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Effects of Nematode-Protectant Seed Treatments on Corn Yields and Nematode Population Densities

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Effects of Nematode-Protectant Seed Treatments on Corn Yields and Nematode Population Densities

Abstract

Plant-parasitic nematodes are microscopic worms that feed on plants. Almost every nematode that feeds on corn is capable of feeding on many other plants. These nematode parasites are thought to be native to most Iowa soils and to have fed upon native plants before corn was grown as a cultivated crop. Population densities (numbers) of most species of plant-parasitic nematodes that feed on corn have to increase to damaging levels (called damage thresholds) before yield loss occurs.

Products that are currently available to manage plant-parasitic nematodes on corn in the state include the soil-applied insecticide/nematicide Counter® and two relatively new protectant seed treatments, Avicta® and Votivo®.

Avicta® is a contact nematicide (active ingredient abamectin) that moves on the surface of the root, and Votivo® is a special strain of the natural soil bacterium *Bacillus firmus* that grows on the root. Avicta® is available from Syngenta Seedcare and Votivo® from Bayer CropScience.

The objective of this experiment was to assess and compare the nematode population densities and yields of corn growing in plots with and without the nematode-protectant seed treatments.

Keywords

RFR A11100, Plant Pathology and Microbiology

Disciplines

Agriculture | Plant Pathology

Effects of Nematode-Protectant Seed Treatments on Corn Yields and Nematode Population Densities

RFR-A11100

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Introduction

Plant-parasitic nematodes are microscopic worms that feed on plants. Almost every nematode that feeds on corn is capable of feeding on many other plants. These nematode parasites are thought to be native to most Iowa soils and to have fed upon native plants before corn was grown as a cultivated crop. Population densities (numbers) of most species of plant-parasitic nematodes that feed on corn have to increase to damaging levels (called damage thresholds) before yield loss occurs.

Products that are currently available to manage plant-parasitic nematodes on corn in the state include the soil-applied insecticide/nematicide Counter[®] and two relatively new protectant seed treatments, Avicta[®] and Votivo[®].

Avicta[®] is a contact nematicide (active ingredient abamectin) that moves on the surface of the root, and Votivo[®] is a special strain of the natural soil bacterium *Bacillus firmus* that grows on the root. Avicta[®] is available from Syngenta Seedcare and Votivo[®] from Bayer CropScience.

The objective of this experiment was to assess and compare the nematode population densities and yields of corn growing in plots with and without the nematode-protectant seed treatments.

Materials and Methods

The experiment was conducted on the ISU Armstrong Research and Demonstration Farm, Lewis, in southwest Iowa. There were four replications of four different treatments. Plots consisted of eight rows, spaced 30 in. apart that were 250 ft long. Yield and nematode data were collected from the center four rows of each plot. The experiment was planted on May 3 and harvested on October 11, 2011. Soil samples for nematode analyses were collected May 5 (3 reps) and 9 (1 rep) and then again, with root samples, on June 6, 2011, when the corn crop was at the V5 growth stage. Soil samples consisted of 20 one-inch-diameter cores that were 12 in. deep collected from under the seed row of the center four rows of each plot. The nematodes were extracted from the soil and root samples, and plant-parasitic nematodes were identified to genus and counted. The treatments, all applied to a single lot of seed of a single corn hybrid, were:

1. Avicta[®] Complete Corn (which is Avicta[®] + Cruiser[®] + Maxim[®] Quattro)
2. Cruiser[®] + Maxim[®] Quattro
3. Poncho[®] (500) / VOTiVO[®] + Acceleron[®] fungicides
4. Poncho[®] 500 + Acceleron[®] fungicides

Treatments 1 and 2 varied only by the presence of Avicta[®], and treatments 3 and 4 varied only by the presence of Votivo[®].

