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Income in SCN-infested Fields Can Be \$200 Per Acre Less With PI 88788 Than With Peking Resistance

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Abstract

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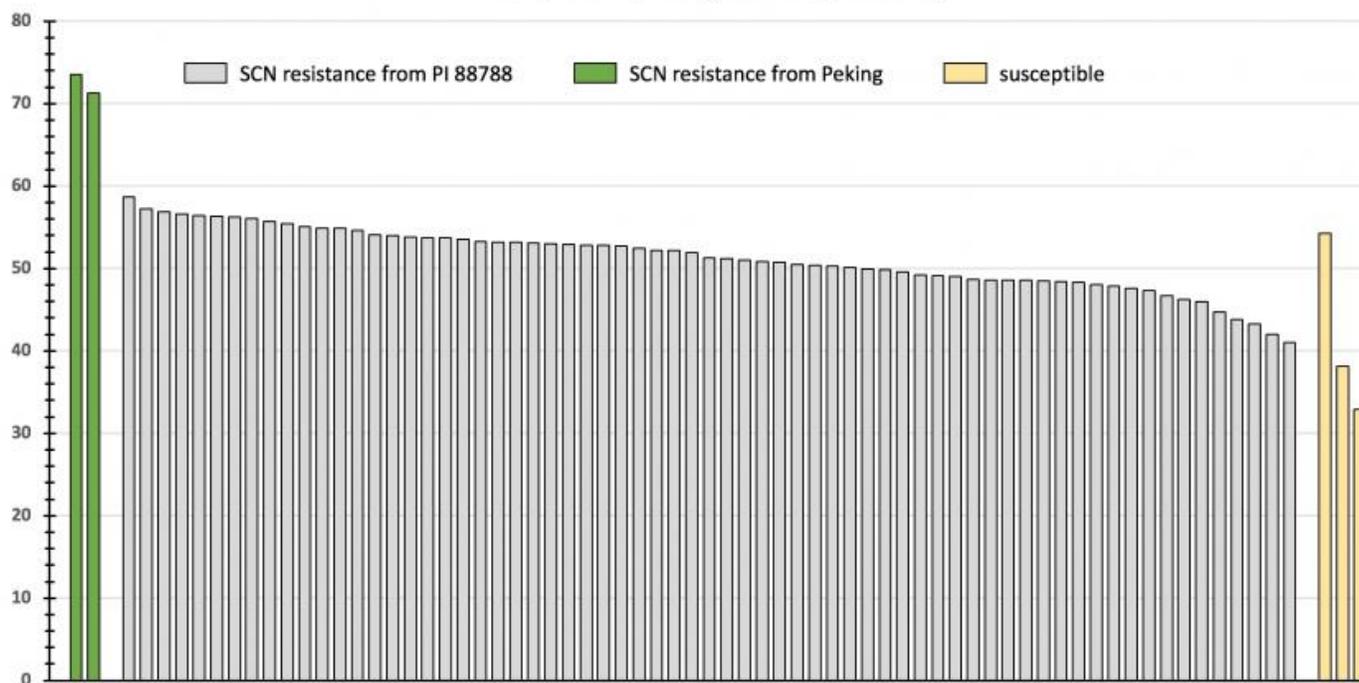
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The results of a field experiment conducted in 2019 with the soybean cyst nematode (SCN) in southeast Iowa were dramatic and alarming. The data illustrate what likely could occur in SCN-infested fields throughout the state in future years.

The experiment was in southeast Iowa and measured yield and SCN control of 67 soybean varieties with SCN resistance from the commonly used breeding line PI 88788 and two varieties with the alternative, hard-to-find Peking SCN resistance, plus three susceptible varieties for comparison. The varieties were grown in a field with a moderate SCN egg count (population density), and the SCN population had elevated reproduction (was virulent) on PI 88788 resistance. Only two varieties with Peking SCN resistance were in the experiment because very few varieties with that source of resistance are available. The research was supported by soybean checkoff funds from the Iowa Soybean Association.

