

Twolined Spittlebug Identification Key

At a Glance

The Twolined Spittlebug, *Prosapia bicincta*, was first detected in Hawai'i in 2016. This species' rapid rise as a pest of grave concern in forage grass pastures of the Big Island has prompted a series of investigations into its biology, distribution, and management.

The following is a summary and key to its identification, in particular the characters that distinguish it from two other spittlebug species that can co-occur.



Adult Twolined Spittlebug photographed in Hawai'i
(Picture credit: S. Wilson)

Background

No species of spittlebugs (superfamily Cercopoidea) are native to Hawai'i. Nevertheless, three invasive species, from three distinct families, are now firmly established.

From the family Cercopidae, the **Twolined Spittlebug** (*Prosapia bicincta*) is the only one of the three with economic impact to Hawaiian agriculture currently. It is established only on the island of Hawai'i, where its expanding range encompassed a little over 178,000 acres by the end of 2021 (Figure 1). Feeding damage caused by this species leads to severe decline in the health and persistence of improved forage grass pastures, in particular kikuyugrass (*Pennisetum clandestinum*).

From the family Aphrophoridae, the **Meadow Spittlebug** (*Philaenus spumarius*) is a highly polyphagous species that feeds on a wide range of host plants, including many of economic importance, such as forage crops, strawberries, and perennial herbs in the northern hemisphere (Yurtsever 2000). Its first report in Hawai'i was in 1946 from the Volcanoes National Park in Kilauea, Hawai'i Island (Davis & Mitchell 1946). The authors listed 58 different host plants where spittle masses were detected. In no case was there observable injury.

From the family Clastopteridae, the **Sunflower Spittlebug** (*Clastoptera xanthocephala*) was first collected on O'ahu in 1997 (Evenhuis et al 2018). In 2002, it was detected on the west slope shrubland and alpine ecosystems of

Haleakala National Park, Maui (Krushelnycky et al., 2007). In its native range across the eastern U.S., this species feeds on a variety of hosts, including chrysanthemum, ragweed, sunflower, plus vineyards and many shrubs and trees (Overall & Rebek 2017).

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Subject Categories: Insect Pests, IP-52
Pasture Range Management, PRM-15

