

Research Note

Morphometrics of *Xiphinema dentatum* Sturhan, 1978 from the Czech Republic

S. KUMARI

Crop Research Institute, Division of Plant Health, Drnovská 507, Ruzyně, 16106 Prague 6, Czech Republic,
E-mail: kumari@vurv.cz

Summary

Morphometrics of first, second and fourth juvenile stages and females of *Xiphinema dentatum* Sturhan, 1978 are presented from the Czech Republic. The species was found associated with *Xiphinema* spp., *Longidorus intermedius* and *Longidorus* spp. under a forest soil.

Keywords: *Xiphinema dentatum*; morphometrics; Czech Republic; nematode; forest

Introduction

Xiphinema dentatum Sturhan, 1978 was originally described from Germany from forest soil (Sturhan, 1978). Since its description, morphometric data on *X. dentatum* has been published from Yugoslavia (Barsi, 1989, 1996; Radivojević & Baujard, 1998), Slovak Republic (Lišková, 1994; Lišková & Liška, 2000) and Poland (Prior *et al.*, 2008). Morphometrics of a population of *X. dentatum*, recently found for the first time in the Czech Republic (Kumari & Decreamer, 2008), are presented in this research note.

Material and methods

Soil samples were taken at a depth of 0–40 cm from a deciduous forest at Silničná, Czech Republic. Nematodes were extracted from soil by a sieving and decanting method; heat killed and fixed in TAF and mounted in anhydrous glycerin. Measurements and photomicrographs were made with the aid of imaging software (Olympus DP-soft) using an Olympus BX-51 light microscope, equipped with a digital camera C4040 and differential interference contrast (DIC, Nomarski).

Results and Discussion

Xiphinema dentatum was found in the rhizosphere of *Carpinus betulus* and *Acer platanoides* in a forest (Kumari & Decreamer, 2008) in mixed populations with *Xiphinema* spp., *Longidorus intermedius* Kozlowska & Seinhorst, 1979 and *Longidorus* spp. The population of *X. dentatum* reported in this paper consisted of females and specimens belonging to the first, second and fourth juvenile developmental stages. Their morphometrics are given in Table 1 and photomicrographs are presented in Fig. 1. Morphometrics of females were compared with two type populations from Germany (Sturhan, 1978); three Slovakian populations (Lišková & Liška, 2000); five Yugoslavian populations (Barsi, 1989; 1996) and one Polish population (Prior *et al.*, 2008). The majority of the morphometrics of the Czech populations are largely similar to the eleven populations compared except few minor differences. The following variations have been observed: the Czech population has shorter mean body length (3.6 vs 4.0 and 4.05 mm) compared with the Yugoslavian population from Ledinci (Barsi, 1989) and Polish population (Prior *et al.*, 2008) respectively; ratio 'a' is shorter (47.4 vs 53.8 to 62) compared with all German, Polish and Yugoslavian populations; ratio 'c' is longer (111.9 vs 99 to 103.8) compared with a German population I, Slovakian population from Gôtovany and two Yugoslavian populations from Malinik mountain; odontostyle length is shorter (136 vs 143,144 µm) compared with two Slovakian populations from Branisko and Gôtovany. Distance from oral aperture to guiding ring is longer (129 vs 110 to 120 µm) compared with German, Polish, Slovakian (Vršatec) and Yugoslavian population from Ledinci. Well developed pseudo-Z organ was clearly visible in all specimens (Fig. 1E) with tooth-like apophyses.

Table 1. Morphometrics of *Xiphinema dentatum* Sturhan, 1978.
Measurements in µm (in form): mean ± standard deviation (range).

