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## PLANT PARASITIC NEMATODES ASSOCIATED WITH RICE IN SRI LANKA

by

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**Summary.** A nematode survey carried out in 1979-1980 in Sri Lanka indicated that *Hirschmanniella oryzae* was widespread but not causing much evident damage in rice fields. Morphometrically, females of *H. oryzae* from Sri Lanka have a shorter body and a posterior vulva compared to topotypes; conversely males are longer. *Aphelenchoides besseyi* was detected only in 27 rice seed stocks out of 200 examined. It was not found in the northern Province and occurred more frequently in the wet zone. However, it does not seem to be a major pest of rice in Sri Lanka.

The rice root nematode, *Hirschmanniella oryzae*, is widespread in Sri Lanka (Ekanayake and Ekanayake, 1990). The white tip nematode of rice, *Aphelenchoides besseyi*, also occurs there and is the causal agent of a decline of onions (Lamberti *et al.*, 1996).

A nematode survey was undertaken of rice fields in Sri Lanka in 1979-1980 to ascertain the presence of *Hirschmanniella* and to establish the morphometric variability of *H. oryzae*.

Symptoms of the white tip disease were never observed in rice fields in Sri Lanka. Therefore samples were taken from seed stocks in several districts to establish the eventual association between rice and *A. besseyi*.

### Materials and methods

Soil and root samples were obtained from 63 rice fields. Rice plants at different stages of development were uprooted from fields and nursery beds and put in plastic bags to avoid dehydration, until extraction was possible. Nematodes adhering to the roots were extracted from the

soil by Cobb's wet sieving technique. Those within the roots were revealed by staining in boiling lactophenol with acid fuchsin. Measurements were taken on specimens preserved in 5% formalin and mounted in anhydrous glycerin.

Two hundred local seed stocks were sampled. One 10 g aliquot of each seed stock was crushed in a mortar and incubated for 24 hrs in Petri dishes. Nematodes recovered were killed in 5% hot formalin and examined in water under a light microscope.

Measurements are expressed in  $\mu\text{m}$ .

### Results and discussion

All the *Hirschmanniella* specimens examined were identified after comparison with Siddiqi's (1973) description, as *H. oryzae* (Van Breda de Haan, 1902) Luc *et* Goodey, 1964.

Among the 57 samples in which *H. oryzae* occurred 23 populations having enough and well preserved specimens of either sex were measured (Table I). Most of them (17) were from the central region of the country, where

TABLE I - *Biometrics of 23 populations of Hirschmanniella oryzae from Sri Lanka.*

