CHARACTERIZATION OF A VENEZUELAN POPULATION OF *APHELENCHOIDES RITZEMABOSI* ON CHRYSANTHEMUM

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Summary. Chrysanthemum (*Dendranthema grandiflorum*) from San Pedro de Los Altos, Miranda State, was found infected with the foliar nematode *Aphelenchoides ritzemabosi*. Chrysanthemum leaves were distorted, smaller and discoloured with blackish brown spots. These irregular necrotic areas occupied 10 to 100 % of the leaf surface. All life stages of the nematode were extracted from infected leaves incubated in distilled water. The female body was slender, lateral field with four longitudinal incisures, excretory pore posterior to nerve ring, genital tract monoprodelphic, uterine sac present and containing sperm, tail conoid with two to four terminal minute processes. The number of males was approximately 20% of the population. Males with posterior end of body curved and a tail peg with 2-3 processes. Measurements of females, males and juveniles of the nematode are reported. This is the first report of *A. ritzemabosi* infecting chrysanthemum in Venezuela.

Key words: *Dendranthema grandiflorum*, description, foliar nematode.

During a nematode survey of cut flowers, a species of foliar nematode belonging to the genus *Aphelenchoides* Fisher was detected in samples of chrysanthemum (*Dendranthema grandiflorum* Kitam.) leaves from San Pedro de Los Altos, Miranda State, Venezuela. In October, when the nematode was detected, the temperature oscillates between 14 and 23 ºC, with high relative humidity because of frequent rains and fogs in the afternoon. Chrysanthemum leaves appeared discoloured and deformed. Spots and blackish brown, irregular, necrotic areas occupied 10-100% of the leaf surface. Leaf tissues contained females, males, juveniles and embryonated eggs of the nematode. Morphometric observations of females, males and juvenile stages of the nematode population are presented herein.

MATERIALS AND METHODS

Symptomatic leaves of chrysanthemum were selected at random, cut into 0.5 cm pieces and incubated in water in Petri dishes at 25 ºC. Emerged nematodes were collected after 24 h, and the different developmental stages were counted under a stereomicroscope, killed and fixed in hot (80 ºC) formaldehyde (2.5%) and processed by Seinhorst's rapid method (s'Jacob and van Bezooijen, 1971). Specimens were mounted in dehydrated glycerin on permanent slides and morphometrical observations of adults and juveniles were made under a light microscope. Measurements and drawings of different life stages were also made with the help of a camera lucida.

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RESULTS AND DISCUSSION

The population densities of the nematode ranged between 45 and 4,380 specimens/g of leaf tissue and were smaller in leaves with larger necrotic areas.

The most important diagnostic characters of females, males and juvenile stages, useful for species identification, are reported in Table I and Figs 1 and 2. The morphometric characteristics of females and males conformed to the description of the chrysanthemum foliar nematode *Aphelenchoides ritzemabosi* (Schwartz) Steiner *et* Buhrer given by Siddiqi (1974).

Females showed body slender, cephalic region hemispherical, offset by a slight constriction, no annulations visible. Stylet with minute but distinct basal knobs. Procorpus slender, median pharyngeal bulb large, oval to rounded in shape, highly muscular; three pharyngeal glands forming a lobe extending about four body widths over intestine dorsally. Four incisures in the lateral field. Excretory pore posterior to nerve ring. Ovary single with oocytes in multiple rows, post-vulval uterine sac extending more than one-half of the vulva-anus distance, often containing sperm. Tail elongate-conoid bearing a terminal peg with 2-4 minute processes pointing posteriorly (Fig. 2 F).

Males were present (at 20% of the population) and showed cephalic region, stylet and pharynx as in females. Posterior end of body usually curved through 180º upon relaxation, tail conoid bearing a terminal peg with 2-3 processes. Testis single, outstretched; spicules smoothly curved, 22-24 µm long, rose-thorn-shaped, lacking a dorsal or ventral process at proximal end (Fig. 2 H).

Juveniles similar to female, of smaller size (Fig. 1 E-G) and with shorter stylet. Body of the second juvenile

Table I. Measurements of females, males and juveniles of *Aphelenchoides ritzemabosi*. Measurements are mean (range) ± SD.