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Acreage of Infected Area

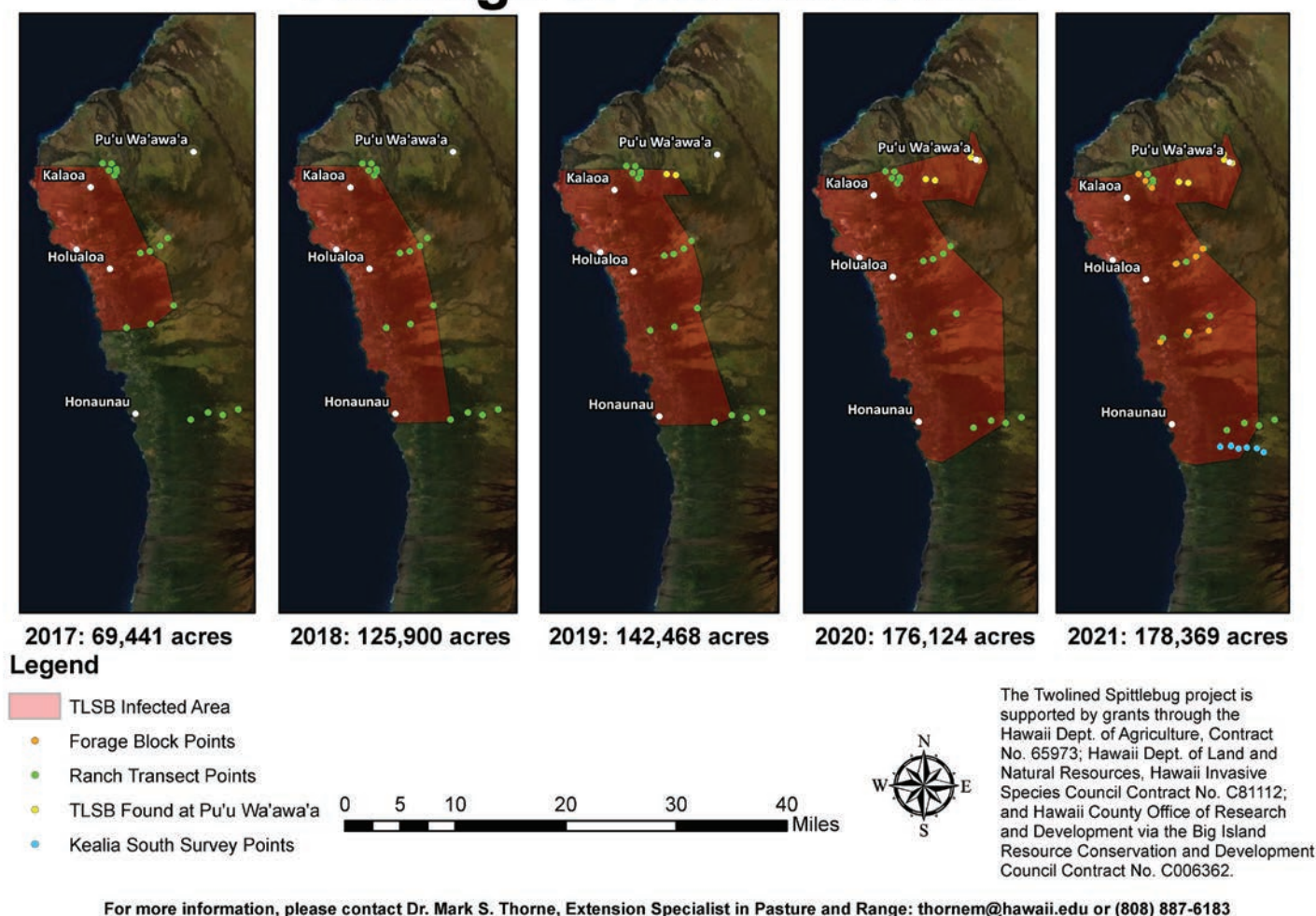


Figure 1. Twolined Spittlebug expanding range across years between 2017 and 2021 determined through field surveys.

Economic Impact

After many years of being present in Hawai'i, as far as we are aware, neither the meadow spittlebug nor the sunflower spittlebug has been indicted in any economic or environmental threats to Hawaiian agriculture or native plants. Conversely, in the short time the twolined spittlebug has been present in the state, the pest has rapidly expanded its range, causing widespread damage to several grasses important to the livestock industry and to the sustainability of the various ecosystem services that rangelands provide. Consequently, the twolined spittlebug poses an economic threat to Hawai'i's livestock industry and tangentially, to the state's food security.

Given this invasive pest's contribution to the degradation of working and natural landscapes that provide valuable economic and ecological services to our communities, it is imperative that populations be detected early and

targeted for control before feeding damage causes long-term degradation of the grass community. Guidelines for monitoring and management of the pest can be obtained through your local CTAHR Cooperative Extension office.

Early detection and intervention depend on the differentiation of the twolined spittlebug from the two other spittle-producing species in Hawai'i. Proper identification improves our ability to track range expansion, to identify incipient populations that might be targeted for eradication, and to ensure that IPM protocols are appropriately applied. Misidentification can lead to costly mistakes.

Identification

The aim of the following key is to allow individuals to confirm the presence of twolined spittlebugs by distinguishing them from the two other spittle-producing

species in Hawai'i. All three species of spittlebugs are sap-sucking insects that feed on fluids in the xylem tissue of plants. All three form spittle masses on their host plants in the form of a frothy mass of white bubbles prepared as a defense from predators and environmental extremes. And all three exhibit three life stages: egg, nymph, and adult. Nymphs live and mature in the spittle mass, passing through 5 developmental stages (instars) before molting into adults. Adults of all three species (called froghoppers) are agile and readily hop and fly to escape threats and disperse.

The following key on the next page emphasizes the characteristics that are distinct across the three species. The twolined spittlebug can be differentiated from the meadow spittlebug and sunflower spittlebug based on size and coloration of the adult, host of the nymph, location of the spittle mass, and association with outbreak populations that cause pasture damage.

Individuals identifying twolined spittlebug are encouraged to photograph and report the location of their sighting to their local Extension agent, the Kamuela Extension Office (808-887-6183), or at 643pest.org.

