

THREE TRICHODORIDAE FROM FRENCH GUIANA AND MARTINIQUE (NEMATODA: DIPHTHEROPHORINA)

Mariette Marais,¹ Wilfrida Decraemer,² and Patrick Quénéhervé³

National Collection of Nematodes, Biosystematics Division, ARC-Plant Protection Research Institute, Private Bag X 134, Pretoria 0001, South Africa,¹ Koninklijk Belgisch Instituut voor Natuurwetenschappen, Department of Invertebrates, 29 Vautier Street, B-1040 Brussels, Belgium,² and Nematology Unit ORSTOM-INRA, Centre ORSTOM, BP 8006, 97259 Fort de France Cedex, Martinique (F.W.I.).³

ABSTRACT

Marais, M., W. Decraemer, and P. Quénéhervé. 1996. Three Trichodoridae from French Guiana and Martinique (Nematoda: Diphtherophorina). *Nematropica* 26:121-128.

Paratrichodorus caribbensis n. sp. from a primary rain forest in Martinique is described and illustrated. The new species, known from the female only, is characterized by a medium-sized onchiostyle (37-41 µm), the far posterior position of the vulva (V = 60-64%), comma-shaped vaginal sclerotizations and the absence of caudal pores. Morphometric data is given for *Allotrichodorus westindicus* (Rodríguez-Montessoro *et al.*, 1978) Rashid *et al.*, 1986 from French Guiana and *Monotrichodorus sacchari* Baujard and Germani, 1985 from French Guiana and Martinique.

Key words: *Allotrichodorus*, French Guiana, geographic distribution, Martinique, *Monotrichodorus*, nematodes, *Paratrichodorus*, taxonomy.

RESUMEN

Marais, M., W. Decraemer y P. Quénéhervé. 1996. Tres Trichodoridae de Guyana Francesa y Martinica (Nematoda: Diphtherophorina). *Nematropica* 26:121-128.

Paratrichodorus caribbensis n. sp. proveniente de un bosque tropical primario en Martinica es descrito e ilustrado. La nueva especie, conocida solo de la hembra, es caracterizada por un estilete de tamaño mediano (37-41 µm), la posición posterior lejana de la vulva (V = 60-64%), las esclerotizaciones vaginales en forma de coma y la ausencia de poros de caudal. Datos morfométricos son presentados para *Allotrichodorus westindicus* (Rodríguez-Montessoro *et al.*, 1978) Rashid *et al.*, 1986 de Guyana Francesa y *Monotrichodorus sacchari* Baujard y Germani, 1985 de Guyana Francesa y Martinica.

Palabras clave: *Allotrichodorus*, distribución geográfica, Guyana Francesa, Martinica, *Monotrichodorus*, nematodos, *Paratrichodorus*, taxonomía.

INTRODUCTION

During nematode surveys of plants in French Guiana and Martinique, several habitats including primary rain forests, grasses, fruit trees and flower plantations were sampled. Specimens belonging to an undescribed species of *Paratrichodorus* were found and are described. Morphometric data are given for *Allotrichodorus westindicus* (Rodríguez-Montessoro *et al.*, 1978) Rashid

et al., 1986 and *Monotrichodorus sacchari* Baujard and Germani, 1985. Only four species of the family Trichodoridae have been previously reported from French Guiana and Martinique: *M. sacchari* from French Guiana, and *A. westindicus*, *Paratrichodorus anthurii* Baujard and Germani, 1985 and *Trichodorus cedarus* Yokoo, 1964 from Martinique (Baujard and Germani, 1985; Cadet and Van den Berg, 1992). The latter species was detected in the rhizosphere of a

Pinus pentophylla bonsai imported from Japan.

MATERIALS AND METHODS

The nematodes were extracted from the soil by the modified elutriation process of Seinhorst (1962), killed in water by gradual application of heat, preserved in TAF and mounted in anhydrous glycerine (Southey, 1986; Hooper and Evans, 1993).

SYSTEMATICS

Family Trichodoridae Thorne, 1935

Genus *Paratrichodorus* Siddiqi, 1974

Paratrichodorus caribbensis n. sp.

