



Insecticide Applications on Minnesota's 2016 Soybean Acres

Minnesota Department of Agriculture



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Introduction

This survey was a cooperative effort between the Minnesota Department of Agriculture (MDA) and the United States Department of Agriculture: National Agricultural Statistics Service (NASS), Minnesota field office. Special thanks goes to Dan Lofthus, Director of NASS within the USDA at the Minnesota field office and his respective staff, for assistance with survey design, data collection and processing. The MDA is ultimately responsible for the representations of data provided in this report, and for the design of the survey mechanism used to collect that data.

This survey was completed in September of 2017 for the 2016 crop year. The survey of insecticide-applying soybean farmers in Minnesota was a subset of the soybean farmers that were surveyed in April of 2017 for the 2016 crop year. Approximately 1,900 soybean farmers who planted nearly 350,000 acres were surveyed at that time. Of those soybean farmers, 420 farmers applied insecticides on 140,000 acres. These 420 farmers were in a pool to be contacted for the follow-up insecticide survey. Three hundred and four farmers (72%) responded in the follow-up survey. Not all 304 farmers answered all the questions in the survey.

Data Reporting and Limitations

Due to the simplified method used to collect what is typically considered complex data, it is helpful for the reader to understand the limitations of the datasets.

Data sets are not “weighted”

Traditional surveys conducted by NASS employ advanced sampling strategies and are designed to statistically represent a non-homogeneous population, thus data is “weighted” to account for sample size, county size and crop acreage, etc.

Because respondents were not selected in proportion the actual number of producers of a given crop, over-selection, or under-selection of these producers might result in unintentional bias in the results for specific crops and their related pesticide use. This bias could lead to problems in extrapolation of results, e.g., and over or under-representation of an activity.

Therefore, attempts to extrapolate data for purposed of estimating for the entire population of Minnesota soybean growers could over- or under-represent the data. The MDA can be contacted to further discuss interpretation of the survey data.

2016 Insecticide Use Highlights

Three hundred and four farmers responded in the survey for insecticide use on soybean acres in 2016. The majority of these farmers applied insecticide for soybean aphids and scouted the fields themselves. Most farmers used a threshold of 200-250 aphids per plant to apply the insecticide and recommendation from a consultant or dealer was the top factor for insecticide applications other than thresholds. Thirty nine percent of farmers did not keep records of the insecticide applications. There were no beehives within three miles of 65% of the farmer’s fields. Farmers used setbacks from surface water most (65%) of the time. Fifty percent of the farmers treated 75% or more of their soybean seeds.

2016 Insecticide Use

This report summarizes insecticide use information reported by 304 farmers for the 2016 crop year. Excellent participation and good record keeping by Minnesota farmers and agricultural chemical dealerships played a vital part in providing complete and detailed pesticide information. The survey pool included 420 soybean farmers who applied insecticide in Minnesota. The original survey covered nearly 5% of the state’s soybean acres. Analysis on that survey has not been completed at this time.

All previous surveys including the 2003, 2005, 2007, 2009, 2011 and 2013 crop years can be found at: <http://www.mda.state.mn.us/chemicals/pesticides/pesticideuse.aspx>

Farmers were interviewed over the phone in September of 2017. These were “cold calls,” meaning the farmers did not get any type of notification about the survey prior to the contact. The interviews typically would last 5 to 10 minutes. Follow-up questions were developed by the Minnesota Department of Agriculture and were designed to quantify insecticide use for controlling soybean aphids. The original survey included 1,949 farmers who raised soybeans in the 2016 crop year (Figure 1).

Figure 1. Crop acres surveyed for soybean pesticide use survey.

