

## **EDN ISSUE # 11, APRIL 1985**

**11-1. SUMMARY OF TRAINING OPPORTUNITIES IN AGRICULTURE FOR MISSIONARIES.** A number of organizations are responding to the need for training of those going to work in Third World agriculture and/or appropriate technology. ECHO has prepared a Technical Note which summarizes the offerings of each of the programs that we know about. Write for Technical Note called "Where can I get Training for Agricultural Missions?"

**11-1. NEW VARIETIES OF HIGH LYSINE CORN SHOW MUCH MORE PROMISE FOR THE SMALL FARM.** A variety of corn that contains much higher concentrations of the amino acid lysine than normal corn was developed by Dr. Ed Mertz at Purdue University in the 1960's. Lysine is the essential amino acid that is most limiting in diets composed mainly of cereals. One way to get extra lysine is to mix cereals with beans. The high lysine corn, however, would be much more nutritious than regular corn for folks or animals that do not have a good mixture of legumes with their corn.

The high lysine corn has not been widely accepted because its yields were inferior and the texture was not as acceptable for human diets in many countries. Dr. Mertz visited us recently on his way home from the International Center for Improvement of Wheat and Maize (CIMMYT) in Mexico. He was quite excited because CIMMYT has just completed yield trials in several countries with some new varieties that have equaled or outperformed the best open pollinated varieties and which have the preferred texture.

Open pollinated corn is the kind the farmers plant year after year using seed that they harvest (as opposed to hybrid corn). Most of you know that hybrid varieties, though producing greater yields, can result in disastrous yields if farmers save and plant their own seed the next year. CIMMYT is to be congratulated for concentrating on open pollinated corn, which is more appropriate than hybrid corn for those farming at near subsistence levels. If there is no sacrifice of yield, high lysine varieties should be seriously considered for the small farm. Human and animal health would both be improved. Some farmers in the United States claim that they save \$2-10 per hog when they feed high lysine corn, mainly because it allows them to reduce the amount of soybeans in the diet by up to 25%. They also claim fewer veterinarian expenses. (I have seen no scientific studies on either point).

If you want to try the new corn, there are some things about which you should be cautious. First, an unusual trait of the high lysine corn is that if it is pollinated by normal corn the crop that is harvested will not be high in lysine. Therefore, if it were introduced to an occasional small farm which is immediately surrounded by fields of regular corn, the extra nutritional benefits might not be present. All farmers in an area should agree to grow the high lysine crop unless fields were somewhat isolated. Second, there is risk in changing all of a farmer's crop to a single new variety. Quite likely the local varieties have developed resistances to disease and insects common to the area. Although the new varieties have no doubt been developed with resistance to common tropical stresses, there is some risk (and scientific loss) if the old varieties are no longer grown.

Dr. Ronald Cantrell is director of the Maize program at CIMMYT. He told us that he thinks it would be best if our readers would write him for seed, rather than sending seed to ECHO for redistribution. This would enable him to send appropriate types. "We have both highland and lowland varieties and also different grain types and maturities." So tell him something about your climate, altitude, length of season and any preferences as to type and texture of the corn so that he can make the best choice.

Write Ron at CIMMYT, Londres 40, Apdo. Postal 6-641, Col Juarez Deleg. Cuauhtemoc, 06600 Mexico, D. F.

If you prefer hybrids, the Crow Seed Co. at Box 306, Milford, IL 60953 is selling hybrid high lysine corn that yields within 5% of other hybrids. About half a million acres are being grown, primarily to be fed on the farm to hogs for the reasons mentioned above. There is no economic incentive to grow more nutritious but lower yielding hybrid corn for sale unless a premium price were paid for it. Dr. Mertz said that in South Africa there is a 12% premium which more than makes up for the 5% lower yield. I know of no other country where such a premium is paid.

**11-2. UPDATE ON ITEMS DISCUSSED IN PREVIOUS ISSUES. Issue #1. Strawberries.** Strawberries would seem to be an "underexploited" cash crop in some countries. For example, Jose Postigo began a project last year at about 3,000 feet in the Dominican Republic, using U.S. varieties. They are now selling dozens of boxes of beautiful berries in the capital. They have also created jobs for several women who make jam from excess or older berries in their homes.

Here at ECHO I have been pleased at the size and quality of berries and plants grown from the seed we have been distributing. (Strawberries are normally propagated by runners). I have not compared them to commercial varieties, but it is a good way to introduce plants to remote locations. Angelino Chipana and Abdon Paredes in Bolivia gave me a picture of a successful plot they began from the seeds. Though a few others say the plants are living, we have received no other reports of successful plantings. Some reported the plants were eaten by ants. Many had no germination. This could be related to heat, though ours always germinate even in the hot greenhouse in the summer. We now include special germination instructions when we mail seeds. If you know of strawberries being grown at other than higher altitudes, send us details. We are always interested in "tricks" to grow crops outside of their normal environment.

