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Fending Off Nematodes That Feed On No-Tilled Corn

Ray Knake
Bayer CropScience
Johnston, Iowa

Nematodes in Corn

- Many corn growers don't realize yield is in jeopardy from a microscopic pest: nematodes.
  - Lesion nematodes are the most common nematode in the Midwest corn growing region and cause wide spread damage. Lesion nematode feeds from inside the root, and yield loss can be as high as 30 percent without even seeing a symptom above ground.
  - Needle nematodes—among the most decimating to corn yields—consistently produce between 10 percent to 75 percent yield reduction.

Corn Nematode Thresholds

- Check with your local Extension Specialist for threshold numbers in your area.
- Threshold numbers range from as low as 1 nematode per sample to 1000 nematodes per gram of root.

Nematodes in Corn

- Nematode populations are on the rise on many corn acres due to:
  - Reduced tillage practices
  - Lower organophosphate and carbamates use
  - More continuous corn acres

How Does Reduced Tillage Fit In This List?

- Nematodes are **Aquatic Animals** (worms) requiring free moisture for activity, so increased soil moisture from reduced tillage may help the nematode.
- Some nematodes are affected by tillage (needle, dagger and possibly others), so reduced or no-tillage favors these nematodes.

Illinois Agri-News 12/17/10, Dr. Terry Niblack Quotes

- "We finished the corn nematode survey and have found an astonishing number of fields in Illinois that are at risk for yield loss due to root-lesion nematodes."

Illinois Agri-News 12/17/10, Dr. Terry Niblack Quotes

- "This is as surprising to me as to anybody else. Over 80% of the fields that were surveyed had lesion nematodes and over two-thirds of those had high enough numbers to be at risk for yield loss."

Nematodes as Plant Pathogens

- 10% of nematodes are parasites of plants
  - Nematodes are obligate parasites and are unable to develop and reproduce in the absence of living host roots

Nematodes as Plant Pathogens

- There are many species of plant parasitic nematodes that feed on corn and soybean
- Nearly all nematode species that feed on corn, likely, are native to the United States

Symptoms Are Not Unique

- Above ground:
- Thin stands, uneven plant height, stunted plants, uneven tasseling, leaf yellowing, or other discoloration

Symptoms Are Not Unique

- Below ground:
- Swollen roots, lack of fine roots and root branching, and necrotic lesions are common symptoms of nematode feeding on roots.

Most Nematodes That Feed On Corn Can Feed On Other Plants

- Most nematodes that feed on corn have a wide host range.
- Most, if not all, have weed hosts.
- They can feed on other crops, especially on most types of grasses.

Nematode Protection

- Poncho/VOTiVO
- Bacteria colonize and grow around the root to create
  a living barrier of prevention.
- This barrier protects corn seedlings from a wide range of nematode species.

Growth Initiated as Seed Germinates

An In Depth Evaluation Of A Corn Plot Near Nichols Iowa, 2010

Where Does The Extra Yield Come From?

Trial Questions

- Nematode Control Products Increased Yield In This Replicated Trial By 6.36 to 12.19 Bu/Acre-Why?
- Was it because of stand? Early plant emergence? More uniform plants? Other factors?

Trial Design

- Trial planted into a field known to have needle nematodes.
- Three reps planted with a research planter 40 feet long. Four rows wide with data gathered from the middle two rows.
- Stand data collected from start of emergence.

Trial Design

- Plant leaf collars determined when plants were in the 5-7 collar stage and each plant's collar number marked with a colored stake.
- Plant heights completed when largest plants were in the 8 collar stage and again after tasseling.
- Tassel emergence was recorded on several days.

Trial Design

- All ears from the middle two rows were hand harvested and the colored stake identifying early collar formation taped to the ear.
- Ear numbers, ear length, ear row numbers and ear weight were recorded.

Yield Data From The Nichols' Plot

Treatment	Yield (Bu/Acre)
Fungicide + Poncho 250	122.06
Fung + Poncho/Votivo	134.25
Fung + Nematode Control Prod.	128.42
Fung + Poncho 250 + Counter	128.88

Stand Data From The Nichols' Plot

Treatment	Stand/Plot
Fungicide + Poncho 250	104.3
Fung + Poncho/Votivo	101.0
Fung + Nematode Control Prod.	104.3
Fung + Poncho 250 + Counter	104.7

Average Leaf Collars/Plant From The Nichols' Plot

Treatment	Average Leaf Collars
Fungicide + Poncho 250	6.21
Fung + Poncho/Votivo	6.10
Fung + Nematode Control Prod.	6.00
Fung + Poncho 250 + Counter	6.10

