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- 1 Red Palm Oil: More than just a good source of Vitamin A
- 4 Colloidal Silver for Clay Water Filters
- 5 Grants for Churches Starting Microenterprise Projects
- 5 World Relief Microfinance Consulting Services
- 6 Source in Africa for Sunnhemp, *Crotalaria ochroleuca*
- 6 Can You Help Us?
- 6 Echoes from our Network
- 7 From ECHO's Seedbank
- 8 Upcoming Events

Red Palm Oil: More Than Just a Good Source of Vitamin A

Perennials that year after year incorporate atmospheric carbon dioxide into biomass, improve our environment, and give us useful food, feed and fuel are wonderful plants. Residents of West Africa have long recognized the African oil palm (*Elaeis guineensis*) as such a plant. There may be places where this is an underutilized resource, and other places where it could be grown but is not known.

The reader may have encountered several kinds of palm oil. All come from the same tree. What I will call crude red palm oil is produced with village technology from the fleshy pulp of the fruit surrounding the kernel. In a commercial factory fruit

bunches are sterilized and stripped, then oil is extracted from the fleshy pulp. After clarification, purification and further refinement, the soft portion is used in various types of cooking oil and synthetic shortenings and the hard portion is used for soap and detergents. Palm kernel oil is extracted from the nuts after the kernels are split. This oil contains a higher percentage of saturated fat. It is clear and quite different from crude red palm oil.

Crude red palm oil, locally extracted, can have a significant positive impact on the nutritional status of populations where it is produced. It is a good source of carotenoids that can be transformed into vitamin A, and byproducts from the pressing can be important ingredients in pig feed. Most of the commercial palm oil on the world market contains almost no carotenoids, as they are destroyed in processing. Malaysia, now recognizing the value of the carotenoids, has developed a special process to produce a deodorized and deacidified red palm oil which is also a good source of vitamin A. The carotenoids are also separated and sold in various forms as health promoters.

According to an article in a recent issue of SIGHT & LIFE (Newsletter 2/1999), red palm oil is the richest natural plant source of carotenoids (500-700 ppm). Of these, 56% are Beta-carotene—the carotenoid most easily converted to vitamin A. Thus as little as one teaspoon of red palm oil per day is sufficient to meet the vitamin A requirements of a child.

Various studies have shown that the carotenoids in red palm oil are bioavailable (i.e. they can be used by the body) and are comparable to synthetic vitamin A. This is significant because more and more scientific results point to a low bioavailability of Beta-carotene from vegetables, especially when eaten raw, steamed or cooked with no fat (Newsletter 3/99). In addition to their ready conversion to vitamin A, the carotenoids are antioxidants. They help to minimize or prevent oxidation and thus reduce the incidence of diseases in which free radicals are implicated.

Studies conducted in the 1980's helped us to understand that consumption of dark green leaves and yellow fruits could protect against the severe vitamin A deficiency that leads to blindness. However, the studies also showed that such consumption might not be capable of preventing a symptomless vitamin A deficiency in a substantial proportion of the children in developing countries. There is evidence that this symptomless vitamin A deficiency, when linked with poor general nutrition, can lead to a significant increase in the risk of illness and death in young children. (SIGHT & LIFE Manual on Vitamin A Deficiency Disorders, 2001).

Vitamin A is a fat-soluble vitamin that is stored in the liver. Therefore, the liver of animals is a concentrated source of vitamin A and should be eaten only infrequently by most people. If we consume too much it can be toxic. Yet multitudes of children suffer from vitamin A deficiency. Their diets do not contain enough vitamin A to supply their needs, let alone build up a surplus. One thing in their favor is that where the intake of vitamin A is low, the body seems to more efficiently use what it does take in. Hence small amounts of red palm oil (or fish liver, butter, whole milk, eggs & cheese, which also supply vitamin A) could keep many from suffering from night blindness (or total blindness) and the many other health complications suffered by those with an inadequate intake of Vitamin A. In many parts of the tropics where dairy products would be difficult to find, the oil palm can be grown.

