

# EDN

## ECHO DEVELOPMENT NOTES

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### A POSITIVE EXPERIENCE WITH EUCALYPTUS.

Missionary Rodney Babe heads a project in Haiti that has had an impressive impact on the community. It is based on reforesting extremely eroded mountain soil with eucalyptus, a tree that is often maligned by farmers and development workers because of its supposed competition for water with food crops. While there have been problems with eucalyptus in some situations, is it being too quickly overlooked? We interviewed Rodney at an ECHO Conference held in Haiti in January.

"The soil is severely eroded and sandy and often there is very little of this poor soil on top of bedrock. There is a severe problem with goats running loose. Less than 10% of the land can be farmed because of the erosion. Most of the soil has no plant covering. Perhaps 2% of the land was covered with trees when we began. (There were a few coconuts and mature mangoes but no young mangoes.) The area receives about 60 inches of rain each year in two rainy seasons. The maximum altitude is 2500 feet. The average farmer owns less than a hectare of land. Slopes up to 60% are considered farmable. Soil pH is neutral."

"The local farmers said that eucalyptus dried the soil and casuarinas poisoned the soil. They thought that leucaena produced too many seeds and that neem would take over. Livestock will not eat casuarina, but they will bite the terminal leader and turn the tree into a bush. They preferred fruit trees." Rodney suggested planting trees as a "crop," with the idea of harvesting them later. This was a new idea to them and they liked it. In the past he has seen farmers accept free tree seedlings but throw them in a ravine rather than plant them on their land."

Of the trees Rodney planted, no fruit trees survived. Goats killed off the leucaena. Neem trees died in transplanting. They decided to try eucalyptus because goats would not eat it. They also planted several other popular native trees, including mahogany. After the first year 75% of the eucalyptus trees had survived but essentially none of the other trees. The average height was 3 feet [.9 m]. After a year and a half the trees ranged from 6 to 15 feet [1.8 to 4.5 m], depending on soil conditions.

"We decided to put 1/4 pound [.11 kg] of fertilizer in a semi-circle one foot from the trunk on the up-hill side of the eucalyptus trees that were 6 feet [1.8 m] tall or less. While fertilizing we made a small hole to hold rainwater, and cut

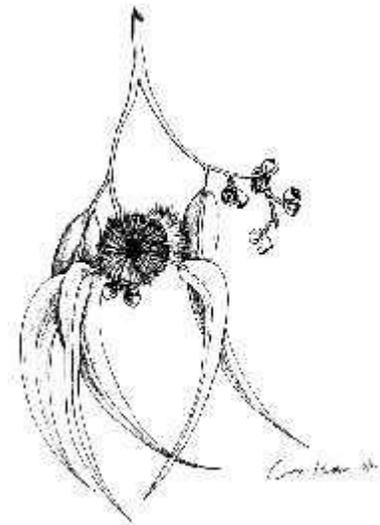
any grass near the trunk. During the next rainy season the trees doubled in height in 2 months. So in future plantings we began using 1/3 pound [.15kg] of fertilizer one month after planting. The fertilized trees reached 12-15 feet [3.6-4.5 m] in a year; unfertilized trees reached about 3 feet [.9 m]. We felt that this initial rapid growth rate was worth the cost of the fertilizer." This was in part because even though animals did not eat the leaves, animals staked near small trees during the cropping season drag their ropes over smaller trees and damage them.

"We fertilized some sections a second time with 1/3 pound [.15 kg] per tree of 15-15-15 fertilizer after 5 months. These trees reached about 20 feet [6 m] in one year."

"After 2 1/2 years people were able to grow pigeon pea under the trees. Pigeon pea growth was not spectacular. The plants reached only 3 feet [.9 m] in a year rather than the normal 9 feet [2.7 m] and bore few peas. The second year the pigeon peas were cut and left on the ground and a new planting was made. This time the height and yield were about the same as in their home gardens. This might be because nitrogen-fixing rhizobia were present in garden soil but not in the eroded soil. So the next year we inoculated the pigeon peas under trees with rhizobia in some areas and not in others. Inoculation caused a 300-400% increase in yield."

"After growing pigeon pea for 2-3 years, people began growing sweet potato, peanut and some black beans. Trees were 10 feet [3 m] apart and gave a very diffuse shade. Now they are planting mango, citron, barbados cherry and a native lumber tree and are seeing about 25% survival."

"When the trees are 6 inches [15 cm] in diameter people are cutting them and making chairs. Quite a lot of chairs are



being sold. We teach them to thin the new sprouts that come from the stump."

