FARMER PARTICIPATION IN ON-FARM VARIETAL TRIALS:

A Report of Work in Progress
April, 1987

Jacqueline A. Ashby
Carlos A. Quiros
Yolanda M. Rivera

CIAT
A.A. 6713
CALI
COLOMBIA, S. AMERICA

Experiences with Farmer Participation in On-Farm Varietal Trials

Why involve farmers in selecting varieties?

Research programs for crop improvement concerned with small farmers in low-income countries have well-established objective criteria such as yield increase or disease resistance, for breeding improved plant varieties. Yet agricultural researchers are often confronted with the experience that the best varieties selected according to such criteria, are not automatically accepted by farmers. Many times small farmers do not adopt a recommended variety when it fails to meet their economic or socio-cultural requirements; and sometimes farmers adopt what researchers expect them to consider inferior varieties. Such adoption patterns are not the result of farmers' idiosyncratic preferences. Farmers in any given production system share consistent and objective criteria for selecting preferred varieties, just as do plant breeders. However, small farmers develop and apply such criteria in the context of their goals and strategies for achieving family welfare through management of limited resources. This is what makes the farmer's point of view distinct from that of a researcher.

Technology development programs oriented to small farmers often conduct diagnostic survey research to set objectives for on-farm experimentation. Experience suggests that the complexity of small farmer decision-making is such that it can take a team of specially trained researchers weeks of field work to ferret out, analyze and interpret notions which come "naturally" to the peasant farmer. A premise of such diagnostic on-farm research is that farmers cannot articulate intelligible objectives for crop breeding programs, but require highly educated intermediaries to interpret their preferences. There is of course, some truth to this. But diagnostic research has become a hothouse of methodology development,spawning sondeo teams, informal surveys, rapid appraisals, key informant surveys,etc. etc. The farmer is an object of investigation, just as plants, soils, insects or viruses are objects to be studied and measured. In this process the

farmer's voice has been lost. Asking farmers questions has become an industry. Listening to farmers has been forgotten as a research tool.

Participatory research with farmers is a different approach, in which the farmer acts as a subject who investigates, measures and studies in collaboration with researchers. Varietal trials with farmer participation aim to elicit the farmers' subjective point of view as articulated by the farmers themselves for the testing and selection of new varieties.

The farmer participation in on-farm varietal trials discussed here was launched to create situations where listening to farmers react to new technology could be integrated into a research program for crop improvement. The key questions addressed in these trials were the following: Instead of using surveys to interpret farmer preferences and objectives second-hand, was it possible to elicit these preferences first hand, by structuring appropriate situations where farmers would and could express their criteria for selecting among different varieties? Could these preferences and criteria then be applied to selecting varieties suitable for testing in their farming system?

This report is a brief description of several methodological approaches that are being tried in order to address these questions; and is intended to give an overview of work in progress. In some cases, final results have yet to be obtained, but the description of how the methodologies are being implemented is included here in response to many requests for information about these, and to stimulate discussion about them.

Types of trials and stages of on-farm research

The farmer evaluations discussed in this report have been conducted at an early stage in on-farm research. In the diagnostic stage, farmer evaluations have been utilised to prescreen with farmers a large number

of varieties to determine which justify testing in farmer-managed trials from the farmers'point of view; and to obtain farmer input on how factors other than variety; such as fertilization, planting distances or other management practices perceived by farmers as relevant to varietal testing, should be incorporated into the design of on-farm trials.

Farmer evaluations have been carried out in several types of trials, such as regional trials which include large numbers of varieties (as many as 35 varieties in one case); exploratory trials with up to ten varieties at two different levels of fertilization; and farmer-managed trials with up to ten varieties superimposed on farmers' levels of management factors in the test crop. The project has therefore consistently worked with relatively large numbers of treatments for farmer evaluation. This has been done in an effort to test the assumption common in on-farm research, that farmers can only evaluate limited comparisons such as for example, the researchers' "best" treatment compared with a farmer check.

In summary, farmer participation in on-farm varietal testing discussed in this report, is not a pre-extension activity for validating prior on-farm research results. The function of farmer participation has been defined as an integral component of diagnosis, problem-definition, design of experimentation, and exploration of potential improvements.

Establishing Varietal Trials With Farmer Participation

1. Pre-screening of varietal materials by farmers

The first step in establishing varietal trials was to give farmers an opportunity to select materials from a wide range of possible varieties for inclusion in the trials. This was attempted with two different crops: improved varieties of bush beans, and cassava. In the case of beans, individual farmers were shown samples of the seed from different lines identified as promising for their agroclimatic region by the CIAT bean program. Each farmer was asked to indicate those grain types of interest, and those which were less acceptable. In the case of

cassava, a group of farmers visited a CIAT regional varietal trial at a site nearby the research area where the cassava plants on the borders of each experimental parcel in the trial had been left standing. Farmers were therefore able to inspect plants of each variety, uproot sample plants to examine cassava roots, and thereby make a selection of the varieties they perceived as interesting for further testing. In a group discussion of how to test the varieties they had selected, the farmers talked about their observations that the same cassava variety would give very different yield and root quality in different fertility conditions, and suggested different fertilizer treatments for inclusion in the on-farm trials.

