

## SOME RECORDS OF PLANT-PARASITIC NEMATODES ENCOUNTERED IN CANADA IN 1967

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Plant parasitic nematodes representing 19 genera and at least 34 species were extracted from soil and plant samples received during 1967 by the Nematology Section, Entomology Research Institute. The samples originated in various parts of Canada or were intercepted on entry from foreign countries: most were submitted by the Plant Protection Division or other government agencies.

### Root-knot nematode (genus *Meloidogyne*)

*Meloidogyne hapla* Chitwood, 1949, the northern root-knot nematode, was found on *Rosa* sp. from Vancouver, British Columbia, and Carlisle, Ontario; on *Scabiosa* sp. from Galesburg, Michigan; *Philadelphus* sp. from Stillwater, Minnesota; *Fragaria* sp. from Minneapolis, Minnesota; *Lycopersicon* sp. from Tifton, Georgia; *Ligustrum* sp., *Forsythia* sp., *Weigela* sp. and *Kolkwitzia* sp. from Huntsville, Alabama; gooseberry (*Ribes* sp.) from Salem, Oregon; *Weigela* sp., *Lonicera* sp., *Ligustrum* sp., and *Viburnum* sp. from McMinnville, Tennessee; and *Salix babylonica* L. and *Lonicera* sp. from Tennessee. *M. hapla* was intercepted on four occasions on *Rosa* sp. from Tyler, Texas, and on two occasions on *Rosa* sp. from West Grove, Pennsylvania. Intercepted European samples showed *M. hapla* to be present on *Clematis* sp. and *Populus alba bolleana* (P. alba var. *pyramidalis* Bunge) from Boskoop, Holland, and on *Rosa multiflora* Thunb. from Belgium and Angers, France. A root-knot nematode, possibly *M. hapla*, was found on *Ligustrum* sp. from McMinnville, Tennessee, and on *Rosa* sp. from McFarland, California. *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949, the southern root-knot nematode, was found infesting *Caladium* sp. from Sebring, Florida, and Seattle, Washington; *Deutzia* sp. and *Hydrangea* sp. from Huntsville, Alabama; *Forsythia* sp., *Tamarix* sp., and *Lonicera* sp. from McMinnville, Tennessee; cabbage (*Brassica oleracea* var. *capitata* L.) and *Lycopersicon* sp. from Tifton, Georgia; and *Lycopersicon esculentum* Mill. from Richton, Mississippi. A root-knot nematode, possibly *M. incognita* was found on *Acer* sp. from Boskoop, Holland, and on *Tilia platyphyllos* Scop. from Holland. *M. incognita acrita* Chitwood, 1949 was found on *Tilia cordata* Mill. from Holland. *M. javanica* (Treub, 1885) Chitwood, 1949, the Javanese root-knot nematode,

was removed from *Lycopersicon esculentum* from Tifton, Georgia, and a root-knot nematode resembling *M. javanica* was encountered on cabbage from Tifton, Georgia. *Meloidogyne* spp. were collected from *Lonicera* sp. from McMinnville Tennessee, greenhouse plants from Monaco; and *Pyrethrum* spp. from Twyford, Berkshire, England. *Meloidogyne* spp. (possibly *M. hapla* and *M. arenaria*) were intercepted from California in association with bulbs of *Begonia* sp.

