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Staff Paper Series

Farmers' Awareness and Use of IPM for Soybean Aphid Control:

Results from the 2005 Survey

by

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DEPARTMENT OF APPLIED ECONOMICS
COLLEGE OF AGRICULTURAL, FOOD, AND ENVIRONMENTAL SCIENCES
UNIVERSITY OF MINNESOTA

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This research was part of the multi-state project, Soybean Aphid in the North Central US: Implementing IPM on a Landscape Scale funded by USDA's CSREES' Integrated Research, Education and Extension Competitive Grants Program – Integrated Pest Management, 112.B Risk Avoidance and Mitigation Program (RAMP), and the University of Minnesota Agricultural Experiment Station.

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Farmers' Awareness and Use of IPM for Soybean Aphid Control:
Results from the 2005 Survey

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Abstract: In response to the introduction and rapid spread of soybean aphid as a major new invasive pest of soybean in North America. A multi-state project, Soybean Aphid in the North Central US: Implementing IPM on a Landscape Scale, was initiated to help transition the North Central US soybean industry to a sustainable and ecologically-based IPM system for soybean aphid. In the first of a series of annual surveys designed to track changes in IPM implementation and adoption over time, 742 farmers in Iowa, Michigan, and Minnesota were surveyed in early 2005. Thirteen percent of the farmers indicated they had treated for soybean aphid in 2004, and they had treated an average of 50% of their soybean acreage. Overall, the farmers showed a fairly good understanding of soybean aphids and their impact on soybeans. Seventy-five percent said aphids damaged their soybeans by sucking sap. Seventy-seven percent said the frequency with which aphids should be treated for profitable control depends on aphid counts, weather conditions, and plant stage. Thirty-seven percent believed that aphids can inflict significant damage at any growth stage; 29% believed that aphids inflict the most yield damage during early flowering through pods set (R1-R3). Sixty-six percent considered the lowest average aphid density for profitable insecticide spraying to be 250 aphids per plant. Over all three states, 84% of the farmers said the most important information for making a decision to treat soybean aphids was scouting reports; 54% said plant growth stage was very important in their decision.

Introduction

The soybean aphid is a major new invasive pest of soybean in North America. In 2003, over 42 million acres of soybean in the North Central US were infested and over 7 million acres were treated with insecticides to control soybean aphid. Producers, industry and university research/Extension personnel have identified the soybean aphid as one of the greatest threats to the US soybean industry.

In response to this concern and threat large multi-state project, Soybean Aphid in the North Central US: Implementing IPM on a Landscape Scale, was proposed and funded in USDA's CSREES' Integrated Research, Education and Extension Competitive Grants Program – Integrated Pest Management, 112.B Risk Avoidance and Mitigation Program (RAMP). The overall goal of the project is to help transition the North Central US soybean industry to a sustainable and ecologically-based IPM system for soybean aphid that is compatible with the multi-pest and multi-crop ecosystems that occur in the region.

One objective of this project is to measure soybean aphid IPM implementation and adoption and to track changes over time. To accomplish this objective, farmers were asked to complete a brief survey while attending field days and winter meetings. The survey was developed by the economists and entomologists on the project team. The brief survey,

recruitment statement, and consent statement required and approved by the University of Minnesota's Institutional Review Board (IRB) for human subjects are attached to this report.

In January, February, and March of 2005, 742 farmers in Iowa, Michigan, and Minnesota completed the brief survey for the RAMP project. Of this total, 307 were in Iowa, 292 in Michigan, and 143 in Minnesota. The results from this initial survey are presented in this report and organized by survey question to facilitate comparison to future surveys.

1. How many acres of soybeans did you plant in 2004?

Not all the farmers who completed the surveys said planted soybeans in 2004: 279 in Iowa, 261 in Michigan, and 132 in Minnesota—for a total of 672 (Table 1).

Overall, the 672 farmers planted an average of 521 acres per farm in 2004. The median (or middle of the range) soybean acreage was 340 acres. Of those farmers who had planted less than 10,000 acres, the average soybean acreage was 460.

