

**THE RUS PUMP.** Wayne DeYoung in Haiti writes about a pump that he is sure will interest our network. It was used in a water well project by Dan Cook and others in Haiti. Wayne believes that it has phenomenal value for many gardening situations along rivers or ponds or where a hand dug well is available. His letter was written about the time that EDN-37 was in the mail. This issue reviewed *How To Build a Rus Pump* and other appropriate technology brochures offered by World Vision of Australia. It appears that Wayne is describing this same pump. So here is a timely testimonial.

"Dan is doing a gardening project where water is the main limitation. They dug a 45 foot deep well at 50¢ a foot, only to find that pumps were outrageously priced, especially now with the United Nations embargo. Then he heard that the Reeves in Gonaive had made a pump from PVC pipe. He bought about 50 feet each of 1¼ and ¾ inch pipe for US \$50." Wayne then describes how homemade foot valves were attached to the bottom of each string of pipe and the ¾ inch string fitted inside the larger one. [ED: a "string of pipe" refers to a series of pieces of pipe connected to make a long section.] "By pumping the ¾ inch pipe up and down it pumps water beautifully, at least 5 gallon a minute."

Our own appreciation for this design was heightened last summer. Merrill Esch, who was studying at ECHO in preparation for work in Honduras, built a Rus pump for ECHO from the Australian design. It is unbelievably simple to build. The only part that might be difficult for some would be making the hardwood valve. Merrill even simplified that by using a 2 inch long piece of bamboo. Note that if the inside pipe is extra long, water can be lifted quite a distance. The bottom section of the Rus pump lifts water by suction, perhaps 6 meters (18 feet), then pushes it the rest of the way.

World Vision Australia and Rus have kindly given us permission to print details of the design. **SEE FIGURE 1 ON PAGE 2.** Oops! In looking at the review in EDN 37-5 I find that the ordering address for the original brochure is missing. The complete set of brochures (*Rus Pump, Making a Hydraulic Ram, Digging a Tube Well and Making Ferro Cement Water Tanks*) is available from World Vision of Australia for A\$5 (about US \$3.75). Write World Vision, G.P.O. Box 399 C, Melbourne, Australia 3001.

**UPDATE ON NUÑAS (POPPING BEANS).** The international research center CIAT in Cali, Colombia is working (on a small scale) with nuñas. Dr. Jeffery White, CIAT bean physiologist, says the beans do not produce well and are susceptible to most bean diseases, so farmers grow them less and less. "In fact, the crop is probably disappearing." Dr. Julia Kornegay at CIAT has crossed popping bean varieties with disease-resistant common beans and sent the progeny to Peru for testing. But when crossed with ordinary beans, the offspring lose their popping ability. Special breeding techniques are needed to recover that trait.

"There are about 30 types of nuñas that differ in seed size, shape and color, but all taste similar. ...They retain their popping ability for years if stored at low temperature and low humidity. But they lose the popping trait in a few months if stored improperly." Dr. Kornegay would like to see popping beans marketed internationally.

**BLOSSOM END ROT ON TOMATOES.** While a fellow gardener and I were sharing gardening experiences the other day, he mentioned that he had added too much nitrogen and caused blossom end rot. This is a very common problem with tomatoes. A spot begins to rot where the blossom was originally attached (opposite from where the stem attaches). I replied that it is *calcium* deficiency that

causes blossom end rot.

It turns out that we were both right. The March/April issue of *National Gardening Magazine* quotes Ohio State tomato physiologist Dale Kretchman, "Nitrogen fertilizer will encourage lush top growth , at the expense of the root system. The plant will get too big for its roots *to supply it with other nutrients* and water, and you set the stage for blossom end rot, which is really a response to calcium deficiency. There is no doubt that gardeners [in the USA] fertilize their tomatoes too much."

