



Cooperative Extension Service  
Institute of Food and Agricultural Sciences

## **Tropical Soda Apple (*Solanum viarum* Dunal) in Florida<sup>1</sup>**

J. Jeffrey Mullahey and Daniel L. Colvin<sup>2</sup>

Tropical soda apple (*Solanum viarum* Dunal), has become a serious weed problem in many perennial grass pastures and native areas of Florida since 1990. A plant with unpalatable foliage to livestock, this noxious weed can infest a pasture or rangeland in 1-2 years resulting in lower stocking rates. Geographically, the incidence of this plant in Florida has been highest in south Florida (see Figure 1) though it has been observed in north Florida. Tropical soda apple (TSA) has been observed as a weed in pastures, ditch banks, citrus groves, sugar cane fields, and rangeland. It appears to be restricted to semi-disturbed sites. Highest incidence of TSA has occurred in improved pastures, such as bahiagrass, with an estimated 150,000 acres infested in south Florida.

This noxious weed produces a yellow fruit (1-1.5 inches in diameter) which contain 200-400 seed per fruit with a seed germination of 75% or more. The plant is readily identified by its immature fruit which are green with white mottling, similar to watermelon (see Figure 6). Fruit production occurs throughout the year, but mostly from September through May, thus providing 40,000-50,000 viable seed per plant for dispersal. Wildlife such as feral hogs, raccoons, and deer feed on the fruit and are vectors for spreading seed through the feces. Beef cattle also will consume the fruit and spread the seed in a similar manner.

### **WEED TAXONOMY**

At maturity TSA is 3-6 ft tall; stems, leaves, flower-stalks and calyxes have broad based white to yellowish thorns up to 0.4 inch long; pubescent leaves are 4-7 inches long and 2-6 inches wide, deeply divided into broad pointed lobes, flowers are white with yellow stamens, a few together on stems below the leaves; fruits are glabrous, globular, about 1 inch in diameter, yellow when mature; seeds are light red-brown, 0.10 inches in diameter. Seeds are only moderately flattened, contained in a mucilaginous layer which contains a glyco-alkaloid called solasodine. See Figure 2, Figure 3, Figure 4, and Figure 5 for photographs of tropical soda apple.

### **WEED ECOLOGY**

Tropical soda apple is a common weed in South America, India, West Indies, Honduras, and Mexico. It is native to Argentina and central Brazil and has been introduced in Africa, much of India and Nepal, and can be expected to occur in other subtropical areas. Its introduction into North America probably occurred from seed adhering to peoples shoes or it escaped from cultivation. In Florida, it is an obligate weed occurring mainly in association with man's activities.

1. This document is SS-AGR-50, a series of the Agronomy Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Revised January 1996.
2. J. Jeffrey Mullahey, associate professor, Southwest Florida Research and Education Center, Daniel L. Colvin, associate professor, Agronomy Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. It is not a guarantee or warranty of the products named, and does not signify that they are approved to the exclusion of others of suitable composition.

The Institute of Food and Agricultural Sciences is an equal opportunity/affirmative action employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, age, handicap, or national origin. For information on obtaining other extension publications, contact your county Cooperative Extension Service office. Florida Cooperative Extension Service / Institute of Food and Agricultural Sciences / University of Florida / Christine Taylor Stephens, Director

In Florida, TSA has been observed as a common weed in pastures, ditch banks, citrus groves, sugar cane fields, and wet areas of rangeland. In south Florida, TSA is typically found in soils belonging to the order of Spodosols (nearly level, somewhat poorly drained sandy soil with a spodic horizon 3-6 ft below the soil surface). During extended periods (over 3 weeks) of standing water, plant death loss can occur. It is sometimes found growing as a monoculture covering up to 50 acres or more. Based on contact with IFAS County Extension Agents in south Florida during 1992, infestations of pastures by TSA in south Florida were estimated to be near 150,000 acres with this number increasing yearly.

*Solanum* spp. were first reported by ranchers in south Florida in the early 1960's. However, these initial reports indicated the fruit was a cherry red color, not yellow. Apparently ranchers were observing *Solanum capsicoides*, not TSA. For the past 6-8 years in south Florida, TSA has been the most prevalent of the two species. Reasons for the increase in TSA are not well understood. No incidence of severe plant defoliation or death loss from insects feeding on TSA has been observed. Occasionally plants appeared stressed and displayed symptoms of leaf mottling, inclusions, etc., associated with fungi or bacteria.

### WEED BIOLOGY

Tropical soda apple flowers throughout the year though it is concentrated from Sept.-May. Fruit production is also yearly and commonly a mature plant will have both immature (green fruit) and mature fruit (yellow). Seed germination from green fruit can be similar to that of yellow fruit. Seed that is white in color is not viable, regardless of fruit color.