In Iowa, the average soybean planting was 662 acres per farm with a median of 400 acres. Of those farmers who had planted less than 10,000 acres, the average soybean acreage was 558.

In Michigan, the average soybean planting was 360 acres per farm a median of 240 acres. No surveyed farm planted more than 3,500 acres of soybeans.

In Minnesota, the average soybean planting was 541 acres per farm with a median of 400 acres. Of those farmers who had planted less than 10,000 acres, the average soybean acreage was 454.

Table 1. Reported soybean acres and aphid treatments in 2004.				
	Iowa	Michigan	Minnesota	Overall
Number of surveys	307	292	143	742
Number of farmers who planted soybeans	279	261	132	672
Mean number of soybean acres per farm soybeans in 2004	662	360	541	521
Percentage of farmers treating for soybean aphids*	21%	5%	10%	13%
Percentage of soybean acres treated for soybean aphids by those who did treat**	54%	48%	40%	50%
Most common insecticides used to treat for aphids**	Asana XL® Warrior® Lorsban 4E®	Asana XL® Warrior®	Asana XL® Warrior® Lorsban 4E®	Asana XL® Warrior® Lorsban 4E® Mustang®
Percentage of farmers who had treated for soybean aphids before 2004**	55%	44%	76%	55%
Percentage of the farmers saying that once a field is treated with an insecticide, soybean aphids could repopulate and cause yield damage in the same year**	76%	79%	93%	81%
*Percentage of those farmers who planted soybeans in 2004.				
**Percentage of those farmers answering the specific question; see text for numbers.				

2. What percent of your soybean acres did you treat for soybean aphids in 2004?

Eighty-five farmers (out of 742 in all three states) said they treated for soybean aphids in 2004. These 85 farmers treated an average of 50% of their soybean acreage; the median was 50%. In Iowa, 58 farmers treated an average of 54% of their soybean acreage; the median was 50%. In Michigan 12 farmers treated an average of 48% of their soybean acreage in 2004; the median was 50%. In Minnesota 15 farmers treated an average of 40% of their soybean acreage in 2004. The median was 30%.

3. If you treated for aphids, what insecticide did you use? And at what rate and how was it applied?

Overall, of those who had treated for aphids, the four most frequently used insecticides were Asana XL[®], Warrior[®], Lorsban 4E[®], and Mustang[®]. Of the 118 farmers who specified the application method used, 80% said they used ground application, 17% said they used air application, and 3% said the insecticide was applied through seed treatment. (Seed treatment was not a legal treatment in 2003 in Minnesota and has a section 18 label in Iowa.) Of the 112 farmers who specified the number of applications, only 5 said they made more than one application. Of the 110 farmers answering the question, 19% said the insecticide was mixed with a glyphosphate/Roundup application. Only 8% of the 96 farmers answering the question had mixed the insecticide with a foliar fertilizer application.

In Iowa, the three most frequently used insecticides were Asana XL[®], Warrior[®], and Lorsban 4E[®]. Of the 68 farmers who specified the application method used, 72% said they used ground application, 22% said they used air application, and 6% said the insecticide was applied through seed treatment. (Seed treatment has a section 18 label in Iowa.) Of the 66 farmers who specified the number of applications, only 2 said they made more than one application. Fifteen percent of the 59 farmers answering the question said the insecticide tank was mixed with a glyphosphate/Roundup application. None of the 50 farmers answering the question had mixed the insecticide with a foliar fertilizer application.

In Michigan, the two most frequently used insecticides were Asana XL[®] and Warrior[®]. Twenty-six of the 27 farmers who specified the application method used ground application. Of the 26 farmers who specified the number of applications, only 2 said they made more than one application. Eight of the 30 farmers answering the question said the insecticide tank was mixed with a glyphosphate/Roundup application. Eight of the 30 farmers answering the question had mixed the insecticide with a foliar fertilizer application.

