

PEST ALERT

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Two-spot cotton leafhopper, Hemiptera: Cicadellidae, Typhlocybinae, Empoascini; *Amrasca biguttula* (Ishida) – A serious pest of cotton, okra and eggplant that has become established in the Caribbean Basin

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INTRODUCTION

The two-spot cotton leafhopper, *Amrasca biguttula* (Ishida) (Hemiptera: Cicadellidae: Typhlocybinae: Empoascini) (Fig. 1), is a serious pest of cotton and several other important crops. This species is problematic wherever it occurs, implied by an old synonym *Empoasca devastans* Distant, 1918. It is also known as “cotton jassid”, jassid being an old name for small leafhoppers, and also the okra leafhopper, a name commonly used in the Caribbean where okra is an important crop. It was first detected in the U.S. Virgin Islands and Puerto Rico in the spring of 2023. At the time, the only other Western Hemisphere record for this species was a single male labeled “Cuba” deposited in the United States National Museum. There are no other prior or subsequent reported finds in Cuba. The two-spot cotton leafhopper is native to the Indian Subcontinent, east to Japan and Micronesia (Cabrera-Asencio et al. 2023).

Like other leafhoppers in the subfamily Typhlocybinae, two-spot cotton leafhoppers feed on the lower surface of leaves, extracting the contents of the cells. This causes yellowing, reddening, then browning of leaves, characteristic of a syndrome called “hopperburn,” along with wilting and curling of the leaves. The leafhoppers themselves are tiny, so it is likely the plant damage will be observed before the insects themselves (see below under “action”).

Damage can be extensive to multiple crops, including, but not restricted to, cotton (*Gossypium hirsutum* L.), okra (*Abelmoschus esculentus* Moench), roselle (*Hibiscus sabdariffa* Rottler), sunflowers (*Helianthus annuus* L.) and eggplant (*Solanum melongena* Wall). See below for photos of damage to various crops. Yield losses may exceed 50% in some crops, given the right circumstances (Cabrera-Asencio et al. 2023). Damage is reminiscent of that caused by vascular plant pathogens, but two-spot cotton leafhopper is not proven conclusively to transmit plant pathogens. There are a couple reports of phytoplasma transmission from India (reported as viruses transmitted by *Empoasca devastans*) (Hill 1943, Nielson 1975, Thomas and Krishnaswami 1939), but they are not substantiated.

In India, the damage caused by two-spot cotton leafhoppers increased greatly with the introduction of Bt cotton. In the past, cotton was sprayed extensively for bollworm, which also controlled the leafhoppers. Reduced insecticide usage allowed the leafhoppers to thrive, establishing high populations in cotton and crops in other plant families (Nagrare et al. 2012).

DESCRIPTION

The two-spot cotton leafhopper superficially resembles *Empoasca* species such as the potato leafhopper, *Empoasca fabae* (Harris). Adults are tiny green insects. They can be distinguished from *Empoasca* spp. by a dark spot on each wing (Fig. 1) and often by two dark spots on the head (https://irac-online.org/pests/amrasca_biguttula_biguttula/). A few other Typhlocybinae in Florida also have spots on the posterior half of the wings, but those species (*Alconeura* spp., some *Dikrella* spp., *Eratoneura* spp.) are not primarily green. The two spots on the wings are nearly always visible and will distinguish this species from other tiny green leafhoppers, especially those related to potato leafhoppers.



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While tentative identification of the two-spot cotton leafhopper can be made in the field and laboratory using the combination of host damage and the black markings on the wing and (sometimes) head, authoritative morphological identification requires dissection and examination of the male genitalia by a specialist. Molecular barcode data also can be used in the case that no males are available; however, male voucher specimens are much preferred for establishment of any new records.

BIOLOGY

Laboratory experiments on the life cycle were conducted by Nagrare et al. (2012). Eggs are inserted in slits in the leaf veins. The nymphal period lasts between 5–16 days. Males lived 15–34 days and females lived 17–37 days. These authors were unable to assess fecundity because it was impossible to count the eggs.

HOSTS

The two-spot cotton leafhopper is a selectively polyphagous pest (CABI 2024). Main hosts include okra (Fig. 2–4), peanut (*Arachis hypogaea* L.), jute (*Corchorus* spp.), soybean (*Glycine max* (L.) Merr.), cotton (Fig. 5), niger (*Guizotia abyssinica* Cass.), sunflower (*Helianthus annuus* L.) (Fig. 6), eggplant (*Solanum melongena* Wall) (Fig. 7), potato (*Solanum tuberosum* L.), mung bean (*Vigna radiata* (L.) R.Wilczek) and cowpea (*Vigna unguiculata* (L.) Walp.). Plants included in this list represent four families: Malvaceae, Fabaceae, Asteraceae and Solanaceae, but closely related plants might not be colonized in equal severity. For example, roselle (*Hibiscus sabdariffa*) is damaged severely, whereas some cultivars of *Hibiscus rosa-sinensis* L., the popular ornamental hibiscus, are colonized lightly in Puerto Rico (observation by Alondra Nieves, graduate student, UPRM, PR 2024, personal communication 2024, by permission). However, see Fig. 8, by Alondra Nieves, showing extensive damage can occur with some cultivars.

