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OCCURRENCE OF PLANT-PARASITIC NEMATODES IN ALABAMA[1]

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Abstract

The frequency of plant-parasitic nematodes in samples from 1662 locations in Alabama is reported. Sixteen genera or groups of nematodes, seven of which were associated with a large number of plants throughout the State, were found. The percentages of the total samples in which they occurred were as follows: Criconemoides, 36; Meloidogyne, 36; Pratylenchus, 44; Trichodorus, 47; Tylenchorhynchus, 19; Xiphinema, 44; and spiral nematodes, 43. Genera occurring in 5% or less of the samples were: Aphelenchoides, Belonolaimus, Ditylenchus, Hemicriconemoides, Hemicycliophora, Hoplolaimus, Longidorus, Meloidodera, and Rotylenchulus.

The frequency of plant parasitic nematodes in association with different plants in Alabama is reported in this paper. A total of 1662 soil and plant samples collected throughout the State during 1955-1962 was examined. About half of these samples were survey samples collected by the authors and the others were service samples. Collections were not restricted to plants showing nematode injury. Survey samples were collected during the growing season, while service samples were received throughout the year. The soil was processed according to modifications of the method of Christie and Perry (1) or Seinhorst (2).

The incidence of nematodes associated with certain plants is recorded in Table 1. Sixteen genera or groups of parasitic nematodes were found as follows: Aphelenchoides, Belonolaimus, Criconemoides, Ditylenchus, Hemicriconemoides, Hemicycliophora, Hoplolaimus, Longidorus, Meloidodera, Meloidogyne, Pratylenchus, Rotylenchulus, Trichodorus, Tylenchorhynchus, Xiphinema, and spiral nematodes. The spiral nematodes generally were not keyed to genera because of the changing taxonomy of this group during the past few years. However, the group consisted of genera referred to in the literature as Gottholdsteineria Andrassy, 1958, Helicotylenchus Steiner, 1945, Rotylenchus Filipjev, 1936, and Scutellonema Andrassy, 1958.

The data suggest a wide host range for species of Criconemoides, Meloidogyne, Pratylenchus, Trichodorus, Tylenchorhynchus, Xiphinema, and the spiral nematodes. Where only a few samples of a given kind of plant were examined, one or more of the nematodes listed above were not found; but where several samples were examined, all were found in most cases. These nematodes occurred in practically all areas of the State, whereas species of Belonolaimus, Hemicriconemoides, Hemicycliophora, Longidorus, and Meloidodera occurred in only the coastal plains region and Rotylenchulus in only the Piedmont region. Although species of Aphelenchoides, Ditylenchus, and Hoplolaimus appeared infrequently in the samples, they were widely distributed. However, Ditylenchus dipsaci (Kühn, 1857) Filipjev, 1936, a stem and foliar parasite of alfalfa, was obtained in only the samples from the northern section of Alabama.

The percentages of all samples containing the different kinds of nematodes are shown in Figure 1. Species of Criconemoides, Meloidogyne, Pratylenchus, Trichodorus, Tylenchorhynchus, Xiphinema, and the spiral nematodes were the predominant groups. These seven groups of nematodes apparently pose the greatest nematode threat to crop production throughout the State, but certain species of the other genera cause considerable damage in local areas.

The species of genera found associated with the various plants in Alabama were as follows: Aphelenchoides coffeae (Zimmermann, 1898) Filipjev, 1934; A. parietinus (Bastian, 1865) Steiner, 1932; Belonolaimus longicaudatus Rau, 1958; Criconemoides curvatum Raski, 1952; C. cylindricum (Kirjanova, 1948) Raski, 1958; C. ornatum Raski, 1958; C. rusticum (Micoletzky, 1915) Taylor, 1936; C. sphaerocephalum Taylor, 1936; C. xenoplax Raski, 1952; Ditylen-

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TABLE 1. PERCENTAGE OF SAMPLES FROM DIFFERENT PLANTS CONTAINING NEMATODES.