In Minnesota, the three most frequently used insecticides were Asana XL[®], Warrior[®], and Lorsban 4E[®]. Nineteen of the 23 farmers, who specified the application method used, said they used ground application, four said they used air application, and none said the insecticide was applied through seed treatment. (Seed treatment was not a legal treatment in 2003 in Minnesota.) Only 1 farmer said they made more than one application. Only 4 farmers said the insecticide tank was mixed with a glyphosphate/Roundup application. None of the Minnesota farmers said they had mixed the insecticide with a foliar fertilizer application.

4. Have you treated for soybean aphids before 2004?

Fifty-five percent of the 718 farmers answering this specific question said they had treated for soybean aphids before 2004. Fifty-five percent of the 301 Iowa farmers answering said they had treated for soybean aphids before 2004. Forty-four percent of the 279 Michigan farmers answering said they had treated for soybean aphids before 2004. Seventy-six percent of the 138 Minnesota farmers answering said they had treated for soybean aphids before 2004.

5. Once a field is treated with an insecticide, can soybean aphids repopulate and cause yield damage in the same year?

Eighty-one percent of the 742 farmers completing the survey said that, once a field is treated with an insecticide, soybean aphids could repopulate and cause yield damage in the same year (Table 1). Two percent of all 742 farmers said no, 9% were not sure, and 8% did not answer the question.

Seventy-six percent of the 307 Iowa farmers said that, once a field is treated with an insecticide, soybean aphids could repopulate and cause yield damage in the same year. Three percent of the Iowa farmers said no, 13% were not sure, and 8% did not answer the question.

Seventy-nine percent of the 292 Michigan farmers completing the survey said that, once a field is treated with an insecticide, soybean aphids could repopulate and cause yield damage in the same year. One percent of the Michigan farmers said no, 8% were not sure, and 11% did not answer the question.

Ninety-three percent of the 143 Minnesota farmers completing the survey said that, once a field is treated with an insecticide, soybean aphids could repopulate and cause yield damage in the same year. Less than 1% of Iowa farmers said no, 3% were not sure, and 3% did not answer the question.

6. How did aphids damage your soybeans?

Seventy-five percent of the 742 farmers completing the survey said aphids damaged their soybeans by sucking sap (Table 2). Eleven percent of the farmers said aphids damaged their soybeans by chewing holes in the leaves. Three percent of the farmers said aphids damaged their soybeans by eating seed pods. Two farmers said aphids damaged their soybeans by feeding on roots. Twelve percent did not answer the question.

Seventy-five percent of the 307 Iowa farmers said aphids damaged their soybeans by sucking sap. Eleven percent of the farmers said aphids damaged their soybeans by chewing holes in the leaves. Two percent said aphids damaged their soybeans by eating seed pods. Two farmers said aphids damaged their soybeans by feeding on roots. Twelve percent did not answer.

Seventy-two percent of the 292 Michigan farmers said aphids damaged their soybeans by sucking sap. Eleven percent of the farmers said aphids damaged their soybeans by chewing holes in the leaves. Three percent said aphids damaged their soybeans by eating seed pods. None of the Michigan farmers said aphids damaged their soybeans by feeding on roots. Fourteen percent did not answer.

Eighty-two percent of the 143 Minnesota farmers said aphids damaged their soybeans by sucking sap. Nine percent of the farmers said aphids damaged their soybeans by chewing holes

in the leaves. Four percent said aphids damaged their soybeans by eating seed pods. No farmers said aphids damaged their soybeans by feeding on roots. Five percent did not answer.

Table 2. Percentage of farmers saying aphids damaged their soybeans in the following ways*				
	Iowa	Michigan	Minnesota	Overall
By sucking sap	75%	72	82	75%
By chewing holes in leaves	11	11	9	11
By eating seed pods	2	3	4	3
By feeding on roots	2	0	0	<1
Did not answer	12	14	5	12
*Percentage of those completing survey: 307 in Iowa, 292 in Michigan, 143 in Minnesota, and 742 overall.				

7. How often do you think aphids should be treated for profitable control?

Seventy-seven percent of the 742 farmers completing the survey said the frequency with which aphids should be treated for profitable control depends on aphid counts, weather conditions, and plant stage (Table 3). Fifteen percent said aphids should be treated once in late July or early August. Only two percent said aphids should be treated once in July and once in August. Less than 1% said aphids should be treated twice in July and twice in August. None of the farmers said aphids should be treated every week beginning in late July through August. Forty-one farmers did not answer the question.