(Fig. 1 A-C; Table 1)

Description

Females: Body straight, cigar-shaped after fixation. Cuticle strongly swollen, 4.1 ± 1.0 (3-6) μm thick. Lip region with distinct labial papillae. Nerve ring at level of isthmus near base of onchiostyle. Secretory-excretory pore (EP) at 105 ± 8.2 (94-118) μm from the anterior end of body, usually just anterior or posterior to the pharyngo-intestinal junction. Pharyngeal bulb length about one third of the total pharynx length. Five pharyngeal gland nuclei present. Six females with a ventral pharyngeal overlap of 3 ± 1.1 (1-5) μm . No spermatheca seen. Vulval sclerotization comma-shaped in lateral view. Vulva a short transverse slit, 2.7 ± 0.2 (3-4) μm long in ventral view. No lateral body pores observed. Posterior body region conoid-rounded. Anus subterminal. No caudal pores seen.

Males: Not found.

Juvenile (third stage): (n = 1) Resembles adult female in most characters. Onchiostyle 34.5 μm long, with a 15.8 μm -long replacement onchium. Genital primordium 31.6 μm long.

Type specimens

Holotype female (slide 29226), twenty-four paratype females and one juvenile (slides 29226-29231 and 29504) deposited in the National Collection of Nematodes, Biosystematics Division, Plant Protection Research Institute, Pretoria, South Africa. Four paratype females deposited in the Muséum National d'Histoire Naturelle, Paris, France and three females (slide RIT 481) deposited at the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium.

Type host and locality

Specimens collected during January 1994 by P. Quénéhervé from a primary rain forest near Reculée (sample 9589), Martinique (4°55'N, 52°15'W).

Etymology: The new species is named after the Caribbean Islands.

DIAGNOSIS

Paratrichodorus caribbensis n. sp. can be separated from all species in the genus by the combination of the following characters: onchiostyle length, posterior position of secretory-excretory pore, posterior position of vulva, comma-shaped vaginal sclerotizations, and absence of caudal pores and males.

The new species resembles five other species (Table 2) of the genus by having a transverse slit-like vulva and caudal pores absent. The species include *Paratrichodorus acutus* (Bird, 1967) Siddiqi, 1974, *P. anthurii* Baujard and Germani, 1985 and *P. renifer* Siddiqi, 1974, with males unknown, and *P. minor* (Colbran, 1956) Siddiqi, 1974, and *P. nanus* (Allen, 1957) Siddiqi, 1974, with males usually rare. *P. caribbensis* n. sp. differs from *P. acutus* in pharynx length (87-123 μm vs 66-102 μm), onchiostyle length (37-41 μm vs 18-34 μm), position of EP

