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Source: *The Florida Entomologist*, Vol. 79, No. 1 (Mar., 1996), pp. 70-73

Published by: [Florida Entomological Society](#)

Stable URL: <http://www.jstor.org/stable/3495757>

Accessed: 11/03/2014 15:50

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## AN EXPLORATORY INSECT SURVEY OF TROPICAL SODA APPLE IN BRAZIL AND PARAGUAY

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Tropical soda apple, *Solanum viarum* Dunal (Solanaceae), a herbaceous annual weed (Aranha et al. 1982) native to South America (Nee 1991), is considered a serious weed threat and has been included in the list of noxious weeds by the Florida Department of Agriculture and Consumer Services (Florida Dept. Agric. and Consumer Services 1994). This weed has spread into other geographical regions including Central America, the Caribbean, India, China, Africa (Coile 1993, Chandra & Srivastava 1978), and south Florida (Mullahey et al. 1993). It was recently found (July 1994) in southern Mississippi by J. Byrd (Extension weed specialist, Mississippi State Univ., pers. comm.). *Solanum viarum* is spreading rapidly, invading pasture lands in south Florida. In 1992, infestations of pastures by *S. viarum* were estimated to be near 150,000 acres (Mullahey et al. 1993). A census of Florida ranchers in 1993 (J. J. M. unpublished) found that nearly 400,000 acres of pastures and natural systems were infested by *S. viarum* causing an annual production loss to Florida ranchers of \$11 million. The rapid spread in south Florida can be partially attributed to the plant's ability to grow in sandy loam soils (Chandra & Srivastava 1978), great reproductive potential (Mullahey et al. 1993), and effective seed dispersal by cattle and wildlife (Mullahey & Colving 1993).

How this South American plant entered Florida is unknown. Earliest records indicate that it was initially observed in Hendry county (southwest Florida) in the 1980s (Mullahey et al. 1993). No insects have been reported feeding on this plant in Florida.

An exploratory survey was conducted by the authors during 8-14 June, 1994 to record insects feeding on *S. viarum* plants in Sao Paulo and Parana states, Brazil and

southeast Paraguay. Collections were made on natural stands of *S. viarum* on roadsides and grasslands. Insects found on the plant were trapped by hand. Plant parts (fruits, leaves, stems) were examined for insects. Fruits and stems were dissected to collect insects feeding on these internal parts. Identification to species level was determined mainly with those insects that were actually feeding on *S. viarum*. The insects collected on *S. viarum* at the different sites are listed in Table 1. The major insects collected included *Neoleucinodes elegantalis* Guenee (Pyralidae), a fruit borer that feeds inside *S. viarum* fruits destroying a great proportion of the seeds. The host-feeding range of this insect is not known (J. Vasconcelos, Universidade Estadual Paulista do Campinas, pers. comm.). Gallo et al. (1988) listed *N. elegantalis* as a tomato pest in Brazil. Based on host data provided by Buzzi (1994), *S. viarum* represents a new host record for the cassidines *Metritona elatior* Klug and *Gratiana boliviana* Spaeth (Chrysomelidae), the larvae and adults of which feed on *S. viarum* leaves. Sweetpotato, *Ipomoea batatas* L. (Convolvulaceae), is also listed as host of *M. elatior* (Buzzi 1994). The genus *Metritona* includes six species (*M. argentina* Spaeth, *M. tenella* Klug, *M. bifossulata* Boheman, *M. erratica* Boheman, *M. vilis* Boheman, *M. bilimeki* Spaeth) that occur in Central America and/or South America (Buzzi 1988, Maes & Staines 1991) and for most of them the host ranges are unknown or incompletely known. Likewise, the host-feeding range of *G. boliviana* is unknown. A complete description of this cassidine is provided by Buzzi (1995). Few attempts have been made to use cassidines for biological control of *Solanum* weeds. *Gratiana lutescens* Boheman and *G. pallidula* Boheman were studied in South Africa (Siebert 1975) as potential biological control agents of *Solanum elaeagnifolium* Cav. but research efforts were not continued because the insects' host range included eggplant, *S. melongena* L.