Red palm oil is easily digested, absorbed and utilized. In areas where it is widely used it plays a useful role in meeting energy and essential fatty acid needs. It has been a safe and nutritious source of edible oil for healthy humans for thousands of years in West Africa where the plant is believed to have originated. It contains no cholesterol. Because it has a moderate level of saturated fatty acids, it does not need to be artificially hydrogenated (an industrial process that turns a liquid fat into a solid fat like margarine) for use as a fat component in foods. As a result it does not contain the exceptionally harmful trans-fatty acids that are created when oils are hydrogenated (information from <http://porim.gov.my/homepage96/nut12f.html>).

While too much oil or fat in the diet can be detrimental, too little can also lead to serious problems. Fat is required to help absorb not only vitamins but also protein and other nutrients.

Poor nutrition is sometimes linked to a lack of fat in people's diets.

Oil palm is the highest-yielding vegetable oil crop in the world. It produces several types of oil that can be used for cooking, margarine, soap and various industrial uses. At the village level, it has long been a source of energy and income in areas where the oil palm is indigenous.

If red palm oil could eliminate the problem of vitamin A deficiency (that can cause blindness and many other complications), and if the plant is one of the world's most efficient oil producers, why isn't it grown in more parts of the tropical world? There are actually quite good reasons, but some of the obstacles are being overcome.

Some Environmental Limitations and How They Are Overcome

Only limited areas meet the climatic requirements of oil palm. The best locations are found within 10 degrees of the Equator, although it is commercially grown up to 17 degrees from the Equator and is sometimes found even further north or south. It likes a rainfall in excess of 1500 mm (60 in) with a fairly even distribution throughout the year. While this is the ideal, it has performed well in some areas with a marked dry season and on a wide variety of soils.

The ideal temperature range for oil palm is between 22-32°C (72-90°F). New hybrids developed by FAO and a Costa Rican company have been successfully grown above 900 m in Ethiopia and these are being further tested in Malawi, Zambia and Cameroon, so there is reason to believe that its growing range can be expanded.

It can take up to two years for oil palm seeds to germinate. Oil palm plantations use special heating equipment and laboratory methods to get quick (3-4 months), even germination.

For the person serious about getting started with oil palm we repeat the following information that we excerpted from *Africa Link Newsletter* No. 19 in EDN 68-6. Bob Mann, with the Methodist Relief & Development Fund, shared a compost pit method (used by PRTC Mfonta nursery) for achieving better germination. A pit is first dug about one foot deep. The bottom is lined with male inflorescences from the oil palm. A layer of ripe oil palm fruits (taken from the inside layers of the fruit bunch) is put down. This is covered with a thin layer of grass, then a layer of soil, and finally with banana stems to prevent chickens from scratching the contents out. The 'compost' germination pit is watered lightly to keep it moist and to encourage the contents to heat up. In five to six months the pit contents are opened. By this point there should be the start of good germination. Seeds that have sprouted (with growing shoots up to 2.5 cm (1 in) in length) are planted in prepared polybags or pots that are 30 cm (12 in) in height and 18 cm (7 in) in diameter.

Shading should be provided for younger seedlings. As they grow they can be exposed to more direct sunlight. They usually remain in the nursery for about one year. They will benefit from six to eight weekly applications of a compound fertilizer (1:1:1 ratio) with added magnesium, placed no closer than 10 cm (4 in) from the plant. Phosphorus is worked into the soil before the plants are transplanted to the field. After planting, N and K are added at six monthly intervals around the plants. For the village 'organic' farmer these nutrients can be supplied in other forms--manure, compost or mulch and a good cover crop (*Centrosema* or *Pueraria*).

For general purposes three types of oil palm fruit are recognized. Wild or semi-wild groves in West Africa are '*dura*' and have a thick shell. Oil yield is low and they take longer to begin to bear fruit. When the '*dura*' is crossed with '*pisifera*' (which has no shell) a hybrid is produced ('*tenera*') which has a shell of medium thickness. It is a good oil producer and begins to bear sooner. *Dura*, *pisifera*, and the cross known as *tenera* all belong to the *Eleaëis guineensis* species.