Prescreening of beans focussed on the initial evaluation of bean grain types by farmers. A CIAT breeder selected ten bush bean materials which were potentially adapted to the agroclimatic conditions of the research site, and ranked them in order of expected acceptability to farmers. Subsequently farmers examined and ranked samples of each variety and discussed acceptability with the research staff.

Farmers were readily disposed to rank the materials according to grain type: their ordering varied somewhat from that of the breeder, because their most important criterion for grain acceptability was grain size, as shown in Table 1. There was however, one intriguing exception to this rule: the interest shown in a small grain variety, BAT 1297. Analysis of the interviews in which farmers made these initial selections suggested that the unexpectedly high ranking given to this variety was the result of women taking part in the selections, and their perceptions that traditionally small grain varieties similar in appearance to BAT 1297 had been the more flavorful and higher yielding. Women viewed a small grain type such as BAT 1297 as desirable from the point of view of subsistence and consumption objectives of the small farm. Men on the other hand were selecting grain types for size primarily with reference to marketability.

The initial selection of varieties was intended to accomplish two objectives: first to ensure that materials obviously unacceptable to

farmers did not enter the on-farm trials; second to create an opportunity for farmers to make suggestions about how trials to be established on their farm could be designed in terms of trial management.

This farmer participation in designing the on-farm trials helps to ensure that the new materials are tested in conditions that farmers view as realistic and representative for their conditions. It also establishes in the farmers' minds from that outset, that the trials are not intended to convince them that any given variety is superior. The initial selection process with farmers ensures that farmers understand the researchers' goal is to test, not to demonstrate varietal performance. This is important because small farmers are acculturated to relationships with scientific experts and extension agents where the expectation is that the experts tell the farmer what to do, and try to convince the farmer that "new" is "better". In order to create a relationship with farmers where frank and open communication about the performance of new technology in their fields is the norm, it is extremely worthwhile for research staff to make the initial investment of time to communicate to farmers the importance of obtaining honest opinions about what is acceptable.

2. Selection of farmers to participate

Farmers who were invited to take part were identified by asking local farmers to name people in the community whom they considered "expert" bean or cassava producers (defined as years of experience and interest in trying new ideas for cultivating these crops). This procedure began with visits to a community leader or farmer randomly selected in each of the different agroecological zones of the research site. Each farmer interviewed gave opinions as to who were the local experts in one or the other crop. The additional farmers identified by this approach were also visited, with the result that the list of names expanded and certain individuals were repeatedly mentioned. Those farmers whose names ocurred more than twice were considered experienced cassava farmers or expert bean growers in the community, and were invited to participate.

In order to take part in trials, farmers have to plan to plant a commercial scale plot of the test crop,so that the trial is situated within this plot. Farmers who took part in managing on-farm trials included "experts" and other farmers from the lists of bean or cassava growers compiled earlier. These farmers were chosen to represent a range of socio-economic resources, based on observation of their housing quality, ownership of consumer durables, ownership of livestock, and other qualitative indicators of their socioeconimic status.

Each subsequent season in which trials were planted, the farmers who managed them were different individuals from the previous season, although in a group of 15-20 farmers in any given season there have usually been two or three who have previously planted a trial with the project. The project wanted to avoid the "trained farmer" syndrome, so that fresh evaluations could be obtained in different seasons with the same varietal materials, and also to avoid pestering farmers with repetitive interviewing. There are obvious advantages for a crop improvement research program to establishing a cadre of farmers in any given target farming system who are experienced in conducting evaluations with research staff, because the relationship of trust and confidence which grows over time is an enormous asset, ensuring that farmers will give honest criticism.

However, the experience of this project suggests that trust and confidence in the research system can be diffused throughout a community, so that even when farmers participate in evaluations for the first time, norms and expectations have been established which encourage frank expression of opinions by farmers.

3. Trial Establishment

(a) Bean Trials

For testing bean varieties the trial design consisted of eight bean varieties including the local variety as a check, superimposed on farmer

management practices which varied from farmer to farmer. Each of the 15 farms on which this trial was planted was a replication. Farmers designated sites for a varietal trial within a field where they planned to plant beans. Farmers planted one bean variety to each of eight plots staked out at the designated sites, some ordering their varieties by grain size, others by grain color. The remainder of the bean field was planted by the farmer with the local variety. Planting densities, fertilization, and all other crop management operations in the trials were determined and carried out independently by each farmer.

At the beginning, planting was done by farmers and observed by one of the research staff who had to be at the field when the farmer decided to plant. As the number of trials to be observed within a short period in the planting season often makes this co-ordination difficult, it has been feasible to give the farmer the seed in separate packets with labels for each variety explain the procedure, for planting in rows or plots (in this case plots are staked out previously in the farmers field) and leave the farmer to do the planting and label each variety. Alater visit is made by research staff to map the locations of varieties in the trial with the farmer who retains a copy of the map.

(b) Cassava Trials

The cassava trials used two approaches to trial establishment. The first approach was similar to that used for the bean varietal trials, but because of a shortage of planting material, and the desire of farmers to include fertilizer treatments in the trials, it was not possible to give each participant all the varieties to evaluate. Instead, each of nine farmers was randomly assigned three of the CIAT varieties and the local check to be planted at two levels of fertilization, as defined with the group of farmers in the initial selection discussed above. Since the main objective of these trials was to obtain farmers' reactions to the new technology, it was decided to reconvene the same group of farmers at harvest time to pool experiences,

and to see if a group could produce a consensus about which materials looked sufficiently promising to farmers to include in further on-farm testing.

