ORGANISATION NORD-AMERICAINE POUR LA PROTECTION DES PLANTES
NORTH AMERICAN PLANT PROTECTION ORGANIZATION
ORGANIZACION NORTEAMERICANA DE PROTECCION A LAS PLANTAS

PEST FACT SHEET

***Solanum viarum* Dunal**

A herbacious perennial broadleaf weed, native to Argentina and Brazil where it is present in improved pastures, that may reach 2 meters in height, that as an exotic noxious weed that displaces pasture grasses and native plants resulting in significant economic and ecological losses. The plant is unpalatable to livestock reducing stocking rates but the fruit is consumed contributing to local spread.

Preferred Scientific Name *Solanum viarum* Dunal

Other Scientific Names *XXXXXXXXX*
XXXXXXXXX

Common Names English - Horse-nettle, Bull-nettle, Sand-brier, Threadsoft, Threadsaf.

French - XXXXXX
Spanish - XXXXXX, XXXX, XXX

Habitat

Native to Argentine, Brazil and Paraguay where it is a common weed in pastures, roadsides, ditch banks, cultivated ground and along edges of forests at low elevations. It also persists and spreads through sugar cane fields, vegetable fields, citrus plantations, natural areas (including oak hammocks, cypress heads and swamps), sod fields, ditch banks, lawns, state parks, nature preserves, landfills and county municvipal parks (Mullahey 1996).

Distribution List

Asia

Europe

)

North America

Mexico **-** northern Mexico (CDA 2003)
USA

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Plant Distribution by State

Solanum viarum Dunal

© Image generated using gd 1.8

Plant Distribution by State

Solanum viarum Dunal

SOVI2

See county distributions for the following states by clicking on them below or on the map.

FL*
* Offsite source.

Alabama
Florida
Georgia
Mississippi
North Carolina
Pennsylvania
South Carolina
Tennessee

(USDA, NRCS 2002)

Solanum viarum Dunal

Genus: Solanum Subgenus: Leptostemonum Section: Acanthophora
Family: Solanaceae.
Nomen number: 317433.
Place of publication: A. L. P. P. de Candolle, Prodr. 13(1):240. 1852.
Name verified on: 13-Nov-2002 by Systematic Botany Laboratory. Last updated: 13-Nov-2002.
Species priority site is: Potato Germplasm Introduction Station (NR6).
NO ACCESSIONS IN NPGS UNDER THIS NAME.

SPECIES RESTRICTED BECAUSE FEDERAL AND STATE NOXIOUS WEED

A declared noxious weed by USDA-APHIS.

A declared aquatic or terrestrial noxious weed and/or noxious-weed seed in these U.S. states, with links to state web documents:
AR°, AZ*, FL, GA°, PR*, SC°, TN*, TX°.
*Only noxious weed.
[a]Only aquatic noxious weed.
°Only noxious-weed seed.

Link to noxious weed information from
Perform invasive species search at Invasivespecies.gov

Common names:

tropical soda-apple (Source: World Econ Pl)

Economic importance:

Medicines: source of solasodine (used to produce steroidal hormones fide Bull BS Ind 13:224. 1971; Solan III:17. 1991)

Weed (fide Sida 15:605-611. 1993; Castanea 61:255-260. 1996)

Distributional range:

Native:

Southern America: Argentina - Chaco, Corrientes, Entre Rios, Formosa, Misiones; Brazil - Amazonas, Goias, Minas Gerais, Parana, Rio Grande do Sul, Santa Catarina, Sao Paulo; Paraguay; Uruguay

Other:

naturalized elsewhere in tropics & subtropics

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Synonyms:

Solanum khasianum var. chatterjeeanum Sengupta

Check other databases for Solanum viarum:

W³TROPICOS: Nomenclatural and Specimen Database of the Missouri Botanical Garden
Mansfeld: Mansfeld's World Database of Agricultural and Horticultural Crops
ePIC: Electronic Plant Information Center of Royal Botanic Gardens, Kew

Images and other information:

Images
Image - North American (various) Images of invasive weeds www.forestryimages.org

Jump to Solanaceae Genome Database

Abbreviations & symbols in GRIN Taxonomy

| USDA | ARS | GRIN | NPGS | New Search |

Cite as: USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland. Available: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?317433 (07 October 2003)

Send your comments to: Dr. J. H. Wiersema.
Return to the Taxonomy Home Page.

