SOYBEAN APHID SUCTION TRAPPING [1/]

Eileen Cullen [2/]

An entry point for understanding soybean aphid as a pest during the soybean growing season is to be familiar with how this insect alternates between asexual and sexual phases on two different plant hosts, buckthorn and soybeans, over the calendar year.

Soybean aphid overwinters in the egg stage on common buckthorn, an exotic, weedy, shrub common in much of the Midwest north of I-80. Eggs hatch on buckthorn in spring (late March, early April). From each overwintered egg on buckthorn in early spring, a wingless female soybean aphid known as the fundatrix, or "stem mother" hatches. These stem mothers are asexual and give live birth to wingless female aphid nymphs, producing several generations on buckthorn. By late spring/early summer, winged soybean aphid females are produced that leave buckthorn in search of soybean.

Migrant soybean aphid females arrive in soybean fields in mid- to late June and begin to form colonies, leading to multiple generations. Soybean aphids during the growing season are all female and reproduce without mating, giving birth to live female nymphs. Winged aphids that occur during the summer months are females capable of dispersing between fields to colonize new soybean host plants. In fall, soybean aphid females produce winged males and winged females (gynoperae). These winged migrants take flight back to buckthorn. Once they arrive on buckthorn, winged females give birth to a non-winged egg-laying female (oviparae). She mates with the winged males on buckthorn and lays the overwintering eggs to start the process again.

Aphid expert Dr. David Voegtlin *Illinois Natural History Survey* has been successful at monitoring the September & October flights of soybean aphid from soybeans back to buckthorn. For the past four years, Voegtlin has operated a suction trap network in Illinois (currently 9 traps). In 2001 and 2003, Illinois had low fall flights and the next growing seasons (2002 and 2004, respectively) the soybean aphid was not an economic problem. In fall 2002 the Illinois suction traps had a large fall flight and growers experienced a major and widespread regional soybean aphid outbreak during the 2003 soybean growing season. The Illinois fall flight in 2004 was the highest yet, and 2005 proved to be another "soybean aphid year" in the region, although not as uniformly as during the 2003 outbreak.

In 2005, Wisconsin joined a new Midwest soybean aphid suction trap network. Wisconsin (5 traps) joins Iowa (4 traps), Indiana (6), Kansas (1), Kentucky (1), Michigan (3), Minnesota (4), Missouri (1), Nebraska (1) and Virginia (1) in this expanded soybean aphid suction trap network.

Wisconsin soybean aphid suction traps are in operation June through October in Walworth County, near Sharon, Wisconsin; Columbia County at the Arlington Agricultural Research Station; Waushara County at the Hancock Agricultural Research Station; Grant County at the Lancaster Agricultural Research Station; and in Eau Claire County at the Pioneer Hi-Bred Int'l. Research Station.

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Objectives of the UW Extension Soybean Aphid Suction Trapping project are to:

1. Establish a statewide soybean aphid suction trap grid in Wisconsin.

2. Determine when soybean aphids leave their overwintering host (buckthorn) to colonize Wisconsin soybean fields. Use this information to alert Wisconsin producers of aphid dispersal to new fields throughout the growing season as well as threat incidence of soybean viruses vectored within season by winged soybean aphids.

3. Estimate overwintering soybean aphid populations moving back to buckthorn in the fall as a means to predict soybean aphid population pressure (low, moderate, high) in soybeans the next growing season.

Soybean aphid suction trap captures in June indicate that winged female aphids have left buckthorn, and the potential for soybean infestation has begun for the season. Likewise, trap captures during July and August indicate the level of dispersal flight between soybean fields as soybeans undergo reproductive growth. While suction trapping is not a replacement for field monitoring, it does provide a regional alert system. The most important objective of the project is to record fall trap captures of winged soybean aphid females and males migrating back to the overwintering host, buckthorn. Fall trap captures appear to have predictive value as to the size and success of the overwintering soybean aphid population and its impact during the subsequent growing season. Will this pattern hold throughout the region, and from year to year?

To answer this question, text excerpts are provided below from an excellent recent article by David Voegtlin and Robert O'Neil in Vol. 2, No. 2, May 12, 2005 of *The New Agriculture Network*. You can access the entire article online at the *Wisconsin Crop Manager* Vol. 12, No. 12, May 26, 2005 http://ipcm.wisc.edu/wcm/pdfs/2005/05-12insect2.html

> "Many factors can influence the size of the following year's aphid population in soybeans. To start with, large numbers of multi-colored Asian lady beetles can be found on shrubs and trees in the latter part of September and into October. An abundance of these predators on buckthorn can effectively prevent the deposition of over-wintering eggs, and the subsequent production of spring migrants that fly into soybeans. Those eggs that are successfully deposited must survive the winter and after successfully hatching, they need to survive the spring weather. Heavy rains and sub-freezing temperature in early spring can eliminate young colonies on buckthorn. In the spring, lady beetles (and other predators) become active and will feed on soybean aphid colonies on buckthorn. So while the aphid can outbreak, factors that lead to an outbreak are many, and all along the way lay pitfalls that can help prevent or ameliorate aphid outbreaks in any given year."