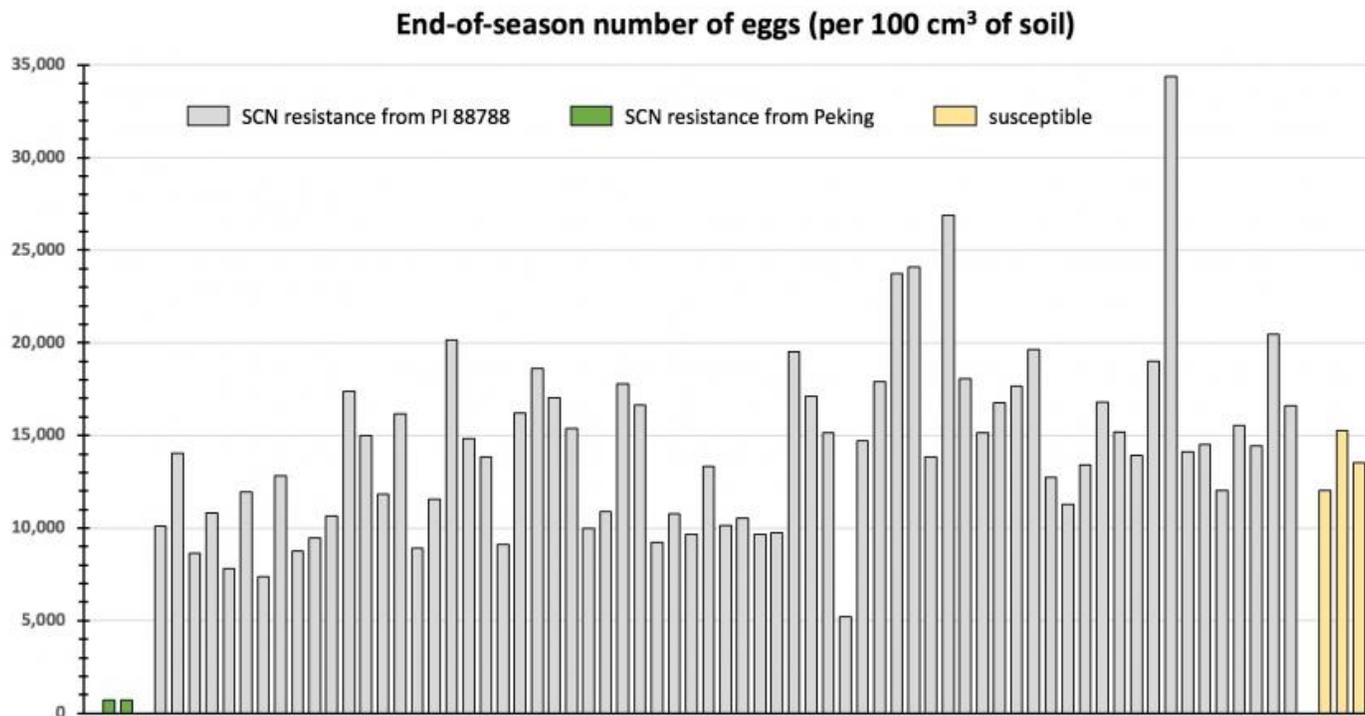
The susceptible soybean varieties in the experiment had an average yield of 41.8 bushels per acre (orange bars in graph below). Yields of the varieties with PI 88788 SCN resistance (gray bars) ranged from 41.0 to 58.7 bushels per acre and averaged 51.2 bushels per acre. The highest-yielding variety with PI 88788 SCN resistance produced 58.7 bushels per acre. The two varieties with Peking SCN resistance (green bars) yielded 71.3 and 73.5 bushels per acre, averaging 72.4 bushels per acre.

Soybean yield (bushels per acre)



Yields of 72 soybean varieties in an experiment near Fruitland in southeast Iowa in 2019. Resistant varieties are listed in decreasing order of yield from highest (left) to lowest (right) followed by susceptible varieties on the far right. There were three susceptible soybean varieties (orange bars), 67 varieties with SCN resistance from PI 88788 (gray bars), and two varieties with Peking SCN resistance (green bars) in the experiment. Full results from this and eight similar experiments conducted in 2019 are available online [here](#).

The soil in the area of the field where the experimental plots were located had 4,687 SCN eggs per 100 cm³ of soil at the beginning of the season. This is a moderate egg count. The average number of eggs in the soil at the end of the season for the three susceptible soybean varieties averaged 13,600 eggs per 100 cm³ of soil (see graph below, same color scheme as yield graph above). The end-of-season SCN population density for PI 88788 varieties ranged from 5,225 to 34,400 eggs per 100 cm³ and averaged 14,432 per 100 cm³. There were 10,100 eggs per 100 cm³ of soil at the end of the season for the top-yielding PI 88788 variety. And in contrast, there were fewer than 800 eggs per 100 cm³ of soil at the end of the season with the two Peking SCN-resistant varieties.



