EDN

ECHO Development Notes

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Edited by Martin Price

Issue Highlights

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A Word from the Editor

The first ECHO-sponsored African conference was held in October in Kenya. It was a special treat to meet so many of you there for the first time. There were about 90 in attendance. I was glad to hear that delegates from Tanzania have decided to hold their own in-country "mini-conference" sometime next year. (If you work in Tanzania, the person to contact is Brian Polkinghorne, Kimkumaka of AICT, P. O. Box 302, Mwanza, Tanzania.) We are tentatively planning another East Africa conference in 2001. A big thanks to our co-sponsor, AISRED, and the hard-working volunteer committee that handled an incredible amount of organizational details.

A month later we were hosting 170 delegates at our 5th conference in Ft. Myers. All but three delegates from Central America had to cancel because of Hurricane Mitch and probably over two dozen from elsewhere were unable to obtain visas.

ECHO has received a most incredible blessing this year. Some special gifts enabled us to construct what we call the International Agricultural Resource Center. It will house an expanded bookstore, a spacious room for our library, a conference room, classroom and offices. One of the two buildings was done in time for the conference.

A striking feature is the large porches surrounding each building on all four sides. The porches are now used to house workshops during our conference rather than renting so many tents. Bonnie and I came to develop ECHO's ministry 17 years. By 1998, with no new office space, we had grown to 19 staff and dozens of volunteers, plus people coming to study.

ECHO's Bookstore

The new facilities will also benefit visitors studying at ECHO. If you'd like to apply for an extended visit to ECHO to make use of the library and plantings, write us to the attention of Dr. Darrell Cox. (Those traveling to the U. S. to study at ECHO need to understand that ECHO has no influence to assist you with obtaining a visa. Also we have no funds to subsidize travel expenses.)

A Second Look At Green Leafy Vegetables As A Source Of Vitamins And Minerals

By Laura Meitzner

The following is based on information from ECHO's newest book, *Edible Leaves of the Tropics 3rd edition.* See book reviews for details

A common prescription for improving nutrition, especially among children, is to promote the addition to people's diet of dark green leafy vegetables, grown in home gardens. A tremendous variety of native tropical leaf vegetables are delicious and easy to grow, providing a regular source of high-quality food at the doorstep. Leaves are even available into the dry season, especially from perennial species or seasonal leaves have been blanched and powdered for use in the dry season. Leaves can provide essential minerals and vitamins often missing in starch-based diets.

I made a survey of recent research reports on nutrition and leaf vegetables, and encountered some surprises. Many studies show that the amount of several important substances in leaves, both nutritional and harmful ones, varies greatly even within the same species and variety of plant. The amount of these substances can vary depending on such factors as season of growth and harvest, stage of maturity when harvested, storage time and conditions, whether the plants are grown in sun or shade, amount of rain, soil fertility, etc.

For example, growing conditions may cause vitamin A levels to vary as much as ten-fold in a species . (Dr. Gary Beecher at the USDA Food Composition Lab). A report on quail grass (*Celosia argentea*) mentioned that vitamins A and C were lowest in the youngest and oldest leaves; protein and nitrates were highest in the younger leaves; and oxalates were higher in the older leaves of the plant.

Several studies on post-harvest decline in nutritive value indicate that vitamin content of most leaves can drop dramatically in less than a day after harvest. A study from Sri Lanka, on eight common species, showed that just four hours of wilting at ambient temperatures could reduce vitamin C content by as much as 30%, with up to 80% loss after one day. A report from Nigeria concluded that steam-blanched, dehydrated leaves maintained just under half of their vitamin C content after six months in storage.

Some research results are perplexing. A study on the effect of leafy greens in improving the vitamin A status in lactating mothers in Indonesia, showed minimal change even with daily "treatments" of cooked leafy greens.

Before proceeding further, we need to define a term. "Bioavailability" refers to the proportion of a nutrient that, when eaten, becomes available to the body for its various uses. In other words, just because a vitamin or mineral is present in a plant does not mean that the body will be able to extract it and make use of it.