Seedling emergence primarily occurs during the dry season (Oct.-May). New plants will emerge either from seed or from roots. Roots have buds which will regenerate new shoots. The root system can be extensive with feeder roots (.25-1.0 inch diameter) located a few inches below ground, extending 3-6 ft from the crown of the plant. Seed germination has occurred from seed planted 3.25 inches into the ground. How deep the seed must be placed in the soil before germination is inhibited is not known. Seed germination is dependent upon temperature, light, and age of seed. Seed germination was highest (95%) for 5 month old seed followed by a gradual

decline to zero germination at 25 months. See Figure 6 for a line drawing of plant parts.

### WEED CONTROL

To date, the best herbicide for broadcast treatment with respect to good weed control and low grass injury has been Remedy. Apply 1 qt of Remedy per acre in 40 gallons of water with a 0.5% (by volume) non-ionic surfactant. If spraying with a Big A Terra Gator, apply Remedy in 60-65 gallons of water.

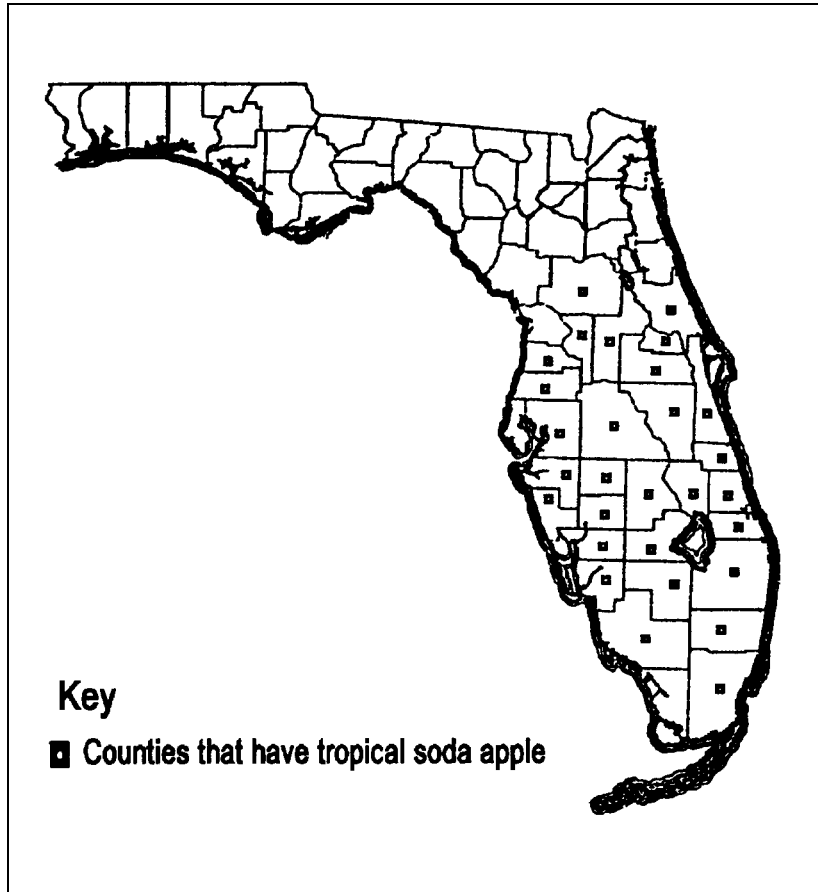
It is important that the plants are actively growing, are 16-24 inches tall, and the entire plant is sprayed to insure acceptable (90%) control. In our studies, plants were mowed in late February and sprayed in late April to early May. We recommend mowing the mature plants, which are 3-6 feet tall, and then spraying the young, tender regrowth which is 16-24 inches tall. Mowing should be practiced even if no herbicide is used in order to prevent fruit production and subsequent seed dispersal. If plants are sprayed too early, new seedlings will be emerging as the sprayed plants are dying.

Repeated applications with a herbicide will be necessary to control this weed. Hopefully, following a broadcast treatment, a rancher could spot treat the remaining plants to reduce costs. With spot treatments, several herbicides have given acceptable control. These herbicides are Weedone CB, 2.8% Roundup solution, and a 1% Remedy solution. Roundup will kill the weed and some adjacent grass and should be used cautiously. Grass damage is not a concern with either Weedone CB or Remedy. Adequate coverage is needed but do not "drench" the plant.

Tropical soda apple in oak hammocks, cypress heads or other native areas must be controlled. These areas serve as a source of seed for wildlife and cattle to spread to adjacent land areas. Spot treatments will be necessary to treat these plants because of limited access by spraying equipment. We are currently researching methods for control of TSA. Our efforts are focused on time of herbicide application, rates of herbicide, benefits from mowing, and reduction in fruit production and seedling emergence. As these projects are completed, we will update this fact sheet.



