Evaluation of Soybean Aphid Management Tactics

RFR-A1764

Ashley Dean, graduate research assistant
Erin Hodgson, associate professor and extension entomologist
Matthew O'Neal, associate professor
Department of Entomology

Introduction

The soybean aphid (*Aphis glycines* Matsumura*)* was first discovered in Iowa in 2001 and has since become the most economically damaging insect pest in the state. Outbreaks of this pest are sporadic, but it is not uncommon for soybean aphid to establish a population on soybean that can cause economic yield loss if left untreated.

Soybean aphids produce up to 18 overlapping generations per year in the Midwest, and populations on soybean can double every 2–7 days. Aphids extract nutrients, mainly nitrogen, and sugars from the phloem, which causes plant stress and yield loss. Soybean yield is impacted by numerous other factors, including planting date. Because soybean is sensitive to photoperiod, late planting results in lower yield potential.

Tools are available to growers to manage soybean aphids, such as insecticides, host-plant resistance, and natural enemies. Insecticides are the most common, but reports of resistance to pyrethroids challenges their use in the future. Host-plant resistance has been proven to provide protection against aphids, but resistant varieties are not yet commercially available on a large scale. Natural enemies often are the most effective at controlling aphid populations, but may not be abundant enough to keep populations below economically damaging levels, especially if an insecticide application diminishes their populations in a field.

Materials and Methods

Plots were established in 2017 at the Northwest Research Farm, Sutherland, Iowa. Similar plots also were established at the Johnson Research Farm, Ames, Iowa. Early treatments at Sutherland were planted May 30 and late treatments June 22 using a four-row planter.

The experimental design was a split-plot in which planting date was the whole plot effect and variety was the subplot. There were 32 total subplots (4 varieties x 2 planting dates x 4 blocks) with dimensions of 80 ft x 129 ft. The varieties were as follows: aphid susceptible and no herbicide tolerance (HT), aphid resistant and no HT, aphid susceptible and Roundup Ready (RR), and aphid resistant and RR. All aphid resistance was conferred by a combination of *Rag1* and *Rag2* genes.

Insecticides were applied if aphid populations reached the economic threshold of 250 aphids/plant. All susceptible treatments received one application of Warrior II (1.92 fl oz/ac) August 30.

Data were collected weekly once plants reached the V2 growth stage. Aphid density and percent defoliation were recorded from 10 random plants/plot and plant height from five random plants/plot during each sampling date. Yield was determined at harvest (October 20). Cumulative aphid days (CAD) were calculated to determine the seasonal exposure to aphids.

Results and Discussion

Our results indicate resistant varieties provide adequate protection against soybean aphids. Seasonal exposure to aphids was low on all resistant treatments, but was above the economic threshold (~5,500 CAD) for three out of four susceptible treatments following an insecticide application. Exposure did not vary

between planting date for each treatment, and treatments were only different when comparing susceptible to resistant varieties (Figure 1).

Yield was only impacted by planting date. Each treatment was different between the early and late planting dates, however, yield did not vary by treatment within each planting date (Figure 2). Percent defoliation and plant height seemed to have no effect on yield. We can conclude resistant varieties and timely insecticide applications offer similar yield protection.

Acknowledgements

We thank the farm managers, employees, and student workers for assisting with project activities. This research was funded by the North Central Soybean Research Program (NCSRP).

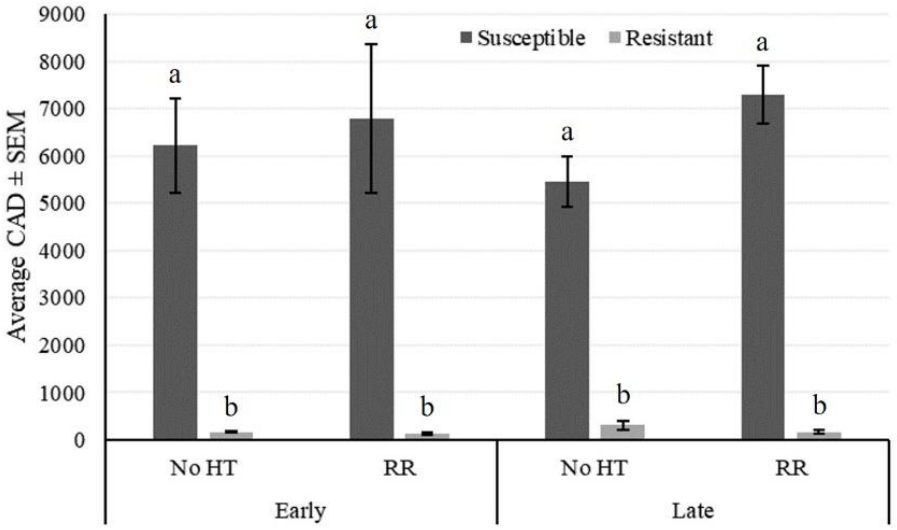

Figure 1. Seasonal exposure of plants to soybean aphids on soybean varieties of varying genetic background (with and without aphid resistance and herbicide tolerance planted at two dates during 2017, see text for details). Seasonal exposure to aphids (estimated by CAD) was not significantly different (α = 0.05) by planting date for each variety. Significant differences occurred (P < 0.0001) between susceptible and resistant varieties. Unique letters indicate a significant difference.

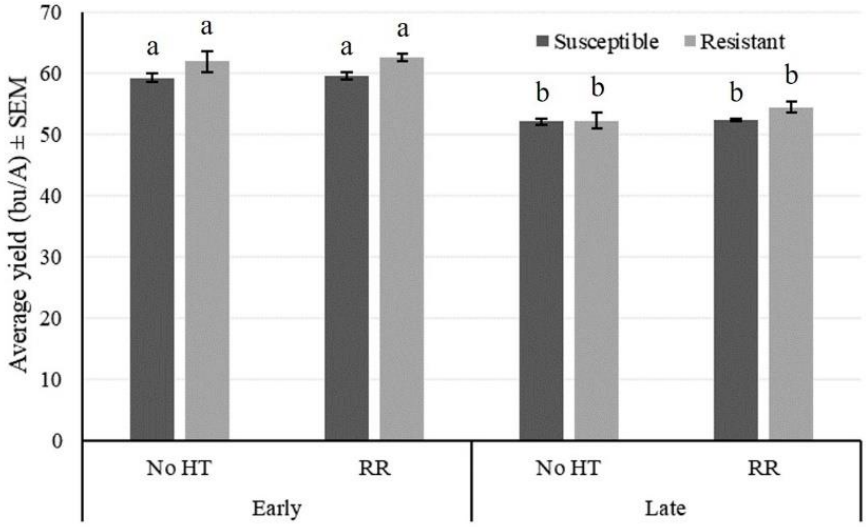

Figure 2. Yield response from soybeans of varying genetic background (with and without aphid resistance and herbicide tolerance planted at two dates during 2017, see text for details). No significant difference occurred between the four varieties within a planting date (α = .05). However, planting date impacted yield for each variety (P < .0001). Unique letters indicate a significant difference.