**FIGURE 1. Design for the Rus pump, courtesy of World Vision Australia and Rus Alit.**

NOTES FROM ECHO'S EXPERIENCE WITH THE RUS PUMP BUILT BY MERRILL: (1) SELECTING A PIECE OF BAMBOO OF THE APPROPRIATE DIAMETER IS EASIER THAN MAKING A HOLLOW HARDWOOD CYLINDER. (2) RUBBER FLAPS MADE FROM INNERTUBES ARE NOT THICK ENOUGH. CUT THEM FROM TIRES AS THE BULLETIN SAYS. (3) PVC PIPE OFTEN COMES WITH ONE END ENLARGED SO THAT THE NEXT PIECE WILL FIT INTO IT. MERRILL FOUND THAT USING THIS ENLARGED END FOR THE UPPER VALVE MADE JUST THE RIGHT FIT INSIDE THE LARGER PIPE. HE JUST FORCED THE BAMBOO INTO THE END AND DID NOT NEED TO MAKE ANY SPECIAL FITTINGS. NOTE, HOWEVER, THAT WE HAVE NOT USED THE PUMP UNDER FIELD CONDITIONS.

**MUSHROOMS IN GHANA.** The Ghana Export Promotion Council is attempting to make Ghana a major exporter of mushrooms. They are involved in production of pure spawn for mushroom growers and run

three-week training courses for commercial growers... Write them at P. O. Box M146, Accra, Ghana. (Condensed from Spore magazine, December 1992, p. 10).

**BEFORE YOU GET EXCITED ABOUT SPICE PRODUCTION, CONSIDER THIS.** (Condensed from Spore magazine, December 1992). Perhaps growing up on a small farm in Ohio made me a cynic, but it seems that any farm product that is at all profitable will be overproduced within a few years. It is happening to spices.

Three years ago black pepper sold for US \$ 2,428 per ton. By mid 1992 it had fallen to \$1,000. The price of cloves dropped from \$5 per pound a decade ago to 80¢ (because Indonesia, which imported vast quantities to flavor cigarettes, now produces its own.) In Madagascar, clove trees are being cut for firewood. Vanilla pods dropped from \$74 per kg to \$50. Madagascar had vanilla stocks at the end of 1990 equal to 2-3 years' total world consumption!

Are there any [temporary] bright spots? Markets for chili and paprika peppers remain strong and there is some room for growth. The market for cassia and cinnamon is steady because of their use in cola drinks. Allspice is in short supply and prices have risen. The use of spices which are used as a natural coloring (e. g. paprika and turmeric) may increase. Some spices, e. g. black pepper and vanilla, can be successfully intercropped. Black pepper grows well using coconut tree trunks as part of its support.

"It is quite clear that 'Will it grow?' is not the first question to be asked. 'Will it sell?' is a better starting point."

**BUNCHY TOP ON PAPAYA.** Some of ECHO's Malaysia exotica papaya trees developed what I presumed to be the disease "bunchy top." Because this is a viral disease, we did nothing to try to control it. Fruit production almost stopped, and what did ripen was so low in sugar as to be uninteresting. We cut the trees and have replanted.

Yong Lee Ming at the Tenom agriculture experiment station in Malaysia sent us some fresh seed, and some important information. "The problem may not be due to a virus. The symptom you described appears to be similar to what we have in Malaysia, but so far is not a big problem and often easily controlled. The so-called bunchy top symptom is often caused by thrips and/or a fungus." He sent us a research report done in Malaysia called "Bunchy and malformed top of papaya cv exotica caused by thrips parvispinus and Clado sporium oxysporum." (Write us if a copy of the article would be helpful). Excerpts follow.

A previously unrecognized disease of papaya (cv exotica) was first observed on nursery plants, then in the field, where more than 50% of plants were affected. Plants showing the symptoms, bunchy and malformed tops, were slow to recover, and had almost no yield if infection occurred before fruiting.

"At a cursory glance, the symptom appeared similar to papaya mosaic virus disease which has not been reported in Malaysia thus far. Closer examination, revealed that the leaves did not exhibit the marked chlorosis and vein clearing of the crown leaves which are characteristic of papaya mosaic disease."