Character	Females (n = 20)	Males (n = 7)	Second stage juveniles (n = 2)	Third stage juveniles (n = 8)	Fourth stage juveniles (n = 14)
L (µm)	896 (767-966) ± 76,9	801 (785-825) ± 13.3	175-183	332 (320-344) ± 11.3	466 (423-528) ± 37.6
a	48.4 (47-50) ± 1.6	42.6 (41-43.7) ± 0.9	19-19.7	26 (24.7-25.3) ± 1.1	32.9 (29.6-39.2) ± 3.23
b	11.6 (10.7-12.1) ± 0.5	10.8 (10.4-11.3) ± 0.33	3.8-3.9	6.5 (6.1-6.8) ± 0.27	7.1 (6.7-7.7) ± 0.31
c	19.1 (16-20.6) ± 1.75	19.2 (18.6-20) ± 0.41	11.8-12.2	14.5 (13-16.9) ± 1.52	15.7 (14.6-16.9) ± 0.84
c'	4.2 (4-4.5) ± 0.18	3 (2.8-3.1) ± 0.1	2.5	2.6 (2.3-2.9) ± 0.3	2.9 (2.5-3.2) ± 0.28
Stylet length (µm)	12	11	9	10	11
Maximum body diam. (µm)	18.5 (16.8-19.5) ± 1	18.8 (18-19.2) ± 0.39	9.2-9.3	12.8 (12.6-13) ± 0.17	14.2 (13-15) ± 0.76
Pharyngeal gland base (µm)	158 (142-172) ± 13.3	154 (150-160) ± 3.81	57	111 (109-116) ± 5.2	126 (116-139) ± 7.4
Anal body diam. (µm)	11.2 (10.2-12) ± 0.59	13.7 (13.5-14) ± 0.22	6	9 (8.4-10.2) ± 0.73	10.5 (9-12) ± 0.86
Tail length (µm)	47 (46-48) ± 0.5	41.7 (40-43) ± 1.03	14.8-15	23 (20.4-24.6) ± 1.6	29.2 (26.2-33.6) ± 2.36
Excretory pore (µm)	92 (90-95) ± 1.72	115 (113-121) ± 2.8		68 (61-73) ± 4.33	75 (70-87) ± 5.62
Excretory pore (%)[1]	10.3 (9.5-11.9) ± 0.87	14.3 (14.1-14.7) ± 0.25		20.3 (19-21.5) ± 1.05	16.5 (14-19.6) ± 1.6
V (%)	69 (68-71) ± 0.75				
Anterior genital tract (µm)	337 (273-370) ± 37.2				
Posterior genital tract (µm)	126 (115-147) ± 11.7				
Genital primordium length (µm)			9.3	33 (29-37) ± 3.3	102 (93-108) ± 6.5
Testis length (µm)		444 (430-458) ± 10.65			
T (%)[2]		55.5 (52.6-56.9) ± 1.32			

