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Invasion Alert

Jamaican Nightshade (*Solanum jamaicense*): A Threat to Florida's Hammocks

Rodrigo Diaz, William A. Overholt, and Kenneth Langeland*

Jamaican nightshade is a prickly, perennial, invasive shrub in central and southern peninsular Florida. It was first seen in Florida in 1930 near St. Cloud, and has since been reported at several other locations in the state. Jamaican nightshade is primarily found in wooded habitats, where it can quickly become dominant in the understory, but it also occasionally grows in isolated patches in the open. Although the distribution of Jamaican nightshade does not appear to be rapidly expanding in Florida, land mangers should be made aware of the potential of this weed to establish at new sites, and initiate control efforts during the early stages of colonization at newly invaded sites.

Nomenclature: Jamaican nightshade, *Solanum jamaicense* Mill.

Key words: Solanaceae, invasive species, understory vegetation.

Solanum jamaicense Mill. (Solanaceae: section *Micrantha* [Nee 1999]) is known by several common names, including Jamaican or Jamaica nightshade (United States); ùnha de gato (Brazil); Friega plato, Huevo de gato (Panama) (Duke 2008); and buli-buli, bura-bura (Guyana) and boboro (Guayana Arawak) (DeFilipps et al. 2008). The plant was first reported in Florida in 1930 near St. Cloud, FL (Osceola County), where it was described as being locally dominant (Mulvania 1930). Since then, it has been found at other locations in Osceola County and at a few locations in Polk, Orange, Highlands, and St. Lucie counties. There is no information on how the plant arrived in Florida, although D'Arcy (1974) speculated that seeds may have been transported by birds from the Antilles. Its closest relative in the United States is wetland nightshade (*Solanum tampicense* Dunal), another invasive weed of the section *Micrantha*.

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Description, Growth, and Development

Mature Jamaican nightshade plants are perennial shrubs with erect stems 0.5 to 3 m tall and up to 15 cm in diameter at the base. The stem and leaf veins have broad-based, laterally compressed, recurved prickles up to 1 cm long (Figure 1). Prickles interlock with stems forming thick mats several meters long. Leaves are subsessile 5 to 20 cm long, 4 to 15 cm wide, angular sinuate, mostly irregularly or acuminate angular lobed, basally acute, pubescent, stellate trichomes dense on blades and petiole, sometime with prickles (D'Arcy 1974). Inflorescences are lateral racemes with 3 to 10 flowers (Figure 1), peduncules and pedicles pubescent 5 to 20 mm long. Flowers are deeply lobed; corolla white, petals five, narrowly lanceolate, 1.25 mm wide; calyx 4 mm long; and anthers yellow. Fruits are berries: glabrous, lustrous, ovoid 0.5 to 1.0 cm in diameter, green turning yellow then bright red at maturity. Berries contain 20 to 60 seeds (Fox and Bryson 1998). Seeds are lenticular, 0.8 to 1.2 mm wide, and tan or light brown (Figure 1). Chromosomes: $n = 12$ (D'Arcy 1974).

Observations in infested hammocks in St. Lucie County indicate that mature Jamaican nightshade plants allocate most leaves at the tops of branches. Plants have green leaves, flowers, and fruits throughout the year.

Voucher specimen. United States, Florida, St. Lucie County: Approximately 0.75 miles southeast of entrance

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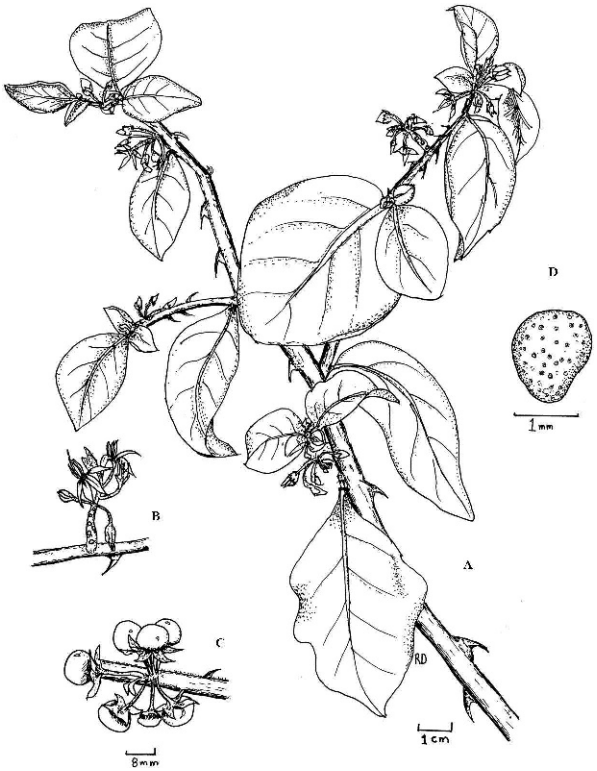