Projected Crop Acres Surveyed								
Crop	Number of Respondents	Total Surveyed Acres	Herbicide Applied		Insecticide Applied		Fungicide Applied	
				(%)		(%)		(%)
Soybeans Acres		597,918	582,928	(97%)	149,690	(25%)	104,882	(18%)
Respondents	1,949		1,847	(95%)	420	(22%)	255	(13%)

Soybean farmers could have more than one answer for many of the questions. Each question was defined as to whether there could be multiple answers or a single answer.

Insecticide spraying for soybean aphids is based on the presence of aphids. There are no insecticides that prevent aphids from attacking the soybeans. Insecticide spraying for soybean aphids on soybean acres **generally** occurs sometime in July or August in Minnesota. Not all soybeans fields are sprayed with an insecticide and not all soybean fields have soybean aphids. It is more likely, in Minnesota, that there are not enough soybean aphids present to spray insecticide and therefore that field is not sprayed with an insecticide. Often, soybean aphids are concentrated in certain areas of Minnesota where conditions are right for development of soybean aphids.

Soybean aphid adults are small insects, with oval-shaped bodies around 1/16th of an inch in length. They were first discovered in Minnesota in 2001. Soybean aphid populations can grow to extremely high levels under favorable conditions. Reproduction and development is quickest when temperatures are between 70° and 85° resulting in the ability for populations to double in two to three days. Aphid reproduction slows down when temperatures are in the 90's, and are reported to begin to die when temperatures reach 95°. Rain can also be detrimental to the soybean aphid. Soybean aphids require buckthorn populations to lay eggs on to over winter in Minnesota.

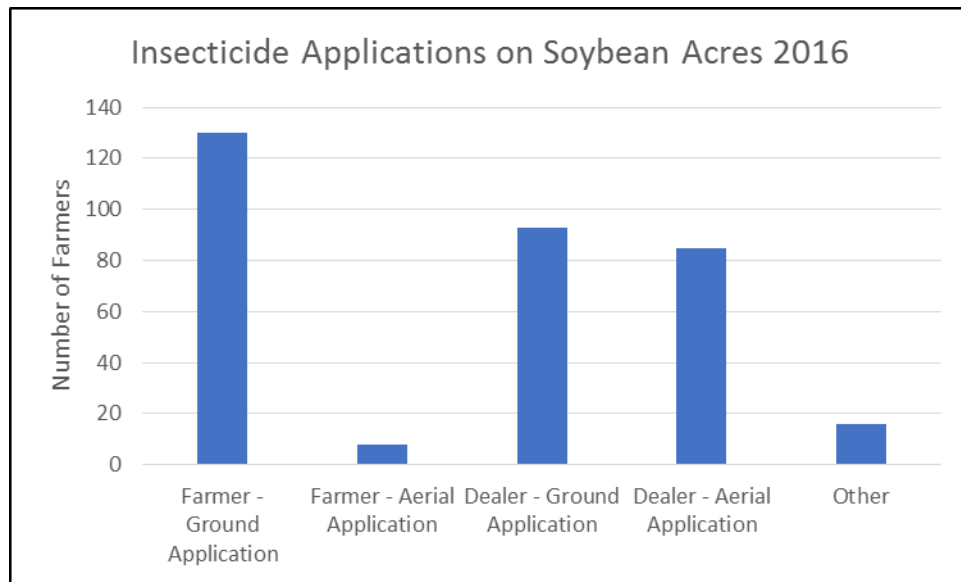
Regular scouting is critical for determining the number of soybean aphids per plant. The University of Minnesota threshold for insecticide treatment is 250 aphids per plant with 80 percent of the 20-30 plants sampled infested. This threshold gives the farmer a 5-7 day lead time to take action before the population reaches a level that can cause economic yield loss, which is estimated to be around 675 aphids per plant. Spraying soybeans at this threshold works well from the R1 through R5 growth stage. Spraying at or beyond growth stage R6 has not been documented to effect yield enough to justify treatment as pods are already set.

