AGRONOMY TOPIC OF THE WEEK

July 6, 2011

Soybean Aphids

While it may seem like soybean aphids have been wreaking havoc on any midsummer lull in field scouting, as well as being a threat to optimum soybean yields, this pest has only been a significant pest in the Midwest since its initial discovery in Wisconsin in July of 2000. Since that time this pest has rapidly become a significant threat to soybean production in the United States. With few natural enemies as well as an ideal overwintering host, buckthorn (a restricted noxious weed in Minnesota), aphid prevalence has soared as well as the research to find ways to predict, prevent, and control aphids. Minnesota's soybean crop alone is valued at $1.5 billion a year and losses from aphid damage as well as the costs of chemical control of aphids can be as high as $200 million a year in Minnesota.

Soybean aphid poses a significant risk to soybean production because of its tremendous reproductive potential. In the summer, the population in soybean is comprised of females that essentially clone themselves. All offspring are female, born pregnant, and give live birth. Their birth rate is 3-8 aphids per day for 30 days. The generation time is 7-10 days. The result is an exponential growth rate, where populations can double in 2-3 days under favorable conditions. Soybean aphid development is best between 77 and 86°F, with the optimal temperature estimated to be 82°F, at which time birth to first reproduction was predicted to be 4.5 days. At temperatures between 68 and 86°F, the pre-reproductive period takes five to seven days before aphids start giving birth to nymphs. Nymphs exposed to higher temperatures of 95°F did not complete development, never produced offspring, and all died within 11 days. The base threshold for soybean aphid development is 47.5°F; below this temperature no growth of the aphid occurs.

A soybean aphid growth estimator tool, SAGE, has been created to help measure and predict days for aphid populations to reach threshold, with threshold being defined as 250 aphids/plant, based on daily temperatures. To utilize the SAGE model, the average aphid density (aphids/plant) and the day's high and low temperature must be entered into the spreadsheet. Zeroes are used to calculated average when no aphids are present on the plant. As the forecasted high and low temperatures for the next 6 days are entered into the spreadsheet, the model will predict an average rate of population build up (expressed as the time required for populations to double). The model will also predict when the population is expected to reach a threshold of 250 aphids per plant. The model is likely to over-estimate aphid populations in the field, but is a tool to help determine a scouting schedule. The link for the SAGE model can be found on the University of Minnesota Extension Website, http://www.soybeans.umn.edu/crop/insects/aphid/aphid_sagemodel.htm.