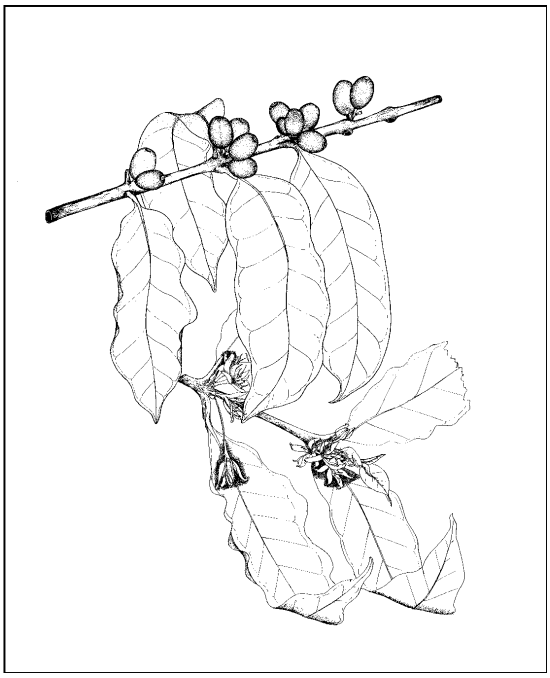
***Coffea arabica* L.** coffee
RUBIACEAE

Synonyms: *Coffea vulgaris* Moench
Coffea laurifolis Salisb.
Coffea moka Hort. ex Heynh.



General Description.—Coffee, also known as café, is an upright, evergreen shrub or small tree up to 5 m in height and 7 cm in diameter at breast height. The plant may grow with a single stem, but often develops multiple stems by branching at the base or on the lower stem. The bark is light gray, thin, and becomes fissured and rough when old. The wood is light-colored, hard, heavy, and tough. The root system consists of a short, stout central root, secondary roots radiating at all angles, and abundant fine "feeder" roots. The glabrous, shiny, dark-green, opposite leaves have petioles 4 to 12 mm long and ovate to elliptic blades 7 to 20 cm long, with entire edges, and pointed at both ends. The fragrant, white flowers are in axillary clusters of two to nine. The 1.0- to 1.8-cm drupes are ovoid, fleshy, green turning red and finally blue-black. The fruits usually contain two greenish seeds, 8 to 12 mm long, that are rounded and flattened on one site with a medial groove. Coffee is an allotetraploid with 2n = 44 chromosomes (Bailey 1941, Howard 1989, Liogier 1997, Little and Wadsworth 1964, Wrigley 1988).

Range.—The original native population of coffee was in the highlands of Ethiopia with possible disjunct populations in nearby highland areas of Sudan and Kenya. All of those areas have been altered and under semicultivation for many years (Charrier and Berthaud 1985). Coffee was first cultivated by Arabs during the 14th century and introduced into the New World and much of the rest of the tropics during the 17th century (Smith 1985, Wrigley 1988). Today it is cultivated throughout the moist subtropics and high-altitude, moist tropics and has naturalized in many of these areas including Puerto Rico, the Virgin Islands (Little and Wadsworth 1964), Guam, and Samoa (Pacific Island Ecosystems at Risk 2002).

Ecology.—The native range of coffee lies at 1,370 to 1,830 m in elevation (Wrigley 1988). In higher latitudes, altitude becomes less critical. Optimum temperatures range from 15 to 24 °C. Growth is impaired above 25 °C. Frosts destroy both leaves and fruits (Willson 1985). The species requires a minimum of 1200 to 1500 mm of annual precipitation. Precipitation in excess of 2500 to 3000 mm begins to be detrimental (Wrigley 1988). Although the species tolerates soil pH's from 4 to 8, pH's of 5.2 to 6.2 are preferred. Good drainage is essential, and soil textures lighter than clays are best (Willson 1985). Coffee is tolerant of shade and usually grows in the forest understory. This environment is simulated when coffee is grown under *Inga vera* Willd. and other shade species. Also, it will grow well and is often cultivated in full sun. There are a number of serious pests and diseases of coffee in plantations; the effects appear to be negligible in dispersed naturalized populations.

Reproduction.—Coffee usually flowers and fruits once per season, but in some areas it flowers twice. In Puerto Rico, flowering occurs January to April (Barrett 1925). It is reported to flower from February through May in Nicaragua (Stevens and others 2001). The flowers are insect pollinated (Wrigley 1988). The fruits take from 6½ to 7

months to mature (Bailey 1941). Seeds of the varieties naturalized in Puerto Rico vary from 0.139 to 0.147 g/seed (Barrett 1925). Seeds 8 weeks old germinate (95 percent in 32 days) better than fresh seed (Wrigley 1988). However, coffee seeds stored more than 21 weeks at ambient temperature begin to rapidly lose their viability (Harrer 1963). The seeds are dispersed by birds, and seedlings can be abundant. Artificial propagation is usually by seed, but the species can be reproduced by budding and cuttings (Center for New Crops and Plants Products 1996).

Growth and Management.—Coffee has a moderate growth rate. Plants begin bearing in 3 to 4 years and are in full fruit production in 6 to 8 years. Coffee plants may live over 100 years (Center for New Crops and Plants Products 1996). Nursery plants are maintained in containers under shade for 6 to 12 months before outplanting (Wrigley 1988). Also, plantations are established by direct seeding into prepared seed spots (Center for New Crops and Plants Products 1996). Weed control is necessary in the first years after plantation establishment. Naturalized and escaped coffee is usually not common enough or does not grow fast enough to warrant control.

Benefits.—As an exotic species in New World forests, coffee has had a gentle impact on biodiversity and contributes to wildlife food and cover, and soil stability. The wood is used mainly for fuel in the New World but is turned into chairs and other types of furniture in Africa (Cheney 1925). Coffee is a good honey plant and yields a light-colored honey (Little and Wadsworth 1964). Coffee berries, edible and slightly sweet, are eaten occasionally by children and field workers. The fruit pulp, which is removed during processing, is sometimes fed to livestock but more often is composted for fertilizer and mulch (Center for New Crops and Plants Products 1996). Coffee seeds have been chewed as a stimulant in East Africa from ancient times (Center for New Crops and Plants Products 1996). The hot drink "coffee" is brewed from the roasted and ground seeds (or "beans") and is one of the world's most popular beverages. It is used to flavor candies, liquors, and pastries. Probably the principal reason for its popularity is the addictive stimulant alkaloid, caffeine (1,3,7-trimethylxanthine), 1.1 to 1.3 percent in the beans, but varying greatly in the beverage due to different brewing practices. The alkaloid is present in the leaf at 0.30 percent, twig, 0.04 percent, stem 0.01 percent, and central root, 0.01 percent. Other alkaloids, xanthine, guanine, and trigonelline, which have stimulant and diuretic properties, are also present (Burkill 1997). Caffeine protects vegetative plant parts from insect and fungal attack and inhibits the growth of plants and bacteria near germinating seeds (Steiman 1997). Purified caffeine is widely sold as a medicinal stimulant, dietary aid, and headache remedy. Leaf poultices are used to treat sores in Trinidad, and root sap or root infusions are drunk to relieve scorpion stings (Burkill 1997). Coffee is also employed in folk medicine to treat asthma, flu, headache, jaundice, nephrosis, malaria, sores, and vertigo (Center for New Crops and Plants Products 1996).

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