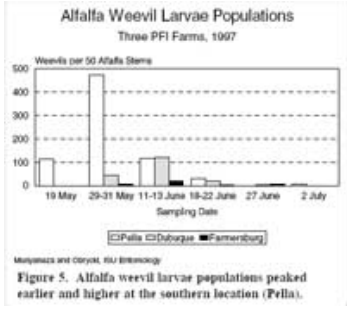
Optimizing Biotic Mortality to Reduce Insecticide Use in Alfalfa

Joseph Munyaneza, postdoctoral researcher, ISU Department of Entomology

With ISU entomologist **John Obrycki** and graduate student Laura Weiser, I have been investigating ways to manage the alfalfa weevil and the potato leafhopper by optimizing biotic mortality. What is biotic mortality, and why is it important? Even pests have their own pests, so if we can encourage those "biotic factors" (diseases, predators and parasites) that weaken and kill the alfalfa weevil and leafhopper, we may be able to reduce insecticide use in alfalfa.

The main objective of this research was to develop management options for forage producers that are sustainable and integrate biological control (use of predators, parasitoids, and pathogens) and cultural control (harvesting). The 1997 phase of this study was conducted at three Practical Farmers of Iowa (PFI) farms. The farmers involved in this research were: 1) **Mark and Julie Roose** (Pella), 2) **New Melleray Abbey** and **Joe Fitzgerald** (Dubuque), and 3) **Jeff Klinge and Deb Tidwell** (Farmersburg).

Figure 5. Alfalfa weevil larvae populations peaked earlier and higher at the southern location (pella).
Munyaneza and Obrycki, ISU Entomology



Each farmer left a border area (9-18 ft wide and 120 ft long) of alfalfa uncut at the first harvest. Alfalfa weevil sampling consisted of weekly stem and sweep samples from early May until the second harvest. From each 50-sweep sample, larval numbers were tabulated. We randomly collected up to twenty alfalfa weevil larvae and reared them at room temperature on field-collected alfalfa, in half-pint cardboard cages to determine the prevalence of the larval fungal disease Zoophthora phytonomi. Also, we measured parasitism of alfalfa weevil larvae by the naturally occurring wasps Bathyplectes curculionis and B. anurus.

Maximum larval numbers were reached between May 23 and June 13, with a mean of 473, 118, and 19 alfalfa weevil larvae/50 sweeps at Pella, Dubuque, and Farmersburg, respectively (Fig. 5). The larval parasitoids B. Anurus and B. curculionis and the fungus Z. Phytonomi were present at all the sites. Both species of parasitoids were present early in the season with B. anurus dominating. The fungus was detected throughout the sampling period and was most noticeable in the declining larval population (old larvae).

The fungus caused higher levels of mortality than the parasitoids. Seasonal larval mortality from these natural enemies was: 54.3% (36.8% fungal disease and 17.5% parasitism) at Pella; 33.7% (28.7% fungal disease and 5% parasitism) at Dubuque; and 14.9% (12.8% fungal disease and 2.1% parasitism) at Farmersburg. The low mortality at Farmersburg may be explained by the low density of the alfalfa weevil larvae.

Results also showed that the fungus spread to the new growth area (after harvest) from the uncut border area of alfalfa. There was an indication that levels of fungal disease at each site were almost the same in the new growth area and the uncut border area, suggesting that the uncut borders were inoculating harvested parts of the fields.