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Trial Results Show Dual Benefits of SCN Resistance

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Trial Results Show Dual Benefits of SCN Resistance

Abstract

The soybean cyst nematode (SCN) continues to be a major yield-reducing pathogen of soybeans in Iowa, and it occurs in up to 75 percent of fields in the state. Growing SCN-resistant soybeans is an important part of managing SCN.

Results from Iowa State University's nine SCN-resistant variety trial experiments in 2013 illustrate how resistant varieties can produce high yields and suppress the buildup of the nematode in infested fields.

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Trial Results Show Dual Benefits of SCN Resistance

The soybean cyst nematode (SCN) continues to be a major yield-reducing pathogen of soybeans in Iowa, and it occurs in up to 75 percent of fields in the state. Growing SCN-resistant soybeans is an important part of managing SCN.

Results from Iowa State University's nine SCN-resistant variety trial experiments in 2013 illustrate how resistant varieties can produce high yields and suppress the buildup of the nematode in infested fields.

The ISU SCN-resistant Soybean Variety Trial Program, in its 23rd year of operation, is funded by the soybean checkoff through a grant from the Iowa Soybean Association. The program is the largest and most thorough at evaluating SCN-resistant varieties for agronomic performance and nematode control in the United States.

The results of all of the experiments from the ISU SCN-resistant Soybean Variety Trial Program conducted in 2013 are currently available online at www.isuscntrials.info. The complete, printed annual report of the 2013 results was distributed in the January 18, 2014, issue of the Iowa Farmer Today.

The agronomic performance and/or nematode control provided by individual SCN-resistant soybean varieties last growing season varied significantly in each variety trial. Some SCN-resistant soybean varieties performed differently among experimental locations. The variable performance of varieties among experimental locations was due, at least in part, to differences in population densities and in the aggressiveness of the SCN populations (HG types) present in the different fields. Also, differences in environmental conditions among the experimental sites contributed to differences in performance of varieties. Environmental conditions greatly affect soybean growth and development and also the nematode-soybean host-parasite relationship.

Resistant varieties yielded 5 to 50 percent greater

The SCN-resistant varieties yielded greater, on average, than the widely grown susceptible varieties at all nine variety trial locations in 2013 (figure 1). The experiment conducted near Glenwood, in the southwestern corner of Iowa, had the greatest overall yields, where SCN-resistant varieties yielded nearly 70 bushels per acre, an average of 3.7 bushels per acre (or 5.6 percent) more than the widely grown SCN-susceptible varieties in the experiment. This field had the lowest initial SCN egg population density at planting of all of the variety trial experiments conducted in 2013.

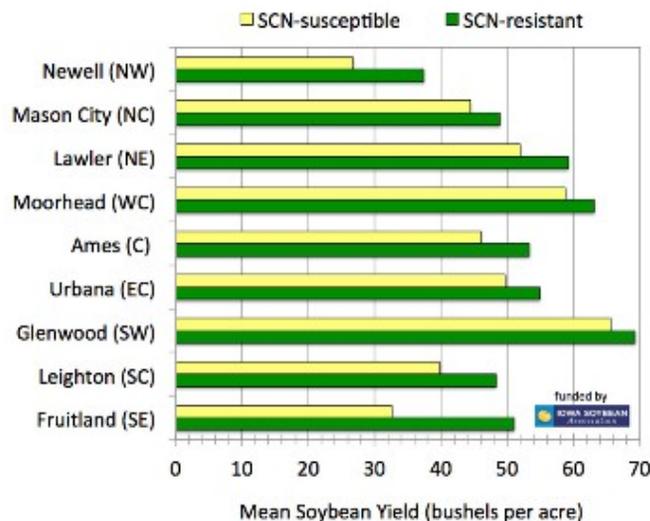


Figure 1. Mean yields of SCN-resistant soybean varieties and widely grown susceptible varieties at nine locations in Iowa in 2013. Data for individual varieties and locations are available at www.isuscntrials.info.

The greatest difference in average yields between SCN-resistant and widely grown susceptible varieties in any variety trial location in 2013 was 18.4 bushels per acre (or 56 percent), which occurred at the experiment conducted in a very sandy field near Fruitland, Iowa (figure 1).

