EDN ISSUE 27. SEPTEMBER, 1989

27-1 SOME NEW THINGS COMING FROM ECHO. I have spent much time this summer thinking through how ECHO can best serve our network in the 1990's. Subject to approval of ECHO's Board of Directors, and funding, there may be some exciting things coming. One thing we have already committed to do is to produce video tapes on technical subjects of interest to people working with small farmers or urban gardeners. We do not yet have anything to the point of accepting orders. But here is a preview of what is coming.

You have read Dr. Carl Campbell's answers to tropical fruit questions in EDN on many occasions. Can you imagine standing under a fruit tree with Dr. Campbell telling you whatever he considered important to know about that tree? How about a detailed demonstration of the most effective grafting techniques for tropical fruit? Well, we have now completed over eight hours of raw footage featuring Carl talking about both major and less well known tropical and subtropical fruits. I do not know how long it will take us to do the editing and reproducing. Hopefully within the year we will be able to announce the series of tropical fruit videos, at a minimal price for overseas members of the ECHO network. Another frequent EDN contributor, Dr. Frank Martin, has agreed to help us prepare a video on his area of specialty, tropical root and tuber crops.

I mention it now in hopes that if you are writing ECHO you might mention whether you have a video tape player and TV or have access to one. We are trying to judge how extensively these tapes might be able to assist you. Are there any topics that would be particularly helpful? Let us know if you have footage yourself of a technique that is effective in your area which we might want to work into a future video?

27-1 VERNONIA (*VERNONIA GLAMENSIS*): A POTENTIAL NEW CROP FOR SEMI-ARID AREAS OF THE TROPICS AND SUB-TROPICS. Dr. Robert Perdue has worked in plant exploration and introduction for the U. S. Department of Agriculture for more than 30 years. He has become so taken by the potential of one new crop, vernonia, that he is retiring this month and will be devoting full time to promoting its commercialization. (It is not a priority to the USDA, probably because it has little potential for this country).

What is so special about vernonia? At the first look, not much. It is a weedy annual that resembles a thistle without thorns and is grown for its seeds. Seeds contain 40% oil of which 80% is a vernolic fatty acid. A very important point is that vernolic acid is "naturally" epoxidized. There is a large industrial market for synthetically epoxidized oils, such as epoxidized linseed or soybean oils, but vernonia oil is epoxidized already.

A second special trait is that the vernonia oil is much less viscous than the synthetically epoxidized oils. The latter are semi-solids at 50 degrees F (10 C) and can no longer be poured at 32 degrees F (0 C). In contrast, vernonia can be poured even below 32 degrees.

As of today there is no market for vernonia oil. Dr. Perdue sees potential for a huge market within a few years, but only if suppliers are ready to step in with product. He is therefore seeking collaborators in different countries who would like to get in on the ground floor by doing some small trials of the plant to find where it grows well and to begin building up a supply of seed.

Where might the market be? There are several possibilities that are being researched at universities and industrial laboratories right now. Most have to do with its special physical properties, especially the fact that the "epoxy" structure is highly reactive with certain chemicals, unlike most fatty acids which are not

epoxidized. Eastern Michigan University's Coatings Research Institute (CRI) foresees the possibility that one pint (one half liter) of vernonia oil could be used in each of the 325 million gallons of alkyd-resin paints produced each year in the U.S.A. alone. Apparently the solvents that evaporate from paint have been identified as major contributors to photochemical smog in California and elsewhere. The low viscosity of vernonia oil should make it a good solvent in paint manufacture and the highly reactive epoxy group will cause it to become chemically bound in the dried paint rather than evaporating into the atmosphere. Others are investigating its use in lubricants, adhesives, and as a raw product for nylons.

The meal that is left after expelling the oil contains 40% protein. Research on use of the meal as an animal feed is underway at three laboratories.

Most of the work on vernonia as a crop has been done in Zimbabwe since 1983. Seed yield was 2227 pounds per acre in 1987, greater than the average yield of 1926 pounds per acre of soybeans in the U.S.A. in 1979 (the best year in 15 years).

A porous well-drained soil is essential. Vernonia will not grow on heavy clay. So far there have been no problems with insects, nematodes or disease. It tolerates full sun and can also grow in partial shade. It should be suitable for agroforestry, serving as an annual cash crop while trees are getting established. I asked Dr. Perdue if it might not become a weed. "I have never seen it as a weed in farmer's fields. A West African variety does become a weed, but we will not be sending that one."

