

Suppression of Soybean Aphids by Natural Enemies

When aphid migration is low, natural enemies can suppress aphid populations. During infrequent outbreak years, greater immigration levels overwhelm natural enemies and aphid populations escape their control.

SOYBEAN APHIDS ARE a sporadic invasive pest that arrive each year in July via southern winds. Widespread outbreak levels occurred in 2006, 2008, 2011 and 2017. During low soybean aphid years, natural enemies including lady beetles, green and brown lacewings, minute pirate bugs, damsel bugs, hoverflies and parasitoids have provided sufficient control. The outbreak in 2017 allowed researchers to compare aphid suppression by natural enemies between outbreak and non-outbreak years.

In 2017 and 2018, 12 and 11 field experiments, respectively, were established in southern Manitoba. Aphid colonies were established on soybean plants that were either open to natural enemies or isolated from them via screens. On fields edges, Malaise traps (Figure 1) were set up to monitor the movement of natural enemies from adjacent habitats (either canola, wheat, alfalfa or wooded areas).

Seven of the 12 fields in 2017 had aphid populations above the economic threshold

of 250 aphids per plant. In contrast, 2018 was the opposite, with very few aphids occurring at all.

Aphids escaped control by natural enemies in 2017 due to high levels of aphid immigration into the field. Significant aphid suppression occurred in only one of the 12 fields, on a field where aphid immigration was low. In 2018, aphid migration was low and natural enemies were able to suppress all experimental aphid colonies.

During the outbreak year, massive immigration of winged aphids overwhelmed natural enemies and aphid populations escaped control. When aphid migration was low, which is the typical situation in Manitoba, natural enemies were able to suppress them.

Natural enemies can significantly reduce aphid populations, but it may be economical to consider an insecticide treatment in outbreak years. To determine if control is economical, consider using the Aphid Advisor app, which calculates



Lady beetle larvae (A) and adults consume up to 107–118 aphids per day. Hoverfly larvae (B) consume up to 17 aphids per day.

a dynamic action threshold based on aphid and natural enemy counts, soybean growth stage and air temperature.

As aphid populations grew week-to-week in 2017, so did populations of hoverflies, lady beetle larvae and adults, minute pirate bugs, damsel bugs, green and brown lacewings and aphid mummies from parasitoids.

Hoverflies (syrphids) made up the highest proportion of predators and increased six-fold in response to the aphid outbreak. Lady beetle larvae and adults (coccinellids) were the second most common and increased four-fold.

Hoverflies and green lacewings moved between soybeans and canola more than between soybeans and other habitats, likely since canola provided pollen as an additional food source. Lady beetles moved from all nearby habitats into soybeans and stayed to feed on aphids. Overall, natural enemies moved among soybeans, wheat, canola, alfalfa and wooded areas, suggesting they are all contributors of natural enemies.

Determining the best combination of natural habitats and crops that maximize natural enemy populations is the next step to achieving sustainable pest control. ▀

Figure 1. Bi-directional Malaise trap between soybeans and adjacent habitats to monitor the movement of natural enemies between crops.



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