Leaves contain high amounts of provitamin A, which is converted by the human body to retinol.. (Note that retinol itself is contained in liver, milk, and eggs. While animal sources in general are far better sources of this nutrient, they are often expensive and scarce compared to vegetables.) However, several reports state that the provitamin A in leaves has a much lower bioavailable than previously believed.

Furthermore, the provitamin A found in leaves in particular is likely less usable in the body than what is found in non-photosynthetic plant parts. One hypothesis is that the provitamin A in leaves is bound in a hard-to-digest "matrix" of cell structures, while that in fruits such as mango and pumpkin, or roots/tubers including carrot and sweet potato, may be more readily absorbed by the body. In fact, today the amount of vitamin A that is present AND bioavailable in vegetables is roughly half of what nutrient tables showed a decade ago (The change is due both to more accurate measurement and the awareness of lower absorption in the body.)

The lesson to be learned from this research is that people should take advantage of a variety of plants and plant parts to meet nutritional requirements. A good rule of thumb on using leaves is to eat greens very frequently in modest amounts, about half a cup of cooked leaves per day. He mentions that this rule offers efficient use of the vitamins, including provitamin A, as well as and the minerals that are also often abundant in leaves.

What is the potential of selecting high-mineral varieties of greens to improve people's diets? Dr. Anusuya Rangarajan, now of Cornell University, studied the bioavailability of iron in 46 lines of amaranth from 12 species of amaranth using anemic rats. She found differences in iron content, with highest amounts in leafy green vegetable amaranths. Fresh leaves contained 300-1500 ppm of iron, but only 20-70 ppm were available after simulated digestion. It would be possible to select or breed for increased levels of minerals in leaves, but the research required for that sort of improvement is not likely to be conducted for very many tropical leaf crops

There is no easy formula for growing leaves in a way that increases their nutritive value, other than the basic recommendations to protect them from water and nutrient stress as much as possible. Given the wide variation present among varieties and within different parts of the same plant, it is better to select species for the garden based on what grows easily and is most accepted in your region, rather than promoting any particular species based on its rank in a nutrient composition table. What clearly is known is that the quality of leaves deteriorates very quickly after harvest. The reports can be summarized simply as follows: a variety of fresh greens should be eaten as soon after picking as possible, stored cool and moist or sealed in plastic bags, and cooked quickly for maximal retention of nutrients. While what we know about the role of leaves in human nutrition has been modified, they should hold their place as a valuable addition in tropical diets.

For Those Who Would Like To Dig A Bit Deeper

To what can we attribute the decrease in estimates of how much vitamin A can be obtained from leaves? Provitamin A is member of a class of chemicals called "carotenoids." But there are several kinds of carotenoids, only one of which can be converted to vitamin A. Older methods of analysis did not distinguish between these different kinds of carotenoids. In

more recent research, an instrument called a “High Pressure Liquid Chromatograph” was used to measure each carotenoid separately. This does not mean that the older data is useless, however. It is now realized that carotenoids serve other valuable functions in the body. This is attributed largely but not exclusively to their ability to serve as “antioxidants.” These valuable substances can reduce risk of such killer diseases as cancer.

A side note. Several of these reports included Moringa (a vegetable tree promoted over the years by ECHO) and every one shows that it’s as good as we thought all along!

Assorted Items Picked Up At The Kenya Conference

By Martin Price

I have pulled together some interesting items picked up in conversation with delegates to the Kenya conference.

David Sharland, Church Missionary Society, Congo
When President Mobutu's soldiers were retreating a year ago they raided all the chickens and goats. W hen people returned, they found their fields and the stored grain that the soldiers had not carried off had been burned (it was near harvest time). Almost the only food that was left was fish (tilapia) from their ponds, which the soldiers had not touched. A consequence is that during this past year of peace the local enthusiasm for fish ponds has grown dramatically. There are about 350 ponds in a 200x100 km (124 x 62 miles) area. Most ponds measure 15x10 meters (49 x 33 ft).