Subsequent research showed conclusively that the syndrome was due to the attack of thrips followed by infection of young leaves with the fungus C. oxysporum. The fungicide benomyl alternated weekly with mancozeb gave complete control. Control of thrips with insecticide was partially effective, but not recommended. It is believed that the thrips are pollinating agents as well; inadequate pollination in papaya may lead to premature fruit drop and reduced fruit size. The cultivar exotica (developed for its disease resistance) was more susceptible than some other Malaysian cultivars.

[It is almost impossible to hear the "s" in 'exsotica'. I missed it when I was first given this seed in Malaysia and have introduced it widely as 'exotica.' At this late date I will not try to change it back. Besides, 'exotica' has intriguing connotations in our culture and I have become attached to it. I guess this is a living example of how languages change.]

For a small packet of Dr. Ming's seed, drop us a line. (All seed is free to development workers, \$1.75 to others). Bonnie and I much prefer its flavor to any of the other solo papaya cultivars.

### **FOR YOUR INTEREST ONLY.**

**Benlate disaster.** (Abstracted from the *Avant Gardener*, February 1993) Benlate has long been considered the best systemic fungicide available. Somehow a contaminant got into some batches and caused millions of dollars in damages (reportedly Dupont has paid \$490 million in settlements). Now the largest commercial grower of clematis, a popular ornamental in the United States, has lost 85% of its 1.1 million plants to Benlate contamination. Just 35 varieties have been left from 330.

**What is the aroma** that is released when hot peppers are heated in cooking oil? The substance that makes peppers hot, capsaicin, breaks down into vanillin and some other substances. Vanillin is the main flavor in vanilla. (Abstracted from *Organic Gardening Magazine*, p. 25, April 1993.)

**DON'T CURB CALCIUM WHILE TRYING TO PREVENT KIDNEY STONES.** (Adapted from *Science News*, Vol 143, March 27, 1993). Most kidney stones are made up of crystals of calcium and a naturally occurring substance in some plants called oxylates. Many plants contain such high amounts of oxylates that we must temper our enthusiasm for those plants. Amaranth leaves and carambola fruit are good examples.

The conventional wisdom is that people with kidney stones should cut back on calcium in their diet. According to a study reported in the March 25 *New England Journal of Medicine*, men who ate a diet rich in calcium had a 34% *lower* risk of kidney stones than men who followed a restricted calcium diet.

"This goes against everything we have been taught," said one of the authors, kidney specialist Gary Curhan. He suggests that the reason may be that oxylates in the diet combine with calcium *in the intestine* in normal diets, creating insoluble crystals that are excreted. A low calcium diet would allow more oxylate to enter the bloodstream and eventually form insoluble crystals with calcium in the kidneys.

Dr. Curhan is not recommending added calcium, but that calcium not be reduced. I cannot help but wonder, though, whether taking extra calcium when I am going to be eating high oxylate foods might result in more of the oxylates being excreted harmlessly.

On a side note, the same study also found that men who ate a potassium-rich diet had a 50% lower risk of stones than those who ate the least amount of potassium. Bananas, oranges and grapefruit are good sources of potassium.

**ECHO (AT LEAST TEMPORARILY) HAS AN EMAIL ADDRESS.** We subscribed to an email (electronic mail) service specializing in the former Soviet Union. We may discontinue the contract at the end of the northern Russian growing season. Because they have gateways to other email services, you can presumably write to us if you have an email account. Our address, at least through September, is [seed@sovusa.com](mailto:seed@sovusa.com). If there is enough interest in using email among our network, we would gladly maintain an email account (perhaps with a different company). Let us know.

**GARLIC TO KILL SNAILS?** Drs. D. K. Singh and A. Singh at the University of Gorakhpur in India looked at the molluscicidal properties of an extract of common garlic, *Allium sativum*, against snails. Aquatic snails, *Lymnaea acuminata*, that serve as intermediate host for parasites which cause fascioliasis of cattle were chosen for the experiment. Ten snails were placed in each glass aquarium. The required amount of garlic cloves was minced in 5 ml water, homogenized for 5 minutes [in a blender], and centrifuged at 1000 g for 10 minutes and added to the water. [Ed: For other than experimental use, this procedure could be greatly simplified. E. g. filtering could probably replace centrifuging.] Each experiment was repeated six times. Concentrations are expressed as weight of garlic clove per liter.