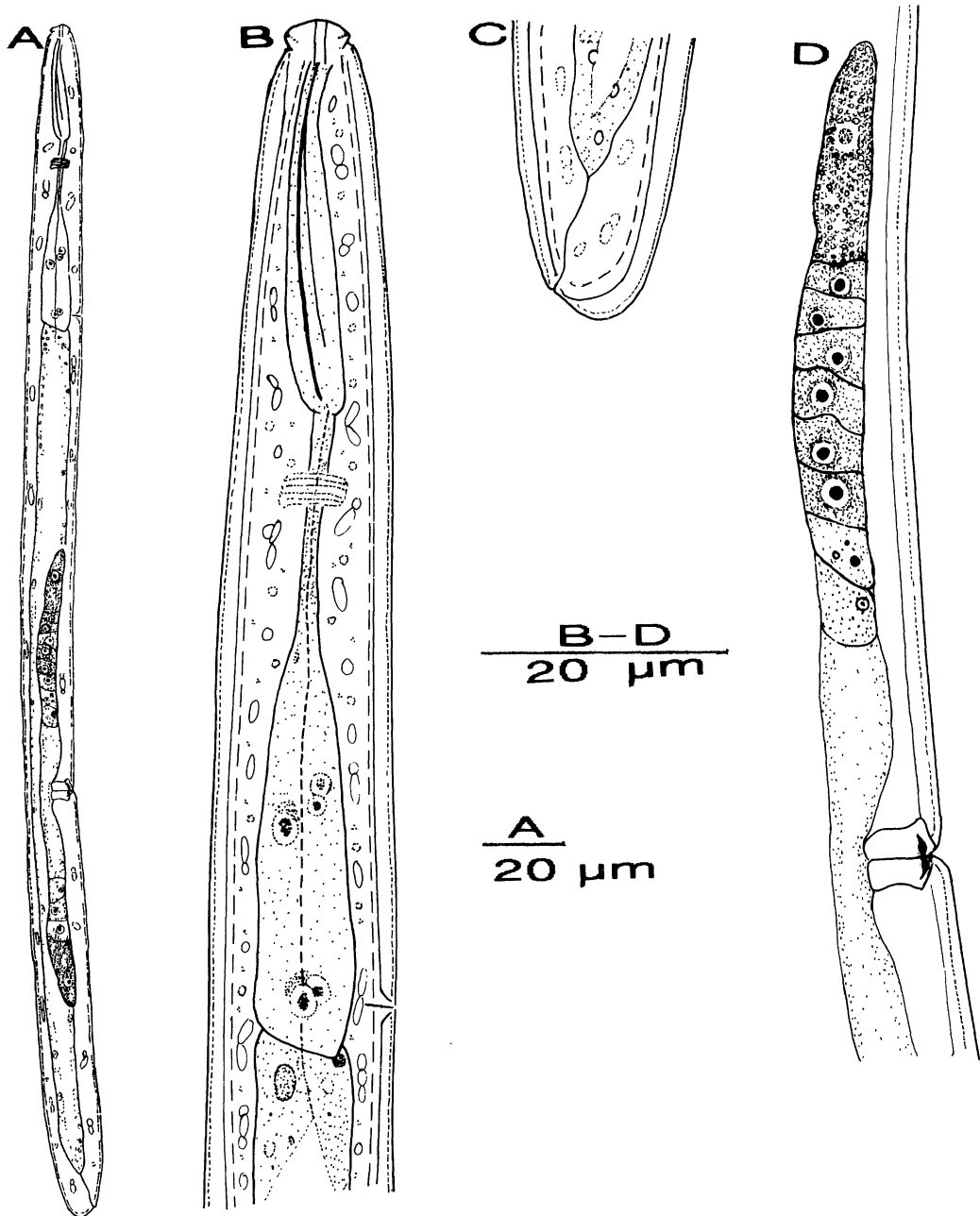


Fig. 1. A-D. *Paratrichodorus caribbensis* n. sp. holotype female. A) Entire female. B) Anterior body region. C) Tail region. D) Anterior branch of reproductive system.

Table 1. Morphometric characters of *Paratrichodorus caribbensis* n. sp.¹

Character	Holotype female	Paratype females (n = 25)
L	509	503 ± 45.4 (403-576)
Body width	25	26 ± 3.0 (21-34)
Onchiostyle length	39	39 ± 1.3 (37-41)
Pharynx length	114	106 ± 9.1 (87-123)
Anterior genital branch length	91	111 ± 11.1 (91-125)
Posterior genital branch length	71	78 ± 8.7 (65-91)
a	20.4	19.2 ± 1.8 (16.6-22.8)
b	4.5	4.8 ± 0.6 (3.5-6.4)
V	62	62 ± 1.2 (60-64)
G1	18	21 ± 4.2 (18-32)
Anterior end to EP/Pharynx length (%)	95	96 ± 5.0 (87-105)
Onchiostyle length/Pharynx length (%)	34	36 ± 2.9 (32-45)
Vagina length	9	11 ± 1.0 (9-12)
Vagina length/Body width (%)	36	39 ± 3.2 (36-46)

¹All measurements in μm and are means \pm SE, with ranges in parentheses.

(94-118 μm vs 45-108 μm), position of vulva (V = 60-64 vs V = 47-58), vagina length (8.9-12 μm vs 6-8.5 μm) and shape of the vaginal sclerotizations (comma-shaped vs bold dots). *P. caribbensis* n. sp. differs from *P. anthurii* as follows: smaller body width (21-34 μm vs 38-44 μm), longer onchiostyle (37-41 μm vs 28-31 μm), more posterior position of vulva (V = 60-64 vs V = 54-58) and different shape of vaginal sclerotizations (comma-shaped vs triangular). *P. caribbensis* n. sp. differs from *P. nanus* as follows: longer onchiostyle (37-41 μm vs 21-26.5 μm), more posterior position of vulva (V = 60-64 vs V = 49-56) and different shape of vaginal sclerotizations (comma-shaped vs rounded-triangular). *P. caribbensis* n. sp. differs from *P. minor* and *P. renifer* in shape of vaginal sclerotizations (comma-shaped vs rod-shaped and reniform, respectively).

