

DISEASE-RESISTANT TEPARY BEANS NOW

AVAILABLE. (We relied on the books *Tropical Legumes: Resources for the Future* by NAS, 1979, and *Food Legumes* by Daisy E. Kay, 1979, in preparing this note.) Probably the most frequent question ECHO receives from people working in the semi-arid tropics is, "It is so dry here! What plants can we grow with so little rain?" The tepary bean, *Phaseolus acutifolius*, is a promising crop for semi-arid to arid regions with infrequent but heavy rains and extreme heat.

This native plant of the Sonoran desert in western North America has been an important cultivated food of native Americans for over 5,000 years. When planted toward the end of the rainy season, tepary beans may receive sufficient moisture in a few heavy rains early in their growth to mature and produce quickly, even when conditions at the end of their life cycle are extremely hot and dry. Sometimes, when planted in recently water-logged soils of certain types, production is possible without any additional rain.



The countless landraces and local varieties vary widely in color, seed size, and growth habit, but most yield their high-protein crop just 60-90 days after planting. The leaves and young pods are a leguminous forage nutritionally comparable to alfalfa. Dried pods may also be fed to animals.

Plants are bushy to semi-vining on dry land, with more extensive vining and foliage growth when water is plentiful. The seeds and trifoliate leaves are a bit smaller than in the common bean. Because they are extremely resistant to

common bacterial blight, which affects other beans in the tropics, they are used in breeding programs to impart this resistance to the common bean *Phaseolus vulgaris*.

Tepary beans can thrive in areas with as little as 500-600mm (20-24 in) rain per year, and seed production drops with over 1000mm/year (40 in). Seeds are generally planted 10-20 cm (4-8 in) deep to utilize the lower water reserves. Plants often receive 3 or 4 irrigations in the early stages of growth. (Continued irrigation can actually lead to increased vegetative growth and lower seed yield). Teparies prefer well-drained soils and are fairly tolerant of alkaline or saline soils. They may mature more quickly at mid elevations than coastal regions.

Despite tepary bean's apparent potential to produce food quickly in semi-arid regions, not much attention has been given to research and improvement of this species by the scientific community. Some obstacles to introduction into new areas include disease problems (in climates where it is not adapted), sensitivity to some salty soils of semi-arid zones, poor productivity in humid regions, tendency toward short-day flowering, frost damage (nighttime temperatures must be above 8°C/46°F), unusually small and flat appearance of the bean, a sweet taste different from the common bean, and long cooking time after long periods of storage. (According to Linda MacElwee of Native Seeds/SEARCH in Arizona, they can take up to 4 hours of boiling, even after soaking, if they have been stored for some time. Even fresh teparies can take longer to cook than many common beans.) Teparies may also cause flatulence and therefore are not recommended as food for babies under one year old.

Agronomists at the United States Department of Agriculture in Mayagüez, Puerto Rico, chose 11 cultivated lines from 70 accessions of tepary after evaluating and selecting under varying environmental conditions. They studied yield, seed size, protein and anti-nutritive factors, and resistance of each line to six diseases.

They found that tepary beans performed best and yielded more than the common bean under higher temperatures in dry regions. (Linda MacElwee says they will produce at 46°C/115°F.) The seed protein concentration for the tested varieties ranged from 17.8 to 26.8%, and anti-nutrients that interfere with protein digestibility were on average less than in the common bean. All lines were resistant to common bacterial blight and susceptible to the bean common mosaic

virus, but the lines had varying resistance or tolerance to rust, ashy stem blight, bean golden mosaic virus, and Fusarium wilt.

The seeds supplied to ECHO are photoperiod-insensitive, virus-free, and selected for high yield and disease resistance; in addition, they may be more tolerant of excess rain than other tepary varieties.

