To Jim and Yvonne's Home Page

Progam Plan

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Our program plan is designed to introduce the four concepts of (1) conservation of water and soil through the use of vetiver grass, (2) the improvement of seeds through better selection techniques, (3) the improvement of soil fertility through use of green manure crops, and (4) better grain storage techniques.

Vetiver Grass Program

The basic idea is to promote to the campesinos the benefits of using vetiver hedges planted along contour lines of their fields to increase short-term harvests and build long-term security by establishing a sustainable agricultural system. Previous studies reported by the Vetiver Network suggest that crops planted just above the vetiver hedges will produce up to twice the harvest as before just from the added soil moisture that accumulates above the hedges. Over the longer-term, soil washed down from above is captured by the hedges and natural terraces start to form which tends to level the growing spaces and the fertile soil is deeper than before. This also means greater harvests in the future.

For program planning, some basic facts have to be recognized. First, while vetiver is extremely drought resistant (very important in Oaxaca where the dry season may last six or more months), the young transplants require sufficient soil moisture to become established. This means planting at the start of the rainy season (about June 1) - which is also the peak labor season of planting corn (maize).

Second, some arithmetic is needed. The recommended spacing for plants to establish a hedge is 10 cm between plants (to permit the hedge to 'close' quickly so it can start retarding the flow of water downhill). This implies 10 plants per meter of hedge (10,000 per km). Our experience with the nursery (corroborated by others) is that one man/day of labor is required to plant 25 meters of hedge (including the digging of the clumps from a nursery row, separating the planting units, and the actual planting). Further, experience shows that one planting unit planted in a nursery with reasonable care will produce 30-50 planting units in one year.

More numbers. The recommended spacing between hedges depends on the vertical interval (i.e., the change in elevation between the hedges). The recommended vertical interval is 1.5-2 meters. Thus, the number of hedges needed to protect a piece of ground will depend on the slope of ground. In the mountainous parts of Oaxaca, very typical slopes are 45 degrees. This implies a need of about 5 km of hedge to protect each hectare (10,000 square meters - about 2 1/2 acres).

Thus, for our typical campesino in the mountains, these numbers imply a need for some 50,000 plants per hectare. It also implies that the family must invest some 200 man/days of labor per hectare.

50,000 plants implies some 33 pickup loads of plants from a nursery. Hence, the previous statement that we don't believe central nurseries are viable solutions to supply plants for a countryside effort. The time and cost of supplying even a few farmers is simply prohibitive. Therefore, our program plan will emphasize teaching the campesinos to grow their own supplies in smaller nurseries close by their fields.

The 200 man/days per hectare labor requirement also needs to be looked at in terms of what is reasonable for a family to expend. Clearly, the ultimate decision will be up to each family, but for planning purposes we are using a figure of 40 man/days per family per year. This implies protecting one hectare every 5 years.

The 40 man/days per family per year figure implies that the goal is to plant one kilometer of hedge per year. One kilometer of hedge will require some 10,000 plants which could be supplied by a nursery planting of some 200-300 plants (which would take about one man/day to plant). At the recommended

spacing of 5 plants per square meter, this implies individual nurseries of 40-60 square meters which seems reasonable.

Thus, our program plan boils down to recruiting individual farmers who will agree to try the program by planting personal nurseries of some 200-300 plants and to committing to the 40 man/days of labor in succeeding years. We, then, must deliver the initial stocks of grass plants, provide some instruction and followup. Actually, we would like to provide sufficient plants to each participant to plant a hedge of some 20-25 meters in addition to his nursery. This would give each participant a chance to test and observe the efficacy of the hedges to control water and soil loss on a smaller scale before they put in a relatively large labor investment. It is our hope that the benefits of this technology will spur each participants self-interest to provide the motivation for continuing (and spreading) the practice without direct inputs from us or others.