2016 Insecticide Use Questions and Answers

Application Method

Insecticides applied on soybean acres can be applied via ground application that is either self-propelled or can be pulled behind a tractor. Insecticides can also be applied aerially by either helicopter or airplane. Insecticides are self-applied or custom applied by a dealer or applicator. In this survey, insecticides were generally applied through some type of ground application on soybean acres. Ground applications by farmers was the top response reported (Figure 2).

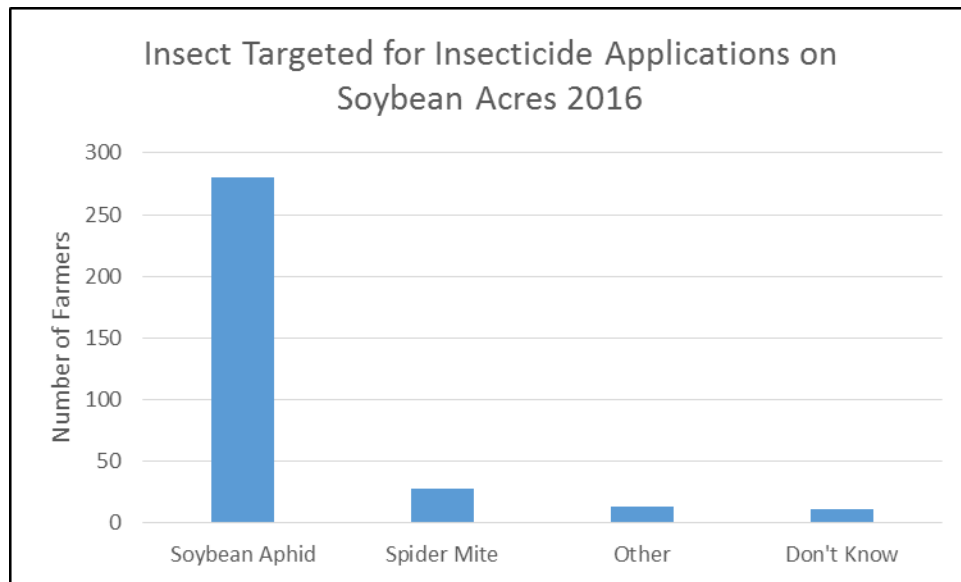
Figure 2. How was the insecticide applied to the 2016 soybean crop?



Insect Targeted

Farmers can make an insecticide application for more than just soybean aphids. However 280 of the 304 farmers who responded to this question applied insecticide for soybean aphid (Figure3). There were 332 responses by the 304 farmers who answered this question (Farmers could select more than one answer). Spider mites are generally more of a problem during a drought in soybeans. Additional potential pests that could be sprayed would include grasshoppers, Japanese beetles, leaf hoppers and a variety of caterpillars. However it is rare that farmers spray for these pests.

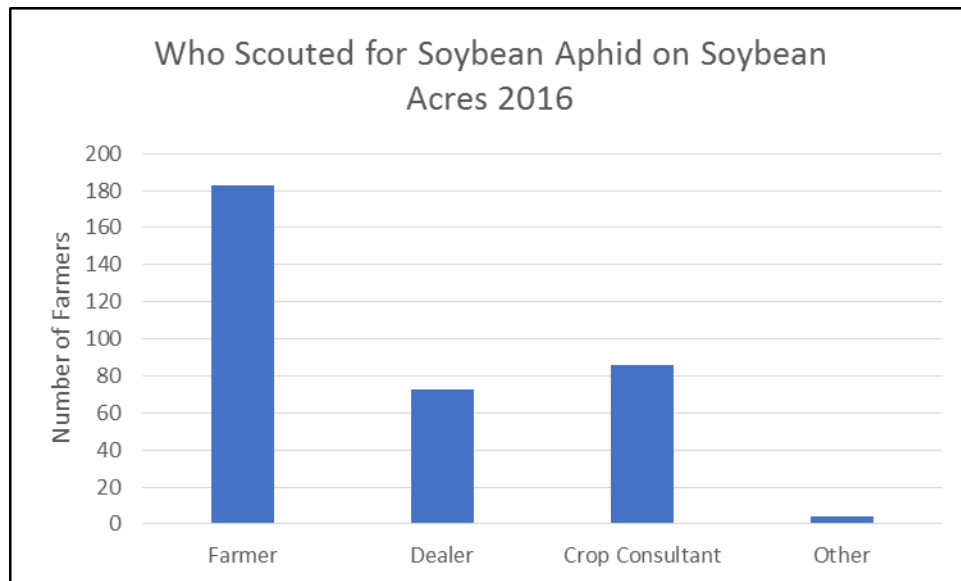
Figure 3. For what insect was the insecticide application was made?