The LC<sub>50</sub> value (the Lethal Concentration required to kill 50% of the snails) was both dose and time dependent. Thus with an increase in exposure time, the LC<sub>50</sub> of garlic decreased from 55 mg per liter at 24 hours to 30 at 48 hours and 12 at 96 hours. The LC<sub>90</sub> (the concentration to kill 90% of the snails) at 96 hours was 36 mg garlic.

How does this compare with commercial molluscicides? The 96 hour LC<sub>50</sub> of two synthetic molluscicides is higher (i. e. less effective): phorate is 15 mg and carbaryl is 14 compared to 12 for garlic. However, the standard molluscicide niclosamide has five times higher toxicity in 24 hours (LC<sub>50</sub> = 12 mg) than garlic (55 mg). The authors believe that if the active ingredient were further purified, it would probably be more toxic than the best synthetic.

**SWEET AND BITTER CASSAVA AND CYANIDE CONTENT.** Dr. M. Bokanga writes in the March 1993 issue of *IITA Research* that "varieties of cassava classified as sweet may have a high cyanogenic potential and those classified as bitter may be low." He measures cyanide as "cyanogenic potential" because pure cyanide does not occur in cassava -- it is produced upon processing or eating. A panel rated several cassava varieties as bitter or nonbitter. Taste was not a reliable indicator of cyanogenic potential. Nonbitter varieties ranged from 0.91 to 10.6 mg cyanide per 100 g fresh weight of cassava. The range for bitter varieties was 5.0 to 39.9 mg.

Boiling is not an adequate method for detoxifying cassava, but it does reduce it, according to the authors. "Boiling cassava roots, which is considered minimal processing, reduces the cyanogenic potential by at least half." This conflicts with the book *Toxicity and Food Security* reviewed in EDN 38-2. Other processing methods (EDN 38 pp 2-5) can reduce it by more than 90%.

**EGUSI CAN REDUCE WEEDS IN CORN.** We first offered egusi seeds in 1984 (EDN 7-1). A recent article on weed control by the International Institute of Tropical Agriculture (IITA) in Nigeria says, "In most parts of West Africa, farmers grow egusi, *Citrullus lanatus*, a spreading herbaceous plant grown widely for its seed, at a wide spacing to maximize fruit size. Studies at IITA and elsewhere show that crops such as maize and cassava interplanted with egusi need to be weeded only once (within 2-3 weeks) after planting if the melon is grown at densities of 20,000 plants per hectare." Without egusi the field had to be weeded 2-3 times. "Ground cover by egusi suppresses weeds until the melon is harvested, by which time the crops have developed a canopy cover of their own."

[ED: Egusi, related to water melon, looks and grows much the same way. Vines do not climb.]

**PLANT PROTECTION IMPROVEMENT PROGRAM (PIIP) FOR BOTSWANA, TANZANIA, AND ZAMBIA.** Johan Morner, the PIIP Manager, writes that "PIIP is currently striving to increase its contacts with non-governmental organizations (NGOs)" that are working in the above three countries. If you work in this region and are involved in any of the activities listed below, you may be able to obtain financial and/or technical support from PIIP. It is funded by the Swedish International Development Authority. PIIP support can be given to national institutions, NGOs or individuals.

"Examples of the types of activities that might qualify for support are (1) training courses on new pest control methods, (2) pest surveys and yield loss assessment in small-scale farming, (3) research into new and appropriate pest control -- indigenous methods, natural pesticides, cultural practices, (4) development of extension materials and methods on appropriate pest control practices and the safe use of pesticides."