[UPDATE: ECHO no longer has strawberry seed. The same "sweetheart" variety can be ordered from Park Seed Co., Cokesbury Rd., Greenwood, SC 29647, USA. Each packet costs \$1.85. Estimate airmail postage. If you can get ahold of fruit of the Douglas variety, blend at a low speed in a blender, then separate and dry the tiny seeds. Plant by scattering on top of moist potting mix and pat with your hand to barely embed the seed into the soil. To make sure the top of the soil never dries out, place a glass or plastic sheet over the pot until they begin to emerge. Be sure NO sunlight hits the pot or it will overheat with the plastic covering. An alternative might be to set the pot in a basin containing an inch or so of water. We have pulled together considerable information on strawberries in the tropics. It costs \$4.00. Ask for the TN on strawberries. If you are not at least 3,000 feet elevation or on a very dry but irrigated farm, forget strawberries.]

**Potato Seed.** We sent out several dozen packets. Not a single positive report came back. Nearly everyone reported poor or no germination or early death of the plants. [UPDATE: ECHO no longer has potato seed. It can be purchased from the Park Seed Company, Cokesbury Rd., Greenwood, SC 29647, USA. They now sell an improved hybrid, "Homestead." One packet is \$1.35, jumbo packet is \$10.25. Estimate airmail postage.]

**11-3. Issue #2. Underexploited Plants.** Our seedbank and your response to it continues to grow. We have sent seed to over 350 folks representing over 60 organizations in 53 countries. Though these plants are exciting, how much of your effort should go into working with them?

Given the frequent difficulty in introducing a new food to a culture, it would most likely be unwise for you to make introduction of these promising but unusual plants a cornerstone of your work. You need to make an immediate impact on your community. Probably you have found some things that do this with little risk. Furthermore, many grants expect project results within a couple years. A project to get winged beans, for example, widely accepted in your country would not be likely to succeed during the life of the grant.

We believe that working with PVO's presents an ideal way to introduce such plants however. Why? Because you or your organization have made a long-term commitment to your region and can see the long term possibilities. What is unlikely in 3 years becomes likely in 10 or 30 years. We are just as concerned with the folks who will be living there in 30 years as we are those today -- and they may use winged beans as a staple! For example, the potato was introduced to Rwanda by European missionaries in the early 1900's. The people would not eat it. Today it has become a staple and 45,000 hectares are grown.

The cost of trying a few of these special plants is almost nothing. I cannot think of many things which can have such an impact in the long term at such a small cost today. Initial acceptance will probably come as a crop to be consumed by the farmer, with cash crop possibilities coming much later if at all.

Do not feel embarrassed if you cannot report back to us that the masses are now growing the crop. Such reports are rare. (Folks who eat a variety of leaves will often readily accept a new leafy vegetable, however, and folks who eat soups may more readily add a new plant to the pot). If something catches on in 10 years, do not forget about us! We would be greatly encouraged to hear about it.

**Tepary beans.** We continue to consider them one of the more promising plants for arid regions. For example, Peter Welle got quick and heavy yields in Haiti in spite of hot, dry weather and calcareous soils. We have plenty of seed if you want to try them.

**Quinoa.** This "grain" of the high Andes is being tested widely in the States, especially in Colorado. An association, Sierra Blanca Associates, 2560 S. Jackson, Denver, CO 80210, USA, has been formed for its promotion and trial. They have several varieties of seed and might be willing to send small samples. It grows best where maximum temperatures do not exceed 90 F (32 C) and night temperatures are cool.

**No-till gardening.** I had a chance to buy an almost new \$1500 rototiller for a couple hundred dollars last weekend. The fact that I turned down the opportunity shows how dramatically the no-till approach has affected ECHO's operations. I could think of no use for the rototiller! There is only one disadvantage that we have found to this heavy use of mulch. It tends to frost on top of mulch at a few degrees higher temperature than elsewhere. Possible problems we had worried about, such as more insect damage or fungal diseases, did not materialize. Be sure not to make a thick, dense, layer of mulch that prevents air penetration into the soil as it can kill trees. I do not know just how thick that would need to be, but would presume a foot of packed, matted grass clippings would be dangerous for example. If you are using this method, we would like to hear how it is working for you.