We planted the tepary beans in our own semi-arid greenhouse as a trial. They germinated immediately and grew impressively well with none of the disease problems usually evident on tepary beans at ECHO (note: we do not send out the tepary seed grown at ECHO because of the risk of transmitting diseases common here). In two months, most of the varieties already have pods and continue to flower. There is quite a bit of variation in foliage produced, flowering time, and leaf size. We asked Dr. Phillip Miklas, who sent us with the disease-resistant varieties, the following questions on the potential of tepary beans:

Q. In what climates have you found tepary beans to outperform other beans?

A. Tepary beans are outstanding for hot climates, in some cases yielding over three times as much as dry beans when high temperatures cause common bean flowers to abort. They are well-suited to areas which suffer periodic drought. For example, in places which often, but not always, receive enough rain for common beans, you might plant a few plots of tepary beans as an insurance crop. However, in extremely rainy periods, tepary beans will produce a lot of vegetation, but very little or no seed.

Q. The seeds of the disease-resistant beans you supplied are smaller than the seeds we receive from Arizona. Can a grower select for larger seed and, if so, will that affect protein levels?

A. These are true-breeding lines of tepary beans; the plants produced should be genetically similar. It is not likely that you will find wide variation in seed size. Any selection of that nature, though, would not significantly affect other characteristics of the bean.

Q. Are the diseases observed in the study usually a major problem in arid to semi-arid zones, or are they primarily present in humid areas? Is there an advantage for people in extremely arid zones in using the selected disease-resistant varieties over other (larger-seeded) ones?

A. The diseases are present in many tropical climates. For example, common bacterial blight occurs mainly in hot, humid areas, and ashy stem blight occurs in hot, dry areas. One thing to remember is that the strains of each pathogen vary in each region; in other words, we were only able to select for resistance to the strains in our area, but different strains may be present in a new area.

Q. Do you have any comments concerning unique cultural requirements?

A. Fertilization should not be necessary. If you fertilize before the plants have emerged from the soil, nitrogen-fixing nodules may not form. So delay any fertilization until after the seeds have sprouted. [Tepary beans can nodulate with the broad cowpea/lima bean/*Canavalia*/mung bean group of rhizobia. Under very hot or dry conditions, the nitrogen-fixing bacteria will not persist strongly from one season to the next. In such conditions it may be best to inoculate the seeds.]

It is very important with tepary beans to try them at different times in the season to determine their best "window" in the local climate. Do not give up on them if they don't succeed on the first try; planting again at a different time may produce better results.

Q. How easily can tepary beans be crossed with other local beans to impart disease resistance?

A. This is not possible at the field level.

Q. Are there other reasons why someone might want to grow tepary beans if they could grow common beans?

A. Tepary beans will often produce at a different time of year than other beans, when it is too hot or dry to grow common beans. In addition, they are an excellent crop for drought insurance in areas with occasional dry years; such areas may want to maintain a plot of tepary beans in case the common beans do not receive enough rain, for example. They may also be used as a green manure in some areas, although that is not their primary use now.

Q. Do tepary beans have potential as a green manure/cover crop for arid zones? (ECHO has heard of this in the Caribbean.)

A. Since tepary bean is a short-lived annual, it doesn't have as much potential as a cover crop as some other plants would. One of its great potential uses may be in an intercropping system with sorghum during the dry season.

Dr. Miklas has sent ECHO seed of these eleven varieties to distribute to our network. We have combined them according to color (white, grey, black, yellow-brown, and red). Sample packets are free to development workers; others please send \$2.50 per packet. When ordering seed, please indicate the dry bean color preferences (if any) for your region.

We and Dr. Miklas (USDA-ARS, P.O. Box 70, Mayagüez, Puerto Rico 00681) are very eager to hear how these varieties perform for you and are accepted in your area. Please note that people with year-round humid weather would probably be wasting their time with this trial. For example, we cannot grow tepary beans at ECHO in the summer.

CAUSES OF BEAN BLOSSOM DROP. James Chrisantus in Kenya asked why all the blossoms fell off of his winged beans, thus producing no beans. ECHO asked

Dr. Andrew Duncan of Oregon State University. His reply concerns beans in general. "The two major causes of bean blossom drop are high temperatures over 90°F (32°C) and drought. Beans selected for temperate zones are more sensitive than those native to the humid tropics and sub-tropics."

