Final report 2020:

Title of project: Determining biocontrol options for peanut pests: a molecular approach

Principal investigator(s)

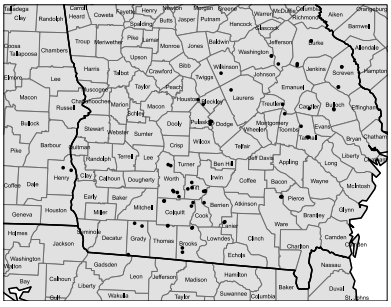
Jason M Schmidt, PhD
Associate Professor | Biocontrol lab
Department of Entomology
University of Georgia
2360 Rainwater Rd, Tifton, GA 31793
Ph: (229) 386-3374 |Email: jschmid2@uga.edu
https://blog.caes.uga.edu/schmidtlab/

Mark Abney, PhD
Associate Professor
Department of Entomology
University of Georgia
2360 Rainwater Rd, Tifton, GA 31793
Email: mrabney@uga.edu

Summary

Current control methods for the peanut burrower bug, *Pangaeus bilineatus* (Say), primarily based on insecticides have been unsuccessful. In addition, the over use of insecticides in attempts to control this pest or others can cause serious problems with other pests. In our first year of this project (2019) we designed a marathon field project across 21 GA counties where we visited 34 commercial peanut fields and 16 cotton fields for a total of 270 samples of insect communities. We successfully designed a molecular system to test for burrower bug predation and found low levels of predation from the dominant natural enemy groups. However, what we did find, and that is consistent with our 2020 sampling of 21 counties and 60 field sites, was a very healthy community of parasitoid wasps. These were in high numbers in the peanut fields. We are encouraged by this finding, and have begun preparing samples for the next phase of processing, finalizing the screening of all predators to determine their biocontrol functions in peanut and using DNA sequencing to understand the types of parasitoids present in these peanut landscapes. We thank the peanut commission for the opportunity to partner on research on biodiversity in peanut systems and biological control. Although we won't submit a formal proposal in 2021, if there are funds remaining, we would enjoy the opportunity for continued partnership. In 2021, we will wrap up the remainder of our processing, publish 1 scientific paper, and outline an extension bulletin for peanut growers from the published scientific results.

Progress on objectives for 2020:



Sampling peanut fields across the GA landscapes: Even given the pandemic, we mobilized a socially distanced team using separate vehicles for each person helping with sampling the fields. We followed distance requirements, masking and handwashing. We sampled 60 locations across 21 counties split between 30 irrigated and 30 dryland, and 33 peanut and 27 cotton. We collected a total of 285 insect community samples for 2020. For both years of this project we have currently sorted from the samples 100%, and have conducted the molecular screening on 75% of the 2019 samples, and have sorted 100% of the 2020 samples and identified 50% of the samples. We haven't conducted any molecular analysis of the samples. We've had pretty restricted conditions on the laboratory, and we had some issues with our equipment. All predators and parasitoids are now sorted and ready for molecular work.

Results on insect communities in GA peanuts:

To date, we have identified over 40,000 arthropods for the year 2020 of this project. Of this, we found 30,000 to be herbivores. The top abundant groups observed were: Thrips, mites, leafhoppers, plant hoppers, plant bugs, and caterpillars. The caterpillars need further identification. For natural enemies, we had a total of 10,000 identified, the top three most abundant were parasitoid wasps (3,414), spiders (2,257) and Orius, minute pirate bug (1,580). The parasitoid numbers are most exciting. These are very sensitive natural enemies, so it's good when we see them in higher numbers. These are still being sorted further, and all the predators will be screened for recent feeding on a host of pests: burrower bug, thrips, aphids, whiteflies, caterpillars, and some other types of arthropods that may be supporting the populations of these biocontrol agents. We are currently preparing the parasitoids for DNA sequencing. These are very difficult to identify, so we will keep representatives for future reference and send DNA material to identify the parasitoids and determine their functions in peanut production. Also, the USDA cropland data layer for 2020 land-use was just released. We downloaded the GA map and have begun extracting data for our analysis to relate pests, natural enemies, and services provided by natural enemies to landscape land-use indices.