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JOINT PROCEEDINGS



TROPICAL REGION

**21st Annual Meeting
of the Caribbean Food Crops Society
and
32nd Annual Meeting of the American Society for
Horticultural Science — Tropical Region**

technology for agricultural development

**Hilton Hotel, Port of Spain, Trinidad
8 - 13 September 1985**

Host Institutions

- Caribbean Agricultural
Research and Development
Institute
- Ministry of Agriculture, Lands
and Food Production, Trinidad
& Tobago
- Faculty of Agriculture,
University of the West Indies

Published by the Caribbean Food Crops Society, Box 506, Isabela, Puerto Rico 00662

DESCRIPTION OF ECHO'S SEEDBANK OF UNDEREXPLOITED FOOD PLANTS

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ABSTRACT

The National Academy of Sciences identified a large number of "underexploited" tropical food plants in the 1970s which should be more widely introduced. However, it is very difficult to obtain seed, especially if you are a development worker rather than a scientist. ECHO has developed a "working seedbank" which sends small packets of these seeds for trial at *no cost* to those working with small farmers as well as to the scientific community. This slide presentation will feature many of these less common plants, as well as a technique of shallow beds suitable for rooftop gardening. Our various services to those working with small farms in the tropics will be briefly described.

RESUMEN

En los años 70, la National Academy of Sciences (Academia estadounidense de ciencias) identificó muchas plantas tropicales alimenticias "sub-explotadas" que deberían ser cultivados de manera más amplia. Sin embargo, es muy difícil obtener semillas, sobre todo si uno es asistente de desarrollo y no científico. Por eso, ECHO ha elaborado un "banco de semillas" que envía paquetitos "prueba" gratuitos de estas semillas tanto a los que trabajan con pequeños agricultores como a la comunidad científica. Esta presentación de diapositivas mostrará muchas de estas plantas menos conocidas, así como una técnica que utiliza los semilleros poco profundos y que conviene muy bien a la jardinería en la azotea. Se describe brevemente los servicios que prestamos a los que trabajan en pequeñas fincas tropicales.

There has been considerable talk at this conference of the tension between our desire to help the small farmer on the one hand and our being evaluated primarily on the basis of publications on the other hand.

I can identify with this. I had a dozen or so publications while doing post-doctoral work at Purdue University. I received my due reward for the publication record. Several other scientists have used and referenced them in their work. However, some dealt with practical solutions to a major problem of Third World farmers. To the best of my knowledge, no Third World farmer or person working with them has implemented that work or even become aware of it.

It has been a delight to work at my present position at ECHO. One aspect of my job is to search out practical, applied information from folks such as yourselves, from publications and from development workers themselves. This is then written up in a newsletter called ECHO DEVELOPMENT NOTES. We send this to about 1200 folks. It is also sent by the Peace Corps to the 50 countries where they have volunteers. We have the satisfaction of knowing that information written today will be read in a couple weeks by folks in many countries who are working shoulder to shoulder with small-holder farmers on a daily basis. We even involve these folks in doing adaptive experimentation themselves.

ECHO is a nonprofit, Christian organization whose primary mandate is to assist workers of any Christian group in their outreach to the small farmer. In practice we extend this to any person who has such a ministry regardless of religious affiliation.

In addition to the newsletter, folks write to us with particular questions. Sometimes they can almost be funny. For example, a worker in Kenya wanted our recommendation for cactus for camel fodder. Someone in Botswana wanted advice on use of leaves of the leucaena tree as feed for his ostriches.

What are Underexploited Plants?

I especially wanted to share with this group about our "working" seedbank. The National Academy of Sciences identified dozens of food plants that had underexploited potential and should be tried much more widely throughout the tropics. They published this in two books: *Underexploited tropical plants with promising economic value* and *Tropical legumes; resources for the future*. These were distributed free throughout the world.

The only problem has been that it is usually terribly difficult to obtain seed. In fact, it is almost impossible for someone working in a remote site with small farmers. To be sure there were sources listed in the book. In most cases, these were scientists who had a grant to work on that plant in the mid 1970 s. You know how grants go. It is unlikely that you will still have money 10 years later. If you did, it is still less likely that it would include money to distribute seed all over the world!

ECHO is growing a great many of these plants on our 5 acre farm in southwest Florida. The seeds are stored in our seedbank and distributed free in small packets to folks working with small farmers (or scientists) for trials and evaluation. We do require that they report back to us with their results. To date we have sent seed to over 50 countries.

But you might be asking yourself why a missionary or Peace Corps worker would be interested in these unusual plants when there are many tropical food plants that grow so lushly and abundantly and are already well accepted?

The answer is that in most cases the person who can afford a reasonable amount of land in a good area that will grow good coffee or bananas or rice, is already growing these and making good money.

If he has questions there are research stations and extension agents to draw upon. The person that the development worker helps usually has only a small amount of land and is very often farming under very difficult situations where it is hard for him to make

any kind of a decent living. Suppose you had 5 acres of land that for much of the year was dry like this. What kind of help would you need to make a living for you, your spouse, and several children?

Another common problem is the farmer who may have land, maybe even a fair amount of it, but the soil is of very poor quality with very few nutrients and poor texture, such as the soil in a poor Haitian refugee community in the Dominican Republic.

Then there are those who must farm very steep land or in regions of exceptionally high rainfall. Perhaps some of these plants have special potential for areas where more common plants are not satisfactory. In the short term, they are likely to be consumed on-site rather than become commercially important. In the long term, some may take off like the potato did in Ireland.