David said, "The low-input part of our work is what survived. Often low-input options are not popular with some leaders, but local farmers usually are positive. Now they are even more enthusiastic."

Roger Sharland, REAP, Kenya
"Churches all over the world preach against smoking because it can harm your health. So why don't they preach against drinking dirty water?"

Jim Ardill, SIM, Ethiopia
Jim crushes dried papaya seeds and takes about 1 teaspoon each day for a week when he has the kind of stomach pain that he associates with worms or amoebas. According to Jim, The discomfort has always gone away. The crushed seeds have a rather nasty taste. It is easy to overdose and become sick from the papaya seed. This happens for Jim if he takes 2 teaspoons of the powder. I discovered that other missionaries in the region take papaya seed when they have worms. E. g., David Sharland chews "8-10 (very bitter) seeds twice a day for 5 days when I have symptoms of worms or amoebas."

Bill Rettie, AIM, Kenya

After seeing a demonstration small-farm silage pit during a conference field trip to a research center, I asked around to find someone with practical experience with this technology. I've read about the technique, but had not yet met someone who knows of local farmers that have constructed and used these silos. I still have not.

Bill's first attempt at silage began with a pit in the ground 2 by 6 m (6 1/2 x 20 ft) on the sides and 2 m (6.6 ft) deep. He wilted napier grass in the full sun for one day, then chopped it to 1/2 cm (0.2 in) lengths with chaff cutters (a lot of work). As the pit was being filled, he had people walk and jump on it to compact it because if too much oxygen gets in the silage it will spoil. He added nothing else to the pit.

In the best pits you lose about 20 cm (8 in) from each side (where oxygen reaches it), so the percent loss of the grass (10% in a pit this size) is considerable. He also discovered that termites had gotten into the pile and ruined more of the silage. So the next time he made silage he lined the bottom and sides with plastic because of the termites. They ate through the plastic. The third time he built concrete block walls and floor. This got rid of the termite problem. He also used a sheet of plastic to cover the top. Moisture rising from the pile condensed on the plastic, dripped back down and caused rotting from the top down.

Now he makes hay, and it has never spoiled. They cut the napier grass into short pieces, spread it 5 cm deep under the roof of an open-sided building and turn it once a day. It is ready for storage in 3-4 days. “We make hay near the end of the rainy season when the humidity is lower. We find that we only need enough hay to feed for 6-8 weeks. We did get a little termite damage, but you can watch that better in a building.” Because there was plenty of grass during this year's "dry" season due to the El Nino floods, he plans to feed two year-old hay this coming season. It is still in good shape.

Can You Help Us?

Roy Danforth, who worked for years in Zaire (now Congo), has asked for help from our network to obtain fruit and nut tree seeds for a new project in Central African Republic. In the Congo Roy and Paul Noren had 500 kinds of fruit and nut trees in an impressive effort to use them to benefit people while slowing deforestation and southern spread of the Sahel.

After sharing seed freely with our network for years, Roy writes, “It is like I am starting over because I cannot even go into the Congo to get seed as the reports are saying this war will continue for some time. So I am at the opposite end of what I have been doing in helping others out with seed. Out of all 500 fruit and reforestation trees we have been working with, I am looking for seed for around eighty of the best eating or most useful trees, that would be donated, if possible. If it would cost some money, then I would have to negotiate with them, as I do not have funding as of yet.”

Roy's wish list is too big to print. We can mail or e-mail a copy if you would like to help. We will also post it on our web site. He would like between 100-200 seeds of each kind of tree.

For Your Interest Only

Some Tree Seeds Need Smoke To Germinate

(Abstracted from *Quandong, vol 24, No 3).* Many plants need to experience a fire before their seeds will germinate. For a long time it was assumed that it was the heat from such events that provided the critical trigger for germination. However, in recent years certain seeds have been shown to respond to smoke, even when there is no fire.

