

**PLANT-PARASITIC NEMATODES ASSOCIATED WITH  
TROPICAL PASTURES IN COLOMBIA**

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**ABSTRACT**

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A survey of three regions of Colombia revealed a total of 31 species of plant-parasitic nematodes associated with tropical pasture legumes and grasses. Seventeen of these nematode species had not been recorded previously in Colombia. There also are 120 newly reported associations of plant-parasitic nematodes on tropical pasture legumes and grasses. The nematode species found most commonly and abundantly were *Helicotylenchus* spp., *Pratylenchus* spp., especially *P. brachyurus*, *Monotrichodorus monohystera* and *Xiphinema* spp. The plant species surveyed were *Andropogon gayanus*, *Arachis pintoi*, *Brachiaria* spp., *Centrosema* spp., *Desmodium* spp., *Hyparrhenia rufa*, *Melinis* sp., *Pueraria phaseoloides*, *Stylosanthes* spp., and *Zornia* sp.

*Key words:* tropical pastures, survey, Colombia.

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**RESUMEN**

Stanton, J. M., M. R. Siddiqi y J. M. Lenné. 1989. Nematodos fitoparásitos asociados con pastos tropicales en Colombia. *Nematropica* 19:169-175.

Un inventario en tres regiones en Colombia reveló un total de 31 especies de nematodos fitoparásitos asociados con forrajeras tropicales leguminosas y gramíneas. Diecisiete de estas especies de nematodos no se han reportado antes en Colombia. También, hay 120 asociaciones nuevas de nematodos reportados en forrajeras tropicales leguminosas y gramíneas y 70 asociaciones nuevas. Las especies de nematodos más comunes y abundantes fueron *Helicotylenchus* spp., *Pratylenchus* spp., especialmente *P. brachyurus*, *Monotrichodorus monohystera* y *Xiphinema* spp. Las especies de plantas examinadas fueron *Andropogon gayanus*, *Arachis pintoi*, *Brachiaria* spp., *Centrosema* spp., *Desmodium* spp., *Hyparrhenia rufa*, *Melinis* sp., *Pueraria phaseoloides*, *Stylosanthes* spp. y *Zornia* sp.

*Palabras claves:* pastos tropicales, inventario, Colombia.

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**INTRODUCTION**

With the increasing need for beef and milk production on acid,

infertile soils of tropical Latin America, there has been continued selection and testing of adapted forage legumes and grasses by Centro Internacional de Agricultura Tropical (CIAT). The aim is to provide persistent and nutritious pastures adapted to constraints imposed by many factors including pests and diseases.

Associations of plant-parasitic nematodes with tropical forage legumes and grasses suggest that nematodes have the potential to restrict pasture productivity. For example, *Tylenchulus semipenetrans* Cobb is known to parasitize *Andropogon rhizomatus* Sw. (15). *Pratylenchus brachyurus* (Godfrey) Filipjev & Schuurmans Stekhoven severely affects growth of *Brachiaria mutica* (Forsk.) Stapf in Brazil (5). In India, *Tylenchorhynchus vulgaris* Upadhyay has caused yield loss of *Stylosanthes hamata* (L.) Taub. (1). A *Heterodera* sp., probably *H. sacchari* Luc & Merny, was found in Nigeria on both *Paspalum conjugatum* Sw. and *B. brizantha* (Hochst ex A. Rich) Stapf. (8). There are several important nematode pests of *Desmodium ovalifolium* Wall., including *Meloidogyne incognita* (Kofoid & White) Chitwood (2), *M. javanica* (Treub) Chitwood (3), *Heterodera glycines* Ichinohe (9) and *Pterotylenchus cecidogenus* Siddiqi & Lenné (4,11); the last named is known to reduce survival and growth of *D. ovalifolium* in Colombia (13). *Desmodium heterocarpon* (L.) DC also is affected severely by *M. javanica* (14). *Pratylenchus brachyurus* is a parasite of *D. asperum* Desv. and *D. polycarpum* (7), and *P. loosi* Loof of *D. gyroides* DC. (6). *Andropogon gyanus* Kunth. has been reported as a host of *Helicotylenchus digonicus* Perry, *Criconemella ornata* (Raski) De Grisse & Loof, and *P. brachyurus* (10).

A survey was done in three trial areas of Colombia to determine the incidence and abundance of these or other plant-parasitic nematodes in tropical pastures.