'*Tenera*' palms will probably begin to bear fruit three to four years after they have been planted in the field. The best yields come after an additional four to five years. The trees will bear fruit for 30 years or more, although it becomes difficult to harvest the fruit bunches when the trees become very tall.

We have noted the disadvantages of the *dura* oil palms: lower yields and a longer period of growth before coming into production. However, they may still have a place for the resource-poor farmer. Hybrid seed does not have to be purchased. *Dura* palms do not have to be fertilized as do the hybrids. Some say they yield more than *tenera* when *tenera* is not fertilized. Others say *tenera* will yield more even if it is not fertilized. It probably depends on the soil and the care.

Adequate pollination in areas devoid of natural pollinators can be achieved by applying collected pollen by hand or by introducing a weevil (*Elaeodobius kamerunicus*) which is specific to oil palm. Because seed is available all year and is one of the easiest to ship it should not be so difficult to find the seed you would need to get started. ECHO does not have oil palm seed in its seedbank, but if you live and work in a part of the world where the oil palm grows, seed should be available. Paul Noren, a Covenant Agricultural Missionary from the Central African Republic/Democratic Republic of the Congo who recently spent some time at ECHO as "Missionary in Residence," said that if seed or seedlings were obtained from a *tenera* plantation about 50% would be *tenera*, 25% *dura*, and 25% *pisifera*. Where hybrid seed cannot be obtained, this would give a reasonable option.

In southern Benin, where they have attempted to move toward hybrid production, there are still viable examples of the '*palmeraie jardin*' ('oil palm forest') or '*palmeraie naturelle*' ('natural oil palm system'). Here the *dura*

plantations cover about 40,000 hectares and have adapted to the dry conditions (1200 mm in a good year). Palm density is said to vary greatly. One will find palms of different ages inter-planted with annual food crops when a lower density is used. When there are no annual crops in the field, the land beneath the trees lies fallow. The palm trees protect the soil from erosion and improve the soil's natural fertility with the help of superficial roots that retain nutrients. This system at best produces about half of what could be obtained from a *tenera* plantation, but it does so at no cost to the farming family except their labor (information from <http://www.nuffic.nl/ciran/ikdm/7-1/segalla.html>).

Processing Palm Nuts

Processing the palm nuts to extract the oil is hot, hard work. It begins with the separation of the fruit from the bunch (regime). Bunches are said to be ready when the first fruits drop from them. In many places the bunches are placed in small mounds, covered and allowed to ferment for a few days in order to facilitate the removal of the fruit from the regime. Studies in Nigeria (*Indigenous Knowledge and Development Monitor*, Vol. 8, Issue 1 March 2000) show that the best quality and highest quantity of crude red palm oil is obtained when the fruit ferments for no more than three days before further processing.



Figure 1: In the Democratic Republic of the Congo, metal barrels are adapted to simplify the extraction of crude red palm oil from pre-boiled, hot palm fruits. Metal arms from the central shaft release the oil from the fruit. Photo courtesy of Paul Noren.

The next stage of processing, the hot part, involves boiling the fruits and pounding them to separate the flesh from the kernels. This also kills the enzymes that would turn some of the oil into "fatty acids." After pounding, the oil is separated from the flesh in different ways; by hand pressing, by mixing with water and allowing oil to float to the surface, or by using a manual press to extract the oil. Village level processing separates about half of the oil from the fruits. Local processes vary in the percentage of oil obtained and in the quality of oil. If the fruits are allowed to ferment for too long or are handled

roughly before boiling, the level of free fatty acids will be higher and the oil will be of a lower quality.

Red palm oil has a deep orange-red color, a strong aroma, and a highly viscous nature. From my perspective it is an easily acquired taste. Others might find it more difficult to add red palm oil to their diets. Due to its health promoting properties some nutritionists in India, not a traditional oil palm area, have been trying to find ways to incorporate red palm oil into their dietary traditions.

