CAPS Datasheet Template

CAPS Datasheets provide pest-specific information to support planning and completing early detection surveys.

Amrasca biguttula

Scientific Name
Amrasca biguttula (Ishida, 1912)

Synonym(s):
Amrasca biguttula biguttula (Ishida);
Amrasca devastans (Distant, 1918);
Chlorita biguttula Ishida*; Empoasca devastans* Distant, 1918

Common Name
cotton jassid, two-spot cotton leafhopper, Indian green jassid, okra leafhopper

Type of Pest
Leafhopper

Taxonomic Position
Class: Insecta, **Order:** Hemiptera, **Family:** Cicadellidae

Figure 1: *Amrasca biguttula* adult (adapted from Cabrera-Asencio et al., 2023, CC BY-NC 3.0)

Pest Recognition
This section describes characteristics of the organism and symptoms that will help surveyors recognize possible infestations in the field, select survey sites, and collect symptomatic material. For descriptions of diagnostic features, see the Identification/Diagnostic resources on the AMPS pest page on the CAPS Resource and Collaboration website.

Pest Description

Adults

Adult cotton jassids are roughly 2-3 mm long and pale green with yellowish-green wings. Males are slightly smaller than females. This insect can be distinguished from most native cicadellid leafhopper species in North America by the pair of black spots on the head and the black spot at the apical end of each wing (Figs.1 & 2). These markings may sometimes be faint or absent. When disturbed, adults and nymphs display characteristic sideways movements and hopping behaviors (Schreiner, 2000).

Confirmatory morphological identification requires dissection of adult male genitalia.

Figure 2: Dorsal view **(A)** and lateral view **(B)** of live *A. biguttula* adults on okra leaves from Florida. Note the blue arrows denoting the black spots on the head. Photos courtesy of Daphne Zapsas.

Eggs

Female cotton jassids lay their eggs within the veins and midrib of host plant leaves, which renders the eggs nearly invisible without specialized tools (Mensah, 2006; Schreiner, 2000). The eggs are yellowish-white, oblong, and less than 0.04 inches long.

Nymphs

Newly hatched nymphs are wingless, pale green, and highly agile, quickly scuttling sideways or falling off of plants when disturbed (Schreiner, 2000). They are very small, usually less than 0.05 inches long (Fig. 3) (Jayasimha et al., 2012; Madar and Katti, 2011; Mensah, 2006) and are difficult to distinguish from the nymphs of other species. Like adults, they feed on the underside of leaves, stems, and petioles, causing damage and excreting sticky honeydew that further compromises plant health (AVRDC, 2003; Pestnet, 2021; Rajendran et al., 2018).

Nymphs coexist with adults throughout the year (AVRDC, 2003; Ghosh and Karmakar, 2022).