Figure 1. Illustration of Jamaican nightshade (*Solanum jamaicense* Mill.): (A) mature plant, (B) inflorescence showing flower arrangement, (C) infructescence showing fruit arrangement, and (D) seed.

to Adams Ranch and Orange Avenue and approximately 12 miles west southwest of intersection of Orange Avenue and King's Highway in Ft. Pierce. W. A. Overholt, s.n. 27.44156°N, 80.5894°W. Datum: WGS84, August 17, 2005, (FLAS 217544).

Importance

Detrimental Impacts. There are no studies that quantify the impact of Jamaican nightshade in Florida hammocks. However, invaded hammocks appear to have a lower abundance of native shrubs, suggesting a displacement of under-story vegetation. Animal movement through infested areas may be impeded by the dense, intertwining, prickly stems.

Beneficial Impacts. There are no reports of wildlife use of Jamaican nightshade in Florida, but birds and mammals could feed on its bright red berries. In Costa Rica, the tropical butterfly *Mechanitis ithsmia* (Bates) feeds and reproduces on Jamaican nightshade (Young and Moffet 1979). A root and leaf decoction was used as anthelmintic and to treat thrush in children in the Guianas; it also contains steroidal sapogenins (DeFilipps et al. 2008).

Legislation. Jamaican nightshade is not included on the US federal or Florida noxious weed lists. However, the Florida Exotic Pest Plant Council lists the plant in Category II, which includes invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species (FLEPPC 2007).

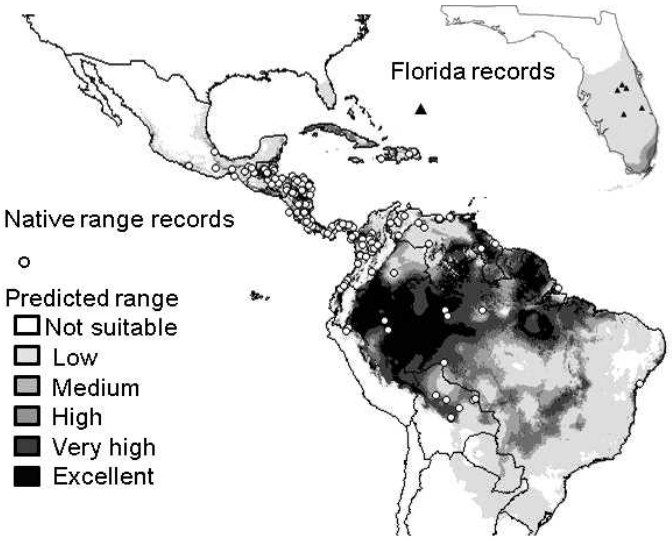


Figure 2. Predicted distribution of *Solanum jamaicense* in North, Central, and South America based on climatic conditions at locations of herbarium specimens at Missouri Botanical Gardens and New York Botanical Gardens as of 2008.

Geographical Distribution

Jamaican nightshade is native to the neotropics. Specimens have been collected from Mexico, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Cuba, Grenada, Hispaniola, Jamaica, Martinique, Puerto Rico, St. Lucia, Trinidad and Tobago, French Guiana, Guyana, Suriname, Venezuela, Brazil, Bolivia, Colombia, Ecuador, and Peru (Missouri Botanical Garden 2008; New York Botanical Garden 2008).

The BIOCLIM model (Busby 1991) in DIVA-GIS software (Hijmans et al. 2005) was used to characterize the climate at locations where herbaria specimens of Jamaican nightshade have been collected and to locate areas of similar climate in North, Central, and South America. Variables included in the analysis were mean temperature in the warmest month, mean temperature in the coldest month and annual precipitation. The prediction (Figure 2) suggests that the climate in Florida is marginal for Jamaican nightshade, with the most favorable areas occurring in far southern part of the state and unsuitable climate in the northern part of the state. The first Florida record of Jamaican nightshade was near the northern limit of the predicted distribution, and all subsequent reports have been farther south.