Now, for the first time, researchers have narrowed the trigger down to a specific compound in smoke.
"Plant ecologists Jon Keeley and D. J. Fotheringham, of Occidental College in Los Angeles, collected seeds of Whispering Bells, a common California wildflower that proliferates after fires, and exposed them to either straight nitrogen dioxide, (NO_2,) or wood smoke (which contains NO_2).

With as little as one minute's exposure in either situation, the researchers managed to trigger germination in every seed. They had the same success when they exposed seeds to NO_2 vapor from sand, paper and water that had absorbed smoke two months earlier.

Will Genetic Engineering Will Have Much Of An Impact On The Work Of The People In ECHO's Network?

Most research in this area (which is extremely expensive) is done by industries and universities. Often the hope is to create new varieties that can be patented and sold. Such research will have little impact on people who farm with little money.

The Rockefeller Foundation, however, is funding research at the International Laboratory for tropical Agricultural Biotechnology that may be quite relevant. They are attempting to alter the genetic makeup of cassava so that it will resist viruses that are "decimating the yields of subsistence farmers" in Africa. The grant program requires that the agencies doing the research "make their technologies freely available in developing countries." "Typical yields of cassava in Africa is 4 tons per acre (1470 kg/ha), but [scientists] hope that resistance to viruses could boost this tenfold." By the way, cassava was introduced to Africa by Portuguese traders who brought it to Congo from the Americas before 1600. (This information was gleaned from a feature in the *Los Angeles Times* December 26, 1997 by Martha Groves, "Plant Researchers Offer Bumper Crop of Humanity.")

ECHOES FROM OUR NETWORK

Mulch or trees in the Sahel

Joel Matthews, Niger (Joel works with the same project on edible acacias that was featured in issue 61 and the "underground forest" in issue 58.)

I represented our project at a recent conference on mulching in arid regions, held in Burkina Faso. Despite the amazing results we have gained in our project, most scientists did not seem to grasp the importance of regenerating trees on the farm. There is an old assumption that trees hinder the performance of the principal crop and their number should be reduced. I think this comes from assuming less stressful conditions than we find in the Sahel. Typically under stress conditions, you would indeed expect that more competition from trees will hinder crop production.

The realities of Sahelian conditions are more extreme: very high soil temperature, high winds, high evaporation rates, and very low fertility/organic content. Under these conditions, we have found that more trees are better, at least up to forty and even a hundred or more trees per hectare (16-40/acre)

Most scientists recommended cultivating grass species in one location and transporting the cut grass to the farms for use as mulch. The problem is that very few farmers are willing to give up scarce land to cultivate a grass. Then there is the issue of time required to move the grass to where it is needed (estimates of 180 hours per ha). Regenerating trees takes very little labor and gives added benefits of wind protection, wood sales, cooking fuel, building materials, fodder, human food, and overall increase in biomass production that the a separate field of grass does not provide. The abundant biomass production from trees eliminates the huge labor problem of cutting and carrying grass to the fields.

Our Experience with Cashew

Brian Hilton, Mozambique

I have been working with World Vision on rehabilitating cashew for the past four years. Because cashew has been mentioned a number times in EDN, I thought I would write with more information.

Cashew (*Anacardium occidentale*) may be known as a poor man's crop, but this is probably because it grows well on sandy soils of poor fertility. In Mozambique and Tanzania, cashew occupies lowland areas close to the coast with a rainfall between 900-1300 mm (35.5-52 in) per year. Cool temperatures of less than 7°C (45°F) kill the flowers. That is why cashew does not thrive at altitudes higher than 500 m (1640 ft) in Mozambique.

Processing of cashew is both complicated and costly because of the existence of CNSL (cashew nut shell liquid). This liquid contains 90% anacardic acid and 10% cardol. These liquids are very caustic and when heated the fumes are poisonous. Related compounds can be found in poison ivy. In fact, people sensitive to poison ivy are often found to develop skin sensitivity to CNSL. Local processing consists of heating the raw nuts over a flame long enough to burn off the CNSL, which is transformed to a thick toxic smoke. The kernels are of low quality and fit only for local consumption. Except for enough trees to meet local demand, I would not encourage the planting of cashew in areas where there is no processing industry. However the value of cashew increases considerably where there is a cashew processing industry which exports the kernels to Europe or the U.S. World demand for cashew is increasing and the future for increasing nut prices looks bright.

