

## Description of *Longidorus crataegi* sp. n. from Portugal and observations on *L. vineacola* Sturhan & Weischer (Nematoda : Longidoridae)

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**Summary** – Two *Longidorus* species were found during a sampling carried out in Portugal : *L. crataegi* sp. n. and *L. vineacola* Sturhan & Weischer, 1964. *L. crataegi* sp. n. found at Casal dos Cabelos, Sobral de Monte Agraço, Lisboa, in the rhizosphere of *Crataegus oxyacantha* L., is described and figured. It closely resembles *L. goodeyi* Hooper, 1961 from which it differs mainly in the presence of males and shape of amphidial pouches. *L. vineacola* found at Tapada, Bragança, in the rhizosphere of hop and at Herdade Do Carvalhal, Constancia, Santarem in the rhizosphere of grapevine, represents a new record for Portugal.

**Résumé** – Description de *Longidorus crataegi* sp. n. et observations sur *L. vineacola* Sturhan & Weischer au Portugal (Nematoda : Longidoridae) – Une enquête conduite au Portugal a révélé la présence de deux espèces de *Longidorus* : *L. crataegi* sp. n. et *L. vineacola* Sturhan & Weischer, 1964. *L. crataegi* sp. n., récolté à Casal dos Cabelos, Sobral de Monte Agraço, Lisboa, dans la rhizosphère de *Crataegus oxyacantha* L., est décrit et figuré. Cette nouvelle espèce est proche de *L. goodeyi* Hooper, 1961 dont elle se distingue par la présence de mâles et la forme des poches amphidiennes. *L. vineacola*, récolté dans la rhizosphère de houblon à Tapada, Bragança, et dans un vignoble à Herdade do Carvalhal, Constancia, Santarem, est signalé pour la première fois au Portugal.

**Key-words** : *Longidorus*, nematodes, Portugal, taxonomy.

The presence of *Longidorus* species in Portugal was first reported by Harrison (*in* Lima, 1962), in a vineyard, at Dois Portos. The species then was not described at the time but thirty years later, *L. vinearum* Bravo & Roca, 1995 was found at the same locality and on the same host. This first report was also mentioned by Macara (1963) who described then two new species : *L. lusitanicus* Macara, 1985 and *L. nevesi* Macara, 1985. Pereira (1989) reported the occurrence and distribution of *L. macrosoma* Hooper, 1961 and *L. profundorum* Hooper, 1966 in Portugal, besides *Paralongidorus maximus* (Bütschli, 1874) Siddiqi, 1964, first reported by Macara (1982), and the two species previously originally described by the last author. Subsequently three new species were described from Portugal : *L. alvegus* Roca, Pereira & Lamberti, 1989, *L. reisi* Roca & Bravo, 1993, and *L. vinearum*.

To give further information on the presence in Portugal of the species belonging to the genus, this paper reports the description of a new species, named *Longidorus crataegi* sp. n., and the occurrence of *L. vineacola* Sturhan & Weischer, 1964 which represents a new record for Portugal.

Nematodes were extracted from soil samples by the Cobb wet sieve technique, killed and fixed in 5 % hot formaldehyde solution, processed by the glycerol-ethanol method of Seinhorst, and mounted in glycerin on

Cobb slides. The specimens were measured with the aid of a camera lucida.

### *Longidorus crataegi* sp. n.

(Fig. 1)