Allotrichodorus westindicus
(Rodriguez-Montessoro,
Sher and Siddiqi, 1978)

Rashid, De Waele and Coomans, 1986

A nematode population collected from the rhizosphere of the tropical fruit tree *Durio zibethinus* L. near Roura (sample 9927), French Guiana, was identified as *Allotrichodorus westindicus*. The population agrees with the type population from Trinidad (Rodriguez-Montessoro *et al.*, 1978) but differs in onchiostyle length (39-42 μm vs 32-37 μm) and in the position of the secretory-excretory pore (101-112 μm vs 98 μm). The EP is also further posteriad compared with a population from Brazil (101-112 μm vs 79-102 μm) (Rashid *et al.*, 1985). Specimens also resemble a population from Martinique (Baujard and Germani,

Table 2. Comparison of characters of *Paratrichodoris caribbensis* with selected species.¹

Character	<i>P. caribbensis</i>	<i>P. acutus</i> ²	<i>P. anthurii</i> ³	<i>P. minor</i> ⁴	<i>P. nanus</i> ⁵	<i>P. renifer</i> ⁶
L	503 (403-576)	338-711	460 (380-530)	440-1530	430-600	413-608
Body width	26 (21-34)	19-36	40 (38-44) ⁷	—	—	—
Pharynx length	106 (87-123)	66-102	—	—	120-148	—
Onchiostyle length	39 (37-41)	18-34	30 (28-31)	26-47	21-26.5	28-40
Anterior end to EP	105 (94-118)	45-108	92 (81-106)	—	—	57.6-108
V	62 (60-64)	47-58	57 (54-58)	50-64	49-56	52.3-67
Vaginal sclerotizations in lateral view	comma-shaped	bold dots	triangular	rod-shaped	rounded-triangular	reniform
Males	unknown	unknown	unknown	rare	rare	unknown

¹All measurements in μm and are means \pm S.E., with ranges in parentheses.

²*P. acutus* - Bird, 1967; De Waele et al., 1990; López and Vilchez, 1991; *P. anthurii* - Baujard and Germani, 1985; *P. minor* - Decraemer, 1991; *P. nanus* - Allen, 1957; Siddiqi, 1963; Baujard, 1983; *P. renifer* - Siddiqi, 1974; Braasch and Sturhan, 1991; Nasira and Maqbool, 1994; Ye, 1994.

³Calculated from paratypes.

Table 3. Morphometric data of *Allotrichodoros westindicus* from French Guiana.¹

Character	Females (n=12)
L	489 ± 43.3 (435-594)
Body width	24 ± 2.2 (21-29)
Pharynx length	109 ± 6.6 (95-116)
Onchiostyle length	40 ± 0.9 (39-42)
Anterior end to EP	108 ± 4.8 (101-112)
Anterior genital branch	107 ± 10.6 (91-123)
Tail length	6.8 ± 1.0 (6-9)
a	19.7 ± 2.0 (16.6-23.4)
b	4.2 ± 0.7 (2.3-4.6)
c	72.1 ± 11.3 (50.4-90.2)
V	65 ± 1.7 (60-67)
G1	22 ± 2.0 (19-25)
Anterior end to EP/Pharynx length (%)	99 ± 7.9 (87-107)
Onchiostyle length/Pharynx length (%)	37 ± 2.2 (34-41)
Vagina length	8 ± 1.5 (6.5-11.1)
Vagina length/Body width (%)	33 ± 28-41)
Cuticle thickness	1.2 ± 0.6 (1-3)

¹All measurements in μm and are means \pm S.E., with ranges in parentheses.

1985) but differ in body length (435-594 μm vs 380-420 μm) and onchiostyle length (39-42 μm vs 34-35). Measurements are given in Table 3.

Monotrichodoros sacchari
Baujard and Germani, 1985

Nematode populations collected from *Anthurium andreaeanum* Hart. in Bols Lezard (sample 6431), Martinique, from the rhizosphere of grasses in Cayenne, (sample 9961) and St Laurent du Maroni (sample 9932) and also from a primary rain forest in the rhizosphere of *Dicorynia guianensis* Amshoff near Paracou (sample 9949), French Guiana were identified as *Monotrichodoros sacchari* (Table 4). The specimens agree well with the original description of

M. sacchari but differ in males in body length (613-1003 μm vs 530-800 μm), position of ventromedian cervical papilla (86-122 μm vs 68-82 μm), position of secretory-excretory pore (92-116 μm vs 74-88 μm), onchiostyle length (56-66 μm vs 52-61 μm), gubernaculum length (8-12 μm vs 12-18 μm) and the distance between ventromedian supplements, SP1 and SP2 (19-41 μm vs 19-29 μm). The females differ in position of secretory-excretory pore (91-105 μm vs 74-88 μm) and length of onchiostyle (56-65 μm vs 53-59 μm).

