PASTEURIA PENETRANS FOR ROOT-KNOT NEMATODE CONTROL IN VEGETABLES AND ORNAMENTALS

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Root-knot nematodes (*Meloidogyne* spp.) cause significant losses in vegetable and ornamental crops. The southern root-knot nematode, *Meloidogyne incognita,* and the peanut root-knot nematode, *M. arenaria,* are found in all vegetable and ornamental producing regions in the southeastern U.S. These nematodes are difficult to control due to their wide host ranges, which makes crop rotation ineffectual for reducing their populations. The biological control agent *Pasteuria penetrans* has potential for controlling some species of nematodes and can now be mass produced *in vitro*. Three methods of application for *in vitro* produced *P. penetrans* were assessed including seed, transplant, and post-plant treatments. Efficacy in controlling galling and reproduction of *M. incognita* on tomato and cucumber, and *M. arenaria* on snapdragon was evaluated. Seed treatment application was only assessed for *M. arenaria* on cucumber. Before nematode inoculum and *Pasteuria* treatments were applied, soil for greenhouse trials was steamed to eliminate naturally occurring nematodes. Microplots were disinfested of nematodes with Telone II. Greenhouse trials were then inoculated with 1000 eggs/pot of *M. incognita* or *M. arenaria* isolated from pure cultures of each nematode species. Microplot experiments were inoculated with 5000 nematode eggs/plot. *Pasteuria* treatment rates of a granular formulation ranged from 50,000 endospores/cm^3 to 300,000 endospores/cm^3 of transplant mix applied at seeding. Additional post-plant applications of 50,000 endospores/cm^3 of soil were applied as a liquid formulation to soil post-transplant for both greenhouse and microplot trials. At the end of experiments plant growth measurements, root condition, and gall ratings were performed, and nematode juveniles were quantified following extraction from both roots and soil.

In greenhouse tomato trials, the number of *M. incognita* J2 isolated from tomato roots was low overall and the untreated control and steam treatment did not differ. Nematode reproduction, root disease, and galling were all reduced by steam, however, the *Pasteuria* treatments did not differ from the untreated control for these variables. In tomato microplot experiments, there were no differences in *M. incognita* J2 in roots or soil, eggs/g root, or nematode reproduction. The UTC did not differ from Telone II for root condition ratings. Telone II did have lower gall index values compared with several *Pasteuria* treatments, except the 300,000 endospores/cm^3 transplant treatment. In greenhouse cucumber trials, all *Pasteuria* treatments were equivalent to the steam control for reducing *M. incognita* populations in roots and soil and reducing nematode reproduction and galling compared to the untreated control. In cucumber microplot trials there were no differences among treatments for *M. incognita* populations in roots or soil, eggs/g root, or root condition ratings. Nematode reproduction on cucumber was low with Telone II and with the seed treatment plus post-plant application of *Pasteuria*, which had the lowest nematode reproduction. However, galling for all *Pasteuria* treatments was higher than galling with Telone II. In snapdragon greenhouse trials with *M. arenaria,* there were no differences among treatments in J2 isolated from roots, and J2 in soil were only reduced by steam treatment. Galling was reduced by steam compared to several *Pasteuria* treatments, however galling did not differ

between the steam and UTC treatments. In Snapdragon microplot trials, overall numbers of *M. arenaria* isolated from roots and soil were very low compared with greenhouse trials on snapdragon with *M. arenaria*. For most variables, the UTC did not differ from the Telone II treatment with the exception of root weight, which was higher in the Telone II treatment. Root-knot nematode control with *Pasteuria* under the greenhouse and microplot environments of these studies varied between the nematode species, and among the crops, and *Pasteuria* application methods tested. Positive results were achieved for control of *M. incognita* with the seed treatment application on cucumber. Further trials which evaluate the conditions that favor successful nematode control with *Pasteuria* are needed.