

Semi-annual Project Report

Prosapia bicincta (Two-lined Spittlebug) Detection and Control in Hawaii
Contract No. 68126

For the Period of
October 1, 2019 – March 31, 2020

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Progress Report

This report covers the period from October 1, 2019 through March 31, 2020. The objectives of the work under this contract are to 1) provide rancher outreach and education; 2) conduct surveys to detect and monitor TLSB populations; 3) develop Integrated Pest Management (IPM) protocols (Pesticides, Grazing management, Forage replacement); 4) conduct biological control agent exploration; and 5) research the biology and ecology of Two-lined spittlebug (TLSB). The work and deliverables of each of these objectives are discussed in the following sections. The attached appendix includes pictures of TLSB damaged pastures and example data output from the project.

Two-lined spittlebug was first detected in Kailua-Kona, on the Big Island of Hawaii in September of 2016 where it had caused damage to nearly 2,000 acres of pastureland. Monthly pasture surveys that began in November of 2017 have revealed that the pest has rapidly expanded its range and as of October of 2019 infests over 222 sq. miles or about 142,468 acres (Figure 1). In highly infested areas, the TLSB has resulted in nearly 100% die back of key pasture grasses including Kikuyu (*Pennisetum clandestinum*) and pangola (*Digitaria eriantha*) grasses. The loss of these important livestock forages provides entry for the establishment of many undesirable, and often invasive plants including Pamakani (*Eupatorium adenophorum*), wild blackberry (*Rubus* spp.), fireweed (*Senecio madagascariensis*), Hilo grass (*Paspalum conjugatum*), several other minor grasses of low forage quality, and other weeds. The weeds tend to replace the dead grasses permanently, reducing the quality and usability of the pasture for livestock production. The rate of spread of this pest combined with its devastating impacts on Hawaii's rangelands threatens the economic sustainability of the Hawaii livestock industry.

Personnel

The current contract provided support for two TLSB research technicians, two graduate students and a partial support for a third Range Research Technician. The Range Research Technician position was filled in November 2019. At the time the contract began in October we had one TLSB Technician on the project. However, that technician resigned in December. Recruitment to hire two new TLSB technicians was initiated in December 2019. One technician position was filled in January and the other in March of 2020. A second graduate student was brought onto the project in January 2020.

Outreach and Education

Outreach and education activities since the beginning of the reporting period include:

- October 25, 2019 – Hawaii Island Landscape Association Annual Landscape Management Conference – TLSB information booth/display
- November 15-16, 2019 – Hawaii Cattlemen's Council Annual Meeting – TLSB information booth and display
- TLSB 2019 Report to the Industry (November 2019) – report on TLSB project to the Hawaii cattle industry
- December 5, 2019 - Outreach and training on TLSB to West Hawaii Master Gardner's Program, Kona Extension Office

- January 14, 2020 – Hawaii Cattlemen’s Council’s Day at the Legislature – provided a presentation and information on TLSB in Hawaii to attending legislators; consulted with HCC on TLSB legislation
- February 19, 2020 – presented paper to Society for Range Management Annual Meeting in Denver Colorado entitled “Changes in Vegetative Community Composition Following Two-Lined Spittlebug (*Prosapia bicincta*) Infestations in Hawaii Rangelands.”
- Hawaii Cattlemen’s Council TLSB committee – ongoing participation and consultation to committee formed in response to threat TLSB poses to the livestock industry. Committee is concerned with reporting information to HCC membership and development of legislative measures to support industry.

Field Surveys – Detection and Surveillance

Monthly field surveys of established transects continue. Two-line spittlebug activity between October and March was low as the pest was largely in diapause. Nevertheless, a small number of nymphs and a few adults were observed on several of the transects. The pest typically breaks diapause in April with increased activity through May and June. Adult populations peak, typically, in late June and late August, or early September. Monthly reports on the survey data from each location are available.

Integrated Pest Management Protocols

We continue to work on developing and refining IPM protocols for TLSB for ranchers and homeowners. These will be compiled and published via extension publications and other media later this year. An identification guide for the spittle bug species present in Hawaii is being prepared.

Biological Control Agent Exploration

We are working, locally, on potential biological control agents. Though we have not made any new progress on the indigenous insect-pathogenic nematode, it remains an interesting line of research. A pathogenic fungus was observed to cause mortality of adult *P. bicincta*, and samples were collected for submission to the USDA insect pathogen lab in Ithaca, NY. We are also planning trials on BotaniGuard as potential control agent for adult TLSB. Exploration of potential biological agents in the home range of TLSB have been put on hold because of the COVID-19 crisis.

Two-Line Spittlebug Biology and Ecology

In addition to the data collected during the monthly surveys that reveal important aspects of the biology and ecology of TLSB, several controlled experiments are underway. These include host-plant specificity trials and adult density threshold (economic injury level) trials. Results from these trials should be available in the fall of this year.

Future Plans:

Surveys of established transects on the four ranch properties will continue monthly to monitor TLSB activity, establish biology and ecology of TLSB in Hawaii, collect samples of nymphs and adults for study, and propagation for greenhouse trials on grass selections and pesticides, and inform the development of integrated pest management strategies.

In addition to the monthly monitoring of the established transects, every two weeks on a select ranch, collection surveys will be conducted to gain insight into the population dynamics of the TLSB across seasons along an elevational gradient. Additional surveys of affected ranchlands within the Kona area will be conducted over the summer on several ranches to quantify the extent and range of damages by TLSB.

We are planning to present a TLSB training webinar series to begin later this summer that will bring together the expertise of several people and the TLSB team to engage and inform Hawaii Livestock Producers on our current knowledge and management protocols for TLSB.

At least two extension publications will be drafted for publication starting this summer; one will focus on correctly identifying TLSB in the field and the other will provide management protocols for ranchers.

We have developed a wire diagram for a TLSB mobile application that will 1) allow users to take report, picture, and geolocate TLSB activity; 2) provide for field identification and estimate level of infestation of TLSB; 3) provide a decision support tool for management decisions based on infestation thresholds; and 4) provide general information on the biology and ecology of TLSB. While the wire diagram and concept notes for the app are complete, finding the right avenue for the development and programming of the app has been more challenging. We are in the process of collecting bids from commercial app development firms to gauge costs and make further determinations on direction we need to take to develop the app.