The influence of the root-knot

PARSLEY YIELDS UNDER CON

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Parsley growing in the coarse-textured soils of the coastal areas of southern California is sometimes severely infected with the root-knot nematode, Meloidogyne incognita. **Affected plants at first appear slightly stunted and the older leaves chlorotic. With each cutting of the parsley greenery, the lower leaves die at a higher level on the plant and the yields lessen because the dead foliage cannot be used by parsley processors. Since yellow and/or dead leaves are harvested along with green foliage, they must be sorted out manually, thereby increasing grower and processor costs. Following the second cutting, many plants fail to produce harvestable foliage and frequently die. This article establishes the effects of root-knot upon yields of a highly susceptible parsely variety under controlled conditions of the greenhouse.**

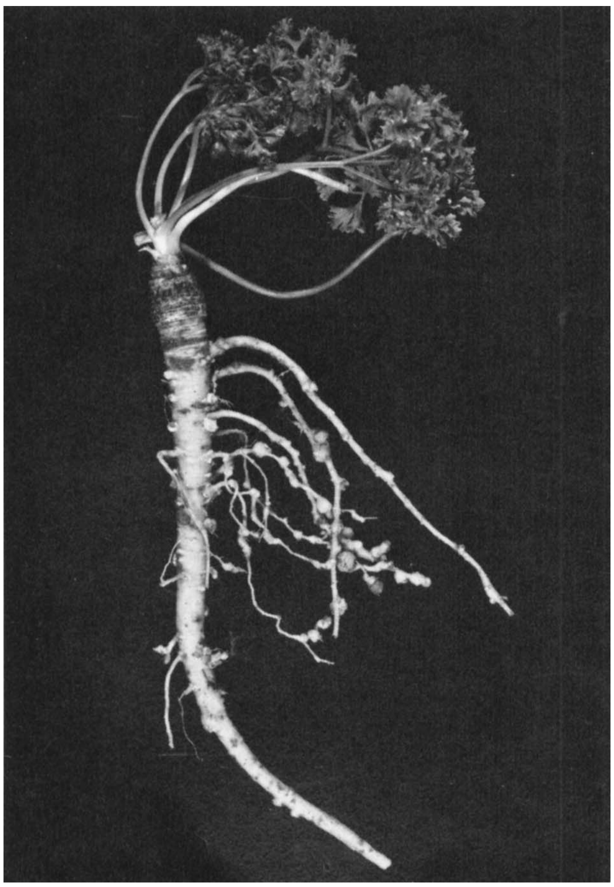
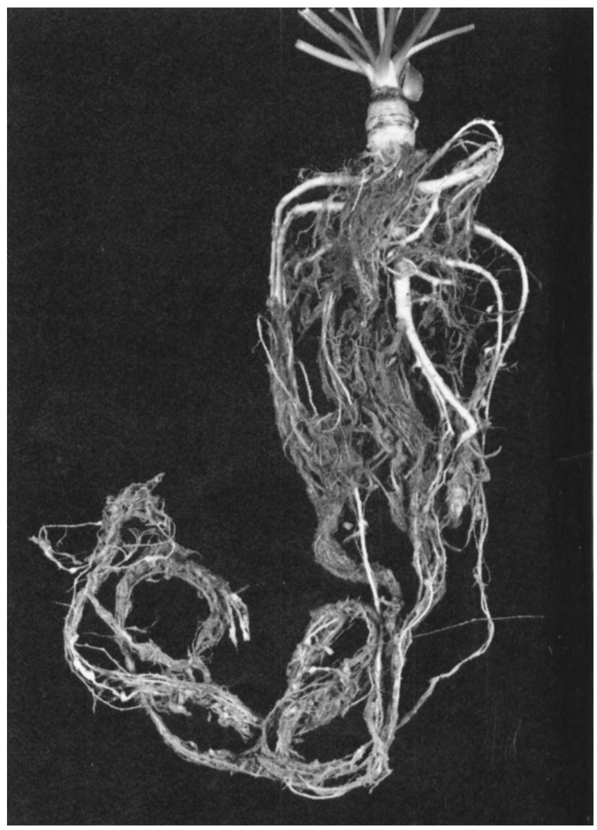


Photo 1. An Evergreen parsley plant illustrating root-knot nematode galls 6 weeks after inoculation (left).

Photo 2. A root system of an inoculated Evergreen parsley plant after the fourth greenery cutting. Note root-knot galls and root discoloration believed to be caused by fungi (right).



nematode, *Meloidogyne incognita*, on

TROLLED GREENHOUSE CONDITIONS

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EIGHTY-ONE 6-INCH POTS of steamed soil were planted to Evergreen double curl parsley on April 30, 1971 in a test of root-knot nematode effects. The sand, silt and clay content of the soil was 93, 4 and 3 per cent, respectively. The plants were thinned to two to three per pot and were grown for three and a half months on a bench in the greenhouse were ambient temperatures range from 75 to 90° F. Watering was done as required and Hoagland's solution was applied weekly. When the plants were 4½ months old, soil in each of 49 pots was infested with a water suspension of approximately 2,000 *M. incognita;* the nematode inoculum originated from field-grown beets. Plants in the remaining 32 pots were not inoculated and served as checks. During the course of the experiment the plant leaves were harvested four times by clipping to within ¾ inch of the crown; leaf weights were taken for third and fourth cuttings.