Kind of plant	Number of samples examined	Aphelenchoides spp.	Belonolaimus spp.	Criconemoides spp.	Ditylenchus spp.	Hemicriconemoides spp.	Hemicycliophora spp.	Hoplolaimus spp.	Longidorus spp.	Meloidodera sp.	Meloidogyne spp.	Pratylenchus spp.	Rotylenchulus sp.	Spiral Nematodes	Trichodorus spp.	Tylenchorhynchus spp.	Xiphinema spp.
Field crops:																	
Alfalfa, Medicago sativa	28	14	0	11	18	0	0	4	0	0	14	21	0	18	39	11	43
Barley, Hordeum vulgare	4	50	0	0	50	0	0	0	0	0	0	0	0	25	0	0	0
Bermuda grass, Cynodon dactylon, coastal variety	18	6	0	89	0	0	0	0	0	0	50	100	0	89	100	6	44
Carpet grass, Axonopus affinis	5	0	0	60	0	0	0	0	0	0	20	0	0	60	60	0	60
Corn, Zea mays	105	10	0	27	8	0	0	1	0	0	20	68	0	48	41	9	32
Cotton, Gossypium hirsutum	212	4	6	31	2	0	0	2	0	0	48	70	1	51	51	5	62
Crimson clover, Trifolium incarnatum	7	0	0	27	0	0	0	0	0	0	43	14	0	71	86	0	0
Dallis grass, Paspalum dilatatum	9	0	0	22	0	0	0	22	0	0	11	78	0	100	44	11	67
Grain sorghum, Sorghum vulgare	6	33	0	17	0	0	0	0	0	0	50	100	0	17	17	50	50
Johnson grass, Sorghum halepense	4	0	0	25	0	0	0	0	0	0	0	75	0	50	75	25	75
Kudzu, Pueraria lobata	3	0	0	33	0	0	0	0	0	0	67	0	0	33	67	0	0
Lespedeza sericea	30	0	0	17	0	0	0	3	0	0	30	50	0	23	30	13	80
Millet, Pennisetum glaucum	3	0	0	67	0	0	0	0	0	0	0	33	0	33	33	0	0
Oats, Avena sativa	12	8	0	25	8	0	0	0	0	0	42	42	0	17	83	0	25
Pasture, mixed grasses	12	0	0	3	0	0	0	0	0	0	42	42	0	67	33	33	83
Peanuts, Arachis hypogaea	75	4	3	64	4	0	0	0	0	0	44	37	0	16	21	1	12
Rye, Secale cereale	6	50	0	33	33	0	0	0	0	0	0	17	0	17	0	17	67
Soybean, Glycine max	29	7	0	10	0	0	0	3	0	0	45	45	0	57	35	14	21
Sugarcane, Saccharum officinarum	4	0	0	50	0	0	0	0	0	0	25	100	0	50	50	0	100
Tobacco, Nicotiana tabacum	13	8	0	46	0	8	8	0	0	0	100	92	0	54	77	0	93
Vetch, Vicia sp.	20	5	0	45	0	0	0	20	0	0	20	45	0	5	85	15	0
Wheat, Triticum aestivum	3	0	0	33	0	0	0	0	0	0	67	33	0	33	100	33	33
White clover, Trifolium repens	8	13	0	25	0	0	0	0	0	0	38	50	0	50	50	38	25
Vegetables:																	
Bean, Phaseolus vulgaris	11	27	0	18	0	0	0	0	0	0	64	64	0	36	46	27	0
Bean, lima, Phaseolus lunatus	4	25	0	25	0	0	0	0	0	0	100	50	0	50	25	25	25
Cantaloup, Cucumis melo	4	0	0	25	0	0	0	0	0	0	75	25	0	25	25	25	0
Cowpeas, Vigna sinensis	13	0	0	31	0	0	0	8	0	0	69	69	0	54	46	0	69
Cucumber, Cucumis sativus	1	0	0	0	0	0	0	0	0	0	100	100	0	100	0	0	0
Home garden, several vegetables	98	5	0	19	0	0	0	2	0	0	68	58	0	62	36	16	45
Potato, Solanum tuberosum	13	8	0	0	0	0	0	0	0	0	62	15	0	31	0	8	8
Okra, Hibiscus esculentus	37	3	0	0	27	0	0	3	0	0	78	70	0	54	49	16	73
Pepper, Capsicum frutescens	7	0	0	0	0	0	0	0	0	0	100	57	0	43	14	0	71
Squash, Cucurbita pepo	3	0	0	67	0	0	0	0	0	0	67	33	0	33	67	33	33
Sweetpotato, Ipomoea batatas	10	0	0	30	0	0	0	0	0	0	80	50	0	40	30	10	50
Tomato, Lycopersicon esculentum	69	4	0	4	1	0	0	3	0	0	71	62	0	55	38	0	48
Watermelon, Citrullus vulgaris	6	17	0	17	0	0	0	0	0	0	33	17	0	33	0	0	67
Fruits and nuts:																	
Apple, Malus pumila	7	0	0	0	0	0	0	14	0	0	57	43	0	71	57	0	14
Fig, Ficus carica	4	25	0	0	0	0	0	0	0	0	100	75	0	0	25	25	25
