

A NEW RECORD OF PARASITIC NEMATODE *APHELENCHOIDES MACROSPICA* (APHELENCHIDA: APHELENCHOIDIDAE) FROM PAKISTAN

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خلاصہ

اس تحریری مقالہ میں *Aphelenchoides microspica* کی پہلی مرتبہ گاڈن سرائے ننگ ضلع کی مروت خیبر پختونخواہ سے سروے کے دوران کاغذی پھول *Bougainvillea spectabilis* پاکستان میں پہلی مرتبہ دریافت ہوا ہے۔ *A. microspica* نقصان دہ دودا کا تعلق خاندان *Aphelenchoididae* سے ہے۔ اسے گروپ 2 میں رکھا گیا ہے کیونکہ ایک طرف یا کبھی کبھی دو میکروویٹ ڈھانچے کے ساتھ دم کی وجہ سے، چار پس منظر کی لکیروں، دم ٹمنس شکل اور سپکول خصوصیات کی بنا پر اس کو وضاحت کے ساتھ اور تصویری خاکوں کے ساتھ پیش کیا گیا ہے۔

Abstract

This paper report *Aphelenchoides macrospica*, that is discover for the first time in Pakistan. During a survey from village Sarai Naurang, District Lakki Marwat, Khyber Pakhtunkhwa from their rhizosphere of paper flower *Bougainvillea spectabilis*. *A. macrospica* belonging to the family Aphelenchoididae, and placed within Group 2: because of tail with one or sometimes two mucronate structure, based on four lateral lines, tail terminus shape and spicule features. A new record of parasitic nematode is briefly described and illustrated herein.

Key words: Nematode, *Aphelenchoides macrospica*, Lakki Marwat, Khyber Pakhtoonkhaw

Introduction

Plant parasitic nematodes (PPNs) feed on almost all plant tissues but most species of PPNS feed on roots. The nematodes of the genus *Aphelenchoides* may represent a primitive type of nematode evolution, because of their ability to feed on both plants and fungi, with a very wide range of host compared to other plant pathogenic nematodes (Shurtleff & Averre, 2000). The order Aphelenchida is a moderately large order of nematodes that falls into four ecological groups namely fungivores, obligate insects parasites, predator but few are plant pathogens in the genera *Bursaphelenchus*, Fuchs, 1937 and *Aphelenchoides* Fischer, 1894 (Nickle, 1970), while most species of *Aphelenchoides* are widely distributed in the world and commonly found in soil, moss and decaying fruits, etc. Thirteen species of *Aphelenchoides* have been reported as plant parasitic of plants throughout the world (Sanchez-Monge *et al.*, 2015). From Pakistan, until now, 19 new and known species of the genus *Aphelenchoides* were reported from different agro-climatic regions. (Shahina *et al.*, 2019)

Materials and Methods

Nematodes were recovered from the soil of around feeding root zone of paper flower *Bougainvillea spectabilis* from the village Sarai Naurang (32° 49' 43" N; 70° 46' 33" E) District Lakki Marwat, Khyber Pakhtunkhwa Pakistan. The soil samples were processed through Cobb's sieving and decanting procedure (Cobb, 1918), followed by Baermann's funnel technique (Baermann, 1917). Heat killed nematodes were preserved in TAF (Tri-ethanol-amine Formaldehyde) containing 8% formalin and 2% Tri-ethanol-amine in distilled water. Permanent mounts were made in a tiny drop of pure glycerin and covered with a covered slip sealed by paraffin wax supported by a glass rod. In a little drop of pure glycerin, permanent mounting of nematodes was done. Subsequently, measurements were taken under de Man's (1884) formula. Using an ocular micrometer and diagrams were drawn under a Camera Lucida fitted with the compound microscope Nikon Eclipse E400. For photomicrographs, Ds-L2 camera was used.