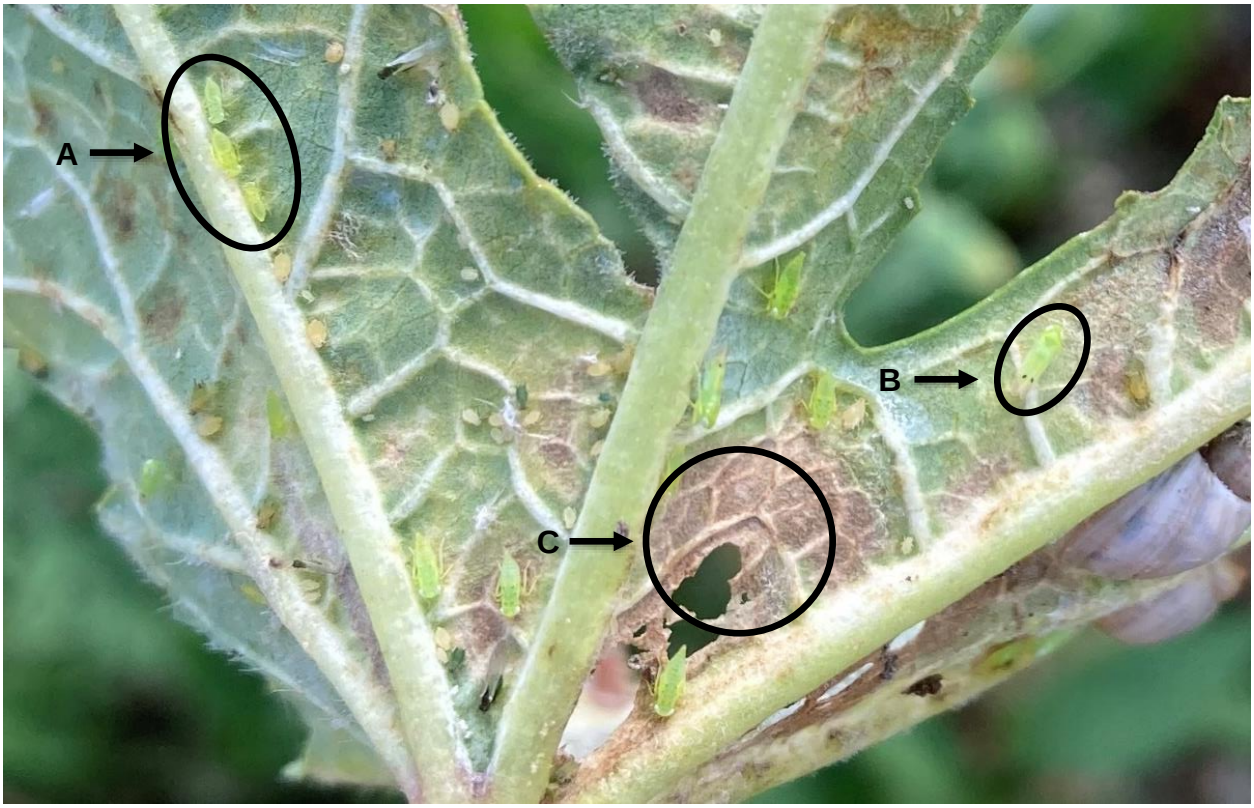

Figure 3: Nymphs and adults on okra leaves in Florida. Note nymphs clustering along the midrib of the leaves **(A)**, an adult with prominent black spots on the wings **(B)**, and possible “hopperburn”, or discolored/necrotic tissue **(C)**. Photo courtesy of Amy Roda.

Signs

Cotton jassids cause significant damage to host plants resulting in disease-like symptoms collectively referred to as "hopperburn" (Fig. 4) (Rajendran et al., 2018; Schreiner, 2000; Schreiner, 1990). Both adults and nymphs feed on the underside of leaves, using their sucking mouthparts to consume the leaf cell contents and disrupt phloem tubes, which exacerbates the damage (Schreiner, 2000). Symptoms begin with yellow blotches on leaves, which progress to curling, browning, and dead spots, often accompanied by a distinctive yellow "halo" along the leaf edges (AVRDC, 2003; Schreiner, 2000). Severe infestations lead to bronzing, brittleness, defoliation, and stunted growth, with premature dropping of leaves, buds, and flowers significantly reducing plant productivity (Dung et al., 2021; Ghosh and Karmakar, 2022).

Figure 4: Damage to okra leaves by *A. biguttula* showing yellowing and some hopperburn **(A)**, moderate hopperburn with leaf curling **(B)**, and severe hopperburn with completely dead/dry portions of the leaf **(C)**. Photos courtesy of Amy Roda.

Feeding also produces honeydew, which fosters the growth of sooty mold—a fungal layer that impedes photosynthesis and diminishes plant vitality (Kamble and Sathe, 2015; Rajendran et al., 2018).

Yield losses are particularly significant in cotton, okra, and sunflower (Ahmad et al., 1985; Al-Hamdany and Al-Karboli, 2017; Madar and Katti, 2011; Manivannan et al., 2021), though crops like eggplant and grapes can also be affected to a lesser extent (Ghosh and Karmakar, 2021; Lit and Bernardo, 1990; Schreiner, 1990).