Seventy-eight percent of the 307 farmers completing the survey said the frequency with which aphids should be treated for profitable control depends on aphid counts, weather conditions, and plant stage. Fourteen percent said aphids should be treated once in late July or early August. Only three percent said aphids should be treated once in July and once in August. Less than 1% said aphids should be treated twice in July and twice in August. None of the farmers said aphids should be treated every week beginning in late July through August. Fifteen farmers did not answer the question.

Seventy percent of the 292 Michigan farmers completing the survey said the frequency with which aphids should be treated for profitable control depends on aphid counts, weather conditions, and plant stage. Eighteen percent said aphids should be treated once in late July or early August. Only three percent said aphids should be treated once in July and once in August. One percent said aphids should be treated twice in July and twice in August. None of the farmers said aphids should be treated every week beginning in late July through August. Twenty-two farmers did not answer the question.

Eighty-seven percent of the 143 Minnesota farmers completing the survey said the frequency with which aphids should be treated for profitable control depends on aphid counts, weather conditions, and plant stage. Ten percent said aphids should be treated once in late July or early August. None of the farmers indicated the other three choices: once in July and once in August; twice in July and twice in August; and every week beginning in late July through August. Four farmers did not answer the question.

Table 3. Percentage of farmers indicating how often they thought aphids should be treated for profitable control*				
	Iowa	Michigan	Minnesota	Overall
Depends on aphid counts, weather conditions, and plant stage	78%	70%	87%	77%
Once in late July or early August	14	18	10	15
Once in July and once in August	3	3	0	2
Twice in July and twice in August	<1	1	0	<1
Every week beginning in late July through August	0	0	0	0
Did not answer	5	8	3	6
*Percentage of those completing survey: 307 in Iowa, 292 in Michigan, 143 in Minnesota, and 742 overall.				

8. At what growth stages do you believe that aphids inflict the most yield damage in your soybean fields?

Overall, 37% of the 742 farmers completing the survey believed that aphids can inflict significant damage at any growth stage (Table 4). Twenty-nine percent believed that aphids inflict the most yield damage during early flowering through pods set (R1-R3) in their soybean fields. Fifteen percent believed that aphids inflict the most yield damage from early vegetative (V5) through early flowering and pod set (R3, maybe R4). Twelve percent believed that aphids inflict the most yield damage after pods are set and seeds are filling (R4-R6). Only two percent believed that aphids inflict the most yield damage during early vegetative stages (VE-V4). Six percent did not answer the question.

In Iowa, 39% of the 307 farmers completing the survey believed that aphids can inflict significant damage at any growth stage. Twenty-eight percent believed that aphids inflict the most yield damage during early flowering through pods set (R1-R3) in their soybean fields. Sixteen percent believed that aphids inflict the most yield damage after pods are set and seeds are filling (R4-R6). Eleven percent believed that aphids inflict the most yield damage from early vegetative (V5) through early flowering and pod set (R3, maybe R4). Less than one percent believed that aphids inflict the most yield damage during early vegetative stages (VE-V4). Seven percent did not answer the question.

In Michigan, 36% of the 292 Michigan farmers completing the survey believed that aphids can inflict significant damage at any growth stage. Twenty-five percent believed that aphids inflict the most yield damage during early flowering through pods set (R1-R3) in their soybean fields. Twenty-one percent believed that aphids inflict the most yield damage from early vegetative (V5) through early flowering and pod set (R3, maybe R4). Eight percent believed that aphids inflict the most yield damage after pods are set and seeds are filling (R4-R6). Four percent believed that aphids inflict the most yield damage during early vegetative stages (VE-V4). Five percent did not answer the question.

