



Soybean aphid-resistant soybean varieties for Iowa

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The soybean aphid is an economically damaging pest throughout much of the North Central United States. Soybean aphids are capable of reaching densities of over 1,000 per plant in the field and can reduce soybean yields by 14–40 percent. Since its discovery in North America in 2000, economically damaging populations have developed in parts of Iowa in seven of the past twelve years.

Aphid-resistant soybean varieties are a new management tool for farmers. These varieties incorporate one or more genes conferring resistance to the soybean aphid. At least four genes have been identified: *Rag1*, *Rag2*, *Rag3*, and *rag4*. These genes suppress aphid growth and reproduction. This causes aphid populations to develop much slower, often preventing them from reaching economically damaging levels (Figure 1).

All four soybean aphid resistance genes currently identified are naturally occurring and were not produced through genetic engineering. Therefore, no requirement to plant a refuge exists, and the genes are compatible with organic production systems.

What should one consider when choosing a soybean aphid-resistant variety?

Yield potential: The most important characteristic to consider is the yield potential of the variety. Resistant varieties are developed to suppress pests and diseases in order to protect yield. All the protection in the world does not matter if there is not something worth protecting. Farmers should consult variety trials for information on the relative performance of soybean varieties.

Other pests: The soybean aphid is not the only pest challenging Iowa farmers. The soybean cyst nematode (SCN), brown stem rot, phytophthora root rot, sudden death syndrome, white mold, and many other diseases pose a threat to producers. Several of the varieties listed here contain resistance to several of these pests. Farmers should consider all pest challenges present in their field when choosing a variety. Specifically, if your field contains SCN, an SCN-resistant variety should be considered. Soybean aphids also can be managed with insecticides, while resistant varieties remain the most effective and reliable management tool for SCN. Farmers should consult Iowa State University (ISU) extension publications PM 1649 and IPM 0052 for more information on SCN-resistant varieties.

What effect do varieties have on soybean aphid populations?

Soybean aphid-resistant varieties slow the rate at which soybean aphid populations increase. The resistant plants will not be aphid free, but they will have fewer aphids than susceptible plants. Figures 2 and 3 depict aphid populations from the *ISU 2011 Insecticide Evaluation of Soybean Insects Report*. At three locations, the soybean aphid-resistant variety containing the *Rag1* gene had significantly fewer aphids than the susceptible check line. However, economically damaging populations of aphids have been observed on soybean aphid-resistant varieties in the field. These populations may be due to aphids capable of overcoming the *Rag1* gene (termed biotypes), which have been identified in the field. Since aphids are capable of reaching economically damaging levels and resistant aphid biotypes exist, farmers should still regularly scout fields planted with soybean aphid-resistant varieties.



Figure 1. Resistant and susceptible soybeans grown side by side. Sooty mold growing on the honeydew left by aphids makes the susceptible soybeans appear blackened.

