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CHARACTERIZATION OF POTATO ROT NEMATODE, DITYLENCHUS DESTRUCTOR THORNE, 1945 (TYLENCHIDAE) FOR REGULATORY PURPOSES.

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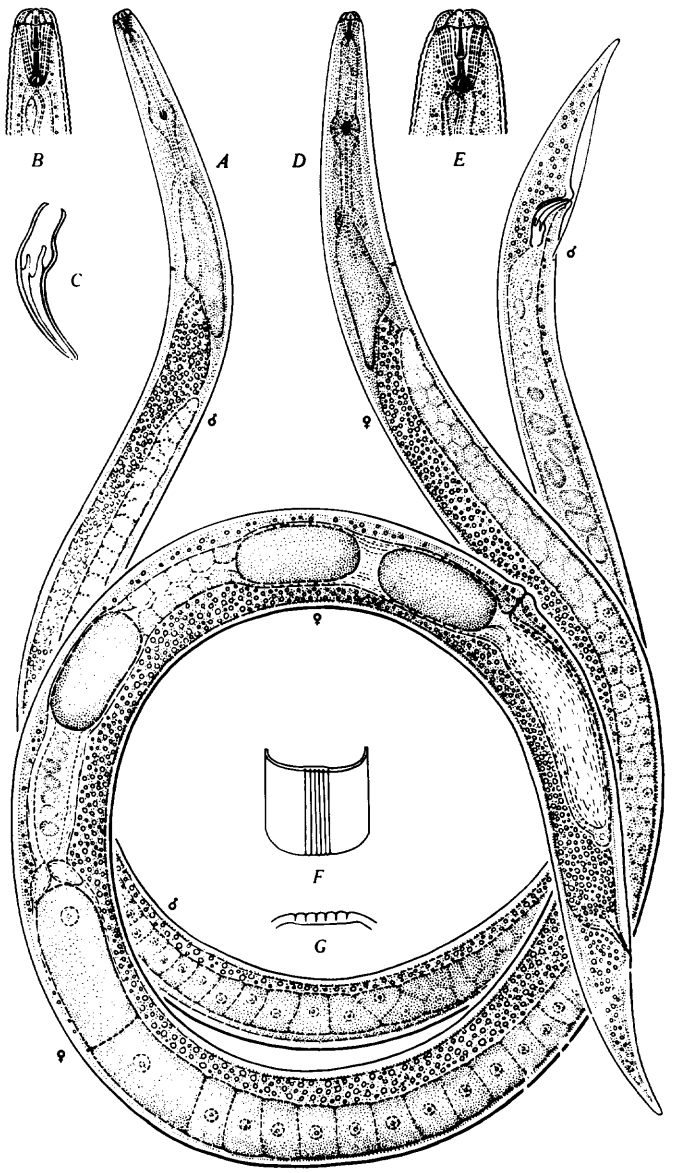
The purpose of this circular is to provide a morphological characterization of potato rot nematode for use as a guide for identification or delineation of the species for regulatory purposes.



Economic Status: Potato rot nematode has not been found in Florida. Detection of this pest in Florida would necessitate immediate regulatory action to protect our extensive potato-growing areas. It is one of the 5 nematodes listed on the EPPO Quarantine list A-2 (zero tolerance required in countries in which the pests are important by reason of prevailing ecological conditions) (1).

Geographic Distribution: Potato rot nematode is reported from the following states: AR, CA, HI, ID, IN, NJ, OR, WA, WI: and also from Austria, Bangladesh, British Columbia, Bulgaria, Canary Islands, China, Czechoslovakia, Estonia, Finland, France, Federal Republic of Germany, Greece, Hungary, Iran, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Prince Edward Island, Roumania, South Africa, Soviet Union, Sweden, Switzerland, and the United Kingdom (excluding Northern Ireland).

Fig. 1. Male (A) and female (D) of Ditylenchus destructor. (B) male head, (C) spicule, (E) female head, (F,G) lateral incisures. (After Thorne).

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IDENTIFICATION CHARACTERISTICS

Morphometrics, ratios and percentages are in Table 1.

Mature Female: Body vermiform (Fig. 1A), tapered slightly anteriorly with a sharp conoid tail. Six lips present, amphids appear as 2 small dots on lateral lips. Labial framework well sclerotized (Fig. 1B). Short stylet with pronounced knobs. Six lateral incisures present* reducing to two toward extremities. Terminal duct of excretory pore very long (2/3 length of esophagus). Medium bulb fusiform. Basal esophageal bulb elongate, comprised of 3 glands that appear as one, dorsal gland with prominent nuclei overlaps intestine up to 1/3 of gland length*. Cardia consists of 2 small guard cells at esophageal intestinal junction. Female gonad outstretched. Oocytes in ovary in 2 or more rows*. A short oviduct comprised of 2 rows of cells, 46 cells in each row, lies between the ovary and uterus. Uterus comprised of 3 regions; beginning anteriorly: 1) an elongate, slightly swollen seminal receptacle; 2) quadricolumella comprised of 16 cells; and 3) uterus proper. Posterior uterine pouch extends 2/3 distance to the anus appearing as a a slender sac in young females, increasing in diameter with age. Vulva-anus distance is 1 3/4 x 2 1/2 times the tail length. Vulva a transverse slit situated on elevated vulval lips. Conoid tail terminates in a minutely rounded tip.