"If beans have been growing under moderate (very favorable) conditions, then the imposition of stresses is even more damaging." Drought stress can occur even when the soil holds considerable water. For example, when soil moisture levels are at half of the field capacity [soils contain half as much water as they can hold without being flooded], and relative humidity is low (<25%), even a 5 mile per hour (8 km/h) breeze can cause moisture stress.

"Root damage by diseases, insects or deep cultivation should also be checked. A long shot is improper use of pesticides. Beans are very sensitive to the 2,4-D type herbicides, even the vapors from a distance. Solvents included in insect sprays can damage blossoms and leaves."

TRENCH TRAPS CONTROL COLORADO POTATO BEETLE.

Researchers at AgCanada and Cornell University have developed a technique to control the Colorado potato beetle, a major pest not only of potato but also of tomato and eggplant. The beetle is native to Mexico, where it actually feeds on two wild Solanaceous weedy relatives rather than the domesticated potato. It has spread throughout the United States (except California), from western Europe through the Mediterranean region all the way to China. Entomologist Prof. Ward Tingey of Cornell said that the beetle will likely reach North Korea by the year 2000. It is primarily a temperate pest, and does not exist as a crop pest south of Mexico or in the Andes, where potatoes are native. If this beetle is not a problem in your area, the technique may still be helpful with other beetles.

The Colorado potato beetle has become resistant to many pesticides. An innovative technique developed by AgCanada and researched by Cornell is the use of "trench traps" to catch the beetles as they walk out of fields in search of new food sources or places to overwinter.

This technique, like most successful pest control programs, relies on a knowledge of the insect's biological cycle. Farmers often rotate their potato crops to adjoining plots of land in an effort to control the beetle's damage to their plants. The effectiveness of this practice is increased by digging deep (minimum 30 cm/12 in, and up to 91 cm/3 feet) trenches around their fields and lining them with 1.5 mil black plastic mulch.

Potato beetles emerge from their winter hibernation in the soil in the previous year's field and disperse to the new field by walking up to 45 m/150 ft from their hibernation site. They do not generally fly to find new food sources, as many

other pests do. In an effort to reach the new potato field, the beetles fall into the plastic-lined trench, and, unable to crawl out, starve to death within 10-14 days.

The design of the trench is important to the success of this control method. It must have at least a 65° angle. The plastic lining is also key in the control: the beetles are able to climb out of the trenches if the plastic is clean (as when new, or just after a rain) due to their fine leg hairs, but they cannot crawl out when the plastic is coated with fine dust particles. Prof. Tingey recommends that growers place their trenches next to roads or well-used pathways so that they are redusted after a rain. Drainage of the trench is effected by perforating the trench bottom every 3m/10 feet. Though some insects may escape the trenches through these perforations, in test areas they have often been killed by a fungus, *Beauveria bassiana*, which thrives in the dark, moist areas below the trench. Farmers find masses of white webbed fungus on dead beetles when they peel back the plastic.

The technique can be used at both ends of the season: at the beginning, to trap insects as they attempt to enter a field, and at the end, as they leave the field to overwinter after the potato foliage is killed before the potato harvest. One main disadvantage is that the plastic does not usually last more than one year and needs to be replaced as new areas are dug.

The technique is not presently being used for control of other pests, although presumably it could be used for other beetles which disperse primarily through walking or crawling rather than flying. In Controlling Crop Pests and Diseases, Rosalyn Rappaport writes that army worms and cutworms, which migrate into crops by crawling, can be trapped and killed in ditches dug around plants. She specifies that the "side of the ditch nearest the crop must be straight, though it need not be more than 10 cm (4 in) deep. The worms cannot crawl up a sheer slope." In many situations, the plastic lining for the trench may not be necessary, and you could experiment with alternatives. (Scott Sherman has used a cut-away PVC pipe buried at ground level to catch chinch bugs.) If you have field success with variations on these methods, let us know and we can relate your experiences to others in our network.