ACKNOWLEDGMENTS

We thank Mrs. M. Bereau from the INRA forest station in Kourou for making the survey at Paracou possible, P. Topart

Table 4. Morphometric characters of *Monotrichodorus sacchari* from French Guiana and Martinique.¹

Character	Males (n=50)	Females (n=50)
L	775 ± 67.9 (613-1003)	719 ± 54.1 (609-851)
Body width	40 ± 5.3 (26-50)	40 ± 4.4 (32-52)
Pharynx length	167 ± 11.4 (141-191)	163 ± 11.6 (141-191)
Onchiostyle length	60 ± 2.8 (56-66)	60 ± 2.3 (56-65)
Anterior end to EP	103 ± 6.8 (92-116)	98 ± 3.9 (91-105)
Anterior end to CP1	99 ± 7.3 (86-122)	—
Anterior end to LP	106 ± 7.6 (93-124)	—
Anterior lateral body pore (distance from vagina)	—	28 ± 12.2 (5-59)
Posterior lateral body pore (n=1) (distance from vagina)	—	12
Anterior genital branch length	—	282 ± 68.8 (207-463)
Posterior genital branch length	—	21 ± 8.0 (10-34)
Spicule length	56 ± 2.9 (49-63)	—
Gubernaculum length	10 ± 1.2 (8-12)	—
Cloaca to SP1	11 ± 1.4 (8-15)	—
SP1 to SP2	30 ± 4.5 (19-41)	—
SP2 to SP3	36 ± 4.5 (22-46)	—
SP3 to SP4 (n=1)	32	—
Tail length	11 ± 1.9 (7-14)	—
Cuticle thickness	3.6 ± 0.7 (3-5)	3.7 ± 0.9 (2-6)
a	19.6 ± 2.6 (15.6-27.6)	17.9 ± 2.0 (13.7-23.4)
b	4.7 ± 0.4 (4.0-5.9)	4.4 ± 0.4 (3.6-5.7)
c	73.1 ± 13.5 (50.5-112.4)	—
V	—	82 ± 2.2 (78-91)
G1	—	39 ± 7.7 (31-62)
G2	—	3 ± 1.0 (1-5)
T	63 ± 6.4 (44-71)	—
Anterior end to EP/Pharynx length (%)	63 ± 4.8 (54-76)	59 ± 5.8 (51-74)
Onchiostyle length/Pharynx length (%)	36 ± 3.1 (31-42)	37 ± 2.8 (32-42)
Vagina length	—	24 ± 3.9 (16-32)
Vagina length/Body width (%)	—	64 ± 10.3 (40-86)
Cloaca to SP1/Spicule length (%)	19 ± 2.7 (12-27)	—
Cloaca to SP2/Spicule length (%)	74 ± 10.3 (53-95)	—
Cloaca to SP3/Spicule length (%)	138 ± 16.2 (114-172)	—
Cloaca to SP4/Spicule length (%)	150	—

¹All measurements in µm and are means ± S.E., with ranges in parentheses.

from ORSTOM for collecting some of the specimens, Mrs. N.H. Buckley (ARC-PPRI) and S. Marie-Luce (ORSTOM) for technical assistance, Dr. P. Baujard (Muséum National d'Histoire Naturelle), Dr. S. L. Gardner (University of California, Davis), Dr. M. Mundo-Ocampo (University of California, Riverside), Miss J. Sheldon and Miss J. Ashurst (International Institute of Parasitology) for the loan of *A. wesfindicus*, *M. sacchari* and *P. anthurii* paratypes.

