MYCOPATHOGENS AND THEIR EXOTOXINS INFECTING GLASSY-WINGED SHARPSHOOTER: SURVEY, EVALUATION, AND STORAGE

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Reporting Period: The results reported here are from work conducted in 2002.

INTRODUCTION

Excluding the observations reported by Turner and Pollard (1959), we know of no studies that have examined the entomopathogens associated with GWSS populations. In general, the lack of pathogens (viral, bacterial, or protozoa) in leafhopper populations may be related to their piercing-sucking feeding behavior. In most cases, these pathogen groups are transmitted orally and would likely need to inhabit the xylem tissue to infect leafhoppers. Pathogens that are transmitted *per os* are typically affiliated with insects with chewing mouthparts. Thus, entomopathogenic fungi, which do not need to be ingested in order to infect insects, are considered to contain the primary pathogens of sucking insects.

Based on a preliminary survey of GWSS (Boucias and Mizell, unpublished 2001) and 20 years of field experience, we expect that the proposed multi-seasonal collections will yield an array of novel mycopathogens that are active against GWSS. This study, will provide a source of mycopathogens with potential for GWSS biological control along with a GWSS microbe collection that will be screened for novel metabolites (exotoxins). In collaboration with an industrial partner, broth filtrates will be screened against an array of eukaryotes and prokaryotes. Of particular interest are the *Hirsutella* spp. isolates affiliated with this insect (Boucias and Mizell, unpublished 2001).

OBJECTIVES

This research will investigate the disease complex associated with glassy-winged sharpshooters in the Southeastern United States. Specific objectives include to:

1. Identify and archive all the major pathogens affiliated with GWSS populations.
2. Estimate the distribution, frequency and seasonality of the major diseases of GWSS.
3. Screen the pathogens for exotoxins with potential toxicity to GWSS and other arthropods.
4. Confirm infectivity of the isolates and the exotoxins and determine which if any pathogens may serve as microbial controls of GWSS and other leafhopper vectors.

RESULTS AND CONCLUSIONS

We have not received final approval of the contract for this grant and cannot proceed full speed until we do. However, we have completed surveys of entompathogens in field populations of GWSS in north and central Florida with some success. During summer 2002, populations of *Homalodisca coagulata* were sampled at sites in Gainesville and Quincy, Florida, and Cairo, Georgia. Insects were collected and held in sleeve cages on crape myrtle for 2-4 weeks for the detection of pathogens. Sharpshooter cadavers were collected and incubated in a warm, moist environment and observed for fungal and bacterial growth. Populations in Gainesville were observed in low densities on red crape myrtle. There was no indication of fungal infection in these insect populations. Sharpshooter populations in Quincy, Florida were observed in much higher densities on citrus, crape myrtle, and holly, among other hosts plants. Sharpshooters collected in late June experienced a rapid die-off but displayed no signs of fungal infection. The die-off seemed instead to be associated with a bacterial infection, the nature of which has yet to be determined. Cultures of bacteria and fungus associated with the cadavers from this collection are awaiting further identification. In southern Georgia, sharpshooters were sampled on hollies at two different nursery sites. One site yielded a great many mycosed cadavers, whereas the other site yielded only healthy insects. Mycosed cadavers collected from hollies at the infected site were incorporated into a preliminary transmission study. In this experiment, mycosed cadavers were placed on crape myrtle with the live sharpshooters collected from both infected and uninfected areas. Horizontal transmission did not appear to occur within the two week exposure period. Only samples taken from the infected area showed signs of fungal infection. Cultures of the fungi associated with these specimens were examined under SEM and

were identified as a *Hirsutella spp*. Currently selected ribosomal genes are being sequenced to confirm identification of this fastidious fungus.

Some initial work has been done on the composition and function of brochosomes, a unique excretion of GWSS that is used to cover the integument and eggs. Brochosomes may play a role in preventing infection, and are therefore of interest as to how they may interact with fungi or bacteria. Also of interest is the presence of internal parasites in a closely-related sharpshooter, *Ocometopia* spp. Strepsipterans were observed in ca. 20% of *Oncometopia* spp. adults collected in north Florida and south Georgia. No data have shown that the strepsipterans found in the *Oncometopia* spp. can infect *H. coagulata* as well, but more study is needed.

REFERENCES

Turner, W.F. and H.N. Pollard 1959. Life histories and behavior of five insect vectors of phony peach disease. USDA Technical Bulletin 1188.

FUNDING AGENCIES

Funding for this project was provided by the University of California Pierce's Disease Grant Program.