Easily Mistaken Species

When surveying for *Amrasca biguttula* in the United States, expect to encounter many species of similar looking leafhoppers. They are often small and green, but most species lack the combination of a black spot on the forewing, two black spots on the head, as well as additional pattern elements. However, dissection of the male genitalia or DNA sequencing is necessary for positive morphological identification.

Here are a few domestic species that are similar in appearance and could be mistaken for *A. biguttula*:

***Empoasca* spp.**

This genus includes multiple small, green leafhoppers that are about $^{1}/_{8}$ inches in length. Nymphs are nearly identical to *A. biguttula* (Fig. 5 A). Adults are similar in size and color to *A. biguttula*; however, *Empoasca* spp. lack the distinct black spots on the anterior margin of the head and forewings (Fig. 5 B). Common species include *E. fabae* (Potato Leafhopper), *E. vitis* (Grape Leafhopper), and *E. kraemeri* (Bean Leafhopper).

Figure 5. *Empoasca fabae* nymph **(A)**, and adult **(B)**. Photo credits: (A) Frank Peairs, Colorado State University, CC BY-NC 3.0 (B) Robert Webster / xpda.com, CC-BY-SA-4.0

***Typhlocyba pomaria* (White Apple Leafhopper)**

This species is light-green and a similar size; however, it is more pale, yellowish white, and lacks the greenish tint and black spots (Fig. 6).

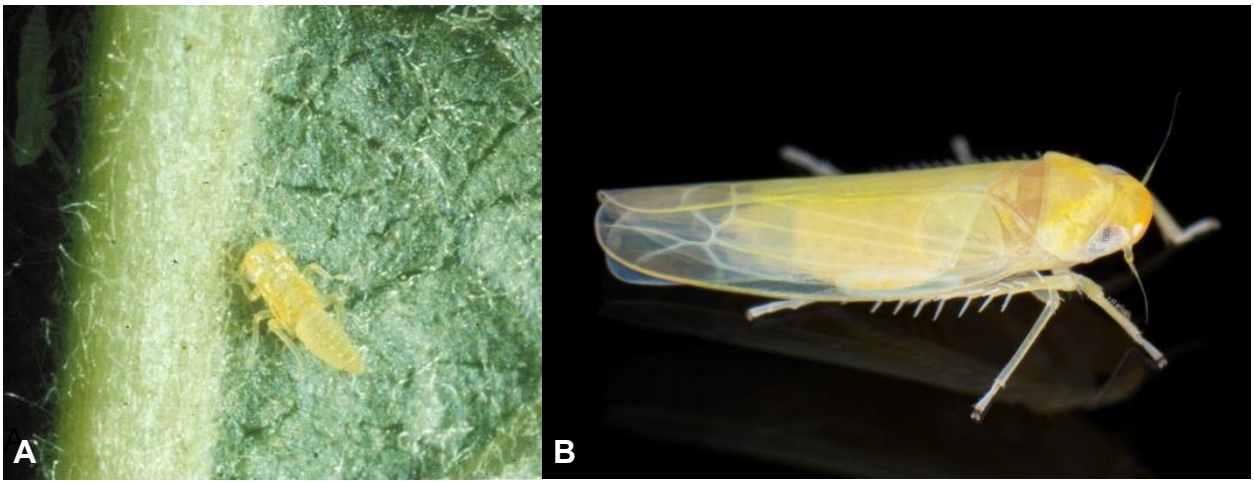

Figure 6. *Typhlocyba pomaria* **(A)** nymph and **(B)** adult. Photo credits: (A) University of Georgia Plant Pathology, University of Georgia, Bugwood.org CC BY-NC 3.0, (B) shared from iNaturalist © solomon v. hendrix, CC BY-NC 4.0

***Kyboasca* spp.**

This is another genus of comparably sized, small, pale green leafhoppers with a similar black spot on each forewing (Fig. 7) but lacking black spots on the anterior margin of the head. It occurs in temperate areas of North America (Cabrera-Asencio et al., 2023; Dmitriev, (2022 onward)). This genus could be transient on *A. biguttula* host plants, but is primarily found on trees (Kittelberger and Howard, 2024).