The second approach was simply to make gifts to farmers of three cassava varieties in separate packages of planting material each labelled with a different number. The recipients of gifts were selected from the list of cassava growers compiled from the community. Gift recipients were evenly distributed about the research area, and represent different socio-economic resource levels. The farmer receiving a gift of cassava varieties was told he/she could plant the material however desired and that follow-up visits would be made by research staff to see how the varieties were performing.1.

Experience to date in following up on these "gift trials" (ensayos con regalos) suggests that close attention must be paid to how the purpose of the gift is communicated to farmers, if the research staff hope to obtain information on how farmers will evaluate new varietal materials. It is important not to influence when, where, and how these gifts are utilized. Even when the agronomist in the act of making the gift of planting material or seed has emphasized to a farmer that it is entirely up to him or her how the material is utilized, follow-up visits suggest that a few farmers may be planting the cassava stakes in a particular way that reflects their concern that the agronomist might be displeased if special treatment is not given to the gift. Since observing this behavior, this project began making gifts through the medium of a local farmer who is a community leader and associated with the project as a field worker, in an attempt to dilute the agronomist's influence on recipients. In socio-cultural settings where it is difficult for farmers to take the initiative in deciding how to handle a gift of seed, it is especially important to communicate to farmers, why the researchers are asking farmers to plant samples, and how the farmer will benefit from taking part in these experiments (See Apendix 1).

---

(1)* This approach was suggested by and implemented in collaboration with Ted Carey, Breeder, CIAT Cassava Program. 1985.

Evaluating Varietal Trials with Farmer Participation

The central objective of establishing the varietal trials was to create opportunities to listen to farmers' reactions to the new technology. The primary data of interest in trial evaluations are therefore, the opinions, preferences and ideas expressed by farmers.

These "preference evaluations" have been conducted on two occasions in the growth cycle of each of the two crops. In the bush bean varietal trials, one evaluation is carried out when the bean pods first begin to form. In the cassava trials, the first evaluation is carried out after farmers in this research site have carried out the first weeding. These evaluations focus on plant architecture, growth habits, disease susceptibility, periodicity and aspects of management to date, as observed by farmers. The second "preference evaluation" follows the harvest and focuses on yield, profitability, marketability and consumption aspects, but aims to capture any relevant varietal characteristic which farmers like or dislike.

The "preference evaluations" require interviewers skilled in the techniques of open-ended interviewing, which involves stimulating the farmer-respondent to express opinions and concepts, and to explain observations of different varieties, without prompting or suggesting that the interviewer has a point of view, which will bias farmers' responses. Experience with these interviews suggests that it is helpful for the interviewer to communicate a priori a complete absence of vested interest in the "success" of the new varieties relative to local varieties. It is necessary to bear in mind that farmers in these interviews tend to expect that the research staff involved in the trials want to hear favorable comments. The interviewer has therefore, to establish at the outset that a farmer's negative reactions are equally acceptable, and that the reasons for such reactions are of profound interest, without prompting the farmer to express ideas that appear to be what the interviewer wants to hear.

At the time of trial establishment each farmer was given a map of trial, stored in a plastic folder, with a simple form in which labor and other inputs to the whole field are recorded by the farmer.

When visiting a farmer's trial, the research staff make a point of relying on the farmer to show them around the trial. The aim here is to communicate to the farmer that this is the farmer's trial for which he or she is responsible, not the researchers' trial. Reliance on the farmer to act as the guide around the trial layout also enables the research staff to assess readily how seriously the farmer takes the trial: whether or not he or she knows his way around the trial and can identify the different plots and varieties is a sure indicator of how attentively the farmer is observing their progress. Most farmers readily locate varieties they are interested in without using a map, and have evidently studied them because they learn the reference letters and numbers of varieties (such as A-36, XAN-212, BAT 1297) and can locate them in the trial by these names, or by the numbers given to the cassava varieties (51, 52, 53, etc.) In several instances farmers have begun to name cassava or bean varieties of particular interest to them from their appearance eg. "la blanca" (cassava hybrid CG 406-6) or "la peque_ita" (bean variety BAT 1297).

This project has used several approaches to recording farmers' comments, while a farmer guides research staff through a varietal trial. In one approach, one person listens to the farmer, interpolating questions and asking for clarification, while another takes notes. In another approach, the person conversing with the farmer records the interview (using a small SONY TCM-2 cassette recorder which is very unobtruisive). Such conversations were later transcribed, and the content was analysed (eg See Table 2). A disadvantage of this approach is the difficulty of making transcriptions. A third approach uses a questionnaire which consists of initial open-ended questions, and continues with specific questions about aspects of plant architecture, disease resistance etc.

To date the most workable proceedure for carrying out preference evaluations in the trials has been to note farmers' comments in columns under broad topic headings in the order that these are spontaneously brought up by farmers during the interview. At the conclusion of the interview the farmer is asked to indicate the three or four varieties of most interest, rank these in order from most to least interesting, and explain this ranking.

Subsequently it is possible to do a content analysis of the interviews recorded in this fashion, and to tabulate the frequency with which specific varietal characteristics or criteria for evaluating the crop in question have been spontaneously mentioned by farmers. Table 3 is an example of a frequency tabulation of criteria mentioned by farmers in bean varietal evaluations. Performing a content analysis with the frequency tabulation highlights the criteria which are important considerations for farmers in a visual evaluation of the bean crop: for example farmers universally commented on yield potential. While several noticed disease resistance or susceptibility, this did not appear as an important criterion for farmers to rank the varieties placed in 1st, 2nd and 3rd place in Table 3.