End-of-season SCN egg numbers for 72 soybean varieties in an experiment near Fruitland in southeast Iowa in 2019. There were three susceptible soybean varieties (orange bars), 67 varieties with SCN resistance from PI 88788 (gray bars), and two varieties with Peking SCN resistance (green bars) in the experiment. The initial SCN egg population density in the experiment was 4,687 SCN eggs per 100 cm³ of soil. The results for the varieties are listed in the same order as used in the yield graph above. Full results from this and eight similar experiments conducted in 2019 are available online [here](#).

Farmers have used resistant soybean varieties to manage SCN for decades. There are hundreds of resistant varieties available. Almost all have SCN resistance genes from a breeding line named PI 88788 (see [here](#)). Fewer than five percent of SCN-resistant soybean varieties for Iowa have the alternative source of resistance named Peking.

Continual use of resistance from the PI 88788 breeding line has forced SCN populations to develop increased levels of reproduction on resistant varieties. Elevated reproduction of SCN populations on PI 88788 resistance is well documented throughout Iowa and most of the Midwest. So, although the results above are alarming, they are not surprising.

Nearly \$200 per acre lost income from growing varieties with PI 88788 SCN resistance

The farmer who hosted the SCN experiment in southeast Iowa grew two different soybean varieties with PI 88788 SCN resistance in the remainder of the field surrounding the experiment, and the varieties yielded 50 bushels per acre. If one of the varieties with Peking SCN resistance in the experiment had been grown in the field, the farmer would have earned nearly \$200 per acre more (based on 22 bushels per acre yield difference between the Peking varieties and the PI 88788 varieties grown by the host farmer and \$9 per bushel soybeans).

These results were very consistent and statistically significant and they illustrate the staggering amount of yield loss that can be caused by SCN when resistance from PI 88788 is overcome.

Looking forward

Many fields in Iowa are similar to the field described above. The only difference between the field where the experiment was conducted and most SCN-infested fields in Iowa is that the field in southeast Iowa had well-drained, sandy soil, and the dry soil conditions that occur in this texture of soil favor SCN reproduction and yield reduction. Very large differences in yields of soybean varieties with PI 88788 and Peking SCN resistance may not commonly occur in fields with medium- and heavy-textured soils in Iowa. Yet. But results like this are possible in any SCN-infested field with any soil texture, especially under dry growing conditions.

Presently, most soybean varieties have PI 88788 SCN resistance, and it is inevitable that yields of these varieties will continue to decrease in fields infested with SCN because reproduction of nematode populations on PI 88788 will steadily increase. The trend will continue until soybean varieties with Peking resistance are commonly and widely grown in rotation with PI 88788 SCN resistance in SCN-infested fields, which is not possible to do currently because very few soybean varieties with Peking SCN resistance are available.

For now, farmers should actively seek out the few soybean varieties with Peking resistance to grow in SCN-infested fields, even if seed has to be purchased of a brand not normally grown. And farmers are strongly encouraged to persistently ask for SCN-resistant varieties with Peking SCN resistance from their seed providers. New soybean varieties with Peking resistance likely will not become plentiful until farmers voice the need.

Learn more about SCN

More information about the biology and management of SCN can be found at [TheSCNCoalition.com](https://www.thescncoalition.com), [soybeancyst.info](https://www.soybeancyst.info), and [soybeanresearchinfo.com](https://www.soybeanresearchinfo.com).

Take-home Points

- hundreds of soybean varieties have SCN resistance from the breeding line PI 88788; few have resistance from a breeding line named Peking
- most SCN populations in Iowa have developed increased levels of reproduction on PI 88788 resistance
- in a field experiment in southeast Iowa in 2019, 67 varieties with PI 88788 SCN resistance yielded 41 to 59 bushels per acre; two varieties with Peking SCN resistance averaged 72 bushel per acre
- soybeans with PI 88788 SCN resistance grown in the field surrounding the experiment yielded 50 bushel per acre
- nearly **\$200 per acre more** would have been earned if a variety with Peking SCN resistance from the variety trial had been grown in the field
- farmers must seek out soybean varieties with Peking SCN resistance to grow in rotation with varieties with PI 88788 resistance
- farmers should persistently request soybean varieties with Peking SCN resistance from seed providers to grow in rotation with PI 88788 resistance

Category: Plant Diseases

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Crop:

Soybean

Tags: SCN soybean cyst nematode soybean cyst nematode resistance

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