

Rodrigo Diaz¹ and Raghavan Charudattan²

¹ Louisiana State University Department of Entomology, ² BioProdex, Inc.

SYNONYMS

Sodom apple, yu-a, tutia de vibora, joa bravo

CLASSIFICATION

RANKING	SCIENTIFIC NAME	COMMON NAME
Kingdom	Plantae	Plants
Subkingdom	Tracheobionta	Vascular plants
Superdivision	Spermatophyta	Seed plants
Division	Magnoliophyta	Flowering plants
Class	Magnoliopsida	Dicotyledons
Subclass	Asteridae	
Order	Solanales	
Family	Solanaceae	Potato family
Genus	<i>Solanum</i>	Nightshade
Species	<i>Solanum viarum</i> Dunal	Tropical soda apple

HISTORY AND DISTRIBUTION

Tropical soda apple is native to South America. It was introduced to North America by 1988, likely adhering to shoes, as a seed contaminant, or escaping cultivation. Although tropical soda apple has been recorded in 12 states



Figure 1. Reported tropical soda apple distribution in North America (Credit: EDDMapS, www.eddmaps.org; USDA PLANTS Database, plants.usda.gov; both accessed 27 August 2021; reports of the weed being established in California are erroneous and pertain only to herbarium records)

in the USA (Fig. 1), long-term populations have only been reported in the southeastern USA. The weed has not been reported in Canada.

IMPACT

Tropical soda apple displaces native species in natural areas and reduces range and pasture production. The prickly leaves and stems are unpalatable to livestock and native grazing animals, and dense stands block access to water and shaded areas. Tropical soda apple is also a reservoir for several pathogens and insect pests that attack crop plants in the same family, for example potato virus Y and tomoato mosaic virus.

IDENTIFICATION

AT A GLANCE

Tropical soda apple (Fig. 2) typically grows as a perennial and partially woody subshrub. Its root system can be up to 1 ft (30 cm) deep with shallow, lateral branches. Mature plants are 3–6 ft tall (0.9–1.8 m) and have multiple branching stems. Stems, branches, and leaves are covered in short, fine hairs. Leaves are broadly oval, deeply lobed, and often drooping. Rigid, yellow spines are scattered on stems, branches, and leaf veins. Flowers have five white, recurved petals, and they occur in small clusters on stems below the leaves. Fruits are berries up to 1 in (2½ cm) across; they are mottled green when young, but turn yellow at maturity. Each contains up to 400 small brown seeds.



Figure 2. Tropical soda apple plant (Sebas, iNaturalist.org CC BY-NC 4.0)

Roots

Tropical soda apple has an extensive root system growing up to 1 ft (30 cm) deep with thick lateral branches extending outwards 3–6 ft (0.9–1.8 m). The lateral roots grow just a few inches below the soil surface and produce new shoots at nodes (Fig. 3a).