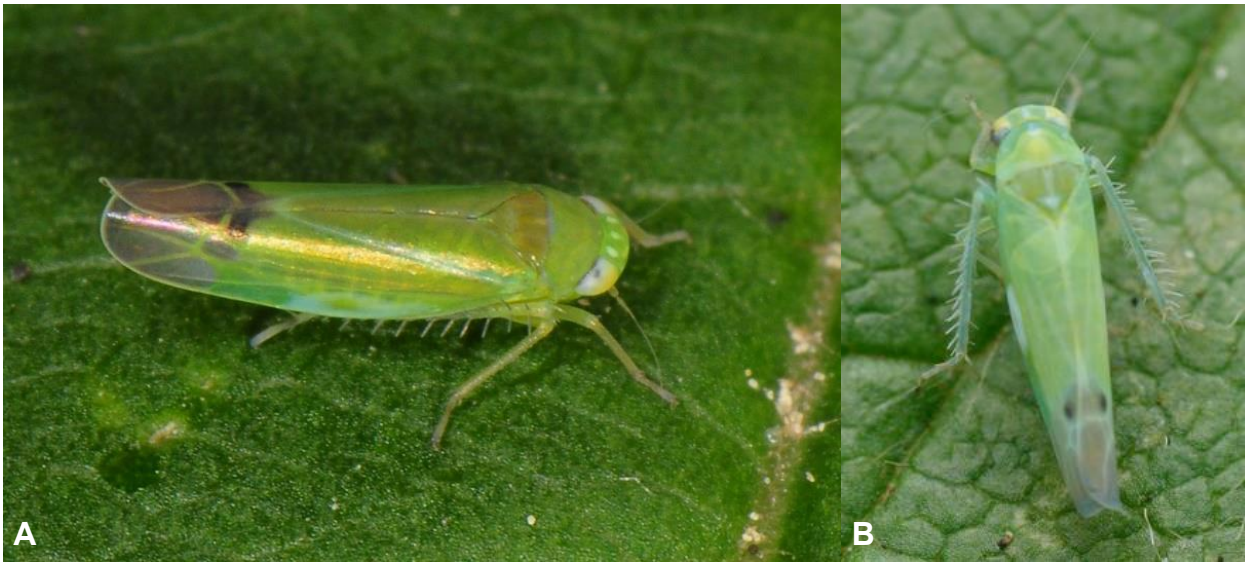

Figure 7. Adults of *Kyboasca* spp. shared from iNaturalist. Note the similar black spots on each forewing. Photo credits: (A) © Jason M Crockwell CC BY-NC-ND 4.0 (B) © Melinda Fawver CC BY-NC 4.0)

***Alconeura* spp.**

This genus of leafhoppers has a similar spot on the forewings (Fig. 8), but the location is slightly different. It does not have black spots on the anterior margin of the head, and the insects often have red or orange coloration in addition to a green body (Cabrera-Asencio et al., 2023). The hosts of this genus are not well described, but there are no reports of *Alconeura* spp. on the hosts of *Amrasca biguttula*. This genus could be transient on *A. biguttula* host plants.

Figure 8. *Alconeura* spp. shared from iNaturalist. Note the similar black spot on each forewing and the orange/yellow coloration. Photo credit: © Rob Van Epps CC BY-NC 4.0.

Due to the similarities between *Amrasca biguttula* and other leafhoppers, morphological examination of male genitalia or molecular characterization is needed to confirm identification (Reddy et al., 2020; Sagarbarria et al., 2020).

Commonly Encountered Non-targets

Because the approved survey methods (visual surveys and trapping with yellow or green sticky traps) are non-specific, they will capture many non-target species, including the easily mistaken species described in the previous section.

There are currently no known lures or traps specific to this species.