Early Plant Height Data From The Nichols' Plot

Treatment	5 Collar Plant Ht as % of 7 Collar Average
Fungicide + Poncho 250	82.07
Fung + Poncho/Votivo	83.35
Fung + Nematode Control Prod.	80.52
Fung + Poncho 250 + Counter	79.87

Early Plant Height Data From The Nichols' Plot

Treatment	6 Collar Plant Ht as % of 7 Collar Average
Fungicide + Poncho 250	92.58
Fung + Poncho/Votivo	96.43
Fung + Nematode Control Prod.	91.34
Fung + Poncho 250 + Counter	88.56

Early Plant Height Data From The Nichols' Plot

Treatment	7 Collar Plant Ht as % of 7 Collar Average
Fungicide + Poncho 250	97.87
Fung + Poncho/Votivo	103.08
Fung + Nematode Control Prod.	99.63
Fung + Poncho 250 + Counter	97.10

Final Plant Height Data From The Nichols' Plot

Treatment	5 Collar Plant Ht as % of 7 Collar Average
Fungicide + Poncho 250	95.16
Fung + Poncho/Votivo	100.83
Fung + Nematode Control Prod.	97.41
Fung + Poncho 250 + Counter	95.90

Final Plant Height Data From The Nichols' Plot

Treatment	6 Collar Plant Ht as % of 7 Collar Average
Fungicide + Poncho 250	98.07
Fung + Poncho/Votivo	102.84
Fung + Nematode Control Prod.	98.32
Fung + Poncho 250 + Counter	99.18

Final Plant Height Data From The Nichols' Plot

Treatment	7 Collar Plant Ht as % of 7 Collar Average
Fungicide + Poncho 250	99.31
Fung + Poncho/Votivo	102.01
Fung + Nematode Control Prod.	98.61
Fung + Poncho 250 + Counter	100.00

Effect Of Treatment On Row Numbers

- No treatment resulted in more average rows of kernels on ears from any leaf collar stage.
- Maximum yield potential of a plant is determined early in the season 5-7 collar stage) so this finding was not surprising.

Ear Length Data From The Nichols' Plot

Treatment	5 Collar ear length as % of 7 Collar Average ear length
Fungicide + Poncho 250	79.87
Fung + Poncho/Votivo	87.88
Fung + Nematode Control Prod.	89.36
Fung + Poncho 250 + Counter	86.06

Ear Length Data From The Nichols' Plot

Treatment	6 Collar ear length as % of 7 Collar Average ear length
Fungicide + Poncho 250	87.88
Fung + Poncho/Votivo	95.48
Fung + Nematode Control Prod.	96.56
Fung + Poncho 250 + Counter	92.86

Ear Length Data From The Nichols' Plot

Treatment	7 Collar ear length as % of 7 Collar Average ear length
Fungicide + Poncho 250	99.99
Fung + Poncho/Votivo	104.43
Fung + Nematode Control Prod.	101.61
Fung + Poncho 250 + Counter	98.71

Ear Weight Data From The Nichols' Plot

Treatment	5 Collar ear weight as % of 7 Collar Average ear wt.
Fungicide + Poncho 250	63.34
Fung + Poncho/Votivo	76.46
Fung + Nematode Control Prod.	78.41
Fung + Poncho 250 + Counter	74.89

Ear Weight Data From The Nichols' Plot

Treatment	6 Collar ear weight as % of 7 Collar Average ear wt.
Fungicide + Poncho 250	80.70
Fung + Poncho/Votivo	94.90
Fung + Nematode Control Prod.	92.91
Fung + Poncho 250 + Counter	87.56

Ear Weight Data From The Nichols' Plot

Treatment	7 Collar ear weight as % of 7 Collar Average ear wt.
Fungicide + Poncho 250	102.33
Fung + Poncho/Votivo	106.31
Fung + Nematode Control Prod.	96.78
Fung + Poncho 250 + Counter	98.26

Yield Data From The Nichols' Plot

Treatment	Yield (Bu/Acre)
Fungicide + Poncho 250	122.06
Fung + Poncho/Votivo	134.25
Fung + Nematode Control Prod.	128.42
Fung + Poncho 250 + Counter	128.88

Trial Conclusions

- Treatments for the control of nematodes that feed on corn had no positive affect on stand, early leaf collar number or ear row kernel numbers and only a very slight affect on early plant height.

Trial Conclusions

- Treatments for the control of nematodes that feed on corn had a positive affect on final plant height, ear length, ear weight and most importantly, total yield.

Summary

- There are many different nematodes that can feed on corn, and each one has a different threshold number.
- Recent survey results indicate that nematodes that feed on corn are more prevalent than previously thought.

Summary

- Yield loss from nematodes that feed on corn vary from year to year and field to field depending on many factors including crop stress.
- Seed treatment products are now available to help reduce yield loss caused by nematodes that feed on corn.

Questions?