The second preference evaluation which follows harvest of a trial involves weighing grain or root yield from each experimental parcel which is recorded with the farmer on a prepared form. The farmer and agronomist evaluating the trial each make a copy when farmer literacy permits. Yields are expressed in returns to seed or to area, depending on local units of measurement for expressing yield for the crop. The farmer is asked to rank treatments in order of preference based on a visual appreciation of yields and quality aspects of different varieties. Next a simple cost-benefit analysis is performed,calculating value of the yield according to the prices obtained by each farmer for each variety, and costs of purchased inputs of concern to the farmer.

The farmer is then asked to rank treatments in order of preference based on this cost-benefit analysis, and the reasons for preferences are discussed. Sometimes the simple visual appreciation is the most

effective evaluation, but often the cost-benefit analysis is a useful tool for eliciting perceptions of constraints when costs or prices vary among treatments in a trial.

Table 4 compares the ranking given to different bean varieties when evaluated by farmers with a simple visual appreciation of yield and grain quality, and when evaluated by the same farmers with a cost-benefit analysis. No substantive difference exists in the conclusions about farmer preferences derived from these two approaches. The value of these farmer evaluations is not principally to arrive at selections of two or three varieties which the majority prefer, but more important, to understand the objectives that farmers are addressing as they make varietal selections. This information is important for narrowing down the combination of varietal characteristics which farmers' view as desirable, and which breeders can then consider including in a breeding program.

Examples of farmers' comments on their ranking of varieties in order of preference given in Table 5 illustrate the reasoning which led to acceptance of inferior small grain types: farmers' perceived the higher-yielding BAT 1297 and Argentino varieties as advantageous for consumption purposes, and increased yield as compensating the lower market price obtained by these varieties.

Participatory Research with Groups

Group participatory techniques for problem analysis are fast becoming popular for planning agricultural extension activities with client involvement. This approach has not been applied explicitly to provide direct feedback to a research program, although experience with participatory diagnosis in agricultural extension has begun to generate a felt need for early involvement of farmers in the design of technology. 2

---

2. Bernardo Peña, Acting Head, Communications Section, Instituto Agropecuario Colombiano (ICA), personal communication, 1986.

For the purpose of conducting varietal trials with farmer participation, this project has experimented with group participatory techniques to provide information to plant breeders on varietal characteristics of interest to farmers, and on how farmers themselves would evaluate new varieties.

Snap-bean variety evaluation: an innovators' workshop.

The innovators' workshop is a method for bringing farmers who are actively experimenting with new ideas in the informal research sector of agriculture together with researchers in the formal research system (Chambers and Jiggins, 1986). The project used this approach to evaluate new snap bean varieties with farmers, since snap beans are a very new crop in the project's research site, and farmers who grow snap beans are by definition experimenting with the crop.

A small group of ten farmers interested and experienced in snap bean production met for two hours with the project agronomist and anthropologist to discuss experiences with the crop and to obtain farmer input on strategies for testing new snap-bean varieties on-farm. A lively discussion ensued of different farmers' experiments with planting distances, fertilization, rotations, disease control, and marketing problems. The research staff used a check-list of topics to focus discussion and as a framework for note taking on the content of the discussion (See Appendix 2). In summary, the group diagnosis came up with recommendations for two types of on-farm varietal trial. A key preoccupation of farmers was the local scarcity of stakes for climbing snapbeans. They suggested one trial in which snap bean varieties would be planted in rotation with tomatoes, utilising the residual tomato fertilization and standing tomato stakes for support of the beans, which thus determined planting distances.

The second type of trial suggested by farmers entailed planting on a newly ploughed field, taken in from fallow. Fertilization levels at planting were suggested by the group; and planting in double rows at

distances also determined by group discussion, to facilitate staking, top dressing, spraying and harvesting.

The group gave priority to the first type of trial--planting in rotation with tomatoes--as the form in which local farmers were most likely to plant snap-beans. A regional on-farm varietal trial incorporating these suggestions was planted in October, 1986,to evaluate 15 climbing and 10 bush varieties of snap bean. It is interesting to note that the two-hour group diagnosis produced similar conclusions about the appropriate type of conditions in which to test snap bean varieties to those obtained from a survey of snap-bean farmers in a neighboring region, which however, required several mandays of interviewing and tabulation.

Evaluations of this same regional trial with individual farmers in a nearby region had suggested that farmer were either unwilling to make selections from among 35 varieties or had difficulty in discriminating among such a large number of superficially similar varieties (D.H. Pachico, personal communication 1987). However group participatory evaluation was attempted, in an effort to see if relevant criteria for selecting promising lines could be elicited via interaction among farmers.

The same group reconvened at the regional trial and walked through the rows of beans examing bean plants and pods of each variety separately. The research staff asked farmers to show them what features of each variety they viewed as positive or negative, and to indicate which varieties they considered should continue to be tested or which should be discontinued. Farmers' discussion rapidly focussed on quality characteristics related to market acceptability of snap-beans. A list of these varietal characteristics as explained by farmers is shown in table 6. In the process of about an hour farmers identified two climbing varieties and two bush varieties which they viewed as outstanding in terms of the above criteria and six bush varieties they would test further.