**11-5. Issue #6. Seed viability measurements.** David Knight in Zaire asked a good question. "Why is it necessary to count the germination on each of several days?" There are two criteria for good seed that the viability test measures: how many will germinate and how uniformly they will germinate. Sometimes a few seeds in a package will germinate in a couple days followed by a few each day for several days. For example, winged beans often have non-uniform germination rates. Some kind of fruit tree seeds can do this to an extreme. It is helpful to know what to expect so you will know to keep watering. If you only want to know the percent that will germinate eventually, you can wait a couple weeks to make the count. This is probably adequate for most uses.

**Rooftop gardens.** Because we do not have flat roofed buildings, we lay down long plastic sheets and pretend they are rooftops. Gardens are planted in thin layers of organic material on top of the plastic. For many kinds of plants, the growth has been so much superior that we have prepared several hundred square feet of these gardens and use them when we want to be sure to succeed. I am not sure of all the reasons, but almost total root knot nematode control is quite likely one of them. I have been selling kohlrabi grown in about 4 inches of old wood chips on a cement slab to a local store.

When I must use fresh or nearly fresh organic material (who has lots of compost laying around?) I find that grass clippings that have been allowed to heat up in a pile for at least 3 weeks give much more reliable results than fresh wood chips or corn cobs. It is hard to prevent nutrient deficiency problems with many, though not all, vegetables in fresh wood chips. My preference now is to put a lot of wood chips in the bottom layers of a hill culture (see issue #10). I will then use them later, perhaps in a year. Anything that is well-rotted, of course, works fine. The material gets better each season. I am able to grow nice peas in grass clippings, but have failure after failure in soil, even with our no-till approach. We have pole bean plants that were planted in a 3 inch layer of old wood chips over plastic that are 4 times as big as the same variety planted the same day in our no-till garden. I am not sure why. Results are not always so different. For example, broccoli usually does best in the sandy soil.

We have learned of only one of our readers who has tried a garden on a rooftop. Elaine Rodriguez in Bogota, Colombia wrote, "In July we built a 4x6 ft box, lined it with plastic with a few drainage holes and placed a brick under each corner so that the cement would not stay wet all the time. We piled grass clippings, which are readily available, on the plastic. Because it was raining a lot the grass started to rot fast.

"In mid-August we put chard in the mass of rotted grass and held our breath. It took hold and grew better than the plants in a big pot of dirt. I didn't water nor fertilize until it stopped raining. [I am surprised that she did not need some initial fertilizer.] I fertilized a few times since then. We get enough chard for our three member family. The grass has reduced to a very fine dirt. If it isn't watered for about 4 days it becomes quite hard. I have also planted strawberries, marigolds, radishes, chives, bunching onions and lettuce. All did well, though the onions were tough and the berries not very productive."

**11-5. Issue # 7. African bees.** ECHO now has a quantity of the [Bee Keeping Handbook](#), an excellent guide published by the Ministry of Agriculture in Botswana. It is a very basic, well illustrated guide that uses simple technologies to handle African bees. You can still order from the address given in #7 for \$2 surface mail. If you receive mail more reliably from the States, you may send us \$2 plus \$3 postage and we will send it via airmail.

**11-6. Passion fruit project in Puerto Rico.** The Wall Street Journal did a story on George Gaskins passion fruit project. "Starting from nothing in 1976, Puerto Rico now produces more than 3,000 tons of passion fruit a year. Two dozen new juices and drinks have come out using the juice. The industry's annual sales are estimated at \$10 million and rising." We can send you a packet of seed from those fruit (grown at perhaps 3,000 feet) if you do not already have good passion fruit in your area.

**11-6. Victor Wynne Farm.** He is having great success with Mimosa scabrella trees. This species might be the higher altitude equivalent of the leucaena. It is dying out where the roots encounter limestone. [UPDATE: If you are over 4,000 feet and want to try it we will put you on a waiting list and send seed when and if we find it.] These trees are planted on the ridges with Andes berry plants growing on wires strung between the trees. He likes the Andes berry because it produces year round. The juice he served from the berry was outstanding. Victor says it will only grow at higher elevations. I am not sure how true it will come from seed, but he would probably send you a few if you wrote to him. I suggest you enclose a couple dollars to cover his costs. (Haiti Seed Store, P. O. Box 15146, Petion-ville, Haiti).

**11-6. Issue # 9. Protecting Crops from Monkeys** J. D. Balarin in Kenya says that monkeys were a pest on the large banana plantation on the Baobab Farm. "We used a dog on a running line as a deterrent and it worked. A less gruesome solution." Roland Bunch in Honduras says, "In Bolivia some years ago, I stumbled across some villagers who had painted some eucalyptus trees with a mixture of water and goat manure, much like your recipe. This had completely stopped the goats from destroying the trees. I would guess this would work with many animals (including monkeys???) that are territorial in nature."