LITERATURE CITED

- ALLEN, M. W. 1957. A review of the nematode genus *Trichodorus* with descriptions of ten new species. *Nematologica* 2:32-62.
- BAUJARD, P. 1983. Observations sur les Trichodoridae Thorne, 1935 (Nematoda) de l'Afrique de l'Quest. *Revue de Nématologie* 6:223-228.
- BAUJARD, P., and G. GERMANI. 1985. Description de *Monotrichodorus sacchari* n. sp., *Paratrichodorus anthurii* n. sp. et d'une population de *Paratrichodorus westindicus* Rodriguez-M., Sher & Siddiqi, 1978. *Revue de Nématologie* 8:35-39.
- BIRD, G. W. 1967. *Trichodorus acutus* n. sp. (Nematoda: Diphtherophoroidea) and a discussion of allometry. *Canadian Journal of Zoology* 45:1201-1204.
- BRAASCH, H., and D. STURHAN. 1991. Zum Vorkommen von *Paratrichodorus renifer* Siddiqi, 1974 und *P. minor* (Colbran, 1956) in Europa. *Nachrichtenblatt. Deutschen Pflanzenschutzdienst (Stuttgart)* 43:113-115.
- CADET, P., and E. VAN DEN BERG. 1992. Les nematodes phytoparasites de la montagne Pelee a la Martinique. *Compte-rendu des Seances de la Societe de Biogeographie* 68:69-104.
- COLBRAN, R. C. 1956. Studies of plant and soil nematodes. I. Two new species from Queensland. Queensland Department of Agriculture and Stock. Division of Plant Industry Bulletin No 94.
- DECRAEMER, W. 1991. Stubby root and virus vector nematodes. *Trichodorus*, *Paratrichodorus*, *Allotrichodorus* and *Monotrichodorus*. Pp. 587-625 in W. R. Nickle, ed. *Manual of Agricultural Nematology*. Marcel Dekker, New York, NY, U.S.A.
- DE WAELE, D., A. J. MEYER, and A. P. VAN MIEGHEM. 1990. *Trichodorus philipi* n. sp. from South Africa, with notes on *Paratrichodorus lobatus* and *P. acutus*. *Journal of Nematology* 22:200-206.
- HOOOPER D. J., and K. EVANS. 1993. Extraction, identification and control of plant parasitic nematodes. Pp. 1-59 in K. Evans, D. L. Trudgill and J. M. Webster, eds. *Plant Parasitic Nematodes in Temperate Agriculture*. CAB International, Wallingford, U.K.
- LOPEZ, R., and H. VILCHEZ. 1991. *Paratrichodorus acutus* (Nemata: Trichodoridae) asociado al helecho de cuero (*Rumohra adiantiformis*) en Costa Rica. *Agronomia Costarricense* 15:193-195.
- NASIRA, K., and M. A. MAQBOOL. 1994. Two new species of *Paratrichodorus* Siddiqi, 1974 (Nematoda: Trichodoridae) with observations on *P. mirzai* (Siddiqi, 1960) Siddiqi, 1974 and *P. renifer* Siddiqi, 1974 from Pakistan. *Fundamental and Applied Nematology* 17:323-332.
- RASHID, F., D. DE WAELE, and A. COOMANS. 1985. Trichodoridae (Nematoda) from Brazil. *Nematologica* 31:289-320.
- RODRIGUEZ-MONTESSORO, R., S. A. SHER, and M. R. SIDDIQI. 1978. Systematics of the monodelphic species of Trichodoridae (Nematoda: Diphtherophorina) with descriptions of a new genus and four new species. *Journal of Nematology* 10:141-152.
- SEINHORST, J. W. 1962. Modifications of the elutriation method for extracting nematodes from soil. *Nematologica* 8:117-128.
- SIDDIQI, M. R. 1963. *Trichodorus* spp. (Nematoda: Trichodoridae) from Tunisia and Nicaragua. *Nematologica* 9:69-75.
- SIDDIQI, M. R. 1974. Systematics of the genus *Trichodorus* Cobb, 1913 (Nematoda: Dorylaimida), with descriptions of three new species. *Nematologica* 19:259-278.
- SOUTHEY, J. F. 1986. *Laboratory Methods for Work with Plant and Soil Nematodes*. Ministry of Agriculture, Fisheries and Food, Reference Book 402. Her Majesty's Stationary Office, London, U.K.
- YE, W. 1994. *Paratrichodorus renifer* Siddiqi, 1974 found in China associated with imported azalea. *Afro-Asian Journal of Nematology* 4:112-113.
- YOKOO, T. 1964. On the stubby root nematodes from the Western Japan. *Agricultural Bulletin of Saga University* 20:57-62.

Received:

23.II.1996

Accepted for publication:

14.VII.1996

Recibido:

Aceptado para publicación: