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Stylet-Bearing Nematodes Associated with Plants in Iowa Prairies

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Stylet-Bearing Nematodes Associated with Plants in Iowa Prairies[1]

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Abstract. Native Iowa prairies contained a plant parasitic nematode population which differed markedly in predominant species from populations in cultivated fields. Nematode species and their abundance varied among the five prairies sampled. *Aorolaimus* was common in most prairies, but is not known in Iowa cultivated soils. *Tylenchorhynchus maximus* was common in the Kalsow and Sheeder prairies, but was not found in the Cayler and Hayden prairies. *Helicotylenchus* was common in all prairies, but the species were unevenly distributed.

The once vast Iowa prairies are now reduced to a few scattered remnants, making them priceless for scientific, historic, and aesthetic interests. Since most of the original prairies are now cultivated, a knowledge of their biology is often valuable in interpreting agricultural problems as well as providing basic botanical and zoological knowledge.

Plant parasitic nematodes are recognized as an important factor in the economic production of crops throughout the world, yet relatively little is known of their native distribution and how this distribution and related ecology are reflected in agriculture. There have been few studies with nematodes in native prairies in the United States, the most extensive being that of Orr and Dickerson (3) who cataloged nematodes, both plant parasitic and non-plant parasitic, of a prairie near Manhattan, Kansas.

The present study was initiated to gain insight as to which plant parasitic nematodes occur and are common in some Iowa prairies.

MATERIALS AND METHODS

Five widely located native prairies were selected for sampling. They were the Hayden Prairie in Howard County, the Ames High School Prairie in Story County, the Sheeder Prairie in Guthrie County, the Kalsow Prairie in Pocahontas County, and the Cayler Prairie in Dickinson County (Figure 1). These prairies are in diverse soil formations.

Soil samples of 250 cc. were collected about roots of prairie plants and processed by a modification of the Christie and Perry method (1). After generic counts were made, specimens were preserved in 5 percent formaldehyde or glycerin for most species identification.

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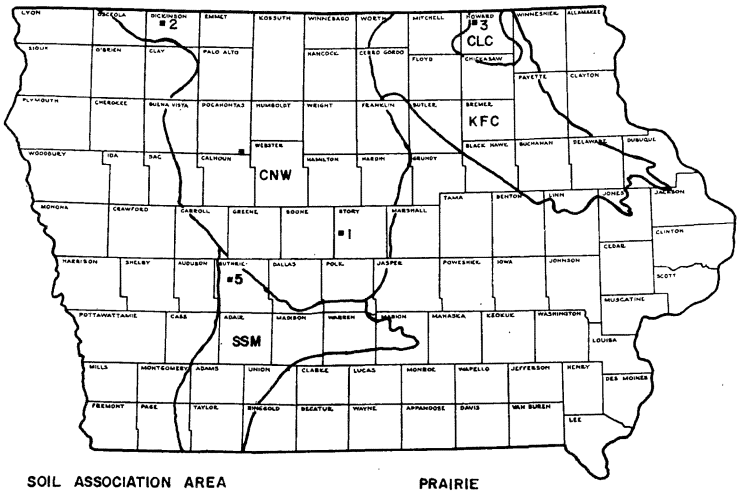

Figure 1. Location of five Iowa prairies and their soil association groups.

Many diverse habitats and plant species were sampled within each prairie and many of the same plant species were collected at all locations. No attempt was made to include all stylet-bearing nematodes in the study, but emphasis was placed on those genera whose species are common in agricultural soils or have been of other interest. Complete records were not kept for the Ames High School Prairie samples and only specimens preserved in glycerin are mentioned. Nematode-plant associations are not listed, since with the exception of some of the bunch grasses and such rhizomatous plants as *Calamagrostis canadensis* (Michx.) Beauv. and *Spartina pectinata* Link., mixed root systems of both forbs and grasses doubtlessly were obtained in most samples. A more critical evaluation of higher plant-nematode associations is needed.

Results and Discussion

Many differences in nematode occurrences were found among the prairies (Table 1). Among these are the low occurrence of *Aorolaimus* in the Cayler Prairie, the absence of *Tylenchorhynchus* in the Hayden Prairie, the absence of *T. maximum* in the Cayler Prairie, the high incidence of *Xiphinema americanum* in the Hayden Prairie, and the uneven occurrence of *Helicotylenchus* spp.