In East Africa yields of cashew have been devastated by powdery mildew (*Oidium sp*.), which kills the flowers. Without treatment yields are very low, 0-5 kg (0-1.1 lb.) per tree. With fungicide treatment yields can be 15-40 kg (33-88 lbs.) per tree. Some farmers treat by dusting with sulfur but I can't recommend this due to the acidifying effects of sulfur on sandy soils (which are already acid).

We are trying to improve cashew yields without chemicals. This is done by pruning suckers on lower branches. These tend to be highly infected by powdery mildew and a source of spores for future infection. Weeding is also encouraged to eliminate competition at the base of the tree, make harvesting easier, and as a firebreak. In Mozambique uncontrolled burning is the major killer of productive cashew trees. *Helopeltis anacardii*, a sap sucking insect that can cause much flower damage, is the second major pest.

A statistician has called cashew the most variable agricultural plant he has worked with. We have trees that have produced 40 kg of nuts one year decrease to zero production the following year (largely because of disease). Rainfall, insect infestation, humidity, and temperature can all affect yields in a variety of ways. This variability makes research difficult and lessens the value of cashew to poor farmers who need regular income. Those who seem to make money off of cashew tend to be the farmers and commercial operators who can implement a regular fungicide spraying program.

As far as labor is concerned, much of the labor needed is at harvest (which comes during the slack season for most farmers). Nuts which fall to the ground from cashew trees are collected daily. Thievery can be quite high in densely populated areas. The work is not heavy. Widows in one survey asked for cashew as a crop they could tend with the small amount of family labor that they had available. Another good thing about cashew is that the harvest is right before the rainy season when many poor families need some income for fieldwork.

For those working in areas where cashew is common, one might want to consider helping farmers create marketing associations so that they can sell in quantity and perhaps negotiate better prices with merchants. If superior producing cashew trees are identified, seedlings can be reproduced by cleft grafting of 10cm of new shoot material (from which the leaves have been removed) to young seedlings.

Technology-Protected Seed: A Development Worker's Perspective

Tracey Henderson (*Until recently Dr. Henderson worked in agricultural development and research with Food for the Hungry in Mozambique.)*

I would like to add my perspective as a development worker to the current debate about the "technology protection system/terminator gene". [See review in EDN 61. This technique causes seed that is harvested from purchased seed to be sterile]. Based on my experience in agricultural development in Mozambique and the former Zaire, I have serious concerns about the effects of this technology on resource-poor small-scale farmers in sub-Saharan Africa and throughout the developing world. Having witnessed some unfortunate consequences of the introduction of hybrid seed in developing countries, it is easy to imagine the potential for similar consequences of introducing "technology-protected" seed.

Proponents of the technology protection system say that farmers will only choose to use technology-protected seed if they predict, based on careful economic analysis, that they will be able to more than recoup their seed costs with returns from the added productivity. Therefore, the argument goes, this technology will not affect farmers who do not have the resources to purchase new seed every year. I believe this argument is flawed on several counts.

First, farmers in severe crisis situations do not always have a choice about the varieties they plant. In cases where most of the existing seed supply has been wiped out due to war, drought, or flood, government programs or NGOs often step in with much-needed seed distributions to allow farmers to plant the following season. The choice of varieties is generally made by the distributing agency. This choice determines to a great extent the most important crop varieties grown in the region for years to come. I have seen a case where a well-meaning NGO chose to distribute hybrid maize seed because its productivity was considerably higher than that of the available open-pollinated varieties. Obviously, this choice left farmers in a difficult situation in subsequent seasons. One would hope that in a similar situation, technology-protected varieties would not be distributed, but the potential for such inappropriate use does exist, and may become increasingly likely if yields of technology-protected varieties are greatly improved.

