

The Clover Root Nematode

new pest discovered in Camarillo district is apparently destructive to clover and may become important pest

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A potentially serious pest, in the production of clover—as well as other crops in this state—has been found in the Camarillo district of Ventura County.

So far this pest, the clover root nematode—a cyst forming species of *Heterodera*—is known in California in this one locality only and has not been collected in any commercial plantings of clover. However, it appears to be very destructive on clover and on the basis of its host range it may become an important pest.

A sample of soil and roots of white clover was taken from a circular area approximately 10' in diameter in the lawn of a private residence in Camarillo where the clover showed yellowing and poor growth in August 1951. The sample was found to be heavily infested with a cyst-forming species of *Heterodera*. Subsequent examination of surrounding properties showed infestations in two other lawns in the near vicinity—an area which had been planted to barley for many years and subdivided in 1948—the soil was too poor to grow good barley. Subsequent growth was volunteer barley, wild oats and Russian thistle.

As homes were built in the subdivision many owners scraped off top soil and imported other soil. Much of the imported soil came from Camarillo Heights, a high ridge nearby where considerable native vegetation—lupine, vetch, and others—occurs. It has not been possible as yet to investigate that area for native infestations of this nematode.

Apparently the clover root nematode was not introduced into the area in clover seed because a portion of the original seed used in planting one of the infested lawns was available for examination—

and no nematodes were found in the seed. The original lot of seed at the nursery was traced to plantings in other areas which were checked and no infestations were found.

There is no conclusive evidence as to the origin of the infestations of this nematode found in California.

A quantity of soil from the infested lawn was used to test the host range of the clover root nematode. In the first tests—started February 6, 1952—the test plants were seeded directly into the infested soil in pots in the greenhouse and allowed to grow approximately 70 days. Then the roots were washed clean and examined for females and cysts. Very heavy populations of females were found in the white clover, in carnations and in Golden Wax bush beans where three cysts were found also; one female nematode and five cysts were found on *Sesbania macrocarpa*; two females were found on garden peas but no infestation was found on sugar beets.

The soil from each pot was washed and examined for larvae and males but none was present or detectable on any of the host plants.

On May 18, 1952 the test was repeated for sugar-beets in sterilized greenhouse soil infested with the washings and roots of the Golden Wax bush bean, white clover and carnation. In addition, 10 females and one cyst from Golden Wax bush bean were used in another pot of sterilized soil. The sugar beets were allowed to grow for approximately 70 days and then examined. No females or cysts were found on the roots and no males in the soil washings.

On June 16, 1952 host tests discovered

a heavy population of females on *Sesbania macrocarpa* grown for 107 days in soil infested with five cysts taken from roots of *Sesbania*; curly dock, planted in infested soil, had a very heavy population of females after 67 days but table beets, also planted in infested soil, had no females after 51 days of growth. The results on table beets may possibly be considered inconclusive because of the shorter period of growth.

On August 20, 1952, another series of hosts were planted to infested soil and grown for 126 days. Ladino clover was found to have a heavy population of females and some cysts; red clover had six females and strawberry clover had one but neither females nor cysts were found on alsike, subterranean, burr, YB sweet clovers nor on alfalfa and birds-foot trefoil.

The results of these tests agree in general with observations of other research workers with *Sesbania* and carnation the only new host records.

It was noted in these tests that there was a distinctive yellow phase in the color of the female as it turned from white to brown.

Measurements on larvae of this species of nematode showed an average total length of 0.517 mm—millimeter—with a spear length of .026 mm to .029 mm. The larvae of the clover root nematode are distinctly longer than those of the sugar-beet nematode—*H. schachtii*—which average 0.469 mm in length.

In view of the greater length of the larvae, the yellow color phase found in the female and differences in host range, the clover root nematode undoubtedly represents a species distinct from the sugar-beet nematode. Further studies are expected to disclose other morphological as well as biological differences.

No males were available for study and there seems to be no explanation for the failure of males to develop in these tests.

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GERMINATION

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sponse of the seed, discussed above, certain aspects of field behavior should be predictable. For example, the age of the stand—years since the last burn—should be an important factor in determining the total amount of germination as well as the degree of fire response. An old stand of chamise should contain a larger number of viable seed in the duff than a young stand; furthermore, the percentage of seed requiring fire to germinate

should be higher in the old stand. Therefore, total germination should be higher in an old stand than in a young stand if fire is the method of clearing. If an old stand were cleared by burning more germination should occur than if it were cleared by mechanical means, while little or no difference should be expected in a young stand.

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