Grape, Vitis labrusca	2	0	0	0	0	0	0	0	0	0	0	50	0	50	0	0	0
Peach, Prunus persica	24	0	0	42	0	0	0	13	0	0	63	67	0	25	50	17	71
Pear, Pyrus communis	1	0	0	0	0	0	0	100	0	0	0	0	0	100	100	0	0
Pecan, Carya illinoensis	9	0	0	11	0	0	0	0	0	0	22	44	0	56	11	0	44
Satsuma, Citrus nobilis unshiu	1	0	0	0	0	0	0	0	0	0	100	0	0	100	0	0	100
Strawberry, Fragaria virginiana	12	17	0	17	8	0	0	0	0	0	25	75	0	67	42	25	50
Walnut, Juglans nigra	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Ornamentals:																	
African violet, Saintpaulia ionantha	9	0	0	0	0	0	0	0	0	0	11	22	0	57	11	0	0
Amaryllis sp.	9	0	0	56	0	0	0	50	11	0	11	60	0	56	67	44	0
Arborvitae, Thuja sp.	7	0	0	0	0	0	0	0	0	0	1	14	0	57	29	57	86
Azalea, Rhododendron sp.	38	11	0	8	0	3	0	0	0	0	8	16	0	50	40	42	16
Barberry, Berberis sp.	1	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0
Box, Buxus sempervirens	58	0	0	22	0	0	0	4	0	0	38	62	0	50	29	21	12
Camellia japonica	37	0	0	24	0	5	8	11	3	0	19	14	0	41	43	19	38
Capejasmine, Gardenia jasminoides	9	60	0	0	11	0	0	0	0	0	56	0	0	56	44	22	0
Chinese elm, Ulmus parvifolia	1	0	0	100	0	0	0	0	0	0	0	0	0	100	100	0	100
Dahlia sp.	2	0	0	50	0	0	0	0	0	0	50	0	0	100	50	0	0
Daylily, Hemerocallis sp.	1	0	0	100	0	0	0	0	0	0	100	0	100	0	0	100	0
Dogwood, Cornus florida	3	0	0	0	0	0	0	0	0	0	33	0	0	67	0	67	0
Bronze elaeagnus, Elaeagnus pungens Reflexa	1	0	0	100	0	0	0	0	0	0	0	100	0	0	0	100	0
Forsythia sp.	1	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
Gladiolus sp.	4	25	0	0	25	0	0	0	0	0	50	0	0	0	0	0	25
Holly, Ilex sp.	27	4	0	11	0	0	0	0	0	0	37	15	0	67	26	26	22
Carolina laurelcherry, Prunus caroliniana	1	0	0	100	0	0	0	0	0	0	0	100	0	100	100	100	0
Magnolia sp.	2	0	0	0	0	0	0	0	0	0	50	50	0	50	50	100	0
Silktree, Albizia julibrissin	2	0	0	0	0	0	0	0	0	0	50	0	50	0	0	50	0
Nandina domestica	1	0	0	100	0	0	0	0	0	0	0	0	0	100	0	100	0
Narcissus sp.	1	0	0	100	0	0	0	0	0	0	0	100	0	100	0	100	0
Orchid, Aspasia sp.	2	0	0	0	0	0	0	0	0	0	0	50	0	100	100	0	0
Petunia hybrida	1	0	0	0	0	0	0	0	0	0	100	0	0	100	0	0	0
Photinia sp.	1	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	100
Pittosporum tobira	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
Pyracantha sp.	2	0	0	0	0	0	0	0	50	0	0	0	0	50	50	0	50
Rose, Rosa sp.	17	10	0	29	0	0	0	0	0	0	12	53	0	35	35	35	29
Taxus sp.	2	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	50
Trifoliate-orange, Poncirus trifoliata	1	0	0	0	0	0	0	0	0	0	100	0	0	100	0	0	100
Turf grasses:																	
Bermuda, Cynodon dactylon	64	2	9	78	0	2	0	0	0	0	14	67	0	69	64	23	45
Centipede, Eremochloa ophiuroides	19	0	0	47	0	0	0	16	0	0	21	74	0	53	58	28	21
Lawns, kind of grass not specified	7	14	0	71	0	0	0	0	0	0	42	0	0	43	43	0	43
St. Augustine, Stenotaphrum secundatum	30	10	0	53	0	0	0	13	0	0	33	40	0	47	17	57	20
Turf nurseries, kind of grass not specified	16	0	0	75	0	0	0	0	0	0	0	69	0	63	94	94	56
Zoysia sp.	253	3	2	74	1	0	2	4	1	0	10	71	0	49	77	38	56
Forest:																	
Pine, Pinus sp.	35	6	0	20	0	0	9	0	0	3	26	23	0	51	17	9	40
Weeds:																	
Several species of native weeds	43	7	0	19	0	0	0	0	0	0	35	44	0	54	33	9	72