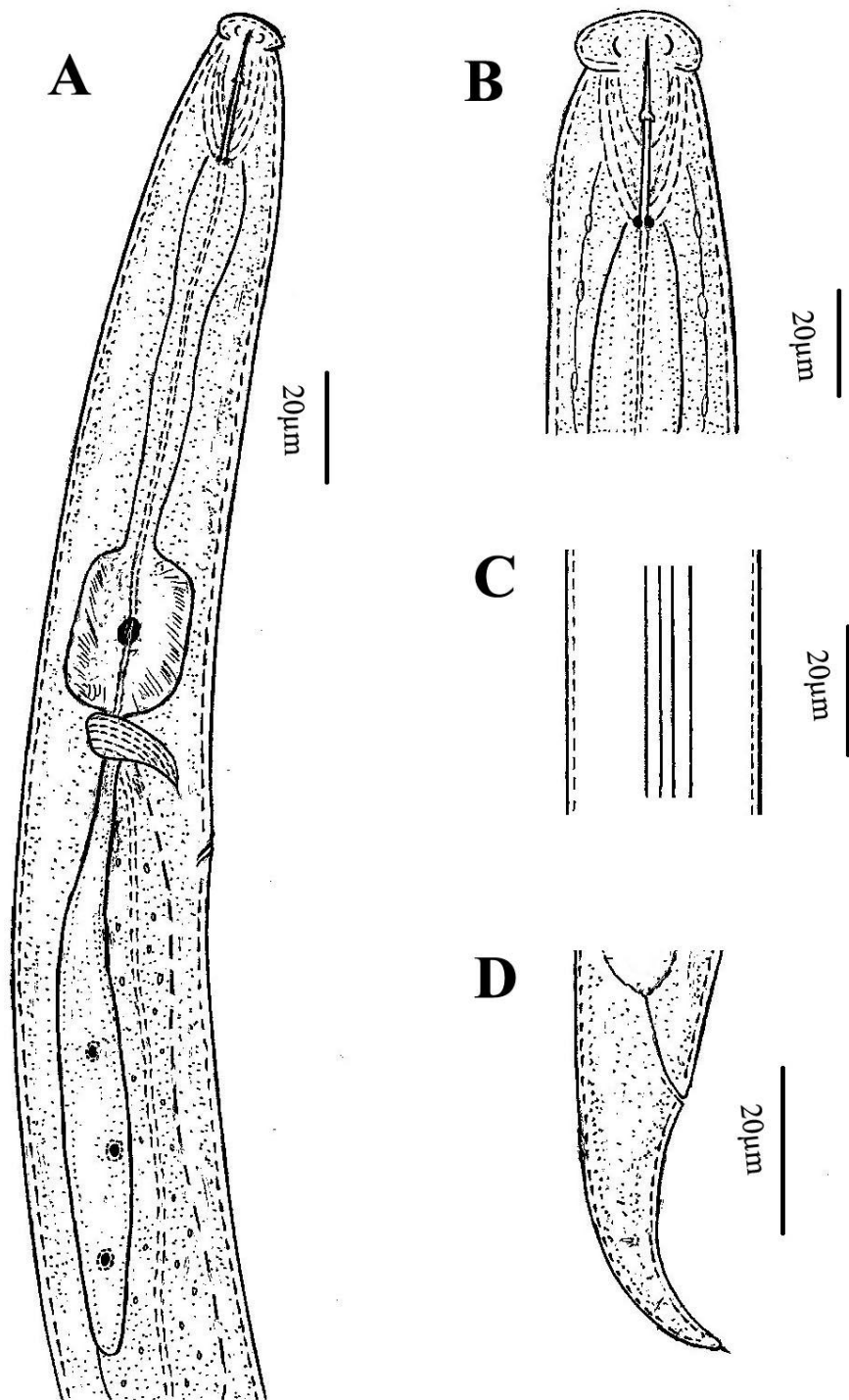


Fig. 1. *Aphelenchoides macrospica* Golhasan *et al.*, 2017. (Female A-D): A- Pharyngeal region; B- anterior region; C- lateral field showing lateral lines; D- Tail region.

