EDN ISSUE # 10, JANUARY 1985

10-1. THE MORINGA TREE, *MORINGA OLEIFERA*, IS CALLED MOTHER'S BEST FRIEND. That is one way they sometimes refer to this tree in the Philippines where the leaves of the malunggay, as they call it, are cooked and fed to babies. Other names for it include horseradish tree and drumstick tree (India) and benzolive (Haiti). I believe it is one of the most exciting plants that we have in our seedbank.

The leaflets can be stripped from the feathery, fern-like leaves and used in any spinach recipe. Small trees can be pulled up after a few months and the taproot ground, mixed with vinegar and salt and used in place of horseradish. Very young plants can be used as a tender vegetable. After about 8 months the tree begins to flower and continues year round. The flowers can be eaten or used to make a tea. They are also good for beekeepers. The young pods can be cooked and reportedly have a taste reminiscent of asparagus. The green peas and surrounding white material can be removed from larger pods and cooked in various ways. Seeds from mature pods (which can be 2 feet long) can be browned in a skillet, mashed and placed in boiling water, which causes an excellent cooking or lubricating oil to float to the surface. The oil reportedly does not become rancid and was once sold as ben oil. The wood is very, very soft, though the tree is a good living fencepost. It makes acceptable firewood but poor charcoal.

It is an extremely fast growing tree. Roy Danforth in Zaire wrote, "The trees grow more rapidly than papaya, with one three month old tree reaching 8 feet. I never knew there would be such a tree." The tree in our organic garden grew to about 15 feet in 9 months, and had been cut back some twice to make it branch out more. It is well to prune trees frequently when they are young or they will become lanky and difficult to harvest. Where folks begin breaking off tender tips to cook when trees are about 4 or 5 feet tall, the trees become much more bushy.

The folks to whom we have sent the tree in Africa have been pleased at its resistance to dry weather. Rob Van Os rated its growth, yield and potential as exceptional and added that it "can be planted after the other crops, even near the end of the rains." He has introduced into several villages already. The first plants grew so well for Gary Shepherd in Nepal that he had us arrange for 1,000 of the large seeds. He reports that at five months one was 12 feet tall and most were 6 feet.

There is more good news. The edible parts are exceptionally nutritious! Frank Martin says in Survival and Subsistence in the Tropics that "among the leafy vegetables, one stands out as particularly good, the horseradish tree. The leaves are outstanding as a source of vitamin A and, when raw, vitamin C. They are a good source of B vitamins and among the best plant sources of minerals. The calcium content is very high for a plant. Phosphorous is low, as it should be. The content of iron is very good (it is reportedly prescribed for anemia in the Philippines). They are an excellent source of protein and a very low source of fat and carbohydrates. Thus the leaves are one of the best plant foods that can be found." In his Edible Leaves of the Tropics he adds that the leaves are incomparable as a source of the sulfur containing amino acids methionine and cystine, which are often in short supply.

We have found that it responds well to mulch, water and fertilizer. It is set back when our water table stays for long at an inch or two below the surface. We planted one right in the middle of our vegetable garden for its light shade. The branches are much too brittle to support someone

climbing the tree. It is not harmed by frost, but can be killed to the ground by freezes. It quickly sends out new growth from the trunk when cut, or from the ground when frozen. I understand that living fences can be continually cut back to a few feet.

We will send Technical Note A-5 "The Benzolive Tree" upon request. It contains greater detail on cultivation, nutritional value and several recipes. If it does not already grow in your region, you may request a small packet of the marble sized seed. It grows wild in many places where people do not know it is edible. The benzolive is one of God's abundant resources for the struggle against world hunger.

10-1. A POCKET DIRECTORY OF TREES AND SEEDS IN KENYA. Wayne Teel sent us a copy of his 151 page book which has just been published by KENGO (Kenya Non-Governmental Organizations). It is written as a handbook for self-help groups working in Kenya. However, I think our readers in other countries may find it helpful for two reasons. First, much of the information is relevant for any tropical country. Second, you might find it a useful model for developing a Pocket Directory of Trees and Seeds for your own country.

Chapter one contains questions and answers that are frequently asked about species selection and seed collection. Chapter two lists climatic regions in Kenya and chapter three lists all the trees which can or could grow in those regions. In chapter four, 90 tree species are individually discussed, complete with drawings, climatic requirements, seed storage and treatment, uses of the tree and, very importantly, local sources for seed. I intend to contact a few of those to see if they will ship out of the country. Make check to KENGO for $5 for surface or $11 for airmail (P. O. Box 48197, Nairobi, Kenya).