#### MEASUREMENTS

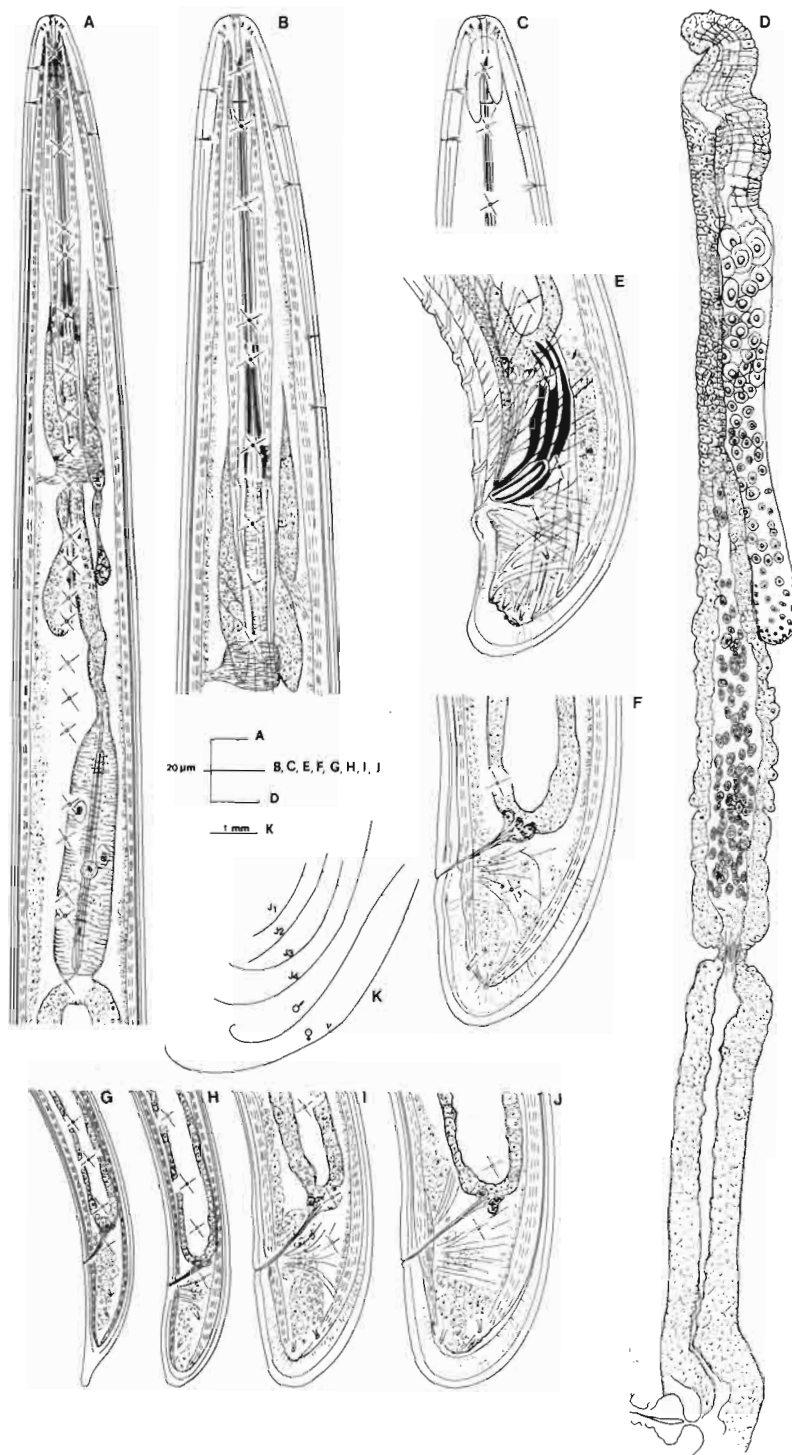
Holotype, females, males and juveniles : see Table 1.

#### DESCRIPTION

*Female* : Habitus almost straight anteriorly and more curved behind the vulva, J shaped or forming an open C in specimens killed by gentle heat. Cuticle apparently smooth in the oesophageal region, but with very fine transverse striations along the body, distinctly criss-crossing on the tail region; it is 4.0-4.5  $\mu\text{m}$  thick along the body, thicker in the neck region (5.0-6.0  $\mu\text{m}$  at the base of the lip region) and even thicker in the caudal region (11.0-11.5  $\mu\text{m}$  ventrally and 10.0-10.5  $\mu\text{m}$  dorsally in the post anal region). Lateral hypodermal cords 5.5-7.5  $\mu\text{m}$  throughout the length of the body, from 6.5 to 9 % of the corresponding body diameter wide. Lateral body pores : four or five in the odontostyle region, one of them located anteriorly to guiding ring, just posterior to the middle of the distance from the oral opening, arranged in a single row in the neck region and in the rest of the body, distributed irregularly along the lateral cords; three dorsal and three ventral body pores visible