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Habitat

Climatic Requirements. Jamaican nightshade has been collected in its native range from areas with rainfall from 1,087 to 4,423 mm per year, temperature from 11.7 C (minimum temp in coldest month) to 35.8 C (maximum temp in warmest month), and elevation from 0 to 2,131 m above sea level.

Communities in Which the Species Occurs. Jamaican nightshade thrives in shaded hammocks in central Florida. In St. Lucie County, the plant was found growing with *Urena lobata* L. (Caesarweed), *Callicarpa americana* L. (American beautyberry), *Psychotria nervosa* Sw. (wild coffee), *Psychotria sulzneri* Small (shortleaf wild coffee), *Quercus* spp. (oak), and *Sabal palmetto* (Walter) Lodd. ex Schult. & Schult.f. (cabbage palm) (W. Overholt, personal observation). In St. Cloud, FL, near Orlando, FL, Jamaican nightshade was found growing with *Persea borbonia* (L.) Spreng. (red bay), *Acer saccharum* Marshall (Florida maple), *Ilex cassine* L. (dahoon), *Ilex glabra* (L.) A.Gray (inkberry), *Myrica cerifera* L. (wax mirtle), *Vitis rotundifolia* Michx. (muscadine), and *Taxodium distichum* (L.) Rich (bald-cypress) (Mulvania 1930). Observations in the native range describe Jamaican nightshade as an early successional shrub in pastures in Costa Rica (Slocum and Horvitz 2000) and as secondary vegetation in agricultural systems of East Amazonia (Baar et al. 2004).

Description of Infested Sites in Florida. Severe infestations of Jamaican nightshade have been observed inside, or in close proximity to, wooded areas on a ranch in western St. Lucie County and along the southeastern shore of Lake Tohopekaliga in Osceola County. At both locations, isolated patches in the open demonstrated that Jamaican nightshade colonization is not limited to shady areas. Slocum and Horvitz (2000) found a higher arrival of seeds, including Jamaican nightshade, under trees compared to open areas in a tropical pasture in Costa Rica. The authors speculated that seed dispersers ''do not generally perch in open areas, but instead limit their movements to woody vegetation, where they disperse seeds.'' Moreover, Jamaican nightshade seed input evaluated with traps was higher in forests than in young successional vegetation in Costa Rica (Young et al. 1987). Bright color, thin skin, and small size of Jamaican nightshade berries were associated with primary bird dispersal (Link and Stevenson 2004). Thus, it appears that frugivorous birds are the major dispersal vectors of Jamaican nightshade in the native range.

Chemical Control

No research has been conducted to determine chemical control methods for Jamaican nightshade. If control is necessary, the methods that have been developed for tropical soda apple (*Solanum viarum* Dunnal) may be tried. These include broadcast applications of herbicides that contain the active ingredients aminopyralid, aminopyralid plus 2,4-D, or triclopyr ester for dense populations. Spot treatments can be used to control sparse populations using a herbicide that contains the active ingredients aminopyralid, triclopyr ester, or dicamba.

Potential for Biological Control

Biological control of Jamaican nightshade may provide long-term control, but this would require exploration for host-specific natural enemies in the native range. A recent study revealed that *Gratiana boliviana* Spaeth (1926), a beetle introduced into Florida to control tropical soda apple, will not feed on Jamaican nightshade (Overholt et. al. 2008). No pathogens of Jamaican nightshade have been reported in the native range. However, host-range studies of a powdery mildew (*Oidium lycopersici*) found in tomato in Czech Republic indicated that Jamaican nightshade was highly susceptible to this disease (Lebeda and Mieslerova 1999). Spruce (1908) reported the presence of ''a large black beetle whose corpulent abdomen was barely half-covered by the elytra and whose sole food was this *Solanum*'' (referring to Jamaican nightshade).

Discussion

No research has been conducted on Jamaican nightshade, so we do not know why this plant, which has been in Florida for at least 78 yr, has not become a more widespread problem. In Florida, it is possible that Jamaican nightshade populations have yet to reach critical mass and is currently in the lag phase as defined by Sakai et al. 2001. However, there appear to be two possibilities: poor dispersal or very narrow niche requirements. Research should be conducted on this plant to estimate its potential for geographic expansion in Florida. It would also be advisable to conduct studies on control methods, and perhaps to initiate control efforts before the plant becomes more widespread.

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