



Healthy Food, Diverse Farms, Vibrant Communities

## Aphid Resistance in Organic Soybean Production

### Cooperators

Ron Rosmann

### Project Timeline

One year

### Web Link

[practicalfarmers.org/resources](http://practicalfarmers.org/resources)

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### Funding

Blue River Hybrids

### Abstract

*Soybean aphids can negatively impact yields for farmers in conventional and organic farming systems. New soybean varieties have become available that might resist aphids. In this one-year trial, the non-resistant soybean variety yielded more compared to the resistant variety. However, fewer aphids were observed on the resistant variety. Future research is needed to test new soybean varieties under aphid pressure.*

### Background

Soybean aphids have become an economically important pest over the past decade in the Midwest. This is the case for both conventional and organic growers. According to organic seed literature, if aphids are present for extended periods of time, yields can be reduced by 50% or more. Conventional growers have insecticides at their disposal should an outbreak occur over the Integrated Pest Management (IPM) threshold levels. Organic soybean producers are limited to only a few commercial products that are cleared for organic use. They are Neem oil, mineral oil, insecticidal soap, and Pyrethrins. Their efficacy for controlling aphids in soybeans has been mixed at best.

This past year (2009) Blue River Hybrids introduced an aphid resistant soybean, 29AR9, which is a Group 2.9 soybean. It has been suggested that this soybean variety deters aphids because of glandular hairs on the leaves that discourage aphids from chewing. Blue River will have a number of new aphid resistant varieties available for 2010 that are of earlier maturity. This is especially significant for growers in the northern part of the state, where aphid pressure has generally been the greatest.

### Method

This past year, Ron Rosmann conducted a PFI field trial comparing aphid-resistant 29AR9 soybeans to a

non-resistant variety, 2A71. Both varieties were from Blue River Hybrids. The soybean plots were planted on May 19, 2009, and were randomized and replicated six times across the entire length of the field. Field strips were eight rows wide and were planted in 38-inch rows. The entire plot was approximately 10 acres. Soybean aphid counts were done on August 15, 2009, and August 28, 2009. These counts were only rough observations and were not conducted in an experimentally acceptable way. Soybean yield of the treatments were harvested on October 20, 2009.

### Farm Cooperators

Rosmann Family Farms has been pesticide free since 1983 and certified organic since the 1990's. The family grows and markets diverse crops including: corn, soybeans, barley, oats, popcorn and alfalfa. Integrated into the organic farming system are a 40-sow deep-bedded farrow-to-finish operation and a 90-head cow-calf herd.



Ron Rosmann at 2009 field day

### Results

The non-resistant soybean variety, 2A71, yielded statistically significantly higher than the resistant variety; however the difference was only one bushel. The average yield for the resistant variety (29AR9) was 64 bu/A as compared to the non-resistant variety (2A71) yielding 65 bu/A. Shelby county 10-year average soybean yield from Iowa State University Extension is 47 bu/A. 51 bu/A was the highest in 2005. Compared to these county averages, at the test site Blue River's varieties in this organic farming system outperformed county averages by 17 and 18 bu/A, respectively. On August 15, aphid counts in the field did show that aphid pressure increased from east to west in the plots. On the west end of the plots, the non-resistant beans had 10-15 aphids/leaf. The resistant beans had 2 aphids/leaf. On the east side of the plots, the non-resistant soybeans had 30-60 aphids/leaf, and the resistant soybeans had 6-12 aphids/leaf.

With a threshold value of 250 aphids/plant, the non-resistant soybeans were at or far above the threshold for spraying an insecticide of some kind. No sprays were used. By the second observation on August 28, 2009, aphid counts had dropped down to 10-15 aphids/plant in the non-resistant variety and down to 0-2 aphids/plant on the resistant variety.

### Conclusions

Tolerance to aphids and resulting yield of two soybean varieties from Blue River Hybrids were compared in an organic farming system on the farm of Ron

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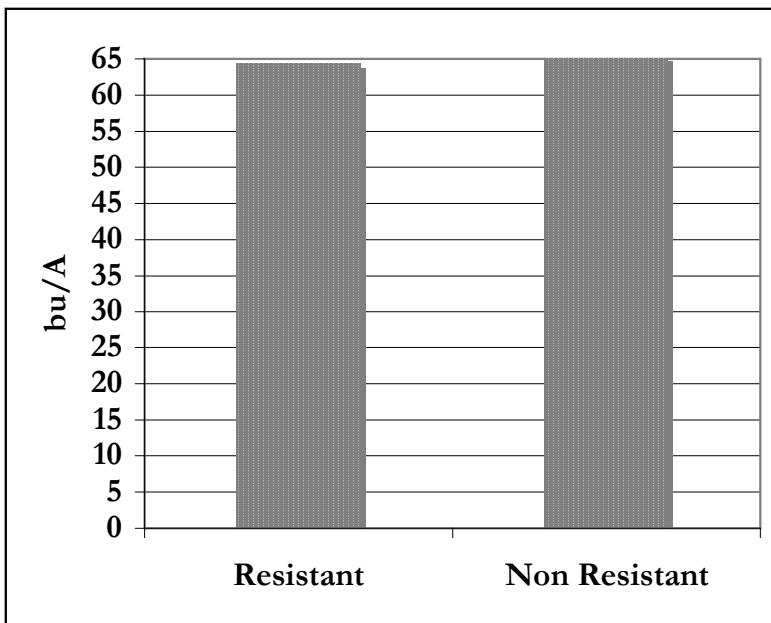


Figure 1. Soybean yield comparison of resistant and non resistant varieties from Blue River Hybrids.

Rosmann. Although the non-resistant variety yielded statistically significantly higher than the resistant variety, it was only a one-bushel difference in actual yield. These yields were at or above the average yields for soybeans in Shelby County for 2009. Aphids counts taken mid-August showed that the resistant variety soybeans were at economic threshold for insecticide application. No insecticides were used in this study. Aphids counts taken at the end of August showed a drastic decrease in the amount of aphids present. Further research needs to be conducted to help answer some of the following questions.

- Why did the non-resistant beans out yield the resistant variety, especially since they were not treated with an insecticide?
- Did beneficial predator insects decrease the aphid pressure in the non-resistant soybeans?
- Was there enough aphid pressure over the whole field to show a varietal difference?
- Did significant rainfall in August decrease aphid pressure?
- Is the 2A71 variety inherently a higher yielding soybean as compared to the 29AR9 soybean so that it made no difference if there was some aphid damage to it?

It has been suggested by Dr. Walter Fehr, soybean breeder at Iowa State University, that a sprayed aphid-free 2A71 replicate needed to be included in this trial so that a true comparison could have been made for aphid damage. This is not allowed for organic certification for organic farmers. For the sake of research this may be unfortunate but this same study could be replicated on a conventionally managed farm. Spraying for aphids was more the norm than the exception over much of Iowa. The results of this trial indicate that more inquiry is needed into these questions.

Future research could include:

- Improve aphid count data collection
- Collect, identify, and count beneficial insects
- Replicate study at northern Iowa farms where aphid pressure is greater
- Calculate the cost/benefit of aphid resistant versus other soybeans