**11-6. Winged bean recipes.** Dr. Andy Duncan sent us several recipes. Write us for a photocopy. Dr. Frank Martin (USDA, Puerto Rico) sent this method for treating winged bean seeds. "Probably no region of the tropics uses the seeds regularly as food. Seeds are parched in Java, but probably only immature seeds are used. They are used for making a vegetable curd similar to tofu from soybean, but our experience showed that such curds are definitely inferior to those of soybean. The four hour cooking time is an obstacle [to use of the seed]. ...The heavy seed has been suggested to cause abdominal pain. Surely, the evidence is persuasive that dry winged bean seeds are difficult to eat."

This was "confirmed in tests of 20 different lines.... Seeds left to soak absorbed water slowly, and some not at all. Three or four hours were required to cook soaked beans, and then some remained hard and unswollen. Cooked beans were harsh and nut-like, acceptable as an occasional food, but not attractive to the eye or the palate. When cooked beans were ground into soups and flavored with other ingredients, an acceptable product was obtained. Although variety differences were seen, these were not sufficient to permit selection of lines of acceptable value.

Frank suggested a different method of cooking. "The beans treated in this fashion are very soft. Even the seed coats are pliable and edible. Such beans have a mild and agreeable flavor comparable to that of other beans. Tests so far suggest that people who eat beans regularly accept them readily. [They can be] used in many traditional dishes. Not all varieties are equally suited to this technique. In many, a few seeds remain hard, and many are intermediate. In these lines, however, the softened seeds can be separated from the hard seeds with a large mesh screen. Here is that better method:

"Measure the volume of the beans to be cooked. Rinse and add 5 volumes of water. To the water add 1% sodium bicarbonate sold as soda or baking powder [about 1/2 teaspoon per cup of water]. Boil the beans and simmer for 3 minutes. Remove from heat and soak the beans in the solution overnight. The following day, discard the soaking water, rinse twice with fresh water and boil in double their volume of fresh water for 20 to 25 minutes."

**11-7. The Moringa Tree.** We have just learned of another unexpected use for this amazing tree from Dr. Samia Al Azharia Jahn with the Deutsche Gesellschaft für Technische Zusammenarbeit in Germany. Suspensions of the ground seed of the benzolive tree are used as primary coagulants. They can "clarify Nile water of any degree of visible turbidity." At high turbidities their action was almost as fast as that of alum, but at medium and low turbidities it was slower. The doses required did not exceed 250 mg/l. Coagulating the solid matter in water so that it can be easily removed can remove a good portion of the suspended bacteria. "River water is always faecally polluted. At our sampling site the total coliforms amounted during the flood season to 1600-18,000 per 100 ml. Turbidity reductions to 10 FTU were achieved after one hour, reducing the coliforms to 1-200 per 100 ml. Good clarification is obtained if a small cloth bag filled with the powdered seeds of the benzolive is swirled round in the turbid water." The material can clarify not only highly turbid muddy water but also waters of medium and low turbidity which may appear milky and opaque or sometimes yellowish or greyish. During the cool season complete clarification, which takes only one hour in hot water, may take two hours unless the water is left in the sun for some time to raise its temperature.

"In the case of the Blue Nile, for example, water of low turbidity in the initial and final flood season needs doses equivalent to about one quarter of a seed per liter, water of medium turbidities needs half a seed per liter and at high turbidities the dose should be 1-1.5 seeds per liter." Water from a different river will require different quantities of clarifier because of variable characteristics of suspended material. Simple experiments in a jar will determine the best dose.

To prepare the seed for use as a coagulant, remove the seed coats and the "wings". The white kernel is then crushed to a powder, using a mortar or placing in a cloth on top of a stone and crushing. The powder should be mixed with a small amount of water, stirred in a small cup, then poured through a tea strainer before being added to the turbid water. It is even better to spread a thin piece of clean cloth on the strainer.

"The milky white suspension has to be added to the turbid water and stirred fast. If a wooden soup whisk is used, the nails sometimes present in these gadgets should be replaced by small wooden sticks. Continue fast stirring for at least half a minute. After that the floc will not form unless it is stirred slowly and regularly (15-20 rotations per minute) for about five minutes." "After stirring the treated water should be covered and left to settle for at least an hour." If moved or shaken before then, clarification will take much longer or fail to reach completion. The GTZ is planning implementation projects in Indonesia and Kenya. You may write to him at GTZ, FB 332; Dag-Hammarskjöld-Weg 1-2; Postfach 5180; D-6236 Eschborn 1 bei Frankfurt/Main, West Germany. We can send a photocopy of her article.