2022 USAFRI Research Project Objectives

Controlling Adult Alfalfa Weevils: A Multi-State University/Industry Collaboration
Montana State University - Wanner

Project Award: $50,000

Justification:

- This multi-state proposal, funded 50% by industry, will support a graduate student position to research the biology and control of adult stage alfalfa weevils in four distinct alfalfa production areas: Desert Southwest (CA), Northern Great Plains (MT), Southern Plains (OK) and the Pacific Northwest (OR/WA). The alfalfa weevil (Hypera postica) is the key chewing insect pest of alfalfa grown nationally; defoliation damage reduces forage yield and quality. Across the western US (and likely nationally) alfalfa weevils have developed resistance to the most common and affordable insecticides used to control their damage. When larval populations reach a threshold value, standard recommendations time insecticide applications to coincide with peak 2nd – 3rd instar abundance (alfalfa weevil has 4 larval stages, 1st – 4th). Traditionally, the adult stage weevils are not targeted for control. Earlier spray applications timed to coincide with peak activity of egg laying adult weevils may provide better protection and management:

    - The availability of insecticides with new modes of action and longer persistence and may allow applications at earlier crop stages and capture the window of peak adult activity as well as early larvae;
    - Preventing yield and quality damage at earlier crop stages may increase profitability; Earlier insecticide applications can be combined with herbicide to reduce input costs;
    - Adult weevils feed on alfalfa while maturing and during egg laying, providing a window of exposure to insecticides;
    - Spring activity and egg laying by adults is dependent on temperature, providing an opportunity to use weather data to predict the timing of early insecticide applications; and
    - Expanding control options may help delay resistance and prolong the usefulness of pyrethroid insecticides.

  The proposal is timely: Alfalfa weevils have developed resistance to the most common class of insecticide used (pyrethroids, data published in: Rodbell E.A., Wanner K.W. 2021. First Report of Alfalfa Weevil Resistance to Lambda-Cyhalothrin in Montana. J. Economic Entomology https://doi.org/10.1093/jee/toab152. Pyrethroid insecticide resistance is both severe and widespread. Additional management strategies are needed.

Objectives:

- The objectives of this project are to: 1) Develop a system to monitor adult alfalfa weevil migration into alfalfa fields and use temperature to predict the peak period of egg laying by females; 2) Target adult weevils by timing insecticide applications to coincide with the beginning of female egg laying to improve crop protection; and 3) Train a graduate student in forage alfalfa research. Specifically, to: a) Complete laboratory bioassays to test effectiveness and persistence of insecticides targeting adult weevils when applied at early crop stages; b) Conduct standardized field trials in the four different production areas to test the ability of insecticides to control adult weevils when applied at early crop stages (6-8 in, 12-14 in and 18-20 in stand heights); and c) Use temperature data to predict the start, duration, and peak of egg laying activity by female weevils in an alfalfa field.