2018 SCN-resistant Variety Trial Results Show Yield Effects and SCN Buildup

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Abstract
Iowa State University annually evaluates the agronomic performance and nematode control of hundreds of soybean varieties that are resistant to the soybean cyst nematode (SCN). A limited number of SCN-susceptible soybean varieties are included in the research to serve as a reference point for comparison. The work is supported by the soybean checkoff through the Iowa Soybean Association. The experiments are conducted in each of Iowa’s nine crop reporting districts.

Disciplines
Agricultural Science | Agriculture
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The results of the experiments conducted in 2018 were compiled in a report that will soon appear in an issue of the Iowa Farmer Today in January 2019. The report currently is available online for free.

A summary of the basic information about yields and SCN populations for eight of the nine experiments conducted in 2018 is given in Table 1. One of the experiments, in southwest Iowa, was not harvested because of wet soil conditions.
Table 1. Basic yield and SCN population information for eight variety evaluation experiments conducted throughout Iowa in 2018.

<table>
<thead>
<tr>
<th>Crop Reporting District</th>
<th>Location</th>
<th>Initial SCN population density (eggs/100 cc)</th>
<th>HG type</th>
<th>Percent reproduction on Peking</th>
<th>Percent reproduction on PI 88788</th>
<th>Maximum yield (bu/ac)</th>
<th>Resistant variety yield range (bu/ac)</th>
<th>Mean yield difference Res. vs Susc. (bu/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW</td>
<td>Newell</td>
<td>3,353</td>
<td>2-</td>
<td>2%</td>
<td>43%</td>
<td>77.1</td>
<td>23.0</td>
<td>+8.8</td>
</tr>
<tr>
<td>NC</td>
<td>Manly</td>
<td>470</td>
<td>2-</td>
<td>0%</td>
<td>44%</td>
<td>69.0</td>
<td>10.6</td>
<td>+3.8</td>
</tr>
<tr>
<td>NE</td>
<td>Arlington</td>
<td>710</td>
<td>2-</td>
<td>1%</td>
<td>26%</td>
<td>68.2</td>
<td>29.7</td>
<td>+19.3</td>
</tr>
<tr>
<td>WC</td>
<td>Moorhead</td>
<td>1,206</td>
<td>1.2-</td>
<td>10%</td>
<td>53%</td>
<td>80.6</td>
<td>34.5</td>
<td>+15.5</td>
</tr>
<tr>
<td>C</td>
<td>Ames</td>
<td>218</td>
<td>2-</td>
<td>4%</td>
<td>36%</td>
<td>77.7</td>
<td>26.5</td>
<td>+4.9</td>
</tr>
<tr>
<td>EC</td>
<td>Urbana</td>
<td>448</td>
<td>2-</td>
<td>1%</td>
<td>35%</td>
<td>79.3</td>
<td>35.6</td>
<td>+14.0</td>
</tr>
<tr>
<td>SC</td>
<td>Leighton</td>
<td>625</td>
<td>2-</td>
<td>0%</td>
<td>15%</td>
<td>74.0</td>
<td>12.8</td>
<td>+16.4</td>
</tr>
<tr>
<td>SE</td>
<td>Fruitland</td>
<td>372</td>
<td>2-</td>
<td>0%</td>
<td>11%</td>
<td>59.8</td>
<td>15.1</td>
<td>+14.6</td>
</tr>
</tbody>
</table>

Low SCN population densities at planting, but high reproduction on PI 88788

In all but one of the experiments, the initial (at-planting) SCN population densities were low (Table 1). The exception was the experiment near Newell (northwest Iowa), which was in a field with a moderate SCN population density. The SCN infestation categories are explained in a publication available online for free.

The ability of the SCN populations in the fields to reproduce on the Peking and PI 88788 sources of resistance also is shown in Table 1. The SCN populations in all of the fields where the experiments were conducted had 10 percent or less reproduction on Peking. But reproduction of the SCN populations on PI 88788 was more than 10 percent in all fields and ranged from 11 percent to 53 percent. Ideally, levels of reproduction should be less than 10 percent. PI 88788 is the source of resistance genes for more than 95 percent of resistant varieties in Iowa whereas currently, Peking resistance is available only in 35 varieties (see previous ICM News article).