In Minnesota, 38% of the 143 farmers completing the survey believed that aphids inflict the most yield damage during early flowering through pods set (R1-R3) in their soybean fields. Thirty-two percent believed that aphids can inflict significant damage at any growth stage. Thirteen percent believed that aphids inflict the most yield damage from early vegetative (V5) through early flowering and pod set (R3, maybe R4). Twelve percent believed that aphids inflict the most yield damage after pods are set and seeds are filling (R4-R6). Only one percent

believed that aphids inflict the most yield damage during early vegetative stages (VE-V4). Three percent did not answer the question.

Table 4. Percentage of farmers who believe that aphids inflict the <u>most</u> yield damage in their soybean fields at the following growth stages*				
	Iowa	Michigan	Minnesota	Overall
Significant damage can occur at any stage	39%	36%	32%	37%
During early flowering through pods set (R1-R3)	28	25	38	29
From early vegetative (V5) through early flowering and pod set (R3, maybe R4)	11	21	13	15
After pods are set and seeds are filling (R4-R6).	16	8	12	12
During early vegetative stages (VE-V4)	<1	4	1	2
Did not answer	7	5	3	6
*Percentage of those completing survey: 307 in Iowa, 292 in Michigan, 143 in Minnesota, and 742 overall.				

9. What do you consider to be the lowest average aphid density for profitable insecticide spraying?

Sixty-six percent of the 742 farmers completing the survey considered the lowest average aphid density for profitable insecticide spraying to be 250 aphids per plant (Table 5). Seventeen percent considered the lowest average aphid density for profitable insecticide spraying to depend on several factors. Nine percent considered the lowest average aphid density for profitable insecticide spraying to be 100 aphids per plant. Three percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be greater than 1000 aphids per plant. Less than one percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be 3 aphids per plant. Five percent did not answer the question.

In Iowa, 56% of the 307 farmers completing the survey considered the lowest average aphid density for profitable insecticide spraying to be 250 aphids per plant. Twenty-two percent considered the lowest average aphid density for profitable insecticide spraying to depend on several factors. Eleven percent considered the lowest average aphid density for profitable insecticide spraying to be 100 aphids per plant. Six percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be greater than 1000 aphids per plant. Less than one percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be 3 aphids per plant. Four percent did not answer the question.

In Michigan, 71% of the 292 farmers completing the survey considered the lowest average aphid density for profitable insecticide spraying to be 250 aphids per plant. Eleven percent considered the lowest average aphid density for profitable insecticide spraying to depend on several factors. Nine percent considered the lowest average aphid density for profitable insecticide spraying to be 100 aphids per plant. One percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be greater than 1000 aphids per plant. Less than one percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be 3 aphids per plant. Seven percent did not answer the question.

In Minnesota, 74% of the 143 Minnesota farmers completing the survey considered the lowest average aphid density for profitable insecticide spraying to be 250 aphids per plant. Seventeen percent considered the lowest average aphid density for profitable insecticide spraying

to depend on several factors. Four percent considered the lowest average aphid density for profitable insecticide spraying to be 100 aphids per plant. Three percent of the farmers considered the lowest average aphid density for profitable insecticide spraying to be greater than 1000 aphids per plant. None of the farmers considered the lowest average aphid density for profitable insecticide spraying to be 3 aphids per plant. One percent did not answer the question.

Table 5. Percentage of farmers considering each of the following to be the <u>lowest</u> average aphid density for profitable insecticide spraying*				
	Iowa	Michigan	Minnesota	Overall
250 aphids per plant	56%	71%	74%	66%
Depends on several factors	22	11	17	17
100 aphids per plant	11	9	4	9
1000 aphids per plant	6	1	3	3
3 aphids per plant	<1	<1	0	< 1
Did not answer	4	7	1	5
*Percentage of those completing survey: 307 in Iowa, 292 in Michigan, 143 in Minnesota, and 742 overall.				