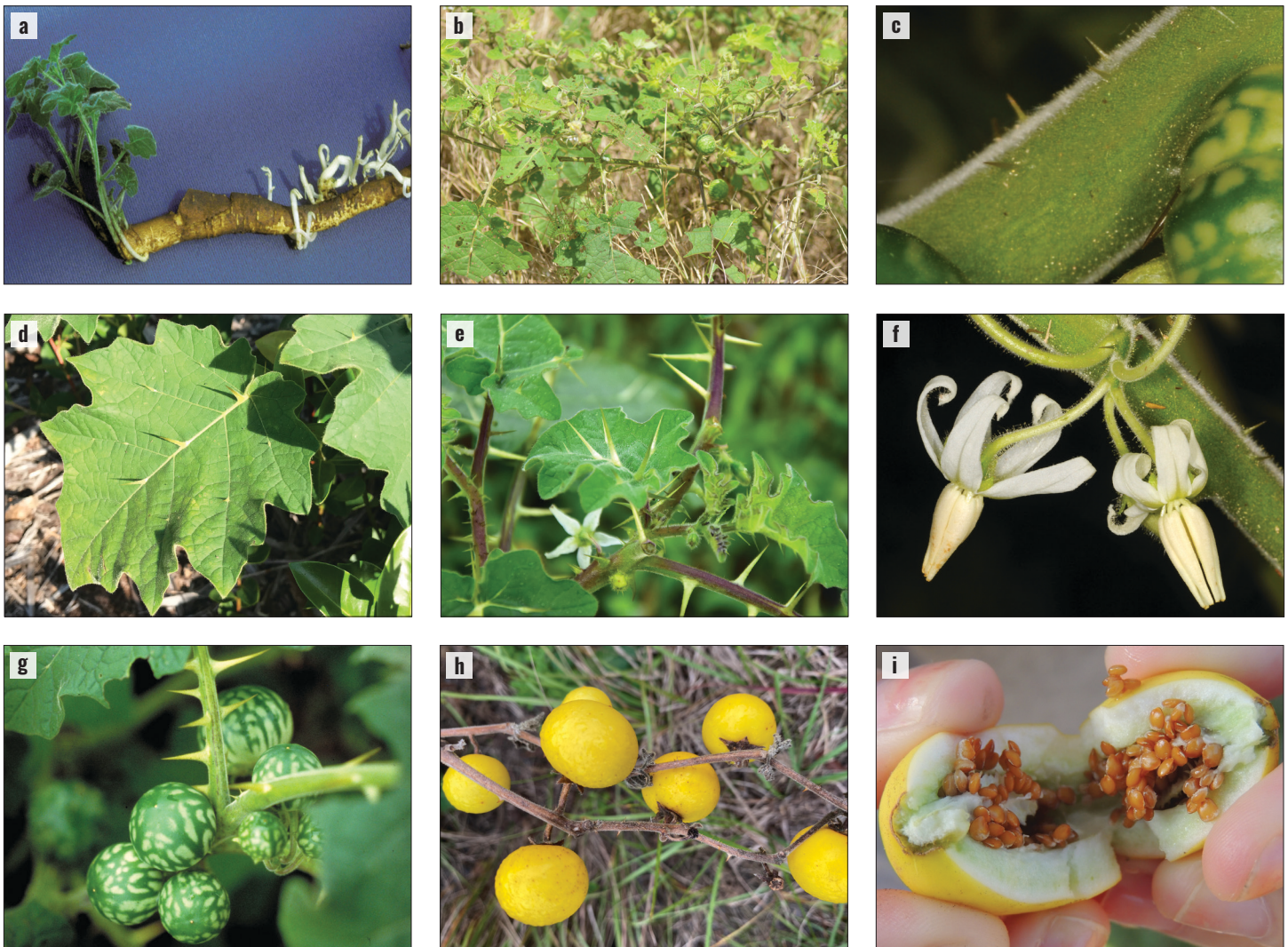


Figure 3. Tropical soda apple (a) lateral roots with new shoots; (b) multiple branching stems; (c) stem covered in fine hairs; (d) lobed leaves with lighter-colored veins; (e) stems and leaf veins scattered with rigid, yellow spines; (f) flowers with 5 recurved, white petals; (g) young fruit mottled green; (h) yellow mature fruit; (i) brown, flattened seeds (a: Charles T. Bryson, USDA-ARS, Bugwood.org CC BY-3.0 US; b: Tom Palmer, iNaturalist.org CC BY-NC 4.0; c,f: Aacocucci, iNaturalist.org CC BY-NC 4.0; d: Jariemames, iNaturalist.org CC BY-NC 4.0; e: Lilca, iNaturalist.org CC BY-NC 4.0; g: J. Jeffrey Mullahey, University of Florida, Bugwood.org CC BY-3.0 US; h: Wiley_c_12, iNaturalist.org CC BY-NC 4.0; i: Victor Wolleck, iNaturalist.org CC BY-NC 4.0)

