Brassica-Root Nematode Here

pest formerly unknown in the United States found to be established in fields in Half Moon Bay area

D. J. Raski and R. H. Sciaroni

The Brassica-root nematode—*Heterodera cruciferae* Franklin, 1945—formerly believed to be in England and Wales only, is in San Mateo County.

Discovery of the nematode was made during attempts to establish experimental field control plots for sugar-beet nematode in the area near Half Moon Bay. A routine check was made on the ability of two populations of nematodes—from separate fields—to attack a number of plants, all of which, except white clover, have been reported as hosts of sugar-beet nematode.

The sugar-beet nematode has a wide host range covering many plant families including the cabbage family—crucifers. But the larvae of the Brassica-root nematode appear to be stimulated to hatch by excretions from roots of cruciferous plants and not by roots of sugar beets.

There is evidence that the recently discovered nematode has been present in California for many years. It has been found in many of the fields near Half Moon Bay, where the production of crops of the cabbage family, especially Brussels sprouts, has been carried on for at least 30 or 40 years. A general survey of the area has not been attempted but a high percentage of the fields that have been examined proved to be infested with heavy populations of the nematode.

In the tests which led to the identification of the Brassica-root nematode, seeds of reported host plants were planted to field soil in four-inch pots. After eight weeks the roots were washed clean and examined for females of the sugar-beet nematode. The soil of each pot was screened and examined for males:

	Nematodes recovered after 8 weeks	
Host Plant	Field I	Field II
Sugar beet	None	None
Curly dock	None	None
Carnation	None	None
White clover	None	None
Sesbania macrocarpa	None	None
Golden Wax Bush Bean	None	None
Garden Pea	None	*
Cabbage	White females Many males	**
Brussels sprouts	.....	White females Many males

* All the seedlings succumbed to damping off.
** Cabbage seedlings suffered damping off and were replaced with Brussels sprouts.

Another test was made at the same time to get some measure of the population levels of the various fields.

In the parallel test three fields—*A*, *B*, *C*—from the Half Moon Bay area were checked against one—*D*—from Alameda County where table beets had been severely damaged in 1952 by sugar-beet nematode. A one-pint sample was taken from each field, allowed to become air-dry, then mixed thoroughly. Four equal measures of 50 grams were weighed out from each soil sample and all the cysts recovered from each measure of 50 grams. The cysts were held in small covered dishes in tap water. Two days later small pieces of clean sugar beet roots were added to each dish. Four weeks later the larvae that had hatched were counted. Only the samples from fields *A*, *B*, and *C* were saved and small pieces of roots of Brussels sprouts were added to replace the sugar beet roots. Counts of larvae that had hatched were made 14 days later.

A recapitulation of the results follows:

Source of soil	Total cysts in 4 aliquots (200 gms.)	Larvae hatching in presence of roots of	
		Sugar beets	Brussels sprouts
Field A	79	87	1598
Field B	163	41	2968
Field C	229	195	4198
Half Moon Bay			
Field D	45*	1512*	....
Alameda County			

* This count was made from only 2 measures of 50 gms. each as two others were lost by accident. There were 52 cysts in those lost so the count for all four would probably have been approximately double that recorded.

These figures indicate a definite response of the larvae from fields *A*, *B*, and *C* to excretions from roots of Brussels sprouts and no more response to sugar beet roots than would be expected in plain tap water. The nematodes from field *D* were apparently correctly identified as sugar-beet nematode and responded by hatching in the presence of beet roots.

Identification Necessary

The Brassica-root nematode is closely related to, but distinguished from, the sugar-beet nematode by its narrow range of host plants which includes only those that belong to the plant family Cruciferae.

Structural differences also distinguish these two species. The cysts on Brassica-root nematodes are shorter and more rounded than the cysts of the sugar-beet nematode. The males and larvae are also shorter so that it is probable that identifications of most material will be possible in the laboratory. It is doubtful, though, if a positive identification can be made under field conditions. One of the important consequences of the presence of the Brassica-root nematode in California will be the complication of the diagnosis of sugar-beet nematode infestations. Previously the only species of cyst-forming nematode known to occur in the cultivated fields of California has been the sugar-beet nematode. Now any diagnosis of a field not under cultivation at the time or of a field planted to crucifers may be questioned as to species. Even where attacks on sugar beets can be demonstrated it is possible that the nematode population present may represent a mixture of both these species. A correct identification will be essential for the effective use of rotation programs in the control of these nematodes.

Importance Undetermined

There is no evidence available at this time as to the importance of the Brassica-root nematode in the production of cruciferous crops.

Field experience indicates that attacks by high populations of the sugar-beet nematode can cause severe reduction in the growth of cabbage, particularly when grown during the summer months. This has been known to occur near Moss Landing approximately 75 miles south of Half Moon Bay. Recently, damage to broccoli as a result of attacks by sugar beet nematodes was observed near Irvington in Alameda County. However, this does not necessarily apply to the Brassica-root nematode and nothing is known regarding the effect of either species on Brussels sprouts—in California.

D. J. Raski is Lecturer in Entomology, University of California, Davis.

R. H. Sciaroni is Farm Advisor, San Mateo County, University of California.

The above progress report is based on Research Project No. 1354.