"Now there must be a few million trees in a 12 square mile [31 km<sup>2</sup>] area. The largest are 50 feet [50 m] tall and 8-10 inches [20-25 cm] in diameter. Some are even starting to plant eucalyptus in their good gardens. Meanwhile we've attended dozens of seminars which tell us that eucalyptus trees hurt gardens. The project has been going for 6 years. The ultimate goal is to get mango and the native *Catalpa longissima* trees growing again."

We contacted Ido Kerpel, the nursery manager at Double Harvest in Haiti which grew the trees for Rodney's project. He has visited the project often. The species used was *Eucalyptus camaldulensis*, or 'river red gum.' He told us that it can be planted from the "mountains down to the coastal plains," withstands both waterlogging and drought, and reportedly can reach 60 feet [18 m] in 10 years under a 10 inch [250 mm] rainfall. The tree does not make a dense shade, thus allowing other crops to be grown in its vicinity (grass grows up to the trunk).

Ido commented, "It is often quoted that eucalypt leaves contain etheric oils which remain in the soil below the tree and serve as a herbicide. If planted around fields and yards, the concentration of the leaf residues is much too small to be of any effect to crops and grass. If large-scale eucalyptus plantings do indeed have this herbicide effect, I personally would still rather see mountains covered with eucalypt forests, useful for their wood supply, than useless bare mountains slowly disappearing into the ocean due to soil erosion. In my opinion, it is a much under-appreciated tree for community tree planting." ECHO can mail or E-mail Ido's other comments about this project (about 3 pages) if you would like to see them.

**ERYTHRINA HAS MANY USES.** [by Daniel Sonke and Tim Bootsma] Mark MacLachlan in Wolaitta (Saddu) Ethiopia writes, "We have a tree here that farmers find very useful, but I haven't seen much about it in other literature. I wonder if it wouldn't be useful to others in other countries. It is *Erythrina abyssinica*. Primarily it is used as a live fence that produces fodder, fuel, intestinal medicine, and is said to fix nitrogen. It is propagated as a fence by putting in cuttings--even as large around as a man's upper arm. The cuttings sprout and grow. Farmers gather the leaves to take to their cattle in the stalls. The species has small thorns, though not so many that they hinder collection of leaves for fodder. It isn't particularly fast growing, but, because it establishes so quickly, fast growth is not as necessary for fencing purposes. It is also said to be resistant to fire and termites. Seed generally has a low germination rate--but once some trees are established, vegetative propagation is simple in the proper time of year. A species with similar uses is *Erythrina brucei*, found only in Ethiopia."

The tree genus *Erythrina* is a very diverse one and, as MacLachlan describes, one which has many potential uses. The many benefits of the genus have been outlined in a field manual called *Erythrina: Production and Use* (review follows). The manual covers production techniques that are in use or have been studied.

Descriptions of growth range and patterns of the 115 different species occupy most of the manual's first chapter. There are *Erythrina* species in Asia, Africa, and in the Americas. The manual lists some of the better-known common names and their areas of origin, but gives little space to the identifying characteristics of species.

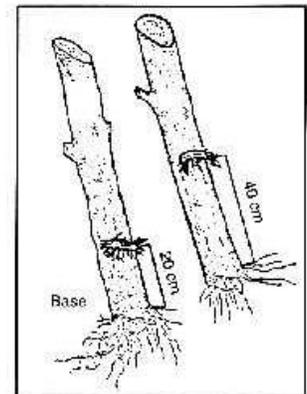
The second chapter deals with the establishment of plants by seed or cuttings. Diagrams and explanations of how and why scarification is needed are easy to read yet quite complete. Seed inoculation also is covered with easy-to-follow instructions using simple tools. The best time and size for taking cuttings for vegetative propagation are also well discussed.

The following excerpt describes vegetative propagation of stakes 1.5 m or longer:

"After cutting, [the stakes] may be planted immediately or stored up to two weeks in a cool, shady place. They should be stored in a vertical position--not piled on top of each other or laid directly on the ground. In preparing *Erythrina* stakes, the top (apical) cut should be made at a 45° angle.... Because *Erythrina* species sometimes have hollow stems, the top cut should be covered with paraffin, plastic, mud, or other material to avoid

accumulation of water. This is especially recommended for species with low survival rates from vegetative cuttings. In Costa Rica, establishment of *E. poeppingiana* cuttings was increased by 22 to 50% by sealing the top cut with paraffin."

