

PARASITES OF THE COTTON FLEAHOPPER, *PSEUDATOMOCELIS SERIATUS*: SEARCHING IN MEXICO

Allen E. Knutson, Julio S. Bernal and Alejandro Gonzalez-Hernandez

Entomology Department, Texas A&M University

College Station, TX

Autonomous University of Nuevo Leon

Monterrey, Mexico

Abstract

This project seeks to identify new insect parasites of the cotton fleahopper for importation into Texas. The long-range goal is to establish populations of new natural enemies which will suppress populations of CFH in its wild hosts and reduce the number of fleahoppers which move from these wild hosts and infest cotton during square initiation. Cotton fleahopper eggs, nymphs and adults were collected from wild hosts in northern Mexico and held for emergence of parasites during 2000 and 2001. Several species of parasitic wasps were recovered from cotton fleahopper collected from species of *Croton* and *Tidestromia lanuginosa*.

Introduction

The cotton fleahopper (CFH), *Pseudatomocelis seriatus*, is one of the most important insect pests of cotton in Texas and adjacent states. Its importance among cotton pests is increasing as losses due to boll weevil and bollworm/budworm decline due to boll weevil eradication and the adoption of Bt cottons, respectively. Currently, growers rely solely on insecticides to manage CFH. However, economic thresholds are not well defined and the persistent migration of adults into the field often requires multiple insecticide applications which increase production costs. These early season insecticide applications can also disrupt natural enemies, leading to an increase in aphids and other cotton pests. Biological control through importation of natural enemies may enhance an integrated pest management program for CFH but this approach has not been investigated.

Two species of very tiny wasps are known to parasitize the eggs of cotton fleahopper in Texas and adjacent states. One species, *Erythmelus psallidis*, is commonly found parasitizing CFH eggs on woolley croton, *Croton capitatus*, evening primrose, *Oenothera speciosa*, and horsemint, *Monarda punctata*. The second species, *Anaphes iole*, is known to parasitize CFH only on horsemint. These two species are reported to parasitize 25-30 % of the CFH eggs on these wild hosts in Texas (Ewing and Crawford 1939). However, there is no evidence that these parasites have a regulating effect on cotton fleahopper populations in Texas (Rajakulendran, 1986).

There are no known parasites of the immature or adult stages of the CFH in the US. In contrast, *Lygus* bugs nymphs and adults are commonly attacked by *Leiophron pallipes* (Braconidae) in Mississippi (Scales 1973). Following the establishment of the parasite *Peristenus digoneutis* (Braconidae), introduced from Europe, numbers of *Lygus lineolaris* in alfalfa declined by 75% in New Jersey and New York (Day 1996). This successful introduction against *Lygus*, a related plant bug, and the absence of parasites attacking CFH nymphs and adults in the US suggests the discovery and establishment of such parasites could provide additional biological control of the CFH.

This project seeks to identify new insect parasites of the CFH for importation into Texas. The long-range goal is to establish natural populations of new natural enemies which will suppress populations of CFH in its wild hosts and reduce the number of fleahoppers which move from these wild hosts and infest cotton during fruit set.

Materials and Methods

Cotton fleahopper has been reported from Canada, the U.S., Mexico, the Dominican Republic, Honduras, Jamaica, the Netherlands Antilles and Venezuela. It has been collected in most regions of Mexico, from the Yucatan Peninsula to Chiapas north to Baja California and Chihuahua. Cotton fleahopper is believed to be indigenous to an area extending from central Mexico to the southern US. There are no published records known to us documenting insect parasites of the cotton fleahopper in Mexico.

An initial trip from Monterrey to Tampico in 2000 identified about 30 sites where weedy plants were found hosting CFH nymphs and adults. Following this trip, six of these sites were sampled monthly for CFH during 2001 and 2002. Additional collections were made at three sites from Reynosa to Monterrey and at eight sites from Monterrey to Torreon in October, 2001. Collection sites were in non-agricultural areas, including roadsides, pastures, old fields and along rail lines, except for the agricultural region around Torreon where one host plant, *Tidestromia*, was found growing in fallow fields.