Aphid Scouting

Scouting is important when determining if and when to spray for soybean aphids. Farmers, dealers, and crop consultants all play a role in scouting for soybean aphids. In 2016, farmers were, generally, performing the scouting of the soybean aphids (Figure 4). One hundred and eighty three, of the 280 farmers that responded, scouted for soybean aphids. Only farmers who reported applying an insecticide for soybean aphids were asked this question. There was a total of 346 responses. Farmers could select more than one answer.

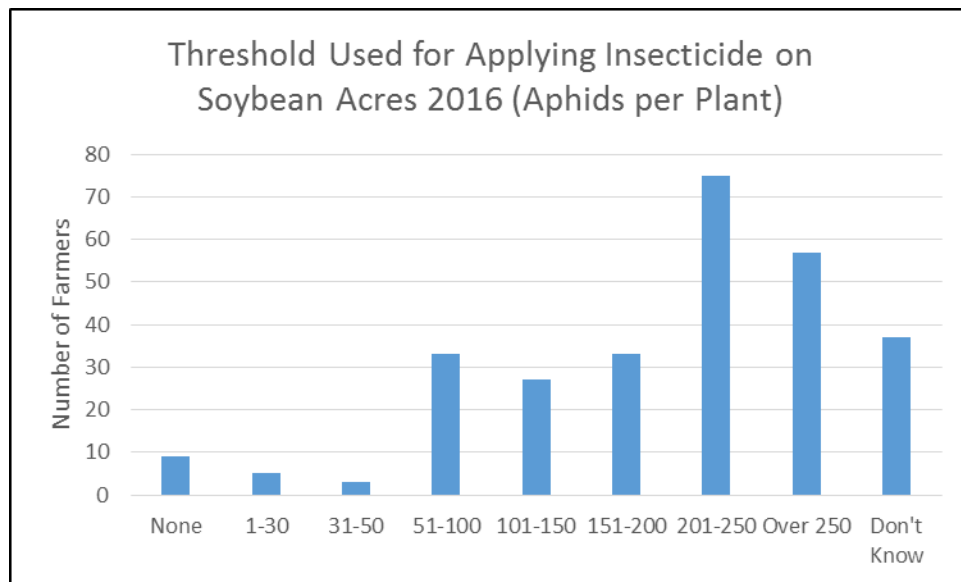
Figure 4. Who scouted for the soybean aphid on soybean acres in 2016?



Aphid Threshold

The aphid threshold is the University of Minnesota recommended method of determining when to use an insecticide for control. There are no published, peer-reviewed data that show soybean aphid injury leading to yield loss is likely below the threshold. Saving unnecessary insecticide applications would also protect the environment. Two hundred and seventy-nine farmers responded to the question of what threshold was used to determine an insecticide application. Only farmers who reported applying an insecticide for soybean aphids were asked this question. Farmers could select only one answer. The top response for thresholds was between 201 and 250 aphids per plant (Figure 5). There was a total of 279 responses.