ECONOMIC IMPORTANCE

Two-spot cotton leafhopper can cause serious damage to cotton, okra, eggplant, peanut, roselle and other crops (Cabrera Asencio et al. 2023, CABI 2024, Nagrare et al. 2012).

NATURAL ENEMIES

A survey of natural enemies in an okra crop in Pakistan revealed spiders, lady beetles, ants and green lacewings (Wagan and Wagan 2015).

DISTRIBUTION

The native range of the two-spot cotton leafhopper ranges from Iran to Japan and south to Indonesia. However, it is adventive in West Africa and the Caribbean (Dmitriev et al. 2024), including but not necessarily limited to Puerto Rico, the US Virgin Islands (Samples from 15 September 2023 from St. Croix on okra, Dr. Consuelo Estevez de Jensen, collector, identified by Dr. Irma Cabrera Asencio, University of Puerto Rico), Barbados (EPPO Reporting Service 2024), Antigua (Dr. Janil Gore-Francis, Director of the Plant Protection and Quarantine Unit), Anguilla (Dr. Norma Samuel) and St. Kitts and Nevis (Dr. Oscar Liburd). The Dmitriev et al. (2024) map shows it in Australia, but as of 2017, the Australian government did not think it occurred there (Fletcher et al. 2017).

Detections have been made in several Florida counties from Miami-Dade County in the south to Jackson County in the north. Surveys are on-going.

ACTION

Two-spot cotton leafhoppers are so tiny (Fig. 9) the severe damage is likely to be noticed before the leafhoppers themselves. For practical purposes, if large numbers of leafhoppers are found feeding on cotton, okra, eggplant, roselle or hibiscus, the infestation should be considered a suspect colony, and samples from Florida should be sent immediately to the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (FDACS-DPI), Entomology, in Gainesville, FL. Further survey methodology is still under development at FDACS-DPI. Experience in the Caribbean indicates sweeping with a fine net over (not through) the damaged crop can be a useful survey tool. Authoritative identification requires a prepared male specimen because differentiation from other similar species, especially congeners, is based on characters of the male genitalia (see Cabrera Asencio et al. (2023) for details and figures). Thus, it is important to send as many specimens as possible to ensure having males for preparation.

FDACS-DPI samples should be sent in 70% alcohol, with identifiable plant material. Put the plant material, with a dry paper towel, into a secure clear plastic bag by itself, clearly marked “live insects.” The form for sample submission can be found at www.FDACS.gov/DPIsamples.

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Figure 1. Adult two-spot cotton leafhopper.

Photo by Daphne Zapsas, USDA-APHIS-PPQ, Biological Science Laboratory Technician, Miami, FL.



Figure 2. Damage to okra in Antigua by two-spot cotton leafhopper.

Photo by Oscar Liburd, University of Florida, Department of Entomology and Nematology.



Figure 3. Close-up of injury in Antigua to okra by two-spot cotton leafhopper.

Photo by Oscar Liburd, University of Florida, Department of Entomology and Nematology.



Figure 4. Two-spot cotton leafhopper damage to field of okra in St. Croix, USVI.

Photo by Amy Dreves, University of the Virgin Islands.



Figure 5. Two-spot cotton leafhopper damage to cotton in St. Croix, USVI.

Photo by Amy Roda, USDA-APHIS-PPQ, Miami.



Figure 6. Two-spot cotton leafhopper damage to sunflower in St. Croix, USVI.

Photo by Amy Dreves, University of the Virgin Islands.



Figure 7. Two-spot cotton leafhopper damage to eggplant in St. Croix, USVI, July 2024. *Epitrix hirtipennis* (Melsheimer, 1847), the tobacco flea beetle, is also present.

Photo by Amy Dreves, University of the Virgin Islands.



Figure 8. Damage to ornamental hibiscus by two-spot cotton leafhopper in Puerto Rico.

Photo by Alondra Nieves, graduate student, UPRM, PR.



Figure 9. Two-spot cotton leafhopper damage to okra in Florida, November 2024. *Aphis gossypii* Glover, the cotton aphid, is also present.
Photo by Sajan KC, FDACS-DPI.



Figure 10. Tiny two-spot cotton leafhoppers on a damaged leaf in St. Croix, USVI.
Photo by Amy Dreves, Univeristy of the Virgin Islands.