"In some cases, it is useful to make incisions in the bark (to the cambium layer) near the base of the cutting in the area that will be just below the soil surface when the cutting is planted. This serves to enlarge the area of callus formation and stimulate the production of superficial roots. Because the base of the stake will be planted as much as 50 cm below the soil surface, young roots may suffer high mortality due to lack of aeration or water logging. By



Incisions near the base of cuttings stimulate superficial root growth. Source: NFTA.

stimulating callus and root formation near the soil surface, it is often possible to improve cutting survival considerably."

Subsequent chapters explain the many different uses of the genus. Discussions of *Erythrina* in alley cropping and shade cropping are given along with lists of the species that grow best in these different cropping practices. Use of certain species as living fence posts is discussed, along with some benefits, management practices, and problems of the technique. Also given are explanations of different feeding practices involving *Erythrina* fodder (*Erythrina* foliage is palatable to most animals, although it should not be used as a complete diet). Briefly discussions of medicinal, lumber, handicraft, human food, ornamental, fiber, dye, and windbreak uses are included in the manual.

The concluding chapters deal with pests and diseases (some of which cause significant harm) along with seed collection and storage. No pest control information is given, although a list of the types of pests commonly found in several regions is given.

Overall the field manual is an excellent guide to the diverse uses of *Erythrina* spp. A significant drawback is that it provides limited help in identifying species.

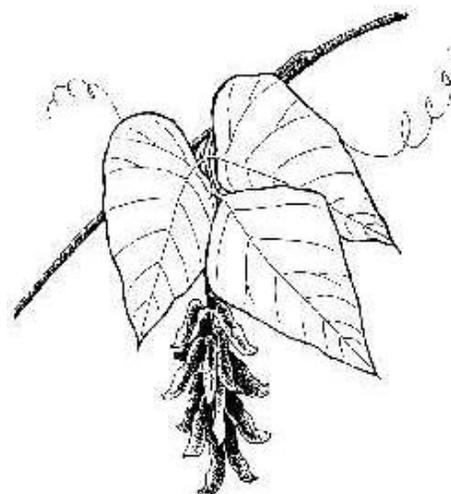
This 55-page publication is available from the Nitrogen Fixing Tree Association (NFTA) for US\$5 members or US\$7 for non-members. Field manuals on other nitrogen fixing trees such as *Leucaena*, *Gliricidia* and *Sesbania* are also available at similar cost. Write to: NFTA Network, Winrock International Rt. 3, Box 376 Morrilton, AR 72110, USA.

ECHO has seed of *E. berteriana* and *E. poeppigiana* available in our seedbank. These two species are native to the Americas. We encourage people elsewhere to try locating local species of *Erythrina* for experimentation before ordering these for introduction. Trial packets of *E. berteriana* and *E. poeppigiana* are free to those working with small farmers overseas; US\$2.50/packet for others.

**SOME INTERESTING QUESTIONS ABOUT VELVET BEANS.** Ursula Thomi, working in Chad, asked some interesting questions about the velvet beans she obtained from our seedbank (see ECHO's book *Amaranth to Zai Holes* [A-Z] p 169, 289 for more information about velvet beans). We thought the answers would interest others.

**QUESTION:** The velvet beans we planted do not begin to flower until early October, when it is too dry for the plant to form seeds. Also, intercropping with millet does not work well because the vigorous legume climbs the millet stalks, causing them to bend and making harvesting difficult. Can you suggest a solution?

**REPLY:** The velvet bean that most workers in the tropics and subtropics use requires short days to bloom. Here in Florida, no matter when this type is planted, the vines begin to bloom around November.



However, in the early 1900's another type of velvet bean was developed by the U.S. Department of Agriculture and became a major crop in the southeastern part of the United States. The "tropical" velvet bean would never set seed in states other than Florida, because winter would come just about the time the plants would be ready to bloom. Varieties were developed that would produce seed farther north, essentially throughout the "cotton belt." The beans were grown along with corn for forage and for the nitrogen and organic matter they added to the soil. Farmers used what is called "90-day" or "120-day" velvet bean. Flowering date for this variety seems to depend on how long the plant has been growing and is independent of daylength. Farmers apparently stopped growing them when fertilizers and mechanical corn pickers became common.

ECHO has seldom sent the "90-day" variety to our overseas network because growth appears to be less vigorous and the pods have a bit more itch-producing fuzz than the tropical kind. (The itch problem is still only a fraction of that caused by dreaded wild velvet beans.) Dopamine content appears to be a bit lower in this type than in most selections.