**Table 1.** Morphometrics of *Longidorus crataegi* sp. n. (All measurements in  $\mu\text{m}$  except L).

Stages	Holotype	females	males	J1	J2	J3	J4
n	1	6	3	4	5	4	10
L (mm)	7.9	7.3 $\pm$ 0.72 (6.5-8.0)	5.8 $\pm$ 0.91 (4.8-6.6)	1.4 $\pm$ 0.05 (1.3-1.5)	2.5 $\pm$ 0.27 (2.1-2.8)	3.8 $\pm$ 0.22 (3.5-4.0)	5.9 $\pm$ 0.30 (5.6-6.6)
a	72.5	81.0 $\pm$ 5.25 (72.5-88.5)	86.4 $\pm$ 7.71 (78.0-93.5)	58.5 $\pm$ 2.07 (56.0-60.5)	67.0 $\pm$ 7.64 (56.5-73.0)	75.0 $\pm$ 2.77 (71.5-77.5)	83.0 $\pm$ 3.72 (77.5-90.0)
b	18.0	17.5 $\pm$ 0.96 (16.5-19.0)	12.5 $\pm$ 1.22 (11.5-14.0)	5.7 $\pm$ 0.27 (5.4-6.0)	7.7 $\pm$ 0.94 (7.0-9.3)	9.9 $\pm$ 1.01 (8.5-11.0)	13.5 $\pm$ 1.30 (11.5-15.5)
c	142.5	154.5 $\pm$ 12.78 (139.0-173.0)	117.0 $\pm$ 9.81 (106.5-126.0)	57.5 $\pm$ 4.74 (52.0-63.5)	63.5 $\pm$ 3.79 (58.0-68.0)	82.5 $\pm$ 4.10 (77.5-86.5)	125.5 $\pm$ 10.53 (110.0-141.5)
c'	0.9	0.8 $\pm$ 0.07 (0.7-0.9)	0.9 $\pm$ 0.03 (0.8-1.0)	1.7 $\pm$ 0.07 (1.6-1.8)	1.3 $\pm$ 0.19 (1.2-1.6)	1.1 $\pm$ 0.04 (1.0-1.2)	0.9 $\pm$ 0.06 (0.8-1.0)
V	51.0	50.5 $\pm$ 2.98 (45.0-54.0)	–	–	–	–	–
Lip region width	16.5	16.0 $\pm$ 0.71 (14.5-16.5)	16.0 $\pm$ 0.34 (15.5-16.5)	7.5 $\pm$ 0.29 (7.0-8.0)	9.0 $\pm$ 0.26 (8.5-9.5)	12.0 $\pm$ 1.00 (10.5-13.0)	13.5 $\pm$ 0.99 (11.5-14.5)
Lip region height	4.5	5.0 $\pm$ 0.67 (4.0-6.0)	5.0 $\pm$ 0.52 (4.0-6.0)	1.7 $\pm$ 0.0 (1.7-1.7)	2.5 $\pm$ 0.32 (2.0-3.0)	4.0 $\pm$ 0.59 (3.5-4.5)	4.5 $\pm$ 0.30 (4.0-4.5)
Odontostyle	104.0	102.5 $\pm$ 3.74 (95.5-106.0)	95.5 $\pm$ 1.89 (93.5-97.0)	59.5 $\pm$ 1.66 (57.0-60.5)	69.0 $\pm$ 6.08 (59.0-74.0)	80.0 $\pm$ 6.01 (71.0-83.5)	93.0 $\pm$ 5.90 (84.0-101.0)
Odontophore	49.0	49.5 $\pm$ 4.14 (44.0-55.5)	45.0 $\pm$ 4.42 (40.5-49.5)	23.0 $\pm$ 0.83 (22.5-24.0)	34.5 $\pm$ 4.47 (29.5-39.5)	43.0 $\pm$ 3.31 (39.5-46.0)	47.5 $\pm$ 5.06 (38.0-54.0)
Total stylet	153.0	152.0 $\pm$ 7.16 (141.0-160.5)	140.5 $\pm$ 3.45 (134.0-146.5)	82.5 $\pm$ 1.59 (80.0-83.5)	103.5 $\pm$ 7.59 (94.0-113.5)	123.0 $\pm$ 5.05 (117.0-129.5)	140.5 $\pm$ 10.15 (127.0-154.5)
Replacement odontostyle	–	–	–	63.5 $\pm$ 1.39 (62.5-65.5)	77.5 $\pm$ 3.16 (74.0-82.5)	91.0 $\pm$ 7.23 (85.5-101.0)	103.5 $\pm$ 5.39 (96.0-111.0)
Guide ring	33.5	34.0 $\pm$ 1.73 (32.0-36.0)	33.0 $\pm$ 0.34 (32.5-33.5)	20.0 $\pm$ 0.29 (20.0-20.5)	21.5 $\pm$ 2.48 (17.5-23.5)	27.5 $\pm$ 1.40 (25.5-28.0)	30.0 $\pm$ 1.62 (26.5-32.5)
Phar. bulb length	121.5	117.0 $\pm$ 12.98 (95.5-131.0)	115.0 $\pm$ 2.35 (114.5-115.5)	60.5 $\pm$ 3.41 (56.0-64.0)	76.5 $\pm$ 6.66 (68.0-84.5)	94.5 $\pm$ 4.48 (88.0-98.0)	112.5 $\pm$ 7.24 (102.5-123.5)
Phar. bulb width	37.0	29.0 $\pm$ 3.83 (25.5-37.0)	28.0 $\pm$ 1.35 (27.5-28.5)	12.5 $\pm$ 0.29 (12.5-13.0)	17.5 $\pm$ 0.72 (16.5-18.5)	22.5 $\pm$ 1.00 (21.0-23.5)	24.0 $\pm$ 1.73 (21.0-26.5)
Ant. genital branch	906.0	749.5 $\pm$ 134.78 (588.5-906.0)	–	–	–	–	–
Post. genital branch	906.0	683.0 $\pm$ 113.43 (558.5-906.0)	–	–	–	–	–
Ant. genital branch %	11.5	10.2 $\pm$ 1.21 (8.5-11.5)	–	–	–	–	–
Post. genital branch %	11.5	9.5 $\pm$ 1.19 (8.0-11.5)	–	–	–	–	–
Body diam. mid-body	108.5	90.5 $\pm$ 11.43 (77.0-109.0)	67.0 $\pm$ 4.79 (61.5-70.5)	24.5 $\pm$ 1.0 (23.5-26.0)	37.5 $\pm$ 6.57 (29.5-44.0)	50.5 $\pm$ 4.64 (45.5-56.0)	71.0 $\pm$ 2.58 (66.5-73.5)
Body diam. anus level	62.5	58.0 $\pm$ 2.99 (53.0-62.5)	53.5 $\pm$ 2.70 (50.5-56.0)	14.5 $\pm$ 1.27 (13.5-16.5)	29.5 $\pm$ 5.19 (23.0-35.5)	41.5 $\pm$ 1.62 (40.0-43.5)	51.5 $\pm$ 2.90 (47.0-55.5)
Rectum	41.0	39.0 $\pm$ 2.17 (35.5-41.0)	38.0 $\pm$ 1.86 (37.5-38.5)	12.0 $\pm$ 1.30 (10.5-13.5)	22.0 $\pm$ 4.53 (16.5-26.5)	30.5 $\pm$ 5.09 (24.0-36.5)	36.0 $\pm$ 3.40 (30.0-43.5)
Tail	55.0	47.5 $\pm$ 5.10 (40.5-55.5)	49.5 $\pm$ 3.78 (45.5-52.5)	25.0 $\pm$ 2.90 (21.5-29.0)	39.0 $\pm$ 1.99 (36.5-41.0)	46.0 $\pm$ 0.88 (45.5-47.0)	47.0 $\pm$ 4.01 (41.5-53.5)
Hyaline tail tip	12.5	14.0 $\pm$ 2.64 (11.5-19.5)	13.0 $\pm$ 0.34 (13.0-13.5)	12.0 $\pm$ 2.51 (9.0-14.5)	6.0 $\pm$ 1.15 (5.5-7.5)	8.0 $\pm$ 1.22 (6.5-9.5)	10.5 $\pm$ 1.52 (8.0-12.5)
Prerectum	517.5	522.0 $\pm$ 96.16 (435.5-682.5)	482.0 $\pm$ 56.85 (450.0-512.0)	179.5 $\pm$ 28.21 (153.0-211.5)	280.0 $\pm$ 48.08 (211.5-341.0)	311.5 $\pm$ 75.48 (259.0-423.5)	337.5 $\pm$ 58.31 (247.0-441.0)
Spicules	–	–	78.0 $\pm$ 1.48 (76.5-79.5)	–	–	–	–
Lat. guid. piece	–	–	22.0 $\pm$ 0.34 (21.5-22.5)	–	–	–	–