It is noteworthy that other than the farmer who planted the trial, none of the farmers in the workshop had participated previously in this type of evaluation, or in farm-trials with the project. It appears that the group process, in which farmers interacted as much or more among themselves as with research staff, in discussing the pros and cons of the different varieties in the trial, was catalytic in motivating the farmers to undertake selections and to reject confidently a high proportion of the material included in the trial in front of the researchers. Moreover, involving these same farmers as a group in setting up the trial was important in the subsequent group dynamics. The farmers identified with a common objective --identifying ways to introduce the snap bean crop into their system --and by the time the evalutaion was conducted, had already had the experience of taking part in the research process as a group.

After completing their varietal selections, the innovators workshop continued: farmers were experimenting on their own farms with alternatives to staking with canes cut from local bamboo, and wanted to set up trials to compare different planting distances and methods of support for climbing snap beans. Also farmers wanted to compare different fertilization methods, a particular concern if they do not rotate snap beans with tomatoes but plant newly cultivated fallow plots. As a result of the workshop farmers are creating initiatives for the formal research system to respond to in terms of developing a set of recommendations or a technology package for snap bean cultivation, but one that will be the product of interaction with a group of experimental farmers.

Group Evaluations of Trial Results

a) Bush Beans

A second example of the use of participatory group techniques was conducted with expert bean farmers who had already taken part in on-farm varietal trials. The objective of the group meeting was to attempt to draw together a synthesis of the "preference evaluations" and harvest

evaluations conducted with individual farmers on earlier occasions, and to ask farmers what they consider desirable criteria for selecting new varieties for inclusion in future trials. On this occasion, men and women formed separate groups, discussed criteria which were listed on a large sheet of paper and then set priorities among criteria by voting on heir importance. These are shown in Table 7, with priority criteria underlined.

In this summary shown in Table 7 the group produced specific criteria which for the most part included those identified from the content analysis of preference evaluations, shown in Tables 3 and 4, but with a much lower investment of time on the part of research staff. In addition the prioritization of criteria provided some useful guidelines for the selection of varieties for inclusion in future trials.

(b) Cassava

A third example of participatory group evaluation was to identify objectives for further on-farm experimentation with cassava varieties. The group of local farmers identified as expert cassava growers in the local community met with the project agronomist and social scientists to review results of on-farm trials, and to discuss directions for future experimentation. Trial results showed that the farmers' local variety out-yielded new lines at low and intermediate levels of fertilization; but that CIAT Hybrids and introduced varieties out-yielded the local variety at a high level of fertilization. This level had been established as the maximum dosage applied to cassava, by local farmers.

In the past, it has been assumed that farmers would not accept new cassava varieties if on-farm trials showed that these were out-yielded by a local variety, but the group indicated that this is not necessarily the case. Farmers said that flexibility of harvest date would be an important factor to be considered over and above comparative yields, when determing acceptability of new varieties.

A first priority for evaluating the varieties further according to the group was to determine whether the new varieties could be harvested at earlier dates than possible with the local variety. In the local farming system, cassava ties up land and capital for a minimum of 14 to 17 months before it can be harvested. Farmers were interested in identifying which if any of the new cassava varieties could be harvested earlier than 14 months, and whether these would spoil if left longer in the ground. New varieties with this potential would provide them with flexibility to respond to price fluctuations in the cassava market. If flexibility in harvest dates could be obtained with new varieties, then they might apply high fertilizer rates to obtain improved yields.

In further discussion, farmers were explicit about the fact that the cassava crop takes low priority in terms of management in their system. Other crops which require intensive care are weeded, fumigated or harvested according to a specific calendar, whereas they only weed cassava when there is time inbetween other activities. Farmers' discussed their observations that timely weeding significantly increases yields, but only three farmers out of fifteen were interested in an experiment to evaluate time of weeding. There emerged from the group discussion a self-defined "recommendation domain" for which an experiment on weeding practices would be appropriate, but which received low priority from the group as a whole.

The group did agree however, that it would be important to re-evaluate the feasibility of timely weeding if the desired flexibility of harvest date could be identified in a variety requiring high fertiliser rates. Their traditional management strategy of low-input, land extensive, serial plantings of cassava to obtain varied harvest dates could then be called into question.

SUMMARY

The experience of the project with farmer evaluations of varietal materials shows that this activity can provide breeding programs with important information to streamline the selection of new varietal

materials for specific farming systems. In the case of beans, simple visual evaluations of grain types with farmers demonstrated that in a farming system where farmers grow beans for home consumption as well as for market, potential, acceptance of apparently inferior grain-types with desirable characteristics for home consumption could be obtained. Although screening varietal materials with farmers did not have the objective of getting farmers to subsequently adopt them, follow-up observation shows that the small-grain bean varieties continue to be planted in farmers fields and are being disseminated from farmer to farmer, with women playing a significant role in sustaining this preference. Superior disease resistance, a priority objective of the CIAT bean breeding strategy, was appreciated by farmers, but yield potential was more important to farmers than resistence; and earliness (compared to the local variety) was perceived by farmers as highly desirable, though historically this has not been an important criterion for breeders'selections.