Additional Products and Uses

In addition to oil, the plant produces many other useful products. After the crude red oil is removed from the fleshy pulp the latter can be strained and boiled down to a thick sauce. This is used to produce many tasty West African dishes. Two by-products of oil production are the oil-impregnated fiber recovered when the oil is filtered off and the ‘mud’ that remains after the oil has been clarified and centrifuged. In the factory this residue is often reprocessed to remove more of the oil. In village processing the oil-impregnated fiber and ‘mud’ remain together and have a higher content of oil. This oil-rich mix can be a complete replacement for cereal grain in the diet of the growing-finishing pig. All that is needed is 200 gm of a good protein supplement per day and a 20 kg pig can grow to 90 kg in 135 days (Thomas R. Preston and Enrique Murgueitio in *Strategy for Sustainable Livestock Production in the Tropics*).

We should also note that raw palm oil can be used as an energy source for pigs and for ducks that have access to water for cleaning. Chickens can also use it, but look rather frightening after they have eaten the oil. Perhaps it could be mixed with a carrier feed to make it a bit less messy. Whole fresh fruit can also be the energy feed resource for growing-finishing pigs. They will eat the fibrous material surrounding the kernel and then they will crack and extract the kernel from the nuts. Rice polishings, or some other available protein supplement, should be given at the rate of 200 grams per day during the growing and 250 grams during the finishing phase. To be able to take a weaner pig to market weight on fresh palm fruit and perhaps only one 60 kg bag of protein supplement, or even on rice polishings, is definitely an example of a good alternative system (Rena Perez, *Feeding Pigs in the Tropics, FAO Animal Production Health Paper #132*).

Conclusion

Oil palms need special growing conditions—but not so special as we once believed. It takes a long time to germinate the seeds—but it can be done with village technology. The trees will not produce for three to four years—but they will continue to produce for more than 30 years. Processing the oil is labor intensive—but there are many people who need jobs. It is a plant that is being used to make money for large-scale investors in Malaysia, Indonesia and elsewhere. Perhaps

the village level technology with oil palm developed in West Africa (and being further developed in Colombia) deserves to be spread to other parts of the world where the growing conditions for oil palm exist.

Colloidal Silver for Clay Water Filters

By Dawn Berkelaar

After the publication of our article on clay water filters (*EDN* 71-4), we were questioned about the safety of colloidal silver. First of all, you might be wondering what exactly colloidal silver is. Peter Campbell, a professor at the University of Quebec in Canada, studies the effects of metals on living organisms. He told us that the term “colloidal” refers only to the size range of the particles. Thus it might refer to metallic elemental silver suspended in a solvent. It also might refer to any solid silver precipitate such as a silver salt, in which case the silver would be in an ionic form. According to our reading, it is better to use silver in elemental form than silver in ionic form. Ingestion of some silver salts can lead to a condition called argyrosis, which is not dangerous but is characterized by a darkening of the skin and the whites of the eyes.

We wrote to Potters for Peace to ask if they knew of any concerns with the use of colloidal silver. We asked if the whole solution mentioned in the article is painted on the inside of the filter. We also wanted to know if tests had been done to see how much silver goes through the filter.

Barbara Donachy wrote back to say that Potters for Peace uses colloidal silver in elemental form. The whole amount of silver is painted inside the filter. Potters for Peace is currently using a slightly more concentrated suspension (3.2% silver preparation with 1 cc per 250 cc of water), than the one we mentioned in our article (0.32% silver preparation with 7 cc added to 250 cc of water).

Although she didn’t know of any tests being done to see how much silver goes through a filter and ends up in the drinking water, Ms. Donachy said that filters had been tested after seven years of use and still worked, which would indicate that silver was still present in the filter.

According to a paper titled “The Development and Functions of Silver in Water Purification and Disease Control” by Richard L. Davies and Samuel F. Etris, “a 2500-year history of the use of silver for water purification...has been established with no reports of toxic reactions to the hundreds of millions of children and adults exposed to it.” Silver vessels were used in ancient times to keep liquids from spoiling, and two well-known water purification systems (the Katadyn system and the Ionics system) incorporate metallic silver into their designs. The authors discuss silver’s ability to sanitize water by several different mechanisms. First of all,

silver catalyzes (i.e. speeds up) a process called oxidation that destroys microorganisms. Silver is not used up at all in this process.