**Fig. 1.** *Longidorus crataegi* sp. n. A, B : Female, anterior region; C : Head (surface view); D : Anterior branch of the genital tract; E : Male, posterior region; F : Female, posterior region; G-J : Posterior region of juveniles, J1-J4, respectively; K : Posture of juveniles and adult stages.

**Table 2.** Range of biometrical values of *Longidorus* species close to *L. crataegi* sp. n., cited in the differential diagnosis.

	<i>L. crataegi</i> sp. n.	<i>L. goodeyi</i> (Hooper, 1961)	<i>L. arthensis</i> (Brown, Grunder, Hooper, Klingler & Kunz, 1994)	<i>L. belloi</i> (Andrés & Arias, 1988)	<i>L. nevesi</i> (Macara, 1985)	<i>L. profundorum</i> (Hooper, 1966)	<i>L. raskii</i> (Lamberti & Agostinelli, 1993)	<i>L. vinearum</i> (Bravo & Roca, 1995)
L (mm)	6.5-8.0	5.6-7.7	5.14-6.74	5.2-8.6	6.0-8.3	6.0-8.3	6.5-8.1	7.4-11.6
a	72.5-88.5	67.0-117.0	74.5-110.0	74.0-132.0	81.0-119.0	81.0-119.0	71.9-96.0	70.7-101.3
c	139.0-173.0	99.0-154.0	123.0-174.0	112.0-214.0	100.0-230.0	132.0-197.0	147.4-211.7	157.7-263.2
Vulva	45.0-54.0	50.0-55.0	50.0-53.0	50.2-55.9	48.0-55.0	50.0-58.0	47.0-56.0	43.0-50.6
Odontostyle ( $\mu\text{m}$ )	95.5-106.0	96.0-109.0	102.0-111.0	74.8-102.7	133.0-152.0	91.0-104.0	90.0-103.0	105.5-132.5
Odontophore ( $\mu\text{m}$ )	44.0-55.5	42.0-79.0	67.0-75.0	39.0-56.5	76.0-94.0	49.0-69.0	61.2-72.9	58.0-85.5
Ant. end-g. ring ( $\mu\text{m}$ )	32.0-36.0	30.0-40.0	30.0-38.0	27.0-34.7	38.0-46.0	35.0-41.0	32.9-38.2	36.0-47.0
Tail ( $\mu\text{m}$ )	40.5-55.5	-	36.0-46.0	29.8-53.2	36.0-52.00	-	35.9-47.0	38.0-57.0
Spicules ( $\mu\text{m}$ )	76.5-79.5	-	60.0-66.0	30.4	87.0-100.0	66.0-79.0	82.3-102.9	111.5-136.5