Second, most small-scale farmers in developing countries, even if they are not in a crisis situation, still have a very

narrow margin for error. I have seen farmers invest in improved varieties of seed, only to lose their first and second plantings to drought and pests. Without any more seed for a third planting (or any more money to buy seed), they resorted to planting either food maize of unknown origin or grain produced from the previous season's hybrid variety. When questioned about their choices, the farmers explained that they knew it wasn't good seed but they had no other options and so "decided to give it a try anyway." The resulting yields were disastrous and these farmers who had invested scarce resources to purchase improved varieties did not produce enough food to feed their families for more than a month or two. Farmers without a thorough understanding of this new technology could easily find themselves in a similar situation.

A third concern is the potential for intentional misrepresentation of the nature of this seed in the local marketplace. In developing countries, it is a common practice for improved seed to be divided into smaller quantities and sold again, without labels, in local markets. The potential exists for local marketers, either due to lack of understanding or unscrupulous motives, to sell this seed to farmers without informing them that it cannot be saved and replanted in subsequent seasons.

[Editor: A related question is, "What will happen to the harvest from protected seed?" The farmer will use some and send the rest to market. I can easily envision farmers buying seed from the market to plant, not having a clue that it will not germinate. At first farmers would not even know to be suspicious of seed in the market. Later, after disasters have been reported, even if viable seed is in the market, one can't be sure it is not seed from a protected variety that will not germinate. Of course one could do a simple germination test before buying the seed, but it is difficult to see how the logistics of that could be worked out in a market place. Fourth, I am concerned about the effect on farmers' ability or willingness to select and save their own seed and continue to grow and develop their locally adapted varieties. We must remember that for many farmers in the developing world, limited land area is a very serious production constraint. With a small farm, farmers may choose to devote more and more of their limited field space to higher-yielding varieties at the expense of indigenous varieties. The result would be less biodiversity, leading to increased vulnerability to pest problems as well as increased dependence on purchased seed.

Finally, we should consider the effect of this technology on the availability in the marketplace of improved varieties that do require annual seed purchases. Will the introduction technology-protected varieties result in a further lack of improved but non-protected varieties for sale? Improved varieties that can be used for several years before replacement is necessary represent an important intermediate-level technology for farmers struggling to move beyond the subsistence level. Without this intermediate step toward variety improvement, farmers may be left with an "all-or-nothing" option that they cannot afford.

The key element in these situations is information. For every farmer in the developing world who has access to sound technical assistance from an extension professional who keeps the farmer's best interests at the forefront, there are many others who are not as fortunate. Let's face it: in much of the developing world, access to adequate information is the exception, not the rule. Farmers who do not have access to enough information to fully understand the issues involved cannot be expected to always choose the most beneficial options. While proponents of the technology protection system may have the best of intentions, the unfortunate reality is that there is great potential for misunderstanding or misrepresentation of the technology at the local level in developing countries if farmers are not adequately informed.

[By the way, we have just heard that International Agricultural Research Centers (CGIAR) have voted to not make use of this technology. This is actually not a surprise, however, because their goal is to make their releases freely available to farmers.]

BOOKS & RESOURCES

Edible Leaves of the Tropics, 3rd edition

Published by ECHO, 184 pages, 1998

ECHO got one of the last available copies of this wonderful resource before it went out of print around 1982. It is still the most valuable resource on the topic. We asked its author, Dr. Frank Martin, for permission to reprint an updated version. We included ECHO's experience growing many of the plants over 16 years and results of recent nutritional research. See the article in this issue "A Second Look at Green Leafy Vegetables as a Source of Vitamins and Minerals" for one example of what you will find in the book.

Chapter titles include: Place of green leaves in the diet; the principal edible green leaf herbs of the tropics; Some vegetables, fruits and ornamental plants with edible leaves; Common weeds with edible leaves; Tropical trees with edible leaves; Tropical leaves as spices and teas; Temperate zone leaves in the tropics; Lettuce in the tropics; Tropical leaves that are poisonous; Culture and care of green-leafed vegetables. The are 55 black and white photos of selected plants.