Biology and Ecology

Amrasca biguttula (cotton jassid) females lay eggs on the underside of leaves or stems that hatch after approximately one week. Females are reported to lay between 14 and 60 eggs in their lifetime and eggs are typically laid within the veins and midribs of host plant leaves, rendering them nearly invisible without specialized tools (Jayasimha et al., 2012; Mensah, 2006; Schreiner, 2000).

Nymphs and adults live and feed together on the undersides of leaves (Dung et al., 2021; Schreiner, 2000), causing damage by sucking sap from mesophyll cells, resulting in curling, yellowing, and bronzing of leaves, a condition referred to as "hopperburn" (Kamble and Sathe, 2015; Reddy et al., 2020). Cotton jassid behavior on host plants is similar to other leafhoppers, including clustering on the underside of leaves, crawling, jumping, or flying short distances when disturbed, and secreting honeydew (Kamble and Sathe, 2015; Schreiner, 2000).

Reproduction occurs year-round, with overlapping generations, and adults living for about one month (Ghosh and Karmakar, 2022; Mensah, 2006). The lifecycle duration of the cotton jassid varies depending on climate and humidity. In India, generation times range from 15 to 46 days, with up to eleven generations per year (Ghosh and Karmakar, 2022; Mensah, 2006). With a continuous supply of host plants in warmer climates, cotton jassid can breed and remain active year-round (AVRDC, 2003; Saeed et al., 2015). Population densities also fluctuate based on environmental conditions, increasing when temperatures are between 81°F and 93°F and relative humidity is around 70% and decreasing during periods of high rainfall and humidity (Ghosh and Karmakar, 2021; Mohammad et al., 2019). Populations typically peak during the hottest months of the year (Ahmad et al., 1985; Ghosh and Karmakar, 2022; Jayasimha et al., 2012; Mensah, 2006; Saeed et al., 2015; Thirasack, 2001).

Plant species attacked by the cotton jassid may shift throughout the season as the insects migrate to take advantage of available hosts (Ghosh and Karmakar, 2021; Saeed et al., 2015).

Known Hosts

Although the cotton jassid is polyphagous (Saeed et al., 2015), and a wide range of hosts are reported, most research focuses on incidence, damage, and control on cotton, okra, eggplant, and sunflower (Table 1) (Al-Hamdany and Al-Karboli, 2017; Fatima et al., 2021; Kalyan et al., 2017; Kamble and Sathe, 2015; Sahito et al., 2017). Grape is mentioned as a heavily affected susceptible crop in Ghosh and Karmakar (2021), and Kulkarni (2020) notes it as an emerging pest of grapevine in Maharashtra, India. However, we currently consider grapes a minor host due to limited evidence of impacts.

While not preferred targets for survey, Table 2 includes additional confirmed hosts of this species that can be a target for survey based on the needs of the surveyor.

The host lists below include cultivated and wild plants that 1) are infested by the pest under natural conditions, 2) are frequently described as major, primary, or preferred hosts, and 3) have primary evidence for feeding and damage documented in the literature. Plants are highlighted in bold if they are commercially produced and the pest causes economically significant damage.

Table 1. Preferred US hosts of *Amrasca biguttula.*

Scientific Name	Common Name	Type/Use	References/Notes
***Helianthus annuus* Linn.**	Sunflower*	Cultivated	Kamble and Sathe, 2015; Saeed et al., 2015
***Abelmoschus esculentus* L.**	Okra	Cultivated	Saeed et al., 2015
Gossypium arboretum	Cotton	Cultivated	Kamble and Sathe, 2015
***Gossypium hirsutum* L.**	Cotton	Cultivated	Kamble and Sathe, 2015
***Solanum melongena* L.**	Eggplant/brinjal	Cultivated	Saeed et al., 2015

* The majority of U.S. sunflower commercial production occurs in states with unsuitable climate conditions for *Amrasca* establishment