in the odontostyle region, one of them located anterior to guiding ring. Lip region almost flattened frontally and rounded laterally, continuous with the rest of the body, with a double circle of labial sensillae. Amphidial pouches distinctly asymmetrically bilobed, with sinus very deep and ventral lobe extending farther than the dorsal one, continuing beyond guiding ring; amphidial aperture indistinct. Guiding ring 5.0-5.5  $\mu\text{m}$  wide. Odontostyle long and slender, odontophore enlarged at the base. Nerve ring wide, located 40-60  $\mu\text{m}$  behind the base of odontophore; pharynx dorylaimoid with pharyngeal bulb cylindrical, containing three gland nuclei: the two subventral ones situated almost on the same level near the middle of the bulb, the dorsal nucleus situated just posterior to the middle of the distance from the beginning of the bulb to the subventral nuclei. Pharyngo-intestinal valve inconspicuous, heart shaped, usually surrounded by intestinal tissue. Genital branches equally developed and reflexed. Ovary long and well developed, usually with a large ovarian sac, sometimes filled with developing oocytes. *Pars dilatata oviductus* long and separated from the uterus by a very strong and muscularized sphincter. Many sperms present in the *pars dilatata oviductus*. Vulva slit-like; vagina cuticularized, extending over half or more the corresponding body diameter; ojector poorly differentiated. Pre-rectum variable in length; rectum 0.6 anal body width long. Tail short-conoid, bluntly rounded, convex dorsally and less so ventrally, with rounded terminus, bearing two caudal pores on each side.

*Male*: General appearance similar to female with posterior part of the body more curved. Morpho-anatomy similar to female except in the genital apparatus and associated somatic structures; testes well developed; spicules curved, not cephalated; lateral guiding pieces well

sclerotized, slightly curved, rounded proximally and bifid distally. Precloacal pair of papillae at 14.0-15.0  $\mu\text{m}$  from the cloacal aperture, preceded by fifteen-eighteen medioventral supplements. Tail similar to that of female, convex dorsally with the ventral profile almost straight or slightly convex, bearing three, exceptionally four, caudal pores on each side.

*Juveniles*: Morphologically similar to female but smaller; tail of first stage elongate conoid with subdigitate terminus, bearing two caudal pores on each side.

#### TYPE HOST AND LOCALITY

Rhizosphere of *Crataegus oxyacantha* L. at Casal dos Cabelos, Sobral de Monte Agraço, Lisboa, Portugal.

#### OTHER HABITATS AND LOCALITIES

Rhizosphere of grapevine at Quinta do Paço, Arruda dos Vonhos, Lisboa; Herdade do Carvalhal, Constancia, Santarem; Sobral de monte Agraço, Lisboa, Portugal.

