

Soybean Aphids

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The soybean aphid (*Aphis glycines*) is an eastern Asian soybean pest that is rapidly invading the United States. A recent immigrant, it was first detected in nine midwestern states—including Minnesota—in the summer of 2000. The soybean aphid now occurs from Minnesota east to New York and south to Missouri and Kentucky. Significant aphid damage and soybean crop losses in 2000 were reported from Wisconsin, Illinois, and Michigan. This summer, 2001, severe infestations are being reported throughout southeastern Minnesota. This brochure will update you on the soybean aphid, its life cycle, how it damages soybeans, and possible management techniques.

How do I recognize soybean aphids?

- ◆ Pale yellow aphid less than 1/16" long
- ◆ Only aphid that forms colonies on soybeans
- ◆ Posterior: black cornicles and pale cauda



*Closeup of soybean aphid (R. Venette)
illustrating black cornicles and cauda.*

Why should I be concerned?

◆ **Little contains the aphids' spread**

The aphids' hosts (soybean, buckthorn) are common throughout Minnesota. Climate is unlikely to be a barrier since aphids successfully survived last winter in Minnesota.

◆ **Invasive species often are worse initially**

It takes a while for natural enemies to adjust to the pest's presence.

◆ **Potential yield loss is significant**

China reported up to 58% yield losses; 13% yield loss occurred in a Wisconsin study in 2000. The soybean aphid also spreads soybean mosaic and other viral diseases.

◆ **Insecticide use is likely to increase**

Soybeans are rarely treated with insecticide now, but the threat posed by soybean aphids and uncertainty of how to manage them will increase insecticide use.

◆ **Not enough research or experience is available**

Infestations are often unrecognized, leading to unexpected yield losses. We don't yet know enough about effective scouting or how many aphids soybeans will tolerate before yield loss occurs.



*Heavily infested field near Red Wing
in 2000 (K. Ostlie).*

How do aphids damage soybeans?

Aphids pierce the soybean's plumbing system and suck sap. Losses may occur for two reasons:

1. aphids remove photosynthates, which affects canopy development, podset and fill, and possibly oil/protein levels.
2. soybean aphids transmit soybean mosaic virus, which causes additional loss and may affect seed certification.



Infested soybeans may demonstrate potassium deficiency that can be mistaken for soybean cyst or iron chlorosis (K. Ostlie)

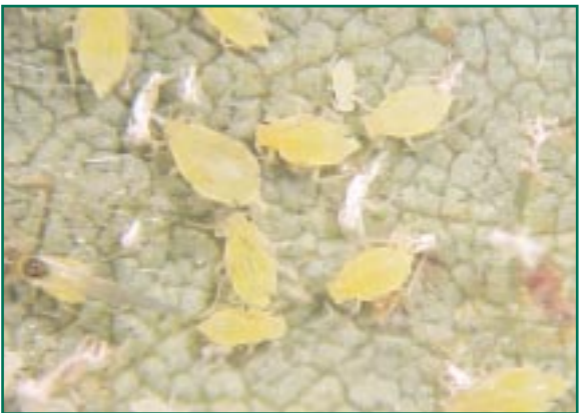
Scouting for aphids

- ◆ During vegetative growth, look for them under young upper leaves, on petioles, and on the upper stem.
- ◆ During later vegetative stages, also check new branches in the lower canopy.
- ◆ During reproductive stages, look at the underside of leaves for honeydew (sap excreted by aphids that falls on lower leaves), sooty mold (a black mold on honeydew), and the white skins cast off by molting aphids.
- ◆ Look for other obvious insects that aphids attract: ants that tend aphids, and ladybird beetles that feed on aphids.



*Ants tending soybean aphids on new leaves
(K. Ostlie)*

In heavily infested fields, aphid populations may decline rapidly as a result of fungal disease epidemics or production of alates (winged females). Fungal outbreaks are more likely after canopy closure and prolonged wet periods. Females begin producing winged alates when crowding occurs or the health of the soybean plant deteriorates markedly.



Colony of aphids in transition: Note winged female (left side), nymph developing wings (lower right), and numerous cast skins (white) (H. Russell).

Where are Minnesota infestations?

This map shows the distribution on July 31, 2001, based on U of MN and MN Department of Agriculture surveys. By late summer, they are expected to move further west and north.



