Pest and natural enemy mark-recapture studies of dipsersal in beans and between alfafla and beans

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1. Abstract.

This study will measure movement and migratory behavior of western tarnished plant bug (its natural enemies) in beans and bwrween beans and alfalfa. Mark recapture will expand upon techniques developed last year in cotton and alfalfa. The absolute abundance, immigration, and emigration from the field will be measured. Cage studies with the parasitoid Peristenus stygicus will measure the impact on Lygus compared to regulation by existing natural enemies.
If pesticides are needed I will coordinate with Brian to suspend experiments at that time. If border rows with alfalfa can remain unsprayed (say 10 rows), then experiments on migration between crops will be better facilitated.

2. Justification and Problem Statement:

Arthropod pests are a major problem for beans. Pests and their natural enemies move within fields and migrate between the field and adjacent areas. Quantitative knowledge of the movement of these pests and their natural enemies is lacking in the field. Better understanding of the movement of these pests and their natural enemies is needed for assessing the reliability of density estimates and subsequent IPM. Improved techniques are now available for studying field scale movement of these organisms. Quantitative understanding of the complex dispersal and host finding behavior of these of pests will also enhance precision agriculture.

3. Previous Work and Present Outlook:

Dispersal is poorly understood because of the labor-intensive nature of the experiments. General studies of within-field dispersal have been performed for Lygus by Goodell, Fleischer, and Hagler. Some lab studies have also documented host-searching behavior of the pests and parasitoids in laboratory studies. These serve as a guide to host-plants preferences and how dispersing insects may form congregations in the field. The experiments will provide a valuable link between migration theory and the practice of pest management.

4. Objectives:

1. Examine the natural movement and abundance of Lygus in relation to location in field and time of year.
2. Test the imapct of biological control by Peristenus stigicus on Lygus compared to natural regulation.
3. Measure the behavior of Peristenus stigicus in bean, which will be compared with field behavior in alfalfa and cotton.

5. Procedure:

Mark-recapture experiments are an effective way to acquire data that may show density, mortality and dispersal in field situations. The dispersal of marked Lygus within the field will be tested, as well as between the bean and adjacent alfalfa. Standard measures of plant residence time and behavioral attributes will be taken. This may include the manipulation of Lygus densities to examine response by Peristenus. Abundances in time and space will be analyzed in models that account for predators, weather, and host condition (bean plant or Lygus denisity).