If a market suddenly becomes available, (and this may never happen) the person who has found what month to plant to get flowering, learned the basics of production, and has accumulated some seed will be in a profitable position. Dr. Perdue suggests that collaborators "plant three rows 3-4 meters long, 30 cm apart and repeat this every month. Note when the seeds were planted, when flowers appeared and when seeds matured, and record the rainfall. This would tell me a tremendous amount." This is a grassroots project done with practically no budgeted funding, so the input from ECHO's network would be a real help. If you want to do a modest trial, write us for seeds and planting instructions. We will forward your results to Dr. Perdue. If you have facilities for a more major trial, describe what you want to do and I will forward your request to Dr. Perdue for extra seed and more detailed experimental plans.

27-2 HOW CAN I SIMULATE LONG DAYS TO MAKE PLANTS BLOOM? Many plants respond to the length of days. For example, most winged beans will bloom only when days are short; most onions will only form bulbs when days are long, etc. In some cases (including the above examples) varieties are available that do not have these day-length restrictions. But what can you do when such varieties are not available?

It turns out that what daylength-sensitive plants are actually measuring is the length of the night. For example, a temperate plant that blooms and produces seed when the days are long, is actually responding to the short nights of summer. If you live in the tropics where nights are never as short as they are during the summer in temperate regions, you might still be able to get it to produce seed by interrupting the night with a period of artificial light. The plant will respond as though it had experienced two short nights -- or one long day!

For another example, suppose you want to make cuttings of a temperate plant that in its native climate grows all summer (short nights) and blooms in the fall (nights about the same as are found all year in the tropics). There is a good chance it will bloom continually in the tropics, which makes it difficult to make cuttings. You can probably make it stop blooming by artificially shortening the nights.

Alan Ferguson in Bangladesh recently wrote us for information on how much darkness or light has to be provided to induce flowering, and how this could be measured without equipment. I passed the letter on to Carl Scharfenberg, a member of ECHO's Board of Directors. Carl is also vice-president for research at Yoder Brothers Nursery, one of the largest commercial nurseries in the States. They make frequent use of techniques for altering day lengths in their business, both artificial darkness when they need long nights and lighting when they need shorter nights.

Carl said the norm is to use 10 foot candles of light for the four hours between 10 p. m. and 2 a.m. A good rule of thumb is that if you divide the total watts of your lights by the area covered you should have 1 watts per square foot. If you use florescent lighting instead of incandescent, the number should be 0.6 watts per square foot.

Here is a neat trick they use to reduce the amount of electricity (which could be even more important if you must generate your own). They have found that they can divide the area into two parts. The lights in one area are left on for 5 minutes, then they are shut off and lights in the other area are left on 5 minutes. This is repeated 5 minutes on and 5 minutes off in each area for the four hours. This works just as well as four continuous hours of illumination, but uses half the electricity.

What about the opposite need: darkness to make longer nights for short day plants? This requires "nights" with less than 1 foot candle of illumination for about 13 hours. Carl uses a rule of thumb that it must be so dark that you cannot read a newspaper. A black polyethylene plastic cover works well.

27-3 SAWDUST USED TO FILL OLD TRACTOR TIRES. CERES, the magazine of the Food and Agriculture Organization, reported a method for using old puncture-prone tractor tires in making ox carts (September / October 1984 issue). Farmers would not accept metal wheels and could not afford new tires. Engineers settled on using old tires filled with sawdust. They are not susceptible to puncture and provide almost the same ride as air-filled tires. The cart carries 500 kg. CERES has now ceased publication.

27-3 MARKETS SATURATED WITH FREE GRAIN. A questionnaire that ECHO sent to its "network" asked, "What are your most frustrating problems?" A missionary in Africa replied, "Free food distribution that puts the local farmers out of business." Where drought or war has resulted in famine such relief is important. However, we need to be very careful before handing out free commodities on a large scale. The following example is Excerpted from Rurcon News by Peter Batchelor, 4 Churchfield, Wincanton, Somerset BA9 9AJ, England.] "All too frequently one hears of well-meaning aid agencies getting grain to needy areas so late that the free gifts coincide with the harvest from local farmers. In 1984 farmers in Chad only produced 58 % of the country's grain requirements, so tons of food aid were needed. In 1985 about 114% of needed food was produced in-country, but food aid continued. In March 1986 1,000 tons of grain were released by FAO in Bongor. Grain prices dropped from about 50 pence a kilo to 5 pence. Farmers thus have no incentive to grow more than their families require and there could well be another famine on the way. An alternative to dumping grain is to store it. Good grain silos at family, community and regional levels should be a priority". If you are a Christian missionary in Africa you should ask to receive Peter's newsletter. Much of his time is spent in personally visiting missionaries. I believe his special expertise is in ways to work with small Third World farmers. He might even show up at your door some day!