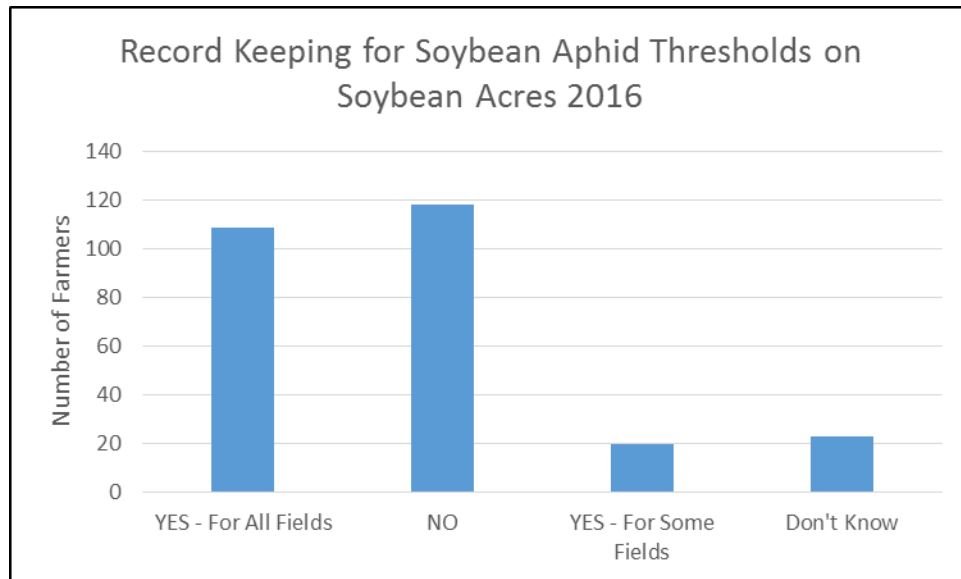
Figure 5. What was the threshold of aphids per plant that was used for applying insecticide on soybean acres in 2016?



Record Keeping

Record keeping is important for all aspects of pesticide applications. It can be especially important to keep records that include thresholds to verify that soybean aphids have not become resistant to specific insecticides. In 2015 - 2017, the University of Minnesota reported that in certain areas of Minnesota, two insecticides containing pyrethroid active ingredients were ineffective on soybean aphids. Thresholds are needed to determine these types of issues. One hundred and twenty-nine farmers kept records for some or all of their fields in regards to soybean aphid thresholds (Figure 6). Only farmers who reported applying an insecticide for soybean aphids were asked this question. There was a total of 270 responses.

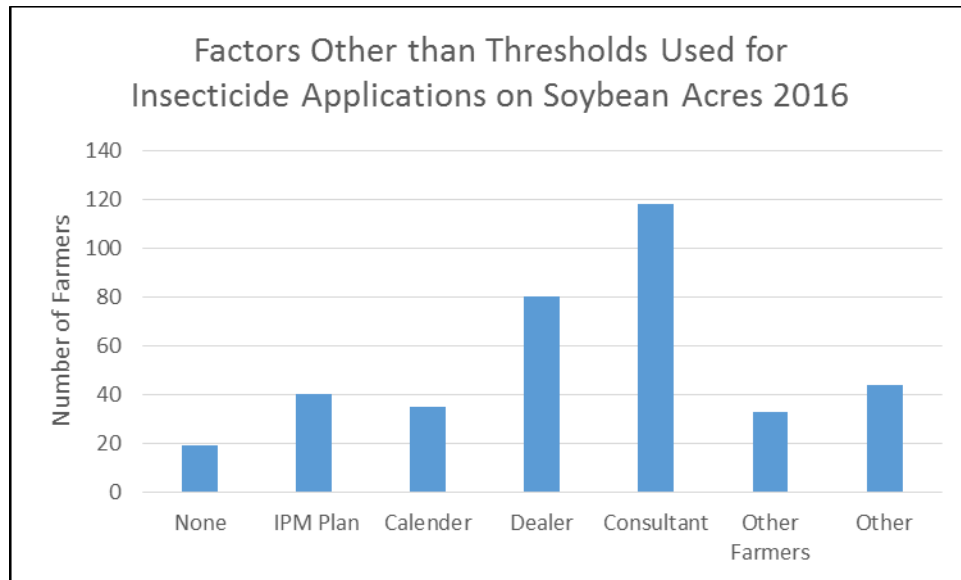
Figure 6. Were records kept for soybean aphid thresholds?