Results and Discussion

The primary plant-parasitic nematodes found in the field were the lesion (*Pratylenchus*), pin (*Paratylenchus*), and spiral (*Helicotylenchus*) nematodes. Spiral nematode was the most numerous (Figure 1). At planting, there were no significant differences in numbers of individual nematode types or in total number of plant-

parasitic nematodes among treatments. Very few nematodes were recovered from the root samples collected in June, so those data were discarded. In the soil samples collected in June, there were no significant differences in numbers of individual nematode types or in total number of plant-parasitic nematodes among treatments. The population densities of all nematodes in samples collected at planting and at V5 corn growth stage were well below numbers thought to cause yield loss to corn.

The overall average yield of the corn in the experiment was 154 bushels/acre. Mean treatment yields ranged from 152 to 155 bushels/acre, and there were no significant differences in yield among treatments. There was some hail damage to the plots and gray leaf spot developed during the growing season, which likely contributed to the lower yields.

Summary

- The nematode-protectant seed treatments did not affect numbers of plant-parasitic nematodes or corn yields in the experiment.
- Overall, corn yields were low in the experiment; the hybrid that was used was not well suited for where the experiment was conducted.
- The low population densities of plant-parasitic nematodes that were present in the field did not affect corn yield.
- The nematode management products may have a much more pronounced effect in fields with very damaging nematode species (like needle nematodes) and in fields with much greater plant-parasitic nematode population densities.

Acknowledgements

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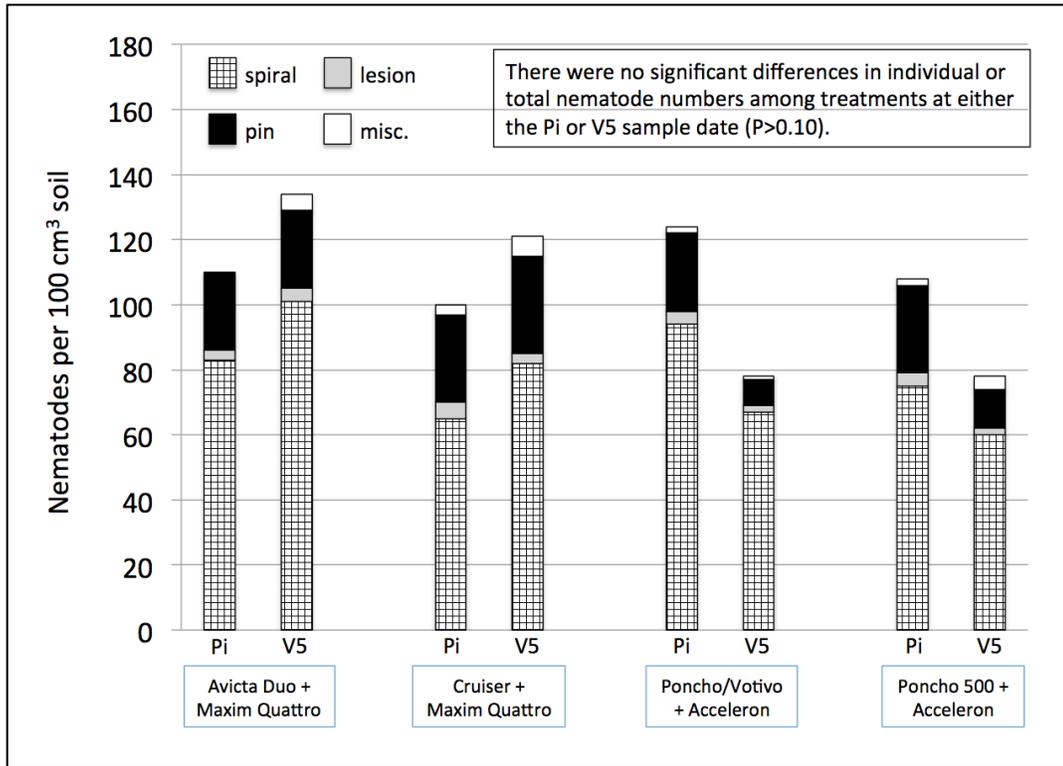


Figure 1. Mean population densities of plant-parasitic nematodes in soil samples at planting (initial population density or “Pi”) and at V5 corn growth stage. All nematode numbers were very low - too low to significantly reduce corn yields. Misc. = miscellaneous plant-parasitic nematodes present in very low numbers.