IMPROVING THE ACCEPTABILITY TO FARMERS

OF SOIL CONSERVATION PRACTICES

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ABSTRACT

Non-adoption of soil conservation practices by farmers in low-income countries is a major obstacle to reversing soil degradation. Farmer participation in designing these practices is required to improve adoption. This study tested participatory methods which dramatically increased adoption among 115 participating farmers over the first year, and stimulated farmer-to-farmer recommendations leading to adoption by an even larger number of farmers. Participatory evaluations were shown to predict future acceptability of optional practices to farmers. When participatory research methods are used to elicit farmers' input into the design of recommendations, these can help to realise the potential of many hitherto unadopted conservation practices.

INTRODUCTION

Non-adoption of soil conservation practices by farmers in low-income countries was recently identified as one of the top priority problems confronting global efforts to contain and reverse soil degradation (Greenland et al., 1994:26). The range of technological options for improved soil management available to the extension worker and the farmer is extensive: from agroforestry, to contour earth structures, grass strips, contour cultivation, ground covers and numerous combinations of these practices. An analysis of successes and failures in achieving adoption of such practices by farmers, in particular resource-poor farmers for whom soil degradation is usually most critical, shows that some key elements of success can be identified. These include: technology thoroughly evaluated by and adapted to local conditions with farmers; farmer-to-farmer transfer of information about practices; and local participation in the design of recommendations, transfer strategies, subsidies and regulatory controls (Laing & Ashby, 1993).

Farmer participation in the design (or re-design) of conservation technology is needed because one reason for lack of adoption is that technical recommendations have been designed to maximise conservation, resulting in additional costs to farmers without a positive cost-benefit ratio (Lutz et al., 1994). One way to improve adoption might be therefore, to adapt existing techniques to achieve a trade-off acceptable to farmers (ie. less than maximum achievable conservation but greater utility to farmers). But identifying this trade-off, and introducing it into technology design is at best, a complex task likely to tax the capacity of even the most sophisticated research programs, and particularly poorly-funded and understaffed programs which have resource-poor farmers as their clients. For this reason, recent efforts to "reverse the unsustainability cycle" advocate the application of a new paradigm in which farmers play an important, hands-on role as active participants in determining which technical recommendations are promoted for a given situation (CGIAR 1994; Greenland et al., 1994).

A "paradigm-shift" in soil conservation programs requires simple and easily-implemented participatory methods, accessible to the ordinary extension agent, to make farmer participation a reality. This paper reports on a study which tested participatory research methods for the evaluation of soil conservation techniques to help understand the trade-offs acceptable to farmers. Specifically, the study addressed the question of whether participatory evaluations by farmers of available technologies, could identify adjustments to recommended techniques for live contour barriers, which would increase their adoption.

STUDY SITE

This study was carried out in the Río Ovejas watershed in Cauca, Colombia, where for ten years or more, the state natural resource management agency (CVC) and the Coffee Federation have recommended coffee and cassava growers to plant live barriers incorporating "citronella" (*Cymbopogon nardus*) and "Limoncillo" (*Cymbopogon citriatus*).

A pilot area was selected, the Río Cabuyal microcatchment, in which to test participatory methods. The Río Cabuyal catchment features steep sloping terrain at an altitude of 1100-2200 masl. An estimated 45% of the catchment is in slopes of above 30%, farmed by a population of 1000 families on farms averaging 5ha in size (average cultivated area is less than 3ha). Farm-level surveys show a population density of 132 persons/km^2, and an average land use of 0.25 ha of cropland per capita, a figure comparable to estimates for Bolivia (0.33 ha cropland per capita), Ecuador (0.25 ha per capita) or Perú (0.17 ha per capita) (Pachico et al., 1994).

This is a marginal coffee production area, with acid infertile soils, which are badly eroded. To supplement cash income from coffee, farmers cultivate cassava together with maize and field beans on the less fertile, steeper slopes. A survey carried out in 1991 found that farmers generally recognised the symptoms and causes of soil erosion, and its deletorious effects on production. Despite this, the long-standing effort to promote soil conservation practices with credit and technical assistance had made little headway.

A survey of the entire population of farmers who could be identified as users of live contour barriers in three principal municipios of the Río Ovejas watershed where cassava is an important crop, was carried out in 1991. The survey identified thirteen farmers using live barriers, and showed that in all except two cases, use was associated with receipt of credit and/or technical assistance with this requirement. Virtually no spontaneous adoption of live barriers was occurring (ie. no barriers were being planted unless farmers were required to do so by credit or extension programs).