10-2. DO NOT EAT SPROUTED SORGHUM. You have heard of the added nutritional benefits that can come from sprouting seeds before eating them. Grain sorghum is an example of how it is not safe to assume that any edible seed can be eaten after sprouting. According to an article in **Science News**, this practice used to be recommended to improve the nutritional value of sorghum. The sprouts were eaten fresh or dried and ground into a meal. "The average fatal dose of HCN (cyanide) is 50 to 60 mg, and this amount was readily obtained from sprouts grown from 100 grams of sorghum seed. Consumption in a single meal of sorghum sprouts or the dried product derived from 100 g of seed is entirely possible." Dried sprouts retained the high levels of cyanide. The authors say this presents a special risk to people with chronic cyanide poisoning from diets high in cassava and sorghum grain. Sprouting could increase the already serious levels of cyanide in their diets by as much as 500 to 1000 fold. We now have the original research article and will share it with you if this is a matter of special concern.

10-2. SOME THOUGHTS ON COMPOSTING. There are three problems with the "proper" way to make fine compost. First, it is more work than most of us, including the subsistence farmer, have time to do. Secondly, most garden and farm residue is too big to decompose quickly unless a lot of work is done with a machete or shredder. Thirdly, humans like immediate gratification, something that only the most elegantly constructed compost piles can offer; the others take forever. We have been working on some methods to get around all of these problems, but now find they have already done that in Germany, with "hugelkultur" (hill culture). The following is taken from **The Avant Gardener** newsletter.

"A hole 6 inches deep and 5 to 6 feet wide is dug of any desired length and running north-south. In the bottom, twigs, branches and rotting logs are laid [I would put things like broccoli stems here too]. Then the sod removed when making the hole is laid face down on the wood layer. On top of this goes a deep layer of rotting leaves ...and green wastes.... Next comes a layer of fresh, nearly finished compost. Finally all this is topped with soil mixed with rich, mature compost. The completed mound can be as high as 30 inches. Hugelkultur experts advise planting leaf and head vegetables such as lettuce, spinach, cabbage and cauliflower, plus tomatoes and cucumbers, the first year when there is considerable heating from the composting. The next year ... root crops can be added. The mound will last 7 years, its height gradually lessening and in the final year a perennial such as asparagus is planted."

[You can subscribe to this newsletter for $15 per year. There is no airmail option. Write to Horticultural Data Processors, Box 489, New York, NY 10028, USA. Though it is definitely oriented toward temperate horticulture, often ornamental, some of our tropical readers may find it helpful from time to time].

The systems we are trying are quite similar. We make layers of whatever material we have available. By being able to plant immediately we not only get that "instant gratification" but also are able to make better use of scarce land by continuing to use the area for planting. Because it is in use there is no hurry for it to all decompose. Because there is no hurry, there is no need for turning or chopping up the coarse material. You also have all the advantages of a raised bed. We are using fertilizer at least this first season because our top compost layer is thin and the decay inside may cause nutrient deficiencies at first. If we had manure tea we would water with it frequently. Instead we often use a soluble fertilizer, pouring it right over the leaves.

We never seem to have enough compost. I expect to tear up some of these "hills" after a year or so rather than following the German scheme exactly.

Heating may not be too serious a problem on a smaller scale. We have very nice carrots right now in a 12 inch tall 2 x 4 foot bottomless box that we placed on a cement slab and filled to the top with grass clippings and a bit of fertilizer. We then placed about 3 inches of potting mix on top and planted the seeds. By the time the roots reached the grass it had apparently cooled down.

Those of you with large amounts of rainfall are often discouraged to see the bit of fertilizer you were able to procure leached away by rains. Hill culture might help because the microorganisms that decay the organic matter in the interior of the hill use the same nutrients that plants use. As nutrients are leached into the pile they are "recycled" by these microorganisms and turned into compost.

10-3. CLARIFICATION ON AUBURN'S ASSISTANCE IN AQUACULTURE. My wording in #9 may have given some of our readers the impression that Auburn has money to give to your aquaculture project. They have a grant to help selected "private voluntary organizations (PVO's)," a willingness to help others as they are able and the hope that future funding will enable greater involvement with PVO's. The grant only covers some of their own internal expenses in offering this help. They can be most helpful if you write with specific questions encountered in your aquaculture project. Broader questions like, "I know little about aquaculture but want to know whether to start a project and how," are far more than they can undertake by correspondence.

10-3. HOW SHOULD I TREAT SOYBEANS SO THEY CAN BE FED TO ANIMALS? Dick Both in Haiti asked us this question. Like many of you, he has found varieties of soybeans that do quite well. They are one of the best sources of protein supplement for animals, a difficult problem on the remote, small farm. Chickens and pigs, for example, are supposed to be fed over 15% protein, yet even a pure corn diet would not go over 10%. Raw soybeans, however, contain a substance called a trypsin inhibitor. It renders the enzyme trypsin incapable of digesting food. This helps protect soybeans from pests, but is a serious nutritional problem.