27-3 TWO OTHER TREE SEED SOURCES TO ADD TO THE LIST IN EDN 23-2. African readers especially may be interested in Lusume Services, P. O. Box 42, Magoye, Zambia. They have a variety of multipurpose and fruit tree seeds at reasonable prices. Jim DeMaster just sent us a price list of several tree seeds from the Latin American Bank of Forestry Seeds. For prices, write to CATIE Seedbank, Box 111, Turrialba, Costa Rica, Central America. The price list is for 1 kg quantities, so if you need less than that you must specify your exact needs.

27-3 A NEW MAGAZINE -- AGROFORESTRY TODAY. We receive so many newsletters and magazines at ECHO that I must pass by most articles. The second issue of Agroforestry Today just made it to the top of the pile and slowed me down considerably.

It is published by the International Council for Research in Agroforestry (ICRAF), a non-profit international research body governed by a board with equal representation from developed and developing countries. ICRAF's mandate is to "initiate, stimulate and support research leading to more sustainable and productive land use in developing countries through integration of trees in land-use systems." The articles were more practical and applied than their research orientation had led me to expect.

Articles include "Agroforestry: a very social science," "Readings in social agroforestry" [a bibliography], "The great eucalyptus debate," "The apple ring Acacia", and an article on beekeeping and forestry. I will quote from the latter.

" 'The secret of extending the period when flowers are available to bees,' says Dr. Michel Baumer [ICRAF staff], 'is paradoxical.' Best results are achieved by planting trees which are actually somewhat ill-suited to their environment. 'If you plant trees that are well-suited to an area, they'll flower when all the other trees flower,' he says. 'But those which are not at their ecological optimum, which are slightly marginal to local conditions, will often produce their flowers at a different moment than their neighbors. Some trees under these conditions even react by producing more flowers than normal.

" 'For example, *Eucalyptus gomphocephala* gives better results in some places in North Africa than on its native sandy plains of southwestern Australia. There are tens of thousands of flowers on an adult eucalyptus .... Even one tree represents a considerable source of nourishment for a bee colony.'

"A tree of great potential for dryland beekeepers is the apple ring acacia, *Faidherbia albida*, also called *Acacia albida*. For beekeepers in the Sahel-Sudan area it has the advantage of producing flowers at the end of the rains (most trees in this area flower before or during the rainy season) and it is the main source of nectar and pollen, if not the only one, during two or three critical months."

Subscriptions for development workers and scientists are free from ICRAF, P. O. Box 30677, Nairobi, Kenya. (If you want to try *Acacia albida*, ECHO can send you a very small packet. For a more substantial trial, write to the Nitrogen Fixing Tree Association, P. O. Box 680, Waimanalo, HI 96795. For commercial quantities, try some of the sources in EDN 23-2.

27-4 POTENTIAL CONTRACEPTIVE FROM NEEM TREE OIL. I do not normally include items in EDN that are not yet ready for use. Because we have mentioned neem so often, though, I thought you would be interested in this item taken from Agroforestry Today. Indian scientists have isolated a neem oil extract which they believe can be refined into a birth control agent for women. They report it has spermicidal qualities and also can prevent a fertilized egg from being implanted in the uterus, possibly by interfering with estrogens. Unfortunately their "ultimate aim is to refine it into a powder that can be synthesized in the laboratory." I hope someone follows up to see whether a technique might be developed for making contraceptives directly from neem in a simple laboratory that could be set up anywhere.

27-4 NEW ADDRESS FOR YATES SEEDS. We often refer people to this company for tropical pasture seeds. The new address is P. O. Box 117, Rockhampton, Queensland 4700, Australia.