	L	Stylet	a	b	b'	c	c'	V%-T%	Tail	Pha-smids from tail tip	Spicules	Guber-naculum
<b>Ambepussa</b>												
<b>females (n=6)</b>												
mean	1338.7	17.8	43.3	11.6	4.9	16.5	4.6	56.3	82.7	37.2		
sd ( $\pm$ )	103.8	2.1	2.9	1.3	0.4	0.8	0.4	0.8	5.0	4.9		
min	1228.0	16.4	41.4	10.0	4.4	15.8	4.0	55.0	76.0	32.0		
max	1463.0	21.9	48.9	13.1	5.6	18.0	5.2	57.0	88.0	44.0		
<b>males (n=6)</b>												
mean	1257.7	17.6	46.5	10.8	5.1	16.9	4.7	50.0	85.7	49.0	27.3	9.1
sd ( $\pm$ )	60.8	0.2	6.0	0.5	0.2	0.4	0.6	8.9	3.2	4.5	0.5	0.2
min	1194.0	17.3	37.4	10.1	4.8	16.2	3.8	38.0	80.0	43.0	26.8	8.6
max	1353.0	17.9	51.5	11.5	5.4	17.2	5.4	60.0	89.0	55.0	28.1	9.2
<b>Angunawkla</b>												
<b>females (n=4)</b>												
mean	1349.3	17.5	50.8	12.8	4.8	16.1	4.3	55.8	83.3	37.8		
sd ( $\pm$ )	100.5	0.6	2.4	1.2	0.4	1.1	1.1	1.3	5.9	5.1		
min	1236.0	16.9	47.4	11.1	4.2	14.8	3.0	54.0	75.0	31.0		
max	1472.0	18.4	53.4	13.8	5.2	17.2	5.4	57.0	88.0	43.0		
<b>males (n=4)</b>												
mean	1248.5	17.5	46.7	10.7	5.0	17.2	4.0	51.8	81.8	54.8	27.7	9.2
sd ( $\pm$ )	78.2	0.2	4.0	0.6	0.2	0.2	0.2	12.7	2.9	11.9	0.9	0.2
min	1193.0	17.3	42.3	10.0	4.8	17.0	3.8	33.0	78.0	44.0	27.0	9.0
max	1364.0	17.7	53.4	11.1	5.2	17.4	4.2	60.0	84.0	66.0	29.0	9.4
<b>Aruwaly (North)</b>												
<b>females (n=3)</b>												
mean	1290.0	17.3	46.2	12.1	4.9	17.2	4.6	55.3	85.0	36.0		
sd ( $\pm$ )	67.1	0.5	8.7	1.3	0.2	0.8	0.7	1.5	4.4	3.6		
min	1217.0	16.7	36.3	10.8	4.6	16.4	3.8	54.0	80.0	33.0		
max	1349.0	17.7	52.4	13.3	5.0	18.0	5.2	57.0	88.0	40.0		
<b>males (n=3)</b>												
mean	1364.0	17.3	45.6	10.9	4.8	16.9	4.2	47.7	82.0	55.3	27.9	9.1
sd ( $\pm$ )	34.0	0.2	2.7	0.5	0.2	0.8	0.5	11.2	6.1	11.5	0.9	0.3
min	1325.0	17.2	43.1	10.3	4.7	16.1	3.8	38.0	78.0	44.0	27.4	8.8
max	1387.0	17.5	48.4	11.3	5.0	17.6	4.8	60.0	89.0	67.0	28.9	9.4
<b>Bombuwela K. (South)</b>												
<b>females (n=4)</b>												
mean	1334.3	17.3	45.2	11.3	5.1	16.2	4.3	55.3	79.8	36.5		
sd ( $\pm$ )	60.6	0.6	4.5	1.3	0.3	1.5	0.9	1.3	4.8	4.0		
min	1245.0	16.8	40.9	10.2	4.6	14.8	3.4	54.0	76.0	31.0		
max	1380.0	18.1	50.9	13.1	5.4	17.9	5.8	57.0	86.0	40.0		
<b>males (n=4)</b>												
mean	1296.8	17.5	44.9	10.9	5.0	16.9	4.6	48.3	84.3	66.8	27.2	9.1
sd ( $\pm$ )	49.1	0.2	1.7	1.4	0.2	0.5	0.9	10.3	4.9	4.0	0.7	0.3
min	1249.0	17.3	42.8	9.9	4.8	16.3	3.8	34.0	78.0	62.0	26.4	8.8
max	1355.0	17.8	46.5	12.9	5.3	17.4	5.4	58.0	89.0	71.8	28.0	9.4
<b>Dayiangamuwa</b>												
<b>females (n=4)</b>												
mean	1345.5	17.6	47.7	11.5	4.6	15.6	4.6	56.0	78.0	39.0		
sd ( $\pm$ )	128.4	1.0	4.1	0.3	0.6	0.3	0.5	0.8	2.7	4.2		
min	1223.0	16.3	44.4	11.3	3.7	15.2	4.0	55.0	76.0	34.0		
max	1496.0	18.7	52.9	12.0	5.2	16.0	5.0	57.0	82.0	43.0		

