EDN ISSUE # 3 OCTOBER, 1982

3-1. **AMARANTH SEED READY FOR DISTRIBUTION** Amaranth grain, corn and beans were probably the primary foods of the Aztecs. The Aztecs unfortunately practiced a religious observance in which they world mix blood from a human sacrifice with popped amaranth grain. They formed this into a statue of a war god, worshiped the statue, then ate it. The Conquistadors considered this a mockery of the eucharist (communion) so banned both the religion and cultivation of the grain in 1517. Amaranth has existed primarily as a wild weed since that time.

Amaranth has received much research attention during the past decade or so because: (it is more resistant to drought than corn, (2) it does fairly well in nutrient deficient soil, (3) it produces yields that compare favorably with corn and rice, (4) the grain is high in protein of unusually high quality, and (5) the leaves also have a good balance of proteins and may be cooked like spinach. Much of the research has been done by Rodale Press (publisher of Organic Gardening Magazine). They enlisted thousands of readers to do back yard experiments with different varieties of amaranth that they brought in from around the world. (This is a model for the kind of world-wide data we hope to gather as you folks report back to us on the performance of seeds that we sent to you.)

The protein is high in lysine, which accounts for 5% of total protein. It also has a very high "chemical score," a calculated value in which the higher numbers are the more perfect match for ideal human nutrition. For example, the chemical score for amaranth is 75-87, corn 44, wheat 57, sorghum 48, peanut 52, soybean 68, cow's mild 72. However, I have read results of feeding trials with rats where they did not do well at all on a corn/amaranth diet compared to corn and soybean. It appears that there are some anti-nutritional factors in raw amaranth that limits its use as a feed. Cooking improves this. Other drawbacks include small size of the seed that makes it difficult to thrash by machine and oxalic acid in the leaves that might tie up too much dietary calcium if eaten frequently in high amounts. We are working on a summary of nutritional and cultivation information that should be ready by the time your request gets to us.

When evaluating amaranth for your area, you should try more than one species and variety, because the variability is considerable. A few of those we grew this year looked absolutely horrible, while others were truly beautiful crops. *Amaranthus cruentus* and *A. hypochondiracus* are grown primarily for their grain and A. tricolor for its leaves. Leaves of any variety can be eaten, however. Doug and Ruth Welcha are trying several of these varieties in Zaire. They just wrote that one variety that they received earlier form Rodale (what we call 81-039) grew 7 to 8 feet in composted soil. "Most of our neighbors demanded seeds, so it has been distributed near and far. But they are using it as a vegetable." This was one of the most prolific grain types for us.

You may request our write-up on amaranth and small packets of the following seeds from us. A. Tricolor:81-036, has green leaves; 81-045, attractive green and red leaves. *A. cruentus*: 81-039, the best of those we tried from Rodale for grain; 81-037, striking red heads but modest yields. *A. hypochondiacus*: 81-048, the best heads of any that we tried; 81-040, short plant selected for mechanical harvesting.

3-3. **SOME INSIGHTS ON RAISING RABBITS IN THE THIRD WORLD** I have talked with some development workers who have been very positive about the role of rabbits in their work. But others have been equally negative. Fremont Regier has worked for some time in Zaire and now in Botswana. He was recommended to me as one who is both successful and enthusiastic about rabbits. So I wrote and asked him why rabbits catch on with one person/place and fail with another. He not only sent a thoughtful reply to this question buy included a write-up for volunteers called "Some planning ideas to remember when considering rabbit production as a church project." We'll be happy to sent you a copy of all of this upon request. But some highlights are summarized here.

"In questioning many one-time rabbit raisers who later abandoned the work, I got many reasons why they stopped. Some said their rabbits died, others that they couldn't sell them, or that they had no food. In questioning other raisers who had continued to raise rabbits, I was told that rabbits do not die for no reason (hunger or ill care of dirty cages cause it), that these people had no trouble selling any rabbits they had and that feed was available. I surmised that in many cases it boils down to the fact that it just takes too much time and work for some people. Not that this is necessarily bad. But you can't raise rabbits with no work or with as little work as an equal number of chickens would take."

