The Sugar Beet Nematode, *Heterodera schachtii* Schmidt, in Southern Alberta[1]

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The sugar beet nematode, *Heterodera schachtii* Schmidt, is a serious pest of sugar beets in Europe (2)[4] and is present in 15 beet-producing states of the U. S. A. (1). The plant parasite was first discovered in Canada in 1931 near St. Catharines, Ontario (4). In 1939 it was found on sugar beets near Sarnia, Ontario (3).

In June 1961, an unthrifty stand of beets 13 acres in size was found near Taber, Alberta. The plants in approximately one-quarter of the field were severely stunted, the leaves were badly wilted, and there was considerable root proliferation (Figures 1 and 2). Numerous white cysts were found on the roots of the stunted plants as well as on the roots of other sugar beets throughout the field (Figures 3 and 4). Cysts were also found on flixweed, *Descurainia sophia* (L.) Webb, and on oak-leaved goosefoot, *Chenopodium glaucum* L., in the same field. The cysts were identified as *H. schachtii* by Dr. A. D. Baker and R. H. Mulvey of the Nematology Section, Entomology Research Institute, Ottawa, Ontario.

Although beets were first grown commercially in Alberta in 1903 and have been grown since 1925 in the district where the infested farm is located, this was the first time the sugar beet nematode had been found in western Canada.

Until 1950 the infested field was flood irrigated but since that time it has been sprinkler irrigated. The area where damage was evident in the field was previously a knoll that had been levelled. The farmer had noted stunting of the beets in this area in 1957, which suggests that the infestation may have been present for at least 4 years.

Although the average yield on this farm was generally higher than that of the surrounding area, the farmer used a very short cropping sequence, in which he grew beets in 10 of the last 17 years. This sequence would be expected to favor a rapid increase in the numbers of nematodes once the field became infested.

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[4] Numbers in parentheses refer to literature cited.

Figure 5.—(lower left) Photomicrograph of a cyst of *H. schachtii* opened to show the eggs (X30).

Figure 6.—(lower right) Enlargement of the nematode eggs shown in Figure 5 (X130).