Mature Male: Males resemble females very closely, except for sexual characteristics (Fig. 1). Single testis outstretched, may reach esophageal base. Spermatocytes occur in 2 or more rows; vas deferens not distinct; seminal vesicle comprises posterior dilated portion of male genital tube. Spicules with 2 longitudinal rays, dorsal ray shorter than ventral. Caudal alae arise from cuticle at level of capitulum and occupy 2/3 to 3/4 the tail length.

Table 1. Morphometrics of Ditylenchus destructor.

Morphometrics (um) and ratios	Ref. (2)(3)(4)(5)(6)(7)(8)(9)(10)(11)(12)	
Character	Female	Male
Body Length	665(800-1400) 1890[X]	671(800-1300) 1580
Ratio-alpha	18 (30-35) 50	24 (34-40) 55
-beta	4 (8-10) 12	4 (7-8) 11
-gamma	9 (15-20) 30	10 (12-16) 21
Vulva %	73 (78-83) 90	
Spear Length	10 (?) 15	10 (?) 12
Posterior		
Uterine sac	40 (?) 128	
Lateral lines	6	6
Excretory pore	116 (?) 170	114 (?) 158
Testes		29 (73-80) 90
Spicules		24 (?) 27
Gubernaculum		9 (?) 12

[X]Numbers inside parentheses indicate original description, numbers outside parentheses are from population morphometrics in various geographical sites.

Host List: The following plants are hosts of this nematode: Agropyron repens (L.) Beauv., Allium cepa L., A. sativum L., Amaranthus caudatus L., Apium graveolens L., Arachis hypogaea L., Artemisia vulgaris L., Barbarea vulgaris R. Br., Begonia sp., Bellis perennis L., Beta vulgaris L., Brassica rapa L. Chinensis Group, B. oleracea L., Canna indica L., Capsella bursa-pastoris (L.) Medicus, Capsicum annuum L., Chrysanthemum x morifolium Ramat., Cicer arietinum L., Cimicifuga racemosa (L.) Nutt., Cirsium arvense (L.) Scop., Citrullus lanatus (Thunb.) Matsum. & Nakai, Colchicum sp., Crocus vernus (L.) J. Hill, Cucumis sativus L., Curcubita moschata (Duchesne) Poir., C. pepo L., Dahlia pinnata Cav., Daucus carota L., Dianthus sp., Festuca pratensis Huds., Fragaria chiloensis (L.) Duchesne, Fumaria officinalis L., Gladiolus sp., Glycine max (L.) Merrill, Helianthus annuus L., Hordeum vulgare L., Humulus lupulus L., Ipomoea batatas (L.) Lam., Iris sp., Lathyrus hirsutus L., L. latifolius L., Linaria vulgaris Mill., Lycopersicon esculentum Mill., Medicago sativa L., Melilotus officinalis (L.) Pall., Mentha arvensis L., Narcissus sp., Nicotiana tabacum L., Pastinaca sativa L., Plantago major L., Portulaca sp., Potentilla anserina L., Raphanus sativus L., Rheum rhaponticum L., Rumex acetosella L., R. obtusifolius L., Saccharum officinarum L., Sisyrinchium angustifolium Mill., Solanum andigenum Juz. and Buk., S. melongena L., S. nigrum L., S. tuberosum L., Solidago graminifolia Salisb., S. lanceolata L., Sonchus arvensis L., S. asper (L.) All., Stachys palustris L., Stenotaphrum secundatum (Walt.) O. Kuntze, Syringa vulgaris L., Taraxacum officinale Wiggers, Tigridia pavonia (L.f) DC., Trifolium hybridium L., T. pratense L., T. repens L., Tripleurospermum maritimum (L.) W. D. J. Koch, subsp. inodorum (L.) Hyl. ex Varr., Triticum aestivum (L.), Tropaeolum polyphyllum Cav., Tulipa praestans Hort. 'Tuberg', T. saxatilis Sieber ex K. Spreng., Tussilago farfara L., Vicia sativa L., and Vigna unguiculata (L.) Walp. In addition to the aforementioned hosts, potato rot nematode feeds on over 65 species of fungi (4).