Another problem is the greater need for management. "A man can have a flock of chickens, throw them a bit of grain occasionally, shut them up in his kitchen at night and get away with it. Much more is required of the rabbit raiser. We found that it is best to start with a farmer who has had no experience with rabbits than with a man who has "raised" rabbits before under improper methods of letting them run around the house. Also, farmers need regular visits to train, give new ideas, support, trouble-shoot etc. ...In areas where the traditional scavenger method of animal husbandry has been practiced, where animals are largely left to find their own livelihood, a fundamental change in attitude must take place for rabbits to be successful. To cage and regularly feed the animal is quite foreign, especially when the farmer and his family may be hungry. We must not underestimate this educational process."

To be economically feasible, the rabbit project must be based primarily on large amounts of green roughage. Though weight gain will not be as rapid, the gains will be inexpensive. The beauty of the rabbit in this situation is that it converts cheap roughage unfit for human consumption into meat of very high quality.

We then received an unexpected letter on the same subject from Gary Shepard in Nepal. "About 8 years ago I tried raising rabbits in the village, but nearly all the 80 young died and I gave up. Last fall I got a few tips and raising rabbits has caught on like wildfire now. The important points were: (1) Clean the pen daily, i.e, throw out all old grass etc. (2) keep feed off the bottom of the pen by either building a feed rack or tying it up. (3) Make sure villagers build pens with bottom slats of bamboo or wooden rods so that it is as self cleaning as possible. (4) Avoid giving grass that is wet during the hot season. Though you might get away with it for a month or more, one day you will find that a bunch have died overnight. Cut grass in the morning and spread it out to dry excess moisture in a sheltered place (on top of the pen) and feed it in the evening. In the evening you can cut grass and dry it overnight. Rabbits do OK on a 90% banana leaf diet, but prefer a mix of foliage, weeds, etc. (5) Some books say not to give salt. This may be OK for cold climates, but if you don't you risk the mother killing and eating her young, as is common here in the monsoon season. But I have never known it to happen to those who feed a little salt. I put it in with a little ground grain made damp with water. Our villagers feed their rabbits a lot of mustard cake. They are far more profitable than chickens and require comparatively little grain."

I really appreciate receiving these kinds of letters. Let me hear from you about things experience has taught you.

3-4. **DOES JOJOBA HAVE POTENTIAL IN THE TROPICS** In each of the countries I visited last spring (Honduras, Costa Rica and Colombia) I found interest in trying jojoba. It is hardly surprising. A desert shrub that produces acorn size seeds containing 40% oil that sells $200 per gallon is interesting indeed! The following item will give more basic information on jojoba. Here I want to help you decide whether to try jojoba in your area and, it so, on what scale to try it.

Native jojoba plantations can be found in areas with less than 12 inches of rain per year, but inadequate seed may be produced under these conditions. Optimal growth occurs with 15-18 inches. It will probably be unsuited for your area if there is over 30 inches of rain.

It is a temptation to plant jojoba on a large scale right away, because it takes 3-5 years for plantings to begin production. By the time smaller test plots were mature, the exceptionally high prices that accompany the present shortage of seed maya be substantially lower. Indeed, I was shown several hundred acres in northern Costa Rica that ha been planted by a group of investors. But Dr. Leon at CATIE mentioned that it was not known whether the plants will produce seed in more equatorial latitudes or what other problems might occur. He urged caution until more is known. You could lose credibility among those you work to help if you built up their hopes only to find the plant would not bear seed. Upon my return I inquired as to who were the leading experts in jojoba, then phoned them.