For further information contact the PPIP Coordinator at one of the following addresses. IN BOTSWANA: Dept. of Agricultural Research, Private Bag 0033, Gaborone, Botswana, phone 267-35 97 80, FAX 267-31 42 53. IN TANZANIA: Sokoine Univ. of Agriculture, Dept. of Crop Science and Production, Box 3062, Morogoro, Tanzania phone 255-56 4079 FAX 255-56 3599. IN ZAMBIA: Univ. of Zambia, School of Agricultural Sciences, PO Box 32379, Lusaka, Zambia FAX 260-1 25 05 87. IN SWEDEN: PPIP Coordinating Unit, Swedish Univ. of Agricultural Sciences, PO Box 7044, S-75007 Upsala, Sweden, phone 46 18 67 25 16, FAX 46 18 67 28 90.

**SEED FOR QUEENSLAND LETTUCE.** Pat and Connie Lahr gave us a packet of seed for this lettuce after a visit to Australia. I was sufficiently impressed with our initial crop to make it a priority this year to harvest enough seed to offer to our overseas network.

Not much information comes with the seed. My apologies to our Australian readers if any of this is in error. Pat believes it is grown primarily by an association of organic market gardeners. As far as he knows seed is not sold commercially. It is a big leaf lettuce that appears to be exceptionally resistant to bolting. Leaves are large, somewhat resembling a cos type lettuce, with an attractive yellowish hue. In Australia they say it produces 8 weeks in summer, up to 14 weeks in winter and that it is best to use lower leaves.

My main interest is their apparent resistance to heat. We have not done carefully controlled experiments, but 'Queensland' appears to outlast most of our lettuce varieties when the warm season arrives. Both times we have grown it I have wondered, "Is this ever going to bolt so we can save seed?" (A key to preventing bolting is to make sure the plants are never water stressed. It might well be that they would bolt quickly if we did not have irrigation.)

Members of our network working in Third World development can request a free trial packet. Be sure to save your own seed if it does well. Others please send \$1.75.

**SERVANTS' MISSIONARY SERVICE.** Kristin Kroll (Food for the Hungry, Kenya) writes that the periodic letters she sends to her supporters in the States are handled by this unique organization. Their sole purpose is to publish and mail "prayer" letters of Christian missionaries. To encourage supporters to write notes to you, they place at the bottom of each letter a "**Short Note**". This can be returned to them in the envelope provided and they send it air mail with others. Kristin says, "They do a nice job, really quickly, it does not cost much, and a lot of people who never would have written send in the "short notes."

Founders Ron and Sue Faircloth say your letter can be sent to them by mail, FAX or email or on computer disk. They can scan drawings into the computer. Average turn around time is 5 days. For a list of prices and policies, write them at Servants Missionary Service, Inc., P. O. Box 3488, Columbia, SC 29230-3488. Phone 803/754-2929; FAX 803/786-8903; Compuserve # 70413-2445.

**TV SERIES LOOKING FOR PROJECTS.** Premilla Dixit writes, "I am working on a five-part documentary film series on sustainable agriculture systems worldwide. Titled *The Golden Harvest*, this series will present the history, culture, philosophy, economics, markets, environmental and health impact and policy concerns of the sustainable agriculture movement. Executive Producer for the series is

eminent documentarian David Kennard whose credits include such TV series as *Cosmos*, *Ascent of Man*, *We the People*." They are "in the process of identifying and researching the projects we might want to include in this series. ... As filmmakers we are interested in both the data and the personal stories." If you have a recommendation, write Premilla Dixit, c/o Ms. Elisabeth Beaird, 1201 Judah, San Francisco, CA 94122.

## ECHOS FROM OUR NETWORK

**Martin Gingerich, Haiti.** The note in EDN 39-4 on using Guinea grass, *Panicum maximum*, as a mulch for onions arrived while Martin was learning about a traditional system using Guinea grass in Haiti. This is in an area near La Valee Jacmel at about 800-1000 meters and 2,000 mm (80 inches) of rainfall. He writes, "Just like the example from Jamaica, the system is used by all farmers in the area and no planting is attempted without it. We could not find anyone who remembers when people started using the system. It is older than those using it today."