A PEAT SUBSTITUTE MADE FROM COCONUTS.

[The following is based on an article by Alan Meerow in *Country Folks Grower South*, November 1993]. Coir is the fibrous part of the coconut husk. The long fibers are "extracted and sold to make brushes, automobile seats, mattress stuffing, drainage pipe filters, twine, etc. Traditionally the short fibers and dust left behind have accumulated as a waste product for which no industrial use had been discovered." Tests in Australia and Europe show that this product makes a remarkably adequate substitute for peat. "The Lignocell company in Sri Lanka (where over 2.5 billion coconuts are processed each year) has become the leading processor [of coir]."

Coir has a high lignin cellulose content, which keeps the piles that traditionally accumulate around processing plants from breaking down. The same property inhibits breakdown of coir pith when used as a growing medium.

The pith is very similar to peat in appearance. It is light to dark brown, with 0.2-2.0 mm particle size. "Unlike sphagnum peat, there are no sticks or other extraneous matter." A study in Australia found "superior structural stability, water absorption ability and cation exchange capacity compared to sphagnum peat." There are reports that coir from sources other than Sri Lanka have contained chlorides at levels toxic to many plants. Perhaps this is a result of the processing method. In any event, watch out for that if you begin using the pith.

"Lignocell processes the pith into highly compressed bricks roughly 8x4x2 inches (20x10x5 cm), each weighing 1.5 pounds (0.7 kg). They are exported for the retail market in 12-brick packages. The 12 bricks fluff out when re-wet into 4 cubic feet (0.1 m³) of ready-to-use material. Each brick absorbs about 2 gallons (7.6 liters) of water. I have been impressed by the ease with which coir pith re-wets after it has been thoroughly dehydrated."

[ED: When I (LSM) did an internship at the Royal Botanic Gardens, Kew, we used coir rather than peat because of the adverse environmental impact on British peat bogs. Most of the horticultural staff preferred it to peat anyway. It worked well with nearly all plants, though they said it was not sufficiently acidic for the carnivorous plants. The coir surface can appear dry even when saturated below, so be careful to avoid overwatering.]

"HOW DO I KEEP BIRDS OUT OF THE GARDEN?"

(by Scott Sherman). Comments like "How can we keep birds from damaging the ripening millet?" or "How can we 'parrot-proof' our corn?" come up year after year. Bird damage to ripening grain is a common problem. Commercial methods available in the States include: sound repellents (electric, propane, pyrotechnics), taste repellents, visual repellents ("scare-eye" balloons, fake snakes), chemicals that make them timid or uneasy, and various netting or screening materials. It is common knowledge that birds quickly become accustomed to some of these and others are inappropriate for the small-holder overseas.

One relatively "low-tech" approach effective in keeping away at least some bird species is the use of a reflecting mylar tape suspended between posts. These "bird tapes" are about 1.3 cm/0.5 in wide with metallic red color on one side and silver on the other. When properly strung between rows they reflect the sun and move in the wind in such a way as to effectively continue scaring birds away.

An article in *Hort Ideas* (vol 9, number 3, pg 26) mentions the use of mylar tape to control birds in strawberries. Drive strong stakes into the ground no more than 10 m/30 ft apart.

You will need mylar tape, strings (50 cm/20 in long) to connect the mylar tape to the post, and strong adhesive tape to secure the mylar to the strings. About 12 cm/5 in above the ground, tie the strings to the stakes, leaving 20 cm/8 in of each end of the string free. Make an "eye" with strong adhesive tape on one end of the mylar tape. Run the strings through this "eye" and tie. Stretch the mylar tape tightly to the next stake. Twist 3 or 4 times and attach in the same manner to that stake. This design allows the mylar to rotate in a breeze without knotting or breaking.

Suspend the tape just above the ground so it can move freely without hitting crops and weeds. Tighten it if it stretches out and replace when the shiny coating wears off (about 6 weeks in the sun). The only supplier listed is John Kaye, Modern Agri-Products, 3770 Aldergrove Rd., Ferndale, WA 98248 who carries "Birdscare Flash Tape"--minimum order: five 250-foot rolls for \$15.00.