Locality	Silničná				Females
	J1	J2	J4		
Specimens					
n	5	3	2		7
L	1140 ± 43 (1073-1193)	1329 ± 13 (1317-1342)	2453 2708		3662 ± 293 (3140-3944)
a	34 ± 2.02 (31.6-37.0)	39 ± 0.35 (38.3-39.0)	38.9 37.1		47.4 ± 3.52 (42.0-52.3)
b	4.4 ± 0.19 (4.2-4.7)	4.2 ± 0.00 (4.2-4.2)	5.5 5.4		7.3 ± 0.81 (6.4-9.0)
c	15.3 ± 1.43 (13.9-17.5)	23.6 ± 0.70 (23.1-24.4)	66.3 71.3		111.9 ± 12.71 (92.3-125.8)
c'	3.79 ± 0.39 (3.27-4.33)	2.35 ± 0.11 (2.28-2.48)	0.77 0.75		0.66 ± 0.04 (0.61-0.71)
V	—	—	—		46.3 ± 1.01 (45.4-47.9)
Odontostyle	59 ± 4.16 (56-66)	72 ± 1.15 (71-73)	116 112		136 ± 4.61 (129-142)
Odontophore	46 ± 1.00 (45-47)	55 ± 2.08 (53-57)	75 78		85 ± 4.86 (77-90)
Total stylet length	105 ± 3.65 (102-111)	127 ± 3.00 (124-130)	191 190		220 ± 7.23 (208-229)
Replacement odontostyle	73 ± 1.52 (72-75)	91 ± 1.15 (90-92)	139 136		—
Greatest flange width	9 ± 1.30 (7-10)	10 ± 0.58 (10-11)	13 13		14 ± 1.29 (12-16)
Oral aperture to guide ring	52 ± 2.88 (48-55)	58 ± 1.73 (56-59)	100 91		129 ± 4.00 (125-136)
Pharyngeal bulb length	69 ± 4.60 (63-75)	84 ± 3.06 (81-87)	108 —		121 ± 5.02 (114-129)
Pharyngeal bulb diam.	19 ± 0.89 (17-19)	17 ± 0.58 (16-17)	27 —		31 ± 2.87 (27-35)
Tail length	75 ± 4.45 (68-78)	56 ± 1.15 (55-57)	37 38		33 ± 1.77 (30-35)
Length of hyaline tip	27 ± 2.65 (24-31)	24 ± 1.53 (22-25)	12 12		13 ± 2.24 (10-17)
Body diam. at lip region	9 ± 0.00 (9-9)	9 ± 0.58 (9-10)	13 13		15 ± 0.90 (14-17)
at guiding ring	23 ± 2.70 (21-28)	25 ± 0.58 (25-26)	42 46		50 ± 2.36 (47-53)
at base of pharynx	32 ± 2.00 (30-35)	33 ± 1.15 (32-34)	60 67		68 ± 2.98 (64-71)
at mid body/at vulva	33 ± 1.52 (31-35)	34 ± 0.58 (34-35)	63 73		77 ± 4.83 (70-82)
at anus	20 ± 1.48 (18-22)	24 ± 1.00 (23-25)	48 51		50 ± 2.30 (46-52)
at beginning of hyaline tip	9 ± 0.55 (8-9)	13 ± 2.52 (10-15)	32 33		35 ± 2.41 (31-37)