TABLE I - *Continued.*

	L	Stylet	a	b	b'	c	c'	V%-T%	Tail	Phas- mids from tail tip	Spicules	Guber- nacu- lum
<b>males (n=4)</b>												
mean	1245.3	17.8	45.5	10.3	5.3	17.1	5.1	43.0	83.0	50.0	28.3	9.0
sd ( $\pm$ )	63.4	0.3	1.6	0.3	0.3	0.8	0.7	9.6	3.2	14.0	0.6	0.2
min	1190.0	17.4	43.8	9.9	4.9	16.0	4.2	35.0	80.0	39.0	27.6	8.8
max	1315.0	18.0	47.7	10.5	5.5	17.8	5.8	54.0	87.0	70.0	28.9	9.2
<b>Doluwa</b>												
<b>females (n=4)</b>												
mean	1325.3	17.9	47.4	11.9	4.7	16.3	4.9	56.8	85.3	40.0		
sd ( $\pm$ )	73.9	1.1	3.5	1.2	0.4	1.3	0.4	0.5	3.2	4.1		
min	1258.0	16.3	43.9	10.4	4.2	15.0	4.4	56.0	82.0	36.0		
max	1405.0	18.7	51.9	13.2	5.2	17.8	5.4	57.0	88.0	44.0		
<b>males (n=4)</b>												
mean	1259.8	17.8	46.2	10.4	5.3	15.9	5.4	53.8	84.8	53.3	27.6	9.2
sd ( $\pm$ )	17.6	0.2	3.9	0.4	0.2	2.1	0.2	9.5	4.3	8.1	0.5	0.1
min	1234.0	17.6	41.7	9.9	5.1	12.9	5.2	40.0	81.0	47.0	26.9	9.0
max	1274.0	18.0	51.3	10.9	5.5	17.6	5.6	60.0	89.0	65.0	28.1	9.2
<b>Godawelayaya</b>												
<b>females (n=4)</b>												
mean	1373.0	17.7	47.0	12.4	4.5	14.8	4.7	56.0	83.0	37.8		
sd ( $\pm$ )	49.6	0.8	1.5	1.5	0.3	2.5	0.3	0.8	4.7	1.7		
min	1305.0	16.6	44.9	10.5	4.2	11.1	4.4	55.0	77.0	36.0		
max	1421.0	18.4	48.4	13.6	4.8	16.8	5.0	57.0	88.0	40.0		
<b>males (n=4)</b>												
mean	1299.5	17.7	44.7	11.1	5.5	17.1	4.5	41.0	84.0	65.5	28.3	9.0
sd ( $\pm$ )	81.4	0.4	1.9	0.2	0.2	0.6	0.8	4.7	2.9	5.1	0.5	0.2
min	1208.0	17.1	43.0	10.9	5.2	16.4	3.6	35.0	81.0	59.0	27.5	8.8
max	1391.0	18.0	47.4	11.3	5.7	17.7	5.6	46.0	88.0	70.0	28.7	9.2
<b>Habarana P. (North)</b>												
<b>females (n=3)</b>												
mean	1335.0	17.6	50.1	13.3	5.3	16.7	4.1	54.3	78.0	41.0		
sd ( $\pm$ )	79.0	0.9	3.6	0.7	0.1	0.7	0.1	0.6	1.7	4.6		
min	1284.0	16.8	45.9	12.5	5.2	16.0	4.0	54.0	76.0	36.0		
max	1426.0	18.6	52.4	13.7	5.4	17.4	4.2	55.0	79.0	46.0		
<b>males (n=3)</b>												
mean	1326.0	17.5	46.6	10.9	5.0	16.7	4.7	36.0	85.0	61.7	27.5	9.2
sd ( $\pm$ )	64.1	0.3	5.0	0.7	0.3	0.4	0.7	1.7	1.7	9.7	0.3	0.3
min	1252.0	17.2	41.3	10.1	4.7	16.5	4.0	34.0	83.0	51.0	27.1	8.8
max	1363.0	17.8	51.2	11.3	5.3	17.2	5.4	37.0	86.0	70.0	27.7	9.4
<b>Hambantota (South)</b>												
<b>females (n=10)</b>												
mean	1388.4	17.6	45.3	11.7	4.7	15.9	4.1	55.4	81.4	38.9		
sd ( $\pm$ )	87.9	0.9	3.4	1.2	0.3	1.0	0.8	1.2	4.6	3.8		
min	1263.0	16.3	41.4	10.1	4.2	14.8	3.0	54.0	75.0	33.0		
max	1498.6	18.8	51.9	13.7	5.2	17.8	5.2	57.0	109.0	45.0		
<b>males (n=10)</b>												
mean	1317.9	17.7	45.3	10.8	5.2	16.7	4.8	46.4	85.0	59.0	27.4	9.1
sd ( $\pm$ )	56.7	0.2	4.0	0.6	0.2	0.5	0.5	7.5	4.3	12.5	0.8	0.2
min	1232.0	17.2	41.2	9.9	4.7	16.1	4.2	35.0	78.0	40.0	26.2	8.8
max	1396.0	18.0	50.3	11.5	5.5	17.3	5.6	60.0	89.0	71.0	28.9	9.4