Dr. Lemoyne Hogan is with the University of Arizona. He has a former student in Brazil who has five year old plants growing south of the equator. They are flowering and fruiting, so he is sure that long day length is not a requirement to get fruit. Reports based on greenhouse work in Australia had suggested that some cold was needed. This also is apparently not a requirement. He stressed that jojoba is not suited if rainfall is over 30 inches or if soils are poorly drained. One of the two big sites he visited in Costa Rica had poor drainage and the other was in poor sand. He has seen projects in other countries with similar problems. An Australian project is in dunes and beach sand. He stressed that jojoba **does need nutrients.** I mentioned the temptation to plant widely rather than do trials first. He replied, "They had <u>better</u> do trials! That's what I keep urging people. It is crazy."

Dr. Yermanos is with the University of California at Riverside. He said jojoba will bear fruit in the tropics, but no one knows what yields can be obtained. He is growing it at low latitudes, but they are all young plants. They do have flowers and seeds however. Not even in our latitude where jojoba is native are there commercial plantations in production. Though there are now 20,000 acres of 1 - 3 year old jojoba plantations, it will be several years before we really know its potential. "Our advice is to start with small plantings." Asked about the large planting in Costa Rica he replied, "The general idea is that it is more of a fiasco. How does one justify it?"

If you believe that jojoba might have potential in your area, I encourage you to begin now to do some **modest scale** experimentation. I have purchased a pound of seed and will send you two dozen seeds to get you started. But for larger quantities, order from either Desert Whale Jojoba Co. at P.O. Box 4194, Tucson, AZ 85717 USA or the U. S. Jojoba Corporation, P.O. Box 45428, Tucson, AZ 85733 USA. The price is $7 per pound for 1-500 and $6 per pound above 500 pounds. Be sure to request recent seed.

Postage is additional. If you have been overseas, you might be shocked at how high airmail postage will be on a pound, so add at least 100% postage. ECHO will be happy to handle the order for you if you prefer and if you have sufficient money on deposit with us. We make no commission on this or any other item. Order whichever way best suits your needs. By the way, based on the weight of 50 seeds, I estimate that there are about 750 seeds per pound.

3-5. **WHAT IS JOJOBA?** Jojoba (pronounced ho-ho-ba) is a hardy shrub which grows wild in the Sonoran desert in northern Mexico and southwest USA. Its seeds contain an oil, which is really a liquid wax, that is very similar in properties to sperm whale oil. This kind of wax is difficult and expensive to synthesize in commercial quantities, so the demand for jojoba or sperm whale oil seems sure to continue. The oil is excellent as a lubricant under high pressures and temperatures. The Christian Science Monitor says that a few drops of jojoba oil added to transmission fluid has been found to reduce internal temperature 20 and in turn double the life of the transmission, but the high price makes oil companies wary so far. It is an excellent agent for controlling foaming in penicillin, requiring only 1/6 the amount of sperm whale oil used for the same purpose. Wyeth Laboratories project their annual needs at 35,000 gallons and the U. S. penicillin industry needs at 7,000,000 pounds. Its main use so far, however, is in the cosmetics industry. I have heard advertisements for products with jojoba. Demand for both cosmetic and lubricant applications is sure to go up as price goes down.

As far as I know, there are no named varieties, though that may soon change. Most plantations are established from seed. One disadvantage of planting seed is that all plants will not be of equal quality. Superior plants can be propagated by tissue culture or cuttings. Plants are either male or female, but the sex cannot be determined until flowering. A ratio of 1 male to 5-7 females seems ideal, with excess males being rogued out. Jojoba has a life expectancy of at least 100 years. It can withstand grazing (and apparently makes good forage). Plants grow to 3 feet under water and grazing stress, but can be 9 feet tall under ideal conditions. I can send you a two page, fact-filled write-up by the Office of Arid Lands Studies called "Jojoba: How To Grow It". We will also try to find answers to specific questions that you cannot track down from your present location.

[UPDATE: The jojoba seed we purchased for the seedbank in 1982 is still viable in 1990. As long as it lasts, we will distribute it. Several have asked where to order in quantity, so here are two possibilities. The U. S. Jojoba Corp, P. O. Box 43428, Tucson, AZ 85733 (phone 602/790-4742) or Desert Whale Jojoba Co., P. O. Box 41594, Tucson, AZ 85717 (phone 602/882-4195) both sold it in 1982. The price was about $11 per pound at that time.]