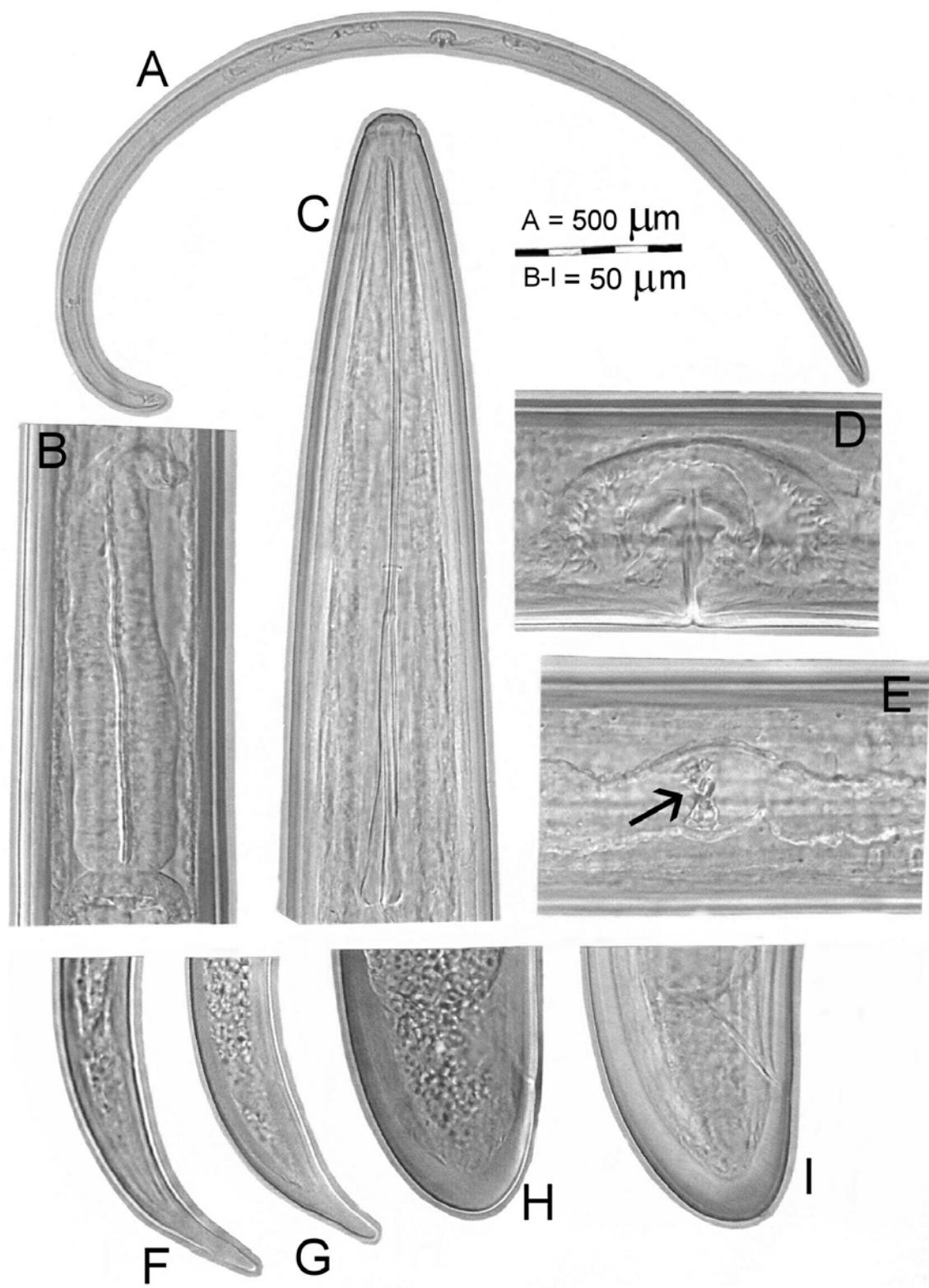


Fig.1. *Xiphinema dentatum* Sturhan, 1978. A: Entire female; B: Female pharyngeal bulb; C: Female anterior region; D: Vulval region; E: Pseudo-Z organ with apophyses; F-I: Posterior region of J1, J2, J4 and female respectively.

Morphometrics of juvenile stages are also similar to the type (Sturhan, 1978) and Yugoslavian populations (Barsi, 1996) except for a few minor differences i. e. tail length of J1 is shorter (75 vs 85 µm) compared to type populations; distance from oral aperture to guiding ring (58 vs 65.4, 69.2 and 65 µm) and tail length (56 vs 59.0, 58.6 and 63 µm) of J2 are shorter compared with Yugoslavian populations and type population respectively. Morphometrics of J3 are similar to type population except ratio 'a' which is smaller (38.9, 37.1 vs 50) than the type population.

It has been demonstrated that for routine identification of plant parasitic nematodes, DNA based diagnostics are quicker than the traditional strategy using morphology and morphometrics (Wang *et al.*, 2003; Oliveira *et al.*, 2005), but morphological identification is still a prerequisite for DNA based diagnostics. Therefore, in this research note detailed morphometrics of *X. dentatum* are provided from the Czech Republic.

Acknowledgements

The author is thankful to M. Vítámvássová for technical assistance. The work was supported by the Ministry of Agriculture of the Czech Republic, Project number MZE 0002700604.

References

- BARSI, L. (1989): The Longidoridae (Nematoda: Dorylaimida) in Yugoslavia. I. *Nematol. Medit.*, 17: 97–108
- BARSI, L. (1996): New records of *Xiphinema dentatum* Sturhan (Nematoda: Dorylaimida) from Serbia with description of the male. *Nematol. Medit.*, 24: 73–78
- KUMARI, S., DECRAEMER, W. (2008): First report of the dagger nematode *Xiphinema dentatum* (Nematoda: Longidoridae) in a deciduous forest in the Czech Republic. *Plant Dis.*, 92: 1370
- LIŠKOVÁ, M. (1994): First record of *Xiphinema dentatum* Sturhan, 1978 from the Slovak Republic. *Helminthologia*, 31: 159–162
- LIŠKOVÁ, M., LIŠKA, M. (2000): Ecological notices to the occurrence of *Xiphinema dentatum* Sturhan, 1978 (Nematoda: Dorylaimida) in the Slovak Republik. *Ekológia (Bratislava)*, 19: 151–156
- OLIVEIRA, C. M. G., FENTON, B., MALLOCH, G., BROWN, D. J. F., NEILSON, R. (2005): Development of species-specific primers for the ectoparasitic nematode species *Xiphinema brevicolle*, *X. diffusum*, *X. elongatum*, *X. ifacolum* and *X. longicaudatum* (Nematoda: Longidoridae) based on ribosomal DNA sequences. *Ann. Appl. Biol.*, 146: 281–288
- PRIOR, T.J., KARNKOWSKI, W., HOCKLAND, S. (2008): First record of *Xiphinema dentatum* Sturhan, 1978 (Nematoda: Longidoridae) from Poland. *Nematol. Medit.*, 36: 141–143
- RADIVOJEVIĆ, M., BAUJARD, P. (1998): Description of three populations of *Xiphinema dentatum* Sturhan, 1978 from Yugoslavia and observations on *X. turicum* Luc & Dalmaso, 1964 (Nematoda: Longidoridae). *Fundam. Appl. Nematol.*, 21: 233–241
- STURHAN, D. (1978): Zwei neue *Xiphinema*-Arten aus Deutschland (Nematoda, Dorylaimida). *Nematologica*, 24: 19–28
- WANG, X., BOSSELUT, N., CASTAGNONE, C., VOISIN, R., ABAD, P., ESMENJAUD, D. (2003): Multiplex polymerase chain reaction identification of single individuals of the longidorid nematodes *Xiphinema index*, *X. diversicaudatum*, *X. vuittenezi*, and *X. italiae* using specific primers from ribosomal genes. *Phytopathology*, 93: 160–166

RECEIVED FEBRUARY 2, 2009

ACCEPTED MARCH 12, 2009