## MATERIALS AND METHODS

Sampling was done by Stanton and Siddiqi in August 1984 at three sites in Colombia: the Instituto Colombiano Agropecuario (ICA), the Centro Internacional de Agricultura Tropical (CIAT) Research Station at Carimagua, and the ICA-CIAT Research Station at Villavicencio in the Meta department, and at the CIAT Research Station at Santander de Quilichao in the Cauca department. These sites represent well-drained isohyperthermic savanna, tropical rain forest, and semi-evergreen seasonal forest, respectively.

Improved pastures and trial plots that had been established for 2–16 years were sampled. Grasses in the native savanna also were included in the survey at Carimagua and Villavicencio. These species were *Trachypogon* sp. Nees and *Andropogon bicornis* L. at Carimagua. *Paspalum* L. sp. also was present at Villavicencio. One to four soil samples weighing

about 1 kg each were taken from each field. These samples were made up of two to five subsamples taken to a depth of 2–15 cm at random locations in the field. Soil was processed by means of sieving and decanting and nematodes were cleared from debris with a modified Baermann method (12). Nematodes were prepared for microscopic examination with the rapid lactophenol method and then mounted in glycerin within wax rings on glass slides (12).

## RESULTS AND DISCUSSION

A total of 31 species of plant-parasitic nematodes were associated with improved pastures and native savanna (Table 1). This is the first record of 18 of these species of nematodes in Colombia: *Helicotylenchus*

Table 1. Nematodes associated with tropical pastures and savanna in Colombia and their frequency.

Nematode species	Frequency (%) <sup>z</sup>
1 <i>Criconemella curvata</i> (Raski) Luc & Raski	6
2 <i>C. onoensis</i> Luc	3
3 <i>C. ornata</i> Raski	10
4 <i>Criconemella</i> sp. (undescribed)	13
5 <i>Gracilacus teres</i> Raski	2
6 <i>Helicotylenchus</i> sp. - A	6
7 <i>Helicotylenchus</i> sp. - B	16
8 <i>H. dihystra</i> (Cobb) Sher	11
9 <i>H. exallus</i> Sher	6
10 <i>H. pseudopaxilli</i> Fernandez, Razjivin, Ortega & Quincosa	23
11 <i>H. stylocercus</i> Siddiqi & Pinochet	2
12 <i>Heterodera</i> sp.	1
13 <i>Longidorus laevicapitatus</i> Williams	6
14 <i>Meloidogyne</i> sp.	1
15 <i>Monotrichodorus monohystera</i> (Allen) Andrassy	18
16 <i>Paratylenchus microdorus</i> Andrassy	4
17 <i>Paratylenchus</i> sp.	3
18 <i>Peltamigratus luci</i> Sher	1
19 <i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven	40
20 <i>P. coffeae</i> (Zimmerman) Filipjev & Schuurmans Stekhoven	2
21 <i>P. zaeae</i> Graham	30
22 <i>Pratylenchus</i> sp.	4
23 <i>Pterotylenchus cecidogenus</i> Siddiqi & Lenné	1
24 <i>Trophurus</i> sp. (undescribed)	1
25 <i>Tylenchorhynchus</i> sp. Cobb	5
26 <i>Tylenchulus</i> sp. Cobb	9
27 <i>Xiphinema brasiliense</i> Lordello	10
28 <i>X. imambaksi</i> Loof & Maas	1
29 <i>X. krugi</i> Lordello	1
30 <i>X. paritaliae</i> Loof & Sharma	1
31 <i>X. radicola</i> Goodey	1
32 <i>Xiphinema</i> sp. (undescribed)	1

<sup>z</sup>Number of samples where nematode present as percent of total number of samples.

*exallus*, *H. pseudopaxilli*, *H. stylocercus*, *Longidorus laeovicapitatus*, *Criconemella curvata*, *C. onoensis*, *C. ornata*, *Monotrichodorus monohystera*, *Paratylenchus microdorus*, *Gracilacus teres*, *Peltamigratus luci*, *Trophurus* sp., *Xiphinema brasiliense*, *X. imambaksi*, *X. krugi*, *X. paritaliae*, *X. radicola*, and *Xiphinema* sp. Furthermore, this survey also records 120 new associations of plant-parasitic nematodes on single plant species and 70 new associations of plant-parasitic nematodes on grass-legume combinations (Table 2).

Several taxa, including *Helicotylenchus* spp., *Monotrichodorus monohystera*, *Pratylenchus* spp., and *Xiphinema* spp., were abundant on established pastures. Twenty-four genera also were present in the savanna (Table 2).