METHODS

Extension agents of the CVC* who worked within the Río Cabuyal catchment area were trained in methods of participatory technology evaluation (Ashby, 1990) in a four-day course, which involved practice sessions with farmers. A condition of the training was their agreement to suspend making recommendations, and to allow farmers flexibility in determining whether and how to establish live contour barriers. For example, when farmers expressed their preference for barriers to be planted following the contour furrows made by ox-ploughing, the extension agents agreed to relax their requirement that barriers should be established on a strict contour determined by using an A-frame and spirit level. Similarly, farmers were to be permitted to select and mix different materials in live barriers in a spirit of experimentation, if they so desired.

A number of optional materials which were being tested in an adaptive on-farm research trial for incorporation into live barriers were evaluated by groups of farmers, using the method of preference ranking (Guerrero et al., 1993) to obtain an acceptability score for each material, before farmers actually tried it out in their own fields.

Preference ranking requires farmers to assess each option being evaluated, and then to rank the options in order from most to least preferred. In 1992 six materials shown in Table 1 were first ranked by 27 farmers: the highest possible acceptability score for any given material was therefore 182 (27 x 6); the score obtained by adding the ranks assigned by each of the 27 farmers to Vetevier grass for example, is expressed in Table 1 as a percentage of 182. The raw scores were analyzed using a non-parametric statistical test of whether the ranking is purely random. The results shown in Table 1 indicate that a non-random ranking of materials was obtained, so that the rankings obtained can be interpreted as a consistent preference structure underlying farmers' subsequent decisions about which materials to plant in live contour barriers. The preference rankings were repeated in the same on-farm trial in 1993 with 46 farmers, and the results were analyzed in the same way, to permit comparison of farmers' preference structures over time.

Farmers to participate in these evaluations were initially selected by local community members as individuals potentially interested in experimenting with improved soil management practices. After the first round of evaluations in early 1992 by these farmers, participants were volunteers.

Each planting season from 1992-1994, groups of farmers participated in field trips to the on-farm trial to familiarize themselves with the menu of optional materials for planting live contour barriers. After they spent time examining the trial, and discussing the characteristics of the optional materials with information supplied by the extension agents taking part in the group interviews, a preference ranking of materials was obtained from each farmer. Farmers then had the option to select one or more materials for experimentation on their own farm, and to determine the location, spacing and extent of their experimental barriers.

After the first round of evaluations, materials for live barriers were sold to farmers at cost, with the agreement that they would give other farmers planting material if requested, for a period of one year. Follow-up visits were conducted by extension agents to observe establishment of barriers and to conduct an interview; whether or not farmers extended barriers voluntarily, and whether a farmer had supplied seed material to others was determined. A total of 261 farmers were interviewed: these included 115 participants in field trips during 1992-4 who were asked if they had recommended the practice to any other farmer or if they knew of other farmers adopting the practice, and visits were made to an additional 146 farmers whose names were obtained in this way, to monitor spontaneous adoption.

RESULTS

The first round of evaluation interviews conducted with 27 farmers who participated in field trips at the beginning of 1992 produced a preference ranking of six optional materials for inclusion in live contour barriers, shown in Table 1. Although Vetiver grass is technically proven to be the best option in terms of soil erosion control in the on-farm trial, it was ranked in last place by farmers, who preferred a cut-and-carry forage grass "pasto telembi" (*Axonopus scoparius* var. telembi) for incorporation into live barriers. Farmers ranked sugar cane (*Sacharum officinarum* L.) in second place, with the recommended "citronella" coming in a poor third. The preference ranking obtained in 1993 with 46 farmers is very similar, with the addition of *arachis pintoi* to the materials evaluated. Pineapple showed a lower score in 1993, although it maintained its relative position in farmers' preference ranking, because farmers discovered it was difficult to establish. The results confirm that the rankings, identified a consistent preference structure among farmers that persisted from year-to-year.

Interviews showed that farmers' criteria for accepting live contour barriers were primarily related to the short-term utility they could obtain from materials included in contour barriers. The cut-and-carry forage grass and the sugar cane are used as supplementary fodder, especially in the dry season when forage is scarce, and some farmers were harvesting and selling the forage to cattle owners during this season. Sugar cane is also used to produce cane juice, and "panela", a crude brown sugar, which are dietary staples. Other criteria for acceptance were the rapidity with which plants in barriers established, the more rapid the better; and the degree of competition with the associated crop (the less competition, the better). Farmers also observed that some barriers helped to retain soil moisture better than others. Although some farmers were willing to experiment with the technically "best" option, Vetevier grass, the participatory evaluations revealed that the majority were looking for a material that has direct utility (ie as forage or dietary supplement) and were willing to forgo a degree of efficiency in soil conservation in order to obtain this.

