyze both qualitative and quantitative data for making decisions during research. This challenge has not yet been totally resolved in PR.

The Atlantic Coast project tested several statistical tools to ensure quality of 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, thus providing a global vision of preferences. Nevertheless, the most useful tool was logistic regression, which was adapted to analyze preference rankings and simulate acceptance of technology by farmers. Perhaps the most important contribution of the Atlantic Coast project with respect to the collection of information and its use was having found a way to technically interpret the subjective opinion given by participants in evaluation, and thus establish an information link between the Atlantic Coast's production system and the experiment stations.

The PRCB procedure recommends preference ranking to compare degrees of acceptance of different varieties, classifying them from the most to the least acceptable. This process is based on techniques of open-ended evaluation, which are useful to discover qualitative viewpoint, explanations, and ideas on farmers' reasoning processes and decision making.

The step for analyzing information as recommended by the PRCB procedure are as follows:

- ✓ Developing flow chart to guide each activity
- ✓ Constructing lists of terms and local agricultural glossaries, and classifying them by region for local, regional, and scientific interpretation.

- ✓ Identifying criteria, differentiating them from descriptive aspects

- ✓ Integrating the reasons, rankings, and criteria identified, differentiating between antonyms and synonyms

- ✓ Developing formats for systematizing the information

- ✓ Developing field books (Hernández 1993)

- ✓ Analyzing information, using several tools

Some results related to information obtained by this process in the Atlantic Coast project were the combination of efficient tools to obtain information (tables of relative frequencies, differentiation between synonyms and antonyms, electronic datasheets for transcribing information directly from 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 preference rankings), a glossary of terms, criteria reasons, rankings, field books, technology profiles, and alternatives tested in the analytical process.

A method recently adapted by Sall et al. (2000) in Senegal is quantification based on a quasi-arbitrary ordinal weighting system of the farmers' 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 may have

- ✓ The presence and quality of those characteristics in the experimental material

- ✓ The characteristics of farmers

This method, the same as the one recommended by the PRCB procedure, explains and predicts the adoption of improved materials.

In data analysis, it is important to consider the source of data and the relative weight given to each participant or group when deriving conclusion from preference ranking. This can be seen as a process of voting, where each participant has the right to vote for his or her preferred clones. If most of the group of participants represent 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 above, to select the participants of a participatory activity carefully. Where this is not possible, then the information obtained from different interest groups should be separated so that the results reflect the community's (or communities') preferences more precisely.

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

Many PPB project procedure lists of farmers' selection criteria. What happens with these at the end of the project? Until when or where are they relevant for other projects in the same areas? An interesting case of information management in the cassava-breeding project in Northeast Brazil, managed by Embrapa Mandioca e Fruticultura. Given the extensive collection of data and the magnitude of the project, the breeder, Waina M. Fukuda, had to create a database to store and manage the large volume of information. Although she felt that she had collected too much information (WM Fukuda personal communication), the database was very useful in the project's later phases for suggesting experimental clones suitable for areas similar to the ones in the database.

Interinstitutional agreements

The Atlantic Coast project was implemented in an international 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 its composition of members, with their experience, fields of expertise, coverage and participation in decision. In the first place, GRUYA made it possible to establish multidisciplinary discussion forums, where experiences were exchanged at each crop cycle, and the analyses and adjustment of the PPB component were facilitated. In addition, GRUYA members had a network of trials in northern Colombia that brought together the experience of more than a thousand small cassava farmers for analysis in the forums. The interinstitutional agreements also helped implementing entities see different potential uses of cassava, incorporating elements and/or phases of production change in the process that had not been contemplated at the project's onset. Finally, the interinstitutional agreements provided opportunities for staff from the different entities to be exposed to the participatory approach. As a result of this experience, the PRCB procedure recommends implementing interinstitutional projects, where possible.

The result of implementing the PPB project in the Atlantic Coast Region in an interinstitutional setting can be seen in the broad geographic coverage of the work, which involved many farmers and the participation of professionals from 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. The institute now uses a routine procedure in cassava breeding and for other crops such as yams (*Dioscorea trifida* L.) around Montería in the Department of Córdoba (A. Lopez, personal communication, ICA Turipaná Regional office).

Despite the interinstitutional agreements during the project's implementation in the Atlantic Coast Region, no joint activities were carried out. 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. Hence, no feedback was received when documenting the process and analyzing information from the different entities, which would have, without a doubt, enriched the work. Neither were the distribution of resources and responsibilities, and the recognition of different member institutions considered in the design of institutional arrangements. These however, are indispensable for motivating, encouraging activity participation by, and empowering the institutions associated in an activity and therefore for increasing the possibilities of the arrangements continuing. Nor was the idea of using international agreements to reproduce the experience on a larger scale considered. This would have required more commitment from the member institutions to a relationship of belonging, from which they could have also expected resources.

Conclusions

A PPB project should have an explicit strategy for farmer selection. This strategy should be based on the objectives of 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, seek hidden end-users, and work with already established groups (if they exist in the area). Farmer selection is key to the project's social impact.