### Cyst-forming nematode (genus *Heterodera*)

Soil surveys for cyst-forming nematodes in the Maritimes, Ontario, and Quebec have shown *Heterodera trifolii* Goffart, 1932, the clover cyst nematode, to be present in soils from various areas, including Halifax, Nova Scotia; St. John, New Brunswick; Montreal, Quebec; Toronto, London, Vineland, and Long Sault, Ontario; and Abbotsford, British Columbia. Interceptions from the United States showed *H. trifolii* to be present in soil supporting *Juniperus excelsa* var. *stricta* Gord. and *Juniperus sabina* L. from Tennessee; *Juniperus chinensis* L. var. *pfitzeriana* Mast. from Athens, Alabama; pear (*Pyrus communis* L.) and apple trees (*Malus sylvestris* Mill.) from Louisiana; *Hydrangea hortensia* (H. *macrophylla* Ser.) from Bundak, Maryland; and *Poa* sp. from the U.S.A. Examination of intercepted European soils showed *H. trifolii* to be present in those supporting *Rosa* sp. and *Hydrangea* sp. from Belgium; house plants and *Clivia* sp. from Germany; house plants, rosemary (*Rosemarinus officinalis* L.) *Prunus* sp., *Cactus* sp., *Aspidistra* sp., and *Vitis* sp. from Italy; daffodils (*Narcissus* sp.) and ivy (*Hedera* sp.) from England; and house plants from Portugal. Cysts resembling *H. trifolii* were removed from soil associated with mint (*Mentha* sp.) from Portugal; *Fragaria* sp. from Poland; *Ficus* sp. from England; and house plants from Germany. *Heterodera avenae* Wollenweber, 1924, was encountered in soil associated with *Chrysanthemum* sp. from England; fruit trees from Gorse, Belgium; *Lilium* sp. from Holland; ornamentals from Germany; and *Hydrangea* sp. from Europe. Cysts resembling *H. avenae* were encountered in soil associated with *Acer platanoides* L. from Holland; ornamentals from Hungary; rosemary from Italy; and greenhouse plants carried in passenger baggage from Italy. *H. cacti* Filipjev and Schuurmans-Stekhoven, 1941, the cactus cyst nematode, was found in Tunisia's Expo 67 Pavilion in soil from greenhouse plants carried in baggage from Tunis. It was also removed from soil associated with *Cactus* sp.

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from Monaco and Tunisia and with Citrus sp. from McAllen, Texas. Cysts resembling H. cacti were found in soil surrounding roots of Chrysanthemum sp. from Italy and of Sansevieria sp. from San Juan, South America. Heterodera humuli Filipjev, 1934, the hop cyst nematode, was extracted from soil associated with house plants from Germany and Poland; Cantua sp. from France; ornamentals from Italy; Rosemarinus officinalis L. from Liberec, Czechoslovakia; greenhouse plants carried in a passenger's baggage from Italy; and Dahlia sp. from Europe. Heterodera cysts resembling H. humuli were found in soils associated with greenhouse plants carried in passenger baggage, Philodendron sp., Chrysanthemum sp. and Prunus sp. from Italy, and Crassula sp. from Hungary. Heterodera punctata Thorne, 1928, the grass cyst nematode, was removed from soil associated with Malus sp. and Laburnum sp. from Holland, and with ivy and Ficus sp. from England. Heterodera rostochiensis Wollenweber, 1923, the golden nematode, was found in soil associated with greenhouse plants and Chrysanthemum spp. from England; holly (Ilex sp.) from Glasgow, Scotland; shamrock (Trifolium repens L.) from Belfast, Northern Ireland; and ornamentals from Germany. Cysts resembling H. rostochiensis were taken from soil surrounding gladiolus bulbs from Hamburg, Germany. Heterodera schachtii Schmidt, 1871, the sugar-beet nematode, was found in soil supporting potatoes (Solanum tuberosum L.). Cysts of a Heterodera sp. (possibly H. cruciferae Franklin, 1945), were removed from soil around the roots of ornamentals from Italy. Cysts of what may be a new species of Heterodera were screened from soil associated with ornamentals from Hungary. Heterodera sp. larvae were extracted from soil surrounding the roots of virus-infected oats Avena sativa L. received from the Arboretum, Central Experimental Farm, Virology Section, Canada Department of Agriculture, Ottawa. Heterodera cysts of undetermined species were encountered several times during the golden nematode survey at Sidney, British Columbia. Heterodera spp. were also encountered in soils associated with Pelargonium spp. from Grand Rapids, Michigan; fern from Michigan; Magnolia soulangeana Soul. from Rives, Tennessee; Tilia cordata Mill. and Acer platanoides L. var. Schwedleri Nichols from Mechanicsburg, Pennsylvania; Dracaena sp., grape (Vitis vinifera L.) and house plants from Italy; Acer platanoides L. and Montbretia sp. from Holland; Pothos sp. from Greece; greenhouse plants from Yugoslavia; and Erica vulgaris L. (Calluna vulgaris Hull) from Inverness, Scotland.