STEMS AND LEAVES

Mature plants are 3–6 ft tall (0.9–1.8 m) and have multiple sturdy, branching stems (**Fig. 3b**). Stems, branches, and leaves are covered in short, fine hairs (**Fig. 3c**). Leaves are often drooping, broadly oval, 4–7 in long and 2–6 in wide (10–18 cm × 5–15 cm), and deeply lobed with lighter-colored veins (**Fig. 3d**). Leaves are sticky to the touch. Rigid, yellow spines up to 0.8 in long (2 cm) are scattered on stems, branches, and leaf veins (**Fig. 3e**).

FLOWERS

Flowers are 0.6 in (1½ cm) across with five white, recurved petals (**Fig. 3f**) and occur in small clusters on stems below the leaves.

FRUITS AND SEEDS

Fruits are berries up to 1 in (2½ cm) across that are mottled green when young (resembling watermelons; **Fig. 3g**) but turn yellow at maturity (**Fig. 3h**). Each contains up to 400 small brown, rounded, and flattened seeds (**Fig. 3i**). A single plant may produce more than 50,000 seeds annually.

ECOLOGY

Tropical soda apple reproduces both by seed and buds on its lateral roots. Seed germination and flowering may both occur year-round, but primarily happen in fall through spring. Though it is typically perennial, this weed can sometimes grow as an annual—germinating, flowering, and dying in the same year. In mild climates, the plant is green year-round. In temperate regions, the plant dies back with frost and re-

sprouts from root buds the following spring. Seeds are readily transported by cattle, wildlife, water, and hay, and may stay viable for two years.

HABITAT

Tropical soda apple capitalizes on disturbance to invade new areas and can then spread into neighboring undisturbed sites. In the USA, it is largely a weed of pastures and rangeland, but can also be found in conservation areas, cultivated fields, citrus groves, hammocks, roadsides, and ditch banks (Fig. 4).

SIMILAR SPECIES

There are many related species in the Solanaceae or nightshade family present in North America that resemble tropical soda apple with their lobed leaves, 5-petal star-shaped flowers, and berry fruit. Most look-alikes are not spiny and tend to grow smaller than tropical soda apple. The species most closely resembling tropical soda apple are described in greater detail in Table 1, along with key characteristics that can be used for differentiation.

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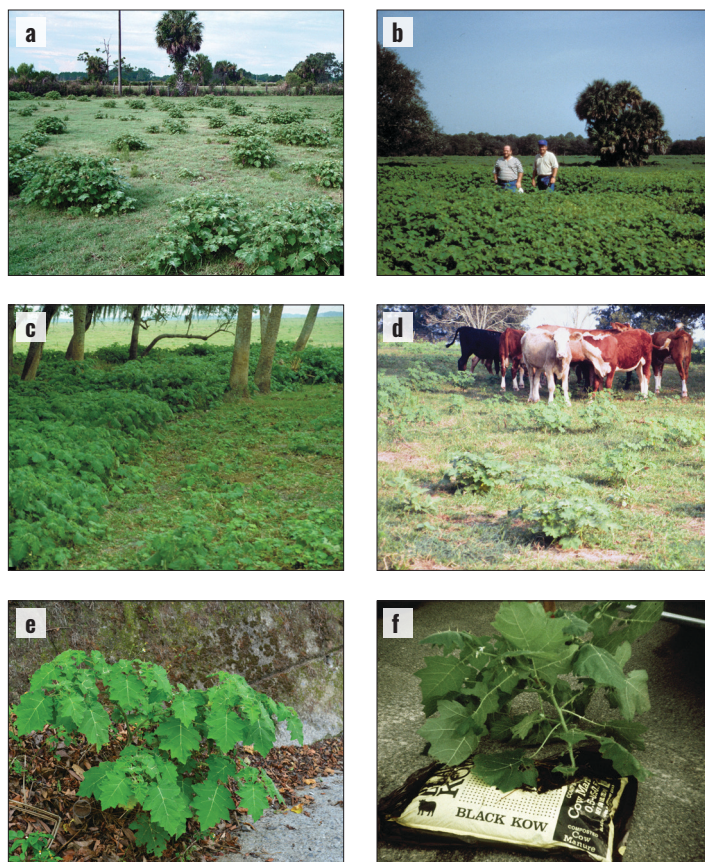






