TABLE I - *Continued.*

	L	Stylet	a	b	b'	c	c'	V%-T%	Tail	Phasmids from tail tip	Spicules	Gubernaculum
<b>Hindagala</b>												
<b>females (n=4)</b>												
mean	1300.3	17.7	47.4	12.3	5.1	15.9	4.6	56.3	84.3	36.3		
sd ( $\pm$ )	73.0	0.6	2.4	1.2	0.4	1.1	0.9	1.0	3.9	4.8		
min	1217.0	17.2	45.4	11.1	4.6	14.8	3.6	55.0	79.0	31.0		
max	1395.0	18.6	50.9	13.5	5.4	17.2	5.6	57.0	88.0	42.0		
<b>males (n=4)</b>												
mean	1306.3	17.7	46.1	10.8	5.2	17.3	4.5	56.3	83.3	64.8	28.0	9.1
sd ( $\pm$ )	28.2	0.4	2.0	0.6	0.3	0.4	0.7	3.9	3.3	3.9	0.5	0.2
min	1282.0	17.3	43.8	9.9	4.8	16.9	3.8	51.0	80.0	61.0	27.4	8.8
max	1338.0	18.1	48.4	11.3	5.6	17.6	5.4	60.0	87.0	69.0	28.5	9.2
<b>Kantalai (North)</b>												
<b>females (n=8)</b>												
mean	1288.0	17.2	46.7	12.2	4.7	16.1	4.1	55.9	82.0	35.9		
sd ( $\pm$ )	62.1	0.8	3.5	1.2	0.4	1.1	0.7	2.0	4.7	3.2		
min	1210.0	16.3	43.4	10.5	4.2	14.8	3.0	54.0	75.0	31.0		
max	1394.0	18.4	52.9	13.6	5.2	18.0	5.2	60.0	87.0	40.0		
<b>males (n=7)</b>												
mean	1263.9	18.0	47.5	10.3	5.1	16.9	4.1	49.7	85.0	50.4	27.6	9.1
sd ( $\pm$ )	69.5	1.0	3.7	0.4	0.2	0.4	0.2	11.4	3.2	10.3	0.5	0.3
min	1187.0	17.3	41.4	9.9	4.8	16.4	3.8	33.0	80.0	40.0	26.9	8.8
max	1384.0	20.3	51.1	11.1	5.4	17.6	4.4	59.0	89.0	66.0	28.4	9.4
<b>Keballa G.</b>												
<b>females (n=4)</b>												
mean	1354.8	18.3	48.2	11.9	4.9	16.8	4.4	56.3	84.8	42.0		
sd ( $\pm$ )	106.4	0.4	4.4	0.5	0.3	0.9	0.8	0.5	1.7	2.7		
min	1217.0	17.9	42.9	11.2	4.4	15.4	3.6	56.0	83.0	38.0		
max	1472.0	18.7	52.9	12.3	5.2	17.4	5.4	57.0	87.0	44.0		
<b>males (n=4)</b>												
mean	1304.0	17.6	44.6	10.4	4.8	16.7	4.4	53.3	86.3	52.3	27.7	9.1
sd ( $\pm$ )	34.0	0.4	1.8	0.3	1.0	0.3	0.8	7.0	2.6	10.5	0.5	0.1
min	1268.0	17.3	42.3	9.9	3.4	16.4	3.8	43.0	84.0	44.0	27.2	9.0
max	1335.0	18.0	46.7	10.7	5.5	17.0	5.6	59.0	89.0	66.0	28.4	9.2
<b>Mahakanda</b>												
<b>females (n=3)</b>												
mean	1373.7	18.0	47.1	11.9	4.5	15.9	4.3	55.7	84.7	36.3		
sd ( $\pm$ )	131.0	0.8	1.9	0.9	0.1	1.0	0.9	1.2	5.8	4.2		
min	1227.0	17.3	44.9	11.0	4.4	14.8	3.2	55.0	78.0	33.0		
max	1479.0	18.9	48.4	12.7	4.6	16.6	4.8	57.0	88.0	41.0		
<b>males (n=3)</b>												
mean	1208.3	17.3	43.1	11.0	4.8	17.4	4.2	49.3	82.3	51.0	28.1	8.9
sd ( $\pm$ )	6.1	0.2	1.1	0.4	0.2	0.2	0.5	5.8	3.1	6.0	0.7	0.2
min	1203.0	17.2	41.9	10.7	4.7	17.3	3.8	46.0	79.0	45.0	27.4	8.8
max	1215.0	17.5	43.9	11.5	5.0	17.7	4.8	56.0	85.0	57.0	28.7	9.2
<b>Mahiyangana</b>												
<b>females (n=3)</b>												
mean	1352.7	18.0	46.1	13.0	4.9	16.7	4.6	56.7	80.3	38.7		
sd ( $\pm$ )	42.2	0.9	3.7	1.1	0.1	1.2	0.9	0.6	3.5	6.1		
min	1323.0	16.9	41.9	11.7	4.8	15.6	3.6	56.0	77.0	32.0		
max	1401.0	18.5	48.9	13.6	5.0	18.0	5.2	57.0	84.0	44.0		
<b>males (n=3)</b>												