Table 2. Additional hosts of *Amrasca biguttula.*

Scientific Name (Common Name)	References
Abutilon indicum (L.) Sweet (monkeybush)	Saeed et al., 2015
Achyranthes aspera L. (devil's horsewhip)	Saeed et al., 2015
***Cajanus cajan* (L.) Millsp. (pigeon pea)**	Kamble and Sathe, 2015
Carthamus tinctorius L. (safflower)	Javed et al., 2013
Chenopodium murale L. (nettleleaf goosefoot)	Saeed et al., 2015
***Citrullus lanatus* (Thumb) Mansf. (watermelon)**	Saeed et al., 2015
Cordia dichotoma G. Forst (fragrant manjack)	Saeed et al., 2015
Cucumis melo L. var. phut (phut)	Saeed et al., 2015
Cucumis melo L. sativus (muskmelon)	Saeed et al., 2015
***Cucumis sativus* L. (cucumber)**	Saeed et al., 2015
Cyamopsis tetragonoloba L. (guar)	Saeed et al., 2015
Cynodon dactylon (L.) Pers. (Bermuda grass)	Kamble and Sathe, 2015
Datura inoxia Mill. (D. metel L.) (pricklyburr)	Saeed et al., 2015
Durio zibethinus L. (durian)	Dung et al., 2021
Grewia asiatica L. (phalsa)	Saeed et al., 2015
Guizotia abyssinica (L.f.) Cass. (niger)	Darandale et al., 2015
Hibiscus cannabinus L. (mesta)	Raju and Rao, 1985
Hibiscus rosa-sinensis L. (China rose)	Kamble and Sathe, 2015
Hibiscus sabdariffa L. (mesta)	Raju and Rao, 1985
Lagenaria siceraria (Molina) Standl. (L. vulgaris Ser.) (bottle gourd)	Saeed et al., 2015
Luffa aegyptiaca Mill. (sponge gourd)	Saeed et al., 2015
Malva parviflora L. (mallow)	Al-Hamdany and Al-Karboli, 2017
Nicotiana tabacum L. (common tobacco)	Saeed et al., 2015
Pisum sativum L. (peas)	Saeed et al., 2015
Raphanus sativus L. (radish)	Navasero and Calumpang, 2013
Ricinus communis L. (castorbean)	Ishikawa and Takahata, 2019
Sesamum orientale L. (S. indicum L.) (sesame)	Ishikawa and Takahata, 2019
***Solanum inacum* Dunal (nightshade)**	Ishikawa and Takahata, 2019
***Solanum muricatum* Ait. (pepino)**	Ishikawa and Takahata, 2019
***Solanum tuberosum* L. (potato)**	Kumar et al., 2011; Saeed et al., 2015
***Vigna mungo* (L.) Hepper (*Phaseolus mungo* L.) (black gram)**	Saeed et al., 2015
Vigna radiata (L.) R. Wilczek (mung bean)	Navasero and Calumpang, 2013
Vigna unguiculata (L.) Walp. (cowpea)	Kamble and Sathe, 2015
Vigna unguiculata x *V. unguiculata* var. *sesquipedalis* (bush sitao)	Kamble and Sathe, 2015
Vitis vinifera L. (grapevine)	Ghosh and Karmakar, 2021
Xanthium strumarium L. (cocklebur)	Saeed et al., 2015

Pest Importance

Cotton jassid is a major agricultural pest that uses its piercing-sucking mouthparts to extract sap from leaves, causing hopperburn, a condition marked by yellowing, curling, and browning of leaves often followed by defoliation. This damage stunts plant growth and results in the premature drop of buds, flowers, and fruitlets, severely reducing crop yield and quality (Dung et al., 2021; Rajendran et al., 2018). Infestations can lead to yield losses ranging from 40% to 75% in key crops like cotton, okra, eggplant, and sunflower (Ahmad et al., 1985; Bhushan, 2023; Thapa et al., 2019).

The pest is particularly problematic in early growth stages of crops, affecting plants before traditional pest control measures are implemented (Navasero, 2015). In some cases, hopperburn increases the host plant's suitability to other pests, resulting in a complex of pests such as borers, thrips, and whiteflies (Sagarbarria et al., 2020). Beyond direct yield losses, infestations increase production costs as growers must adopt earlier and more frequent control measures, often relying on chemical pesticides (Ghosh and Karmakar, 2021).