3-5. **WHEN YOU NEED ENGINEERING ASSISTANCE** Engineering Ministries International is a group of evangelical professional engineers who desire "to proclaim the love of Jesus Christ though the work of Christian relief projects." They have experience in such fields as structural engineering, architectural planning, hydraulics (including hydrogeology and water supply), electrical engineering, mechanical engineering and surveying. The Director, Mr. Michael Orsillo, has ten years of education and experience in civil engineering, including registration as a Professional Engineer in California and Colorado. He is also an ordained minister with a masters degree from Oral Roberts University.

The material they sent to ECHO explains that many relief projects and churches are built with little or no professional design work. EMI is able to provide competent design assistance at a fraction of the cost of professional consulting services. Often the cost of assistance is off-set by a savings in material costs, time over-runs or future maintenance problems. They are presently working with Compassion International on a water supply project in Haiti. Another current project is with a national church in Jamaica designing a 500 seat church and Bible school, involving an architect, an electrical engineer and a civil/structural engineer. Recently they provided structural design for a Bible College for Youth with a Mission on the island of Saipan. The design was needed to overcome the effects of periodic typhoons.

For more information, contact Mr. Michael Orsillo, Engineering Ministries International. [Update: Mike says they have expanded to add architectural services now also. The new address and phone number is 110 S. Weber, Suite 102, Colorado Springs, CO 80903. Phone 719/633-2078.]

3-6. **STUDY IN AGRICULTURE AND VETERINARY MEDICINE (FOR THOSE WHO SPEAK FRENCH OR DUTCH)** After receiving his masters in horticulture from Florida, Pete Ekstrand went to the Prince Leopold Institute of Tropical Medicine in Antwerp, Belgium for a year of study before beginning work in Zaire. I could tell from his exciting letters that he was gaining much from the studies, so I asked him to write a couple paragraphs about the school. "The course lasts for ten months (early October through June). It consists of two programs, one in animal health and hygiene and the other in animal production. In the first program we studied tick-borne diseases, trypanosomiasis, other protozoan diseases, insect control, infectious disease and the role of veterinarians in prophylactic campaigns. In the second we studied agronomy, fodder crops and natural pastures, animal husbandry, management of farms and stations, construction, molasses and non-protein nitrogen, agricultural by-products, trade policies, wildlife use, hydrobiology, fish farming, handling of hides and skins, biometry and statistics." "So what do I think of it? I have thoroughly enjoyed the course! Although French is a second language and I was able to study it only four months, I have had no problem following and understanding the material, except for the expected new vocabulary. In fact, they greatly helped my French. The students this year are from Bolivia, Spain, Zaire, Benin, Ghana, Cameroon, Ivory Coast, Togo, Belgium and the USA (myself). It has been enjoyable and enlightening to talk with them about situations and potentials in their countries. The professors have had experience in developing countries and are current in what they teach. I have been impressed with their knowledge and understanding of all the parameters involved in development. I am sure the year will greatly benefit my future work in Zaire."

The only fee mentioned in the catalog is 40,000 BF registration. At today's exchange rate that would be exactly $600. For more information, write to Institute de Medecine Tropicale Prince Leopold; Section Medecine Veterinaire; Nationalestraat 155, B-2000 Anvers (Belgique). Phone 031/38.58.80.

3-6. **NEW PEACE CORPS MANUAL CALLED "PRACTICAL POULTRY RAISING"** The book addresses questions such as: "How do you produce chickens profitably? Should you raise chickens for meat, for eggs, or for both? Will country chickens meet your marketing needs or can you afford to expand production with improved breeds?" Ducks, geese, guinea fowl, turkeys and pigeons are also discussed. My copy has not yet arrived, but I mention it now based on a review so that you can order free copies (readers in the third world only) form [UPDATE: See issue 7-1 for additional titles and instructions for non-profit organizations wishing to obtain a few free copies of Peace Corps books.]