MULTIGUARD®: EFFECTS ON NEMATODE POPULATIONS AND GALLING ON TOMATO AND PEPPER

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Multiguard® Protect, a commercial formulation of furfural (2-furancarboxaldehyde), was evaluated in a series of greenhouse trials over three seasons for effects on plant growth, nematode populations in roots and soil, and galling caused by *Meloidogyne incognita*. 'Tiny Tim' tomato (*Lycopersinon esculentum*) and 'Capistrano' bell pepper (*Capsicum annuum*) were transplanted into pots containing field soil naturally infested with *Meloidogyne incognita*, as well as other pathogenic and microbivorous nematodes, and soil microorganisms. In the first set of trials, Multiguard treatments were applied as soil drenches at rates equivalent to: 1) 452 kg/ha, 7 days preplant; 2) 452 kg/ha, 7 days preplant + 28 kg/ha, 2 weeks post-plant; 3) 85 kg/ha, 7 days preplant; 4) 85 kg/ha, 7 days preplant + 28 kg/ha, 2 weeks post-plant; and 5) 28 kg/ha, 2 weeks post-plant. The experiments were performed twice, once in fall 2005 and repeated in winter 2006. In the second set of trials, performed in fall 2006, Multiguard treatments were: 1) 28 kg/ha, 2 days preplant; 2) 85 kg/ha 7, days preplant; and 3) 452 kg/ha 7, days preplant. An untreated control was included in all experiments.

In the first set of trials, under warm fall conditions and high root-knot nematode pressure, high rates of Multiguard increased root-knot nematode populations in both roots and soil in both tomato and pepper compared to the untreated controls, and lower rates of Multiguard. However, even with significantly increased numbers of nematodes in roots and soil, galling was significantly reduced on tomato at the 452 kg/ha rate (Fig. 1A). Galling rates on pepper were very low and were not reduced by the higher rates of Multiguard (data not shown). Populations of beneficial microbivorous nematodes were also increased in roots and soil of tomato and pepper with some rates of Mutiguard.

Under cool conditions and low soil nematode numbers in the winter trials, the low rates of Multiguard increased root-knot nematode populations in tomato and pepper roots, similar to the effect with the higher rates in the fall trial. As in the fall trials, regardless of the number of root-knot nematodes isolated from roots or soil, the two 452 kg/ha preplant Multiguard treatments significantly reduced galling on tomato (Figs. 1A and 1B). The additional post-plant application of 28 kg/ha did not significantly increase control over the 452 kg/ha preplant rate alone (Fig. 1B). Microbivorous nematode populations did not differ from the control for tomato, but for pepper the 85 kg/ha rate increased these populations. There were no differences compared to the untreated control in soil populations of microbivorous nematodes in the winter trial. However, in the tomato trial, the

452 kg/ha rate with 28 kg/ha applied post-plant, which had the lowest level of galling, had significantly more microbivorous nematodes in soil than lower rates.

In the second set of trials, increasing rates of Multiguard reduced root-knot nematode juveniles in tomato roots. Only the highest preplant rate reduced juveniles in soil of tomato. Gall ratings on tomato reflected the treatment effects on soil nematodes, with the highest rate of Multiguard reducing galling on tomato (Fig. 1C). However, an increase in galling on tomato occurred with the lowest rate of Multiguard (Fig. 1C). Greatly reduced numbers of root-knot nematode juveniles were extracted from pepper roots and soil, however, numbers of juveniles extracted from pepper roots increased with increasing rates of Multiguard, as seen in the first set of trials. This increase in nematodes extracted from pepper roots was not reflected in an increasing in galling on pepper. Also, numbers of microbivorous nematodes extracted from pepper roots increased with increasing rates of Multiguard.

Multiguard affects parasitic nematodes differently than beneficial microbivorous nematodes, especially those isolated from roots. This effect varies depending on the host plant and rate of treatment, and may be indicative of less detrimental, or stimulating influences on soil microoganisms, on which microbivorous nematodes feed. At high rates, there are indications that Multiguard has an effect on either the host plant or the nematode that inhibits gall formation in tomato. Regardless of the effects of Multiguard on nematode and microbial ecology, high rates of Multiguard effectively managed galling caused by *M. incognita* on tomato, while lower rates and post-plant applications were not effective, or did not increase levels of control over the high rates applied alone.