Other Factors for Consideration

Although the soybean aphid threshold is the method preferred by the University of Minnesota to determine an insecticide application. There are other factors that can be used to determine an insecticide application. Farmers commonly have more than one reason for implementing a practice. Farmers reported that dealers and consultants were often factors, in addition to thresholds, for an insecticide application (Figure 7). Only 19 farmers reported using thresholds as the only factor for determining insecticide applications on soybean aphids. Only farmers who reported applying an insecticide for soybean aphids were asked this question. There was a total of 369 responses. Farmers could select more than one answer.

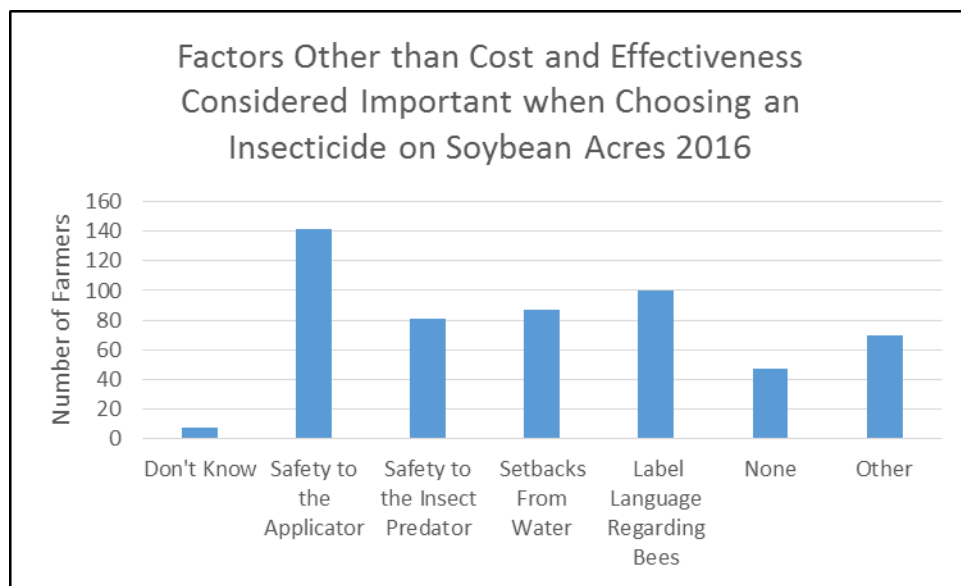
Figure 7. What factors were used, other than thresholds, for insecticide applications for soybean aphids on soybean acres in 2016?



Insecticide Selection Factors

Farmers can base insecticide applications for soybean aphids on multiple factors. Farmers reported that safety to the applicator and label language regarding bees were the two top reasons in addition to cost and effectiveness for the insecticide application (Figure 8). Most farmers had more than one additional response besides cost and effectiveness. Only farmers who reported applying an insecticide for soybean aphids were asked this question. There was a total of 534 responses. Farmers could select more than one answer.

Figure 8. What factors other than cost and effectiveness were considered important when choosing an insecticide on soybean acres in 2016?

