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Farmer Experimenters: Self-developed Technology

In Honduras, as the result of the work of some 20 agricultural development agencies up through the early 1990s, hundreds of farmer experimenters (FEs) have been experimenting totally on their own for anywhere from two to ten years after the closing of the programs in which they were previously involved. In 1999, the Association of Advisors for a Sustainable, Ecological and People-Centered Agriculture (COSECHA) in Honduras decided to find out what technologies these FEs had been developing on their own, and how these technologies could best be disseminated to other farmers. To that end, COSECHA has systematically interviewed 50 of these FEs. The technologies counted were only those that small farmers had developed on their own, after program termination, and that had not been promoted or known within the country prior to the FE's discovery of the technology.

The study shows that FEs are capable of developing large numbers of very significant and original technologies, providing evidence that the collecting and dissemination of FE technologies in other nations around the world could be a very useful activity for institutions involved in agricultural development.

Participatory technology development (PTD) programs in Honduras

Starting with the initiation of the World Neighbors-managed Guinope Program in January of 1981, PTD has become a fairly widely used methodology of agricultural development in Honduras. Some 20 development organizations taught farmers to experiment in at least 30 different programs around the country. Many of these programs ended by the early 1990s, with the result that Honduras is one of the richest nations in terms of its per capita concentration of FEs who have been experimenting without any institutional support. However, no institution had ever studied this phenomenon.

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The study

COSECHA* has made visits to both the FEs homes and the fields where they apply the technology they developed. During these visits, an interview is carried out, which consists of an informal conversation in which the interviewer tries to make sure that each of a list of some twenty issues is covered. After each visit (which typically takes at least half a day), the list of questions prepared at the beginning of the study is checked to make sure all the questions have been dealt with, and those that have been missed are asked.

The questions deal with such issues as what technologies the FE has experimented with, and what technologies seem to be successful (i.e., which ones the farmer has adopted for continuing use). Detailed descriptions of the successful technologies are made, with a cost/analysis in each case comparing this technology to control plots. Data as to the elevation, amount of rain, total size of landholding, slope of the fields, etc. are also taken. The farmer is also asked about other farmers' responses to, and adoption of, the technology. COSECHA also inquired into such issues as what the farmer feels are his/her limiting factors, whether he/she would be interested in working with certain marketing ventures, whether the farmer would be interested in joining a nationwide organization of FE's and, if so, what the principal objectives of the organization should be.

The results to date: technologies discovered

Fifty-two FEs from 10 of Honduras' 23 departments have been interviewed. These FEs include farmers who had been originally trained by 17 different organizations, ranging from 12 NGOs to 3 governmental and semi-governmental organizations and 2 academic institutions. They also include 7 women FEs, even though women in Central America, by and large, are not heavily involved in extensive cropping (that is, outside the homestead garden) until after the harvest, nor had they been trained to be FEs by the programs in the 1980s and early 1990s.

These 52 FEs have developed 82 technologies, mostly having to do with extensive agriculture, but including a small minority of post-harvest and food preparation technologies. An attempt has been made to grade these technologies in three categories. Category A represents those technologies which seem valuable enough in terms of farmer benefits accrued and width of applicability among other farmers in Honduras rendering them worthy of further validation and then, depending on the results of the validation process, disseminating to other farmers. Category B includes those technologies that might be worth validating, but which would be done later. Category C includes those technologies that very likely are not worth disseminating. Although these are necessarily rather subjective evaluations, COSECHA does work with a list of 19 criteria of an appropriate technology (Bunch 1982) that helps us evaluate each technology.

Of the 82 original technologies developed, 39 have been classified as being in Category A. Of these 39, the following number pertained to each of the categories listed below:

Insect control	15
Fertilization	10
Control of plant diseases	8
Weed control	2
Food preparation	2
Animal husbandry	2
Plant propagation	1
Green manuring	1
Soil conservation	1
Others	3
—	45

The total number of technologies is greater than 39, because some of the technologies included aspects of two categories.

It can be observed from this list, first of all, that FEs have chosen to experiment with a wide variety of different technologies, including even some (e.g. food preparation) which are not commonly included within the purview of agriculture.

It is also interesting, however, that a few categories of technologies have been totally left out. Not a single FE experimented with water harvesting or use, even though many areas of Honduras have moderate to severe droughts; in much

* The concerned interviewer was Mateo Canas, co-author of this article, an agronomist and son of a farmer experimenter.

of southern Honduras, periodic and overall water shortages are without doubt the critical limiting factor in the production systems of villager farmers. Furthermore, experience with FEs in current programs provides major evidence that while they are very interested in experimenting with water harvesting and more efficient water use, none of these FE's are included in the study because this COSECHA program is still in operation.

It is also interesting to note that none of the technologies have to do with the introduction of new crops (although the criteria used in the study, perhaps too restrictive, would eliminate the inclusion of the introduction of any crop that already existed anywhere else in Honduras) or the use of tree crops or agroforestry. First of all, it is very likely that some categories of technology (e.g. water harvesting) were never experimented with because farmers either never thought any solutions were within their grasp, or simply because working with such technologies had never occurred to them. Thus, agricultural programs in the future should, perhaps, discuss with farmers before they terminate their work in an area, what sorts of possible future technologies they might experiment with.