[Here is a bit more detail for those who know a little chemistry. Because of silver's structure, oxygen atoms (not molecules) are adsorbed by silver but do not react with it. These oxygen atoms can remove hydrogen atoms from sulfhydryl (-S-H) groups on the surface of bacteria and viruses. The sulfur atoms then join together, blocking both respiration and electron transfer. Monovalent silver (silver with a +1 charge) can also effectively kill bacteria and viruses. The silver ions can replace hydrogen ions on the sulfhydryl groups, disrupting electron transfer in bacteria and preventing the unwinding of DNA in viruses. The authors write "mammalian cells are not affected by silver because the protective cell walls block entry of large ions such as silver."]

In addition to its use in water purification, colloidal silver is often used to treat infections. However, it is not a substance regulated by the U.S. Food and Drug Administration (FDA). In fact, the FDA has stated that it "is issuing a final rule establishing that all over-the-counter (OTC) drug products containing colloidal silver ingredients or salts for internal or external use are not generally recognized as safe and effective and are misbranded. FDA is issuing this final rule because many over the counter (OTC) drug products containing colloidal silver ingredients or silver salts are being marketed for numerous serious disease conditions and FDA is not aware of any substantial scientific evidence that supports the use of OTC colloidal silver ingredients or silver salts for these disease conditions" (Federal Register 64(158), pp. 44653-44658). The regulation became effective September 16, 1999.

A web search of the term "colloidal silver" will lead to numerous links to web sites stating the benefits of colloidal silver. The sites I have looked at all report no negative side effects from the use of colloidal silver. Ms. Donachy also told us of a study done in Mexico by a chemist named Michael Owens; the study showed no negative health effects from colloidal silver used over a 30-year period.

Once again, note that the colloidal silver used and advocated by Potters for Peace is pure, elemental silver, NOT silver salts of any kind. Before you buy colloidal silver, make sure you know that it contains elemental silver. This silver remains in the filter and acts by catalyzing reactions that destroy bacteria, in contrast to water purification by chlorine compounds that are actually additives dissolved in the water.

Grants for Churches Starting Microenterprise Projects

The Mustard Seed Foundation, a Christian foundation founded in 1983 by Dennis and Eileen Bakke, seeks to

partner with local churches from around the world that are starting micro-enterprise and revolving loan fund projects. The Foundation typically matches funds that churches contribute—at a ratio depending on the country. Grants are generally \$5,000 or less and always represent less than 50 percent of a project's budget. Please contact the Foundation to receive an application and guidelines. Do NOT write to ECHO for forms or assistance. Applications must follow the guidelines to be considered. Address: Mustard Seed Foundation 330 N. Washington Blvd. Suite 100, Arlington, VA 22201; phone: (703) 524-5620; website: www.msfdn.org

World Relief Microfinance Consulting Services

Are you considering the use of microenterprise development as a means to fight poverty in your area? Does your organization have funds available to set up such a program? If so, World Relief's Microfinance Consulting Services (MCS) can help you with some of the questions you may have about microenterprise. We recently received a brochure from World Relief about their MCS program. Following are some highlights about their ministry.

World Relief's Microfinance Consulting Services (MCS) does not provide funds, but can help you decide whether or not to begin some form of economic development assistance. If you decide to begin such a program, MCS can help you determine which form would be most appropriate for your situation. Many options exist, but a successful program requires understanding, planning, long-term vision, commitment, and hard work.

MCS has a team of experts who can help with:

- Introductory training and materials in the field of microenterprise development
- One-on-one consulting, addressing your specific goals and objectives
- Technical support and training in many areas including finance, accounting, management information systems (MIS), and adult education.

In general, informational questions and requests are free. There are charges for more in-depth assistance. Contact MCS (address below) to find out more information.

Economic interventions can be tremendous tools for development, but if they are not done properly, they can backfire with some very damaging results, including broken relationships, money mismanagement, church splits, and an attitude of dependency.

