

A Preliminary Study of the Relationship of the Sugar Beet Nematode *Heterodera schachtii*, to Three Varieties of Red Tomatoes

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The most practical method of controlling the sugar beet nematode, *Heterodera schachtii* Schmidt, has been accomplished primarily by growing a non-host crop for at least four years between sugar beet crops.

Tomato, *Lycopersicon esculentum*, was considered by Thorne (4) to be a non-host plant and he recommended that it be grown in crop rotation for fields infested with *H. schachtii*. Raski (3) found two yellow varieties of tomatoes, Golden Queen and Jubilee, to be hosts of *H. schachtii* but he did not consider Earliana, a red tomato variety, to be a host. Golden and Shafer (1) reported that Pearson 40, a red variety of tomato was susceptible to *H. schachtii* with an infection-index rating which varied from light (2.0) to heavy (4.0) with an average index rating of 2.1. The sugar beet was indexed as heavy (4.0).

An experiment was conducted by the Utah-Idaho Sugar Company at West Jordan, Utah, to determine if the tomato varieties grown locally were hosts to *H. schachtii* and to investigate the cause of variation in infection as reported by Golden and Shafer (1) and Raski (3).

Fifteen plants from each of three red tomato varieties, Hybrid T3, Moscow A, and Moscow B (commercial) were planted March 15, 1960 in a field heavily infested with *H. schachtii*. After 70 days from the date of planting, tomato roots were dug and washed. All three varieties tested were found to be lightly infested with nematode cyst. These cysts were identified as *H. schachtii* after microscopic examination of the cysts by the author. E. C. Jorgensen², USDA nematologist, concurred in this identification.

Of the three varieties tested, the smallest number of female larvae were found to be feeding on the roots of the Hybrid T3. Upon microscopic examination of the roots it was found that the three varieties apparently varied in their resistance to *H. schachtii* since a few of the third stage female larvae were imbedded under the epidermis of the tomato roots and were unable to break

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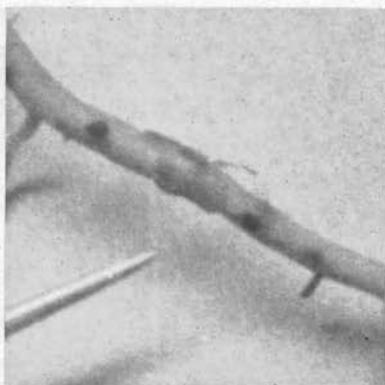


Figure 1.—Brown third stage female larvae of *Heterodera schachtii* imbedded in a tomato root.

through to complete their life cycle (Figure 1). The females trapped inside the roots were brown in color and were found to be nearly devoid of eggs and larvae. Approximately 50% more females were trapped in the roots of Hybrid T3 than in those of the other two varieties. The mechanism of trapping has been reported by Hijner (2) in *Beta patellaris*, where the larvae of *H. schachtii* penetrated into the roots of *B. patellaris*, but were incapable of developing and completing their life cycle.

During the study of the tomato roots, it was observed that secondary roots with thicker epidermis had entrapped more female nematodes than the smaller roots. The Hybrid T3 plants had more vigorous roots and thus fewer nematodes were able to break through the roots and complete their life cycle as compared to the other two varieties.

The apparent difference in resistance to *H. schachtii* exhibited by the three tomato varieties tested has strengthened the contention of Golden and Shafer (1) that resistance exists in some red tomato varieties.

This study points to the fact that varietal resistance may be due to genetic variation in the tendency of tomato roots to trap the female larvae of *H. schachtii*. However, as stated, the three varieties tested had light infection which may rule out the possibility of using these tomato varieties as a trap crop.

Nematologists and tomato breeders should be encouraged to select and breed tomato varieties completely resistant to *H. schachtii* so that tomatoes could be grown in crop rotations in sugar beet districts without any danger of increasing the nematode infestation.

In some areas where *H. schachtii* infestation is widespread it is desirable that the rotation period between beet crops be shortened. A possible solution would be the development of a tomato variety that causes hatching of nematode larvae in large numbers with a subsequent trapping of the adult female within the tomato root.

Literature Cited

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