10. Rate the importance of the following information for you to make a decision to treat aphids.

Over all three states, the most important information for making a decision to treat soybean aphids was scouting reports with 84% of the 742 farmers completing the survey rating this as very important (Table 6). Fifty-four percent said plant growth stage was very important in their decision. Thirty-one percent said regional reports of aphid activity were very important. Eighteen percent said the availability of custom application was very important; 13% said a neighbor treating for aphids was very important. Other information specified as important by farmers in all three states included: high yield environment, aphid population in the field, own scouting, scouting reports, other insects, rust, economics, growth stage, weather conditions, free time to apply, insecticide choice and cost, price of soybean, cost of application, temperature, moisture forecast, moisture availability, weather, weather forecast, agronomist recommendation, what's in their own field, the IPM web newsletter, population in own field, drought, and rain.

Table 6. Percentage of farmers indicating the importance of the following information for making a decision to treat aphids*				
	VERY important	somewhat important	NOT important	No answer
ALL STATES				
Scouting reports	84%	8%	<1%	9%
Plant growth stage	54	28	4	14
Regional reports on aphid activity	31	47	12	13
A neighbor treating for aphids	13	50	25	13
The availability of custom application (aerial or ground)	18	27	42	14
Other	3	2	3	92
Iowa				
Scouting reports	87	7	0	7
Plant growth stage	55	31	4	9
Regional reports on aphid activity	30	46	10	14
A neighbor treating for aphids	10	47	32	11
The availability of custom application (aerial or ground)	14	27	48	11
Other	3	<1	5	92
Michigan				
Scouting reports	78	8	<1	13
Plant growth stage	51	26	4	19
Regional reports on aphid activity	37	45	3	16
A neighbor treating for aphids	18	52	14	17
The availability of custom application (aerial or ground)	18	24	39	19
Other	4	3	1	92
Minnesota				
Scouting reports	87	9	0	4
Plant growth stage	60	27	1	13
Regional reports on aphid activity	23	57	13	7
A neighbor treating for aphids	7	51	33	9
The availability of custom application (aerial or ground)	24	31	33	11
Other	4	3	3	90
*Percentage of those completing survey: 307 in Iowa, 292 in Michigan, 143 in Minnesota, and 742 overall.				

In Iowa, the most important information for making a decision to treat soybean aphids was also scouting reports with 87% of the 307 farmers completing the survey rating this as very important. Fifty-five percent said plant growth stage was very important in their decision. Thirty percent said regional reports of aphid activity were very important. Fourteen percent said the

availability of custom application was very important, and ten percent said a neighbor treating for aphids was very important. Other information specified as important by Iowa farmers included: temperature, moisture forecast, moisture availability, weather, weather forecast, agronomist recommendation, what's in own field, IPM web newsletter, population in own field, drought, and rain.

In Michigan, the most important information for making a decision to treat soybean aphids was also scouting reports with 78% of the 292 farmers completing the survey rating scouting reports as very important in their decision to treat soybean aphids. Fifty-one percent said plant growth stage was very important in their decision. Thirty-seven percent said regional reports of aphid activity were very important. Eighteen percent said the availability of custom application was very important, and eighteen percent said a neighbor treating for aphids was very important. Other information specified as important by Michigan farmers included: weather conditions, free time to apply, insecticide choice and cost, price of soybean, and application cost.

In Minnesota, the most important information for making a decision to treat soybean aphids was also scouting reports with 87% of the 143 farmers completing the survey rating scouting reports as very important in their decision to treat soybean aphids. Sixty percent said plant growth stage was very important in their decision. Twenty-four percent said the availability of custom application was very important. Twenty-three percent said regional reports of aphid activity were very important. Seven percent said a neighbor treating for aphids was very important. Other details of the responses to this question are in the table below. Other information specified as important by Minnesota farmers included: high yield environment, aphid population in the field, own scouting, scouting reports, other insects, rust, economics, and growth stage.

Summary

As part of the multi-state project, Soybean Aphid in the North Central US: Implementing IPM on a Landscape Scale (funded in USDA's CSREES' Integrated Research, Education and Extension Competitive Grants Program – Integrated Pest Management, 112.B Risk Avoidance and Mitigation Program, RAMP), 742 farmers in Iowa, Michigan, and Minnesota were surveyed in January, February, and March of 2005 to measure soybean aphid IPM implementation and adoption. This is the first in a series of annual surveys designed to track changes in IPM implementation and adoption over time. The results from this initial survey are presented in this report.

