2012

Effect of Certified Organic Products on Soybean Aphid

Kenneth T. Pecinovsky
Iowa State University, kennethp@iastate.edu

Brian J. Lang
Iowa State University, bjlang@iastate.edu

Effect of Certified Organic Products on Soybean Aphid

Abstract
The soybean aphid (Aphis glycines), native to China, has become the most economically damaging insect in soybeans in northeast Iowa. Soybean aphid may have up to 18 generations per year, beginning with overwintering eggs on the alternate host buckthorn. In spring, winged aphids migrate from buckthorn to nearby emerged soybeans. Generations advance in these fields, and then another winged migration occurs in summer spreading from these fields to others. A third migration occurs in fall with aphids moving back to buckthorn. Depending on the season, soybean proximity to buckthorn, and soybean aphid migration patterns, populations of aphids tend to peak in soybeans anywhere from late July to early September. With higher aphid populations, the production of honeydew (the excrement of the aphid) and the resulting black fungus that grows on it (sooty mold) may become apparent. Aphid feeding may cause stunted plants, reduced pods and seeds, and may also transmit viruses that could cause mottling and distortion of leaves, reduced seed set, and discolored seeds.

Keywords
RFR A11109

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

Effect of Certified Organic Products on Soybean Aphid

RFR-A11109

Ken Pecinovsky, farm superintendent
Brian Lang, field agronomist, ISU Extension

Introduction

The soybean aphid (*Aphis glycines*), native to China, has become the most economically damaging insect in soybeans in northeast Iowa. Soybean aphid may have up to 18 generations per year, beginning with overwintering eggs on the alternate host buckthorn. In spring, winged aphids migrate from buckthorn to nearby emerged soybeans. Generations advance in these fields, and then another winged migration occurs in summer spreading from these fields to others. A third migration occurs in fall with aphids moving back to buckthorn. Depending on the season, soybean proximity to buckthorn, and soybean aphid migration patterns, populations of aphids tend to peak in soybeans anywhere from late July to early September. With higher aphid populations, the production of honeydew (the excrement of the aphid) and the resulting black fungus that grows on it (sooty mold) may become apparent. Aphid feeding may cause stunted plants, reduced pods and seeds, and may also transmit viruses that could cause mottling and distortion of leaves, reduced seed set, and discolored seeds.

The established economic threshold for soybean aphid on conventional soybean production is 250 aphids/plant with the aphid population increasing, and for plant development stages up to R5.5. A threshold level has not been determined in organic soybean production using organic certified pesticides, repellents, or other products.

There are several natural enemies that help manage soybean aphid, including lady beetles, lacewings, syrphids, orius, nabids, spiders, and predatory wasps and fungi. It is a challenge to try to retain or encourage beneficial insects while trying to control aphid pest populations.

In 2002 and 2003, ISU Extension in northeast Iowa conducted trials on soybean aphid with certified organic products. Of the compounds studied in these trials, the most promising was azadirachtin, the active ingredient in Neem.

Recent collaboration with Quality Organic Producers Cooperative in northeast Iowa has allowed for additional research to be conducted on soybean aphid in 2010 and 2011 at the ISU Northeast Research Farm, Nashua. The following is a summary of these trials.

Materials and Methods

The two research sites at the ISU Northeast Research Farm were prepared with fall chisel plowing cornstalks and spring field cultivation. Blue River 2A12 soybeans were planted on May 20, 2010 and Blue River 15F1 soybeans were planted on May 24, 2011. They were planted at 189,000 seeds/acre in 30-in. rows. Individual plots were 6 rows wide by 60 ft long in a randomized complete design with four replications.

The 2010 treatments included: 1) Untreated control, 2) Warrior, a synthetic pyrethroid to provide an "aphid-free" check, 3) Neem + Karanja oil (www.neemresource.com), 4) Sugar + Peroxide (www.rebekahspure living.com), and 5) PyGanic (www.mgk.com/Crop-Protection.aspx). The 2011 trial included treatments 1 through 4. Pyganic was not included in the 2011 trial because of its poor results in the 2010 trial as well as the earlier trials in Winneshiek County during 2003.

Aphid populations were counted weekly each season. Treatments were first applied once soybean aphid populations averaged over 10 aphids/plant, and then reapplied once every two weeks, except for Warrior, which was applied only once. The trials were harvested on September 10, 2010 and September 29, 2011 by combining the middle 4 rows of the 6-row plots, 10 ft wide by 56 ft long.