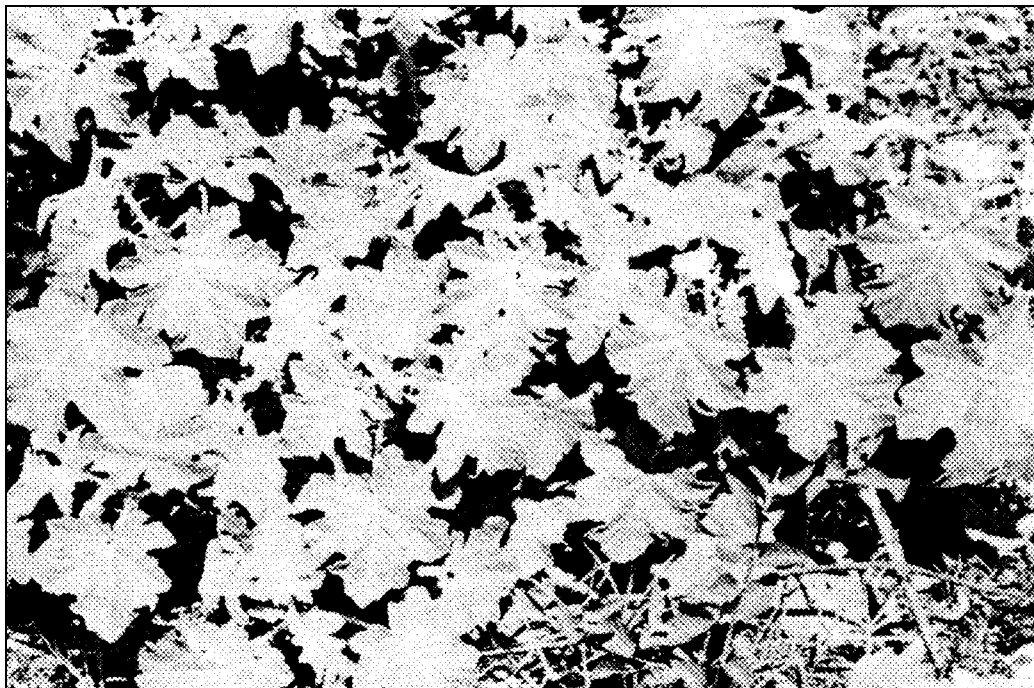
**Figure 2.**  
Tropical Soda  
Apple fruit  
w h i c h  
r e s e m b l e s  
a  
s m a l l  
w a t e r m e l o n



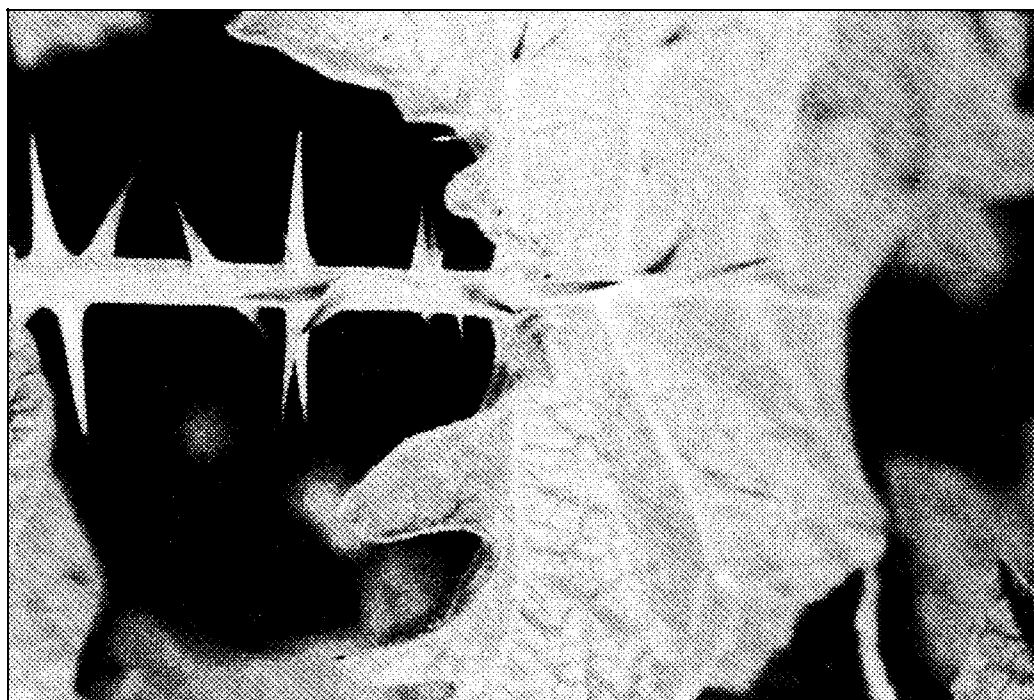
**Figure 1.** Florida state map showing counties that have tropical soda apple.