[1](Distance from head end to excretory pore/body length) × 100

[2](Distance from cloacal aperture to anterior end of testis/body length) × 100

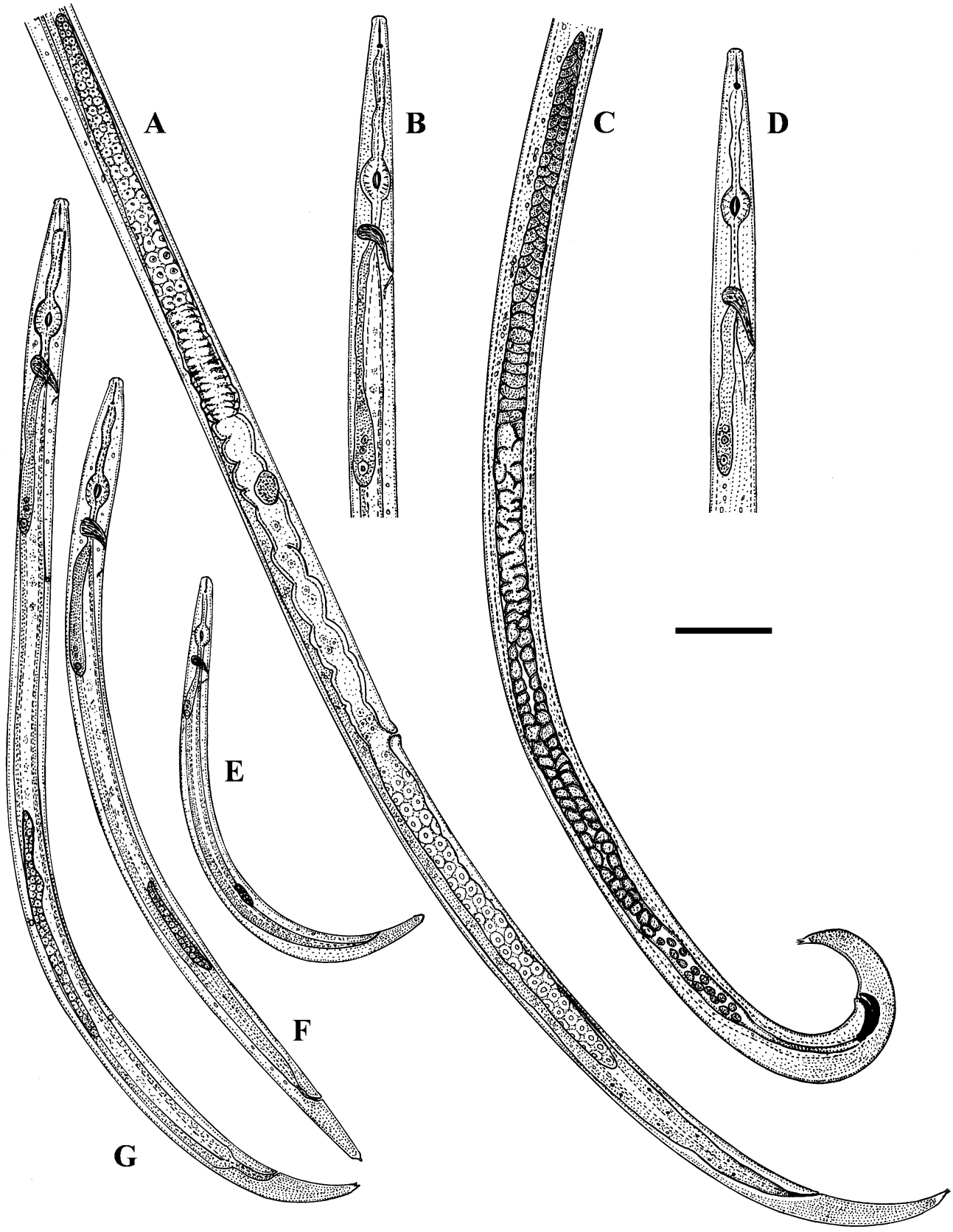

Fig. 1. *Aphelenchoides ritzemabosi*. Female: A and B, posterior and anterior body, respectively. Male: C and D, posterior and anterior body, respectively. Juveniles: E, F and G, entire body of second, third and fourth juvenile stages, respectively. Bar = 40 µm.

stage ventrally arcuate, while the body of the third and fourth juvenile stages is more or less straight or slightly ventrally arcuate. Cephalic region hemispherical, offset by a constriction more evident in adults than, in decreasing order, in fourth, third and second juvenile stages (Fig. 2 C-E). Terminal peg similar to that in fe-