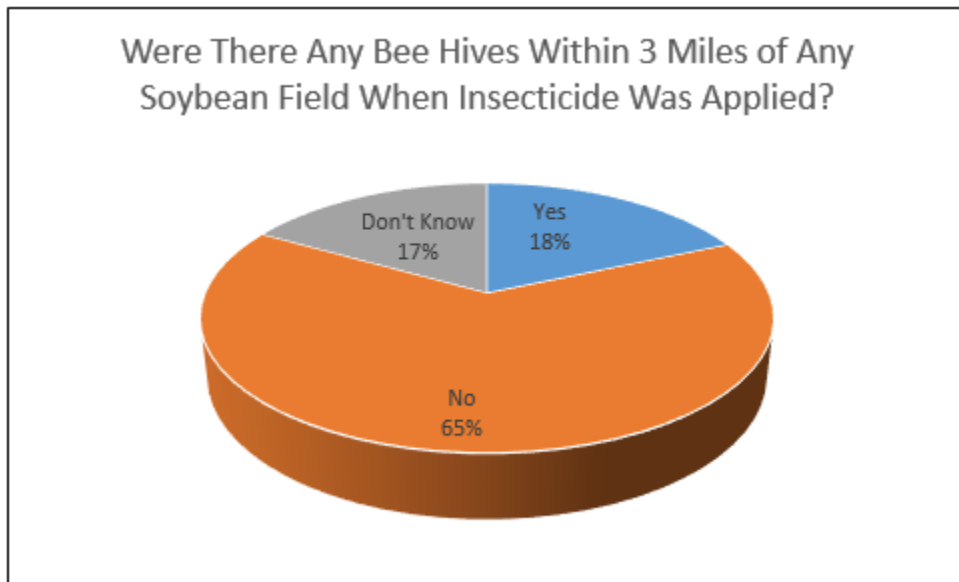


The following three questions were for all farmers surveyed, not just the farmers who applied insecticide for soybean aphids.

Proximity to Bee Hives

Farmers were asked if there were any bee hives within 3 miles of any soybean field when insecticide was applied on soybean acres in 2016. Approximately two thirds of the farmers reported that there were not any bee hives within 3 miles of any of their soybean fields when an insecticide was applied (Figure 9). There was a total of 303 responses.

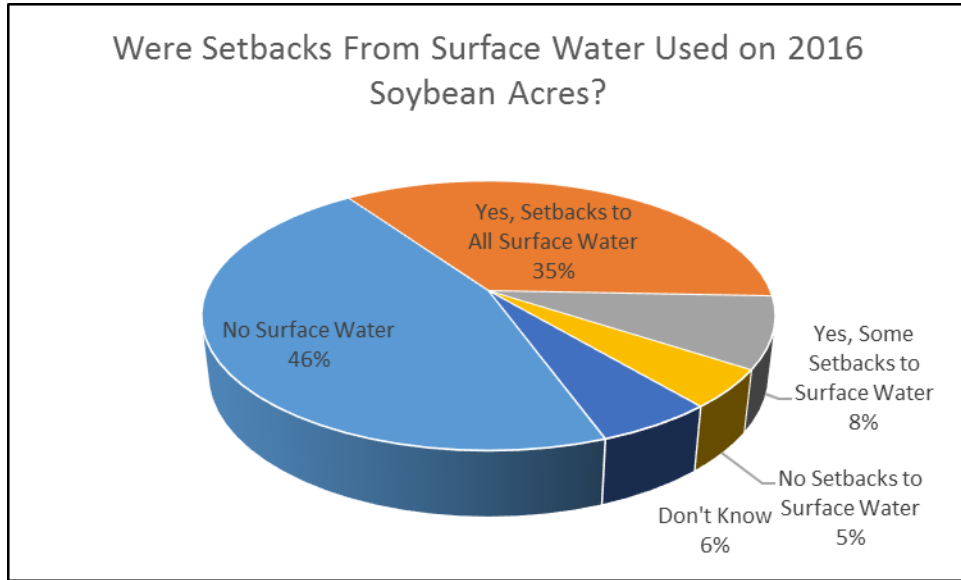
Figure 9. Were there any bee hives within 3 miles of any soybean field when insecticide was applied on soybean acres in 2016?