TABLE I - *Continued.*

	L	Stylet	a	b	b'	c	c'	V%-T%	Tail	Pha- smids from tail tip	Spicules	Guber- nacu- lum
mean	1341.3	17.6	44.3	10.7	5.1	17.3	4.5	48.0	85.0	63.0	28.7	9.2
sd ( $\pm$ )	143.2	0.3	1.4	0.7	0.3	0.5	0.5	10.6	0.0	6.9	0.3	0.0
min	1194.0	17.4	43.0	10.3	4.9	17.0	4.0	36.0	85.0	55.0	28.4	9.2
max	1480.0	17.9	45.7	11.5	5.4	17.8	5.0	56.0	94.0	67.0	29.0	9.2
<b>Monakulam P.</b>												
<b>females (n=3)</b>												
mean	1295.7	18.5	49.9	11.2	5.0	15.9	5.2	55.7	84.7	38.3		
sd ( $\pm$ )	68.8	0.2	1.5	1.2	0.3	1.3	0.3	1.5	2.9	3.8		
min	1218.0	18.4	48.4	10.5	4.6	15.0	4.8	54.0	83.0	34.0		
max	1349.0	18.7	51.4	12.6	5.2	17.4	5.4	57.0	88.0	41.0		
<b>males (n=3)</b>												
mean	1308.3	17.4	47.9	10.4	5.3	17.0	3.9	50.0	84.3	55.7	28.7	9.1
sd ( $\pm$ )	54.7	0.4	5.5	0.1	0.5	0.5	0.4	13.2	3.5	13.5	0.3	0.1
min	1247.0	17.1	41.7	10.3	4.8	16.6	3.6	35.0	81.0	42.0	28.4	9.0
max	1352.0	17.9	52.2	10.5	5.7	17.6	4.4	60.0	88.0	69.0	28.9	9.2
<b>Dambulla</b>												
<b>females (n=9)</b>												
mean	1373.1	17.9	45.7	12.1	4.8	16.5	3.8	55.6	79.2	37.4		
sd ( $\pm$ )	91.6	0.7	3.5	1.2	0.5	0.7	0.7	0.7	3.8	4.9		
min	1252.0	16.7	41.4	10.6	4.2	15.2	3.0	54.0	75.0	32.0		
max	1469.0	18.9	52.9	13.7	5.4	17.6	5.2	56.0	87.0	45.0		
<b>males (n=10)</b>												
mean	1287.9	17.7	45.9	10.6	5.2	17.0	4.6	43.2	83.8	53.6	28.1	9.2
sd ( $\pm$ )	46.0	0.3	3.3	0.4	0.3	0.5	0.7	8.4	4.1	8.9	2.0	0.6
min	1210.0	17.3	41.3	10.1	4.8	16.3	3.8	33.0	78.0	42.0	26.6	8.8
max	1349.0	18.1	50.3	11.3	5.6	17.7	5.6	59.0	88.0	68.0	33.4	10.9
<b>Nalanda</b>												
<b>females (n=4)</b>												
mean	1354.0	17.4	45.5	12.5	4.9	16.2	4.7	55.0	79.5	36.3		
sd ( $\pm$ )	122.7	0.7	3.8	0.3	0.3	1.3	1.0	0.8	2.6	4.9		
min	1216.0	16.7	40.9	12.1	4.4	15.0	3.2	54.0	77.0	32.0		
max	1491.0	18.2	49.9	12.7	5.2	17.8	5.4	56.0	83.0	41.0		
<b>males (n=4)</b>												
mean	1299.5	17.3	47.0	11.0	5.7	16.7	4.1	41.0	81.0	51.5	28.1	9.0
sd ( $\pm$ )	72.5	0.4	3.7	0.5	0.1	0.4	1.0	6.5	2.4	4.0	1.2	0.3
min	1221.0	17.1	43.8	10.3	5.5	16.3	3.6	35.0	79.0	48.0	26.4	8.8
max	1386.0	18.0	52.0	11.5	5.7	17.2	5.6	50.0	84.0	57.0	29.0	9.4
<b>Naranwita</b>												
<b>females (n=4)</b>												
mean	1411.0	16.9	49.4	11.6	4.8	16.8	3.9	55.5	78.0	40.8		
sd ( $\pm$ )	71.2	0.4	2.3	1.3	0.6	0.8	1.0	1.3	2.2	3.3		
min	1323.0	16.6	46.4	10.7	4.2	16.0	3.0	54.0	75.0	37.0		
max	1496.0	17.3	51.9	13.5	5.4	17.4	5.2	57.0	80.0	44.0		
<b>males (n=4)</b>												
mean	1334.0	17.8	48.8	11.0	5.3	16.5	4.9	39.5	82.5	58.0	27.8	9.1
sd ( $\pm$ )	52.7	0.4	4.2	0.2	0.4	0.3	0.5	5.1	5.1	9.1	0.9	0.3
min	1268.0	17.2	42.8	10.7	4.7	16.2	4.4	36.0	78.0	51.0	26.8	8.8
max	1396.0	18.1	52.0	11.1	5.6	16.8	5.6	47.0	89.0	70.0	29.0	9.4
<b>Naula</b>												