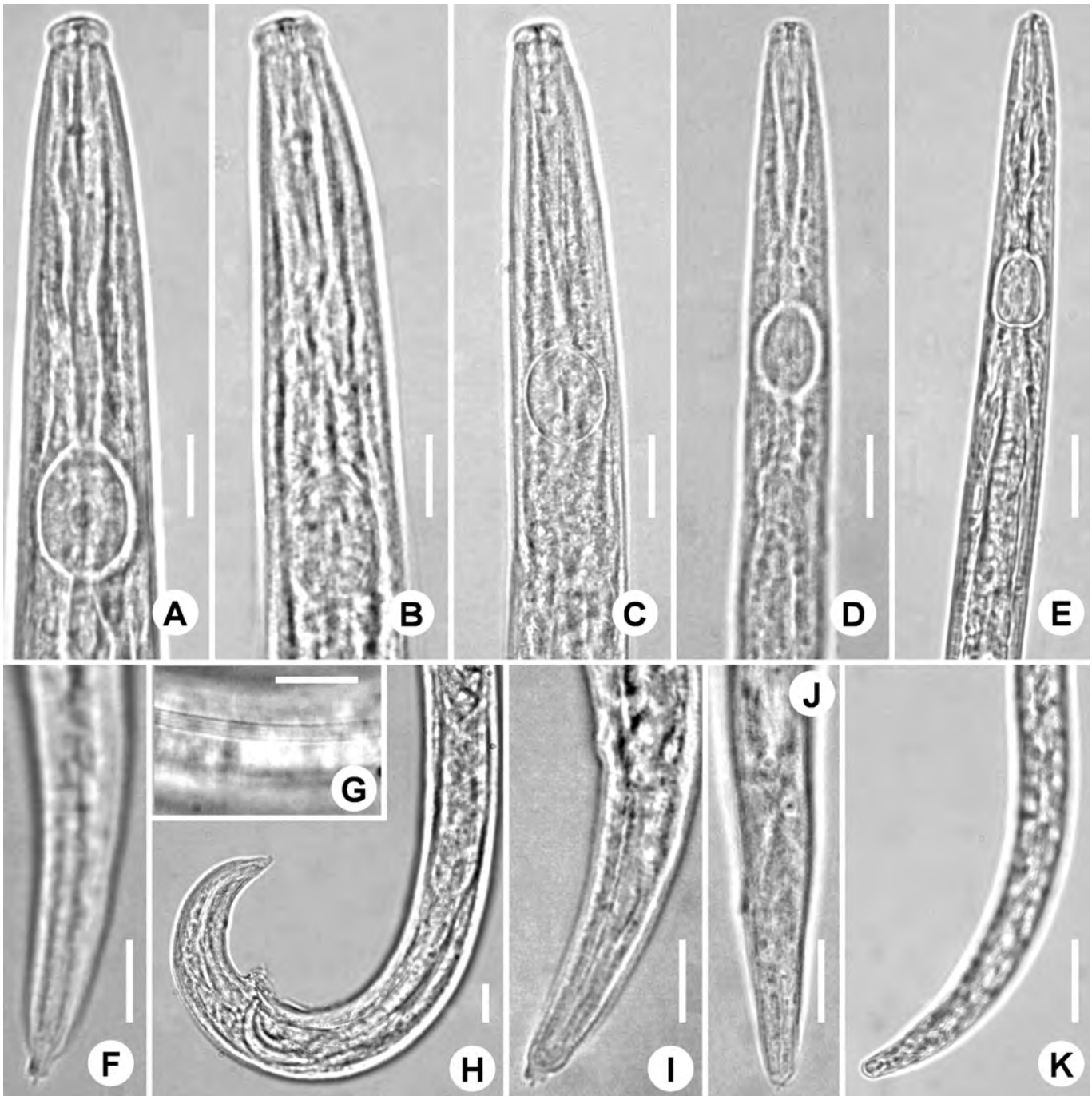

Fig. 2. Photomicrographs of *A. ritzemabosi*. Female: A and F, anterior and posterior body, respectively; G, longitudinal lines forming three lateral fields. Male: B and H, anterior and posterior body, respectively. Fourth juvenile stage: C, anterior body, I, tail with terminal peg with three minute processes. Third juvenile stage: D, anterior body, J, tail with terminal peg with two little spines. Second juvenile stage: E, anterior body, K, posterior body, without processes or spines. Bars = 10 µm.

male in fourth juvenile stage, with two spines in third juvenile stages and without processes or spines in second juvenile stage (Fig. 2 I-K). To our knowledge this is the first report on morphometrics of juveniles of *A. ritzemabosi*.

The morphometrics of the nematode population extracted from foliar tissues of chrysanthemum were similar to, and correspond also with those reported by Vovlas *et al*. (2005) from Italy in leaves and stems of *Ocimum basilicum* L., Chizov *et al*. (2006) from Russia in leaves of *Sambucus racemosa* L., and Demi *et al*. (2007) from Iran in leaves of chrysanthemum.

Voucher specimens have been deposited in the Museo de Zoología Agrícola (MIZA), Universidad Central de Venezuela, Maracay, Venezuela.

This is the second detection of *A. ritzemabosi* in Venezuela and the first report of it infecting chrysanthemum plants. In the past the nematode had been detected only once, associated with *Polianthes tuberosa* in La Encrucijada de Carabobo (Carabobo State), by Mered-

ith and Yépez (1973). Apparently, the planting material was originally taken from Los Teques (1170 masl), Miranda State, a rather humid area important for the cultivation of ornamental plants. Due to the dry climate in La Encrucijada de Carabobo, the nematode did not find favourable conditions for its establishment there and has not been detected in that area again.

The damage caused by *A. ritzemabosi* to cut flowers and other ornamental plants in Venezuela is probably considerable and it requires further studies to assess the importance of the nematode in these crops. Erroneous field diagnosis, due to difficulty in differentiating the symptoms caused by fungal and bacterial diseases from those caused by this foliar nematode, may have delayed its detection in Venezuela.

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