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Nematodes Associated with Potato in Prince Edward Island and New Brunswick[1]

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Abstract: Analysis of soil and root samples collected from potato fields across Prince Edward Island and the Woodstock-Grand Falls region of New Brunswick, Canada showed that *Pratylenchus* spp. were the dominant plant-parasitic nematodes. *Pratylenchus penetrans* occurred more often on Prince Edward Island, and *P. crenatus* predominated in New Brunswick. It was estimated that about 10% of the sites from Prince Edward Island had population levels of *Pratylenchus* spp. that may have caused economic losses.

Key words: potato, *Pratylenchus penetrans, P. crenatus,* root lesion nematode, *Solanum tuberosum.*

A nematode survey conducted in 1973 on Prince Edward Island indicated that the root lesion nematodes *Pratylenchus penetrans* (Cobb, 1917) Filipjev and Sch. Stek., 1941 and *P. crenatus* Loof, 1960 were the dominant species of plant-parasitic nematodes in potato roots and soil (3). It was shown subsequently that control of *P. penetrans* with nematicides could result in significant tuber yield increases in cultivars such as 'Superior' (4,5). This paper summarizes the results of more recent nematode population surveys carried out in potato fields on Prince Edward Island and in New Brunswick, Canada.

MATERIALS AND METHODS

Soil and root samples were collected in July and August 1984 from 30 potato (*Solanum tuberosum* L.) fields in Kings, Queens, and Prince counties, Prince Edward Island. Ten fields were planted to either 'Russet Burbank', 'Shepody', or Superior during the last 2 weeks of May 1984. Soil type in the potato region of Prince Edward Island is generally a fine sandy loam (approximately 65% sand, 25% silt, 10% clay), and the optimum pH range is 5.5–6.0. Average rainfall during the growing season (May to September) is approximately 40 cm. The crop rotation was obtained for each field. The most common was wheat (*Triticum aestivum* L.) or barley (*Hordeum vulgare* L.), followed by red clover (*Trifolium pratense* L.) and (or) timothy (*Phleum pratense* L.), and then potato. Another popular crop sequence was wheat or barley followed by potato.

In the New Brunswick survey, samples were taken in early August 1979 from 40 potato fields in the Woodstock-Grand Falls region. Twenty-three of the sites were planted with Russet Burbank, ten with 'Kennebec', three with 'Katahdin', and two sites each were planted with 'Sebago' or Superior during early May 1979. Soil type in the region is usually a gravelly sandy loam (14% gravel, 50% sand, 30% silt, 6% clay), and the optimum pH for potato production is 5.5–6.0. Information on the crop rotation for each site was not available, but the most common sequence is usually wheat and (or) barley followed by potato. The average rainfall from May to September is about 45 cm.

Sites or fields for both provinces ranged in size from 10 to 30 hectares. Fifty soil cores, each 2.5 cm d and 20 cm deep, were taken at random from the vicinity of roots in each field and combined to make one composite sample. Each sample was mixed thoroughly and screened through a 2-mm sieve. A 50-g subsample of soil and up to 10 g of fresh washed roots from each sample were placed in a modified Baermann pan (10) and a mist chamber (2), respectively. After 7 days at 20–25 C, nematodes that had emerged from soil and roots were counted with a stereomicroscope and then preserved in 5% formalin. Up to 50 nema-

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TABLE 1. Frequency of occurrence (percent) of genera and species of plant-parasitic nematodes, and the orders of Rhabditida and Dorylaimida associated with potato roots and soil from Prince Edward Island (30 sites) and New Brunswick (40 sites).

	Prince Edward Island		New Brunswick	
	Roots	Soil	Roots	Soil
Pratylenchus penetrans	63	67	20	20
P. crenatus	23	17	40	43
Pratylenchus spp.†	14	16	8	10
Aphelenchoides spp.		10	100	100
Tylenchus spp.		73	5	73
Helicotylenchus spp.		40		
Tylenchorhynchids		30		
Aphelenchus avenae Bastian, 1865		7	30	10
Heterodera trifolii Goffart, 1944		10		
Meloidogyne hapla Chitwood, 1949	7		5	3
Paratylenchus spp.				5
Criconemoides spp.		3		
Rhabditida		100		
Dorylaimida		23		8

† Not identified to species (mostly juveniles).

todes were selected randomly from each sample and examined with a compound microscope for identification of genera and species.

RESULTS AND DISCUSSION

Pratylenchus penetrans and *P. crenatus* were the dominant plant-parasitic nematodes recovered from potato roots and soil on Prince Edward Island and in New Brunswick (Table 1). *Pratylenchus penetrans* occurred more often on Prince Edward Island, whereas *P. crenatus* predominated in New Brunswick. There is evidence that *P. penetrans* is more harmful than *P. crenatus* to potato (1), but their relative pathogenicity on potato requires more study (8,9).

Aphelenchoides spp., or foliar nematodes, were recovered in all of the soil and root samples from New Brunswick (Table 1). Population levels of *Aphelenchoides* spp. were usually greater than those of *Pratylenchus* spp. in the same sample. Although foliar nematodes are not on record as causing damage to potato, their presence in relatively large numbers in roots is interesting, since they usually do not utilize roots of higher plants as a food source (6). *Tylenchus* spp. was the only other stylet-bearing nematode frequently detected in soil samples from both provinces, and this group normally feeds on soil algae and fungi (7). Specimens from the order Rhabditida were found in all of the soil samples from Prince Edward Island. These nematodes feed on bacteria and are not pathogenic to higher plants.

The numbers of root lesion nematodes from Prince Edward Island potato fields (Table 2) were not as high as in an earlier survey (3). Based on previous studies (4,5), three fields of Superior potato with counts of 4,730, 1,570, and 1,090 *P. penetrans* per

TABLE 2. Frequency (percent) and population density of root lesion nematodes associated with potato on Prince Edward Island (30 sites) and New Brunswick (40 sites).

	Per g dry root		Per kg dry soil	
	Frequency (%)	Range (N)	Frequency (%)	Range (N)
Prince Edward Island				
Pratylenchus spp.†	23	10–520	20	80–510
P. penetrans	54	30–1,720	60	70–4,730
P. crenatus	13	120–310	10	170–2,330
Both species	10	490–820	7	90–1,080
New Brunswick				
Pratylenchus spp.†	23	10–1,300	25	80–1,250
P. penetrans	5	850–2,130	5	5,280–7,200
P. crenatus	25	20–5,330	28	140–4,190
Both species	15	60–4,610	15	460–3,540

† Not identified to species (mostly juveniles).

kilogram of soil might have benefited from a nematicide treatment. There were no significant relationships between numbers of root lesion nematodes and different potato cultivars or crop rotations.

In general, the numbers of nematodes in the New Brunswick survey were relatively low in most fields (Table 2). Several fields of Russet Burbank had population levels of *P. penetrans* that may have damaged plants; however, no information is available from New Brunswick on the effects of nematodes on potato tuber yields. No significant relationships were evident between numbers of root lesion nematodes and different potato cultivars.

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