Cotton fleahoppers nymphs and adults were most commonly collected on species of *Tidestromia* and *Croton* along the routes described above. *Tidestromia lanuginosa* (Amaranthaceae) is a summer annual, often germinating after spring rains. It was found in the Torreon area growing in cultivated and abandoned fields and along roadsides and rail lines north of Monterrey and near Victoria. The Spanish name for this plant is “espanta vaqueros.” Several species of *Croton*, including *Croton humilis*, *C. leucophyllus*, *C. argyranthemus* (Euphorbiaceae), hosted large numbers of CHF adults and nymphs. *Croton* species were most common along roadsides and rail lines from Victoria to Tampico but were not found along the route from Saltillo to Torreon in October. Cotton fleahopper were also collected on *Solanum elaeagnifolium* (Solanaceae) and *Melochia tomentosa* (Sterculiaceae) but in low numbers.

All life stages of the cotton fleahopper, eggs, nymphs and adults, were collected from wild hosts. Cotton fleahopper nymphs and adults were collected with sweep nets. Sweep net contents were placed inside a clear box and fleahoppers were separated from other insects and spiders with an aspirator. CFH were placed in cardboard containers with a piece of host plant material and held in a cooler until they were returned to the laboratory. A subsample of CFH adults and nymphs from the sweep net sample was placed in alcohol and labeled for later dissection. Plant terminals, ca. 2-3 inches long and presumably containing fleahopper eggs, were also collected from weedy hosts and placed in labeled cardboard containers and held in a cooler.

All collections were returned to the Entomology Laboratory at the University of Nuevo Leon in Monterrey within 1-2 days of collection from the field. Adults and nymphs were placed in small cages to allow internal parasites to develop. Green beans served as a source of food and moisture for CFH. Parasite larvae emerging from CFH dropped through the screen bottom and pupated in the sand in the cage bottom. Parasite cocoons collected from the cage bottoms were held for emergence of the adult parasites which were then identified. Cotton fleahopper nymphs and adults were also dissected with an aide of a microscope to recover parasite larvae and estimate percent parasitism.

Cotton fleahopper eggs are inserted into the plant stem. Only the “cap” of the egg is exposed at the surface of the stem. Terminal sections, about 2-3 inches long, of stems from host plants were placed in glass vials plugged with cotton and held for emergence of parasites from CFH eggs assumed to be present in the stems. Vials with terminals were held in the laboratory for two or more weeks and then examined to recover adult parasites emerging from the eggs.

Results

Egg parasites in the family Mymaridae were collected from stems of *Tidestromia* and *Croton* spp. at several collection sites in northern Mexico. All identified to date are in the genus *Erythmelus* and *Gonatocerus*. *Erythmelus psallidis* is commonly found parasitizing CFH eggs on woolley croton, *Croton capitatus*, evening primrose, *Oenothera speciosa*, and horsement, *Monarda* spp. in Texas. *Gonatocerus* spp. has not previously been reported as an egg parasite of the CFH, and additional studies are necessary to confirm this host association. Trichogrammatidae were also commonly recovered but their host association with CFH must also be confirmed by additional studies.

The only parasite recovered to-date from CHF nymphs and adults is provisionally identified as *Leiophron* spp. (Braconidae) and was associated with CFH collected from *Croton* in northern Mexico. *Leiophron pallipes* is a common parasites of adults and nymphs of the tarnished plant bug, *Lygus lineolaris*, in Mississippi and Arkansas. If future studies confirm that *Leiophron* parasitizes cotton fleahopper, it will be the first record of a parasite attacking the nymph and adult stages of this pest. Dissection of the preserved CFH nymphs and adults is underway and once completed, will estimate the percent of CFH parasitized by this and possibly other unidentified parasite species.

References

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