# Nematodes on Strawberries

## preplanting soil fumigation controls root-lesion nematodes in experiments with strawberries on old apple land

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**Populations** of root-lesion nematodes on roots of Shasta strawberries ranged from an average of 2.5 per sample pint of fumigated soil to 59.5 per pint sample of untreated soil in counts made in 1951.

The population counts were taken in the course of root-lesion nematode investigations initiated in November 1949, in a field of strawberries planted in a former apple orchard.

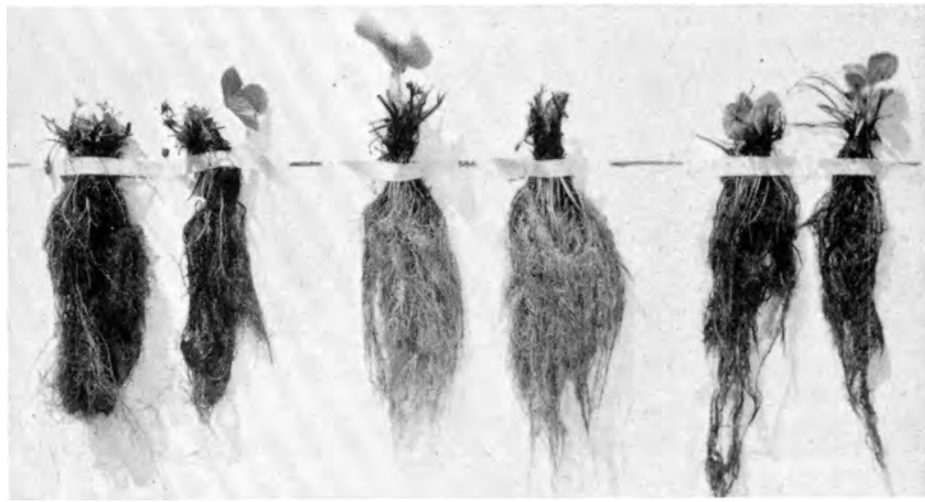
The root-lesion nematode species—*Pratylenchus vulnus*—is widely distributed in California and is an important parasite of trees and vines. It has been found associated with root diseases of strawberries and bush berries. A second unnamed root-lesion nematode species, referred to by this laboratory as *Pratylenchus*, species No. 2, is also present in the state and is important as a root parasite of apple, tuberous begonia, lily and strawberry.

In 1948 an apple orchard near Watsonville was torn out and in early 1949 the field was planted to Shasta strawberries. This planting failed to make satisfactory growth and was destroyed by the grower in late 1949. In November 1949, prior to replanting the field with strawberries, several small test plots were established in an attempt to improve the growth of the subsequent planting.

Strawberry roots are frequently injured by a disease complex referred to as strawberry root rot or black root rot. The primary cause of the root rot has not been definitely established although it has been shown by a number of workers that certain plant pathogenic fungi are nearly always associated with the root-rot complex. In a number of instances nematodes belonging to the genus *Pratylenchus* have been found associated with the diseased roots.

The strawberry field near Watsonville had an infestation of verticillium wilt as well as nematodes and fungi associated in the root-rot complex.

The principal damage caused by root-lesion nematodes is in the feeder-root system. A high population of the nematodes will usually kill most of the feeder roots by their massive invasion of the root tissues. In addition, lesions of varying sizes may be produced on the larger roots. These lesions may eventually girdle a root resulting in the death of all the roots beyond that point.



**Strawberry roots, *left*, treated with D-D, 200 pounds per acre; *center*, treated with CBP-55, 200 pounds per acre; *right*, untreated.**

Chemical control of root-lesion nematode infestations of annual or short-lived perennial crops can be accomplished by the use of preplanting soil fumigation treatments but no satisfactory chemical treatments have yet been devised for use in controlling nematode infections of the roots of living plants in the field. Dosages large enough to obtain high kills of the nematodes in the soil around the roots of living plants usually are also fatal to the plant roots.

In November 1949 preplanting exploratory treatments were applied to areas five beds wide and 150 feet long in the Watsonville field.

*1.* CBP-55—technical chlorobromopropene 55%—in split application of 15 gallons per acre applied by chisel applicator followed in five days by 15 gallons per acre applied by plow applicator.

*2.* CBP-55, 20 gallons per acre single application applied by chisel applicator.

*3.* CBP-55, 30 gallons per acre single application applied by chisel applicator.

Continued on page 14

**Strawberry field in which rows on the left received CBP-55, 30 gallons split treatment, center rows were left untreated, rows on the right received CBP-55, 20 gallons split treatment.**

## STRAWBERRIES

Continued from page 3

4. D-D—dichloropropene-dichloropropane mixture—100 pounds per acre applied in May 1950 in irrigation water to living plants.

In June 1950 the growth of the strawberry plants in plots treated with CBP-55 was markedly better than the growth of plants on untreated plots. The split 30-gallon treatment was superior to all others.

Eight samples of one pint of soil were taken from each plot at two depths—0″ to 6″ and 6″ to 12″—to determine the effect of the treatments upon the nematode population.

The results of these treatments indicated that the nematode control obtained with the split treatment of 30 gallons of CBP-55 per acre was superior to the other treatments. Plant growth in this treatment was also better than in other treatments or the untreated plots.

The single applications of 20 and 30 gallons per acre applied by chisel produced plants much superior to those grown on untreated plots, but inferior to those grown on the 30-gallon split treatment.

