

# EFFECTS OF SEED TREATMENTS ON POPULATION DENSITIES OF SOYBEAN CYST NEMATODE AND SOYBEAN YIELDS IN IOWA

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Nematode-protectant seed treatments are a relatively new strategy to manage the soybean cyst nematode (SCN). And many such products now are available (see Table 1).

Table 1. Names, sources, and characteristics of currently available nematode-protectant seed treatments.

Product and provider	Crop(s)	Targeted nematodes	Active ingredient	Mode of action
 Syngenta	cotton, corn, soybean	all plant-parasitic nematodes	abamectin	inhibits nematode nerve transmission
 Plant Health Care, Inc.	all plants	all plant-parasitic nematodes	harpin protein	induced plant defenses
 BASF	cotton, corn, soybean	all plant-parasitic nematodes	<i>Bacillus firmus</i>	living barrier of protection on roots
 Syngenta	soybean	SCN	<i>Pasteuria nishizawae</i>	nematode parasite
 BASF	soybean	SCN, root-knot, reniform, lesion	fluopyram	SDHI enzyme inhibitor
 Bayer Crop Science	cotton, corn, soybean	SCN, root-knot, reniform, lesion, others	tioxazafen	mitochondrial translation inhibitor
 Valent	corn, soybean	SCN, root-knot, reniform, lesion, others	<i>Bacillus amyloliquefaciens</i>	not stated or known
NEMASECT Beck's	corn, soybean	all plant-parasitic nematodes	heat-killed <i>Burkholderia rinojenses</i> + fermentation media	not stated or known
TRUNEMCO BASF	cotton, corn, soybean	???	<i>Bacillus amyloliquefaciens</i> + cis-Jasmone	induced plant defenses and ???

A total of 92 small-plot experiments were conducted between 2014 and 2018 throughout Iowa to assess the effects of several of nematode-protectant seed treatments on soybean yields and season-long changes in nematode population densities. The seed treatments were applied by the companies selling the products and were applied to seed of SCN-resistant soybean cultivars selected by the company. The experimental plots were four rows wide and 17 feet long, and each experiment had 12 replicate plots of two treatments: 1) the nematode-protectant seed treatment on a base of insecticide and fungicide and 2) the base insecticide and fungicide alone.

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In 32 experiments conducted from 2014 through 2017 with Clariva on a base of CruiserMaxx Advanced + Vibrance, significant ( $P \leq 0.10$ ) yield increases occurred twice and significant ( $P \leq 0.10$ ) reductions in season-long changes in SCN population densities occurred twice with Clariva (Bissonnette et al. 2018). The yield increases were 3.3 and 4.5 bushels per acre. Interestingly, the experiments where reduced SCN reproduction with Clariva occurred were not the experiments in which yields were significantly increased.

There were 27 experiments conducted with Ilevo on a base of Poncho/Votivo from 2015 through 2017. Significant ( $P \leq 0.10$ ) increases in yield occurred with Ilevo in three experiments (3.7, 2.9, and 2.8 bushels per acre), and there were two experiments where season-long SCN reproduction was significantly ( $P \leq 0.10$ ) less with the Ilevo treatment. As with the Clariva experiments, the experiments in which Ilevo significantly increased yield were not the same experiments in which Ilevo reduced season-long SCN reproduction.

A total of 17 experiments were conducted from 2017 to 2018 with Aveo on a base of Intego. There were single experiments in which Aveo significantly increased yield (3.3 bushels per acre, 2018) and significantly decreased yield (3.7 bushels per acre, 2017). No significant changes in SCN populations over the season were detected in any of the experiments in 2017. The SCN data for 2018 were not available before this paper was submitted. When yield data from all 8 experiments in 2018 were combined for analysis, mean yield with Aveo was significantly ( $P \leq 0.05$ ) greater than the base by 2.0 bushels per acre. No significant yield difference was detected when data from all 9 experiments in 2017 were combined.

In eight experiments with NemaStrike on base of Acceleron F1 conducted in 2018, a significant ( $P \leq 0.05$ ) yield increase of 4.5 bushels per acre occurred in one experiment. The yield differences in the other seven experiments were small and not significant. Also, there was no significant yield difference between treatments when yield data from all experiments were combined. The SCN data for 2018 were not available when this paper was prepared.

Trunemco is a nematode-protectant seed treatment currently under development by BASF with projected release in 2020. Eight experiments were conducted in 2018 with Trunemco, and it was on a base of Obvius Plus. There was no significant difference in yields between Trunemco plus base versus the base alone in any of the individual experiments. But when the data from all eight experiments were combined for analysis, mean yield with Trunemco was significantly ( $P \leq 0.10$ ) greater than the base treatment by 1.0 bushel per acre. As with the other 2018 experiments mentioned above, SCN data for the experiments were not available when this summary was submitted.

#### Reference

Bissonnette, K.M., C.C. Marett, M.P. Mullaney, G.D. Gebhart, P. Kyveryga, T.A. Mueller, and G.L. Tylka. 2018. Effects of Clariva Complete Beans seed treatment on *Heterodera glycines* reproduction and soybean yield in Iowa. Plant Health Progress 19:1-8. <https://doi.org/10.1094/PHP-08-17-0043-RS>