Determining Best Management Practices
For Control of the Soybean Aphid in Michigan

Project Number: GR02-039

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Statement of Challenge

Michigan Soybeans have been faced with uncertain damage potential from the Soybean Aphid since 2000 when they were first identified here. First impressions of this pest were that they could be controlled by natural predators (i.e. ladybird beetles, green lacewings and minute pirate bugs). Preliminary control trials in the Saginaw Valley in 2001 showed that this is not the case. A yield loss of 11.1 bushels per acre was documented on commercial farms. If this yield loss were to be extended across the 2.1 million acres of soybeans grown in Michigan the lost revenue would reach over $100 million.

Very limited information of this pest is available at this time and thus, has caused poorly informed control decisions on farms. These decisions may cause unneeded production expense or worse, the improper use of pesticides. While limited data in 2001 has shown an advantage to chemical control of the aphid, further data is needed to prevent the unnecessary use of excessive amounts of pesticides in soybean production. In addition, commercial pesticide companies have made claims of an established threshold without scientific basis. This information led to grower confusion and reportedly some early insecticide applications to low populations of aphids.

Objectives

1. Quantify the yield loss caused by Soybean Aphid. Environmental conditions may have exaggerated the yield loss that was measured in 2001.
2. Quantify the yield effect of the timing of insecticide application. Early applications may show the largest yield benefit.

3. Determine the populations of aphids in trials and correlate with yield loss to aid in determining a treatment threshold. A threshold is not available to help growers decide when or if to spray.

Results and Accomplishments

The intent of this project was to build a sizeable base of data in support of formulating a treatment threshold for control of the Soybean Aphid. The mass of data was acquired through the use of twelve on-farm demonstration trials coordinated by MSUE Agriculture Agents across the Saginaw Valley and Thumb areas of Michigan along with technical support provided by Dr. Chris DiFonzo, MSU Entomologist. A crop scout was used in the gathering of aphid population data in all of the seven counties of this project. The scout first found aphids on July 1 in Saginaw County. By August 6th, aphids were found in all fields in the study except for one location, Lapeer County. This is in contrast to the 2001 field season, when an average of nearly 7,000 aphids per plant was recorded in Saginaw County. However, in 2002, aphid populations remained extremely low throughout the season, averaging less than one aphid per leaflet. The highest recorded population was only 17 aphids on one leaflet.

As a result of the low aphid numbers, the first treatment could not be made as planned based on a leaflet rating of 2 (11-25 aphids/leaflet). Instead, the first treatment was made at the assumed optimum timing (based on plot work in 2001), that is, in the late vegetative to early reproductive stages. Two other treatment timings were made at 7 and 14 days after the first treatment.

Soybean yield at various locations ranged between 35 and 60 bushels per acre. However, within a given field, yields among different treatments did not differ significantly from each other or the untreated check. This is not surprising, given the very low aphid populations.

This project clearly provided two lessons that impact Soybean Aphid management.

1. Spraying low levels of aphids (before a "1" on the leaflet scale = 1-10 aphids per leaflet) does not result in a soybean yield increase.
2. Spraying aphids early in the season is not a reliable way to prevent an aphid outbreak, since we can not predict that aphid numbers will increase later in the season.

Impacts

This project demonstrated that soybean growers should not make an insecticide application to control soybean aphids at low populations. This information will control the unnecessary use of insecticides used by growers to control soybean aphids on the 2.1 million acres of soybeans in Michigan. If only 25% of these acres were treated at low aphid populations, it would cost the growers about $10 per acre or a total of over $5 million in unnecessary cost. The environmental pesticide load will also be reduced similarly, if eliminated on 25% of Michigan's soybean acres, then over 24,000 gallons of pesticides will be not used where they are not needed.

Funding Partnerships

$ 5,000	MSU Specialist, Technical Support
6,000	MSUE Agents, Coordination of Trials
1,800	DuPont, Insecticide Manufacturer (supplied product)
1,200	Several Custom Pesticide Applicators (sprayed plot area)
$14,000	Total