Establishing the objectives of a PR activity is perhaps the most important phase of a project, because many of the decisions on how to implement a procedure will depend on its objectives. We suggest that, where possible, the objectives be established together with the participants in the process and not beforehand. This will increase the relevance of the work for the end-users and therefore 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 fact, the Atlantic Coast project highlights the need for having different objectives: two elements were not considered that have proven to be essential in later PPB projects:

- ✓ A phase of mass multiplication of seed of clones accepted by farmers
- ✓ An impact assessment study that considers the methodology per se and the process implemented.

A key topic dealt with in this article is the quality and use of gathered information. In the Atlantic Coast project, several alternatives were used to meet the challenge of establishing a link between the analysis of quantitative and qualitative information. Logistic regression is recommended, when once it is adapted to the analysis of preference rankings to simulate farmers' acceptance of experimental materials. The use of a field book similar to the one developed during the Atlantic Coast project is also recommended to limit the amount of information gathered to that which can really be used and analyzed. Incorporating information or conclusions of analyses to make decisions on the clones to be evaluated, recommended, and released is an essential step in that process and should be considered participatory.

The PRCB procedure was developed within an interinstitutional framework, which provided several advantages for the Atlantic Coast project. Among them was being able to interact with a wide range of professionals, both research and extension, merchants, and farmers; the availability of wider geographic coverage for trials; and the exposure of several institutions to a new research approach. Given that institutional framework is a contextual element, over which projects and their implementers do not have much influence, and does not comprise a suggested step in the procedure, perhaps we are out of place to make recommendations as to its form. Nevertheless, we should mention that institutional collaboration can be highly advantageous for a PPB project and where there is such collaboration, members are recommended to jointly establish the objectives and roles of each, and the corresponding responsibilities and obligations.

The Atlantic Coast project and the development of the PRCB procedure were very successful. We need only to see the number of clones released and their acceptance by farmers, and the adoption of the same procedure by several Latin American countries.

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To save space, acronyms are used to replace the publisher' full names. For an explanation of the acronyms, see Acronyms and Abbreviations Used in the Text.

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Acronyms and Abbreviations Used in the Text

CIALs	Spanish acronym for Local Agricultural Research Committees
CIAT	Centro Internacional de Agricultura Tropical, Colombia
CNPMF	Centro Nacional de Pesquisa de Mandioca e Fruticultura Tropical (of EMBRAPA)
CORPOICA	Cooperación Colombiana de Invesctigación Agropecuaria
CGIAR	Consultative Group on International Agricultural Research
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuaria, Brazil
GRUYA	Spanish acronyms for Cassava Group and Associates
ICA	Instituto Colombiano Agropecuario
INIAP	Instituto Nacional Autónomo de Investigaciones Agropecaurias, Ecuador
IPRA Project	Investigación Participativa en Agricultura / Participatory Research in Agriculture (of CIAT)
NARS	national agricultural research systems
NGOs	nongovernmental organizations
PCA	principal components analysis
PPB	participatory plant breeding
PR	participatory research
PRCB	participatory research for cassava breeding\
PREDUZA	Proyecto Resistenci Duradera en la Zona Andina, based in Ecuador



Future Harvest is a non-profit organization that builds awareness and support for food and environmental research for a world with less poverty, a healthier human family, well-nourished children, and a better environment. Future Harvest supports research, promotes partnerships, and sponsors projects that bring the results of research to rural communities, farmers, and families in Africa, Latin America and Asia. It is an initiative of the 16 food and environmental research centers that are primarily funded through the Consultative Group on International Agricultural Research.

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The consultative group on International Agricultural Research (CGIAR) works to promote food security, poverty eradication, and sound management of natural resources throughout the developing world.

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In recent years the CGIAR has embarked in a series of Systemwide Programs, each of which channels the energies of international centers and national agencies (including research institutes, non-government organizations, universities, and the private sector) into a global research endeavor in a particular theme that is central to sustainable agriculture, fisheries, and forestry.



The purpose of the CGIAR Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation (PRGA Program) is to assess and develop methodologies and organizational innovations for gender-sensitive participatory research and to apply these in plant breeding, and crop and natural resource management.

The PRGA Program is cosponsored by 4 of the 16 centers that make up the CGIAR: the International Center for Tropical Agriculture (CIAT), which serves as the convening center; the International Maize and Wheat Improvement Center (CIMMYT); the International Center for Agricultural Research in the Dry Areas (ICARDA); and the International Rice Research Institute (IRRI)

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CIAT's mission is to reduce hunger and poverty in the tropics through collaborative research that improves agricultural productivity and natural resources management. Headquarters in Cali, Colombia.



CIMMYT is a nonprofit scientific research and training organization engaged in a worldwide research program for sustainable maize and wheat system, with emphasis on helping the poor while protecting natural resources in developing countries. Headquarters in Mexico City, Mexico.



ICARDA's mission is to improve the welfare of people through agricultural research and training in the dry areas in poorer regions of the developing world. The center meets this challenge by increasing the production, productivity and nutritional quality of food to higher sustainable levels, while preserving or improving the resource base. Headquarters in Aleppo, Syria.



IRRI is a nonprofit agricultural research and training center established to improve the well-being of present and future generations of rice farmers, and consumer, particularly those with low incomes. It is dedicated to helping farmers in developing countries produce more food on limited land using less water, less labor, and fewer chemical inputs, without harming the environment. Headquarters in Los Baños, The Philippines.

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