Three nematode species, *Pratylenchus coffeae*, *Xiphinema imambaksi*, and *X. krugi*, were found only in soil around plant species in native savanna.

A species of *Tylenchulus* similar to *T. semipenetrans* was found in several pastures at Carimagua and Villavicencio. Large populations of juveniles were associated with both grasses and legumes, viz. *Andropogon gayanus*, *Brachiaria humidicola*, *B. decumbens*, *B. dictyoneura* in association with *Pueraria phaseoloides*, *Stylosanthes guianensis*, and *Centrosema brasilianum*. Unlike *T. semipenetrans*, males were not encountered in soil samples. Juveniles of a species of *Heterodera* were associated with savanna grasses at Carimagua. *Melinis* sp. and *Desmodium heterocarpon* were infested with a *Meloidogyne* sp.

*Helicotylenchus pseudopaxilli* was encountered in large populations around roots of *Andropogon gayanus*, *A. bicornis*, *Brachiaria brizantha*, *Hyparrhenia rufa*, and *Centrosema* sp. A species of *Helicotylenchus* (possibly undescribed) (species A in Table 1) also was found in large numbers around the roots of *A. gayanus*, *Brachiaria* sp. *Stylosanthes guianensis*, *Desmodium ovalifolium*, and *Centrosema brasilianum*. *Helicotylenchus dihystra* was associated with the legumes, *D. ovalifolium* and *D. heterophyllum* and also with the grasses, *A. gayanus*, *B. brizantha*, and *Trachypogon* sp. *Helicotylenchus dihystra* was especially abundant in trial plots at Quilichao. *Helicotylenchus exallus* occurred in large populations associated with *A. gayanus*, *Stylosanthes* sp., and *Trachypogon* sp. *Peltamigratus luci* was found associated with *Brachiaria humidicola* and *B. decumbens*.

An undescribed species of *Trophurus* was found in large numbers in only one sample from *A. gayanus*. *Tylenchorhynchus* sp. was found on several occasions on *A. gayanus*, *Brachiaria* spp., and savanna grasses.

Heavy infestations of *Desmodium* spp. sites with *Gracilacus teres*, and of *Brachiaria humidicola*, *Paspalum* sp., and *Trachypogon* sp. with *Paratylenchus* (*Paratylenchus*) *microdorus* were encountered in Carimagua. *Criconemella ornata*, *C. curvata*, and *Criconemella* sp. were found in low to moderate numbers in association with several grasses and *C. onoensis* was

Table 2. Presence and distribution of plant-parasitic nematodes of tropical pastures in Colombia.

Pasture species	Site <sup>w</sup>	Nematodes <sup>x</sup>
<i>Andropogon gayanus</i> Kunth.	C	1,(3) <sup>y</sup> ,4,6,8,9,10,15 (19),21,22,23,24,25,26
<i>Brachiaria brizantha</i> (Hochst. ex A. Rich) Stapf	C	13
	Q	8,19,21,22
	V	10,28
<i>B. decumbens</i> Stapf	C	6,15,19,21,22,25,31
	V	3,7,10,13,21,26
<i>B. humidicola</i> (Rendle) Schweickt.	C	3,4,7,10,15,16,17,18,19, 21,22,25,31
<i>Brachiaria</i> sp.	C	8,10,19,21,27
<i>Centrosema brasilianum</i> (L.) Benth.	C	5,6,8,26
<i>C. macrocarpum</i> Benth.	C	5,8,19
<i>Centrosema</i> sp.	C	1,3,7,10,19,21
<i>Desmodium heterocarpon</i> (L.) DC.	C	5,(14)
	Q	19
<i>D. heterophyllum</i> (Willd.) DC.	C	2,5,8,19
<i>D. ovalifolium</i> Wall.	C	4,6,7,17,19,21,23,25,27,30
	Q	5,8,19,22
<i>Hyparrhenia rufa</i> (C. G. Nees) Stapf	C	3,6,10,19,21,27
	V	10,13
<i>Melinis</i> sp.	C	3,6,7,12,(14),15,19,21,27
<i>Stylosanthes capitata</i> Vog.	C	4,6,7,13,19,21,27
<i>S. guianensis</i> (Aubl.) Sw.	C	4,11,15,16,19,21,26
<i>S. macrocephala</i> M. B. Ferr. & S. Costa	C	19
	C	6,15,19
<i>S. viscosa</i> Sw.	C	6,22
<i>Zornia</i> sp.	C	6,22
<i>A. gayanus</i> + <i>Pueraria phaseoloides</i> <sup>z</sup> (Roxb.) Benth.	C	1,2,3,6,7,8,10,11,15,(19)
<i>A. gayanus</i> + <i>Stylosanthes</i> sp.	C	3,4,6,10,15,21
<i>Brachiaria</i> + <i>Arachis pintoi</i>	C	6,10,19,21
<i>Brachiaria</i> sp. + <i>D. ovalifolium</i>	C	6,19,21,32
<i>Brachiaria</i> sp. + <i>P. phaseoloides</i>	C	2,3,4,7,10,13,18,19,21,26,27,28,32
	V	2,3,7,10,19,32
Native savanna species	C	1,2,3,4,6,7,8,9,10,11,15,16,17,19, 20,21,25,26,27,28,29,30,32
	V	9,10,21,25