Second, farmers may be aware of certain types of technologies they could work with, but may not perceive those technologies as being of a very high priority for them. For instance, in the case of tree crops, FEs are certainly aware that they exist and are profitable, but may feel that the many years one must wait before payback make these technologies of less priority than those with a quicker payback. This might also be the case with agroforestry systems, although farmers in southern Honduras in the FAO program, which is emphasizing dispersed trees, are experimenting quite a lot with various modifications of the dispersed tree system.

Of course, FEs probably did not experiment with new crops because the crops, in order to be included within the study, would have to be crops only grown outside Honduras, in which case the FEs would have had considerable difficulty learning about the crops or obtaining planting material.

Promising technologies developed

- Farmers observed that aphids died if dried out. They therefore tried using wheat flour diluted in water to spray on

fruit trees in their tree nurseries, and found they could control aphids and other similar sucking insects fairly easily this way.

- Sugar water or slightly salty water, applied to the growing tip of the plant, was tried successfully as a way of controlling the corn borer.
- Another FE noticed that leaf-cutter ants did not like living near neem trees. By planting neem trees immediately over several troublesome nests of leaf-cutter ants, he was able to get rid of them (they moved their nest elsewhere).
- Foliar fertilizers were developed using either animal manure, mother of cacao leaves, the leaves of several common weeds, or even wood ashes (the last one also proving to be very useful in disease prevention).
- One woman FE found that coffee pulp could be dried just by spreading it out to dry in the sun. Another FE found that just mixing the wet coffee pulp with chicken manure or sawdust would also dry it out. Once dried, the coffee pulp is an excellent fertilizer, one that previously just polluted the country's rivers.
- A solution of leaves of mother of cacao and eucalyptus was found to be very good as a fungicide for tree nurseries.
- One farmer found he could apparently disinfect the soil in a nursery by cultivating the soil well and then covering it with clear plastic so that it heated up thoroughly under the mid-day sun.
- Both spraying crops with wood ashes dissolved in water, as well as placing wood ashes around the stems of plants, have been found to control a series of plant diseases, even very treacherous ones like late blight (*Phytophthora infestans*) in tomatoes and potatoes.
- A maize-based animal feed was made including leaves from the Tithonia and eggshells, thereby increasing egg production.
- One FE found that, at altitudes over 500m, grafting neem material on to the locally available "paradise" tree rootstock resulted in much faster growth of neem trees.
- Another FE found that by intercropping jackbeans (*Canavalia ensiformis*) among his cassava plants, he greatly reduced his weeding time and increased his cassava productivity by over 25 percent.

It should be noted that these technologies are in almost every way technologies that would be included under the label of low-input or ecological technologies, and in many cases, in the category of totally organic technologies. They are also technologies that are highly appropriate for poorly capitalized villager farmers. By and large, they are extremely inexpensive (most require absolutely no cash output), they use locally available resources, they do not increase risk, they provide fairly quick, recognizable returns, most of them are highly cost-efficient, and most of them are fairly widely applicable. The above list shows quite clearly that villager FEs not only can develop innovative technologies, but that the technologies they develop are highly appropriate for other small farmers.

One of the most disappointing results of the study was that the technologies developed by small farmers had not been disseminated very widely. In no case did FE-generated technology spread to more than 10 other farmers through the exclusive efforts of local villagers.

Lessons learned

- This study leaves little doubt as to whether villager FEs can develop, on their own, both adaptive and basic technologies that appear to have considerable potential for farmers around the country, if not around the world. While these technologies still need to be further verified, their potential, according to established criteria of appropriateness and their economic cost-benefit ratios, would seem to be quite high.
- Different organizations in Honduras have used different techniques to train FEs. It was noticed, in the course of this study, that organizations which had used the technique of maximizing success in farmers' experiments during the first few experiments they did, had motivated far more farmers to experiment in the future than did the remaining organizations. Achieving rapid, recognizable success among farmer experimenters right from the start is thus an important part of the total motivational process necessary for people to expend the effort to experiment frequently.
- In some cases, programs will not be able to find any already validated, successful technology already being used by any programs in a similar situation (ecologically, culturally, etc.). The program may have to experiment with several technological possibilities before working with the farmers. Nevertheless, as time passes, fewer and fewer programs find themselves in such a situation.
- Thus, programs that have given a high priority to having the PTD process start with future FEs selecting the technologies from a long list of potentially useful technologies, might consider reducing the list to a rather short one of technologies already proven to provide rapid, recognizable success in the vast majority of cases.
- The study provides major evidence that the collection, validation, and further dissemination of FE-developed technology may well be a very valuable activity for some researchers and/or NGO's to become involved in. Development agencies should therefore use their abilities to disseminate ideas around the world through various printed media, information technology, international conferences such as the present one, and courses and workshops to spread information about this possibility and its usefulness.