27-4 A SOURCE OF FREE TREE SEEDS FOR TRIAL IN AFRICA. The Henry Doubleday Research Association, a registered charity in the United Kingdom, asked us to let our network in Africa know about their work with multi-purpose tree and shrub species for arid and semi-arid countries. Under their new program, "the HDRA will assist groups working in Africa to select species for their required purposes and will provide, free of charge, sufficient seed of tested and guaranteed quality for local evaluation. Seed will be accompanied by full technical and practical details on their cultivation and use." Address your requests to Dr. Phil Harris, Overseas Projects Coordinator, HDRA, Ryton-on-Dunsmore, Coventry CV8 3LG, United Kingdom. (Phone 0203-303517; Fax 0203-639229).

27-4 INTER-CROPPING OF SUGAR CANE. The following is quoted from an article "Malnutrition in the well-off farmer" in the World Development Forum, which I believe they got from Ceres. "Researchers in Nairobi, surprised to find malnutrition among the families of relatively well-paid sugar-cane workers, devised an ingenious corrective." By marginal widening of the row crop spacing, they found "room for two protein-rich, non-cash crops (maize and beans) which could be harvested within three months of planting. As cane takes 22 months to mature, it proved possible to snatch two successive inter-row crops before the spreading roots of the cane feel any adverse effects from the competition." A great side benefit is that the need for cane weeding was reduced. The reason for the malnutrition among the workers and their families was that the need for cash for buying property, consumer goods, schooling, and physical assets competed with their need for food.

I seldom find in World Development Forum this kind of ready-to-use technical information. However, my staff and I always find the brief excerpts from development and hunger-related articles, talks and publications contained in this free newsletter to be an interesting five minutes reading. It is published every two weeks. Their address is 1300 19th St., N. W., Suite 407, Washington, D. C. 20036.

27-4 UPCOMING COURSES. (1) In November 1990 the Department of Agriculture at the University of Queensland is proposing to sponsor a 7 week international training course on the topic "Fodder tree legumes - multipurpose species for agriculture." Some scholarships will be available. For further information, write to Dr. Ross Gutteridge, the University of Queensland, St. Lucia, Queensland, Australia 4067.

(2) Each year the University of California (Santa Cruz) offers a six month apprenticeship in "Ecological Horticulture." Applications for the class beginning April 1990 are due by December 5, though late applications are considered if the approximately 30 positions are not yet filled. The program emphasizes hands-on learning "with instruction in traditional organic horticulture, stressing ecological interactions between plants, soils, climate, insects and pathogens." Formal classes are held on Monday's at 9 A.M. and 2 P.M., with introductory evening classes on Wednesdays. Most instruction occurs during the performance of actual work of growing, harvesting and marketing produce.

The apprenticeship is held at the University's 25 acre farm and 4 acre garden. The garden is the site where the French-intensive biodynamic method of horticulture first gained recognition in the United States. The cost is $1,000 tuition (1/4 of the expense of the program). Graduates receive a "Certificate in Ecological Horticulture," a letter grade and 20 extension credits. Whether these transfer to other institutions is at the discretion of those institutions. Students erect tents and live on the farm. They tell me it does not rain at that time of year. Because much of their food comes from farm produce and students take turns cooking, meals cost an average of $10 per week! For an application and further details write to Lynn Garling; Apprenticeship - Box A; Agroecology Program; Univ. of California; Santa Cruz, CA 95064, U.S.A.

(3) "Tropical Fruit Production and Research" is a very popular graduate course that has been offered every other year at the University of Florida's Tropical Research and Education Center by Dr. Carl Campbell. When I hired Scott Sherman as my Assistant Director in 1988 the first thing I did was have him take that course. Although Carl is "retired" he is teaming up with Dr. Jonathan Crane, the man who assumed his position, to offer it again next summer (approximately mid-May to mid-June). This course is geared toward highly motivated students. You must register for credit through the university and pay tuition (which will be out-of-state for most of you). There are no special scholarships. A B. S. degree in a plant or agricultural science is a prerequisite (with some exceptions). Enrollment is limited. Lectures and field trips take place between 8 and 5 weekdays, so the course requires a full-time commitment. For details write to Dr. Campbell or Dr. Crane at TREC, 18905 S. W. 280 St., Homestead, FL 33031.

27-5 REARING LADYBUG BEETLES (*COCCINELLA SPP*.) IN CAPTIVITY. In EDN 16-2 we replied to a request for methods of raising ladybug beetles in captivity. Harold Watson had noticed that ladybugs were eating the plant lice which were damaging leucaena trees and wanted to greatly increase their number. We consulted with an entomologist who explained that in this country the ladybugs that are sold are collected in the wild. He knew of no way to grow them, though he said it is possible such a method has been worked out.