In Chad, the insensitivity to daylength of the "90-day" variety might mean that farmers could produce their own seed before the dry season becomes too severe. Also, because the vigorous growth is a problem, the lesser vigor of the "90-day" variety may be an advantage. Seeds for the "90-day" variety are available from ECHO. Trial packets are free to those working with small farmers overseas; others please send \$2.50/packet.

As for intercropping with millet or sorghum, we suggested Thomi try planting the velvet bean a few weeks after these grains, to give the grain a chance to get started before competition begins. In Central America, many farmers actually plant velvet beans near the end of the grain growing season, then let them grow up and cover the harvested grain stalks. We realize this might be too near the dry season to work in her situation.

A 1922 USDA extension bulletin (# 1276), *The Velvet Bean*, states "The yield of corn is decreased by the beans, depending on the rate and date of planting the beans and soil fertility. When corn is planted several weeks earlier than the beans, little damage occurs as the vines do not make sufficient growth to pull it down before the ears are nearly mature....Even though the yield of corn is decreased, the value of the beans for green manure or feeding will offset the loss to the corn crop. The cost of picking the corn, however, is greater...."

QUESTION: Velvet bean seeds contain dopamine, which can be harmful to animals in large doses. "Do leaves also contain dopamine, or can they be used for animal feeding? Fresh or as hay?"

REPLY: At ECHO, we've never seen any reference to whether leaves contain dopamine. However, we would not be surprised if it is found only in the seeds. According to the USDA bulletin quoted above, both leaves and seeds can be used as animal feed within guidelines. It states that large quantities were used for animal feed (in 1922):

"The value of velvet beans as a winter pasture, either for carrying cattle through the winter or for fattening them, is well established.... The crop may also be used for silage and hay," though "velvet beans are seldom used for hay because of the difficulty in handling the long tangled vines. If hay is to be made it must be harvested before many of the pods mature because the leaves shatter rapidly as the pods approach maturity. The hay is coarse and rough at best and is not relished by horses and mules."

"The most important use of the velvet bean is as a grazing crop for cattle and hogs in the autumn and winter. ...Hogs should be allowed to follow cattle to consume the beans which they have wasted [see later caution on using too much in pig rations]....A good stand of velvet beans should produce about 200 pounds [91 kg] of beef and 100 pounds [45 kg] of pork per acre."

"As velvet bean [plants and seeds] are very high in digestible protein, great care should be exercised in feeding them to livestock, especially at first. After the animals become accustomed to the beans they should be kept in the field for only a short period each day until the crop is somewhat reduced, as excessive consumption is a waste of concentrated feed. In addition, overfeeding sometimes has a laxative effect."

The bulletin reports that velvet bean meal was a common feedstuff for some animals, though feeding experiments indicated that "little benefit is derived from grinding the beans for cattle and...winter grazing will probably replace the picking of the beans for grinding." "In the manufacture of velvet bean meal the beans and pods were crushed together. Because it is not good to feed them alone, a

common mixture was to grind velvet beans in the pods with corn in the shuck. "In horse feeds velvet bean meal seldom forms more than 25% of the mixture, whereas for dairy cows it may run as high as 70%. A popular dairy feed is 15% cottonseed meal, 45% corn-and-cob meal and 40% velvet bean meal."

The protein content of velvet beans is 23%; of pods is 5%; beans and pods ground together 18%. By comparison corn is about 9% protein. "It requires about 2 1/2 pounds [1.1 kg] of velvet bean meal [pods and beans] or 1 1/2 pounds [0.68 kg] of ground beans to equal the feeding value of 1 pound [0.45 kg] of cottonseed meal."

Apparently farmers in those days had trouble with spoilage of ground beans. "Ground velvet beans heat quickly, become rancid and mold readily. Whole velvet beans, either dry or soaked, are much more palatable than dry ground velvet beans, which are so unpalatable that steers will not eat enough to make good gains."

"While [the seeds] usually give good results with cattle and sheep, even when fed in considerable amounts, they are generally unsatisfactory for swine when forming any considerable part of the ration and may even cause severe vomiting and diarrhea. ...When velvet beans do not form more than one-fourth of the ration, and an efficient protein supplement...is included, fair results may be obtained.

"At the Florida research station, corn and cracked velvet beans in various proportions were compared with corn alone as feed for pigs. In all cases the pigs made more rapid and cheaper gains on the corn and velvet bean mixture than on corn alone." In another test shelled corn and soaked velvet bean meal were fed to three hogs, the proportion of velvet bean meal being gradually increased from one-fourth to two-thirds by weight. The hogs made very satisfactory gains, and it was found that the feed produced hard pork.