The area in meters planted in live barriers by 261 farmers from 1992-1994 is shown in Table 1. The rank order of the six optional materials with respect to meters planted is similar to that obtained from the preference ranking obtained before farmers began planting barriers, with "pasto telembi" in first place and Vetiver grass in last place. Arachis pintoi was planted by some farmers as a cover crop along the perimeter of the contour barriers, but was not established alone in the form of a barrier. This information shows that the preference ranking technique provides a reliable picture of farmers' decision-making, which can be used for projecting the likely acceptability of alternative conservation practices.

Follow-up of these 261 farmers showed that a process of spontaneous adoption had begun. Of these farmers, 146 (56%) had planted live contour barriers on their own initiative, as a result of a recommendation from another farmer.

The diffusion curve for the total number of farmers planting live contour barriers presented in Figure 1 shows that in 1992-3 the number of farmers adopting began to rise steeply following participation in the preference ranking interviews and the introduction of farmer-selected materials into the contour barriers, and that each year thereafter to the end of 1994, this trend has continued.

Comparing the trend in adoption of obligatory practices associated with credit programs, and the trend associated with participation in field trips for participation in preference rankings, the adoption of optional practices for which farmers were paying the cost of materials had a similar level of success as the credit programs from 1992-3, and then exceeded this level in the succeeding two years. Spontaneous adoption following recommendation by another farmer, and independent of any extension contact, has occurred at a similar rate to adoption resulting from contact with extension in the field trips. The effect of involving farmers in making decisions about the recommendations was therefore, to catalyse a rapid process of farmer-to-farmer transfer of information about the optional practices.

Of course, the follow-up interviews only give a partial picture of spontaneous adoption since they capture only those farmers known to participants in the field trips. Whereas the survey carried out in 1991 had identified only thirteen farmers using contour barriers located in the Río Cabuyal catchment, a census of all farms in the Río Cabuyal catchment, carried out for other purposes in 1993, showed that one year after initiating the participatory evaluations, the number of plots with live barriers in the catchment had risen to 420 or 16% of the plots surveyed.

The credit programs referred to earlier, continued to promote "citronella" and "limoncillo", the recommended materials for live barriers, during 1992, after which the source of credit dried up. However, of the forty farmers who signed in 1992 for credit requiring the establishment of live barriers, twenty never actually planted them, a reaction to the perceived risk of the credit as well as the obligatory practices *per se*. The contrast between the impact of the credit programs and the participatory evaluations is telling, and shows that involving farmers in adapting conservation techniques and in decision-making about recommendations was a more effective approach than the use of credit, to promoting their diffusion.

CONCLUSIONS

Participatory evaluations of soil conservation techniques can be a powerful tool for improving rates of spontaneous adoption, if farmers' criteria for acceptability of optional techniques are taken into consideration in designing the technology and in formulating recommendations. In this study, a forage grass barrier was found to be acceptable to farmers who were previously uninterested in planting contour barriers. Once this material, together with sugar cane also selected by farmers as a useful component for live barriers, was made available, farmers were willing to pay for planting material to establish the barriers. In the pilot area where participatory evaluations were tested, the number of farmers who established barriers independent of any credit incentive increased dramatically from two farmers in 1991 to 261 by 1994.

A process of spontaneous adoption (without direct intervention by extension agents), was stimulated by farmer-to-farmer recommendations, which is of equal magnitude to that promoted by the extension program through field trips and participation in the evaluations. This result demonstrates the importance of farmer participation for increasing the effectiveness of extension programs promoting conservation practices.

The close correlation between what farmers said they preferred in the preference ranking interviews conducted in early 1992, and the practices they actually adopted and recommended to each other, shows that participatory research methods can be used by soil conservation programs to improve their recommendations and their likelihood of future success.

These results suggest that there may be significant unrealized potential in the existing array of technologies for soil conservation which currently meet with little success in terms of spontaneous adoption by farmers, a potential which could be "unlocked" by involving farmers in participatory evaluations to identify acceptable adaptations.

Table 1. Ranking of optional materials for incorporation into live soil conservation barriers and area sown by farmers, 1992-4, Cauca, Colombia.