Recently Wayne Niles visited ECHO. He had just done a laboratory project in a biological control course at the University of Florida in which he mass-produced ladybugs! We asked him to put his experience in writing for members of the ECHO network who might face this need. His comments follow:

"Raising insect enemies of harmful insects is fairly easy once you get a knack for it. In a developing country an enterprising student or villager might be taught to rear such insects as a means of livelihood, selling the insects as pest control. You need suitable containers, a food supply, and a few minutes each day for sanitation and feeding. Large numbers of natural enemies are not necessary if you can pre-inoculate your plants before the pests build up. The juvenile stages are most voracious and render the best control because they do not fly away. Adults leave eggs and move on.

"A reasonable strategy would be to maintain several dozen females on artificial media in captivity and to regularly transport the eggs they lay (on leaves, for example) out to the field near sites of potential pest infestation. This augmentation of the natural ladybug population is necessary because they require 2-3 weeks per generation and would build up more slowly than aphids or psyllids.

"A word of caution, however. Be sure the ladybugs you are rearing will devour your pest. I am amazed by the diversity of ladybug species and their specificity of diet. Collect and rear only those adults that you are absolutely certain are eating your pest (not the honeydew they produce or the mold growing on the honeydew)."

The adult ladybug beetles were collected from an aphid-infested field, then were maintained in 9 cm plastic petri dishes. The female beetles were fed all the aphids that they could eat. The aphids were collected by holding an infested plant over a stiff piece of paper and beating the plant. They could be kept for up to two weeks in a tightly capped plastic bottle at 4 C. The mean daily aphid consumption by adults was 36 and mean daily egg production was 25. Larvae ate an average of 190 aphids over a 19 day period before reaching adulthood.

He enclosed a photocopy of a few paragraphs from an article by Li concerning the mass rearing of ladybugs on artificial media in China. If you do not always have a source of aphids and want to see this article, drop us a note. "I suspect adequate results can be obtained without the hormones and other exotic materials in the Chinese recipees. One can always throw a few aphids into the artificial media to supply whatever is

lacking." One example was the ladybug *Cryptolaemus montrouzieri*, which is used to control mealybugs. It can be mass produced in the laboratory using mealybugs (grown on pumpkin or buds of potato) as food, but adults can be reared with a semi-artificial diet consisting of powdered milk, honey, yeast, a little royal jelly and dry mealybugs. Another ladybug diet contained 5 g pig liver, 0.5 g brewer's yeast, 1 g honey, and 0.05 g vitamin C (plus optional preservative).

27-6 CERETECH LOOKING FOR SOME COLLABORATORS. CereTech is a Christian organization committed to Third World development. Alan Ball, CereTech's director, says they have developed some appropriate technologies to the state where they work well. Now they require a small number of collaborators to test them under "field" conditions. In each case the units are free but you would need to pay shipping.

"(1) Three sites are needed to test 20 units each of our Vert-I-Grow vertical vegetable production technique. At least two in Africa. One each in a refugee camp, a slum and an area of depleted soils. (For these he prefers that someone with a degree in agriculture / horticulture be present). (2) Two sites where rice is grown and harvested and stripped by hand to test their manual rice stripper. Report back on output per hour, efficiency of stripping, and use for winnowing. (3) One or two sites where skilled carpenters work without sophisticated tools to test their manually operated lathe. Report on type of products made and economic appraisal of income differential achieved by use of the lathe. (4) One project to test a manually operated spinner, perhaps tied in with use of the lathe to make the spinners. Must go to a project where spinning is already an income generating project, either via drop spindles, imported wheels or both. Report on comparison with drop spindle spinning and/or use of Ashford or other wheel, productivity in kilograms per hour and definition of wool / cotton or other yarn produced. (5) A small workshop in a rural area to test a manual grinder. (6) One or two projects where string is made from wool, cotton, sisal or other fibre then processed into baskets and mats etc. to test their manual string maker. Report on production and quality, economic appraisal of making of, for example, baskets and any increase in income per person per unit time.

"All applications for free of cost test equipment will be carefully considered and replied to. Describe as fully as possible the situation where they would be tested." Write Mr. A. P. Ball, CereTech Limited, 3 The Courtyard, Lower Slope, End Farm, Hungerford, Berkshire, RG17 ORE