TABLE I - *Continued.*

	L	Stylet	a	b	b'	c	c'	V%-T%	Tail	Pha-smids from tail tip	Spicules	Guber-naculum
<b>females (n=4)</b>												
mean	1315.3	18.1	46.8	12.2	5.0	16.4	5.2	55.8	82.8	35.0		
sd ( $\pm$ )	65.0	1.1	4.1	1.4	0.6	1.2	0.6	1.5	4.3	4.2		
min	1251.0	16.4	41.9	10.3	4.2	15.4	4.4	54.0	77.0	32.0		
max	1400.0	18.8	50.9	13.6	5.4	18.0	5.6	57.0	86.0	41.0		
<b>males (n=4)</b>												
mean	1335.8	17.8	42.5	10.8	5.3	16.8	4.9	47.8	82.8	45.8	27.1	9.2
sd ( $\pm$ )	36.4	0.3	1.5	0.6	0.3	0.7	0.9	7.8	2.9	7.6	0.7	0.3
min	1290.0	17.3	41.2	10.3	4.8	16.2	3.8	40.0	79.0	39.0	26.3	8.8
max	1368.0	18.0	44.2	11.5	5.5	17.6	5.6	58.0	85.0	55.0	27.7	9.4
<b>Palapathwela</b>												
<b>females (n=3)</b>												
mean	1309.0	17.2	51.6	12.2	4.6	16.2	3.9	54.3	83.3	38.3		
sd ( $\pm$ )	79.6	0.3	0.6	1.9	0.4	0.6	0.9	0.6	7.2	3.2		
min	1221.0	16.9	50.9	10.1	4.2	15.6	3.0	54.0	75.0	36.0		
max	1376.0	17.4	51.9	13.7	5.0	16.8	4.8	55.0	88.0	42.0		
<b>males (n=3)</b>												
mean	1224.3	17.6	45.6	10.2	5.1	16.5	4.9	41.3	82.3	54.3	27.6	9.2
sd ( $\pm$ )	30.0	0.2	2.8	0.2	0.2	0.3	0.8	7.2	4.0	10.6	0.8	0.3
min	1195.0	17.5	42.9	10.1	5.0	16.3	4.0	33.0	78.0	43.0	26.9	8.8
max	1255.0	17.8	48.5	10.5	5.3	16.9	5.4	46.0	86.0	64.0	28.5	9.4
<b>Plimantalawa</b>												
<b>females (n=4)</b>												
mean	1415.8	17.6	44.8	12.1	4.5	16.6	4.0	55.3	82.3	39.3		
sd ( $\pm$ )	73.4	1.1	2.8	1.7	0.3	1.3	0.8	1.3	5.4	2.2		
min	1314.0	16.6	40.9	10.4	4.2	15.4	3.0	54.0	75.0	36.0		
max	1489.0	18.8	47.4	13.8	4.8	17.8	4.8	57.0	88.0	41.0		
<b>males (n=4)</b>												
mean	1338.5	17.5	46.3	11.0	5.0	16.5	4.9	40.3	83.3	52.8	27.5	9.1
sd ( $\pm$ )	68.0	0.3	2.2	0.6	0.3	0.3	0.3	5.4	3.9	14.8	1.0	0.3
min	1244.0	17.2	43.6	10.1	4.7	16.3	4.4	33.0	78.0	39.0	26.6	8.8
max	1398.0	17.9	48.3	11.5	5.4	17.0	5.2	46.0	87.0	66.0	28.7	9.4
<b>Uhana K.</b>												
<b>females (n=4)</b>												
mean	1368.5	17.8	43.2	11.3	4.8	16.0	4.6	55.5	85.0	42.0		
sd ( $\pm$ )	111.5	0.7	2.2	0.9	0.4	0.6	0.9	1.3	2.9	2.9		
min	1258.0	16.7	41.4	10.1	4.4	15.0	3.4	54.0	81.0	39.0		
max	1494.0	18.3	46.4	12.2	5.4	16.4	5.6	57.0	88.0	45.0		
<b>males (n=4)</b>												
mean	1328.5	17.7	48.0	10.3	5.4	16.9	4.7	53.5	81.5	55.5	28.1	9.1
sd ( $\pm$ )	41.3	0.4	3.3	0.3	0.2	0.3	1.0	9.7	3.1	10.3	0.5	0.3
min	1268.0	17.1	43.6	9.9	5.2	16.5	3.6	39.0	79.0	43.0	27.7	8.8
max	1356.0	18.0	51.2	10.7	5.7	17.1	5.6	60.9	86.0	67.0	28.9	9.4
<b>Weligatta (South)</b>												
<b>females (n=3)</b>												
mean	1404.7	18.0	47.2	12.0	5.1	16.5	4.9	56.0	79.7	37.3		
sd ( $\pm$ )	71.5	0.1	3.8	1.2	0.1	1.3	0.8	1.0	3.5	5.5		
min	1341.0	17.9	42.9	10.9	5.0	15.6	4.0	55.0	76.0	32.0		
max	1482.0	18.1	49.4	13.2	5.2	18.0	5.4	57.0	83.0	43.0		
<b>males (n=3)</b>												