#### TYPE SPECIMENS

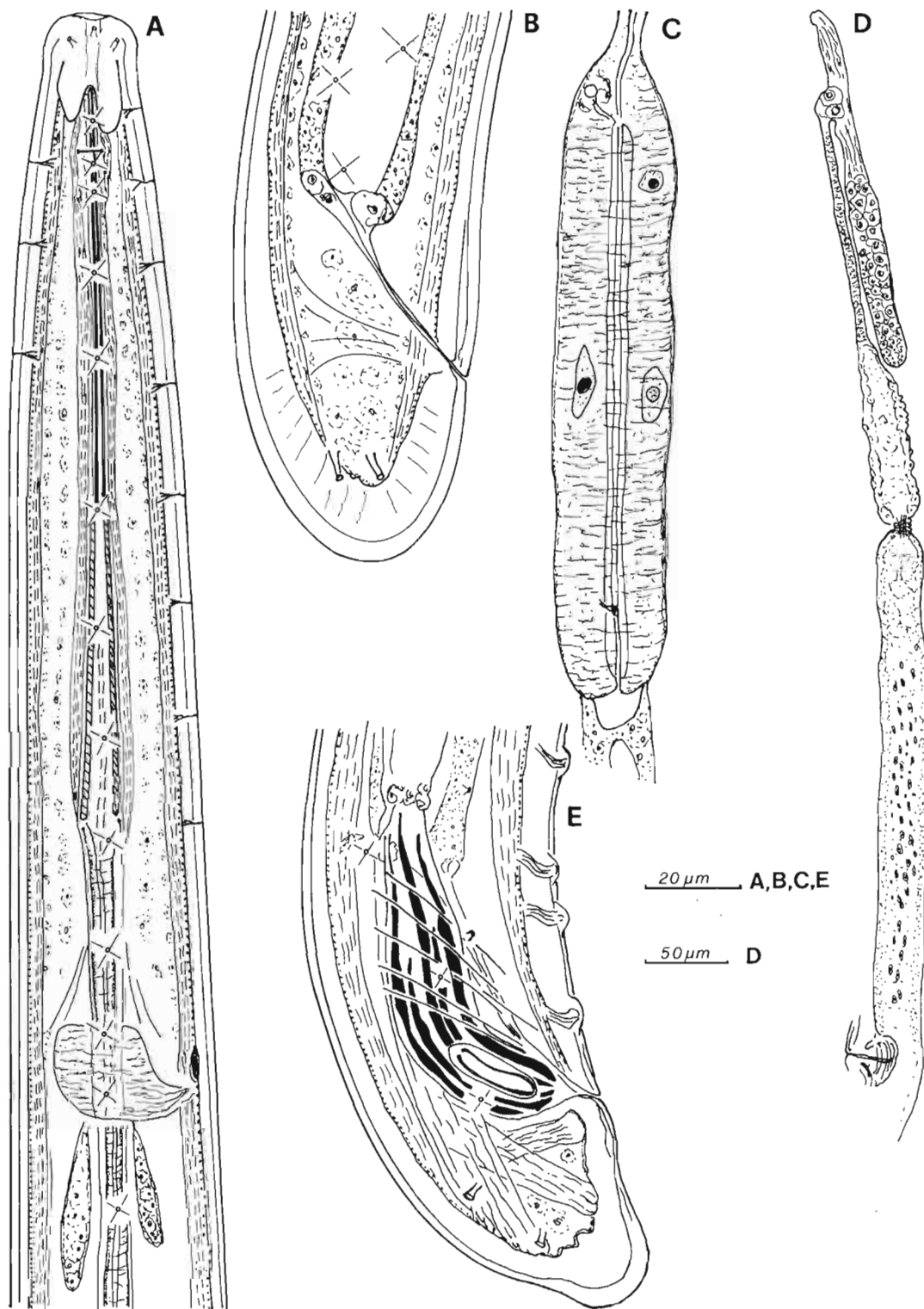
Holotype, three paratype females, three paratype males and juveniles in the Collection of the Istituto di Nematologia Agraria del Consiglio Nazionale delle Ricerche, Bari, Italy; one paratype female in the following collections: Muséum National d'Histoire Naturelle, Laboratoire de Biologie Parasitaire, Protistologie, Helminthologie, Paris, France; Entomology and Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, UK; Plant Nematology Laboratory Collection, United States Department of Agriculture, Beltsville, Maryland, USA.

#### DIAGNOSIS AND RELATIONSHIPS

*L. crataegi* sp. n. is characterized by a broadly rounded lip region continuous with the rest of the body, amphi-

**Table 3.** Morphometrics of *Longidarus vineacola* population from Tapada, Braganca. (All measurements in  $\mu\text{m}$  except L).

