

Fact Sheet

November 2012



An Agroforestry System

Shade coffee production in Puerto Rico has experienced a resurgence in growth during recent years, after undergoing a dramatic period of deforestation to convert to coffee production under full sun. The revival of shade coffee production utilizes a combination of coffee shrubs and shade trees that form a secondary forest. Shade coffee production has been proven to provide environmental benefits such as soil erosion control, water quality and quantity improvement, and wildlife habitat. Shade coffee production also provides socioeconomic benefits such as the opportunity to develop other sustainable forest products, and the reintroduction of traditional jobs and cultural activities for local coffee pickers.

The coffee growing zone in Puerto Rico is located mostly in the humid mountains of the west-central section of the "Cordillera Central." This area is characterized by steep, mountainous topography and a cool climate in the humid and wet subtropical forest.

The coffee tree or shrub originated in Ethiopia. The most common species grown in Puerto Rico are the *Coffea arabica* and *C. canephora*. According to Don José S. Alegría, coffee trees from the Dominican Republic were introduced to Puerto Rico in the town of Coamo in 1736. Coffee rapidly became Puerto Rico's most important export product, with 50 million pounds exported annually by the end of the 19th century. Currently, about 82% of the coffee planted in Puerto Rico is *arabica*.

Coffee Shrubs Under Shade

Coffee shrubs require certain environmental and ecological conditions to perform at their best in terms of vigor, growth and berry production. These conditions



Coffee fruits in process of ripening.

are achieved by planting coffee in locations with the most suitable environmental conditions. In Puerto Rico, not all coffee plantations may be located in areas that are ecologically suitable for coffee growth. Therefore, recreating favorable coffee growing conditions may be beneficial for both coffee production and for the environment.

For example, the optimum growth temperature for *arabica* coffee varies from 60° to 65° F. With these conditions, coffee shrubs grow adequately, developing vigorous and healthy branches and leaves. The temperature in Puerto Rico's coffee zone fluctuates between 55° to 85° F. One method to maintain ideal coffee-growing temperatures is to manage shade on the plantation.

Healthy coffee plantations also require adequate moisture, in terms of both rainfall and relative humidity. Coffee shrubs require 70 to 100 inches of rain per year and a relative humidity of 70 to 85%. Shade trees help to reduce potential evapotranspiration by modifying solar radiation. The amount of solar light in shade coffee plantations can be managed by pruning shade trees.

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A shade tree (guaba or *Inga vera*) planted in an individual terrace or "media luna."

A Favorable Environment

- **Soils:** Trees provide valuable soil erosion control. Roots anchor soil particles in place and the canopy intercepts raindrops, reducing their erosive impact on the soil below. Leaf litter and other organic matter accumulates on the soil surface as mulch and is slowly incorporated into the soil, providing habitat for beneficial organisms.



Coffee Shrub

- **Water:** The formation of a secondary forest by shade grown coffee helps increase water retention in the soil profile, benefitting base flow and helping to recharge aquifers. Trees improve water quality by helping to reduce soil erosion and storm water runoff, thereby reducing sediments and other potential contaminants dissolved in storm water.
- **Air:** Planting shade trees reduces wind speed in the coffee groves, benefiting pollinators and wildlife and reducing potential wind damage to coffee shrub roots.
- **Plants:** Development of tree strata (creating layers of branches) improves tree health and wildlife habitat. Planting leguminous trees also provides nutrients to the soil.
- **Animals:** Shade coffee production creates wildlife habitat and particularly benefits endemic and threatened species.
- **Energy:** Shade trees moderate the temperature on the coffee plantation, improving plant health, cooling buildings and providing a better working environment for farm laborers.

Shade is not necessary in every ecosystem, each farm must be evaluated to determine the practices and management methods needed to produce the best coffee. Other conservation practices suitable for coffee plantations are: planting along the contour, trails, vegetative barriers, pruning, nutrient management, integrated pest management, ecological pulp-ing equipment, and waste management.

For More Information

Please contact the NRCS Field Offices or the State Office in San Juan, Puerto Rico, at 787-766-5206, or visit our Web site at: www.pr.nrcs.usda.gov.

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