Spiral nematode (genera Helicotylenchus and Rotylenchus)

Helicotylenchus digonicus Perry in Perry, Darling and Thorne, 1959, was found in soil associated with Tilia cordata from Gardiner, New York. Helic-

otylenchus dihystra (Cobb, 1893) Sher, 1961, was found at the Central Experimental Farm, Ottawa, associated with virus-infected oats. Helicotylenchus platyurus Perry in Perry, Darling and Thorne, 1959, was extracted from soils associated with Tilia cordata from Gardiner, New York, Rosa sp. from New York, Juniperus sp. from Maryland, Ligustrum vulgare L. from Holland, and house plants carried in passenger baggage from Europe. Helicotylenchus pseudorobustus (Seiner, 1914) Golden, 1956 was found in soil associated with Juniperus sp. from Maryland. A Helicotylenchus sp. (possibly H. pseudorobustus) was found in soil associated with privet (Ligustrum sp.) from McMinnville, Tennessee. Immatures of Helicotylenchus sp. were removed from soil associated with Siberian crab apple (Malus baccata Borkh.) from Lake Benton, Minnesota.

Rotylenchus robustus (de Man, 1876) Filipjev, 1936, was found in Compositae from Holland.

Root-lesion nematode (genus Pratylenchus)

Pratylenchus coffeae (Zimmermann, 1898) Filipjev and Schuurmans-Stekhoven, 1941, was extracted from soil from Germany, and P. convallariae Seinhorst, 1959 from soil surrounding the roots of Ligustrum vulgare from Holland. P. crenatus Loof, 1960, was found in soil associated with Tilia cordata from Mechanicsburg, Pennsylvania, Gleditsia triacanthos L. from Englishtown, New Jersey, Tilia cordata from Gardiner, New York, Thuja woodwardii (T. occidentalis L. var. woodwardii Spaeth.) from Butler, Pennsylvania, and in soil associated with Ligustrum vulgare, Tilia cordata, flax-like plants, and Compositae from Holland. P. neglectus (Rensch, 1924) Filipjev and Schuurmans-Stekhoven, 1941, was found in soil associated with Siberian crab apple from Lake Benton, Minnesota, and nursery stock from Sturgeon Bay, Wisconsin. P. penetrans (Cobb, 1917) Filipjev and Schuurmans-Stekhoven, 1941, was encountered in soils associated with clover roots from Charlottetown, Prince Edward Island, Siberian crab apple from Lake Benton, Minnesota, and Gobiloba L. from Princeton, New Jersey. P. penetrans was also found in soil associated with Dahlia spp. from Denmark, Ligustrum vulgare, Tilia cordata and Acer platanoides from Holland, and Ligustrum ovalifolium Hassk. from Boskoop, Holland. P. pratensis (de Man, 1880) Filipjev, 1936, was screened from soil associated with Rosa sp. from New York and Ligustrum vulgare from Holland. A nematode which may be a new species of Pratylenchus was discovered in soil associated with pear trees from Holland. Pratylenchus sp. was encountered in soil associated with Juniperus virginiana L. from Wisconsin, and Ligustrum vulgare and Weigela 'Abel Carrière' from Holland.

Stunt nematode (genus Tylenchorhynchus)

Tylenchorhynchus brevidens Allen, 1955, was removed from soil associated with Ginkgo biloba from Princeton, New Jersey, pear trees and plant species from Holland, and Dahlia sp. from Denmark. T. claytoni Steiner, 1937, the tobacco stunt nematode, was found in soil associated with azalea from Beamsville, Ontario, and Rhododendron sp. from Wantagh, New York. T. dubius (Bütschli, 1873) Filipjev, 1936, was found in large numbers in soil associated with virus-infected oats from the Central Experimental Farm, Ottawa. T. dubius was also found in soil associated with African violet (Saintpaulia ionantha Wendl) from Westfield, Kings County, New Brunswick. A Tylenchorhynchus species (near T. dubius) was removed from soil associated with grass from Lethbridge, Alberta. T. nothus Allen, 1955, was extracted from Compositae from Holland. T. ornatus Allen, 1955, was removed from soil associated with house plants carried in a passenger's baggage from Poland. A Tylenchorhynchus sp. was extracted from soil associated with arbovitae (Thuja occidentalis L.) from Wisconsin.

Bud and leaf nematode (genus Aphelenchoides)

The chrysanthemum foliar nematode, Aphelenchoides ritzemabosi (Schwartz, 1911) Steiner and Buhner, 1932, was found infesting Chrysanthemum sp. from England. An Aphelenchoides sp. (near A. parietinus (Bastian, 1865) Steiner, 1932) was found associated with Lilium spp. from Poland. A possibly undescribed species of Aphelenchoides was discovered in association with taro (Colocasia esculenta Schott) plants from Hong Kong. An Aphelenchoides sp. (an undetermined species) was found associated with Gleditsia sp. from Galt, Ontario; strum vulgare, from Holland; Viburnum spp. from Boskoop, Holland; and Chrysanthemum spp. from England.

