ROOT-LESION NEMATODES ASSOCIATED WITH FORAGE LEGUMES IN THE MARITIME PROVINCES[1]

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Abstract

Red, alsike and white clover, alfalfa and birdsfoot trefoil roots were examined for the presence and abundance of root-lesion nematodes, Pratylenchus spp. The numbers extracted from red clover roots in replicated plots were much higher than from alfalfa, and younger plants supported larger populations than older plants, Pratylenchus spp. were extracted from 46 of 70 root samples collected in the Maritime Provinces, and numbers extracted exceeded 500 per gram dry weight of root tissue in 13 of the 46 samples.

Introduction

Problems have been encountered in maintaining good stands of forage legumes in the Maritime Provinces. It is recognized that certain diseases (8) and insects (5) are included among factors causing reduction in forage crop yields, but an understanding of the importance of nematodes in this respect has not been developed. Preliminary examination of the nematodes associated with red clover in Prince Edward Island indicated that root lesion nematodes, Pratylenchus spp., mostly P. penetrans (Cobb, 1917) Filip. and Stekh. 1941, predominated in root samples, and were frequently more numerous in soil samples. Other plant-parasitic nematode genera found included: Tylenchorhynchus, Tylenchus, Meloidogyne, Heterodera, Paratylenchus, Helicotylenchus, Criconemoides, and Longidorus. This paper summarizes results of a survey of the prevalence of Pratylenchus spp. associated with forage legume roots in the Maritime Provinces.

Materials and methods

Samples of 25 living forage legume plants were dug at random from replicated plots near Charlottetown and from fields throughout Prince Edward Island and certain areas of Nova Scotia and New Brunswick. Samples were taken from plots or fields which had been seeded to one or more of the following: red clover, alsike clover, white clover, alfalfa and birdsfoot trefoil. Plants were not examined for nematode injury and varied considerably in age. Following washing, the root system, exclusive of the tap root, was cut into small pieces and a maximum of 20 g extracted using a modification of a technique described for soil samples (6). Numbers of Pratylenchus were counted after 1 week of extraction. The root samples were then dried at 80-90°C for 24 hours and the numbers of nematodes per gram of dry root tissue were calculated.

Results and discussion

Red clover supported a significantly higher population of Pratylenchus than alfalfa both in the seedling year and in the first year of production (Tables 1 and 2). These results were obtained from replicated field plots where the root-lesion nematode infestation was considered uniform. Younger plants supported a larger population of root-lesion nematodes than older ones, probably because of the greater abundance of small, succulent roots. Numbers recovered from alfalfa and red clover, although considerably lower in the first year of production than in the seeding year, reflect the same relative degrees of infestation between plant species. This is in agreement with results obtained in greenhouse studies (2). The numbers of root-lesion nematodes extracted from red, alsike and white clovers and from alfalfa are in agreement with those previously reported (1, 3, 4, 7).

There was a wide range in the numbers of root-lesion nematodes extracted from root samples taken throughout the Maritime Provinces (Table 3). Considering the total number of samples from each province, Pratylenchus spp. were extracted from a greater proportion of those from Prince Edward Island. The proportion of samples which yielded more than 500 Pratylenchus per gram of dry root tissue also was greater for Prince Edward Island. Red and alsike clover were more heavily infested than the other plant species. Although the numbers ranged from low to high, the large populations from some samples suggest that root-lesion nematodes should be investigated further with respect to their possible association with root injury, disease, yield reduction and lack of persistence of forage legumes in the Maritime Provinces.

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Table 1. Mean numbers of Pratylenchus spp. extracted from 4-month-old red clover and alfalfa grown in replicated field plots.

Forage legume	Variety	No. per gram of root tissue (dry wt.)
Red Clover	'LaSalle'	15,879[1]
Alfalfa	'Vernal'	4,171

[1] Mean for red clover significantly higher than for alfalfa at the 1% level.

Table 2. Mean numbers of Pratylenchus spp. extracted from 15-month-old forage legumes grown in replicated field plots

Forage legume	Variety	No. per gram of root tissue (dry wt.)
Birdsfoot trefoil	'Empire'	8,868a[1]
Alsike clover	commercial	5,461a
Red clover	'LaSalle'	3,841a
White clover	'Ladino'	3,169a
Alfalfa	'Vernal'	820

[1] Means followed by the same letter are not significantly different at the 5% level.

Table 3. Incidence of Pratylenchus spp. in forage legumes in the Maritime Provinces - 1966

Forage legume	Prince Edward Island			Nova Scotia			New Brunswick			Total		
	No. of samples	No./g dry wt. 1-500	>500	No. of samples	No./g dry wt. 1-500	>500	No. of samples	No./g dry wt. 1-500	>500	No. of samples	No./g dry wt. 1-500	>500
Red clover	17	8	7	6	3	1	4	2	0	27	13	8
Alfalfa	12	7	0	4	0	0	3	0	0	19	7	0
Birdsfoot trefoil	9	6	1	3	2	0	1	0	0	13	8	1
Alsike clover	6	2	4	0			1	1	0	7	3	4
White clover	3	1	0	0			1	1	0	4	2	0
Total	47	24	12	13	5	1	10	4	0	70	33	13

literature cited

1. Chapman, R.A. 1954. Meadow nematodes associated with failure of spring-sown alfalfa. Phytopathology 44: 542-545.
2. Chapman, R. A. 1959. Development of Pratylenchus penetrans and Tylenchorhynchus martini on red clover and alfalfa. Phytopathology 49: 357-359.
3. Chen, Tseh-an, R. A. Kilpatrick and A. E. Rich. 1962. Stylet-bearing nematodes associated with white clovers in New Hampshire 1960-1961. Plant Disease Reptr. 46: 346-347.
4. Lau, N. E. and J. P. Reed. 1960. Nematodes associated with red clover in its second growth year. Plant Disease Reptr. 44: 402-404.
5. Thompson, L. S. 1964. Insect survey of forage crops in Prince Edward Island. J. Econ. Entomol. 57: 961-962.
6. Townshend, J. L. 1963. A modification and evaluation of the apparatus for the Oostenbrink direct cottonwool filter extraction method. Nematologica 9: 106-110.
7. Townshend, J. L. and T. R. Davidson. 1960. Some weed hosts of Pratylenchus penetrans in 'Premier' strawberry plantations. Can. J. Botany 38: 267-273.
8. Willis, C. B. 1965. Observations on the diseases of forage crops in Prince Edward Island. Can. Plant Dis. Surv. 45: 8-11.