<sup>w</sup>C = Carimagua; Q = Santander de Quilichao; V = Villavicencio.

<sup>x</sup>Numbers refer to listing in Table 1.

<sup>y</sup>Numbers in parentheses indicate associations which have been reported previously. Those not in parentheses indicate first recordings.

<sup>z</sup>Plant species growing in association.

found in large numbers associated with *Desmodium heterophyllum* and *Pueraria phaseoloides*.

*Pratylenchus* spp. were the most frequent plant nematodes encountered in association with both grasses and legumes at all three sites surveyed. *Pratylenchus zaei* and *P. brachyurus* are found commonly in large numbers, usually on grasses and legumes respectively, but both species may occur together. *Pratylenchus zaei* was found abundantly in associa-

tion with *Brachiaria* spp., *Andropogon bicornis*, *A. gayanus*, and *Hyparrhenia rufa*, and was associated with poor growth and chlorosis in some plots. Pastures of *Desmodium ovalifolium* and *Centrosema* sp. also harbored large populations of *P. zae* as did savanna grasses.

Large populations of *Pratylenchus brachyurus* developed in legumes, *Desmodium ovalifolium*, *D. heterophyllum*, and *Centrosema* spp. Large to medium populations of *P. brachyurus* were found in plots of *A. gayanus*, *A. bicornis*, *B. decumbens*, *B. humidicola*, *Melinis* sp. *Hyparrhenia rufa*, *S. guianensis*, and *S. capitata*.

*Xiphinema brasiliense* was abundant on *A. gayanus*, *B. decumbens*, *B. humidicola*, *H. rufa*, *S. capitata*, and *P. phaseoloides*. *Xiphinema radicolica*, *X. paritaliae*, *X. imambaksi*, and an undescribed species of *Xiphinema* were found in isolated cases. *Longidorus laevicapitatus* was established in many locations; large populations were found in soil associated with *B. brizantha*, *B. decumbens*, *B. dictyoneura*, *H. rufa*, and *S. capitata*. *Monotrichodorus monohystera* occurred in large numbers in association with *A. gayanus*, *B. decumbens*, *B. humidicola*, *Stylosanthes viscosa*, *Trachypogon* sp., and amongst roots of other savanna grasses.

*Criconemella* sp., *Trophurus* sp., and *Xiphinema* sp. appear to be undescribed; specimens of *M. monohystera* differ slightly from the type species and may be a distinct subspecies. These taxa will be described in a future paper.

Twelve other nematode genera and species were found in the survey, but these are not generally considered to be plant parasites. These were *Aphelenchus avenae* Bastian, *Aphelenchoides bicaudatus* (Inamura) Filipjev & Schuurmans Stekhoven, *Aphelenchoides* sp., *Basiria* sp., *Boleodorus* sp., *Discotylenchus* sp., *Ditylenchus* sp., *Filenchus* sp., *Nothotylenchus* sp., *Ottotylenchus* sp., *Safianema* sp., and *Sakia* sp. In most cases, they were found in very low numbers.

We suggest that investigations should commence on the effects of these nematodes on the productivity of pasture plant species. The most important associations are *Criconemella* spp., *P. brachyurus*, and *P. zae* with most plant species studied, *Helicotylenchus pseudopaxilli* with *Brachiaria* spp. and *Monotrichodorus monohystera* with *A. gayanus* and *Brachiaria* spp. If damage caused by nematodes is a constraint on plant growth, then resistant germplasm might be selected.

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