MCS is committed to providing honest analysis and advice on microenterprise programs. They write, "We want to help you count the cost and understand the challenges that lie ahead so as to better equip and prepare you for the task."

Can You Help Us?

Please note that World Relief's MCS does NOT provide funding for microenterprise projects. They offer technical help, not financial assistance.

For more information, contact the following:
Microfinance Consulting Services
World Relief
P.O. Box 2056
Baltimore MD 21297-0392
Phone: (410) 347-3939
E-mail: mcs@wr.org

Source in Africa for Sunnhemp, *Crotalaria ochroleuca*

In *Amaranth to Zai Holes* p. 169, we mentioned Father Rupper in Tanzania as a contact for seed of sunnhemp (*Crotalaria ochroleuca*). We recently learned that Father Rupper passed away several months ago. Mr. Gabriel Mhagama is now in charge of the Sunnhemp Seed Bank (SSB) and all requests for seed should be directed to him at P.O. Box 208, Peramiho, TANZANIA, East Africa.

Aflatoxins. We are currently working on an article about aflatoxins. These are extremely toxic metabolic substances produced by certain fungi which can contaminate crops during harvest or storage. Aflatoxins are most likely to be found on corn and peanuts and products made from them. Although tasteless and colorless, aflatoxins can cause serious health problems when they are eaten.

If you have information about aflatoxin problems in the country where you are working, please let us know. We are particularly interested in simple methods to prevent and to identify the presence of aflatoxins in foods and feeds.

Chaya. We would like to feature chaya (*Cnidoscolus chayamansa*) in an upcoming issue of EDN. Chaya is a productive, drought-resistant plant with exceptionally nutritious leaves. However, it should not be eaten raw. It contains cyanogenic glycosides that can be inactivated and removed by boiling or frying the leaves for five minutes.

ECHO has sent chaya cuttings to scores of people and countries over the years. If you or someone you know has introduced chaya into your area, we would love to hear an update. How does it grow in your climate? Is it accepted locally as a green vegetable? If so, how is it usually prepared and served? We look forward to hearing from you!

ECHOES FROM OUR NETWORK

One More on SRI

Dave Askin in Papua New Guinea wrote to Norman Uphoff with a question on SRI and stem borer. "Dear Norman, Greetings. I read the SRI article in *Echo Development Notes*. Very interesting. I wondered about the wisdom of very low populations of rice where considerable stem borer problems exist--and no insecticides--I am referring to some places in Papua New Guinea where I work. My concern is the farmers could end up with no crop as each tiller is destroyed. At least with lots of plants established some deaths is not too bad. I am interested in your comments."

Norman Uphoff replied as follows: "Dear David, Your question further illustrates why we say that SRI is a set of principles to be tested and adapted

rather than a technology to be implemented mechanically. I would suggest trying this out. Farmers in Bangladesh told me in December that they had less problem with stem borer using SRI methods because of the plants' health and vigor. Generally farmers report that SRI rice is more robust and resistant to pests and disease. But this is always an empirical question. Good luck, and keep us informed on any experience, good or bad."

Loss of Mango Crop

Wes Tenney in the Philippines wrote to us with a question about mangos. "Perhaps you can provide us with some help. I am in the central Philippines around 600 m above sea level. The farmers have lost their entire mango crop this year. They

always spray potassium nitrate as a flowering inducer late January or early February of each year. This year after spraying, the tree leaves reverted to a young state and did not flower.

"Many of these trees have not been sprayed for more than two years, so they did not induce flowering too soon. I looked at the leaves and they were the proper maturity for spraying the chemical flower inducer. The trees were fertilized twice last year (in June and again in the last week of December).

"Some of the trees were not fertilized at all last year. All the trees had the same problem of no flowers after the inducer was sprayed. The trees range in age from 10 to 40 years old. There was no pruning done before induction that could have caused the problem.

“This is a VERY SERIOUS problem because around 1000 families rely on income from the mango harvest every year. We need to find out what happened so it does not happen again next January. There are a small number of trees that will be induced to flower in June of this year. We do not want the farmers to lose those mangoes also. The local agricultural officials do not know the answer. Thank you for any assistance you can provide.”

