
Innovations in Green Manures

ECHO Inc.

Roland Bunch, author of *Two Ears of Corn*, the popular book on how to do agricultural development (EDN 66; 255), sent an intriguing report on his visit to the state of Santa Catarina in Brazil to see the work of EPAGRI. "It was, technologically speaking, the most impressive piece of work with small farmers that I have ever witnessed: highly innovative, aimed at a crying need throughout the Third World, very popular with the farmers, widely disseminated, and with results in better economic standards among the farmers."

"Probably the most important issue of all is that we must get away from the escalating dependency on velvet bean (at least in Central America)." He suggested that ECHO increase the number of green manure/cover crops (GMCC's) in our seedbank, which we have now done (see page 5). The following is abstracted from Roland's report.

The project has been continuing for 13 years, on both flat coastal areas and mountains. The technologies include contour grass barriers and orienting crop rows on the contour, but by far the most popular aspect of their work is green manures/cover crops. These plants are used to fertilize and condition the soil, usually left on the soil surface rather than buried. They are valued both as green mulches while growing and dead mulches after being cut. The vast majority of farmers use a traditional animaldrawn tool called a "rolofaca" (knife roller?) which knocks over and cuts up the GMCC. Then with other animaldrawn instruments, they clear a narrow furrow from the mulch and plant their next crop. The resulting mulch both reduces or simplifies weeding and noticeably increases soil fertility. The majority of farmers who have used any of these systems for more than 56 years are no longer plowing, evolving from a minimumtillage system to a notill system. Seeds of the succeeding crop are merely handdrilled into the soil. Some farmers' animaldrawn plows are rusting in abandonment.

The project works intensively with some 60 species of GMCC and have seen widespread adoption of about 25. We very much need to continue finding new species and varieties of GMCC's. Also, if we are to avoid having more and more insect and disease problems with GMCC's, we must rotate them just like we rotate major crops. Furthermore, we must avoid becoming dependent on one or two species, lest we fall into the trap that Leucaenabased programs did in Southeast Asia when psyllid insects defoliated thousands of hectares of the world's most successful alley cropping. More specifically, for those many programs totally dependent on the

velvet bean as a green manure crop, it should be noted that in southeastern Paraguay, a fungus has wiped out two of the four varieties of velvet bean that were previously used in the area.

Maintaining soil cover is much more important in preventing erosion than terraces or soil conservation barriers, live or dead. Roland says, "This is the first program I have seen which took this fact to heart, and was able to convince the farmers of its value through their own observation and experience. Thus, one more nail has been pounded into the coffin of our old bag of tricks, which featured contour ditches, grass or tree barriers, and contour rock walls. We are not ready to abandon these practices entirely, but certainly we are in the middle of a process of reexamination which will probably result in a major deemphasis in our use of at least rock walls and contour ditches."

"The overall quantity of biomass is more important, relative to amount of nitrogen fixed, than we had previously assumed." For example, both oats and turnips are widely used as GMCC's. This makes sense if covering the soil and achieving a no-till system are as important to the farmer as are supplying nutrients to the soil.

The possibilities of GMCC's to fit into a wider and wider number of cropping systems was confirmed. Farmers were using GMCC's in cropping systems based on corn, onions, cassava, and fruit trees. Also Roland was shown photographs of GMCC's associated with wheat, grapes, tomatoes, soybeans, and sorghum.

There is a tremendous need for farmer experimentation to discover new species and ways to adapt to differing agricultural systems. No agronomist-staffed research stations will ever be able to investigate and refine all the possibilities.

Probably the single most important result of the Brazilian work is that by eliminating the need for most of the weeding and all of the plowing, the small farmer is at much less of a competitive disadvantage with the large, mechanized farmer. Small farmers, especially on hillsides, were never able to carry out the really heavy and expensive labors of plowing and weeding as cheaply as could the mechanized farmer. The answer lies not in the mechanization of these jobs, but in their elimination.

Roland cites a study by Flores and Estrada which compared no-till velvet bean-based system with a neighboring mechanized modern system in Honduras. The velvet bean system was less productive, but the costs per ton of corn produced were 30% less.

Roland has started a non-profit consulting and training organization, COSECHA, whose purpose is to spread knowledge and use of the "people centered development" process as described in his book *Two Ears of Corn*.

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