Some people in Florida keep birds from landing in their pools by stringing monofilament lines (i.e. fishing line) over them. These are hardly noticeable to us, but birds see them. *Hort Ideas* (vol 9, number 4, pg 42) says that a similar approach is used to protect corn and berries. Drive 2-meter/6-foot stakes in the ground around the garden. String the line at about eye-level around the perimeter of the plot and criss-cross it in the middle. According to Cornell University biologists, the reason for success of this technique may be that the fishing line mimics the "impedimenta" warning strings spiders construct near their webs to keep birds from flying through them and destroying their work.

Rosalyn Rappaport, author of Controlling Crop Pests and Diseases, says that West African farmers bend the sorghum heads over when it is nearly ripe to make it hard for seed-eating birds to reach the grain. She also mentions "humming tape," which involves stretching video or cassette tape between posts. When a breeze blows over the tape it hums, which scares birds away. The tape should be about 5 mm wide and not break when pulled. How you string the tape is crucial. Place posts 4-5 m/15 ft apart and stretch tapes tautly perpendicular to the prevailing winds without any twists. If wind direction is variable, orient them at assorted angles. Hang them high enough to be above the crop at maturity. When protecting large areas (0.5 hectare/1.2 acres or more), place lines 10-20 m/32-65 ft apart. Video or cassette tape will stretch more than commercial tapes and should be replaced every 5 or 6 weeks.

One farmer told us that shooting birds worked fine for him until they learned to avoid the field he was hiding in. He then found that if two people walked into a field and only one walked out, the birds would return. Apparently birds can't count.

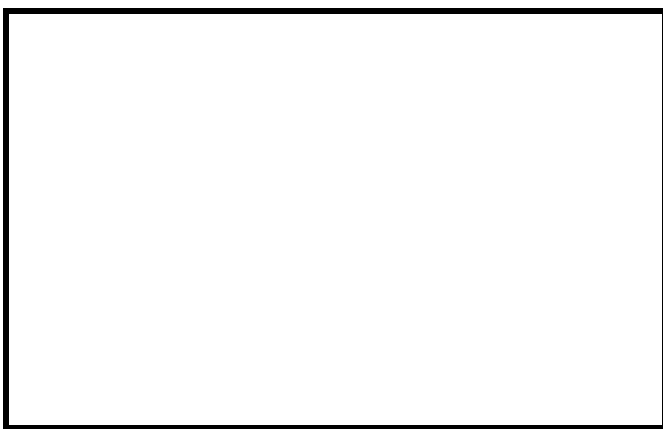
Tom Datema said that farmers in Sierra Leone keep birds from eating newly planted corn seeds by planting in cone-shaped holes about 20 cm/8 in deep. By the time the birds

can reach the seedlings they're too big for them to bother.

If you try any of these methods, please let us know your results. We would also like to hear of other approaches to bird control that you or farmers you work with have personally found to be effective.

WILL CARAMBOLA TREES COME TRUE TO SEED?

Carambola fruit, *Averrhoa carambola*, also known as "star fruit" has gone from an obscure, inexpensive fruit in the U.S. to an exceptionally expensive "yuppie" fruit. When sliced, the star shape makes it popular on top of fruit salads, added to stir-fried vegetables, dried, or as a decorative addition to desserts. Most people in southern Florida who have tasted the old dooryard seedling trees find the fruit too sour to be of interest. They are usually amazed to taste the new, sweet grafted varieties. Since carambola bears at a young age and produces one of the heaviest crops of any small tree over a long season, the good varieties are great dooryard trees.



We wondered what would happen if ECHO sent out seed taken from fruit of one of the superior trees. Would it give fruit just like the parent, or would the fruit be sour and unappealing? To find out, we planted seven seeds taken from the commercial yellow Florida variety 'Arkin.' The great variation in shape and flavor is such a good demonstration of why people prefer grafted fruit trees (where every tree is like its parent) that we have left the entire planting to use in our educational program.