"Velvet beans cannot be recommended for poultry, based on four years of experiments in North Carolina. When 22½% ground velvet beans was fed in the ratio, it produced a harmful [Ed: unspecified] effect on the health and performance of the birds." There is little doubt, based on what we now know about the high dopamine content of velvet bean [A-Z page 289 ff], that dopamine was causing the problems with poultry and pigs.

The 1922 bulletin concludes with mention of a human feeding trial. "At the Florida station six persons tested the edibility of velvet bean seed prepared as baked beans. They were found to be very palatable but caused purging and vomiting. The three persons who ate only about half as many of the beans as they would have eaten of baked navy beans were thus affected. The other three, who ate very sparingly, suffered no ill effects. In some sections of the southern states it is reported that when the beans are boiled

like peas and the water changed, they make an excellent food and produce no ill effects."

## ECHOES FROM OUR NETWORK

**Claude Good, Pennsylvania**, wrote referring to EDN 54-3 where we mentioned a study claiming that a single 10¢ dose of worm medicine given to children improves growth as much as a school feeding program. "I have taken that seriously and just out of personal interest have been trying to eat more healthfully and thus saving money to buy worm medicine. I was astonished to find that with the money saved in six months I could buy worm medicine in Mexico to deworm 1500 Triqui Indian children ...."

**Joel Matthews, Niger**. "Referring to your article on tomatoes (EDN 53-3), while it is true that cherry type tomatoes are the most reliable producers in the tropics, it is possible to get heavy production from large-fruited temperate types provided correct timing is observed. High temperatures do not adversely affect the vegetative growth stage, so tomatoes can be planted while it is still too hot for fruit to set, but near the time when weather cools off. In Niger, and probably most of the sahel zone of West Africa, I would suggest planting in October for fruiting in the winter months (November-January). We have also found that adding clay to the almost pure sand that is the common growing medium in our region helps production of just about any crop. Thirdly, don't forget the value of partial shading to reduce the temperature at the hottest part of the day. I am experimenting with moringa (*Moringa oleifera*, see A-Z 61, 111) because of the light shade for the understory and its exceptional food value."

**Fern Yocum, Bangladesh**. [written by Daniel Sonke] Fern, a livestock scientist with the Mennonite Central Committee in the Noakhali area of Bangladesh wrote to us, "Do you have any information about using tobacco tea as a wipe-on to kill ticks and lice on goats, cattle and/or dogs? A solution made by soaking 1 kg dried tobacco leaf in 4 liters water overnight seemed to be effective in killing ectoparasites on some of our goats. The solution was wiped on, allowed to dry in the sun and then rinsed off after one hour. The goats experienced no apparent ill effects. Do you have reports of this use for tobacco tea and if so, are there any precautions we should take?"

We wrote back with the following recipes, taken from our library. The first is taken from *Ethnoveterinary Medicine in Asia Vol. 2: Ruminants* (p 50) and corresponds fairly closely to the one which Fern used. "Soak 300 g of dried tobacco leaves in 1 liter of water. Add 1 tablespoon [15 ml] of salt. After 3 hours, use the tobacco leaf as a sponge and rub the liquid over infested areas [of the animal's body]." A second recipe is taken from *Natural Veterinary Medicine: Ectoparasite in the Tropics* (p 165): "500 g of tobacco dust/2 liters leaf extract of *Sambucus nigra* L. (European

elder)/1 teaspoon [5 ml] eucalyptus oil. This remedy is especially recommended against heavy infestation with lice and ticks in sheep." Yet another recipe is designed for control of pests on plants. Taken from *Natural Pest and Disease Control* by Henry Elwell (p 101) (see A-Z for reviews of each of these books), this recipe calls for 1 kg of bruised tobacco/15 liters of water.

The strong warning we passed on to Fern was to be careful in the use of tobacco "tea." Nicotine is a very powerful toxin. When dissolved in water it can be absorbed through the skin at a higher concentration than it is absorbed while smoking. Be sure to wear plastic gloves and avoid skin contact when using the tea.

Fern sent back the following report.

"We treated our goats (11) one time with good results and no ill effects. Treating steers with a more dilute solution, as per your recommendation, resulted in two of our nine animals suffering nicotine toxicity. Several



farmers also found nicotine toxicity to be a problem. All of the animals recovered without permanent ill effects, after treatment with Atropine. Farmers who rinsed solutions off of the cattle after 30 min (instead of 1 hour or 45 min) and kept the animals in the shade while the tobacco solution was on them experienced no problems with toxicity. I am curious if tobacco tea can be safely used for this purpose but am hesitant to risk expensive animals to find out. We may do some investigative work with goats, but we're hesitant to risk their health as well. It's hard to justify harming an animal if you know it can be avoided completely." If you have experience working with tobacco as a tick control, let us know so that we can share it with our readers.