We contacted Dr. Tom Davenport, a plant physiologist at the University of Florida. Here is his response: “Without being there to look at all possible causes of the problem, I hesitate to give a definitive answer. I can, however, suggest that the overall reason why potassium nitrate (or any mango induction product) fails to work is due to immature terminal stems on the branches. Is it possible that the trees grew vegetatively following the June fertilization, or did rains occur in the fall to stimulate a flush of growth?

“The age of the last flush is critical. In easy-flowering cultivars, stems must

be at least 4 or 5 months old since the limp red leaf stage of development, and at least one month additional time is needed for hard-to-induce cultivars. It is not clear to me whether the comment “The trees’ leaves reverted to a young state and did not flower” indicates a vegetative flush occurred after the potassium nitrate spray or if nothing occurred. If a vegetative flush occurred it indicates the stems were definitely too young (nitrate simply stimulates growth—not flowering per se). If nothing (no new growth) occurs, then 4% KNO₃ sprays should be repeated every other week until flowering buds are observed. Sufficient age of the previous vegetative flush is critical.”

Dr. Davenport will be one of the speakers at AMC 2001, our eighth annual Agricultural Missions Conference here at ECHO.

We wrote in *Amaranth to Zai Holes* (p. 125-6) about a different scenario in a location in Venezuela where flowering—but no fruit set—occurred on large, mature mango trees. In that instance, Dr. Carl Campbell commented that where trees bloom during periods of high humidity and

temperature, flowers can be infected with anthracnose and no fruit will set. Anthracnose can be controlled by spraying with fungicides.

Mole Repellent Effective

Terry Mason, Lesotho, Africa.

“In a recent *EDN* (Issue 68) you gave an easy recipe for mole repellent on page 7. Thanks; it really works well for us! Sonke notes not knowing of moles (family Talpidae) being considered pests outside North America, but here in the Lesotho Highlands we have **a lot of problems** in gardens with moles in the family Chrysochloridae. We used the first recipe given via a sprinkle can. The formula works very effectively for up to several weeks. Once the formula is applied around a perimeter, the moles will not enter that area.”

The recipe mentioned above, from the April 1998 issue of *Organic Gardening*, calls for 1/8 cup (1 oz or 29.5 ml) of castor oil per gallon (3.8 liters) of warm water, with a few drops of dish detergent added to help mix the oil with the water.

FROM ECHO’S SEEDBANK

‘Amarillo’ Forage Peanut and ‘Manoa’ Lettuce

By Daniel Sonke

We have read several reports suggesting the use of “forage peanut” (or “forage groundnut”) in the tropics, either as a pasture legume or as a leguminous cover crop for fruit orchards or for plantations of coffee or oil palm. Here in Florida, *Arachis glabrata*, a perennial forage peanut species, is called “Florida alfalfa (lucerne)” because of its use as a nutritious forage suited to our subtropical weather. However, because it is propagated exclusively by vegetative stolons, we are unable to distribute it to most of our readers.

In Australia, Asia, and Central America, another forage peanut species called *Arachis pintoi* is more widely utilized as a forage and ground cover. Seed is commonly used for establishing this species, though stolons are used as well. ECHO has seed available of ‘Amarillo,’ a named cultivar of *Arachis pintoi*.

Amarillo is perennial. In pasture conditions it is grown with grasses such as Bahia grass (*Paspalum notatum*), Guinea grass (*Panicum maximum*), and Signal grass (*Brachiaria decumbens*). As a cover crop, it is usually grown in pure stands and tolerates partial shade. Amarillo has been recommended as a ground cover under banana,

papaya/pawpaw, custard apple, avocado, stone fruit, and oil palms. Amarillo grows best in areas with more than 1000 mm annual rainfall, and should be planted when rains have begun. It does not tolerate waterlogging for more than a few days, so plant it in soils with good drainage.