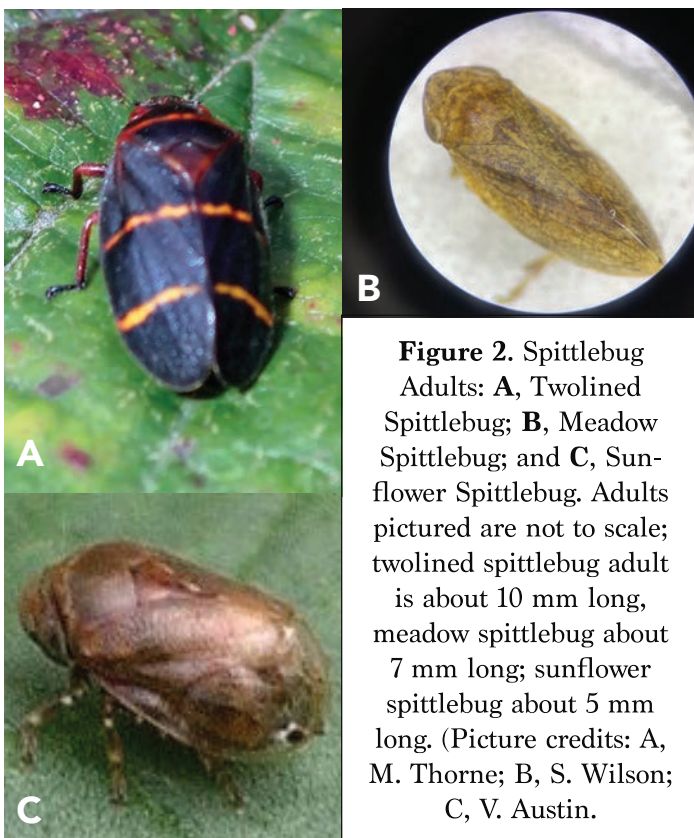


Figure 2. Spittlebug Adults: **A**, Twolined Spittlebug; **B**, Meadow Spittlebug; and **C**, Sunflower Spittlebug. Adults pictured are not to scale; twolined spittlebug adult is about 10 mm long, meadow spittlebug about 7 mm long; sunflower spittlebug about 5 mm long. (Picture credits: A, M. Thorne; B, S. Wilson; C, V. Austin.)

Key to Species

1. If your specimen is:
 - a. An adult, as in Figure 2, go to – 2
 - b. A nymph, as in Figure 3, go to – 3
 - c. A spittle mass, as in Figure 4, go to – 4
2. Which picture in Figure 2 (A, B or C) looks like your adult?
 - a. Fig. 2A: Mostly black with red marking on underside, backside, and legs, notably with two orange/red lateral stripes across the back; about 9-11 mm long
 - i. Twolined Spittlebug
 - b. Figure 2B: Various shades and color patterns of gray to brown; no red coloration or markings; about 6-8 mm long
 - i. Meadow Spittlebug
 - c. Figure 2C: Mostly brown with indistinct markings; oval shaped; about 4-5 mm long
 - i. Sunflower Spittlebug
3. Which picture in Figure 3 (A, B or C) looks like your nymph?
 - a. Figure 3A
 - i. Twolined Spittlebug
 - b. Figure 3B
 - i. Meadow Spittlebug
 - c. Figure 3C
 - i. Sunflower Spittlebug
4. Where is the spittle mass located (refer to Figure 4)?
 - a. On a grass or sedge plant: on the root, crown, lower stem; in the thatch, on or near the ground (< 3 inches above the ground; rarely > 3 inches above the ground)
 - i. Likely the Twolined Spittlebug; extract the nymph from the spittle mass and return to 3 (Figure 3) to confirm identification.
 - b. On a forb or shrub usually >4 inches above the ground surface, often high into the canopy near growing tips (Figure 4B, Figure 4C)
 - i. Likely the Meadow Spittlebug or Sunflower Spittlebug; extract the nymph from the spittle mass and return to 3 to confirm identification.

Figure 3. Spittlebug nymphs: **A**, Twolined spittlebug nymphs (backside down) showing all five instars (earliest to latest, left to right) and distinct orange/red coloration on sides of abdomen (Batelli glands) (left) and a single nymph showing brown head capsule, red eyes and cream-colored body (right); **B**, Meadow Spittlebug nymph showing typical green coloration; **C**, Sunflower spittlebug nymph. Pictures are not to scale; at the same developmental stage (instar) twolined spittlebug is larger than meadow spittlebug which is larger than sunflower spittlebug. (Picture credits: A and C, S. Wilson; B, left, J. Boggs; right, Public Domain).