Farmers also indicated strong preference for a different type of grain (the "radical" type), not included in the lines initially selected for testing in this area by the breeders, but which is now entering on-farm evaluations of the project in response to farmer's requests. Plant architecture was noted by farmers in their evaluations, but to date has not emerged as a criterion for acceptance or rejection. Many farmers observed, for example, that the variety A-36, selected by a majority of farmers for its superior yield and desirable grain type for market purposes, tended to sprawl and caused difficulties for weeding and fumigation. Several farmers in their evaluations of plant architecture made selections on the basis of yield indicators, such as length of pod and number of grains per pod, and experiments are now in progress to involve farmers in selecting individual plants from breeders' nurseries planted on-farm, to explore the type of information that can be obtained from farmers in this way.

In the case of cassava, feedback obtained from farmer evaluations is being used to design new farm trials to evaluate varieties with respect to different dates of harvest. Follow-up has yet to be

completed on the "gift trials" of small samples, but casual observation suggests that farmers are harvesting and replanting selectively, and that this proceedure will help to weed out the obviously unacceptable varietal materials according to farmers' criteria. Farmer evaluations of cassava varieties with flexible harvest dates might turn out to be a key component for constructing a higher productivity and higher management intensity technological package (variety +fertilisation+ timely weeding). This is a desirable objective from the point of view of limiting current practices of land-extensive, low-input cassava cultivation, associated with increasing soil fertility degradation and erosion in the farming system.

The results of the group participation by farmers illustrate some of the advantages and pitfalls of the approach. Group participation in problem diagnosis has certain adavantages for the efficient use of research staff time. A synthesis of farmers' common practices and alternative management strategies, which is the core information aimed for by informal surveys, can be rapidly achieved in group discussion with farmers. The advantage of a participatory group diagnosis such as carried out with the snapbean innovators, as opposed to diagnosis conducted only by researchers, is that it is interactive: researchers can test their interpretations of farmers' problems, and even potential interventions to solve these problems in a setting which stimulates farmers to discuss among themselves as much as to respond to researcher's questions. Consensus and dissent within a group are highly productive in highlighting farmers' management problems and constraints, and different strategies for coping with these. The group provides a forum for prioritizing problems or needs from the farmers' point of view, and is productive of conclusions about what new directions in technical innovation farmers themselves see as interesting.

The participatory group evaluations conducted in this project show that this approach can be usefully applied to identifying potential objectives for on-farm experimentation. Although group evaluations can provide researchers with ready accesse to farmers' ideas about desirable varietal characteristics or about combinations of technology components

that are of general interest to farmers, the composition of the group is evidently critical in determing what priorities will be established by the group process. Criteria for defining group composition need to be well thought-out for group participatory evaluation to be useful in orienting on-farm experimentation, and establishing these criteria requires a careful knowledge of the farm community. The more homogeneous the group in terms of self-defined interests and perceived problems,the more effective the group process is likely to be.

For example, the bush bean evaluations carried out in this project identified farmers individually and in groups as "expert" bean farmers. However, results of the preference evaluations and group discussions indicated that there are two distinct types of bean farmer in the community and that farmers define themselves and others in these terms: "commercial bean growers", who plant larger areas and are primarily oriented to production for the market; and "farmers who grow beans mainly for consumption purposes." The combination of these different types of farmer into a single group helps to explain why the varietal evaluations produced a mixed set of preferences, for large-grain varieties favored in the market, on the one hand, and for high-yielding, flavorful small grain varieties liked for their consumption qualities on the other hand. One conclusion that can be drawn from these results is the importance of consulting farmers about their perceived identification with different interest groups, when drawing up the criteria for the formation of groups for participatory evaluation of new technology.

The experience of this project strongly suggests the importance of giving farmers the opportunity to pre-screen a wide set of options among potential technological introductions. For example,in this project the set of bean varieties initially tested with farmers was limited to those most similar to the current local variety, because these were the advanced lines available from the breeding program at the time.Instead of asking "which of this set of set of varieties do you think are most acceptable?" as was done initially, it was more informative to ask as was done in the group evaluation of bush bean trial results, "What would

a desirable variety look like to you?". This question can be used in a group discussion to construct an understanding of why certain concrete varietal characteristics might be desirable or undesirable from the farmers' point of view. This type of evaluation has prompted the project to include a greater diversity of varieties and breeding lines in future trials for farmer evaluation, in response to information about farmers' interests in specific varietal characteristics.

TABLE 1

Results of farmer evaluation of new bush bean lines and varieties proposed for on-farm trials, pre-screening according to grain quality, Pescador, Cauca, Colombia.

Bush Bean	Grain Type	Farmers' ranking [1]	Breeders Ranking
AFR-205	Large, purple mottled	1	3
A-486	Large, pink opaque	2	2
A-36	Medium, red opaque	3	1
ANCASH-66	Medium, white	4	9
PVAD-1261	Medium, white	5	7
BAT-1297	Very small, red opaque	6	10
G-4453 x BAT 1386 C	Small, red opaque	7	8
HORSEHEAD XYC 206	Small, red opaque	8	4
G 7223 x BAT 1276 C	Small, red opaque	9	6
ANTIOQUIA 8L-40	Small, red opaque	10	5

[1] Farmers were asked to select six preferred grain types out of the total ten and rank them from most preferred (score=6) to least preferred (score=1); the final ranking is based on total score for each variety.