## UPCOMING EVENTS

If you are sponsoring a conference or course (or know about one) that would be of interest to our network, please send us details. It is best to send them at least six months before the event. Items arriving too late for EDN may still be placed on our web site. We will, of course, screen for relevance to our network.

**ECHO'S 4th Annual Agricultural Missions Conference, November 4-6, 1997 in Ft. Myers, Florida.** The list of speakers grows month by month as additional speakers are contacted or delegates register and we recognize a potential

speaker. We will be adding speakers right up until conference time.

Several themes seem to be appearing so far. Dryland agriculture; green manure/cover crops; incorporating ecological concerns in agriculture projects; integrating agriculture and Christian evangelism/discipleship; controlling nematodes. ECHO does not set one single theme because we want there to be many things of interest every year to every delegate.

Tony Rinaudo will talk about useful techniques for dryland Africa. He is an Australian missionary with SIM who has worked for several years in Niger. Those who have read our book, *Amaranth to Zai Holes: Ideas for Growing Food Under Difficult Conditions*, may recognize Tony as the one who told ECHO how local farmers are using termites to increase yields of millet via "zai holes." He also is having considerable success in using seeds from certain acacia trees as human food.

Milton Flores is a Honduran who directs CIDICCO (International Covercrops Clearinghouse). There is a great deal of new thinking going on about when, where and how to use covercrops. He will give an overview of where such thinking is leading and share from his own observations across Latin America.

Joel Matthews is an American that works on the same SIM team as Tony Rinaudo. He will serve a catalytic role at the conference in pulling together a discussion group of other delegates with interest in the subject of integrating agriculture and evangelism/discipleship (If you will attend, let us know if you would like to contribute to that). He will also speak from SIM's own experience in that area.

Dr. Dave Mahan is assistant director of the AuSable Institute for Environmental Studies in Michigan. AuSable has long been interested in how agricultural development, missions and ecology interface. They recognize that ecology cannot be addressed in the absence of agricultural development when it involves land held by needy people.

Dr. Bob Dunn, a nematologist at the University of Florida, will help us better understand nematodes and practical methods for their control.

Stan Doerr, who formerly headed a technical school in Malawi, will discuss and demonstrate their very popular course which taught farmers how to make their own handtools.

Beth Adams will demonstrate the use of bucket trickle irrigation and give an abbreviated version of her several-day workshop for farmers of dryland gardens.

## BOOKS AND OTHER RESOURCES

### RESOURCES FOR TEACHING AGRICULTURE AT THE ELEMENTARY OR MIDDLE SCHOOL LEVEL.

[by Daniel Sonke] Gudrun Mahlau of the University of Kiel Institute of Agricultural Economics in Kiel Germany wrote to ECHO looking for help in planning an agriculture curriculum for a project in Cameroon. This is something that we suspect is facing many of you. It makes sense to teach skills in the elementary schools, since many children have not had agricultural traditions handed down to them by previous generations. We searched the resources in ECHO's library to see what might be helpful.

*Agriculture Education in the Tropics* [194 pages; MacMillan, 1994] is a detailed volume designed to be used as a textbook for training secondary school agriculture teachers or as a resource for those already teaching agriculture. Nearly all of the 24 chapter titles involve the word "teaching": Teaching aids in agriculture, Teaching methods in agriculture, Teaching the importance of farm records, Teaching soil science, Teaching crop protection, Teaching horticulture, Teaching animal science, and so on. Most of these chapters have the sub-headings "Objectives," "Course units," "Teaching methods," and "Practical work." Written by two Nigerian university professors, the book seems quite comprehensive in covering the philosophical, sociological, and practical topics one needs to know in order to be effective at teaching agriculture in a tropical, developing-nation setting. Suggested lesson plans and activities are included. Available for £8.95 from MacMillan, Houndmills, Basingstoke, Hants, RG21 6XS, England (phone:+01256 29242, fax:+01256 842084).