Over all three states, the average soybean acreage was 521 acres. The median (or middle of the range) soybean acreage was 340 acres. Thirteen percent of the farmers indicated they had treated for soybean aphid in 2004, and they had treated an average of 50% of their soybean acreage. Fifty-three percent of the farmers said they had treated for soybean aphids before 2004.

Overall, the farmers showed a fairly good understanding of soybean aphids and their impact on soybeans. Eighty-one percent of the farmers said that, once a field is treated with an insecticide, soybean aphids could repopulate and cause yield damage in the same year. Seventy-five percent said aphids damaged their soybeans by sucking sap. Seventy-seven percent said the frequency with which aphids should be treated for profitable control depends on aphid counts, weather conditions, and plant stage. Thirty-seven percent believed that aphids can inflict significant damage at any growth stage; 29% believed that aphids inflict the most yield damage

during early flowering through pods set (R1-R3). Sixty-six percent considered the lowest average aphid density for profitable insecticide spraying to be 250 aphids per plant; 17% considered the lowest average aphid density for profitable insecticide spraying to depend on several factors. Over all three states, 84% of the farmers said the most important information for making a decision to treat soybean aphids was scouting reports; 54% said plant growth stage was very important in their decision.

Controlling Soybean Aphids in Soybeans
RECRUITMENT STATEMENT
Brief Farmer Survey

Since you are attending today's meeting on soybean production, we invite you to participate in a regional research study of the cost, benefit, perception, and adoption of production methods for reducing the negative impacts of soybean aphids in soybean production. Results will be made available by state.

The purpose of this study is to better understand growers' motives and levels of adoption of soybean aphid IPM. If you agree to be in this study, you will be asked a series of questions about your practices, expenses, and yields related to soybean production; your perceptions of the efficacy of the alternative aphid control methods; your farm; and yourselves. There are no questions that will allow us to identify you, your farm, or your answers. The survey will take approximately 10 minutes to complete

The only risks involved with this study involve the possibility that questions regarding you, your farm and your practices, expenses, and yields may be considered sensitive. However since the surveys have no name or identification on them, they are anonymous and no one can identify you, your farm, or your answers.

The benefits to participation are the chance to help improve our understanding of the costs, benefits, and efficacy of alternative production techniques. This knowledge can potentially improve your economic viability and reduce your exposure to risk.

Your decision whether or not to participate is entirely voluntary and will not affect your current or future relations with our University or the University of Minnesota. Further details are available in the consent statement being handed out with the brief survey.

Are there any questions about this survey or why you are being asked to participate?

[If there are questions, we'll answer them at this point.]

If there are not we'll hand out the survey. Please return your completed surveys to the end of the row [or boxes by the door, ... These details may differ with meeting location.]

Controlling Soybean Aphids in Soybeans
CONSENT STATEMENT
Brief Farmer Survey

You are invited to be in a research study of the cost, benefit, perception, and adoption of production methods for reducing the negative impacts of soybean aphids in soybean production. You were selected as a possible participant because you are attending a soybean production meeting. We ask that you read this form and ask any questions you may have before agreeing to be in this portion of the regional study.

Dr. Kent Olson, Professor in the Department of Applied Economics at the University of Minnesota, is conducting this portion of the study. Results will be available and reported in all states involved.

Background Information: The purpose of this study is to better understand growers' motives and levels of adoption of soybean aphid IPM. If you agree to be in this study, you will be asked a series of questions about your practices, expenses, yields, related to soybean production your perceptions of the efficacy of the alternative aphid control methods, your farm, and yourselves. There are no questions that will allow us to identify you, your farm, or your answers. The survey will take approximately 10 minutes to complete

Procedures: If you agree to be in this study, you will be asked a series of questions about your practices, expenses, and yields related to soybean production; your perceptions of the efficacy of the alternative aphid control methods; your farm; and yourselves. There are no questions that will allow us to identify you, your farm, or your answers. The survey will take approximately 10 minutes to complete. This will be the only activity you will need to do as part of this portion of the study.