TABLE 2

EXCERPT FROM A FARMER'S EVALUATION OF THE STANDING BEAN CROP, PESCADOR, CAUCA, 1985

INTERVIEWER: Which variety is this? What's this one called?
FARMER: A-66, I don't like this plot very much. This one has a lot of leaves and few pods.

INTERVIEWER: A lot of leaves?
FARMER: And few pods, that's to say that it's flowered a lot but only formed a few pods.

INTERVIEWER: Is it a disadvantage that it has a lot of leaves?
FARMER: Yes, it really has a lot, I'm afraid of a bean plant which is so leafy, it's grown into a mountain of bean plants and then the diseases take hold more easily because of the humidity.

INTERVIEWER: I see.
FARMER: That's why I don't like it, because it has to be planted a bit further apart and as it's formed few pods well, the yield would be very low. So it's better to look for a variety which doesn't have a lot of leaves and which has more pods.

INTERVIEWER That's very important for us to know.....
FARMER: There's no comparision with another plot we can see over there, a plot I really like, it's formed a lot of pods and the plant is like this.... look.

INTERVIEWER: It's small?
FARMER: Yes, look at the number of pods,you can tell from a distance. So that plot will yield more because you can plant closer and you can harvest more (plants). Now this here is very nice plot, I like this bean a lot...Look at the difference between this bean plant and the one we saw over there with lots of leaves.
This plant is still pretty leafy but it also formed a lot of pods, look at this plant here... it's healthy almost no disease. Yes, this plot is really healthy-looking. Do you know what to do with this type of bean plant, they're bush beans but they put out tendrils, the right thing to do for this one is always plant in a straight line so you have space to walk through between the lines.

TABLE 3

Content analysis of farmers' visual evaluations of bean plants in farm trials: Characteristics of bean plants mentioned by farmers.

Variety	BEAN VARIETY CHARACTERISTIC							
	High Yield	Low Yield	Early	Late	Disease Resistent	Infected	Upright Plant	Sprawling Plant
Rank Most Preferred	.....percent of farmers who commented.....							
1 A-486	100	-	22	-	11	22	22	-
2 PVAD-1261	100	-	-	11	22	11	44	-
3 BAT-1297	77	-	-	11	22	-	-	44
4 A-36	55	-	-	11	11	11	-	11
Least Preferred								
CALIMA	55	-	-	-	11	44	-	-
ANTIOQUIA	-	11	-	55	11	33	-	11
ANCASH-66	-	11	-	55	33	11	-	41
AFR-205	-	11	-	-	11	44	-	11

TABLE 4

Ranking obtained for bush bean varieties from farmer evaluations of results from on-farm trials, fall semesters 1985 and 1986.

	Visual evaluation of yields Rank according to:		Cost Benefit evaluation Rank according to:	
Variety	Percent of farmers who selected	Total Score 1	Percent of farmers who selected	Total Score 1
A-36	1	1	1	1
ARGENTINO	4	4	2	3
BAT-1297	2	2	3	2
CALIMA[2]	3	3	4	4
PVAD1261	5	5	5	6
ANT 8L-40	8	8	6	5
A-486	6	6	7	7
AFR-205	7	7	8	8

1 Farmers selected 4 preferred varieties and ranked them from most preferred (Score=4) to least preferred (Score=1); rank is based on the sum of scores obtained from 21 farmer evaluations.

2 Calima is the local farmers' variety.

TABLE 5

Examples of Farmers'reasons for selecting or rejecting bush bean varieties, obtained from farmer evaluations of on-farm trials, fall semesters 1985, 1986.

	EXAMPLE 1	EXAMPLE 2	EXAMPLE 3
Variety	BAT-1297	A-486	ANTIOQUIA BL-40
Breeders Ranking:	10th place (least acceptable)	2nd place	5th place
Farmers Final Ranking:	2nd place	6th place	8th place (least acceptable)
Reasons for Choosing	"although its grain is small and price is lower, it is still profitable" "because it is high yielding" "because flavor is good" "because it is resistent to diseases and pests" "because it withstands drought" "it germinates better than other varieties" "it is good for consumption purposes because it swells to a good size when cooked, it yields in the cooking pot"	"the size and color of the grain is very nice when freshly harvested" "it yields well and is delicious to eat" "it is early"	"because it yields well"
Negative Aspects:	"the grain is very small" "it is a later variety than the local one, Calima".	"it is very quickly infested by storage pests" "a short time after harvest the dried grain changes color and is difficult to market"	"the grain is very variable in color which makes marketing difficult" "it is very bushy or srawling plant and in the rainy season is much affected by disease, also the type of plant makes weeding difficult" "it has a lot of small pods or immature pods at harvest time" "it yields well, but a lot of the beans are no good, some are rotten, others are still green". "it is very late" (compared to the local variety) "it requires more care, (fumigation) because the plant is large and bushy"

TABLE 6

RESULTS OF INNOVATOR WORKSHOP ON SNAP BEANS,
FARMERS' CRITERIA FOR SELECTING ACCEPTABLE SNAP BEAN VARIETIES

1. Snap cleanly (without fibre) when pressed length-wise between finger and thumb; soft, non-fibrous texture (test is that the thumb nail should enter pod cleanly showing no fibre)

2. The bean should be cylindrical, not flat (plancha); long (approx 20-26 cm); and straight not curved.

3. Bean pod should be disease-free

4. When snapped open the pod should be "full" (llena) ie. no tunnel of air appears inside between the incipient grain and the pod wall. This affects bean weight.