*Primary School Agriculture: Volumes I & II* are published by GATE (German Appropriate Technology Exchange) and GTZ, a German government agency which produces international development materials. The books, written by Herbert Bergmann, a GTZ employee who has worked in Cameroon, present a method of teaching a scientific approach to agriculture. They cover not only the theory behind teaching agriculture, but also the techniques of both traditional and new approaches to small-scale agriculture, classroom and outdoor activities, and even teaching subunits and lesson plans on which to plan your curriculum. The lessons are oriented to encourage students in observation and experimentation--very important skills for good farmers. *Primary School Agriculture Volumes I & II* are available free of charge for those working in developing countries or for DM 24.50 for vol. I and DM 29.80 for vol. II for those in industrialized countries. Write GATE/GTZ (P.O. Box 5180; D-6236 Eschborn; Germany; phone: 0049-6196-793185, fax: 0049-6196-797352, e-mail: GATE-ISAT@GTZ.DE, WWW: <http://www.gtz.de/gate/isat>).

The U.S. Peace Corps publication *Teaching in the Whole Garden* (ROO85) is another book oriented towards agriculture education on the primary school level. While it

goes into less detail than *Primary School Agriculture*, it charts out three terms of an agriculture course for each of six class levels. Notes about where other subjects such as social studies or math could be integrated into the course are included for each class level. Sample lesson plans and class activities are included as well. For example, in one activity students are taught to determine the amount of seed needed to plant a bed of a certain crop using information on crop spacing and seeds per ounce. This requires that the students draw on their multiplication and division skills in order to learn an agricultural skill.

While Peace Corps Manuals are no longer available free from the Peace Corps (except to PC staff), they can be purchased. The manuals are in the public domain, so if you have access to them, they may be copied. Peace Corps publications are now available for purchase from: ERIC Document Reproduction Service, EDR/CBIS Federal, 7420 Fullerton Rd., Suite 110, Springfield, VA 22153-2852, USA; phone 800/443-3742 or 703/440-1400 and National Technical Information Service, 5285 Port Royal Rd., Springfield, VA 22161, USA; phone 703/487-4650. ERIC had a MUCH better price when I called them; ERIC's price was US\$11.91 plus shipping (\$3.75 plus tax in the U.S.; overseas customers write for postage cost) whereas NTIS's price was US\$21.50 plus \$4 shipping to customers in the U.S. or \$43 plus \$6 handling plus \$8 airmail for overseas customers.

***Production Without Destruction*** (188 pp.) is a primer on organic growing and a manual for teachers of sustainable systems published by the NATURAL FARMING NETWORK. This organization links agencies cooperating to promote working examples of sustainable agriculture in Zimbabwe. They also have some excellent publications. *Production Without Destruction* would also serve as an excellent handbook for the beginner in tropical agriculture. The clearly-written text, with charts or pictures on most pages, make this a valuable textbook or reference tool on a wide variety of topics. Chapters include: Agriculture and ecological systems, Soil, Water, Plant propagation, Trees, Pests and Weeds, Managing a sustainable farm, Improved gardening practices, Dryland cropping, Integrating animals, and more. *Production Without Destruction* is US\$7 on the African continent; \$9 elsewhere; from the Natural Farming Network, P.O. Box CY 301, Causeway, Harare, ZIMBABWE; fax 723056. All prices include surface shipping. This book is also available in local currencies through the following organizations, which may be able to help you with other aspects related to sustainable agriculture: BOTSWANA: Attn. R. Clarke, Permaculture Trust of Botswana, P Bag 47, Serowe; KENYA: Attn. J. Ngugi Mutura, Sustainable Agricultural Community Dev't Programme (SACDEP), P.O. Box 44752, Nairobi; LESOTHO: Attn. M. Letela, Berea Agricultural Group, Assumption High School, Bag Box 572, Teyateyaneng 200; SOUTH AFRICA: Attn. C. Nottingham, Planner Bee Plant

Care, P.O. Box 3093, Cresta 2118, Johannesburg; TANZANIA: Attn. C. C. Rwechungura, Tanzania Org. of Permaculture Promoters (TOPP), P.O. Box 9421, Dar es Salaam.

***Outreach*** information packs are packets of materials to be used for "non-commercial, educational purposes in low-income countries." Provided free of charge on a regular basis to subscribed "multipliers" in low-income countries, the 40 to 70 page packs consist of both original articles and materials gleaned from other sources on a single theme related to environmental / ecological awareness. Intended for journalists (print and radio), community and NGO workers, and teachers, the materials take the form of reports, scripts, short stories, interviews, charts and illustrations. For educational purposes, these could form supplementary classroom materials for upper elementary, middle, and even high school classes. For example, the packet covering Soil Basics (100) starts with a "Dirty Riddle" designed for children. Following is an article about the components of soil, including illustrations and a quiz on reading a chart of soil make-up, suitable for middle to high school ages. This article is followed by a children's story about an earthworm and a fox. And so on.

