Lesion nematode control in apples

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I Rome apple tree growing in preplant fumigated soil

Red Rome apple tree growing in check plot

LESION NEMATODES (*Pratylenchus* sp.) are recognized as pathogens of apples in the eastern part of the United States, and various preplant control measures have been demonstrated beneficial in re-establishing orchards. During the early '60s two small-scale preplant fumigation trials were conducted in replanted orchards in the Oak Glen area of San Bernardino County, California. Many tree replants or interplants in established orchards in this area were dying or demonstrating lack of vigor at that time. Soil and root analysis showed that high populations of *Pratylenchus* sp. were present in the orchards and were believed to be a major contributing factor to tree failure in these orchards. The results of these two early trials showed that preplant measures for nematode control were beneficial.

Another small field experiment consisted of the following treatments: (1) 50 gpa 1,3-dichloropropene applied 6 inches deep on 12-inch centers by handgun; (2) 400#/AC chloropicrin applied as above; and (3) untreated check. Each treatment was replicated nine times (single tree replicates). Eighteen months after planting, measurements of trunk circumferences and tree heights showed that trees growing in both the 1,3-D and the chloropicrin treated soils were significantly larger and more vigorous than those growing in the untreated check.

A large-scale preplant fumigation trial was then conducted on the same farm in the fall of 1962, again in a replant situation. The old orchard had been removed in 1960 and 1961. Preplant nematode samples showed a high population of *P. penetrans*, with some *P. vulnus* and *P. minyus* present. Treatments consisted of: (1) 50 gpa of 1,3-dichloropropene; (2) 70 gpa of 1,3-dichloropropene; and (3) untreated check. Each treatment was replicated three times, and plots were 45 by 75 ft. A minimum of ten trees was planted in each plot. The 1,3-D was applied by machine, with shanks on 12-inch centers and fumigants injected to a minimum of 8 inches deep. The soil was a sandy loam and moisture was near field capacity at the time of fumigant injection. Immediately after injection the soil was compacted with a cultipacker. Three months after soil treatment, Red Rome apples grafted onto apple seedlings were planted.

Excellent nematode control was obtained in both the fumigated treatments for approximately two years, after which the nematodes began to reappear in the fumigated plots. Six years after planting, lesion nematode populations were as high in the treated plots as in the checks. However, the initial protection of the preplant treatments had allowed the trees to become established and produce good crops.

Yields, trunk sizes, and tree replacement data in 1970, eight years after planting, are given below.

For the 50 gpa treatment, the average trunk cross section measurement (taken four inches above the soil line on Red Rome scion) was 41.6 cm. These trees yielded 3.98 field boxes each (averaging 42 lbs per box). In the 70 gpa treatment, the average trunk cross section was 37.5 cm, and yield was 3.20 field boxes per tree. The untreated check trees measured an average of 13.1 cm in cross section and yielded only 0.88 boxes per tree. With respect to tree replacement among the 30 original trees in each replication, no trees in the 50 gpa treatment were replaced, four were replaced in the 70 gpa treatment, and eleven were replaced in the untreated plots.

In 1974 plots were again sampled for nematodes, and no differences existed in population densities per unit of apple roots between the fumigated and check treatments. Trees in the check plots that still remained from the original planting in 1963 were only one-third the size of those in the fumigated plots. Yields of the untreated checks were estimated to be only 25 to 30% of those in the fumigated plots. Approximately 50% of the trees in the untreated checks in 1974 had survived, whereas 95% of those in the fumigated plots were still alive and producing well. The photos show the size in 1974 of the fumigated and unfumigated trees.

Conclusions

This and the previous trials demonstrate the benefits of preplant soil fumigation for the control of lesion nematodes on apples in the Oak Glen area of southern California. Similar results have been demonstrated in other parts of the U.S. Benefits of fumigation are evident in the establishment of the orchard and in subsequent yields. Replant problems are minimal following fumigation of soils where lesion nematodes are a potential problem. In this area, 50 gpa of 1,3-D did as good a job in establishing the orchard as did the 70 gpa treatment. Subsequent grower trials in the area have verified our results, and another trial is currently underway using a broad-spectrum biocide to investigate additional benefits of fungus and nematode control.