Amarillo is a protected variety under Australian law, which means you may not grow seed to sell to others without a permit. You may, however, grow it for your own use or for non-commercial distribution. If you have success with the seed sample provided by ECHO, we can provide an address where large quantities of seed may be purchased. Anyone working not-for-profit in a

developing country may request a free sample packet from ECHO. Because of the variety protection, we will not sell this variety to individuals.

Regular readers of *EDN* will remember that ECHO has several

varieties of lettuce for you to try. All of them are reported by seed companies to be heat-resistant or slow-bolting. We have added a new variety to the collection. We ordered 'Manoa' from the University of Hawaii and then learned that on the mainland of the US this variety is

also called 'Green Mignonette.' Under either name it does well in Hawaii at sea level, so it may do well in other areas of the tropics. You may order a free sample packet from ECHO if you are working not-for-profit in a developing country.

ECHO's Eighth Annual Agricultural Missions Conference

*ECHO, Fort Myers, FL, USA
November 13-15, 2001*

ECHO's 8th Agricultural Missions Conference will be here in four months, November 13-15, 2001. We already have some great speakers lined up. Many others will be selected from among delegates as registrations begin to arrive.

Roland Bunch, author of *Two Ears of Corn*, will be coming in from Honduras to share his experiences and observations on two topics. In one talk he will share about impressive results he saw in Brazil with green manure/cover crops and soil use. These innovations have only been reported in Portuguese, so are not widely known. For his other topic, we have asked him to give us an update on work in Honduras with water micro-catchments (reported in *EDN* 63).

I asked **Dr. Hugh Popenoe**, Director of the Center for Tropical Agriculture and Professor of Soils and Tropical Agriculture at the University of Florida, if he would think back on the insights and ideas he has gained from extensive travels and study of small tropical farms. "What are some things you have seen or learned about that could give delegates new ideas to consider for their

UPCOMING EVENTS

projects or new insights to help them understand what they are observing?" A particular question I asked him to address is "What is the point in sending soil to be tested if farms are so remote and unproductive that farmers could never afford amendments to correct the imbalances the soil test would identify?" He also promised to share some ways to get an indication of soil deficiencies without laboratory analysis of the soil.

It is always a highlight to learn from agricultural missionaries with many years of experience. **Wayne Niles** was an agricultural missionary for some time in Africa and, for the last ten years, in Haiti. He plans to "Do a (not entirely serious) public self-evaluation of my decade of work in Haiti. I'll cover what led me into various areas of activity, the relative success or failure of those activities, and whether I feel they merit continued pursuit."

ECHO's farm and nursery manager, **Danny Blank**, found the insights he gained from **Dr. Tom Davenport** to be especially helpful in managing ECHO's tropical and subtropical fruit tree arboretum. Dr. Davenport does research and extension on tropical fruits with the University of Florida. Particularly helpful to Danny was that "He helped me understand the flowering cues for citrus, mango and avocado. It

gives me a better idea of how to manage them now that I understand the mechanisms that cause flowering." Dr. Davenport is a reproductive physiologist with the University of Florida who does research and extension on the biology of fruit tree flowering. He has done considerable international consulting.

Community Health Evangelism (CHE) Training Seminar

*Colorado Springs, CO, USA
September 11-16, 2001*

This seminar is sponsored by Medical Ambassadors International. The goal of the training is to enable people to have an integrated community development and evangelism discipleship program. People trained at a Community Health Evangelism Training Seminar are themselves trained to teach others.

The program cost is \$350.00 (includes registration, tuition, and room and board). The training session is limited to 25 participants.

For more information or to obtain a registration form, contact Medical Ambassadors International, P.O. Box 576645; Modesto CA 95357; phone (209) 524-0600; fax (209) 571-3538; e-mail: mai-che@pcintouch.com; website: www.med-amb.org

THIS ISSUE is copyrighted 2001. Subscriptions are \$10 per year (\$5 for students). Persons working with small-scale 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). The book and all subsequent issues are available on CD-ROM for \$19.95. Issues 52-72 can be purchased for US\$12, including air postage. ECHO is a non-profit, Christian organization that helps you help the poor in the third world to grow food.