About 75 packets are presently available (numbered 26 to 102). Themes listed in the index of available packets include Crops (covered in 5 packets), Gardening (2 packets in a "Learning-by-Doing" series), Appropriate Technology (many titles from Shelter to Transportation and Solar Energy), Endangered Species, Land Degradation (Soil Basics, Causes and Consequences, Some Agricultural Solutions). The "Learning-by-Doing" issues on gardening (72, 73) are written specifically for teachers. They take the form of 25 photocopy-ready sheets which can be folded in half to form 4-page booklets. These booklets make great introductions into all aspects of gardening from seeds to vegetative propagation, to acid and alkaline soils, to irrigation, to drying the harvest. Teacher's notes and handouts are included. The series is designed to be accompanied by hands-on activities in the garden, classroom, and kitchen.

The information in *Outreach* packets may be adopted in whole or in part for inclusion into articles, activities and programs, or adapted for other educational uses, however, the source (either *Outreach* or the original source reproduced by *Outreach*) must be properly credited. For packets write to James Conner, *Outreach* Director, Teaching and Learning Center, 200 East Building, 239 Greene Street, New York University, NY 10003, USA or Richard Lumbe, *Outreach* Co-ordinator, Regional Office for Africa, UNEP, P.O. Box 30552, Nairobi, KENYA.

Have you found or developed materials which have worked well in teaching agriculture either at the elementary or upper levels? If so, please let ECHO know so that we can pass that information on to our network.

### **CD-ROM LIBRARY FOR SUSTAINABLE DEVELOPMENT & BASIC HUMAN NEEDS.**

ECHO was contacted last year by the Global Help Project of Belgium and asked to allow some of our publications to be placed on a CD-ROM disc along with publications from other organizations which publish health and development materials. The result is a library of some 12,000 pages of information, including many complete books, related to community development, all contained on one CD-ROM disc. Designed for computers with a CD-ROM drive and using Windows™ 3.1 or Windows 95™, the CD-ROM contains the library of documents plus the software which allows you to read the information, search for words appearing in the text, and view the occasional illustrations. While it took us a while to learn how to use the software, we found that it was adequate for reading articles and doing text searches.

Understandably, book selections were limited to items for which publishers were willing to give publishing rights without being paid royalties, but there are many great titles none-the-less. ECHO's book *Amaranth to Zai Holes: Ideas for Growing Food Under Difficult Conditions* is on the disc, along with several of our technical notes. The forty-four booklet *Better Farming* series by the Food and Agriculture Organization; twenty-six books by the National Academy of Sciences (BOSTID reports); six books on animal traction by GTZ/GATE; several books or shorter publications on water and sanitation, alternative energy, cookstoves, health, nutrition, medicine, education (including *Primary School Agriculture: vol. I & II* reviewed in this issue), food production, self-reliant pottery, and building and construction. The disc contains many issues of magazines, including *Ceres* (since 1976)

and all issues of *SPORE*. We are told that we will be sent replacement discs in May with approximately twice the number of publications. Additional discs are being prepared for future release.

One disappointment is that many illustrations from the original publications are missing, though we understand that pictures take much more space on the disc than does text. For example, although we were glad to see an out-of-print book that we use a lot, *Firewood Crops Vol 2* (published by the National Academy of Sciences), the numerous photos that are helpful in identifying species were not included. In other publications many illustrations were included.

The publisher is making 200 discs available to ECHO for those members of our network who are actively involved in Third World development or education. The price to you is only US\$5 (to cover shipping and handling). If even that is too expensive, we will waive this fee for a few hardship cases. Others readers please send \$29.95.

**WHAT IS MEANT BY A REFERENCE LIKE "A-Z p 61?"** Rather than repeat information previously appearing in EDN, this refers you to the appropriate page in our book *Amaranth to Zai Holes: Ideas for Growing Food Under Difficult Conditions*.

**THIS ISSUE** is copyrighted 1997. 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 #1-51 (revised) are available in book form as *Amaranth to Zai Holes: Ideas for Growing Food Under Difficult Conditions*. Cost is US\$29.95 plus postage in North America. There is a discount for missionaries and development workers in developing countries (in the Americas, US\$25 includes airmail; in Europe, Africa, and Asia, \$25 includes surface mail and \$35 includes air mail.) ECHO is a non-profit, Christian organization that helps you help the poor in the third world to grow food under difficult conditions.

### **ECHO DEVELOPMENT NOTES--ISSUE # 56**

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