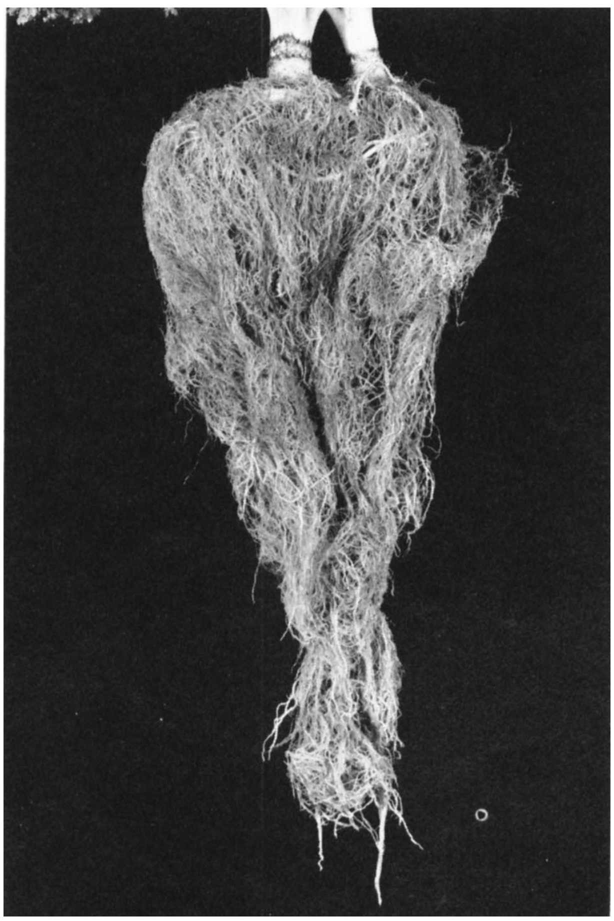

Photo 3. The root systems of uninoculated Evergreen plants after the fourth greenery cutting. Note the extent of clean feeder roots and white color in comparison with the inoculated roots in photo 2.

Galls evident

When the inoculated roots were examined, at the termination of the experiment, abundant galling due to the root-knot nematode was evident. The appearance of the roots suggested that fungi were also associated with and accelerated the rate of plant decline. Isolations from the root systems were made on PDA; *Rhizoctonia solani* and species of *Pythium* and *Fusarium* were consistently recovered. Isolations from the check plants revealed that neither pathogenic fungi nor bacteria were present.

Although root-knot nematode galls were evident six weeks after inoculation (photo 1), in terms of leaf weights, the first two harvests showed no differences between the nematode-inoculated plants and the checks. Differences in plant weights appeared in the third cutting (approximately four months after inoculation) and were extremely accentuated in the fourth (see table).

Plant survival

The total number of live plants in each pot was recorded at the time of the third and fourth cuttings. After the fourth cutting, all check plants survived and were growing vigorously, whereas 73% of the inoculated plants died. Plant death was not the sole reason for the drastic decline in yield (table). This was revealed when yields were computed on the basis of individual living plants. When check plants were washed free of soil and the roots examined, the feeder roots were observed to be abundant, and usually white and healthy (photo 3). Roots from root-knot infected plants were a tannish brown in color, lacked feeder roots, and were heavily galled (photo 2). A comparison of the leaf growth 10

Photo 4. Uninoculated check plants of Evergreen parsley, to left, 10 days after the fourth greenery cuttings.

Photo 5. Inoculated plants of Evergreen parsley, below, 10 days after the fourth greenery cutting. Note lack of leaf growth and death of some plants.

days after the fourth cutting is illustrated in photos 4 and 5; photo 4 shows the uninoculated check and photo 5, the plant infected with root-knot. Photo 6 is an example of an uninoculated check plant whose foliage had never been trimmed throughout the experiment.

Nematode-fungi interaction

Root-knot nematodes are not known as "plant killers" per se but are generally associated with lack of plant vigor and gradual decline. Death of some plants between the third and fourth cuttings is probably due to the interaction between the nematodes and the fungi. The fungi were undoubtedly introduced along with the nematode inoculum which was collected from sugar beets growing in a field at the UC Experiment Station at Riverside. Studies on the interactions between the nematodes and the fungi are now in progress.

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YIELDS OF PARSLEY INOCULATED AND NON-INOCULATED WITH ROOT-KNOT NEMATODE; THIRD AND FOURTH CUTTING

Date cut	Average yield per plant: Check	Average yield per plant: Root-knot inoculated
	gms	
10 Dec 1971* (3rd cutting)	15.0	10.9
18 Jan 1972 (4th cutting)	11.2	3.5

* Four months after plants were inoculated with nematodes.

Photo 6. Uninoculated and uncut Evergreen parsley at the termination of the root-knot inoculation experiment (below).