Although *A. biguttula* does not typically kill host plants or directly affect natural ecosystems, its polyphagous nature means it feeds on a wide variety of plants, which could include plants federally listed as threatened or endangered. However, there is no evidence of overarching direct impacts on natural environments to date.

Market losses due to *A. biguttula* can be severe. In South Asia, it is a leading cause of reduced production in cotton, okra, and eggplant (Ghosh and Karmakar, 2021; Saeed et al., 2015). In Africa, recent infestations have contributed to a 38% reduction in cotton exports from Senegal and significant financial losses for farmers, prompting government subsidies and loan forgiveness programs (PR-PICA, 2022; Sylla, 2023). Detection of *A. biguttula* is challenging due to inefficient survey methods and resemblance to other leafhopper species, increasing the likelihood of unnoticed establishment and subsequent economic impacts (Navasero, 2015)

Potential trade implications could arise if infestations establish in new regions like the United States, where crops such as cotton, eggplant, and grapes are economically important.

Pathogens or Associated Organisms Vectored

Amrasca biguttula is not confirmed to be a vector of any pathogens.

This species has been associated with phytoplasma species and chickpea chlorotic dwarf virus, but its status as a vector has not been confirmed (Biswas et al., 2018; Nielson, 1968; Reddy et al., 2020; Sharif et al., 2019).

Known Distribution

The cotton jassid is native to Asia and Oceania, where it is widespread in warmer areas, occurring from the Middle East to Australia and the Mariana Islands. However, recent outbreaks of the cotton jassid in Africa (PR-PICA, 2022) and new detections in the Caribbean (Cabrera-Asencio et al., 2023; IPPC, 2024) suggest this pest is spreading rapidly. The cotton jassid may have been present in Africa at non-outbreak levels for some time, with detections in Ghana as early as 1999 (Obeng-Ofori and Sackey, 2003), but the pest appears to have spread recently into new regions across Africa and it was reported for the first time in Northern Cameroon in 2022 (Jacques et al., 2024).

Table 3. Countries where *A. biguttula* is known to occur.

Continent	Country	References/Notes
Africa	Benin	PR-PICA, 2022
Africa	Burkina Faso	PR-PICA, 2022
Africa	Cameroon	Jacques et al., 2024; PR-PICA, 2022
Africa	Chad	PR-PICA, 2022
Africa	Côte d'Ivoire	PR-PICA, 2022
Africa	Ghana	Obeng-Ofori and Sackey, 2003
Africa	Mali	PR-PICA, 2022
Africa	Niger	Franç et al., 2024
Africa	Senegal	PR-PICA, 2022
Africa	Togo	PR-PICA, 2022
Asia	Afghanistan	Xu et al., 2017
Asia	Bangladesh	Xu et al., 2017

Asia	China	Xu et al., 2017
Asia	India	Xu et al., 2017
Asia	Indonesia	Xu et al., 2017
Asia	Iraq	Al-Hamdany and Al-Karboli, 2017
Asia	Japan	Thirasack, 2001
Asia	Laos	Thirasack, 2001
Asia	Pakistan	Xu et al., 2017
Asia	Philippines	Xu et al., 2017
Asia	Sri Lanka	Xu et al., 2017
Asia	Thailand	Xu et al., 2017
Asia	Vietnam	Xu et al., 2017
North America	Barbados	IPPC, 2024
Oceania	Australia (Christmas Island)	Kulkarni, 2020
Oceania	Guam	Schreiner, 1990
Oceania	Northern Mariana Islands	Schreiner, 1990

Status of infestation in the United States (January 2025)

In the Caribbean, the pest was identified in the southern portion of Puerto Rico in 2023 (Cabrera-Asencio et al., 2023) and the U.S. Virgin Islands in 2024 (FAO, 2022; IPPC, 2024). In November 2024, cotton jassid was detected in Florida.