Results and Discussion

Aphid populations were low in 2010, never exceeding 300 aphids/plant in the trial (Figure 1), and showed no yield response to treatments (Table 1). In 2011, aphid populations exceeded 500 aphids/plant late in the season (Figure 2), but as in 2010, did not result in a significant yield response for any of the treatments (Table 1). The Sugar+Peroxide treatment reduced aphid populations in both seasons by approximately 28 percent. The Neem reduced aphid populations by about 45 percent in 2011, but had no response in 2010. However, in the 2010 trial we believe we miscalculated and under applied the rate of active ingredient of Neem for the trial. In previous trials in Winneshiek County in 2002 and 2003, Neemix 4.5 reduced aphid populations by 71 percent and 37 percent, respectively. Pyganic showed no response in this trial in 2010, and only reduced aphid populations in the 2003 Winneshiek County trials by 14 percent.

Grain samples were collected from every plot each year and tested for percent protein, fiber and oil. For each trial, samples did not have any significant differences in grain quality.

Acknowledgements

Thanks to Quality Organic Producers Cooperative in Decorah, Iowa for providing support to conduct these trials.

Table 1. Effect of soybean aphid treatments on grain yield and harvest moisture.

	2010		2011	
Treatment	Yield	Moisture	Yield	Moisture
	bu/ac	%	bu/ac	%
Untreated control	55.9a	13.3a	49.8a	14.8a
Warrior	57.6a	13.4a	53.4a	14.8a
Neem + Karanja Oil	55.8a	13.5a	51.9a	14.9a
Sugar + Perovide	56.5a	13.4a	50.8a	14.9a
Pyganic	55.6a	13.5a		
$LSD_{0.05}$[1]	3.7	0.3	3.7	0.3

[1]LSD = least significant difference. Means followed by the same letter in the same column are not significantly different with 95 percent certainty.