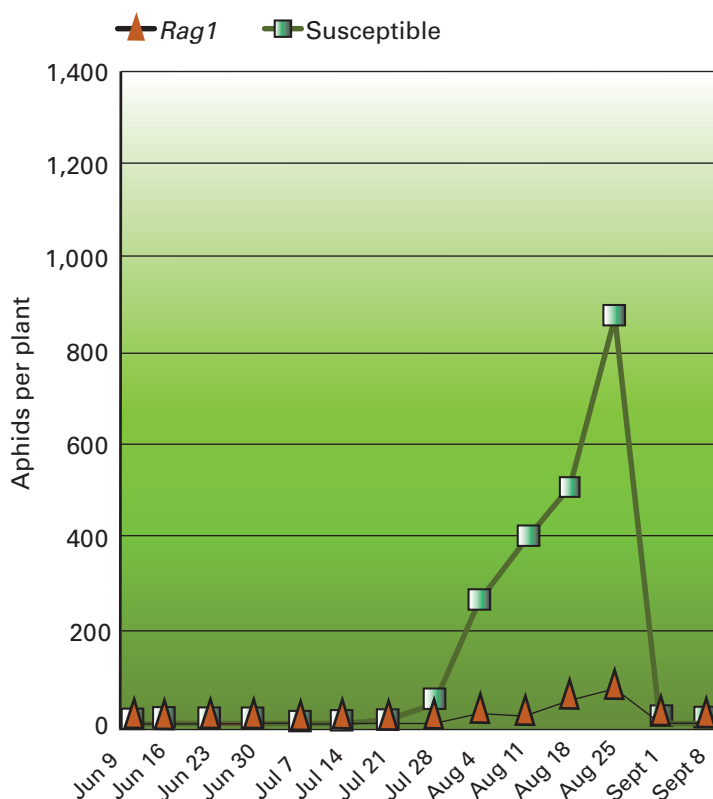


Figure 2. Soybean aphid numbers on susceptible and *Rag1* soybean varieties at the Northwest Research Farm in the 2011 ISU insecticide evaluation.

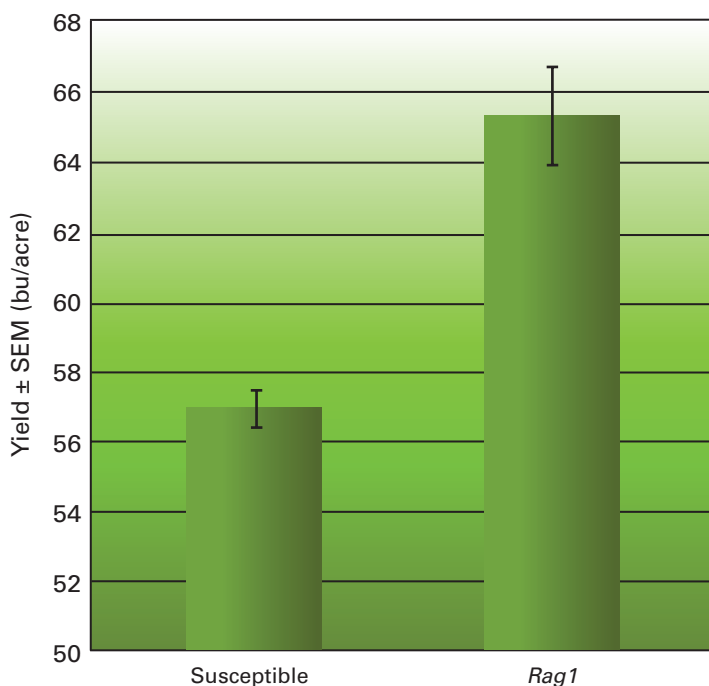


Figure 3. Yield (bushels per acre) of susceptible and *Rag1* soybean varieties at the Northwest Research Farm in the 2011 ISU insecticide evaluation.

When should farmers consider using soybean aphid-resistant varieties?

We are not able to predict if a soybean aphid outbreak will occur in time to affect planting decisions. Therefore, Iowa State University entomologists recommend Iowa farmers to consider planting soybean-aphid resistant varieties if any of the five statements are true for them:

- 1. Fields located north of Interstate 80, especially North-east Iowa.** Soybean aphid outbreaks are more common in northern Iowa. This is especially true for farmers in North-east Iowa who experience significantly earlier colonization of soybean by aphids due to their proximity to large buckthorn stands present in Minnesota. Therefore, if you grow soybean in the northern half of the state, you are more likely to see benefits from growing soybean aphid-resistant varieties.

- 2. Fields sprayed for soybean aphids two out of the last four years.** The premium for the seed of soybean aphid-resistant varieties is lower than the cost of chemical insecticides. Therefore, if insecticides are sprayed in half of the years soybean is grown, it would be more cost effective to grow a soybean aphid-resistant variety.

- 3. Farms with organic soybean varieties.** Organic soybean producers do not have effective management tools for soybean aphid. Therefore, if a farmer is planning on producing organic soybeans, we recommend the use of soybean aphid-resistant varieties. This is especially true for organic producers with fields in the northern half of the state.

- 4. Farmers with difficult to spray fields.** Timely insecticide applications are necessary to prevent yield loss from soybean aphids. Those fields that are difficult to schedule and apply insecticides to should be considered. These fields may include those with windmills, terraces, or irregular shapes.