Ordering information: Hardback edition $29.95; paperback $14.95. Postage and handling $4.00 first class in the USA or surface mail overseas. Florida residents add 6% sales tax. Airmail rates Canada and Mexico $6; elsewhere in the Americas $ 9.50; Europe $13.00; Africa and Asia $17.00. Retail bookstores should write for terms.

Humanity Development Library, v2.0

CD-ROM by Humanity Libraries Project, 1998. Reviewed by Martin Price.

With a new release of this incredible resource, the number of books and magazines from around the world has increased from 700 to over 1200. I counted 113 books from the Peace Corps, for example. Others who gave permission to include some of their publications include: ECHO, GTZ, NRI, BOSTID, FAO, Oxfam, Tool, WHO, United Nations, IIRR, UNESCO, IDRC and more. All seem to be complete, except pictures have been left out in some cases because they would so quickly fill up the available space on the CD.

If you already have an earlier version, it is worth upgrading not only for the extra material but also for the great improvement in the accompanying software for locating what you want to find. It uses Greenstone Software of the New Zealand Digital Library and your own web browser. You can search for a word and every article or book with that word is selected. You can also quickly search for everything by a publisher, or category.

ECHO sells this new version for $29.95. Our price to anyone working in a developing country is $12, which includes airmail postage.

Dr. Michel Loots, MD, the organizer behind this great project, would like to locate non-profit organizations in developing countries that would like to become distributors. His goal is to get thousands of these libraries all over the developing world at the lowest price possible. To become a distributor, you would need to order at least 30-100 CDs. You would need to pay for them, but at a discounted price. If you are interested, contact him at Humanity CD bvba; Oosterveldlaan 196; B-2610 Antwerpen; Belgium. Phone 32-3-448.05.54. Fax 32-3-449.75.74. E-mail mloots@globalprojects.org. Web www.oneworld.org/globalprojects/humcdrom.

Agrodok series

booklets published by Agromisa. Reviewed by Daniel Sonke.

This is a popular series about small-scale and sustainable tropical agriculture. The 30- to 80-page booklets each offer a concise packet of information on a specific topic. Among the 27 titles in this series are: *Preparation and Use of Compost*, *Erosion Control in the Tropics*, *Fruit Growing in the Tropics*, *Vegetable Garden in the Tropics*, *Agroforestry*, *Hatching Eggs by Hens or in an Incubator*, *Preservation of Foods*, *Storage of Tropical Agricultural Products*, *Small-scale Production of Weaning Foods*, and more. The latest title is *On-farm Fish Culture*. All titles are available in English and French; some are available in Spanish and Portuguese.

I often refer to the 56-page *How to Grow Tomatoes and Peppers* when one of our readers sends in a question about tomato or pepper production.

Pruning of tomatoes is commonly recommended to gardeners in the U.S. However, according to this Agrodok, in humid areas or during the rainy season, the chance of infection as a result of pruning wounds is large. Therefore you may not want to prune the plants.

Here are some excerpts regarding pruning. First, the main reason for pruning is that it improves the size and quality of the fruit. If plants are not pruned, they will grow at random and fruit will be smaller. It is better to guide the growth of tomatoes by nipping (pinching) the small side shoots off with fingers or a knife so that only one main stem remains. An exception is bush type tomatoes, which are not normally pruned.

[Editor: Here are two terms you should know. The bush-type tomato is short and does not need to be tied to a stake. It quickly grows to a determined height, bears its fruit and dies. This growth pattern is called "determinate." The other kind of tomato, called "indeterminate," is usually tied to a stake because it keeps growing for an indefinite (undetermined) length of time. Its advantage is that it can provide fruit over many weeks. Its disadvantage is that it may die before reaching its potential where the rainy season is short or where hot and humid weather encourage diseases. Under these conditions, the short-lived determinate tomato may be preferred.]