Trees began to produce fruit in 2-3 years. Four give orange fruit, but on three it turns from green to nearly white, to pale orange as it ripens. Two of the orange-fruited trees are very sour, one is moderately sour, and the other is sweet. Two of the light-colored fruits are slightly sour with fair flavor, but we think that one tastes as good as or better than commercial varieties. (It will not become a commercial variety because the ideal commercial shape here is long with short "wings," which are less likely to be damaged in shipping. All these seedlings were shorter and had longer wings than the commercial varieties.) Several are good enough to leave for fruit production.

If you do not have sweet carambola in your country, you may request a packet of seed and we will send seed when available. Seeds reportedly cannot be stored, so we will probably send them in moist peat moss. They may be germinating by the time they arrive, so plant at once. You will probably find that you like fruit from some trees very much and some not at all. You may even find one that will be so good it will become a new variety for your country. (At ECHO we graft our best varieties to limbs of trees with sour fruit.)

ECHO's interns tell us carambola is one of their favorite juices. They remove any green tips on the "wings" (which can have an off-flavor) and mix with some kind of citrus juice and sugar. Dr. Julia Morton warns that the content of oxalates is so high that the fruit should not be consumed in large quantity. The less sour varieties have less oxalic acid.

CAN YOU HELP US?

ECHO is preparing some technical notes for those working in high altitude regions in the tropics. We are interested in hearing your responses to the following questions: "How is tropical high altitude food production different from temperate summer gardening?" and "What are your main challenges in growing food in high altitude regions (soil types, temperatures, erosion, growing seasons, etc.)?" Please address your responses to Laura Meitzner.

ECHOS FROM OUR NETWORK

Steve Knisely, Nepal. "The tephrosia plants (EDN 42-5) are about a year old and are three meters high. We had no insect problems until flowering, but now about 10% of the flowers have been attacked by aphids. Apparently the flowers do not have the insecticidal compounds that are found in the leaves. I have mixed dried and pounded leaves with water and used as an insect spray on ants and various kinds of caterpillars, with good effect. Caterpillars died after some hours. Spraying or even scattering dried leaves across the path of ants coming into the house stopped them for a few days. I sprayed the tephrosia solution on the tephrosia flowers and two days later had no more aphids. Other expatriates and Nepali co-workers have expressed an interest in planting and using this species in their gardens."

Roy Danforth and Paul Noren, Zaire. "It was slow going at the beginning of our program as people used to refuse to plant fruit trees for reasons such as, 'I'll die before the tree starts fruiting' or 'if a man eats fruit, he'll get a hernia and have to be operated on' or 'fruit gives me diarrhea.' But now jakfruit, canistel, rollinia, black sapote, yellow passionfruit, abiu and inga are big favorites with the local people.

"We now have several hundred species of fruits, nuts and other useful trees/vines and have planted them out in various locations ranging from a single tree in someone's yard to

several acres in an orchard. Some species have little potential to help the people here as they take too long to come into production or the fruit is not of good quality.

"However, we have hit upon several really good winners for this area. The top vote getter with the local people is the canistel (*Pouteria campechiana*), simply because it is good food. Its taste is similar to the sweet potato that is widely grown and eaten here [ED: except that canistel does not need to be cooked.] Rollinia (an *Annona*) is a close second as it is a large fruit with a lot of edible flesh.

"Jakfruit (*Artocarpus heterophyllus*) is becoming more and more popular. Though not everyone appreciates it, those that do cannot get enough of it. More jakfruit trees have been planted than any other tree and many come into production in less than two years! Because they are seedlings, there is enough variation in fruit taste, consistency, latex content, etc. to find one that will please most everyone. ...The abiu is coming on strong as a popular fruit because the variety we are using has a short 2-year bearing age and produces large quantities of delicious fruit.

"A difficult problem here is thievery. These fruits are so popular that most of the fruit gets stolen off the trees before they are ripe. We get reports from everywhere that when villagers plant trees in their yards, the trees are dug up in the night and taken to who-knows-where.

