

Control of Southern root-knot nematode on tomato using soil amendments

Forum 3

Green Technology and its applications



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Speaker 6

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Abstract

The present results found that organic waste materials were effective against root-knot nematode attacking tomato under field condition and significantly reduced root gall indices, nematodes and egg masses as compared to control. Organic soil amendments stimulate the activities of microorganisms that are antagonistic to root-knot nematodes. The decomposition of organic matter results in accumulation in the soils of specific compounds that may be nematicidal. Amendments are mainly bio-products and wastes from industrial, agricultural, biological and other activities. Ladies and gentlemen, It my pleasure to share my topic with you. Then I'd like to talk about

I. Background

First I'll introduce the background .

As we know, root-knot nematode lives and feeds in the root of various plants, and the most susceptible crop is tomato.

RKN has a stylet, a hollow retractable needle connected to the esophagus and three unicellular esophageal glands. This structure is used to pierce and penetrate plant cell walls, to release esophageal secretions into the host tissue and to take up nutrients from the giant cells which have several nuclei.

Root-knot nematode most economically destructing species is on feld, horticulture, crops , and vegetable crops losses around 10%. Meloidogyne species are obligate parasites of the plant roots like monocots, dicots, herbs, shrubs, and woody plants.

Meloidogyne's infection symptoms include root galls (formation of galls due to damages in water and nutrient-conducting abilities of the roots), shoot chlorosis, deficiency of nutrient, stunted growth, and wilting.

II. Methods of root knot nematode control

In view of the adverse impact of root-knot nematodes, it is important to manage the root-knot nematode infestation in the manage. There are severies methods:

1. use of chemical nematicides

Chemical nematicides are popular for their quick response. Nematicides are artificial solutions made for the control, although they start giving feedback as soon as after the application; They damage to the crop itself and also side effects associated with the human health. So the use of chemical nematicides is being limited.

2. rotation of antagonistic plants and usage of grafting

The antagonistic feature of these crops has highly reduced the nematode population

3. use different biocontrol agents.

Biological agents like fungi, bacteria, actinomycetes, and others are host specific and have the potential to kill the plant parasitic nematodes. Among these fungi and bacteria are the most dominant microbes that naturally born in soil ecosystem and also have a great potential to control the nematodes.

4. organic materials on control of root-knot nematode (RKN)

In the literature, many trails of organic amendments like crop waste, compost, manure, agro-industrial waste, different extracts and chopped leaves are used by different researchers as organic additives to improve crop yields and suppress the root-knot disease. Organic materials may be animal and plant origin.

Numerous plant-based products have been used in suppressing the nematode infestation, not only the plants or their residues also their byproducts are found to be quite satisfactory.

III. Organic materials on control of root- knot nematode of tomato

Now I'll introduce two kinds of amendments, one is the waste of a kinds of medicinal insect , EUPOLYPHAGA, the other is a plant-based product , Zanthoxylum bungeanum Seeds.

EUPOLYPHAGA FRASS AND ITS EXTRACTS PROTECTED TOMATO FROM MELOIDOGYNE INCOGNITA INFESTATION.

This topic mainly take Eupolyphaga (*Eupolyphaga sinensis* Walker) frass as material, the control effects of frass and its extracts on *Meloidogyne incognita* was studied through laboratory assays, pot experiments and field trials. The nutrients, organic volatile compounds and oligochitosan contents in the frass were analyzed.

The nematode immobility and mortality was significantly increased with increasing extract concentration and treatment time.

Compared with control, the egg hatching was significantly inhibited when the extract concentration was beyond 20%.

Through pot experiments, the gall index (GI) decreased significantly. And in the soil, the number of root-knot nematodes were obviously reduced after adding frass.

The ingredients analysis showed that organic matter and humic acid content is 19.3% and 8.85%, respectively, macroelement and microelements are rich in frass. There are 18 essential amino acids, 110 kinds of volatile compounds.

And the content of oligochitosan was about 4.4%. Oligochitosan is derivative of chitin that is part of insect constituents has nematicidal effect. These natural chitinous materials are potential as substitutes to synthetic nematicide, since they are also abundant and less harmful to environment.

Control of Southern Root-knot Nematodes on Tomato and Regulation of Soil Bacterial Community by Biofumigation with *Zanthoxylum bungeanum* Seed. We used field experiments in the greenhouse to determine the effects of *Z. bungeanum* seeds on SRKN, plant growth parameters, soil physicochemical and microbial characteristics.

As the chart and pictures showed biofumigation with *Z. bungeanum* seed had a significant effect on controlling SRKN.

There were 26 kinds of volatile compounds were qualitatively identified. Some of the volatile substances were previously reported as having insecticidal activity.

As shown in the figures, biofumigation of *Z. bungeanum* seed provided favorable living conditions for these microorganisms to accumulate in the following periods in the treated habitat. And the co-occurrence network of bacterial communities was reconstituted by biofumigation of *Z. bungeanum* seed.

IV conclusion

Although the use of organic amendments for effective nematode control is limited by the large quantities needed, they can reduce nematode population densities to different.

In addition to their suppressive effects on nematode density, organic amendments stimulate microbial populations of actinomycetes, bacteria and fungi, elements of which might be antagonistic to nematodes.

Meanwhile organic soil amendments provide better media for plants to grow, result in better soil texture, increase water holding capacity, supply the nutrients to deficient soil.

Organic soil amendments have been used successfully as effective alternative, environment friendly methods for controlling the root-knot nematodes.

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