A Description of Several Underexploited Plants

Well, what are a few of these plants like? If you lived in an arid region you might be interested in the **tepary bean** (*Phaseolus acutifolius*). This bean is grown by the Indians in the Sonoran Desert in the Southwest of the United States. After there has been a flash flood in the desert and the waters have receded, they plant the bean. It does not need to rain again for them to get a crop. There is a good chance that the tepary bean could be planted while there were 1 or 2 rains left in the rainy season. The farmer might then be able to harvest a crop during the dry season when there are very few kinds of food plants available.

The beans are fairly comparable to the soup bean or navy bean with which you are probably familiar. ECHO has sent seed of the tepary bean to a number of people around the world. Only a few results have been reported to date. The best results seem to come from areas with somewhat alkaline soil.

The **winged bean** (*Psophocarpus tetragonolobus*) is a good candidate for growing in a rain forest. The pods can be eaten the same way as a green bean. They have four jagged edges which is where it gets the name "winged." In addition to its use as a green bean, all parts of the plant can be eaten. The mature seeds can be eaten like soybeans, and are just as nutritious. (However, they are not very good unless special techniques are used in preparation. We can provide information on this).

The leaves can be eaten like spinach. And when the plant is finally done producing, you can feed the tops to the livestock and dig up the roots where there are tubers that have ten times the protein of our Irish potato. When you remember that protein is the nutrient in shortest supply in the diets of many in the Third World countries, you realize what a difference winged beans could make.

The **jacama** (*Pachyrhizus erosus*) has a lot of potential as a cash crop. Of all the unusual plants that we have examined, I think that it has the greatest potential for southern tier U.S. gardens. The leaves and pods are not edible because they contain rotenone which is a natural insecticide. The edible part is the tuber that forms underground. It is eaten either raw with dip or hot sauce or cooked. When you cook an Irish potato it becomes soft, but when you cook the jacama it remains crunchy like water chestnut.

For that reason they are used as a substitute for water chestnuts which are quite expensive.

The **egusi** (*Colocynthus citrullus*) is a plant which is important in large parts of central Africa. It looks much like a watermelon but there is a big difference in taste. The fruit of this plant is bitter and probably somewhat poisonous. So what part of the plant would you eat?

The egusi is grown for its seed. The seeds are larger than watermelon seeds and are eaten in soups, roasted or mashed up like peanut butter. A missionary recently sent ECHO a recipe for egusi pizza. Well, it is doubtful whether many people will eat egusi pizza, but it is a very nutritious food. The hulled seed contains 50% oil and 30% protein.

The **benzolive tree** (*Moringa oleifera* also known as horseradish tree, moringa or mallungay) is an amazing tree. Under good conditions it will even out-grow papaya. In the Philippines it is called "Mother's Best Friend." They strip the leaves and then cook and puree them, much as we do with spinach. This is then fed to babies. It is one of the highest green leaves in calcium and contains considerable amounts of other minerals and of vitamins and protein. Adults enjoy eating it in various kinds of dishes, also.

The pods grow about a foot long. Before they ripen you split them open and put the seeds and material inside of the pod into the stew pot. Like the winged bean every part is nutritious and high in protein.

The flowers bloom just about all year round. It is unusual in this regard and is a very good bee tree. A lady from Haiti told me that she would take the dried seeds of the benzolive, brown them on a skillet, mash them, then put them in boiling water and then collect a very fine cooking oil that would float to the surface.

A scientist working along the Nile wrote that he is using the seeds in water purification. After the floods the water is murky with suspended particles. Human feces and accompanying bacteria are often attached to the particles. By adding a crushed benzolive seed to roughly a quart of water and stirring, the water will become clear within a few hours. Most of the bacteria settle to the bottom with the sediment.

Amaranth (*Amaranthus hypochondriacus*, *A. cruentus*) is the underexploited plant that probably has the greatest possibility for becoming an important crop in the United States, if any of these plants become important there.

Both the grain and the leaves are edible. The grain is about a tenth the size of a grain of rice, yet there are so many thousands of these grains that you get very good yields.

In situations where subsistence farmers are working, the yields are comparable to corn. In a poor year they would be even better because amaranth is more tolerant of dry weather.

Chaya (*Cnidoscolus chaymansa*), is sometimes called the spinach tree. This plant is very tolerant to dry weather. It also flourishes in Florida summers with heavy rainfall. I have never seen a chaya bush with either insect or disease problems. The part that is eaten is the leaves. The large leaves are cooked like spinach. It has a pleasant taste, though it is a bit chewy. This native of Mexico and Central America is also used to wrap tamales.

The wax gourd (*Benincasa hispida*) has a very attractive fruit. The Chinese call it the winter melon. The white chalky material on the outside is actually a wax that the plant produces and lays down on the surface of the gourd. This keeps microorganisms from successfully attacking it, thus you can store it for up to a year in the tropics without refrigeration. In taste it is similar to a summer squash though perhaps a little bit firmer.

Conclusion

In conclusion, perhaps ECHO can help you to get some of your best, most practical, applied results into the hands of small farmers. If you come across especially interesting information or seed for a specially adapted variety of a common or underexploited food plant, get in touch with us. If you know folks who are working with small farmers on a daily basis and whose work might be strengthened by being in touch with ECHO, send us their address. We neither charge them or solicit money from them. If we can help you sometime with a small packet of seeds of the underexploited plants, drop me a line.