- 5. Farmers interested in minimizing chemical inputs for broader integrated pest management.** Farmers interested in adopting a more diversified approach to pest management on their farm should consider soybean aphid-resistant varieties. These varieties can reduce the need for chemical inputs, especially later in the season (R3 or later). If a farmer were trying to avoid chemical applications at that point in the season, a soybean aphid-resistant variety would be a valuable management tool for consideration.

Table 1 on the following page is a compilation of soybean varieties that are marketed as having resistance to the soybean aphid. Iowa State University has not verified the resistance claims. Only resistance genes described in the scientific literature are provided, not trade names for resistance traits. Varieties are listed by seed company.

Table 1. Soybean aphid-resistant soybean varieties for Iowa.

Brand	Variety	Relative Maturity	Glyphosate Resistant (Y or N)	Liberty Link® (Y or N)	Seed Treatment	Source of SBA Resistance	Resistance to Other Pests*
Albert Lea Seed House, 1414 West Main Street, Albert Lea, MN 56007, 800-352-5247, www.alseed.com							
Viking	1544AT	1.4	N	N	N	<i>Rag1</i>	
Viking	O.1955AT	1.9	N	N	N	<i>Rag1</i>	
Viking	O.IA3027RA	2.6	N	N	N	<i>Rag1</i>	
Blue River Hybrids, 27087 Timber Road, Kelley, IA 50134, 800-370-7979, www.blueriverorgseed.com							
Blue River	15AR3	1.5	N	N	N	<i>Rag1</i>	
Blue River	19AR1	1.9	N	N	N	<i>Rag1</i>	
Blue River	29AR9	2.9	N	N	N	<i>Rag1</i>	
Iowa State University Research Foundation, 210 Lab of Mechanics, Ames, IA 50011, 515-294-9442, www.agron.iastate.edu/cad							
ISURF	IA3027RA1	3	N	N	N	<i>Rag1</i>	
ISURF	IA3027RA12	3	N	N	N	<i>Rag1</i> and <i>Rag2</i>	
ISURF	IA3027LFRA12**	3	N	N	N	<i>Rag1</i> and <i>Rag2</i>	
ISURF	IA3045RA12**	3	N	N	N	<i>Rag1</i> and <i>Rag2</i>	
Syngenta, 11055 Wayzata Boulevard, Minnetonka, MN 55305, 1-800-258-0521, www.nksoybeans.com							
NK Brand	S17-D2	1.7	Y	N	CruiserMaxx® plus Vibrance	<i>Rag1</i>	Rps1k, IDC, SDS
NK Brand	S21-Q3	2.1	Y	N	CruiserMaxx® plus Vibrance	<i>Rag1</i>	Rps1K, SCN, IDC, BSR, SDS
NK Brand	S25-F2	2.5	Y	N	CruiserMaxx® plus Vibrance	<i>Rag1</i>	Rps1k, IDC, BSR, SDS, White Mold

*Rps = Phytophthora root rot, IDC = iron deficiency chlorosis, SDS = sudden death syndrome, SCN = soybean cyst nematode, BSR = brown stem rot

**Variety pending release

Disclaimer

The list in this publication may not be complete. Although sincere effort was made to contact all companies offering soybean aphid-resistant varieties for sale in Iowa, numerous companies that were contacted did not respond to our request for information. It is acknowledged that some companies may have been inadvertently overlooked in our effort. However, no company was intentionally excluded. If you represent a soybean seed company and your varieties are not listed, please contact us so that we can correct the omission.

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For more information on soybean aphid management

Field Crop Insects and *Soybean Aphid Management* are available from the Iowa State University Extension and Outreach Online Store (<https://store.extension.iastate.edu> or 515-294-5247). All are available from the Iowa Soybean Association (www.iasoybeans.com/productionresearch/productiontech.html).



Erin Hodgson and Matt O'Neal maintain a website that reports their ongoing research on the soybean aphid and its management (www.soybeanaphid.info). From July through August, weekly updates of aphid populations are discussed in a podcast, *The Soybean Aphid Podcast*, which can be downloaded from this website as well as from iTunes.

This publication is a cooperative effort between the Iowa Soybean Association and the College of Agriculture and Life Sciences and Extension and Outreach at Iowa State University.

Information in this publication may be specific to Iowa. Those using the publication from outside Iowa should check with their state extension service for local recommendations.

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