USING TRAP CROPPING TO MANAGE ROOT-KNOT NEMATODE ON VEGETABLE CROPS

B. B. Westerdahl*[1]

[1]Department of Entomology and Nematology, University of California, Davis

Root-knot nematodes (*Meloidogyne* sp.) are widely distributed throughout California and are the most important nematode pest of carrot (*Dacus carotae*). In addition, stubby root nematode *(Paratrichdorus* sp.) is found statewide, often in association with root-knot nematode, and needle nematode *(Longidorus africanus*) is important in the Imperial Valley. Current control methodology relies on the use of Metam sodium and Telone II. Metam sodium, for example, was used on 33% of California's carrot acreage in 1997 and Telone II was used on 10%. Although Methyl bromide is no longer registered on carrots, it was used on 1% of California's carrot acreage in 1997.

Trap cropping is a nematode management technique that has been tested periodically since the late 1800's. A susceptible host is planted and larvae of a sedentary parasitic nematode such as root-knot are induced to enter and establish a feeding site. Once this has occurred, and the female begins to mature, she is unable to leave the root. The plants are then destroyed before the life cycle of the nematode can be completed, trapping nematodes within the root. By itself, trap cropping is not likely to provide the same level of control as a chemical nematicide such as Telone II, because not all nematodes are induced to enter the roots. However, the potential for loss of registration of this and other chemical nematicides for various environmental reasons is great enough that an IPM approach using two or more techniques in combination, that will each provide partial control of the nematode population is warranted.

A trial with 5 replicates of 12 treatments using carrots as a trap crop was conducted in a randomized complete block design at the UC South Coast Research and Extension Center in Irvine, CA in a field with an established population of root-knot nematode *(Meloidogyne javanica*). Each replicate was 4.6 meters long by 0.91 meters wide with a 0.91 meter buffer on each end. The field location has a loam soil (66 percent sand, 21 percent silt, 13 percent clay and 0.6 percent stable organic matter) with a pH of 7.6 and a CEC of 0.68 milimhos/cm. Temperatures within the plots were monitored with Hobo microloggers for determination of nematode degree-day information.

A carrot trap crop was planted, and 1 week post-germination, some plots received glyphosate or tillage. Two weeks post-germination, additional plots received glyphosate or tillage. Three weeks post-germination, some additional plots received tillage. Following planting of the trap crop, seeded plots and wet fallow treatments were watered daily or every other day as needed through drip irrigation tubing to maintain required moisture for germination and growth. Dry fallow was maintained by running hoses around the replicates needing to remain dry. One week after the completion of the tillage and Roundup treatments, all plots were planted to carrots. The trial was sampled for nematodes pre-plant, to establish the level of the population, and at harvest. Soil samples consisted of 12, 2.54 cm diameter cores per replicate to a 30 cm depth. Nematode extraction was by elutriation followed by sugar centrifugation.

Harvested carrots were graded into 4 categories: 1) without nematode damage, 2) with nematode damage only on lateral roots that would normally be removed prior to eating, 3) not typically edible because of nematode damage, and 4) not typically edible without nematode damage. Carrots in each category were counted and weighed. For data analysis, categories 1 and 2 were combined to determine typically acceptable numbers and weights of carrots. Data were analyzed with Analysis of Variance (ANOVA) followed by Fisher's Least Significant Difference Test. Percent values were arcsin transformed prior to analysis.

A trap crop can be any root-knot nematode susceptible seed. Carrots were selected for this trial based on results of previous trials comparing potential trap crops. Carrots were also used as the final "commercial" demonstration crop because they are a very sensitive root-knot nematode bioindicator crop. Results from carrots could be extended to other root-knot sensitive crops such as tomatoes, beans, potatoes, sweet potatoes, cucumbers, peppers, squash, and melons.

The Dry fallow + Glyphosate2 + till3 treatment is considered the untreated control. Percent marketable carrots based on number of carrots was greater ($P = 0.05$) than the untreated for all treatments except: Carrot + till1, Carrot + Glyphosate2, and Wet fallow + Glyphosate2. All treatments except Carrot + till1 had a greater percentage of marketable carrots based on weight than the untreated ($P = 0.05$). All treatments except Wet fallow + Glyphosate1 + till2, and Wet fallow + Glyphosate2 had a lower number of root-knot nematode juveniles in the soil at harvest ($P = 0.05$). In the Wet fallow treatment, in which a carrot trap crop was not planted, the weeds that germinated served to trap nematodes within the roots. These results indicate that either planting a trap crop, or that a pre-irrigation to germinate weeds, followed by glyphosate or tillage, could provide a degree of nematode control.