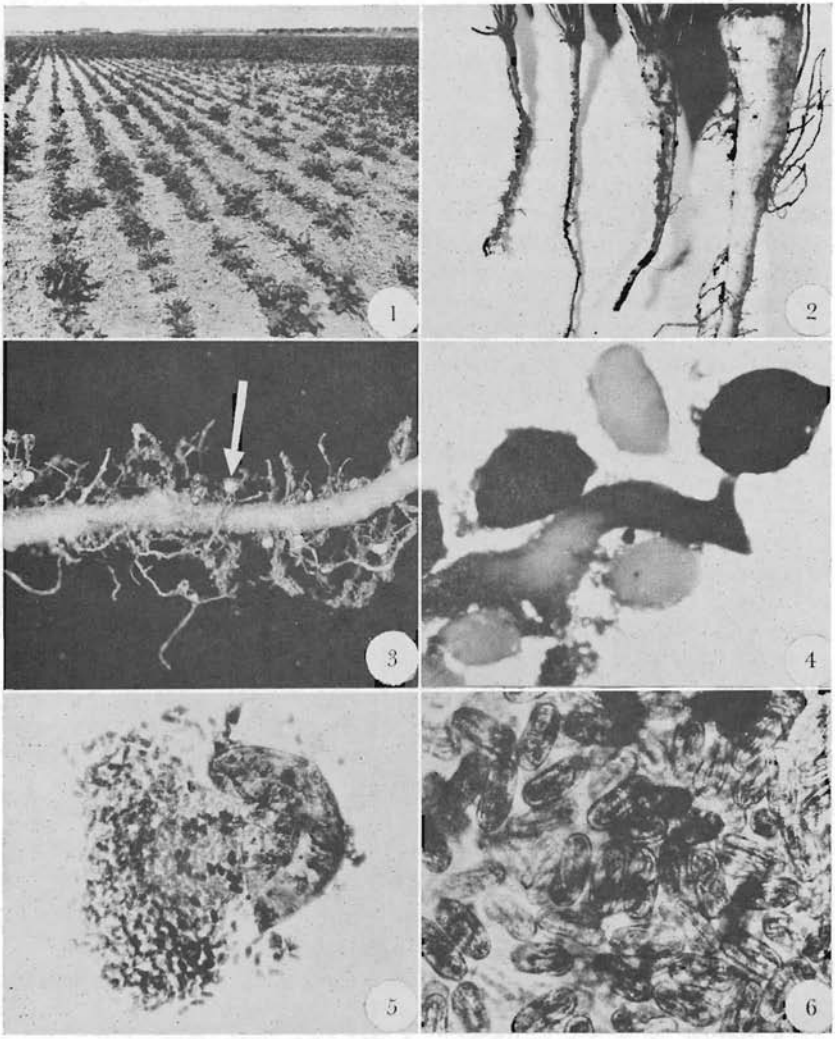

Figure 1.—(upper left) Sugar beet field near Taber, Alberta, severely infested with *Heterodera schachtii* Schmidt. The beets were wilted, stunted, and chlorotic.

Figure 2.—(upper right) Comparison of a normal beet (right) with three beets severely stunted by *H. schachtii*. "Hairiness", exhibited by the beet at the left, is often indicative of the presence of the sugar-beet nematode.

Figure 3.—(center left) A portion of a heavily infested beet. Arrow points to one of the cysts (X10).

Figure 4.—(center right) Photomicrograph of one of the secondary roots of a beet with adhering lemon-shaped cysts of *H. schachtii* (X30). Cysts ranged in color from white to brown.

Survey

In early July, sugar beets and soil from the most unthrifty areas of 721 sugar beet fields throughout southern Alberta were examined by the authors in the laboratory for cysts of *H. schachtii*. No other infestations were discovered. Jones (2) found, in England, that with a population of cysts under one million per acre there were no crop symptoms and the infestation was not detectable. It is possible, therefore, that there may be light, undetectable infestations of the nematode in southern Alberta.

Some beets examined during the survey had an abnormally large number of lateral rootlets. In most cases this abnormal growth appeared to result from damage by the sugar-beet root aphid, *Pemphigus betae* Doane, the sugar-beet root maggot, *Tetanops myopaeformis* (Röder), or the wireworms *(Ctenicera destructor* (Brown) and *Hypolithus bicolor* Esch.

In the infested field, soil samples taken from around beets contained 135 cysts per 200 grams of soil. Both old and young cysts were present in July, the latter full of eggs and second-stage larvae (Figures 5 and 6). The presence of old cysts and the degree of infestation indicated that this pest had probably been present in the field for more than one year.

On July 14 several small beets from the infested field were lifted with adjacent soil and planted in 6-inch pots in a greenhouse. Approximately 170 days later one 100-gram sample of soil was taken from an area immediately adjacent to the beet in each of 8 pots. The average number of cysts obtained from the soil samples was 1,192.

Control measures

The ability of *H. schachtii* to increase rapidly and spread made it desirable to reduce this infestation as quickly as possible. The field was plowed and fumigated on August 14 by applying approximately 25 gallons per acre of the nematocide Shell DD at a depth of 6 to 8 inches. Forty-five days later beets were planted in 8 pots containing soil from the fumigated field. Approximately 95 days after planting, the pots contained an average of 170 nematodes per 100 grams of soil. Although the nematocide appeared to greatly reduce the number of nematodes in the field the residual population could still cause serious damage to beets.

It was recommended that alfalfa, which is not a host of *H. schachtii,* should be grown on this land for at least 6 years and that on the remainder of the farm sugar beets or other susceptible crops should not be grown oftener than once every 4 years. To prevent serious infestations of this pest from developing in sugar-

beet-growing areas of Alberta, officials of the sugar beet growers' association and the Canadian Sugar Factories Limited have agreed to adhere to these recommendations and also to a general recommendation that susceptible crops should not be grown oftener than once every 4 years.

Literature Cited

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