In June 1994, the lace bugs (Hemiptera: Tingidae), *Corythaica sp.* near *cyanthicolis* (Costa) formed small aggregations on the underside of *S. viarum* leaves. This insect was most commonly found on *S. viarum* leaves. The genus *Corythaica* includes thirteen species that occur in the neotropics (Drave & Ruhoff 1965) and for most of them the plant host ranges are unknown or incompletely known. *Amblyophallus maculatus* Funkhouser (Homoptera: Membracidae) was the second most abundant species found on *S. viarum* stems and leaves. The butterfly *Mechanitis lysimnia* Fabricius (Nymphalidae: Ithomiinae), probably polyphagous, was collected by Pitelli, a junior author (R. A. P.), around Jaboticabal, Sao Paulo. The larvae seem to be associated with extensive *S. viarum* leaf-chewing damage. The known geographical distribution of *M. lysimnia* extends from Mexico to northern Argentina (D'Abrera 1984, DeVries 1987), including Brazil. The other minor insects collected on *S. viarum* were not causing significant damage to the plants and most are probably polyphagous (Coccidae, Coreidae, Fulgoridae, Pentatomidae, Rhopalidae). *Diabrotica speciosa* Germar is a key pest in Brazil. Larvae and adults feed on roots and foliage of common beans, *Phaseolus vulgaris* L., field corn, *Zea mays* L., and potatoes, *Solanum tuberosum* L.

This survey in Brazil and Paraguay indicated that a diverse group of insects (phytophagous and others) is associated with *S. viarum* and at least 5 species, *M. elatior*, *N. elegantalis*, and *M. lysimnia*, the tingid *Corythaica sp.* and the membracid *A. maculatus*, probably cause significant damage to *S. viarum* plants in South America. Paraguayan technicians (Centro Tecnológico Agropecuario) indicated that *S. viarum* is not considered an important weed in the region. In Brazil, *S. viarum* is an occasional invader of field crops and its geographical distribution includes Goiás, Minas Gerais, and the southern states (Costa et al. 1985). Further surveys in the weed's native region, basic biological studies, and preliminary host range tests need to be implemented to start a biological control project for *S. viarum* in Florida.

TABLE 1. INSECTS ASSOCIATED WITH *SOLANUM VIARUM* IN BRAZIL AND PARAGUAY.

Family	Species	Plant Part Collected	Insect Stage <sup>1</sup>	Collection Site <sup>2</sup>
Pyralidae	<i>Neoleucinodes elegantalis</i>	fruit	L	Taiuva, SP Divinolândia, SP Ciudad del Este
Nymphalidae	<i>Mechanitis lysimnia</i>	leaf	L,P	Jaboticabal, SP
Noctuidae	—	leaf	L	Divinolândia, SP
Chrysomelidae	<i>Metriorhynchus elatior</i>	leaf	P,A	Divinolândia, SP Ciudad del Este
Chrysomelidae	<i>Gratiana boliviana</i>	leaf	A	Divinolândia, SP
Chrysomelidae	<i>Diabrotica speciosa</i>	leaf	A	Taiuva, SP Divinolândia, SP Ciudad del Este
Cerambycidae	—	leaf	A	Ciudad del Este
Tingidae	<i>Corythaica sp.</i>	leaf	A	Taiuva, SP Divinolândia, SP Ciudad del Este
Coreidae	—	leaf	A	Divinolândia, SP
Pentatomidae	—	leaf	A	Taiuva, SP
Rhopalidae	—	leaf	A	Ciudad del Este
Coccidae	—	stem	N,A	Taiuva, SP
Fulgoridae	—	leaf	A	Taiuva, SP
Membracidae	<i>Amblyophallus maculatus</i>	leaf-stem	N,A	Taiuva, SP Divinolândia, SP Ciudad del Este
Acrididae	—	leaf	A	All sites
Formicidae	—	leaf-stem	A	All sites

<sup>1</sup>L=larva, N=nymph, P=pupa, A=adult.

<sup>2</sup>SP=Sao Paulo state, Brazil; Ciudad del Este in south-east Paraguay.

We thank G. R. Buckingham (USDA-ARS), J. H. Frank, and D. H. Habeck (Department of Entomology and Nematology, University of Florida) for reviewing the manuscript. We also thank J. Vasconcelos (Universidade Estadual Paulista do Campinas, Sao Paulo) for identifying *M. elatior*, *N. elegantalis*, and *M. lysimnia*; Z. J. Buzzi and A. Sakakibara (Universidade Federal do Parana in Curitiba, PR) for identifying *G. boliviana* and *A. maculatus*, respectively; S. E. Halbert (State of Florida Department of Agriculture & Consumer Services-Division of Plant Industry, Gainesville) for identifying the *Corythaica sp.* Specimens of several of the species identified were retained by the taxonomists responsible for identification. Others were deposited in the insect museum of the Universidade Federal do Parana in Curitiba, Brazil, and the University of Florida Entomology & Nematology Department insect collection in Gainesville, Florida. This manuscript is published as Florida Agricultural Experiment Station Journal No. R-04336.

## SUMMARY

An exploratory survey was conducted in Brazil and Paraguay to record insects feeding on *Solanum viarum* Dunal (Solanaceae). A list of insects collected is included. The survey indicated that a diverse group of phytophagous insects is associated with *S. viarum*, and some of them may have potential as biocontrol agents of *S. viarum* in Florida.

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