Low initial SCN population densities build up to cause yield loss
Even though initial SCN population densities were low in all but one experiment, differences in yield between resistant and susceptible varieties occurred in all of the experiments and ranged from 3.8 to 19.3 bushels per acre (Figure 1). For example, the initial SCN population density in the experiment near Urbana, in east central Iowa, was 448 eggs per 100 cc of soil. And the average yield of resistant varieties was 14 bushels per acre (or 35 percent) more than yields of the susceptible varieties in that experiment. This large yield difference shows the potential for low population densities of SCN in the soil to reduce soybean yields.

![Figure 1. Overall mean yields of SCN-resistant and susceptible soybean varieties in experiments conducted in 2018. The \(P_i\) numbers in the column on the left are the initial SCN population densities in the plots when the experiments were planted. Significant soybean sudden death syndrome (SDS) occurred in the experiments near Arlington, Moorhead, and Urbana.](https://crops.extension.iastate.edu/cropnews/2019/01/2018-scn-resistant-variety-trial-results-show-yield-effects-and-scn-buildup)

The population density of SCN in the soil increased 3- to 22-fold over the course of the growing season in the experiments on both SCN-resistant and susceptible varieties (Figure 2). The experiment conducted in the field near Ames, in central Iowa, had the lowest initial SCN population density of 218 eggs per 100 cc of soil. End-of-season population
densities at harvest in the Ames experiment averaged 1,618 for the resistant varieties and 4,975 for the susceptible varieties. The largest increase in SCN population densities was seen in the experiment in southeast Iowa, near Fruitland, where the initial SCN population density was 372 eggs per 100 cc of soil and end-of-season population densities averaged 7,968 for the resistant varieties and 6,392 for the susceptible varieties.

A wide range of yields among SCN-resistant soybean varieties

There were some large differences in yields and in the season-long increases in SCN population densities among the SCN-resistant soybean varieties in the experiments. Differences in yields of individual SCN-resistant varieties ranged from 10.6 to 35.6 bushels per acre in the experiments (Table 1). Some differences in yields and in season-long

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**Figure 2.** Mean end-of-season (final) SCN egg population densities for SCN-resistant soybean varieties compared to susceptible soybean varieties in experiments conducted in 2018. The \( P_i \) numbers in the column on the left are the initial SCN population densities in the plots when the experiments were planted.
changes in SCN population densities were not significantly different (i.e. were not true differences among varieties but due to various other sources of variation). However, there were many significant differences among varieties studied in the experiments.

**Soybean sudden death syndrome in three experiments**

SCN is never the sole pathogen or pest within a field. Efforts are taken to not use fields with a history of other diseases to conduct the SCN-resistant soybean variety evaluation experiments. Also, substantial efforts are put forth to control weeds and insects (if warranted). However, disease levels sometimes reach the extent that they likely affect the yield results of the experiments. Such was the case with soybean sudden death syndrome (SDS) in 2018.

Significant SDS occurred in the experiments conducted in northeastern, west central, and east central Iowa. For those three experiments, SDS incidence and severity were rated for each plot, and an SDS disease index was calculated and included in the tables in the report with the other data for those experiments.

**Summary**

The results of these experiments show that even low SCN soil population densities in the spring can increase greatly throughout a growing season and cause substantial yield loss. The yield benefits of SCN control provided by good resistant varieties are apparent in the research.

The data from these experiments represent a limited number of locations and should be used only as a beginning point for developing a SCN management program for a specific field. Performance of individual SCN-resistant soybean varieties in SCN-infested fields will vary among locations and years. Farmers and those who advise them are encouraged to evaluate several SCN-resistant soybean varieties at their own locations to determine the best varieties for their local conditions.

**Learn more about managing SCN from The SCN Coalition**

SCN continues to reduce the productivity and profitability of soybean production throughout Iowa and the Midwest. Yield losses due to SCN occur in every infested field. The best approach to managing SCN is through integrated use of multiple management strategies including growing nonhost crops and resistant soybean varieties with different sources of resistance. Nematode-protectant seed treatments also are available to use in an integrated management plan. And fields must be monitored regularly to assess changes in...
population densities. Consult the SCN Coalition for more information at www.TheSCNCoalition.com.

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Category: Plant Diseases

Crop: Soybean

Tags: SCN; SCN resistance; SCN Management

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