Stages	females	males	J1	J2	J3	J4
n	6	3	1	14	23	13
L (mm)	8.6 $\pm$ 0.62 (7.7-9.5)	8.7 $\pm$ 0.54 (8.0-9.0)	1.4	2.5 $\pm$ 0.25 (1.8-2.7)	3.9 $\pm$ 0.40 (3.3-4.7)	6.4 $\pm$ 0.59 (5.3-7.3)
a	129.0 $\pm$ 11.21 (109.5-144.0)	153.0 $\pm$ 5.14 (147.5-158.0)	67.5	78.5 $\pm$ 3.35 (73.5-85.5)	99.0 $\pm$ 5.09 (90.5-109.5)	117.5 $\pm$ 11.16 (96.0-135.0)
b	17.5 $\pm$ 0.76 (16.5-18.5)	19.0 $\pm$ 2.81 (17.0-22.5)	4.1	8.0 $\pm$ 0.91 (6.0-9.0)	10.5 $\pm$ 1.15 (9.5-14.0)	14.5 $\pm$ 1.57 (11.5-16.5)
c	244.5 $\pm$ 34.40 (195.0-278.0)	208.5 $\pm$ 19.21 (193.5-230.5)	34.0	58.0 $\pm$ 5.01 (50.0-65.0)	97.5 $\pm$ 9.70 (80.0-115.0)	161.0 $\pm$ 20.45 (120.5-191.5)
c'	0.7 $\pm$ 0.13 (0.6-0.9)	0.9 $\pm$ 0.07 (0.8-1.0)	2.8	1.7 $\pm$ 0.16 (1.5-1.9)	1.2 $\pm$ 0.12 (1.0-1.5)	0.9 $\pm$ 0.09 (0.7-1.0)
V	51.5 $\pm$ 2.38 (48.0-55.0)	–	–	–	–	–
Lip region width	19.0 $\pm$ 0.87 (18.0-20.0)	19.0 $\pm$ 1.22 (17.5-20.0)	9.0	11.5 $\pm$ 1.25 (10.0-15.5)	14.0 $\pm$ 0.74 (12.5-15.5)	16.0 $\pm$ 0.82 (15.5-18.0)
Lip region height	6.0 $\pm$ 0.81 (4.5-7.0)	6.5 $\pm$ 1.02 (6.0-7.5)	2.5	3.5 $\pm$ 0.46 (3.0-4.0)	4.5 $\pm$ 0.63 (3.0-5.5)	5.0 $\pm$ 0.78 (4.0-6.5)
Odontostyle	95.5 $\pm$ 4.67 (88.0-101.0)	100.0 $\pm$ 2.65 (97.5-103.0)	49.5	59.0 $\pm$ 2.80 (53.5-62.5)	74.0 $\pm$ 2.64 (69.0-79.5)	84.5 $\pm$ 3.14 (80.0-91.0)
Odontophore	62.5 $\pm$ 3.26 (59.0-66.5)	60.0 $\pm$ 2.07 (58.0-62.5)	30.5	40.5 $\pm$ 2.28 (37.5-45.5)	48.0 $\pm$ 4.51 (40.0-55.5)	57.5 $\pm$ 6.53 (43.5-66.0)
Total stylet	158.0 $\pm$ 4.13 (153.0-164.0)	160.0 $\pm$ 4.72 (155.5-165.5)	80.0	99.5 $\pm$ 4.02 (91.5-106.5)	122.0 $\pm$ 5.82 (109.5-132.5)	142.0 $\pm$ 7.49 (126.0-153.0)
Replacement odontostyle	–	–	55.5	74.0 $\pm$ 2.38 (69.5-77.5)	86.5 $\pm$ 3.72 (80.5-92.5)	99.5 $\pm$ 2.33 (96.0-103.5)
Guide ring	31.5 $\pm$ 1.95 (29.0-34.0)	32.0 $\pm$ 1.80 (30.0-33.5)	15.5	19.5 $\pm$ 0.95 (17.5-20.5)	24.0 $\pm$ 1.25 (21.5-26.5)	29.5 $\pm$ 2.13 (27.0-33.5)
Phar. bulb length	141.0 $\pm$ 8.47 (130.0-154.5)	134.5 $\pm$ 8.49 (129.5-144.0)	64.5	82.0 $\pm$ 5.09 (71.0-92.5)	101.5 $\pm$ 5.01 (91.0-113.0)	123.5 $\pm$ 7.23 (110.5-134.0)
Phar. bulb width	24.5 $\pm$ 1.38 (23.5-27.0)	22.5 $\pm$ 1.18 (21.0-23.5)	10.0	15.5 $\pm$ 1.77 (11.5-18.5)	17.5 $\pm$ 1.84 (13.5-20.5)	20.5 $\pm$ 1.99 (18.5-23.5)
Ant. genital branch	793.0 $\pm$ 69.34 (694.0-876.5)	–	–	–	–	–
Post. genital branch	780.5 $\pm$ 40.70 (717.5-835.5)	–	–	–	–	–
Ant. genital branch %	9.2 $\pm$ 0.69 (8.7-10.5)	–	–	–	–	–
Post. genital branch %	9.0 $\pm$ 0.44 (8.3-9.5)	–	–	–	–	–
Body diam. mid-body	67.5 $\pm$ 6.89 (60.5-78.0)	57.0 $\pm$ 2.38 (54.5-59.5)	20.0	31.5 $\pm$ 3.09 (24.5-35.5)	40.0 $\pm$ 3.78 (34.5-49.0)	54.0 $\pm$ 4.64 (47.5-64.5)
Body diam. anus level	49.5 $\pm$ 3.40 (44.5-53.5)	46.5 $\pm$ 1.02 (45.5-47.0)	14.0	25.5 $\pm$ 2.89 (18.0-29.5)	34.0 $\pm$ 3.10 (29.5-41.5)	44.0 $\pm$ 2.58 (40.5-47.5)
Rectum	35.5 $\pm$ 4.82 (29.5-43.0)	42.5 $\pm$ 6.61 (37.0-50.0)	16.0	19.0 $\pm$ 3.16 (14.5-26.0)	23.5 $\pm$ 2.50 (19.5-27.5)	36.0 $\pm$ 3.04 (31.0-42.5)
Tail	35.5 $\pm$ 3.73 (32.5-41.0)	41.5 $\pm$ 2.35 (39.5-44.0)	40.0	42.5 $\pm$ 5.08 (31.5-48.0)	41.0 $\pm$ 4.30 (33.0-50.0)	40.0 $\pm$ 3.82 (34.0-46.0)
Hyaline tail tip	14.5 $\pm$ 0.96 (13.5-16.0)	13.5 $\pm$ 0.90 (13.0-14.5)	9.5	11.5 $\pm$ 1.72 (8.5-14.0)	11.5 $\pm$ 1.34 (9.0-14.5)	11.5 $\pm$ 0.91 (10.0-13.5)
Prerectum	548.0 $\pm$ 95.17 (400.0-635.0)	647.0 $\pm$ 58.82 (588.0-705.5)	176.5	229.0 $\pm$ 44.47 (182.5-306.0)	286.0 $\pm$ 60.45 (164.5-400.0)	440.5 $\pm$ 110.54 (294.0-676.5)
Spicules	–	84.5 $\pm$ 2.23 (83.0-87.0)	–	–	–	–
Lat. guid. piece	–	24.0 $\pm$ 2.23 (22.5-26.5)	–	–	–	–