Results and Discussion

Family: Aphelenchoididae (Skarbilovich, 1947) Paramonov, 1953
 Sub Family: Aphelenchoidinae Skarbilovich, 1947
 Genus: *Aphelenchoides* Fischer, 1894
A. macrospica Golhasan *et al.*, 2017

Description

Female: Head offset, rounded, 3-4 μm high and 6-7 μm in width (Figure B). Lateral field marked by 4 incisures (Fig. C). Lip region set off from head contour. Stylet 13-15 μm long with distinct knobs. Procorpus cylindrical, 50-60 μm long and 5-8 μm wide leading into a centrally placed round shaped metacarpus, 15-20 μm long and 10-15 μm wide and placed at the level of 55-70 μm from head region. Pharynx 100-120 μm long. Hemizonid invisible. Nerve ring placed at a level of 80-100 μm from head. Excretory pore situated behind the nerve ring. Excretory pore measuring from head about 90-1120 μm (Figure A). Dorsally located oesophageal gland present. Vulva 65-75% posterior. Ovary outstretched about 180-275 μm long. Oviduct includes spermatheca, is packed with disc like sperms in a single row. Vulva-anus distance is about 165-230 μm . Post uterine sac present about 20-30 μm long. Tail tapering uniformly to an abruptly conoid, acute terminus, 45-60 μm long with short mucro (Figure D).

Male: Medium size nematode 750-900 μm long, slender body when heat killed. Cuticle with fine transverse annulations about 1-2 μm at mid body. Lateral field consist of four incisures. Lip region hemispherical, set off from the body, 3-4 μm high and 6-7 μm in width. Stylet 13-15 μm long with prominent basal knobs. Procorpus cylindrical, metacarpus rounded to oval with conspicuous valve plates. Nerve ring is posterior to metacarpus. Pharynx 80-120 μm long, pharyngeal gland lobe slender. Excretory pore situated to posterior to the median bulb; hemizonid invisible. Testis single, anteriorly outstretched, locating left of intestine. Spicules paired and very robust, rosethorn-shaped 28-32 μm long. Bursa and gubernaculum absent. Three pairs of subventral caudal papillae present. Tail conoid, slightly ventrally arcuate, 55-60 μm long. Tail terminus with a simple mucron.

Measurements

Female (n = 5): L= 700-950 (850 \pm 85); a = 20-32 (29 \pm 3.2); b = 8-11 (10 \pm 1.5); b' = 4-5 (4.5 \pm 0.3); c = 15-18 (16 \pm 1.5); c' = 3.0-3.5 (3.2 \pm 0.2); V% = 65-75 (\pm); Stylet = 13-15 μm (14.5 \pm 0.6); TL= 45-60 μm (55 \pm 4.0).

Male (n = 5): L= 750-900 (850 \pm 54); a = 25-30 (26 \pm 2.4); b = 8-10 (9.2 \pm 1.5); b' = 4-5 (4.3 \pm 0.3); c = 15-17 (15.5 \pm 2.3); c' = 2-3 (2.7 \pm 0.3); Stylet = 13-15 μm ; (15 \pm 0.3), TL= 55-60 μm (57 \pm 4.7).

The morphological and morphometric characters of this species correspond well to the description given by Golhasan *et al.*, 2017 with slight variation in female stylet 13-15 vs 15-16 μm , Pharynx 100-120 vs 83-100 μm and tail 45-60 vs 52-63 μm . Current species slightly differ from male in size 750-900 vs 807-963 μm , in b ratio 8-10 vs 9-10 and Stylet 13-15 vs 14.5-16 μm .

Conclusion

Species of the genus *Aphelenchoides* occur in soil, decaying plant residues, moss, and on the surfaces of rocks and trees. Many of the species are mycophagous but a few have importance as ecto- and endoparasites of plants. The major plant-parasitic species include *A. besseyi* Christie, 1942, *A. fragariae* (Ritzema Bos, 1890) Christie, 1932 and *A. ritzemabosi* (Schwartz, 1911) Steiner & Buhner, 1932, parasitising rice, strawberry, ornamental and other plants (Golhasan *et al.*, 2016). *Aphelenchoides macrospica* was first reported by Golhasan *et al.*, 2017 from soil associated with the rhizosphere of rose plants in Hasanlou old hill, northwestern Iran and now it is reported first time from the village Sarai Naurang of District Lakki Marwat, KPK Pakistan from paper flower *Bougainvillea spectabilis*.