Pin nematode (genus Paratylenchus)

Paratylenchus projectus Jenkins, 1956, was removed from soil associated with Juniperus virginiana from Wisconsin, Ginkgo biloba from Princeton, New Jersey, Quercus borealis Mich. from Mechanicsburg, Pennsylvania, and Acer platanoides from Holland. A Paratylenchus sp. (near P. projectus) was found in soil associated with house plants carried in passenger's baggage from Poland.

Ring nematode (genus Criconemoides)

Criconemoides lobatum Raski, 1952, was found in soil associated with Chrysanthemum sp. from England, and Criconemoides xenoplax Raski, 1952,

in soil associated with Tilia tomentosa Moench from Boskoop, Holland. A nematode resembling Criconemoides mutabile Taylor, 1936, was extracted from Compositae from Holland, and a Criconemoides species (near C. quadricorne (Kirjanova, 1948) Raski, 1958) was found in soil associated with Juniperus sp. from Virginia.

Lance nematode (genus Hoplolaimus)

Hoplolaimus galeatus (Cobb, 1913) Thorne, 1935 was extracted from soil associated with Gleditsia spp. from Gardiner, New York; Gleditsia triacanthos from Englishtown, New Jersey; Ginkgo biloba from Princeton, New Jersey; Juniperus spp. from McMinnville, Tennessee; and house plants carried in passenger baggage from Europe.

Stem and bulb nematode (genus Ditylenchus)

Nematodes resembling the potato-rot nematode, Ditylenchus destructor Thorne, 1945, were found in soil associated with tobacco (Nicotiana tabacum L.) from Kentville, Nova Scotia. Ditylenchus sp. was removed from soil associated with lily (Lilium sp.) bulbs from Smith River, California, and Rosa sp. from Holland.

Seed gall nematode (genus Anguina)

Anguina sp. was extracted from soil associated with Poa pratensis L. from Louisburg, Cape Breton County, Nova Scotia.

Sting nematode (genus Belonolaimus)

Belonolaimus sp. was removed from soil associated with Rosa sp. from Tyler, Texas.

## Dorylaimids

The American dagger nematode, Xiphinema americanum Cobb, 1913, was found associated with Acer sp. from Strathroy, Ontario; Rosa sp. from Tyler, Texas; Juniperus sp. from Virginia; Gleditsia sp. and Tilia cordata from Gardiner, New York; Gleditsia triacanthos and Gleditsia sp. from Englishtown, New Jersey; Quercus palustris Muenchh. from Princeton, New Jersey; Juniperus sp. from McMinnville, Tennessee; Tilia cordata and Quercus borealis from Mechanicsburg, Pennsylvania. Xiphinema diversicaudatum (Micoletzky, 1927) Thorne, 1932, the European dagger nematode, was found

heavily infesting Rosa sp. from Brampton, Ontario. An undetermined species of Trichodorus, the stubby root nematode, was associated with azalea plants from Beamsville, Ontario. A Trichodorus sp. (possibly T. proximus Allen, 1959) was associated with Tilia cordata from Gardiner, New York.

#### Miscellaneous nematodes

Aphelenchus spp. were extracted from soil from Germany and from soil associated with Ligustrum vulgare from Holland; Lilium sp. from Poland, and Tilia cordata from Gardiner, New York; Siberian crab apple from Lake Benton, Minnesota; Phlox sp. from Kemptville Agricultural School, Kemptville,

Ontario; and Acer platanoides from Holland. Tylenchus cancellatus (Cobb, 1925) Filipjev, 1934, was found in soil associated with Tilia cordata from Gardiner, New York. Tylenchus sp. was found in soil associated with Pelargonium sp. from Grand Rapids, Michigan; Juniperus sp. from Virginia; Taxus media var. hicksii Rehd. from Butler, Pennsylvania; Tilia cordata from Gardiner, New York; Viburnum sp., Acer platanoides, and Tilia cordata from Boskoop, Holland; Ligustrum vulgare from Holland; Lilium sp. from Poland; and tobacco from Kentville, Nova Scotia. Nothotylenchus sp. was found in soil associated with Acer saccharinum L. from Holland. Paraphelenchus sp. was found in soil associated with Thuja occidentalis var. woodwardii and Taxus media var. hicksii from Butler, Pennsylvania.