Commercially, the oil is expelled from soybeans and the meal is heated. The heat destroys the inhibitor. Not many of you will have the equipment to expel oil. I asked Dr. Charles Hill in the Poultry Science Dept. at North Carolina State University for advice. He said that they use an autoclave, heating ground soybeans in about a 1 inch layer for 15 to 20 minutes at 15 psi. He thought that if you could rig up a device to provide steam heat at atmospheric pressure that 30 to 60 minutes would be adequate. It is best to grind the beans first. Dr. Garren at Western Carolina University said he has found that 10% raw soybeans were OK in rations for laying hens.

Several of you have asked for a commercial appropriate technology oil expeller. You might want to write to S. P. Engineering Corp., P. O. Box 218, 79/7, Latouche Roac, Kanpur, India. They have several models of "table" oil expellers which were designed for cottage industries. Models require either a 3 or 5 horse power motor. In a January 1983 letter they quoted prices of $750 for the best expeller and $150 for recommended spare parts. If you know of others, or have a design you have made yourself, please send me details.

10-3. MORE ON ANIMAL FEEDS. One of the most important questions faced by our readers is how to feed animals when farmers cannot purchase commercial rations. I would like to write a number of notes on this as information comes to my attention. I hope that a number of you will have items from your personal experience that you will write to share with all of us.

John Troesle says that he gets a crop of buckwheat (*Fagopyrum esculentum*) in about two months in Monte Verde, Costa Rica. They are near the "cloud forest" at something over 3,000 feet. Potentially this could give several crops per year. It does best in cool, humid climates and is known for being disease-free. It is an excellent crop for beekeepers too. It is normally grown in northern temperate countries. In parts of Poland and Russia it is a basic item in human diets, but is used mostly for animal feed in the States. However, I had sourdough buckwheat pancakes nearly every morning during winters when I was growing up and still love them (though few people who did not grow up with them seem to like my pancakes!)

I asked Dr. Hill at N. C. State Univ. about its usefulness in animal feed. It is not as palatable as most cereals, so should not be used in more than 1/3 of the ration. It is best to grind it for all animals except for poultry, which apparently do well eating it whole. It is a substitute for grain in dairy rations. The nutritional value is about 10-15% less than oats. In the States yields range up to 40 bushels per acre.

When used in too high a concentration in pig rations it makes soft pork. This means that fats are too unsaturated and tend to be runny. (Because unsaturated fats are said to be less likely to lead to high cholesterol levels I wonder if pork that is more unsaturated might not be a great thing for human nutrition.)

If you are in a region where it is cool and moist, but with no frost, for at least two months, this might be an interesting crop to try. John gave us a small amount of seed to share and I am trying to locate more. We will send you enough to get a few plants and increase your own seed upon request.

10-4. BOOKS IN FRENCH ON TROPICAL AGRICULTURE. We forwarded this request from Ron Angert in Haiti to Pete Ekstrand in Zaire. We excerpt his reply. "These are the best I have seen. We use them for our teaching here. The ones from the French Foreign Ministry are not too expensive either. Unfortunately one of the best has been out of print for a couple years. [If I read their catalog right they are reprinting it]. It is **Precis D'Elevage du Porc en Zone Tropicale**. It is excellent!! This and a host of other excellent books on agriculture and animal husbandry in the tropics come from the French Ministry of Cooperation and Development. Write them for a catalog at: Direction De La Documentation Francaise, 29-31, Quai Voltaire, 75340 Paris Cedex 07, France.

[Ed: I have obtained catalogs and include the price in parenthesis after each title. A French frank was $0.104 in early January]. "I have purchased or seen and recommend the following from the French Ministry: **Memento de L'Agronome** (80F) is an excellent handbook on everything: soils, climate, crops, husbandry, pathology, etc. **Memento Du Forestier** (80F) is an excellent book on forestry. It does not cover reforestation and does cover fish culture [??]. **Manuel d'Hygien du Betail et de la Prophylaxie des Maladies Contagieuses en Zone Tropicale** (45F) is brief and to the point, sort of a field manual. **Precis du Petit Elevage** [being revised] is an excellent treatment of poultry and rabbits. **Manuel de construction des Batiments pour l'Elevage en Zone Tropicale** (45F) gives plans for cattle, pork, chickens, and the needs of each. **Manuel sur les Paturages Tropicaux et les Cultures Fourrageres** (45F) is an excellent discussion of pastures and their management. **Manuel d'Alimentation des Ruminants Domestiques en Milieu Tropical** (53F)is an excellent analysis of <u>all</u> foods for ruminants and the needs of these animals, including suggested rations. **Precis de Parasitologie Veterinaire Tropicale** (102F) gives an excellent coverage of all the parasites found in the tropics.

