

## **CACAO—Good for Agriculture and the Environment**

The Aztecs of Mexico called cacao beans “the food of the gods.” They used them in religious services, as currency, and for gifts. Aztecs roasted and ground the beans and mixed them with water and maize to make a bitter drink they called “chocolatl.” They believed its daily consumption was essential.

Today, the world annually consumes about 3 million tons of the beans of the cacao tree as chocolate in many forms and in combination with many other foods. Americans devour more than \$12 billion worth of chocolate each year—about 12 pounds per person.

Cacao beans account for only about 20 to 30 percent of the ingredients in milk chocolate. Milk solids make up 20 to 30 percent; sucrose, 40 to 50 percent. Few realize that transforming the imported cacao beans into chocolate is among the largest industries supporting U.S. agricultural business. For every dollar of cacao imports, about \$1.50 in other agricultural commodities are used to make chocolate confections.

Each year, U.S. chocolate manufacturers use about 250,000 tons of dry milk, 400,000 tons of sugar, and 350,000 tons of peanuts. In 1997, the industry used more than \$3 billion worth of these and other U.S. agricultural products. According to the American Cocoa Research Institute in McLean, Virginia, the United States exports over \$600 million worth of chocolate products a year.

Besides being an economic powerhouse, cacao has increasingly become recognized for its potentially positive environmental role. Last year, the Smithsonian Institution convened an international workshop on sustainable cacao growing. Participants concluded that traditional, shade-grown cacao has an important role to play in tropical conservation and biodiversity.

At one time, cacao beans were grown mainly on large plantations in South America, Africa, and Asia. Today, about 5 to 6 million small farmers provide over 85 percent of the crop. Typically, each farmer owns about 2.5 to 5 acres of land and grows about 1,000 cacao trees. The beans are generally the family’s main source of cash income, with other farming enterprises built around it.

Evergreen cacao trees grow best between about 20 degrees north and south of the Equator. They are rainforest trees that like to grow in shade, traditionally under the cabruca—a canopy of shade trees that provides an ecologically sustainable growing system. There, beneficial wasps and other natural parasites and predators control the larvae of destructive pod borers, and flower-pollinating midges proliferate.

Nonshaded cacao farms are being tried today on a large scale in West Africa using recently developed sun-tolerant cacao tree hybrids. However, the long-term sustainability of these cacao farms is being questioned, as they require considerable input of agricultural chemicals and technical support—something missing from most of West Africa and far beyond the reach or knowledge of small farmers in rural Africa.

And small cacao growers are currently having a tough time with cacao diseases and pests.

Each year, an estimated one-third of the world’s cacao crop is lost from diseases and pests. Conventional chemical insecticides and fungicides do not fare well in the tropics, where insect resistance develops quickly and large rainfalls simply flush fungicides away. Costs of such agrichemicals make them unaffordable for most small cacao growers, and a lack of modern agricultural extension services compounds the problem.

The Agricultural Research Service’s work on fungal diseases of cacao is both unique and important. It involves developing ecologically sound growing systems and pest- and disease-control

programs suitable for small farmers.

ARS research may have a very significant positive impact on the environment in Bahia, Brazil. One of the world’s major cacao-producing areas, it is a critical center of remaining biodiversity.

Noted for its rare Atlantic rainforest, only 7 percent of the original Atlantic Coastal range remains. Cacao cabruca serves as an important buffer to the remaining forest, provides an essential habitat for animals, and allows for a safe transit of migratory animals between the remaining forest fragments.

As cacao growing in Bahia plummets, pressure is great to cut down the cabruca. But this would significantly reduce the region’s biodiversity and put considerable stress on the remaining rainforest. Thus, the failure of cacao farming in Brazil could lead to an economic and ecological disaster.

Reversing the deforestation could have global impact. It would keep more carbon in vegetative form, instead of releasing it to the atmosphere to contribute to global warming. And it would help protect soil quality—as well as rare and endangered species of birds, plants, and other unique flora and fauna.

Currently, long-term cacao bean production lags behind consumption by about 3 percent.

“Supplies are fine for the short term,” says John B. Lunde, director of international environmental programs for M&M Mars, Inc., one of the world’s largest chocolate manufacturers. “But if cocoa supplies do not increase, there could be serious problems 5 or 6 years from now.”

ARS’ cacao research program offers hope for preserving cacao farming and the forested areas in which it can thrive. It also helps ensure the continuing availability of a food and confectionery ingredient important to U.S. farmers and to consumers everywhere.

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