South America

Brazil - Amazonas, Goias, Minas Gerais, Parana, Rio Grande do Sol, Santa Catarina, Sao Paulo (USDA, ARS 2003)
Argentina - Chaco, Corrientes, Entre Rios, Formosa, Misiones (USDA, ARS 2003)
Paraguay (Mullahey 1996)
Uruguay (USDA, ARS 2003)

Brazil Paraguay (Mullahey 1996)

Distribution Notes

Native to South America, this weed has been introduced into North America, Africa and India (Mullahey 1996), West Indies, Honduras and Mexico (Mullahey and Colvin 1996). In it's native range it is "a common weed of roadsides, pastures, edges of forests at low elevations, and disturbed areas, mostly below 100m, from Paraguay, northeastern Argentina, and Uruguay through much of eastern Brazil" (Mullahey et al. 1993). This species has been misidentified in the literature as S. khasianum, S. aculeatissum (Nee 1991), and S. reflexum (Morton 1976). Thus it is unclear as to the status of the plant in Mexico. The first known collection of S. viarum in the United States was from Glades County, Florida in 1988 but it may have been present in the state as early as 1981 or 1982 (Coile 1993). Since it's introduction into the U.S., it has spread rapidly and currently infests approximately one million acres in Florida alone...also found in improved pastures, citrus groves, sugar cane fields, ditches, vegetable crops, sod farms, forest lands and natural areas in eight states. The plant was placed on the Florida Noxious Weed List in early 1994 and was placed on the Federal Noxious Weed List in 1995.

Further research is needed in order to determine the "fitness" of this plant to more northerly areas of the North American continent (Bryson and Byrd 1994).

Biology and Ecology

In Florida, this plant performs as an "obligate weed", occurring mainly in association with human activities

(Mullahey 1996). It's introduction into North America probably resulted from seed adhering to people's shoes or escaped from cultivation (Mullahey *et al.* 1993).

Seedling emergence primarily occurs during the dry season (Oct.-May) in Florida (Mullahey and Colvin 1996). New plants will emerge from seed or from roots which have buds from which new shoots will emerge. Root systems are extensive with feeder roots up to 2.5 cm in diameter located a few cm below the ground but extending up to 2 meters beyond the crown of the plant. Successful seed germination will take place from seeds buried up to at least 9 cm in the ground. Seed germination is dependant upon temperature, light and age of seed, being about 95 % for 5 month old seed, followed by a gradual decline to zero germination at 25 months (Mullahey and Colvin 1996).

Although the plant will flower throughout the year, blooms tend to be most numerous from September through May (Mullahey et al. 1993). Large numbers of viable seed are produced produced from a single mature plant (45,000 per plant) and with an average germination rate of about 70% a single plant could give rise to at least 30,000 new plants. Seed will not germinate inside whole fruit and needs to be released from the plant and dried for a short period to allow good germination. Scarification further increases the rate of germination and thus, consumption by herbivores with passage of seed in fecal material is a primary seed dispersal mechanism. Aside from animal vectors, seed is also dispersed in contaminated hay, grass seed, moving water and sod. Rapid local spread is often associated with soil disturbances such as field discing, cattle milling about feeders, cleaning of ditches, or feral hogs rooting in infested fields, all providing an ideal environment for the establishment and growth. The plant cannot long periods of flooding but new plants will emerge from seed once the area dries. (Mullahey 1996). In Florida, the plant is typically found in soils belonging to the order of Spodosols (nearly level, somewhat poorly drained sandy soils with a spodic horizon 1 to 2 m below the soil surface) and it is sometimes found growing as a monoculture covering up to 20 ha or more (Mullahey et al. 1993).

Although seed remains the primary propagative agent, plant regeneration can also take place from the roots (Mullahey and Cornell 1994) and flowering from regrowth after mowing generally requires 45-60 days (Mullahey 1996).

Economic Impact

tropical soda apple
This plant and one or more synonyms are listed as invasive weeds by the authoritative sources noted below. Synonyms are italicized and indented. This plant may be known by one or more common names in different places, and some are listed above. Click on an acronym to view each invasive plant list, or click here for a composite list of Invasive Plants of the U.S.
US

Plant Protection and Quarantine. 1999. Federal Noxious Weed List (http://www.aphis.usda.gov/ppq/bats/noxweed.html, 20 October 1999). USDA Animal and Plant Health Inspection Service. Washington, DC. 2pp.