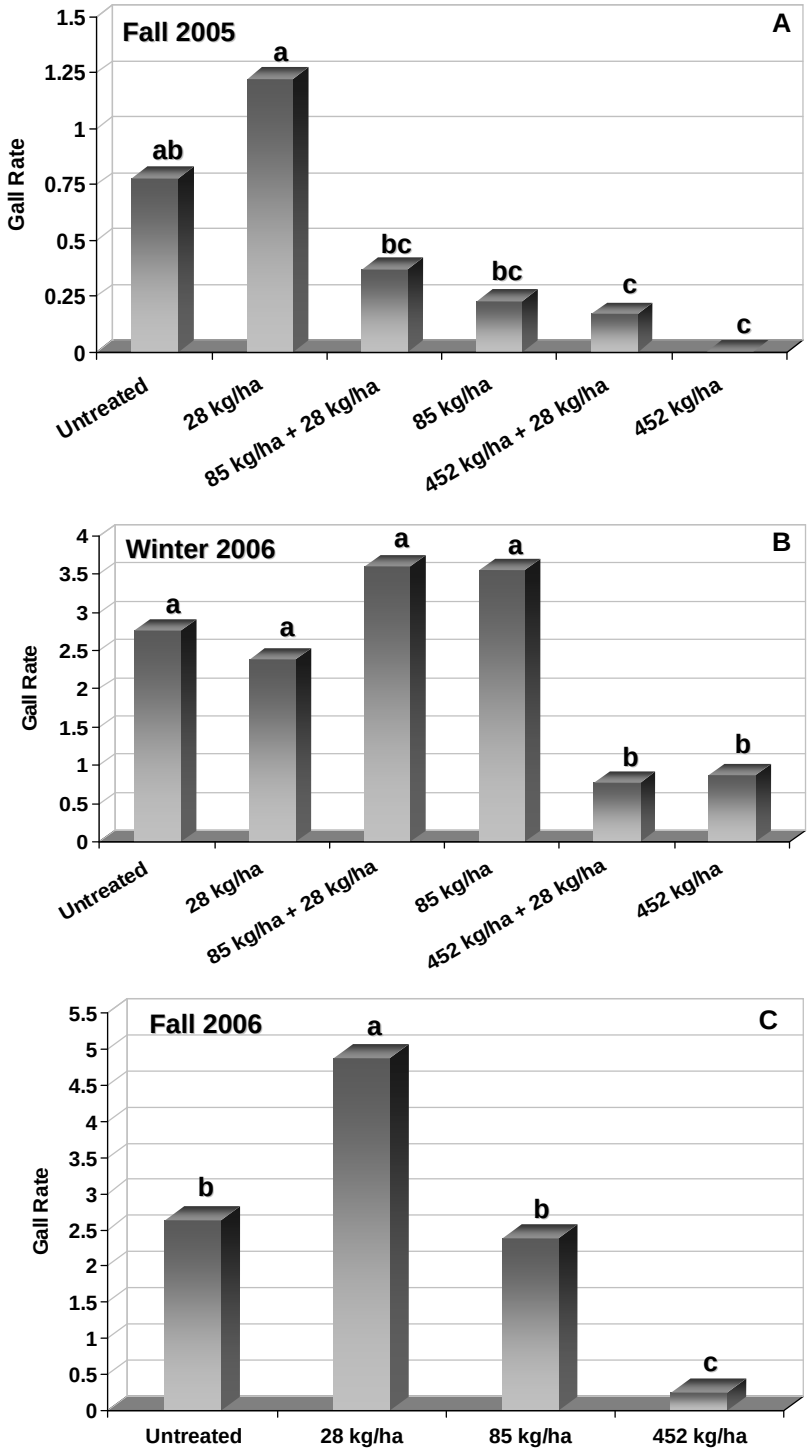

Fig. 1. Effects of Multiguard treatments on galling of tomato in three trials conducted in fall 2005 (A), winter 2006 (B), and fall 2006 (C). Gall rates were based on a 0-10 scale.