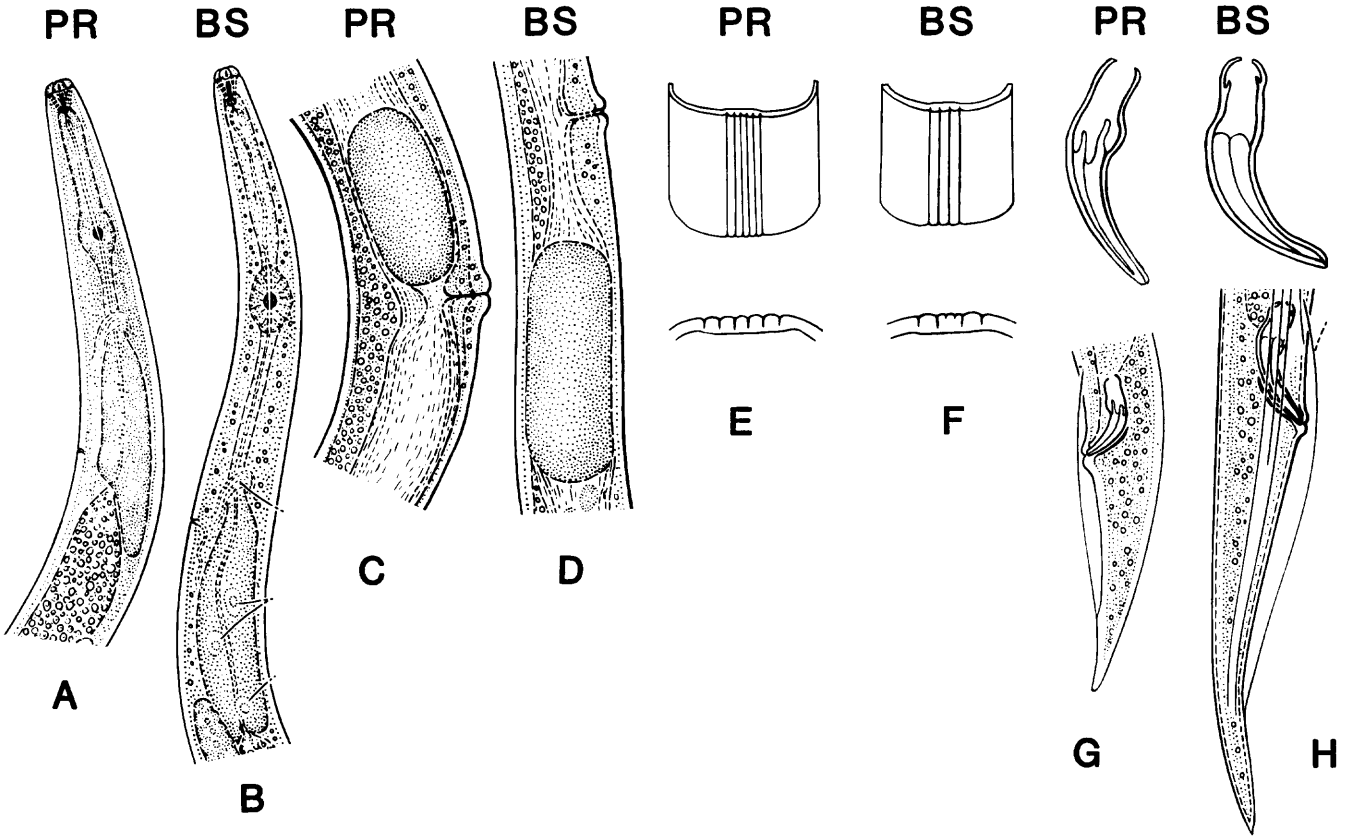

Fig. 2. Potato rot (PR) and bulb and stem (BS) nematodes compared. (A) Overlapping glands, (B) Non-overlapping glands, (C) Short egg, (D) Long Egg, (E) 6 lateral lines, (F) 4 lateral lines, (G) Spicule with ventral bulge, (H) Spicule without ventral bulge.

Diagnosis: Potato rot nematode closely resembles the bulb and stem nematode Ditylenchus dipsaci (Kuhn, 1857) Filipjev, 1936. Both pests attack a number of identical host plants so it is important to differentiate between the two pests. Fig. 2 shows morphological differences. Two biological differences also serve to differentiate the pests. Toward the end of a growing season, thousands of pre-adult bulb and stem nematode bodies aggregate, and form a wool-like mass on bulbs, tubers, or roots. Potato rot nematodes do not form such a mass, and do not produce a large build-up of pre-adults.

Detection: Potatoes exhibiting rot should be submitted to the Nematology Bureau for analysis.

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*Principal diagnostic characters

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