STATE

Assorted authors. 199_. State noxious weed lists for 35 states. State agriculture or natural resource departments.

USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

The plant has become a serious weed problem in many perennial grass pastures and natural areas of peninsular Florida. First collected in the US from Glades County in 1988 (Mullahey et al. 1993), the incidence of this plant in Florida is highest in southern Florida where it has been observed in pastures, natural ecosystems, citrus (*Citrus* spp.), sugar cane, (*Saccharum offinarum* L.), sod fields, ditch banks and roadsides (Mullahey and Colvin 1993). In natural ecosystems, S. viarum must be carefully controlled - oak hammocks and other areas with mast crops

will attract wildlife including birds (Bryson *et al.* 2003) (and unfenced cattle) which consume the fruit and spread the seed to new, non-infested areas (Mullahey and Colvin 1996).

The plant has been identifies as a host for 9 viruses that cause economic damage to vegetables (McGovern *et al.* 1994).

The plant has unpalatable foliage to livestock, infesting a pasture or rangeland in 1-2 years resulting in lower stocking rates (Mullahey and Colvin 1996). Highest incidence of this weed in Florida is in improved pastures, such as bahiagrass, with an estimated 150,000 acres infested in south Florida (Mullahey and Colvin 1996).

Tropical soda apple contains a glycolalkaloid, solasodine, that is found in the mucilaginous layer that surrounds the individual seeds. Although there are reports of the deliberate cultivation of the plant for the production of solasodine, a precursor in the industrial production of steroid hormones useful in the treatment of cancer, solasodine is poisonous to humans but a lethal dose would require the ingestion of approximately 200 fruit (Frohne and Pfander 1983). Freshly opened fruit has a sweet odor similar to a plum or apple but the seeds have a bitter taste, however they are not sufficiently detractive to wildlife (feral hogs, raccoons and deer) and beef cattle which actively consume the fruit and thus spread the seed (Mullahey 1996).

The weed is a threat to the vegetable crop industry as a competitive weed and because it is an alternate host, and thus a reservoir for, numerous pathogens that cause disease in other solanaceous hosts including eggplant, peppers, potatoes, tomatoes, etc. These pathogens include cucumber mosaic virus, gemini virus, potato leafroll virus, potato virus Y, tobacco etch virus, tomato mosaic virus, tomato mottle virus and the fungus, *Alternaria solani* (Bryson *et al.* 2003).

If not controlled in pastures, pasture production declines resulting in lower stocking rates (animals per hectare). High seed production and high germination rates translate to rapid spread within 1-2 years (Mullahey *et al.* 1993).

Morphology

At maturity, tropical soda apple ranges from one to two meters in height, stems and leaves have broad-based, white to yellow thorns up to 20 mm long and generally more evident on the petiole and main veins than on the stems. Leaves are arranged alternately, 10-20 cm long and 6-15 cm wide and are shallow or sometimes deeply divided into broad pointed lobes. Flowers are borne together in small numbers, white in colour with cream-coloured anthers, hidden in small clusters on stems beneath the leaves. Fruits are globular, glabrous, about 2-3 cm in diameter and yellow in colour when mature. Most distinctive is the immature fruit which is green with white mottling, similar in appearance to immature water melon fruit. Each mature fruit contains about 400 light red-brown seeds approximately 2.5 mm in diameter, with a seed germination of 75 % or more (Mullahey and Colvin 1996).

Similarities to other species/conditions

Of the native Solanaceae, *S. viarum* most closely resembles horsenettle, *Solanum carolinense* L. (Bryson *et al.* 2003).

Control

Prevention

Prevention of entry remains the best form of control of this weed. Failing that, early detection and prompt response with an integrated approach is the most cost-effective strategy for control.

Cultural Control

Repeated mowing mature plants from Februrary to April has resulted in 50 - 80 % control without herbicides (Mullahey *et al.* 1994), although attention must be given to mowing before seeds and fruits become mature as

some spreading of plants takes place otherwise. Mowing every 60 - 80 days will allow control to take place before fruit develops and matures from regrowth of shoots.

Chemical Control

Various chemical responses are available for the control of *Solanum viarum* (Mullahey 1996) but serious attempts to control this invasive weed should be dependant upon current research and extension work. Regardless, repeated applications of herbicide will be necessary to eliminate infestations because of rapid seedling emergence following the control of existing plants. Likewise, high seed production, resulting in a rapid build-up of the resident seed bank will require aggressive control measures for at least 1-3 years.

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