Figure 4. Tropical soda apple is frequently found in (a–d) pastures and tree hammocks grazed by cattle. It is also a weed of (e) roadsides and other disturbed places. The seeds are often spread via (f) cow manure (a–c: J. Jeffrey Mullahey, University of Florida, Bugwood.org CC BY-3.0 US; d: Charles T. Bryson, USDA-ARS, Bugwood.org CC BY-3.0 US; e: Jodyhsieh, iNaturalist.org CC BY-NC 4.0; f: Randy Westbrook, Bugwood.org CC BY-3.0 US)

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Table 1. Key traits for differentiating tropical soda apple from similar related species established in North America (all in the Solanaceae or nightshade family).

SPECIES	SIMILARITIES	DIFFERENCES	PLANT	LEAF	FLOWER	MATURE FRUIT
Cockroach berry <i>Solanum capsicoides</i> Exotic annual or perennial	Habitat: leaf size and shape; long prickles scattered over stems, leaf veins; 5 petals white, recurved; fruit mottled green when young	Typically shorter and more sprawling; long, simple glandular hairs covering stems; mature fruit deep orange				
Carolina horsenettle <i>Solanum carolinense</i> Native perennial	Habitat: lobed leaves; long prickles scattered over stems, underside of leaf veins; 5 petals; fruit mottled green when young, yellow at maturity	Grows shorter, less woody; leaves narrower, less drooping; prickles not on upper leaf veins; flowers larger; petals wider, fused at the base, not recurved, often purple-tinged; fruit smaller				
Buffalobur <i>Solanum rostratum</i> Exotic and native annual	Habitat: lobed leaves; long prickles scattered over stems, leaf veins; 5 petals	Grows shorter; leaf lobes more rounded; flowers larger; petals yellow, wider, fused at the base, not recurved; two different kinds of stamens; fruit covered in spines				
Scrambling nightshade <i>Solanum tampicense</i> Exotic perennial	Leaves lobed; long prickles scattered over stems, leaf veins; 5 petals white, recurved	Restricted to more moist sites; grows shorter and more sprawling; leaves narrower; fruits smaller, not mottled when young, solid red at maturity				
Turkeyberry <i>Solanum torvum</i> Exotic perennial	Habitat: leaves lobed; long prickles scattered over stems, sometimes leaf veins; 5 white petals; mature fruit yellow	Shrub or small tree; stems, leaves, petioles covered in fine, star-shaped hairs; leaves longer; flowers larger with glandular hairs; petals wider, fused at the base, not recurved; immature fruit not mottled				

Photos: cockroach berry plant (ab69129), leaf (Sylviaz), flower (Vincentkang), fruit (Suchihfen) (all iNaturalist.org CC BY-NC 4.0); Carolina horsenettle plant (Jason Whittle), leaf (Sarah Town), flower (bbk-hx), fruit (Matthew Beziat) (all iNaturalist.org CC BY-NC 4.0); buffalobur plant, leaf, flower, fruit (all Travis McMahon, MIA Consulting); scrambling nightshade plant, leaf, flowers, fruit (all Keith Bradley, iNaturalist.org CC BY-NC 4.0); turkeyberry plant, fruit (Forest & Kim Starr, Starr Environmental CC BY-4.0) leaf, flower (Carel Jongkind, iNaturalist.org CC BY-NC 4.0)

needed by the professional invasive species management community.

SUGGESTED CITATION

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