PARATYLENCHUS PROJECTUS IN ALFALFA FIELDS OF CENTRAL AND NORTHERN ALBERTA[1]

G.R. Webster[2], W.R. Orchard[3] and E.J. Hawn[4]

Abstract

Paratylenchus projectus has been detected in considerable numbers in certain soils of Alberta. It appears to be associated with a disease of alfalfa in central and northern Alberta. Twenty-three percent of the soils analyzed contained more than 4,000 nematodes/kg of soil. Most of the high counts were from the Dark Gray Luvisolic soils where, of the areas examined, alfalfa "sickness" was the most prevalent. Further studies are in progress.

Introduction

Paratylenchus projectus Jenkins (4) was first detected in soils of Alberta by the late W. R. Orchard in 1970 and identified by Dr. L. Y. Wu. The occurrence of this nematode appears to be associated with a widespread disease of alfalfa (Medicago sativa L.) in central and northern Alberta. Symptoms of the disease, called "alfalfa sickness" (7), are poor plant growth interspersed with irregularly shaped patches of healthy growth. Affected plants are short, spindly, yellowish-green in color, and poorly nodulated. Additions of N, P, K, and micronutrients have not materially improved the growth of diseased plants (5, 7, 8). Genetic selection against the toxic soil condition has proved futile (3.) Beneficial effects from treating "sick" soils with steam and with Vapam (metam, sodium) have been reported (7). Research on the effects of root temperature and leachates from "sick" soils on growth of alfalfa (5, 7) has indicated that a toxic agent, probably biologic in origin, may be at least partially responsible for the disease. Particular interest in nematodes of the genus Paratylenchus was stimulated by Orchard, who during the period 1962 to 1969 examined alfalfa plants and soil adhering to their root systems and consistently found appreciably higher counts of Paratylenchus in soils from areas of poor growth as compared to areas of good growth. There were a few nematodes of the genera Tylenchus and Tylenchorhynchus in all samples. He recommended that a survey be conducted to determine the magnitude of infestation of Paratylenchus in central and northern Alberta. This paper presents a summary of the counts that were obtained in 1970.

Materials and methods

Alfalfa plants and soil adhering to their root systems were collected from fields selected at random and from experimental plots, giving a total of 43 locations. The distribution gave a fairly broad coverage of the central and the Peace River areas of Alberta. Sampling was done during June and September 1970. Excess soil was trimmed from the root system leaving approximately 300 g of soil which was washed from the roots in about 6 liters of water; the suspension was allowed to settle for a few seconds and the supernatant passed through a 60-mesh Endecott sieve. The material on the sieve was rinsed and the entire supernatant passed through 100, 200, 325, and 400-mesh sieves and the screenings from the latter two were placed in Baermann funnels for roughly 16 h. (1). Counts of Paratylenchus were based on morphological characteristics (6).

Results and discussion

Counts of Paratylenchus varied widely from field to field, covering a range from zero to greater than 7,000/kg soil. Twenty-three per cent of the soils contained more than 4,000 Paratylenchus projectus/kg of soil. Most of the high counts were from the Dark Gray Luvisolic soils in areas west and north of Edmonton where of the areas examined alfalfa "sickness" was the most prevalent.

Since alfalfa, oats, barley, sweet clover, brome, and orchard-grass are hosts of P. projectus (2), it would appear that extensive research is warranted to determine the implications of its presence. Field,

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[1] Alberta Institute of Pedology Publication No. T-71-3

[2] Alberta Institute of Pedology, University of Alberta, Edmonton, Alberta

[3] Deceased, formerly Research Station, Canada Department of Agriculture, Saanichton, British Columbia.

[4] Research Station, Canada Department of Agriculture, Lethbridge, Alberta

Table 1. Counts of Paratylenchus projectus in alfalfa fields of central and northern Alberta

Count range *	Percentage of samples in each range
0	6.8
1– 500	20.9
500– 1,000	13.9
1,000– 2,000	13.9
2,000– 3,000	9.3
3,000– 4,000	11.8
4,000– 5,000	9.3
5,000– 6,000	4.7
6,000- 7,000	4.7
7,000-40,000	4.7

* Average numbers of nematodes in soil washed from root systems of three to five alfalfa plants per field or plot, expressed as numbers per kg of oven–dry soil.

surveys were continued in 1971 to further determine its distribution and experiments are in progress to determine its role in the alfalfa "sickness" disorder. The presence of other parasitic nematodes were also recorded in tho 1971 survey;

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