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Root-knot nematode control in cantaloupe

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CANTALOUPE IS GROWN on a wide variety of irrigated soils in southern California. Of the root-knot nematodes, *Meloidogyne incognita*, is the most common species which attacks this crop. This nematode, as well as other species of the genus, is generally a problem on coarser-textured soils in the southern valleys. When *M. incognita* is present at planting time it stunts the young plants soon after emergence and causes severe galling of the roots (photo). Plants infected in the very early stages of growth remain stunted and unproductive and seldom bear marketable melons (photo). Localized infestations in a field range in size from a few square yards up to several acres. Sometimes entire fields are uniformly infested with the nematode and, if proper preplant control measures are not taken, the entire field may be unproductive.

Currently, the university suggests using various preplant fumigants such as the 1,3-dichloropropenes (D-D, Telone, Vidden D), DBCP (Nemagon, Fumazone), or ethylene dibromide to control this pest. Experimental attempts have failed to salvage a crop such as cantaloupe, once it has become infected with root-knot. This failure also holds true for any annual crop.

Occasionally growers find that the registered and suggested preplant fumigants are inadequate, because of faulty application equipment, improper material placement, poor soil preparation prior to application, undesirable level of soil moisture, or large amounts of undecomposed plant root systems which protect nematodes from fumigant action. In the Imperial Valley of southern California one grower's preplant fumigation did not give an adequate degree of root-knot nematode control, and plant damage was obvious in this field before the time of plant thinning. The plants were in the first and second true-leaf stage of growth and slight galling was evident on some of the young plant roots. Large portions of the field were uniformly infested and provided ample space for an experimental plot to test the efficiency of Vydate.

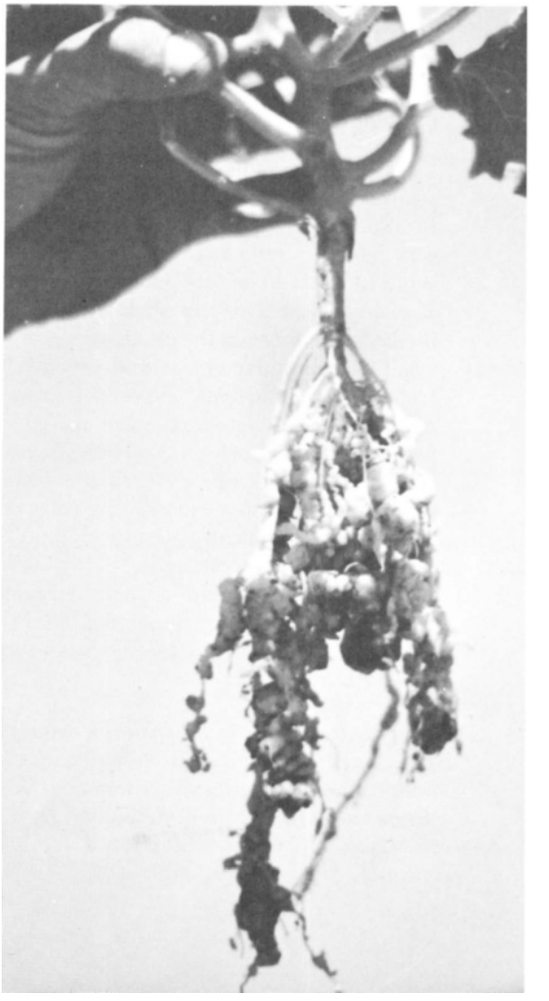
In order to gain information on the

GALL RATINGS OF CANTALOUPE PLANTS DUG AT MATURITY IN THE VYDATE TRIAL FOR CONTROL OF ROOT-KNOT

	Replications				Total	Average gall rating per plant	% of plants where galls were detected
	I	II	III	IV			
Foliar Vydate (sprayed)	1.0*	9.0	.6	0	10.6	.26	11%
Checks	16.0	22.6	10.7	18.1	67.4	1.7	75%

* Each number represents the average gall rating for 10 plants.

Root of young cantaloupe plant showing severe galling caused by root-knot nematode



Stunted cantaloupe plants infected by root-knot nematode in early stage of growth