TABLE I - *Continued.*

	L	Stylet	a	b	b'	c	c'	V%-T%	Tail	Pha- smids from tail tip	Spicules	Guber- nacu- lum
mean	1257.3	17.2	45.3	10.4	5.1	17.4	4.5	47.0	81.3	46.7	27.5	9.0
sd ( $\pm$ )	51.4	0.2	2.6	0.9	0.5	0.5	0.8	8.5	2.5	14.2	0.9	0.2
min	1199.0	17.1	43.5	9.9	4.7	16.8	3.6	38.0	79.0	38.0	26.7	8.8
max	1296.0	17.4	48.3	11.5	5.7	17.7	5.0	55.0	84.0	63.0	28.5	9.2
<b>Total</b>												
<b>females (n=102)</b>												
mean	1297.0	18.7	45.5	11.0	4.0	16.4	5.1	56.0	89.0	38.0		
sd ( $\pm$ )	85.7	0.8	3.6	1.1	0.4	1.0	0.8	1.1	4.4	4.1		
min	1210.0	16.3	36.3	9.9	3.7	11.1	3.0	54.0	75.0	31.0		
max	1498.6	21.9	53.4	13.8	5.6	18.0	5.8	60.0	109.0	46.0		
<b>males (n=102)</b>												
mean	1320.0	18.4	46.1	10.7	4.4	15.8	5.1	40.0	87.0	48.0	27.8	9.1
sd ( $\pm$ )	63.5	0.4	3.4	0.6	0.4	0.6	0.7	9.1	3.5	10.3	0.9	0.3
min	1187.0	17.1	37.4	9.9	3.4	12.9	3.6	33.0	78.0	38.0	26.2	8.6
max	1480.0	20.3	52.2	12.9	5.7	17.9	5.8	60.9	94.0	71.8	33.4	10.9

the nematode is widespread (Ekanayake and Ekanayake, 1990), three from the northern (Aruwaly, Habarana Polonnaruwa and Kantalai) and three from the southern (Bombuwela Kalutara, Hambantota and Weligatta).

Females of *Hirschmanniella oryzae* from Sri Lanka (Table I) have a shorter body, slightly longer stylet and posterior vulva compared to topotypes (Siddiqi, 1973); conversely males are longer even than females within the same population, and with slightly longer stylet, spicules and gubernaculum.

In spite of such biometric differences the Sri Lanka populations cannot be distinguished morphologically from *H. oryzae* (Siddiqi, 1973). In fact both male and female have a straight to slightly ventrally arcuate habitus in dead specimens; cuticle marked by c.a. 1.7  $\mu$ m wide annulation; lip region low, continuous with body contour, marked by 3 to 4 annules; spear knobs rounded; oesophageal glands elongate, overlapping ventrally the intestine; lateral fields not areolated; female genital system paired with outstretched ovaries; tail elongate, conoid, bear-

ing a sharp ventral mucro at the end; male with bursa, cephalated, slightly arcuate spicules and simple gubernaculum (Fig. 1).

The populations of *H. oryzae* from Sri Lanka are morphometrically identical to a single population reported from China by Vovlas *et al.* (1996).

Rice fields in Sri Lanka are generally infested by *H. oryzae* but nematodes are in most cases few and plants symptomless. However, in patches with stunted and yellowish plants (Fig. 2), numerous specimens of *H. oryzae* occurred. A significant negative correlation between population density of *H. oryzae* and yield has been found in rice fields in southern India (Muthukrishnan *et al.*, 1977).

A brief description and illustrations of *Aphelelenchoides besseyi* Christie from Sri Lanka are given by Lamberti *et al.* (1996).

In Table II are listed the districts where the 200 seed samples were collected. Only 27 of them were infested by the causal agent of the white tip disease of rice. The infestation was not cultivar dependent, since 26 different culti-