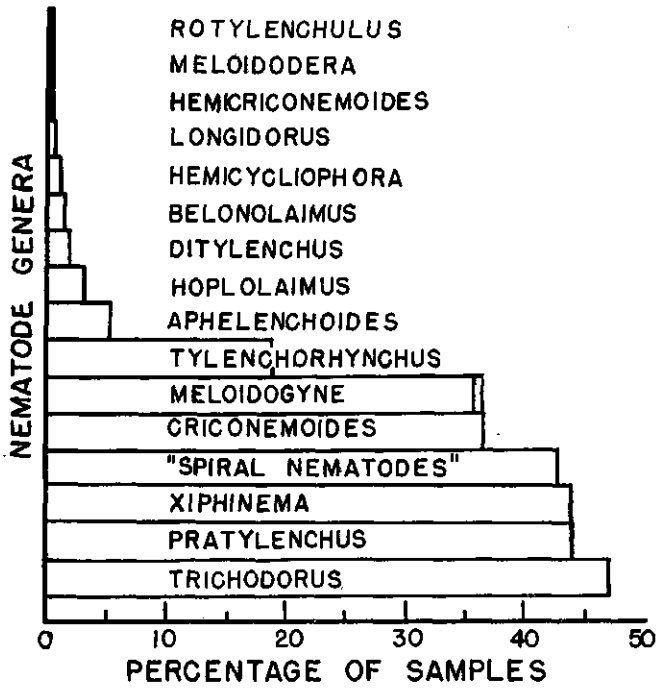

FIGURE 1. Frequency of occurrence of various nematodes in 1662 sampled locations in Alabama.

chus dipsaci (Kühn, 1857) Filipjev, 1936; Helicotylenchus erythrinae (Zimmermann, 1904) Golden, 1956; H. multicinctus (Cobb, 1893) Golden, 1956; H. nannus Steiner, 1945; Hoplolaimus tylenchiformis Daday, 1905; Longidorus elongatus (de Man, 1876) Thorne & Swanger, 1936; Meloidodera floridensis Chitwood, Hannon, & Esser, 1956; Meloidogyne arenaria (Neal, 1889) Chitwood, 1949; M. hapla Chitwood, 1949; M. incognita (Kofoid & White, 1919) Chitwood, 1949; M. incognita acrita Chitwood & Oteifa, 1952; M. javanica (Treub, 1885) Chitwood, 1949, Pratylenchus brachyurus (Godfrey, 1929) Filipjev & Schuurmans Stekhoven, 1941; P. hexincisus Taylor & Jenkins, 1957; P. neglectus (Rensch, 1924) Filipjev & Schuurmans Stekhoven, 1941; P. penetrans (Cobb, 1917) Filipjev & Schuurmans Stekhoven, 1941; P. pratensis (de Man, 1880) Filipjev, 1936; P. scribneri Steiner, in Sherbakoff & Stanley, 1943; P. vulnus Allen & Jensen, 1951; P. zeae Graham, 1951; Rotylenchulus reniformis Linford & Oliveira, 1940; Scutellonema brachyurum (Steiner, 1938) Andrassy, 1958; S. christiei (Golden & Taylor, 1956) Andrassy, 1958; S. coheni (J. Goodey, 1952) Andrassy, 1958; Trichodorus christiei Allen, 1957; T. porosus Allen, 1957; T. primitivus (de Man, 1880) Micoletzky, 1922; Tylenchorhynchus acti Hopper 1959; T. acutus Allen, 1955; T. claytoni Steiner, 1937; T. martini Fielding, 1956; T. nudus Allen, 1955; Xiphinema americanum Cobb, 1913; X. chambersi Thorne, 1939.

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