Overall, soybean yields were the lowest in the variety trial conducted near Newell, Iowa, in the northwest part of the state. Parts of the experiment were flooded early in the season at that location. Nonetheless, yields of SCN-resistant varieties averaged a little more than 37 bushels per acre, which was 40 percent greater than yields of the average yield of 26.7 bushels per acre for the widely grown susceptible varieties at that experiment (figure 1).

Resistant varieties allowed much less SCN reproduction

Initial SCN egg population densities at planting for the nine variety trial locations in 2013 ranged from 431 to 10,952 eggs per 100 cubic centimeters (cc) of soil, which is a little less than a half cup of soil. This was an unusually wide range of initial SCN population densities among the variety trial locations. The final or end-of-season SCN egg population densities under the SCN-resistant varieties were one-fifteenth to one-half of the densities that developed under the widely grown susceptible varieties (figure 2). The amount of soybean yield loss caused by SCN is directly related to the SCN egg population density, so the nematode control provided by SCN-resistant varieties will pay dividends in the form of higher yields the next time soybeans are grown.

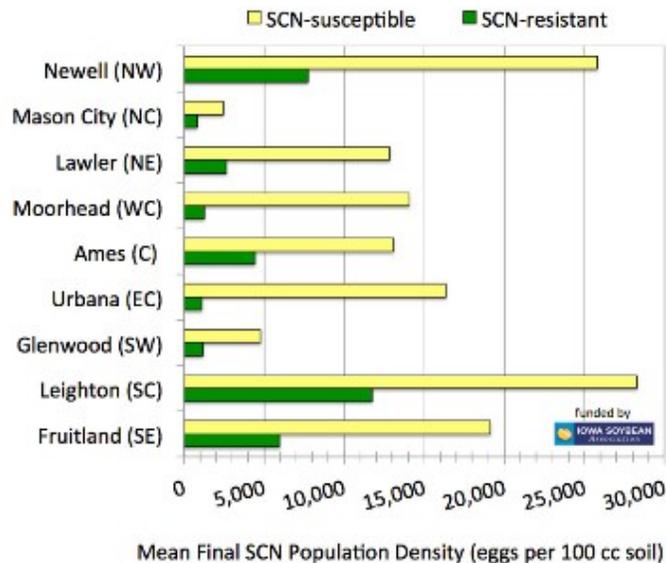


Figure 2. Mean final (end of season) SCN population densities (numbers) of SCN-resistant soybean varieties and widely grown susceptible varieties at trial locations in Iowa in 2013. Data for individual varieties and locations are available at www.isuscntrials.info.

The greatest level of nematode control provided by SCN-resistant varieties was at the variety trial near Urbana in 2013 (figure 2). The average SCN population density in the field before the experiment was planted was 431 eggs per 100 cc of soil. At harvest, SCN population densities in this experiment increased to 1,120 eggs per 100 cc of soil under the SCN-resistant varieties. In contrast, the end-of-season SCN population density under the widely grown susceptible varieties in that experiment was 16,350 eggs per 100 cc of soil.

The greatest amount of SCN reproduction on SCN-resistant varieties, as a whole, occurred in the experiment near Leighton in 2013. The field had an initial SCN egg population density of 1,694 eggs per 100 cc of soil; final population densities were 11,745 eggs per 100 cc of soil on average under the SCN-resistant varieties and 28,267 eggs per 100 cc of soil under the widely grown susceptible varieties.

Resistant varieties are an effective management tool, but not a cure

The results of these experiments illustrate the benefits of growing SCN-resistant soybeans in fields infested with the nematode. But it is important to remember that yields of SCN-resistant soybeans are reduced by SCN, although to a lesser extent than yields of susceptible soybean varieties. The most profitable soybean production in fields infested with the nematode will come through integrated management of SCN using nonhost crops, like corn, in rotation with soybean varieties with varying types of nematode resistance and in conjunction with nematode-protectant seed treatments as they become available.

More information about managing SCN

For more information about the biology and management of SCN, visit www.soybeancyst.info and www.planthealth.info/scn_basics.htm. Iowa State University's management recommendations for SCN are available online in a downloadable format, Soybean Cyst Nematode (SCN) Management Recommendations, IPM 63. An annually updated list of SCN-resistant

soybean varieties for 2014 is available in PDF format online at the Iowa State University Extension and Outreach Online Store.

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