"Farmers grow mostly corn, beans and some cabbage. There are plots that have only Guinea grass, often owned by larger landholders. Once a year the grass is harvested. A farmer wanting to plant a grain crop in the coming months will purchase and harvest a plot of Guinea grass, which he spreads over the entire field that he intends to plant. These are not large fields. The next step is to tie an animal in the plot to eat and trample the grass. They use horses, burros, mules, cattle and goats. Pigs are tied near the house and their refuse is carried to the field. After the farmer removes the animal from the field he lets it set 2-3 weeks. He then deeply tills the field with a pickaxe, incorporating some of the Guinea grass and leaving some on the surface. Planting is done soon after tillage."

**A CORRECTION.** I somehow got the name of Dr. Lesley Currah's organization wrong in the onion article in EDN 39. She works with the Natural Resources Institute (not National Research Institute). Also, on page 39-2 we said that Texas grano type onions have good over-wintering storage characteristics. We should have said that they over-winter well *in the field* but have poor storage characteristics in general. "Dr. Currah asked me to mention that readers of EDN are welcome to write to NRI (but not to her) for their list of publications. Good idea. See the note under "Books". By the way, we still have plenty of seeds for the onion variety trials. Let us know if you want the 6 or 12 variety trial. When that trial is over, write for a second trial. We have over 30 varieties all together.

## WORKSHOPS AND COMING EVENTS

**MEDICAL AMBASSADORS INTERNATIONAL** along with Food for the Hungry offers a program "developed and tested over many years to train people who want to establish a community-based health care program which also integrates evangelism and discipleship. We can also assist those who have already established their own program and want to integrate evangelism and discipleship components." They quote a past participant, "My organization talks about integration of physical and spiritual but they do not tell me how to do it. This training has given me the How-To's to help us establish such a work." Training takes place in Colorado Springs October 18-23, 1993 and costs \$300 for room, board and tuition. For details and application write Attn: CHE, Missionary Internship, P. O. Box 50110, Colorado Springs, CO 80949. The phone number for the director of the program, Stanley Rowland, is 209/524-0600, FAX 209/571-3538.

**Third international course on Fodder Tree Legumes - multipurpose species for agriculture,** November/December 1994 at the University of Queensland, Queensland, Australia. "The course will comprise a six week program of lectures and field visits to commercial properties and experimental stations in tropical and subtropical Australia." Cost A\$12,000. Write Dept. of Agriculture, University of Queensland, St. Lucia, Queensland 4072, Australia. Phone (61-7)365-2062; FAX (61-7)365-1188.



## BOOK REVIEWS

**PUBLICATIONS CATALOG OF THE NATURAL RESOURCES INSTITUTE (NRI).** How does one review a 68 page catalog of books in a few paragraphs? For starters, NRI is the scientific arm of Britain's Overseas Development Administration. They work in resource assessment, integrated pest management, food storage, processing, packaging, transport and marketing.

We have already reviewed one of their titles, *Food Legumes*, (EDN 36-5), one of the most useful books in our library. *Their several hundred titles are available at no charge to organizations working in countries that are eligible for British aid.* I will list JUST A VERY FEW titles under each category in their book catalog to give a "feel" for the range of subjects. Some are large books; many others are booklets. Many are relevant to community-level development; others are oriented more toward research or country-wide development. To order a catalog, write NRI, Central Avenue, Chatham Maritime, Kent, ME4 4TB, United Kingdom. FAX 0634 880066/77. A partial listing follows:

**Land Resources:** *Land Resources Assessment of Northern Belize; Development Prospects of the Southern Rift Valley in Ethiopia; A Soil Survey of Seychelles.* **Forestry:** *Pulping Characteristics of Hardwood Species Growing in Plantations in Fiji [there are many studies of pulping characteristics of specific trees]; Field Guide to Forest Trees of Ghana; Charcoal Production - a Handbook.* **Crop Production:** *[Only 3 titles of general interest] Onions in Tropical Regions; Root Crops; Food Legumes.*

**Processing of Non-Food Crops:** *Processing of Oil Palm Fruit and its Products [most of the rest relate to dye products].* **Processing of Food Crops:** *Processing of Macadamia Nuts; Starch Extraction - a Checklist of Commercially Available Machinery.* **Food Storage:** *Food Storage Manual; Storage and Handling of Onions; Evaluation of Structures Suitable for Emergency Storage in Tropical Countries.* **Grain After Harvest:** *Training in Grain Post-harvest Technology for Developing Countries; Fumigation Technology for Developing Countries.*