**Fig. 2.** *Longidorus vineacola* Sturhan & Weischer, 1964. A : Female, anterior region; B : Female, posterior region; C : Female, posterior part of oesophagus; D : Posterior branch of the genital tract; E : Male, posterior region.

dial pouches distinctly bilobed, with ventral lobe longest and extending well beyond the guiding ring, female tail short-conoid, bluntly rounded, and first larval stage with subdigitate tail.

Among the species with lip region almost continuous with the rest of the body, amphidial pouches distinctly bilobed and tail short, bluntly rounded, *L. crataegi* sp. n. closely resembles *L. goodeyi* Hooper, 1961 from which it differs biometrically in having slightly longer body, higher "c" value and slightly more anteriorly situated vulva (Table 2). Morphologically the new species differs from *L. goodeyi* in amphidial pouches (ventral lobe extending well beyond the guide ring in the new species, but reaching only to guide ring in *L. goodeyi*), and presence of the male (not found in *L. goodeyi*).

*L. crataegi* sp. n. is also similar to *L. arthensis* Brown, Grunder, Hooper, Klinger & Kunz, 1994, *L. belloi* Andrés & Arias, 1988, *L. nevesi* Macara, 1985, *L. profundorum* Hooper, 1961, *L. raskii* Lamberti & Agostinelli, 1993, and *L. vinearum* Bravo & Roca, 1995, from which it differs in amphidial pouches, ventral lobe extending well over the guide ring, and in some biometric characters (Table 2). Particularly, the new species differs from *L. arthensis* in having longer and more robust body, slightly shorter odontostyle, shorter odontophore, longer tail, longer spicules, differently shaped lip region (slightly offset with the neck contour in *L. arthensis*); from *L. belloi* in having more robust body, slightly shorter odontostyle, longer distance of guiding ring from anterior end, longer tail and spicules; from *L. nevesi* in having shorter odontostyle and odontophore, shorter distance of guiding ring from anterior end, shorter spicules, differently shaped lip region (subacute in *L. nevesi*); from *L. profundorum* in having more robust body, anterior situated vulva, shorter odontophore, shorter distance of guiding ring from anterior end, and differently shaped lip region (truncate in *L. profundorum*); from *L. raskii* in having lower "c" value, shorter odontophore, slightly longer tail, and shorter spicules; and from *L. vinearum* in having shorter body, shorter odontostyle and odontophore, and shorter distance of guiding ring from anterior end.

***Longidorus vineacola* Sturhan & Weischer, 1964**  
(Fig. 2)

Two populations of that species were found, one in the rhizosphere of hop at Tapada, Braganca, Portugal

and the other in the rhizosphere of grapevine at Herdade do Carvalhal, Constancia, Santarem, Portugal (only one female and few juveniles).

The population from hop is morphologically identical to the original description of *L. vineacola* (Sturhan & Weischer, 1964), but some biometrical differences were observed (Table 3): the body is slightly longer and more robust ( $L = 7.7-9.5$  vs  $6.9-9.2$  mm; "a" value  $109.5-144$  vs  $120-149$ ), the odontophore is longer ( $59-66.5$  vs  $40-50$   $\mu\text{m}$ ), and the spicules and lateral guiding pieces are longer ( $83-87$  vs  $54-67$  and  $22.5-26.5$  vs  $14-19$   $\mu\text{m}$ , respectively).

In comparison with the Scottish population (Boag & Brown, 1987), the population from hop appears closer to the type specimens and European populations: the body, odontostyle, and tail are longer ( $8.6$  mm,  $95.5$   $\mu\text{m}$  and  $35.5$   $\mu\text{m}$  vs  $7.16$  mm,  $92$   $\mu\text{m}$ , and  $33$   $\mu\text{m}$  of the Scottish specimens) and the odontophore is significantly longer ( $62.5$   $\mu\text{m}$  for females vs  $46$   $\mu\text{m}$  for the Scottish population).

*L. vineacola* represents a new record for Portugal.

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