Material	Acceptability score 1992 (N = 27 farmers)	Score[7] 1993 (N = 46 farmers)	Area planted 1992-4 (meters) (N = 261 farmers)
Pasto "Telembi"[1]	92	91	48,945
Sugar Cane[2]	63	62	19,440
Citronella[3]	48	45	3,420
Pineapple	43	30	1,060
Limoncillo[4]	26	26	1,060
Vetevier[5]	8	14	600
Arachis[6]	--	8	na
Kruskal Wallis test (Chi Square approximation)	98.1 p = 0.0001	130.6 p = 0.0001	--

Notes:

1 Axonopus scoparius, var. telembi

2 Sacharum officinarum L.

3 Cymbopogon nardus

4 Cymbopogon citratus (d.c) stapf

5 Vetiveria zizanioides (L) Nash

6 Arachis pintoi

7 The acceptability score is the rank given to each item expressed as a percentage of the highest possible ranking it could obtain.

na: not available

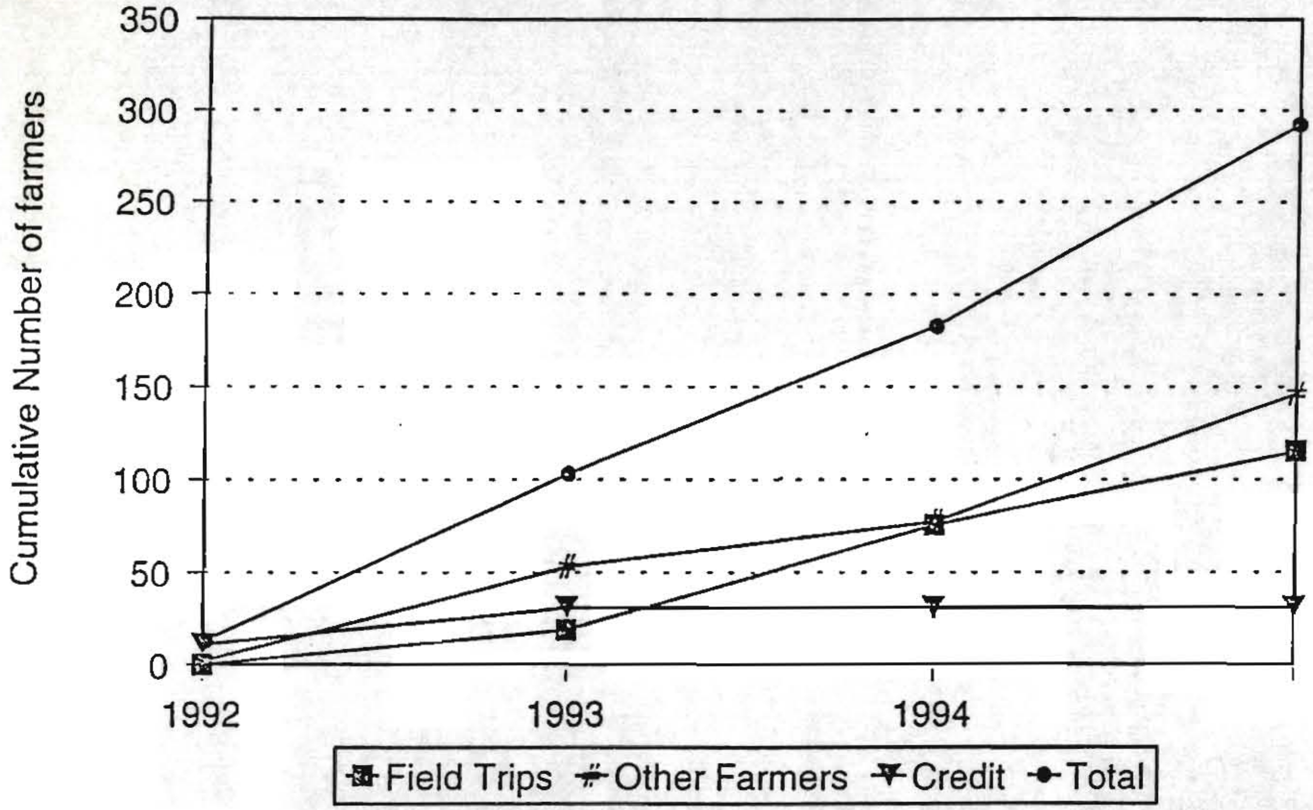

Fig. 1. Adoption of live contour barriers, 1992-1994 by principal source of information.

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Photo Caption: Materials for contour barriers being evaluated by group of farmers.