RESEARCH NOTES

Comparative Response of Sugarbeet and Fodder Beet to Heterodera schachtii[1]

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Sugarbeet and fodder beet (*Beta vulgaris* L.) are being considered for fuel alcohol production (1,2). Sugarbeet is susceptible to *Heterodera schachtii* Schm., and yields are adversely affected (3). The effect of the nematode on fodder beet is not known. The objective of this study, therefore, was to compare certain aspects of the host-parasite relations of *H. schachtii* on sugarbeet and fodder beet.

Cultivars used in this study were the commercial sugarbeet cv. TASCO AH 14 and fodder beet cvs. Yellow Daeno, Oscar, and Monorosa. Nematodes for inoculum were obtained from a Utah population cultured on sugarbeet in the greenhouse.

Fourteen-day-old sugarbeet and Monorosa fodder beet seedlings were transplanted into bromomethane-fumigated sandy loam soil in 12.5-cm plastic pots and inoculated with 800 *H. schachtii* juveniles/pot of four plants. The plants were grown at constant soil temperatures of 5, 10, 15, 20, and 30 C. After 14 days of growth, plants were harvested; roots were stained in an acid fuschin-lactophenol solution and root penetrations by *H. schacthii* J2 were determined. Penetration of 14-day-old sugarbeet and (Monorosa) fodder beet seedlings did not differ and was comparable to that previously reported on sugarbeet (3); it increased with increasing soil temperature to 25 C, then decreased.

Differences in the degree of susceptibility of sugarbeet and the three fodder beet selections were compared by inoculating ten 14-day-old seedlings of each plant selection with 1,000 *H. schachtii* J2/seedling. The plants, including 10 noninoculated controls, were grown in the greenhouse at 22 ± 4 C in individual 15-cm containers. Day length was maintained at 19 hours with supplemental fluorescent illumination lamps. Fresh root and top weights were determined at 80 days post emergence. No differences ($P = 0.05$) were observed in the degree of susceptibility of sugarbeet and fodder beet to *H. schachtii*. Compared to noninoculated controls, root weights were reduced 58 and 55% for sugarbeet and fodder beet, respectively; shoot weights were reduced 82 and 75% for sugarbeet and fodder beet, respectively. Similar results were observed when sugarbeet and fodder beet (Monorosa) were grown at different soil temperatures (Table 1). Root and top growths of sugarbeet and fodder beet were significantly reduced ($P = 0.05$) by *H. schachtii* at all temperatures, except for top growth at 16 C.

To detect differences in development of *H. schachtii* on sugarbeet and fodder beet, 36 pots containing four 14-day-old sugarbeet or Monorosa fodder beet seedlings were infested with 4,000 *H. schachtii* J2/pot. The plants were maintained at 26 C. Two days after initiation of the experiment, and every 2 days after for a period of 24 days, 12 plants (three pots) of each cultivar were harvested. The soil was removed from the roots, the roots stained with an acid fuschin-lactophenol solution, and nematode development determined. The period of exposure required for nematode development from J2 to J3, J4, and adults at 26 C were 8, 12, and 16 days, respectively, for Monorosa fodder beet and 8, 16, and 22 days, respectively, for sugarbeet. The life cycle (J2 to J2) was completed after 22 days on both plant cultivars. The reproductive potential of *H. schachtii* on sugarbeet and fodder beet was similar.

The effect of soil temperature on the rate of nematode maturation to final densities of mature females or cysts was determined for sugarbeet and fodder beet. Six 14-day-old seedling of each cultivar were inoculated with 200 J2/plant. The plants

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Table 1. Effect of *Heterodera schachtii* on the growth of sugarbeet cv. TASCO AH 14 and fodder beet cv. Monorosa at different soil temperatures.*

Soil temp. (C)	Root weight (g)				Top weight (g)			
	Fodder beet		Sugarbeet		Fodder beet		Sugarbeet	
	Inoc.	Control	Inoc.	Control	Inoc.	Control	Inoc.	Control
16	5.4	6.7	2.9	3.5	38.2	42.9	24.2	25.5
20	5.0	7.3	3.5	5.2	40.1	48.9	29.9	38.3
24	4.4	7.8	3.5	6.0	41.9	50.5	29.2	40.5
28	2.9	7.9	2.8	6.7	46.5	62.9	29.1	44.8
LSD ($P = 0.05$)								
Root weight								
Sugarbeet		0.3						
Fodder beet		0.6						
Top weight								
Sugarbeet		5.6						
Fodder beet		7.3						

*Fourteen-day-old sugarbeet seedlings inoculated wtih 1,000 *H. schachtii* J2 and grown for 60 days.

were grown at soil temperatures of 16, 20, 24, and 28 C. Numbers of females or cysts per plant were determined 42 days after inoculation and ranked with an index of 1 = none, 2 = 1–10, 3 = 11–20, 4 = 21–30, 5 = 31–60, and 6 = more than 50 females per plant. Females or cysts per plant indices at 16, 20, 24, and 28 C were as follows: 3.5, 4.8, 6.0, and 6.0 for Yellow Daeno; 2.8, 4.0, 6.0, and 6.0 for Oscar; 3.0, 4.5, 6.0, and 6.0 for Monorosa; and 3.0, 4.3, 6.0, and 6.0 for TASCO AH 14.

Twenty cysts were hand picked at random from each plant growth at 28 C. The eggs were hatched in a 3 mM $ZnCl_2$ solution which was added daily for a period of 21 days. The reproductive potential of *H. schachtii* on sugarbeet and fodder beet was similar. There were averages of 248 and 242 juveniles per cyst from sugarbeet and fodder beet, respectively.

We conclude that sugarbeet and fodder beet are equally susceptible to *H. schachtii* and that the nematode reproduces equally well on both *B. vulgaris* types.

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