"Les Principales Cultures en Afrique Centrale (1,200 B. Fr. including postage) is an excellent book on the cultivation of ALL tropical crops. It is in-depth and covers all the diseases and the processing of the crops. Order from Patrimoine Du Musee Royal De L'Afrique Centrale, 13 steenweg op Leuven, B - 1980 Tervuren, Belgie - Belgium. **Agriculture Tropicale en Milieu Paysan Aricain** (134 French franks) does an excellent job on all the basics of agriculture and could be used as a text for the beginning classes without changes. It has incredible pictures on the basics: soils, biology, fertilizers, nutrition, water and its movements, spacings, composting, etc. You may even want to learn to read French once you see it!" (I ordered it. He is right, I sure wish I could read it. The pictures are intriguing). Order from Terres et Vie, rue Laurent Delvaux 13, 1400 Nivelles, Belgium.

10-5. MORE ON USES OF THE NEEM TREE AS AN INSECTICIDE. R. N. Mall in Pakistan writes, "We learned during the Health Education Program that in some villages the seeds are crushed and the oil is being used against head lice, which is quite effective." Dick Lockman, also in Pakistan, says that they use the dried leaves for moth protection of woolen clothing in storage. A few leaves in the pockets and scattered among the items prevent moth damage. In our original article in issue #7 I stated that the 26 F freeze did not hurt our 7 foot tree. This turned out to be incorrect. I had water spraying on the tree that night at about 4 feet. It was OK from there down, but after some weeks the leaves above 4 feet dropped. Eventually all parts that were not protected with water spray died. A large number of you requested the Technical Note on neem. We are very interested in

hearing if you find it successful, how widely it is used and if you find any new applications. Victor Wynne in Haiti has supplied some of you with seed. An African source is the Baobab Farm, Ltd. J. Balarin says they sell neem seeds for Kshs 20 per 100 g (approximately 400 seeds) and he welcomes inquiries. You can write him at the Baobab Farm Ltd., P. O. Box 90202, Mombasa, Kenya, East Africa.

10-6. TROPICAL AND SUBTROPICAL FRUIT TREES FOR ARID REGIONS -- PART 2. We continue the conversation with Dr. Carl Campbell. We can now provide seed for both the Indian jujube and for red and yellow prickly pear cactus that were discussed the last time.

The imbe, *Garcinia livingstonei*, grows in some pretty arid places and is fairly productive, though it is not a desert tree. It has a bulbous base underground like many arid and fire-resistant trees. It is so closely related to the mangosteen that it can be used as mangosteen rootstock. Quoting from **Sturrock's Fruits for Southern Florida**, it is "quite hardy in southern Florida and grows equally well on the acid sandy soils and alkaline rock soils. [To be hardy here means it can stand high rain and humidity also]. (Several generations of) trees grown from seed were quite fruitful with little variation in fruits. There are male and female trees. The stiff, unsymmetrical growth and the grey-green stiff foliage give it an unusual and striking appearance. ...The small orange-colored fruits have a thick tough skin and a very large seed. The small amount of juicy acidulous pulp has a pleasant flavor. It is, however, more a curiosity than an economic fruit." Write for seed, which we will supply when it is next available.

10-6. BIOMASS GASSIFIER WOULD ENABLE YOU TO RUN STATIONARY ENGINES ON CHARCOAL, WOOD CHIPS, CRUSHED COCONUT SHELL, ETC. The SELTEC company, with some help from the British government's Tropical Development and Research Institute, has designed a gassifier that will run internal combustion engines directly or diesel engines with 20% diesel fuel (some diesel fuel is necessary to provide ignition). Basically the fuel falls by gravity from a hopper into the combustion section where it is converted to gas. The hot dirty gas then passes through a three stage cleaning process, then to cooler / condensers to convert to "engine quality." They have one unit for carbonized fuel and a separate one if charcoal is not the fuel of choice. The electrical power generating capacity is 5 to 25 KW. As a rough guide, 1 kg of wood chips will give 1 KWH of electricity.

This is obviously not for the subsistence farmer. But many of our readers are using diesel fuel to run generators for hospitals and other needs. If the supply is expensive and unreliable, this might be worth exploring further. My contact at the company is Phil Harris. He writes, "both gassifiers will cost about the same, 2700 $^{+}$-300 pounds (1 pound is about $1.15). A rough estimate of packing, insurance and freight is 600-1200 pounds."

I am not qualified to evaluate the engineering, but the basic idea is an old and proven one. You could no doubt make your own unit with a creative mechanic. We could even send some general information on gassifiers. I wonder, though, if there would be a savings by the time you did the research and debugging needed to get a reliable unit, especially the cleaning processes. For information write A. G. Harris at Specialist Engines Limited, P. O. Box 2, Helston, Cornwall TR13 8XB, England.