Setbacks from Surface Water

Farmers were asked if there were setbacks from surface water on soybean acres in 2016. Almost half the farmers reported that there was no surface water by any of their soybean fields. However, when there was surface water located by their fields, farmers were most likely to have setbacks (Figure10). There was a total of 303 responses.

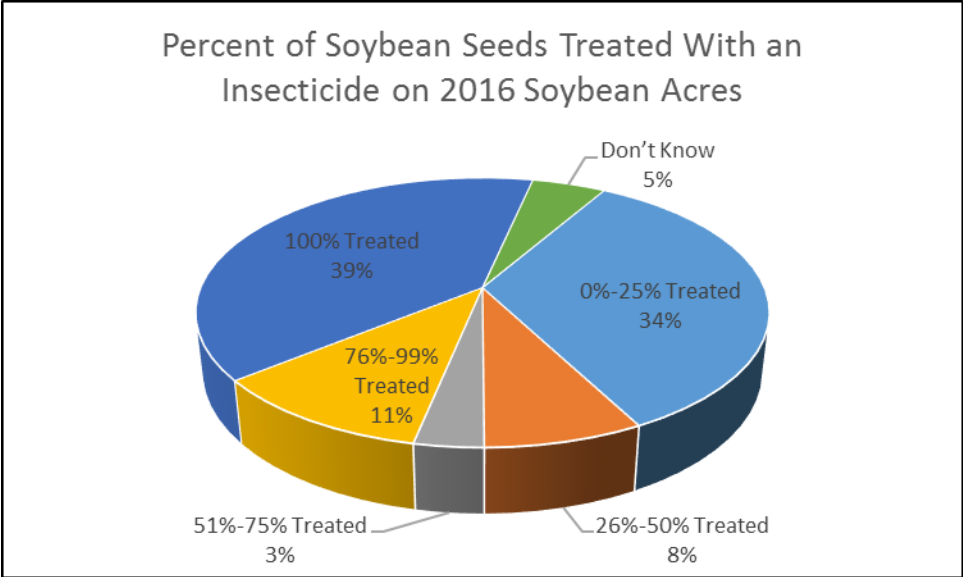
Figure 10. Were setbacks from surface water used on soybean acres in 2016?



Soybean Seed Treatment

Treating soybean seeds has grown in popularity over the past decade. Farmers treat soybean seed to prevent insects from eating the seed and from early season insects such as the bean leaf beetle. Half of the surveyed farmers treated 75% or more of their soybean seeds for the 2016 crop season (Figure 11). There was a total of 303 responses.

Figure 11. What percentage of soybean seeds were treated with an insecticide on soybean acres in 2016?



Conclusions:

This report is based on responses from 304 farmers who applied insecticides on soybean acres in the 2016 growing season. It is a subset of 1,900 soybean farmers who grew soybeans and were surveyed in the spring of 2017. The 304 soybean farmers in this report were surveyed in September of 2017. The following points are highlights from those responses to the survey.

- Most soybean fields had insecticides ground applied either by the farmer or the dealer.
- Over 90% of the farmers reported insecticide applications on soybean acres for soybean aphids.
- Soybean fields were most likely to be scouted by farmers.
- Approximately ½ the farmers reported using a threshold of more than 200 soybean aphids per plant to make an insecticide application and about ½ the farmers kept records on thresholds.
- Most farmers used other factors in addition to thresholds for an insecticide application and a dealer or consultant were the top responses for other factors.
- In addition to cost and effectiveness of the insecticide, safety to the applicator and label language protecting bees were also important.
- Two thirds of farmers reported having no bee hives near their soybean fields.
- Approximately ½ the farmers did not have surface water near their soybean fields. If they did the soybean fields were highly likely to have a setback.
- Half the farmers treated 75% or more of their soybean seeds for the 2016 crop season.

The Minnesota Department of Agriculture would like to thank all the farmers who took time to be involved in this survey.