5. Deep green color preferred (not pale green, or reddish, or purplish)

6. Yield (only if other quality requirements are satisfied).

TABLE 7

GROUP EVALUATION

Farmers' Characterization of Preferred Type of Bean Variety
(Priority criteria are underlined)

Criteria given by men's working group

1. High Yielding
2. Long pod with 6-7 grains (related to high yield)
3. Tall erect plant (not sprawling) appropiate for planting higher density
4. Adaptability to different soil fertility conditions, or fertilization
5. Large Grain Size
6. Deep red grain color ("radical" type)
7. Shorter Season(not longer than 85 days)
8. Disease Resistent (1 or 2 sprayings adequate, not more)
9. Resistent to storage pests
10 Pod which does not split open in the field causing grain loss at harvest
11 Flavor
12 Soft-skin when cooked.
13 Stability of yield over at least 3 production seasons

Criteria given by women's working group

1. Quick cooking
2. Grain Swells quickly, increasing total portion size when cooked.
3. Flavor (sweet, not bitter)
4. Soft skin
5. Resistent to storage pests
6. Pod which is not difficult to open for threshing
7. High Yielding
8. Short Season

APPENDIX 1

GENERAL GUIDELINES FOR GIVING OUT SAMPLES OF SEED MATERIAL FOR FARMER EVALUATION OF VARIETIES.

These guidelines are for field staff who distribute samples of seed to farmers for evaluation.

Three questions are answered in these guidelines, to provide the information you should give each individual farmer or group of farmers when you ask them if they are interested in planting samples of the seed in their own fields and evaluating them.

1. Why are the reasearchers' asking farmers to plant this seed and evaluate it?

   Researchers have selected large numbers of different cassava varieties which have the potential to improve cassava production The question researchers want to answer is:"Which of these many varieties would farmers prefer to grow?

   To answer this question, researchers would like the farmers, to experiment with samples of new varieties and tell us why you some are worth growing and why others should be rejected. This information will help researchers to do a better job in selecting new varieties that are useful to farmers.

2. How will the farmer benefit from taking part in these experiments?

   Planting material of new varieties will be given to each farmer as a gift.

   Farmers will own this material and will be able to multiply it from the seed it produces. If a farmer wants to request more planting material of a variety, new samples of that variety will be available for them to plant in the next season.
   If a large number of the farmers say they like a particular variety, this will be recommended by researchers for multiplication and release of seed material in quantity. In this way farmers will have a say in which new varieties are made available and they can be confident that new varieties will meet their needs.

3. What will the farmers be asked to do to take part in these experiments?

   You will be asked to:
   - Receive samples of seed in small quantities of several different varieties.
   - plant the seed in a plot where you are currently planting cassava, preferably at the same time you plant the rest of the plot.
   - plant as you normally plant, and care for the samples with your usual cultural practices. It is important you care for them as you normally care for the rest of your cassava crop, so that you

can be sure that any variety you may select will continue to do well if you and other farmers grow it on a large scale.

- label each row or parcel with the label provided for each variety so that you can tell which variety is which.
- harvest individual plants, rows, or parcels as early as you decide is appropriate, or convenient, so that you can make judgements about how the new varieties are developing. Continue to harvest at whatever times you think it is important to examine root production.

  If you decide you want more planting material, new samples of varieties you select will be available for you to plant in the next planting season.
- cook and taste roots of the new varieties so you can decide if they are good to eat and whether they can be marketed successfully.
- whenever you want to, use the planting material to replant new varieties that you like, so you can continue to evaluate them.
- discard the varieties you do not like.
- decide which of the new varieties you like or dislike, and discuss your reasons with the technician who will visit to ask you your opinions from time to time.

It is just as important for researchers to know which varieties you don't like and why, so that these are no longer included in the research program, as it is to find out which varieties you may like.

APPENDIX 2

Innovators' workshop: Check list of topics for group discussion of farmers' experiences with innovation in snap-beans.

1. What experiences have you had with growing snap-beans:
   -Why have farmers started experimenting with snap-beans in this area?
   -how many farmers have been planting snap-beans around here?
   -how long ago did the first person to try snap-beans plant them?
   -how many seasons have people in this group planted them?
2. What have been the main problems in snap bean production that you have tried to resolve, and how?
3. What types of plots have you tried planting snap-beans in?
   -plot history, rotations
   -soil types (farmer classification)
4. What seasons or planting dates have you tried, and with what results?
5. What varieties of snap-beans have you tried to date?
6. What experiences have you had with respect to obtaining or producing seed?
7. Have you tried planting snap beans in association with other crops or only in monocrop?
8. What practices have you experimented with for snap bean cultivation, with reference to:
   -land preparation?
   -planting methods, distances etc?
   -types of fertilizers?
   -methods of fertilizer application?
   -timing of fertilizer application?
9. What pest and disease control methods have you tried, and with what results?
10. What systems of support (staking) have you used?
11. What methods and timing of weeding have been tried?
12. Has anyone used irrigation, in what form?
13. How are snap beans harvested, how are they utilized?
14. What yields have you obtained? Roughly speaking, what are the major costs of producing snap-beans? How profitable are snap-beans? Why is it worthwhile to grow snap beans: under what conditions?
15. How are snap-beans marketed?