Based on low fall 2005 trap captures in Wisconsin and neighboring states, the pattern would suggest a relatively low soybean aphid pest status level during the 2006 growing season. This is the first test of the hypothesis at a regional scale.

Reference

Allison, D., and K.S. Pike. 1988. An inexpensive suction trap and its use in an aphid monitoring network. J. Agric. Entomol. 5:103-107.

Soybean Aphid Suction Traps in Wisconsin

North Central IPM Center

Regional Soybean Aphid Suction Trap Network

CSREES

WISCONSIN SOYBEAN MARKETING BOARD

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Suction Traps started in Illinois Fall 2001.

Predictive potential based on fall trap captures of winged soybean aphid males and females flying back to buckthorn to overwinter.

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Illinois Experience …

Fall 2001 Trap Catches Very Low
2002 Growing Season low soybean aphid year

Fall 2002 Traps caught 700+ migrants
2003 Growing Season outbreak soybean aphid year

Fall 2003 Trap Catches again Very Low
2004 Growing Season very low soybean aphid year

Fall 2004 Traps caught 1,765 migrants
2005 Growing Season moderate to high aphid year

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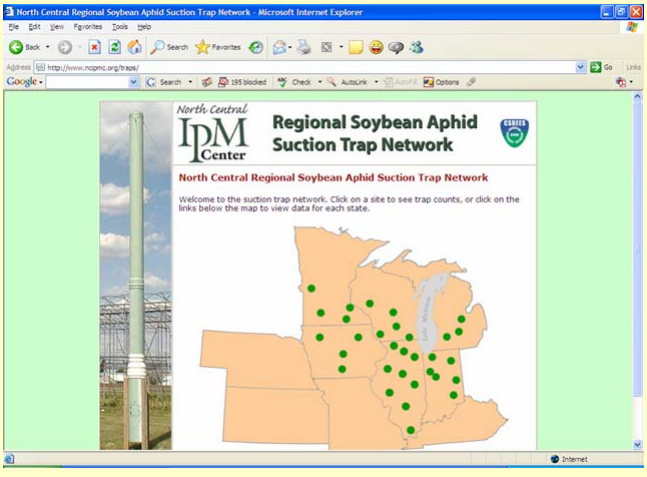
http://www.ncipm.org/traps/



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Fall 2005 to
2006 Growing Season

6 states now testing suction trap predictive value

Collection Jars sent weekly June – October to *Illinois Natural History Survey* for expert aphid identification.

Counts posted to Website

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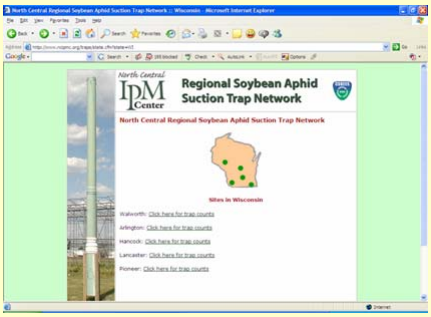

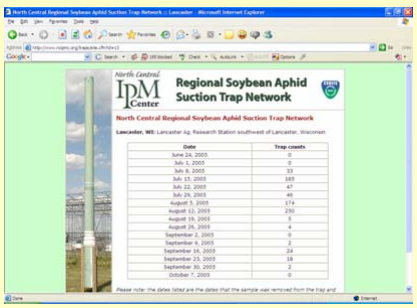

Walworth Co. (near Sharon, WI)
Arlington Agric. Res. Station
Lancaster Agric. Res. Station
Hancock Agric. Res. Station
Pioneer Research Station (near **Eau Claire, WI**)

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WI Soybean Aphid Suction Trap Catch, 2005

Date	Walworth	Arlington	Hancock	Lancaster	Eau Claire
Jul 15	75	316	46	185	17
Jul 22	147	---	81	47	38
Jul 29	30	42	11	46	33
Aug 5	180	83	51	174	226
Aug 12	75	78	120	250	278
Aug 19	4	19	35	5	222
Aug 26	5	8	0	4	8
Sept 2	3	0	1	0	7
Sept 9	0	1	1	2	3
Sept 16	0	1	3	24	1
Sept 23	5	0	0	18	3
Sept 30	0	0	---	2	1
Oct 7	0	0	0	0	---
Oct 14	0	0	0	0	0

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Key Points ...

- Summer suction trap catch is not predictive, these catches represent all-female population. Dispersal flight between fields in growing season.
- Watch September-October flights for predictive potential! These are winged males & females migrating to buckthorn, the host plant where overwintering eggs are laid.

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Preliminary conclusions …

- Fall 2005 Trap captures low in WI (see previous slide) other states similar.
- Based on history of traps in Illinois, low 2005 fall captures we are seeing now indicate low soybean aphid year potential for 2006.

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