Seed Selection

Even cursory inspections of typical corn fields in Oaxaca will reveal that about half of the stalks have no ear at all, while the other half will have one ear. Ocassionally, one can find a plant with two or more ears. The sizes of the ears varies greatly as well, but that is most likely a result of nutritional factors for the individual plant.

When asked about how the seeds for planting are selected, the usual answer is the best looking grains are selected (after the grains have been removed from the cob). We found one farmer who claimed he took grains from the biggest ears.

According to T. Boone Halberg, an internationally recognized expert in corn (maize) who lives and works in Oaxaca (for some 40 years), a slight increase in knowledge of how to select seeds can produce dramatic improvements in as little as two or three years. In particular, it is necessary to select seeds by observing the PLANTS as they grow in the field. By selecting seeds (and carefully storing them until the planting season) from PLANTS that show favorable characteristics such as multiple ears, good growth in crowded conditions (typical of the way the local campesinos plant their seeds), freedom of disease and insects, etc., Boone believes in two or three years EVERY stalk of corn can have two ears, and the plants will be adapted to the local conditions and microclimate of each individual farmers field. All of this would be possible WITHOUT inputs of fertilizers or insecticides. Boone estimates there are some 80,000 varieties of corn (maize) growing in the State of Oaxaca. (Incidentally, Boone claims that corn (maize) was INVENTED right here in Oaxaca some 8,000 years ago.)

For program planning purposes, implementing this phase of the overall program is seen to entail an educational aspect. To do this, we plan to hold group and individual meetings to talk about it. As we work with volunteers to establish the vetiver hedges, we talk about better seed selection. Of course, the time for action on seed selection is at harvest (September-November), so the talking will get more intense in that time frame.

Green Manures

The local soils are not very fertile, and even with the necessary techniques described above for conserving water and soil and better seeds, there is and will be a need to improve the basic soil fertility. We don't believe that the use of chemical fertilizers is a sustainable practice for the long run, and the local campesinos can't afford them anyway. Therefore, our program plan recommendation is to promote the use of green manure crops grown in place to build long-term soil fertility.

There is nothing new about this technique. It is used with great success in many parts of the world and our own AMEXTRA organization has successfully promoted it in Chiapas. Basically, the technique calls for the planting of a leguminous plant (to fix atmospheric nitrogen)(they use a bean called frijol nescafe in

Chiapas) in between the rows of corn. A good choice will result in vigorous growth that will produce much vegetative matter both above and below the ground. At a suitable time, the cover crop plants are cut off at the root and the leaves and stems are simply allowed to fall to the ground where they form a mulch that continues to protect the soil. The mulch is left in place where it decomposes and enriches the soil. Follow-on crops are planted right through the existing mulch such that the layer gets thicker with time.

This technique avoids plowing and turning of the soil, so the labor required to put in a crop drops dramatically. In Chiapas, the soil for 6 or more inches becomes very dark, soft and fertile. Planting is done simply by poking holes with a stick and dropping in the seed. Yields have gone up by as much as 6 times as well.

For program planning purposes, we recognize two difficulties with this phase. First, we have not yet identified a suitable green manure crop. We may have to find more than one, as many of our communities have over 2,000 feet of elevation differences with quite different climates from top to bottom. Secondly, this technology will represent a distinct change in from traditional techniques and we anticipate it will be slower to catch on.

Therefore, we plan a more experimental approach. First with respect to trying various candidate green manure crops, and secondly with respect to recruiting volunteers to try the technique in small patches on their farms.

Grain Storage Techniques

Informal, but very consistent, surveys among campesinos indicate that somewhere around ONE HALF of their harvests are lost to insects and vermin in storage! Some communities report the problem is so severe that they don't even bother trying to store their harvests. They sell them instead - when the prices are lowest. Then, to feed their families the tortillas they all love, they have to buy grain - when prices are high.

Clearly, this represents an opportunity to double the efficiency of the food production process (measured in terms of 'tortillas en la mesa'). At this moment (April 1997), we do not have specific recommendations, but we will research and develop such recommendations for implementation in our overall program.

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