In early 1951 additional experimental plots were established on a portion of the field. The plots in this test which received split applications were treated with half the material applied by chisel, then the soil was plowed and the other half applied by chisel. The remainder of the field was treated by the grower with CBP-55 at the rate of 30 gallons per acre in a similar split application.

These plots were sampled in August 1951. In addition to soil samples strawberry rot samples were collected. Nematode counts were made and recorded. The results are shown in the preceding table.

**Average Number of Root-Lesion Nematodes Per Pint of Soil and Per Gram of Root in Treated and Untreated Plots.**

| Treatment | Ave. no. nematodes per pint of soil | Ave. no. nematodes per gram of root |
|---|---|---|
| CBP-55 30 gal. per acre split application | 2.5 | 6.7 |
| D-D 20 gal. per acre single application | 10.8 | 7.7 |
| D-D 40 gal. per acre single application | 4.1 | 12.8 |
| D-D 80 gal. per acre split application | 0.0 | 0.0 |
| CBP-55 10 gal. per acre split application | 23.9 | 16.9 |
| Untreated | 59.5 | 89.5 |

Subsequent observation of the plant growth in the treated plots and in the remainder of the field indicated that satisfactory nematode control was obtained with CBP-55 at the rate of 30 gallons per acre and D-D at 40 and 80 gallons per acre.

It is believed that the control of the root-rot disease in the 80 gallons per acre D-D treatment was comparable to that obtained in the 30 gallons per acre split CBP-55 treatment.

A considerable improvement in plant growth was also observed in the 40 gallons per acre single application of D-D. The improvement in these latter plots is attributed to control of the nematodes involved in the root-rot complex.

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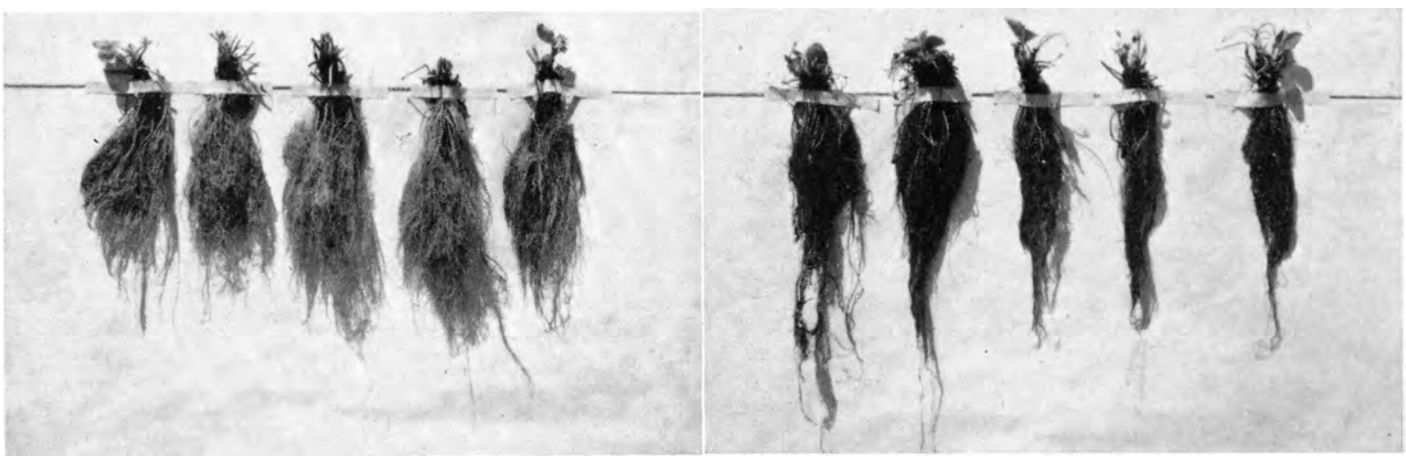

**Roots of strawberry plants, *left,* grown in soil treated with CBP-55 at the rate of 200 pounds per acre; *right,* in untreated soil.**

## GARLIC

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plants in the greenhouses. Only the 60° F storage lot was distinguishable in top growth. No significant effect of storage temperature on bulbing could be detected.

In other field tests, Early and Late garlic were planted after storage of 32° F and 50° F. For both varieties, the plants from cloves stored at 32° F began to bulb most quickly. However, by May 19 for the Early garlic, and by June 8 for the Late, differences in bulbing were no longer evident.

In still another field test, differences in earliness resulting from storage temperature persisted until harvest. Late garlic was stored at 32° F, 50° F, and in an open shed, then planted in the field on January 13. The plants from bulbs stored at 32° F grew most rapidly and matured about one week before those from bulbs stored at 50° F. The shed-storage bulbs produced plants which matured a few days later than the 50° F storage plants.

The tests showed that clove storage temperatures may have a definite effect on bulb formation in greenhouse plantings. But the effect of low-temperature storage on field plantings was always slight. This might be expected, since field plantings are subjected to two to three months' low temperature in the field before temperatures and day length become favorable for the initiation of the garlic bulbs.

Storage temperature has an additional influence on garlic growth as it affects clove dormancy. Freshly harvested garlic will not sprout readily if field planted and irrigated. Experiments indicate that storage temperatures have a marked effect on this dormancy. What relation there may be between the effect of storage temperature on dormancy and its effect on time of bulbing and maturity still has to be explored.

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