**Pests:** *Constraints on Adoption of IPM in Developing Countries; Pest Control in ... [several titles: Groundnuts; Tropical Legumes; Tropical Onions; Tropical Root Crops; Tropical Tomatoes]; Locust and Grasshopper Agricultural Manual; The Desert Locust Pocket Book [a great many locust titles, most very technical].* **Post Harvest Technology:** *Guidelines for Management of Insect Pests and their Natural Enemies in Wetland Rice; Use of Plants and Minerals as Traditional Protectants of Stored Products.*

**Animal Feeds and Products:** *Production of Protein Foods and Concentrates from Oilseeds; Small Scale Manufacture of Compound Animal Feed (reviewed in EDN 37-6); Manufacture of Leather Uppers; Rabbit as a Producer of Meat and Skins in Developing Countries.* **Fish:** *An Illustrated Guide to Fish Preparation; Fish Handling, Preservation and Processing in the Tropics; Comparative Study of Solar and Sun Drying of Fish in Ecuador.*

**Producer Gas:** *Wood and Agricultural Residue Combustion Systems - Survey of Commercially Available Equipment; Producer Gas - its Potential and Application in Developing Countries; Anaerobic Digesters for Small-scale Vegetable Processing Plants.* **Rural Technologies:** *Pedal Powered Grain Mill; Charcoal Production using a Transportable Metal Kiln; Heat Production from Sawdust.* **Industrial Economics:** *Manufacture of Dry-cell Batteries; Industrial Profile of Breadmaking; Economic Aspects of Small-scale Fish Freezing; Tanning of Hides and Skins; Tomato Paste or Puree - an Industrial Profile; Industrial Profile of Small-scale Expelling of Vegetable Oil; Guide to Economics of Dehydration of Vegetables in Developing Countries.*

**Marketing:** *Methodologies for Studying Agricultural Markets in Developing Countries; Selected Markets for Chilies and paprika; Market for Dried Fruit in the United Kingdom, Germany and France.* [There are many other highly specific marketing studies]

**HEDGES FOR RESOURCE-POOR LAND USERS IN DEVELOPING COUNTRIES.** When we offered our small Technical Note on living fences in EDN 32-8 I asked whether anyone knew of a well-illustrated and carefully written book on the subject of living fences. Jörg Henninger in Paraguay told us about this book. He wrote, "Its 256 pages give orientation about techniques for establishing and management of hedgerows, uses and functions, social and economic issues and a list of species applicable. It has about 57 tables and 92 figures. I love this book because it is by far the most complete one I know."

Now that I have the book, I can understand his enthusiasm. The book is exceptionally thorough, perhaps to a fault. (My personal preference is for a "get to the point" briefer style of writing.) I have selected a few highlights to give you a flavor for the book, and because the information itself is worthy of a note in EDN.

"Lac production on hedges can be an incentive for soil conservation." Shellac is made from the resinous secretion by the lac insects. Several hedge species are listed, including acacias and pigeon pea Cajanus cajan. "In Thailand lac lice raised on pigeon peas planted on contour bunds for erosion control has been promoted by one project. Loss of cropping area to the hedge row can be more than compensated by selling of stick lac and pigeon peas."

For many farmers the only option is a stockproof hedge without barbed wire. Such a hedge should be low-growing, sturdy, multi-stemmed from the base (or low branching), dense branching with rigid or entangling branches and a spreading crown, small, sparsely distributed leaves that cast little shade, have spines, prickles or thorns, be resistant to fire, trampling and browsing; require little upkeep; be capable of regeneration if damaged. Not many plants meet these characteristics. So often a mixture of plants are used to fill in the gaps and strengthen the barrier. The following categories can be distinguished: framework plants, fillers, and entanglers. Four pages with 15 tables list trees and shrubs (names only) with high potential for: food, forage, fuelwood, timber, soil conservation, ornamentals, fillers, irritants, entanglers, fence reinforcers, garden hedge, windbreak hedge, general security hedge, live fence post, tropical highlands, humid tropics, arid & semi-arid tropics.