References

- Alcides S., Lorena F., Luis S., Sue H. & Wim B. (2014). An updated list of the plants associated with plant-parasitic *Aphelenchoides* (Nematoda: Aphelenchoididae) and its implications for plant-parasitism within this genus. *Zootaxa* (2): 207-224.
- Baermann, G. (1917). Eine einfache Methode zur Auffindung von *Ankylostomum* (Nematoden) Larven in Erdproben. *Geneesk.Tijdschr. Ned. Ind.*, 57: 131-137.
- Christie, J. R. (1932). Recent observations on the strawberry dwarf nematode in Massachusetts. *Plant Disease Reporter* 16:113-114.
- Christie, J. R. (1942). A description of *Aphelenchoides besseyi* n.sp., the summer-dwarf nematode on strawberries, with comments on the identity of *Aphelenchoides subtenuis* (Cobb, 1926) and *Aphelenchoides hodsoni* Goodey, 1935. *Proceedings of the Helminthological Society of Washington* 9:82-84.
- Golhasan, B., Ramin H., Mehrab E., and Esmail M. (2017). Description of *Aphelenchoides macrospica* n. sp. (Nematoda: Aphelenchoididae) from Northwestern Iran. *Journal of Nematology* 49(1):67-76.
- Cobb, N.A. (1918). Estimating the nema population of soil. *Agric.Tech.Circ.USD epofAgric*, I: 48pp.
- De Man, G. (1884). Diefrei in der reinen Erde und in süssen Wasser lebenden Nematoden der niederländischen Fauna-Einesystematische-faunistische Monographie, Leiden, *The Netherlands*, 206 pp.
- Fischer M. (1894). "Übereine Clematis-Krankheit. Ber. Physiol. Lab. *Landw. Inst. Halle* 3 (11): 1-11.
- Fuchs, A. G. (1937). Neue parasitische und halbparasitische Nematoden bei Borken käfern und einige andere Nematoden. I. Teil die Parasiten der Waldgartner Myelophiluspiniperda L. und minor Hartig und die Genera *Rhabditis* Dujardin, 1845 und *Aphelenchus* Bastian, 1865. *Zool. Jahrb. Abteil. Syst. Oek. Geogr.*, 70: 291 - 380
- Geraert, E. (1966). Systematic position of families Tylenchulidae and Criconeematidae. *Nematologica*, 12: 362-368.
- Golhasan, B., Ramin H., Sergio O., Mehrab E., Pablo C. and Juan E. P. (2016). *Aphelenchoides iranicus* n. sp. (Nematoda: Aphelenchoididae) from West Azerbaijan province, Iran. *Nematology*, 18:973-985.
- Nickle W. R. (1970). A taxonomic review of the genera of the Aphelenchoidea (Fuchs, 1937) Thorne, 1949 (Nematoda: Tylenchida). *Journal of Nematology*, 2:375-392.
- Paramonov, A.A. (1953). [A revision of the super family Aphelenchoidea Fuchs, 1937 (Nematoda: Tylenchata)]. In: *Papers on Helminthology presented to Academician K.I. Skryabin for his 75th birthday. Izdat'stvo Akad. Nauk. SSSR, Moskva*: 488-496. [in Russian]
- Ritzema-Bos, J. (1891). Zweie neue Nematodenkrankheiten der Erdbeerpflanzen. *Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz*, 1:1-16.
- Shurtleff, M.C. and Awerre, C.W.III (2000). *Diagnosing Plant and Insects*, 2nd edn. CAB International, Wallingford, UK.
- Sanchez, M., A., Flores, L., Salazar, L., Hockland, S., and Bert, W. (2015). An updated list of the plants associated with plant-parasitic *Aphelenchoides* (Nematoda: Aphelenchoididae) and its implications for plant-parasitism within this genus. *Zootaxa* 4013(2):207-224.
- Shahina, F., Nasira, K., Firoza, K. and Erum, Y. I. (2019). Overview of the nematode fauna of Pakistan. *Journal of Nematology* 37 (2): 171-243.
- Siddiqi, M. R. (1980). The origin and phylogeny of the nematode orders Tylenchida Thorne, 1949 and Aphelenchida n. ord. *Helminthological Abstracts*, Series B. 49: 143-170.
- Skarbilovich, T. S. (1947). Revision of the systematics of the family Anguillulidae Baylis and Daubney, 1962. *Doklady Akademii Nauk SSSR* 57:307-308.
- Steiner, G., and Buhrer, E. M. (1932). Miscellaneous notes on nematode diseases. *Plant Disease Reporter*, 16:137.
- Thorne, G. (1949). On the classification of the Tylenchida, new order (Nematoda: Phasmida). *Proc. Helminth. Soc. Wash.*, 16: 37-73