"Other fruits that people continue to buy from the nursery include those that existed in the area before we started the agroforestry program. These include ambarella (*Spondias cytherea*), breadfruit, coconut, citrus, avocado and ... mango. Of the last three it is the grafted trees that are selling. Of the native Zairian fruit trees, only one has been developed extensively and that is the safu or *Dacryodes edulis*. There are quite a few cultivars of this species that are much larger and less sour than the wild ones and they come nearly true to seed."

[Ed: Roy has promised to be a keynote speaker at one of ECHO's agricultural missions conferences, probably sometime within the next three years. You can order seeds from them on an exchange basis or pay equivalent to US\$1 for each tree type requested. Roy and Paul can be contacted at B.P. 1377, Bangui, Central African Republic.]

WHEN WRITING ECHO BY FAX OR EMAIL. More and more of you are faxing your questions and requests to ECHO. This gets it to us a week or so faster, but sometimes leaves us with a problem. It costs ECHO much more to reply by fax than by mail. If you want an immediate reply by fax please include a master/visa card number, expiration date and your signature authorizing us to bill the card for the overseas call. Otherwise be sure to include your address and we will reply by airmail.

We're also getting more requests via email. If you require just a short reply, we will probably reply via email. However, we cannot send our publications such as technical notes via email.

UPCOMING EVENTS

THE 3RD NATIONAL NEW CROPS SYMPOSIUM, October 22-25, 1995 at Indianapolis, Indiana, USA. Registration \$190. Oriented primarily toward US crops. Write Continuing Education, Purdue University, 1586 Stewart Center Rm 110, W. Lafayette, IN 47907-1586. Phone 317/494-7220; fax 317/494-0567.

THE INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION offers courses on Development Concepts (Oct 16-27, 1995), Development Communication (Feb-Mar 1995), Household Food Security through Home Gardening (Nov 27-Dec 15, 1995), Rural Development Management (April 17-May 12 and Aug 7-Sept 1, 1995), Systems in Community-Managed Health (June 19-July 15, 1995), and Regenerative Agriculture (Sept 4-29, 1995). Courses run 2-4 weeks at their campus in the Philippines. Participants must be proficient in English, willing and able to participate in intensive training, and have rural development experience (3 years or more) related to the course of interest. Course fees range from US\$1300-2500.

For more information and an application, contact: The Director, Training Division, International Institute of Rural Reconstruction, Silang, Cavite 4118, Philippines; fax: (632) 522 2494; Email: iirr@phil.gn.apc.org. Completed applications should be received no later than 2-3 months prior to the start of the course.

ECHO'S SECOND ANNUAL AGRICULTURAL MISSIONS CONFERENCE will be held October 30-November 2, 1995, at ECHO. Write now for an application and information about sharing your work with the other delegates.

BOOKS AND OTHER RESOURCES

MORE HELPFUL PUBLICATIONS FROM IIRR (INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION). Reviewed by Scott Sherman. Earlier (EDN 38-8) we mentioned IIRR's *Agroforestry Technology Information Kit* as a good summary of proven agroforestry technologies. We have recently received four more publications worth mentioning: *Farmer-Proven Integrated Agriculture-Aquaculture: A Technology Information Kit*(\$15), *Low-External Input Rice Production (LIRP) Technology Information Kit*(\$17), *The Bio-Intensive Approach to Small-Scale Household Food Production*(\$16) and *Resource Book on Sustainable Agriculture for the Uplands*(\$15).

The first three are along the same lines as the Agroforestry Kit; practical, well-illustrated collections of proven, basic, sustainable technologies for resource-poor farmers. Each is a collection of individual packets in a folder rather than a book. The *Resource Book* is a 200-page collection of articles on topics such as: soil and water conservation, land tenure, animal production, intensive feed gardens, agroforestry, and agroforestry seed technology. Another title which we have not seen, but may be of interest to some is: *Participatory Approach to Rural AIDS Education: A Workshop Manual*(\$8).