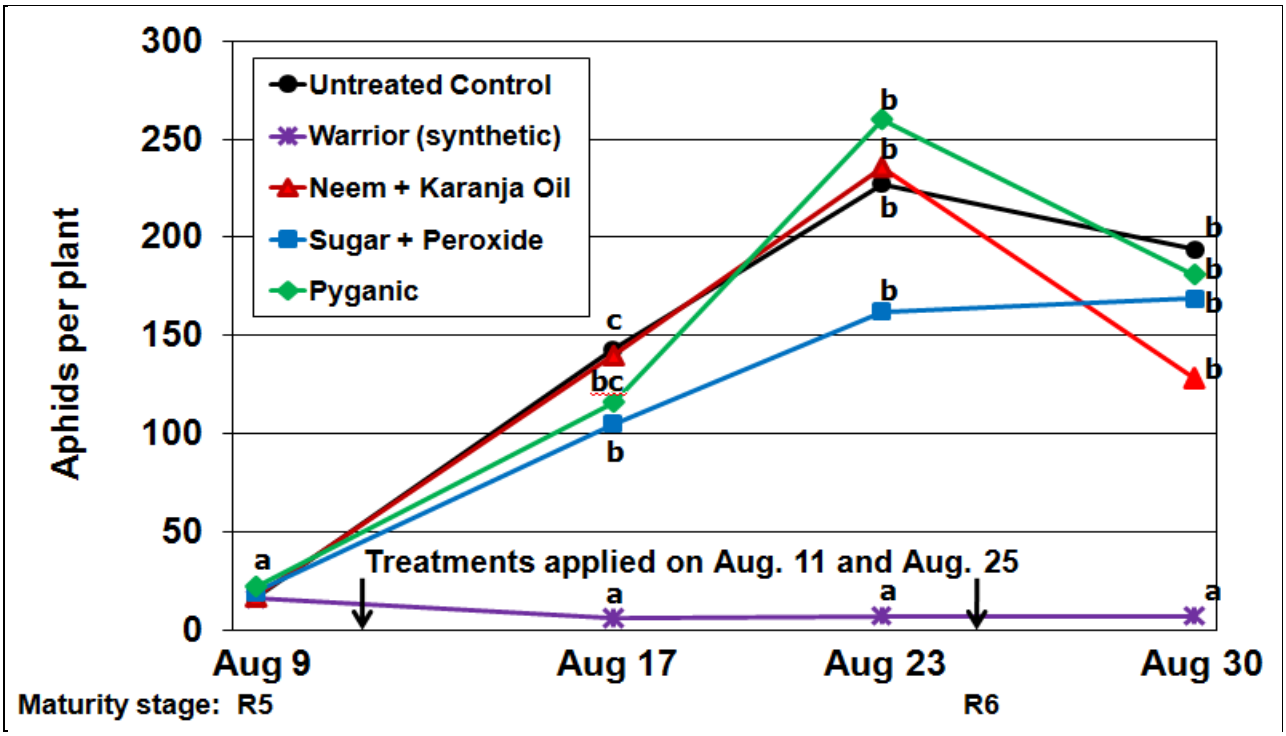

Figure 1. Aphid populations for various treatments applied in 2010. Treatments with the same letters on the same dates were not significantly different.

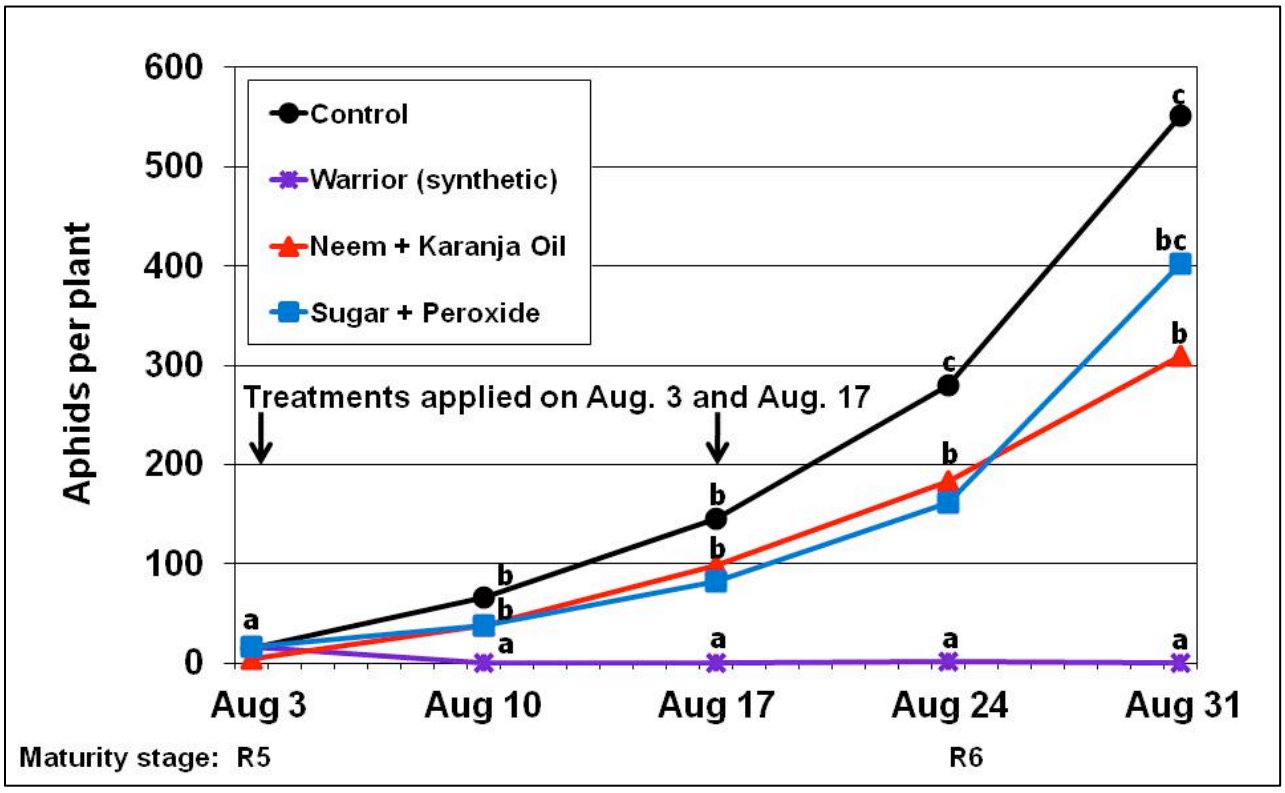

Figure 2. Aphid populations for various treatments applied in 2011. Treatments with the same letters on the same dates were not significantly different.