The weakness of the book, for development workers, is that you can read a great deal and still not have much of an idea as to what to do locally. I found the four brief case studies especially relevant, and wish there had been 400. Two case studies are summarized next.

Villagers in Huancal, Peru (3600 meters, temperate cold, 600 mm rainfall) developed this system after natural vegetation disappeared. Small fields are surrounded by a living fence of Cassia. Annual crops are grown followed by a fallow period in which animals graze in the fields. Just before planting the trees are coppiced, leaves used for mulch and wood dried for firewood. The Cassia has been growing 4 years and the cycle starts again. A study showed that Cassia (planted 1.5 m apart in the fence row) makes an average family self-sufficient in their annual fuel requirement.

In arid watersheds, many flood plain farming communities have disappeared or shrunk because the land bases have been destroyed by flood. In contrast farmers in the upper Rio San Miguel have maintained a fairly stable agroecosystem. Use of living fences is a key reason.

Living fences are planted along the margins of the riverbank. Farming takes place on the floodplain. Flood water carries a heavy load of top soil from overgrazed rangeland upstream. As the flood begins to

overflow into the space between the fencerows and the edge of the cultivated area, the force of the water is broken by the trees and by brush that is deliberately thrown in around their bases. (The brush also helps keeps cattle out). The sediment load of the less rapidly moving water settles out behind the trees, fertilizing the fields. The fences also retard erosion and cutting of new channels. Eventually enough alluvium is accumulated behind the fencerows that cultivation can be extended right up to the row of trees [elevation is increased].

To make hedgerows, cuttings are taken from Populus fremontii (a cotton wood tree) and Salix gooddingii (a willow). Brush from various local species is woven between these vertical posts. Cuttings (3-4 m) are trimmed from all branches and leaves and planted in trenches (1.5x0.5x0.5 m) at a planting distance of 0.5-0.75 m. One cottonwood is planted

between a dozen willows. Mature trees in older fencerows are pruned so that the trunk is about 2 meters.

The book is published by the GTZ, which will often send a book at no charge to a non-profit development group working in the Third World. You might write on official letterhead and see if you qualify. The address is GTZ; Dag-Hammarskjöld-Weg 1 + 2; D-3236 Eschborn; Germany. DO NOT WRITE to ECHO for the book. If you only want the four pages of tables, ECHO can send a photocopy. Ask for the hedgerow tables mentioned in EDN-41.

**INDEX FOR ISSUES 1-35.** In February we updated the index to include all issues of EDN through # 35 (the first ten years). If you have the issues and want the index, drop us a line. (No charge if you work in the Third World; \$1 for others).

**INFORMATION ON BACK SETS OF EDN.** It is time to begin offering a second backset of EDN issues. Set # 2 includes issues of EDN (in a binder) that were published since the first backset grew too large to keep expanding. It was "closed" at 10 years (issue 35). The price will increase by \$1.25 after each new issue. The current price, for issues #36 - 41 is \$7.50. Add 10% for U.S. and Canada postage, 20% for airmail overseas. Remember, payment must either be by check on a US bank or by credit card (MasterCard or Visa; include card number and expiration date).

**THIS ISSUE** is copyrighted 1993. Subscriptions are \$10 per year (\$5 for students). Persons working with small farmers or urban gardeners in the Third World should request an application for a free subscription. Issues through #35 in a binder, *EDN: the First Ten Years*, costs \$20 plus air postage: \$3.00 USA (surface), \$6 Latin America, \$10 Europe, \$13 elsewhere. ECHO is a non-profit, Christian organization that helps you to help the poor in the Third World to grow food.

**ECHO DEVELOPMENT NOTES -- ISSUE # 41**  
**17430 DURRANCE ROAD**  
**NORTH FORT MYERS, FL 33917-2200 U. S. A.**  
**PHONE 813/543-3246 FAX 813/543-5317**