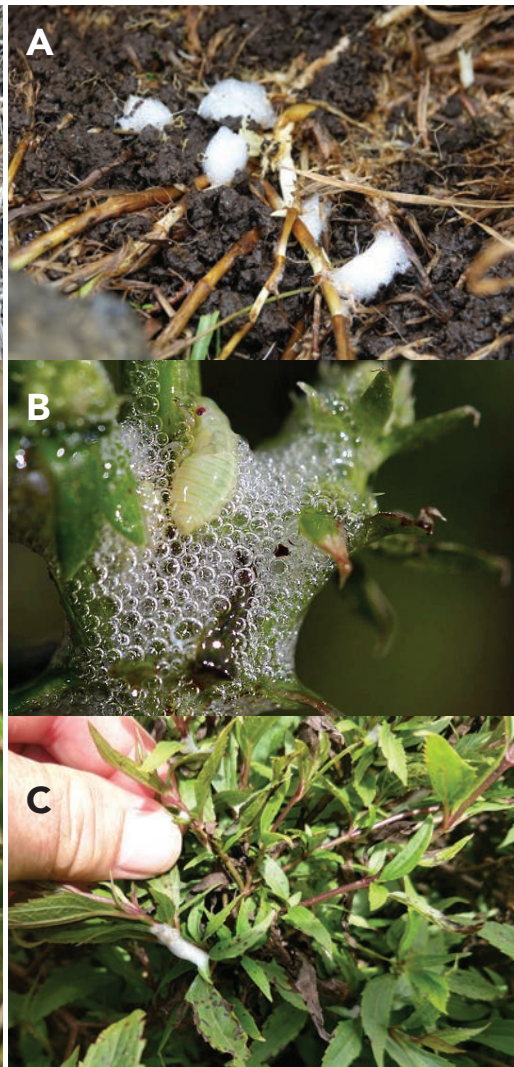
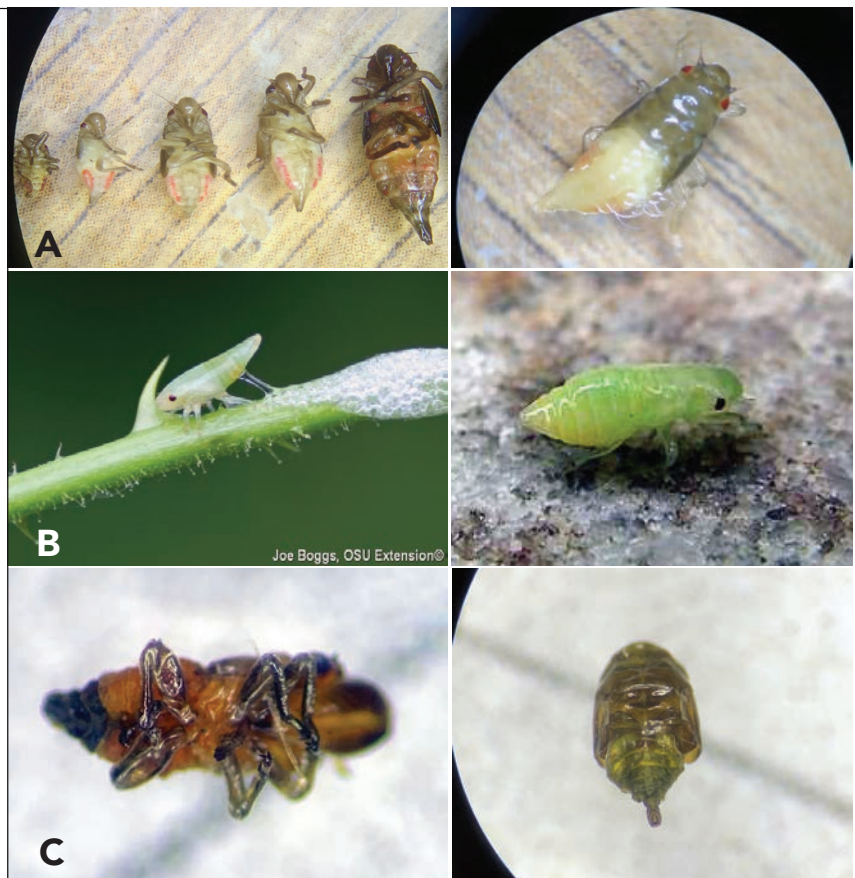


Figure 3. Spittle masses: **A**, Twolined spittlebug spittle masses on grass tillers (left) and on grass roots at the soil surface (right); **B**, Meadow spittlebug spittle masses on the aerial portion of plants (left and right), nymph is visible in right image; and **C**, Sunflower spittlebug spittle masses located on the aerial portions of Pamakani (left and right), nymph is visible in left image. (Photo credits: A, M. Thorne; B, left J. Boggs, right T. DiTerlizzi; C, left, S. Wilson, right M. Thorne).



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