Risks and Benefits of Being in the Study: The only risks involved with this study involve the possibility that questions regarding you, your farm and your practices, expenses, and yields may be considered sensitive. However since the surveys have no name or identification on them, they are anonymous and no one can identify you, your farm, or your answers.

The benefits to participation are the chance to help improve our understanding of the costs, benefits, and efficacy of alternative production techniques. This knowledge can potentially improve your economic viability and reduce your exposure to risk.

Confidentiality: The records of this study will be kept private. There is no name or identification attached to the survey so the information will be anonymous. There is no way to identify the person being interviewed. Only the staff involved with the survey and its analysis will have access to the completed surveys. In any sort of report we might publish, we will include only summary information and statistical results. We will not include any information that will make it possible to identify a subject. Research records will be kept in a secure area; only researchers will have access to the records.

Voluntary Nature of the Study: Your decision whether or not to participate is entirely voluntary and will not affect your current or future relations with the University of Minnesota.

Contacts and Questions: The researchers conducting this study are Dr. Kent Olson, Department of Applied Economics, University of Minnesota. You may ask any questions you have now. If you have any questions later, you may contact Kent Olson at 612-625-7723. If you have any questions or concerns regarding the study and would like to talk to someone other than the researchers, contact Research Subjects' Advocate line, D528 Mayo, 420 Delaware Street S.E., Minneapolis, Minnesota 55455; telephone (612) 625-1650.

This is your copy to keep for your records.

Awareness and Use of IPM for Soybean Aphid Control

LOCATION: _____ DATE: _____

PLEASE ANSWER THE FOLLOWING QUESTIONS BY FILLING IN THE BLANK OR CIRCLING YOUR ANSWER.

1. How many acres of soybeans did you plant in 2004? _____
2. What percent of your soybean acres did you treat for soybean aphids in 2004? _____%
3. If you treated for aphids, what insecticide did you use? And at what rate and how was it applied?
 - a. Insecticide: _____
 - b. Rate: _____
 - c. How was it applied? (circle one): ground air seed treatment
 - d. Did you make more than one application? No Yes (If yes, describe the details on back.)
 - e. Was the insecticide tank mixed with:
 - (1) a glyphosphate/Roundup application? Yes No Not sure
 - (2) a foliar fertilizer application? Yes No Not sure
4. Have you treated for soybean aphids before 2004? Yes No Not sure
5. Once a field is treated with an insecticide, can soybean aphids repopulate and cause yield damage in the same year? Yes No Not sure
6. How did aphids damage your soybeans?
 - a. By chewing holes in the leaves
 - b. By eating seed pods
 - c. By sucking sap
 - d. By feeding on roots
7. How often do you think aphids should be treated for profitable control?
 - a. Once in late July or early August
 - b. Twice in July and twice in August
 - c. Once in July and once in August
 - d. Every week beginning in late July through August
 - e. Depends on aphid counts, weather conditions, and plant stage
8. At what growth stages do you believe that aphids inflict the most yield damage in your soybean fields?
 - a. During early vegetative stages (VE-V4)
 - b. From early vegetative (V5) through early flowering and pod set (R3, maybe R4)
 - c. During early flowering through pods set (R1-R3)
 - d. After pods are set and seeds are filling (R4-R6)
 - e. Significant damage can occur at any stage
9. What do you consider to be the lowest average aphid density for profitable insecticide spraying?
 - a. 3 aphids per plant
 - b. 100 aphids per plant
 - c. 250 aphids per plant
 - d. >1000 aphids per plant
 - e. Depends on several factors
10. Rate the importance of the following information for you to make a decision to treat soybean aphids.

a.	2	1	0	The availability of custom application (aerial or ground)	
b.	2	1	0	Plant growth stage	2 = VERY important to you
c.	2	1	0	Scouting reports (mine or a consultant's)	1 = somewhat important to you
d.	2	1	0	A neighbor treating for aphids	0 = NOT important to you
e.	2	1	0	Regional reports on aphid activity	
f.	2	1	0	Other, please specify: _____	