Pathway

The movement of *Amrasca biguttula* into new regions has not been linked to any specific pathway. Recent spread and new introductions of *A. biguttula* indicate there is an unknown open pathway for this pest to move to new areas. Agricultural inspectors have intercepted *A. biguttula* five times from aircraft cargo at ports of entry in the United States (ARM, 2024), suggesting that, while it appears to happen rarely, the cotton jassid is capable of moving into the country through international trade. Adults and nymphs have the potential to travel as hitchhikers on humans, equipment, or other transport mechanisms and eggs laid on plants imported for propagation could introduce the pest to new regions.

Natural spread may also occur, though adults are unlikely to disperse long distances unaided based on the short dispersal distance of similar leafhopper species (Blackmer et al., 2004; Northfield et al., 2009). However, there have been documented cases of leafhoppers being carried on wind currents over extremely long distances (Ghauri, 1982) and there is potential for wind-assisted long distance dispersal from the Caribbean into the continental United States (Andraca-Gómez et al., 2020; Bertone et al., 2008).

Use the PPQ Commodity Import and Export manuals listed below to determine 1) if host plants or material are allowed to enter the United States from countries where the organism is present and 2) what phytosanitary measures (e.g., inspections, phytosanitary certificates, post entry quarantines, mandatory treatments) are in use.

These manuals are updated regularly.

Agricultural Commodity Import Requirements (ACIR) manual: ACIR provides a single source to search for and retrieve entry requirements for imported commodities. https://acir.aphis.usda.gov/s/

Plants for Planting Manual: This manual is a resource for regulating imported plants or plant parts for propagation, including buds, bulbs, corms, cuttings, layers, pollen, scions, seeds, tissue, tubers, and like structures. https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/plants_for_planting.pdf

Treatment Manual: This manual provides information about treatments applied to imported and domestic commodities to limit the movement of agricultural pests into or within the United States. https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf

Potential Distribution within the United States

Based on a comparison of plant hardiness zones (PHZ) (Takeuchi et al., 2018) where this species is known to occur and collection records exist, it could establish in the United States in PHZ 7-14. This area spans the eastern seaboard from Massachusetts to Florida, west through most of Virginia, southern parts of Kentucky, Missouri, Kansas, Colorado, Utah, and Nevada. It also extends across the southern states, along the west coast from the Mexican border to the Canadian border, and to Hawaii and the territories.

Areas in the United States in PHZ 10-12 may be at greater risk for establishment and impacts based on more frequent distribution records in those climates. The distribution of hosts is unlikely to significantly affect the area at risk, as the species is a polyphagous pest that regularly changes host plants based on availability.

Survey and Key Diagnostics

Approved Methods for Pest Surveillance*:
For the current approved methods and guidance for survey and identification, see Approved Methods for Pest Surveillance (AMPS) pest page on the CAPS Resource and Collaboration website, at https://approvedmethods.ceris.purdue.edu/.

Survey Method images

See below for images of the recommended visual survey/manual collection methods. The full description of survey design guidance and sample collection instructions are found at the approved methods site, at https://approvedmethods.ceris.purdue.edu/.

Figure 9. Bagging host leaves to collect specimens. **(A)** Inverting the bag over the leaf and **(B)** collecting the entire leaf to capture all insects found. Photos courtesy of Daphne Zapsas (A) and Amy Roda (B).

Figure 10. Beat sampling by tapping host plant leaves over a tray filled with alcohol. Photo courtesy of Daphne Zapsas.

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Versions

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Reviewers

Nichole Carrier, National Operations Manager, USDA-APHIS-PPQ-FO
Todd Gilligan, Director, USDA-APHIS-PPQ-S&T, PITL
Stephen Lavallee, National Policy Manager, USDA-APHIS-PPQ-EDP, PER
Eric Rohrig, National Science Program Coordinator, USDA-APHIS-PPQ-S&T, DESS
Amy Roda, Supervisory Entomologist, USDA-APHIS-PPQ-S&T, TIML