

Integrated Approach to the Control of the Golden Nematode, *Heterodera rostochiensis*¹

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Abstract: Under high population densities of *Heterodera rostochiensis*, control is impossible by one method alone, whether by chemical means, crop rotation, or the use of resistant potato varieties. Integrated control using thiazone (DMTT) in autumn, resistant potato hybrid 61-8/1, or *Solanum andigenum* cultivars 'Antinema' and 'Specula', followed by cereal and clover reduced the population below the detection level in the upper 18-cm on small plots on sandy loam soil. *Key Words:* *Solanum andigenum*, thiazone, DMTT, rotations.

Current knowledge of different control methods used against the golden nematode, *Heterodera rostochiensis*, has shown that their application is conditioned by many factors including degree of soil infestation, single or numerous infestation foci, soil structure, etc. Detailed investigations of the effects produced with crop rotations and chemical control have revealed advantages and disadvantages of both methods, according to Efremenko (1). Crop rotation is cost- and labor-saving, but eliminates potato-growing for a long time. Chemical control is quick and highly effective but, being very expensive, cannot be widely applied.

MATERIALS AND METHODS

Some resistant potato varieties useful for controlling the golden nematode on sandy loam soils were tested in the Leningrad and Minsk regions. A resistant hybrid, 61-8/1, and *Solanum andigenum* cultivars 'Antinema' and 'Specula' were tested in two trials conducted on heavily infested plots. Reduction of populations was determined by the percent reduction from the original population level, based on the average number of larvae in 100-ml samples taken at a depth of 0-18 cm. Tests of integrated treatments were made on two sites on sandy loam soils. Treatments included fall application of thiazone (DMTT) dust (85%) 3,5-dimethyltetrahydrol-1,3,5,2H thiaziazine-2-thione) at the rate of 270 kg/ hectare followed by spring planting of the potato hybrid 61-8/1 for one or two years in succession. One-half the plot then was planted

to resistant potatoes, and the other half to barley with clover undersown in the second growing year. Effectiveness of treatments was determined by the number of living larvae per 100 ml of soil taken in the fall before application of thiazone, in the spring before planting hybrid 61-8/1, and again after harvest.

RESULTS AND DISCUSSION

Data from the first trial (Table 1) show that a significant reduction in population level resulted from growing resistant potatoes for one year. The greatest reduction occurred the first year with 57, 46, and 81% for the three potatoes, respectively. However, many nematodes still remained in the soil as shown by the final infestation level, even after four consecutive years of resistant potatoes. Thus, growing resistant varieties should be combined with some other control measures on heavily infested plots.

Results of the second trials are presented in Table 2. Integrated control resulted in marked reductions in the number of larvae present at the end of the tests. In fact, no larvae could be recovered in the upper 18 cm of soil. This method of integrated control has been tested widely in Byelorussia with good results (2). When results on the two test sites are compared, it appears that chemical treatment of the soil is not necessary in areas with up to 1,000 larvae per 100 ml of soil.

CONCLUSIONS

The golden nematode should be controlled with different methods: chemical control if there is a single infestation focus in a region; crop rotation, including resistant potato varieties, when larvae are present in low to moderate numbers and in numerous foci; and

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TABLE 1. Effects of resistant potatoes on the number of *Heterodera rostochiensis* larvae in soil. (Numbers per 100 cc).

Cultivar	Original level	Percent reduction in larvae						Final level
		1967	1968	1969	1970	1971	1972	
Hybrid 61-8/1	7530	57	31	5	2	...	...	363
Antinema	5330	46	38	3	2	...	...	545
Specula	36054	...	...	...	...	81	10	747

TABLE 2. Effects of integrated control measures on population levels of *Heterodera rostochiensis*.

Location, area, and year treated	Treatments	Number of larvae per 100 cc soil
Minsk region (0.12 ha)	Original infestation	5,189
1968	Thiazone, 270 kg/ha	526
1969	Resistant hybrid 61-8/1	249
1970	Half-plot planted to 61-8/1	0
	Half-plot under barley + clover	0
Gomel region (0.10 ha)	Original infestation	1,100
1967	Thiazone, 270 kg/ha	185
1968	Resistant hybrid 61-8/1	83
1969	Half-plot planted to 61-8/1	0
	Half-plot under barley + clover	19
1970	Clover	0

with a combination of both methods on heavily infested plots.

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