

2017 AFRP Research Project Objectives

Developing an Attractant for *Lygus hesperus* Derived from Host Plant Volatile Compounds University of Notre Dame - Syed

Project Award: \$250,000

Objectives:

- The overall objective of this project is to develop attractants for the alfalfa stink bug, *L. hesperus* that represents a major pest in alfalfa seed production field. We propose to isolate and identify biologically important volatile organic compounds (VOCs) from their wild non-alfalfa hosts, and the wild and cultivated alfalfa cultivars. We will field collect *Lygus*, and plants, raise them in the greenhouse and test their relative attraction - for whole plants and their headspace extracts - to adult male and female *L. hesperus* in a choice assay. Attraction will be quantified of all the extracts, and up to 5 extracts demonstrating maximum attractancy will be subjected to isolation and identification of biologically active constituents by using Gas-chromatography linked antennographic detection (GC-EAD) method wherein *L. hesperus* antennae will be used as biological sensors. Active constituents will be identified on a GC-MS and further confirmed by measuring the responses elicited by the synthetic standards from bug antennae. Finally, the constituents will be formulated into mixtures approximating their natural release rates and tested back in the 4-arm olfactometer for their induced responses. Since our process uses *L. hesperus* antennae as the biological sensing element, it is unlikely that these blends will cross-attract non-target insects, yet we will test the attractive blend (s) against common pollinators. The specific objectives are: 1) Isolate and identify the headspace volatiles of selected wild host plant species of *Lygus hesperus*, two wild-alfalfa subspecies and cultivated alfalfa host plants, damaged by *Lygus*, and undamaged, by 1a. Dynamic headspace collection of the flowering plants (vegetative+floral components) onto Super-Q and eluting them in organic solvents, 1b. Solid Phase Micro-Extraction (SPME) analysis of the headspace, in tandem, with 1a; 2) Behavioral response of male and female *L. hesperus* to live plants and VOC profiles; 3) Isolation and identification of biologically active volatile constituents from the extracts (1a) by employing male and female antennae as biological detectors (GC-EAG); 4) Behavioral analysis of the compounds from obj. 3 and development of appropriate blends for potential field application; 5) Presentation of research results to the scientific community and to alfalfa seed industry and seed producers. Development of appropriate extension program to make the results available to the farmers.