**Figure 3.**  
Young Tropical  
Soda Apple  
plant exhibiting  
serrated leaves  
with spines.



**Figure 4.** Mature T.S.A. plant with dense foliage shading existing range grass.



**Figure 5.** Close-up of typical spines on Tropical Soda Apple plant

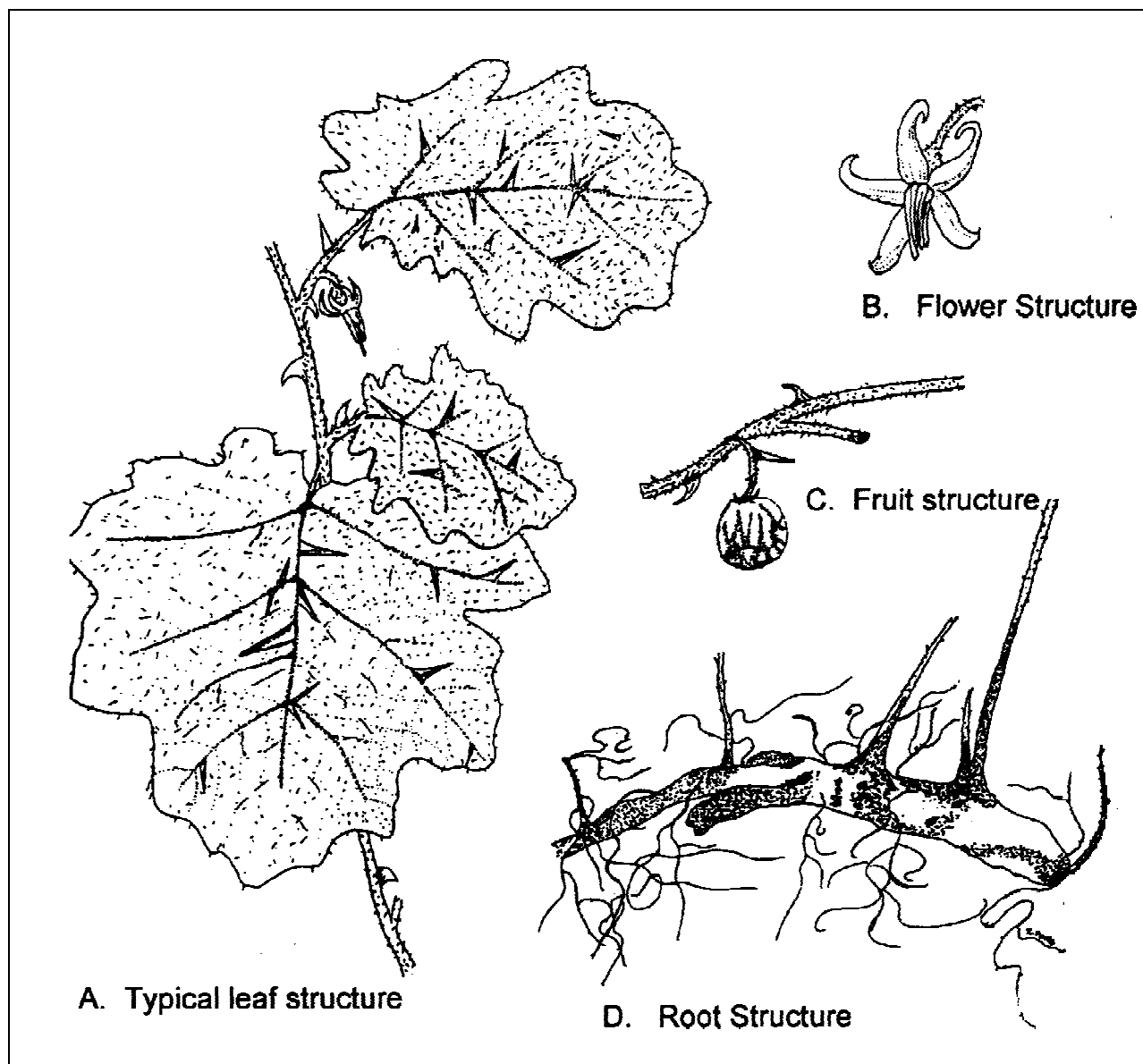


Figure 6. Line drawings of typical Tropical Soda Apple plant parts.