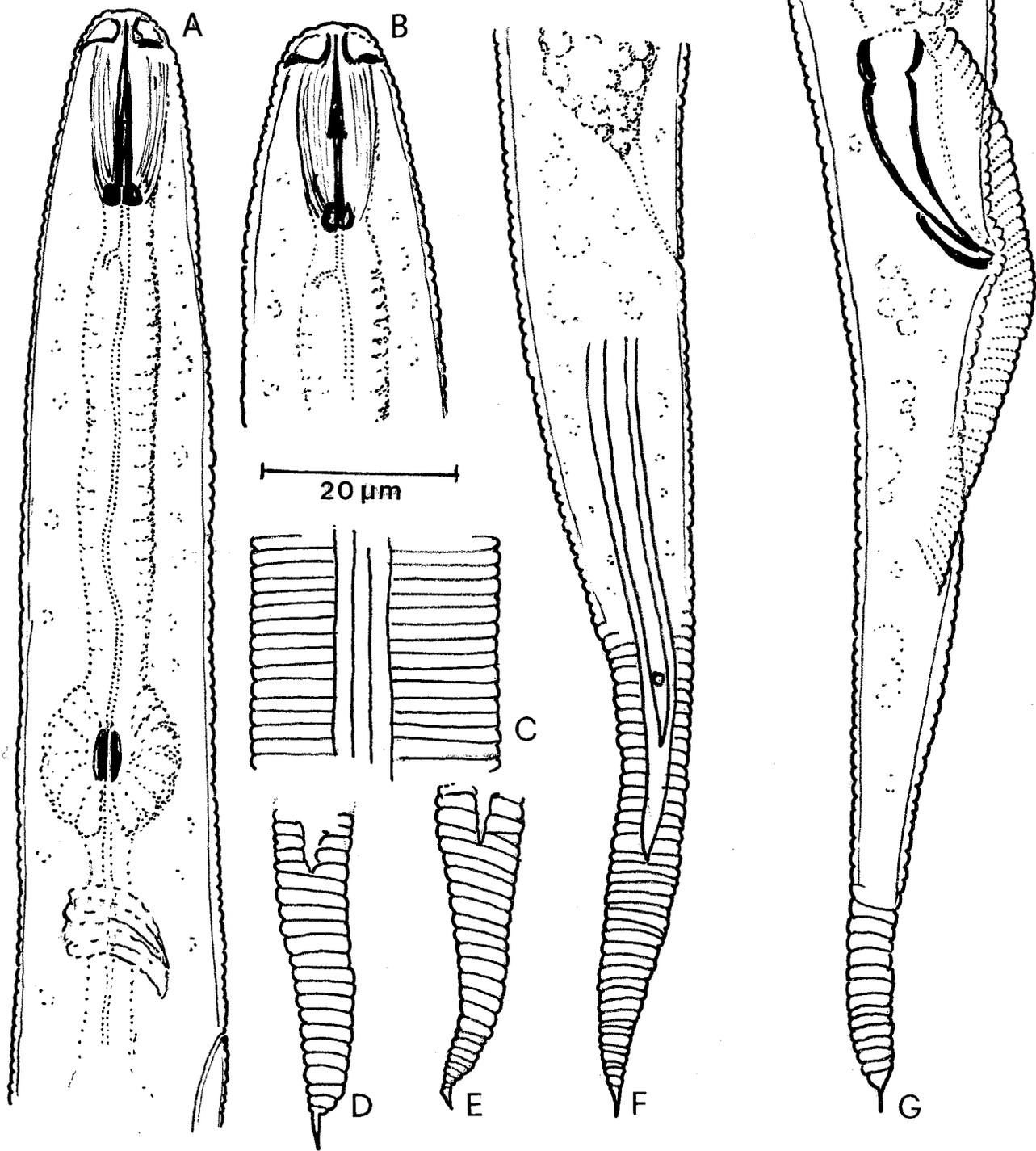


Fig. 1 - *Hirschmanniella oryzae* from Sri Lanka: A, female anterior region; B, female anterior end; C, lateral fields; D-F female tails; G, male tail.



Fig. 2 - A patch of stunted and yellow plants in a rice field infested by *H. oryzae* in Sri Lanka.

TABLE II - *Districts of origin of the seed stocks examined for Aphelenchoides besseyi.*

Province	District	Number of samples	Number of positive samples
Northern	Jaffna	27	
	Vavuniya	3	
North Central	Anuradhapura	5	
	Polonnaruwa	8	1
Central	Kandy	13	1
	Kurunegala	7	2
Eastern	Amparai	4	
	Batticaloa	3	3
	Trincomalee	2	
Western	Chilaw	2	1
	Colombo	49	8
	Kalutara	2	
Uva	Badulla	3	1
Sabaragamuwa	Kegalle	10	1
Southern	Galle	14	2
	Hambantota	11	1
	Matara	37	6

vars were found infested, mostly at a very low level. In fact, in as many as 20 samples 1 to 3 nematodes only were observed in 10 g of seeds; from four samples collected respectively from Borella, Nagoda and Walasmulla, in the District of Colombo and at Pilana, in the District of Kurunegala, from 4 to 10 nematodes were extracted; two samples, one from Nagoda and the other from Denyaya. In the District of Matara, contained 11 to 20 nematodes/10 g of seeds and only in one sample from Matara, were over 20 *A. besseyi* per 10 g of seeds detected. Most specimens observed were juveniles.

*A. besseyi* was not found in the northern Province and appeared to be more frequent in the southern region where, however, a larger number of samples were collected. Nevertheless it is worthwhile noting that higher infestations and higher frequency of occurrence were observed in the wet zone of the country.

*Aphelenchoides besseyi* is not considered as a major problem of rice in Sri Lanka. However, in Tamil Nadu, India, nematode populations rang-

ing from 3 to 47 per spikelet on symptomless rice plants seem to cause economical damage (Muthukrishnan *et al.*, 1974).

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