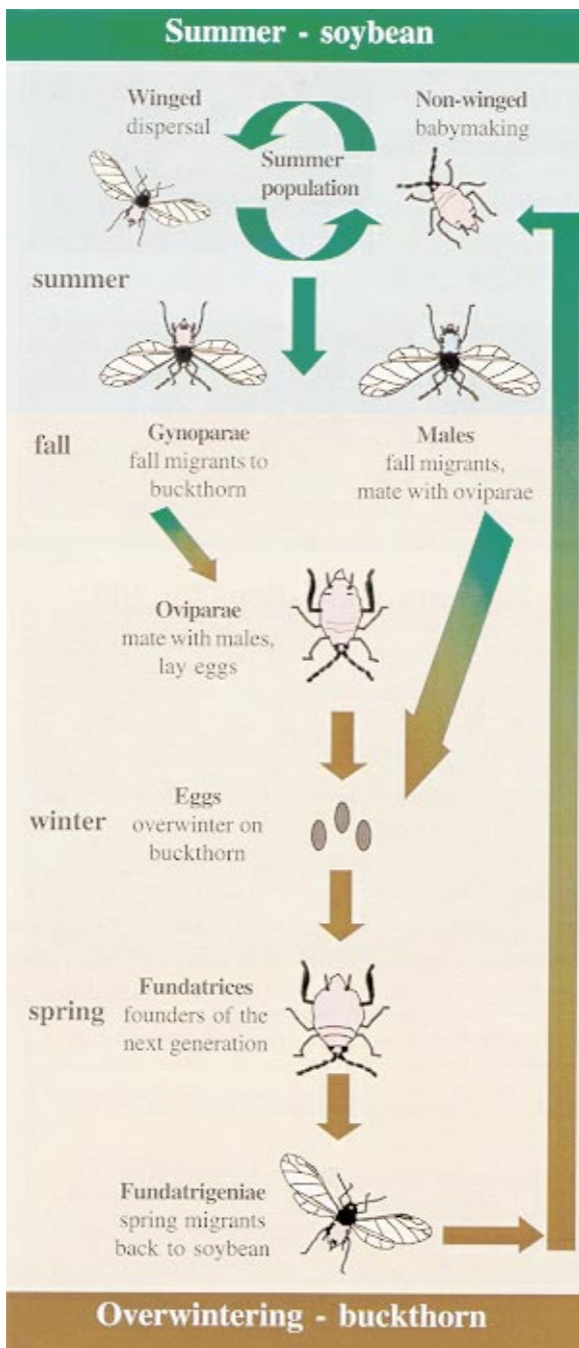
Soybean aphid distribution 7/31/2001 (R. Venette)

Managing soybean aphids

There are more questions than answers about soybean aphid management. We have not identified production factors that minimize the risk of aphid infestations. Aphid impacts on soybean yield, quality, and disease incidence in Minnesota are unknown. Yield losses probably reflect the cumulative effect of aphid numbers over time and soybean stage. No stage-specific thresholds have been developed for row or drilled soybeans, but several hundred aphids per plant during reproductive stages are likely to damage soybeans. Neither the short- nor long-term impacts of insecticide application have been studied in the U.S. As a result, farmers and their agricultural advisors will find it difficult to decide whether or not to spray, especially with low soybean prices. If you decide to apply an insecticide, record pre-treatment infestation levels, leave check strips, and check yields so you can learn from the situation.

Life Cycle of the Soybean Aphid

Illustration by C. DiFonzo



The soybean aphid's life cycle is complicated, but typical of most aphids. The aphid splits its life cycle between a primary (or overwintering) host, a woody shrub called buckthorn, and its dominant summer host, soybeans.



Buckthorn (Rhamnus spp.) is the winter host (F. Breitenbach).

Only females, which bear live young without sexual reproduction, are present in the summer. The wingless form (apterae) predominates. Overcrowding or reduction in soybean quality triggers production of the winged form (alates). Alates disperse to deposit live nymphs on other soybean plants within the field or in other fields. Females grow quickly and are capable of bearing their own young within 7 days; up to 15 generations per season can occur on soybeans. Populations may double in as little as 2-3 days. In the fall, winged males and females are produced that seek out buckthorn, where sexual reproduction occurs. Eggs overwinter on the buckthorn and hatch in the spring. Three generations are produced on newly expanding buckthorn leaves before the aphids migrate back to young soybeans.

What are my insecticide options?

The following insecticides are labeled for foliar application to soybeans. Three that specifically list Chinese aphids are Furadan 4F, Lorsban 4E, and Warrior T. Neither effectiveness nor economic benefit of these products has been studied. Carefully note re-entry and pre-harvest intervals listed below. Control may be more difficult when aphids are under leaflets, canopy is closed, and aphids have shifted to mid-canopy leaves and pods during reproductive stages.

Ground application with high water volume (20 gallons per acre) is strongly recommended.

Warning: Insecticides may disrupt natural control of soybean aphids by predators and para-

<u>Insecticide</u>	<u>Rate per acre</u>	<u>REI¹</u>	<u>PHI²</u>
Ambush 2E*	6.4 - 12.8 oz	12 hrs.	60 days
Arctic 3.2E*	4.0 - 8.0 oz	12 hrs.	60 days
Asana XL*	5.8 - 9.6 oz	12 hrs.	21 days
dimethoate	(see labels)	48 hrs.	21 days
Furadan 4F*	0.50 pt	48 hrs.	21 days
Lannate*	0.75-1.5 pt	48 hrs.	14 days
Lorsban 4E*	1.0 - 2.0 pt	24 hrs.	28 days
PennCap-M*	2.0 - 3.0 pt	4 days	20 days
Pounce 3.2EC*	4.0 - 8.0 oz	12 hrs.	60 days
Warrior T*	3.2 - 3.84 oz	24 hrs.	45 days

* *Restricted-use insecticide*

¹ Restricted Entry Interval. Entry into treated field within this interval requires protective clothing and gear specified on label.

² Pre-harvest Interval. Do not apply insecticide during this period.

www.soybeans.umn.edu

Funding provided by Minnesota Soybean Research & Promotion Council

M1007

August 2001

Produced in partnership by the University of Minnesota Extension Service and the College of Agricultural, Food, and Environmental

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