When compared with plant parasitic nematodes found in cultivated soils in Iowa (2) major differences are noted; *Aorolaimus* and *Trichodorus* are relatively common in the prairie, but these genera have never been found in Iowa cultivated soils. Conversely, *Pratylenchus* spp. and *Hoplolaimus galeatus* are common in cultivated soils, but

Table 1

Percentage Occurrence of Some Stylet Bearing Nematodes in Iowa Prairies

Nematode	Ames High School[1]	Prairie: Cayler (40)[2]	Hayden (11)[2]	Kalsow (37)[2]	Sheeder (23)[2]
		%	%	%	%
Aorolaimus Sher, 1963	P	5.0	72.7	40.5	30.4
Aphelenchoides Fischer, 1894	P	12.5	18.2	8.1	8.7
Aphelenchus Bastian, 1865	P	37.5	18.2	35.1	39.0
Boleodorus Thorne, 1941	—	0.0	0.0	2.7	0.0
Criconemoides Taylor, 1936	—	0.0	18.2	8.1	0.0
C. curvatum Raski, 1952	—	0.0	9.1	5.4	0.0
Ditylenchus myceliophagus J. B. Goodey, 1958	—	5.0	0.0	0.0	0.0
Dorylaims	P	55.0	72.7	81.1	87.0
Helicotylenchus Steiner, 1945	P	75.0	100.0	81.1	65.2
H. digonicus Perry, in Perry, Darling and Thorne, 1959	P	40.0	27.3	16.2	26.1
H. dihystera (Cobb, 1893) Sher, 1961	P	7.5	27.3	10.8	8.7
H. exallus, Sher, 1966	—	0.0	0.0	2.7	0.0
H. labiodiscinus Sher, 1966	—	0.0	27.3	5.4	4.3
H. leiocephalus Sher, 1966	P	2.4	9.1	2.7	4.3
H. platyurus Perry, in Perry, Darling and Thorne, 1959	P	0.0	0.0	13.5	0.0
H. pseudorobustus (Steiner, 1914) Golden, 1956	P	25.5	18.2	40.5	21.7
Heterodera A. Schmidt, 1871	—	5.0	18.2	5.4	0.0
Hirschmanniella Luc and J. B. Goodey, 1963	—	2.5	0.0	2.7	0.0
Hoplolaimus galeatus (Cobb, 1913) Thorne, 1935	—	7.5	0.0	0.0	4.3
Longidorus (Micoletzky, 1922) Filipjev, 1934	P	0.0	9.1	0.0	0.0
Paratylenchus Micoletzky, 1922	P	7.5	18.2	13.5	0.0
P. nanus Cobb, 1923	—	0.0	18.2	0.0	0.0
P. projectus Jenkins, 1956	—	0.0	9.1	2.7	0.0
Psilenchus hilarulus de Man, 1921	P	2.5	9.1	8.1	17.3
Pratylenchus Filipjev, 1936	P	0.0	0.0	10.0	0.0
Rotylenchus Filipjev, 1936	P	0.0	9.1	0.0	0.0
Tetylenchus Filipjev, 1936	—	5.0	0.0	0.0	0.0
Trichodorus Cobb, 1913	—	17.5	0.0	35.1	4.3
Tylenchorhynchus Cobb, 1913	P	47.5	0.0	51.4	78.3
T. martini Fielding, 1956	—	0.0	0.0	0.0	4.3
T. maximus Allen, 1955	P	0.0	0.0	24.3	36.1
T. nudus Allen, 1955	—	40.0	0.0	24.3	26.1
T. silvaticus Ferris, 1963	—	5.0	0.0	8.1	17.3
Tylenchus Bastian, 1865	P	75.0	100.0	67.6	95.7
T. costatus de Man, 1921	P	17.5	—	35.9	8.7
T. davanii Bastian, 1865	—	5.0	—	0.0	13.0
T. filiformis group	P	52.5	—	18.7	56.5
Xiphinema Cobb, 1913	P	37.5	100.0	21.6	39.1
X. americanum Cobb, 1913	P	37.5	90.9	21.6	39.1

[1]P = Present.
[2]( ) = Number of samples collected.

were found infrequently in the prairies. Whether these differences are due to the presence or absence of host plants or to the edaphic conditions must await further investigation.

Heterodera cysts were associated with *Spartina pectinata, Liatrus,* and *Andropogon.* Only with *S. pectinata* can host parasitism be accepted with any degree of certainty. Orr and Dickerson (3) did not find *Heterodera* in a Kansas prairie.

We also encountered several new species; specimens of *Aorolaimus, Heterodera, Tetylenchus, Longidorus,* and *Trichodorus* are apparently new species, although more collections are needed. Most specimens of the *Tylenchus filiformis* group fit *T. exiguus* de Man, 1816. Many other specimens of *Tylenchus* present a confusing picture and identifications for many were not attempted. *Tetylenchus* was associated with *Spartina pectinata* and *Salix interior* Rowlee in low, wet areas of the Cayler Prairie.

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