Each is available by ordering prepaid from IIRR (475 Riverside Drive, Room 1270, New York, NY 10115). Prices of each are noted above, postage and handling is an additional 15% for U.S. orders and 20% for overseas orders (surface mail). Those in Asia might try contacting their Philippine office: IIRR, Silang, Cavite 4118, Philippines.

CUIDEMOS NUESTRA TIERRA: Una Vida Mejor Mediante el Aprovechamiento de los Recursos en el Campo. Edited by Alberto de la Rosa and Werner Moosbrugger. 69 pages and full-color poster, Spanish only. This short book accompanies a large poster which depicts a mountainous campesino community demonstrating ecologically sound agricultural systems. Each page of the book amplifies one area of the poster scene and briefly defines the illustrated technique, explains its advantages and implementation, and suggests discussion questions and activities related to the topic. Among the 28 areas promoted are: soil improvement techniques, water system management, use of native crops, farm inventory, intercropping, school gardens, grazing and use of farm animals, and various erosion control measures.

The poster could be very useful in a classroom and serve as a reference for instruction on the environmental and economic advantages of integrating these ideas into village practices. The manual is not technical and serves primarily to explain the concepts attractively presented in the poster. The strong point of the book is that it positively outlines how the proposed techniques can address common problems of many campesino communities and offer other incidental benefits as well. The book (\$14) and poster (\$9) are available from Werner Moosbrugger, AA 100409, Bogotá 10, Colombia. Prices include postage.

VALOR NUTRITIVO Y USOS EN ALIMENTACION HUMANA DE ALGUNOS CULTIVOS AUTOCTONOS SUBEXPLORADOS DE MESOAMERICA, by FAO.

115 pages, Spanish only. Reviewed by Hugo Valverde, ECHO intern. The book was written to help professionals working in agriculture, food science, and nutrition promote Mesoamerican crops to contribute to the nutritional and economic development of the region. It provides a brief overview of native Central American fruits, vegetables, roots and tubers, and cereals. Each plant receives a two-page description with plant family, scientific and common names,

nutritional value, uses, geographic distribution, morphological description, and areas of needed research. Information on known toxicities of some of these plants was lacking; for example, no reference to toxicity was given in the description of chaya which contains cyanide. Each plant has an accompanying color picture.

As a nutritional guide, this book does not offer much information on the indigenous uses or agricultural practices for the described plants. It is a good introduction to anyone interested in becoming familiar with native Central American plants and their nutritional contribution to the diet. Available free upon request from Dr. Cecilio Morón, Oficina Regional de Política Alimentaria y Nutrición, Oficina Regional de la FAO para América Latina y el Caribe, Casilla 10095, Santiago, Chile; fax (56-2) 2182547.

LES QUATRE SAISONS DU JARDINAGE, an organic gardening magazine in French, is available from the association Terre Vivante in southern France. The publication is a lively mix of practical information on selection and organic culture of featured fruits and vegetables, ideas on techniques and simple equipment of use to the farmer, and articles related to animals, ecology, and cooking. (Unfortunately, no one on ECHO's current staff reads French well enough to make our own evaluation. We were not even sure whether the article on frogs in one issue was a description of their role as garden wildlife or their contribution to the kitchen!) Most pages have good color photos or summary diagrams and charts. The magazine is tropical in focus, but gives new ideas on methods which may be adapted. Six issues per year cost 213F (about US\$42), overseas.

Those who may be passing through France may wish to visit the Terre Vivante European Ecological Center, a farm with working demonstrations on sustainable living. Those interested in *Les Quatre Saisons* or the Center can contact Terre Vivante, Domaine de Raud, B.P. 20, 38711, MENS Cédex, France; fax: 76.34.84.02.

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17391 DURRANCE ROAD
NORTH FORT MYERS, FL 33917-2200 U. S. A.
PHONE 239/543-3246 FAX 239/543-5317
EMAIL 74172.370@compuserve.com

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