Another kind of pruning is called heading. This refers to nipping the tip of the main stem of the tall [indeterminate] type of tomato when 3 to 5 leaves are fully-grown. The shoots that grow out of the top 2 to 4 eyes are left to grow. In this way 2 to 4 side-shoots will grow as main stems, supported by sticks. When these stems are 1-1.25 m (3.3-4.1 ft) long, the tops should also be pinched off. New side-shoots should be removed regularly by nipping them. Usually 3 to 4 fruit clusters grow along each stem."

Hot peppers and determinant (self-topping) tomato plants are not pruned. "Sweet pepper plants are pruned like tall type tomato plants. Sometimes 10-day old sweet pepper seedlings are headed before transplanting to encourage branching of the plants. It is not necessary to nip side-shoots (on bush types) because these stop growing after some time."

Agrodok publications are available free of charge to inhabitants of African (excluding Mediterranean countries), Caribbean, and Pacific countries working in the field of agriculture or rural development. If you qualify to apply for free Agrodok publications, contact the Publications Distribution Service of CTA, Technical Centre for Agricultural and Rural Co-operation, P.O. Box 380, 6700 AJ Wageningen, The Netherlands; E-mail: pds@cta.nl; Phone: +31-317-467150/2; Fax: +31-317-460067. The price to purchase each Agrodok booklet is NLG 13.21 (approximately US$8.00), including

cost of postage. To purchase Agrodoks, contact Stichting Agromisa, P.O. Box 41, 6700 AA Wageningen, The Netherlands; Fax: +31-317-419178; E-mail: agromisa@wxs.nl.

UPCOMING EVENTS

Empowering Farmers through Animal Traction into the 21st Century

ATNESA sponsored conference, Republic of South Africa, 20-24 September 1999

Workshop topics include: Challenges of animal traction in the 21st Century; Entrepreneurship development in animal traction; Environmental issues and conservation tillage; Empowering farmers with animal traction; Participatory research, development and extension; Training, education and policy issues; Animal welfare, nutrition and management; Supply and distribution of implements; The role of information technology and media in promoting animal traction. For more information, contact: Mr. Bruce Joubert, Workshop Secretariat, Sanat@ufhcc.ufh.ac.za; tel +27 4060 22085; fax +27 4065 31730

World Neem Conference

Conference, Canada, 19-21 May 1999

The plenary speakers will be speaking on such diverse topics as: Development of neem for plant protection and medicinal uses in Africa (Kenya), Contraceptive action of neem and its role in prevention of sexually transmitted disease (India), Neem and *Melia* seed extracts – their potential in locust control (Germany), Use of neem for the management of malaria and other insect-vectored diseases (India), Antifungal constituents of neem (India), Mechanisms of action of azadirachtin (U.K.), and Development and commercialization of neem insecticides (India). The conference will be held at the University of British Columbia in Vancouver Canada. Registration materials can be obtained from: Prof. Murray B. Isman, Meeting Chairman, Faculty of Agricultural Sciences, University of British Columbia, Vancouver British Columbia, Canada V6T 1Z4; fax: 604-882-8640; E-mail: murray.isman@ubc.ca.

Fallows In Tropical Africa: roles, management, and alternatives

Conference, Senegal, 13-16 April 1999

The conference is organized by CORAF, the Delegation of the European Community in Senegal, the regional project Fallows, ISRA and ORSTOM. Language: French; possibly English translation. Conference themes: Roles, functions and the future of natural fallows in rural societies in tropical Africa. Their place in village lands; Natural fallows play a role in the conservation of biodiversity and in production; Fallows and the fertility of the environment. Biological aspects of the restoration of soil fertility; Improved fallows; Current techniques that substitute for fallows (agro-forestry, forage rotations, short fallows between crops). The conference will be held in Dakar, Senegal. For information write Secretariat of the International Seminar; Fallows in Tropical Africa; Projet Jachère; ORSTOM; BP 1386 Dakar, Senegal. Phone: (221) 832 34 80. Fax: (221) 832 26 98. e-mail: ponpon@dakar.orstom.sn. Web: http://www.orstom.sn/act-rech/jachere

First International Symposium on Cherimoya

Conference, Ecuador, 16-19 March 1999

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