

Research Article

Compilation of Phytonematodes of the Family Longidoridae (Nematoda: Dorylaimida) from Senegal

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Abstract

Historically, this synthesis work on the Dorylaimida parasite of plants encountered in Senegal is the second of its kind. It is then a synoptic view that, through the scientific literature on the description of populations of phytonematode dorylaimides from Senegal, lists all species of Longidoridae from Senegal. The present work aims to: i) make an inventory of the Longidoridae nematofauna described in Senegal so far; ii) contribute to the knowledge of the geographic distribution of this nematofauna in Senegal as well as the host plants, iii) establish a simple local identification key for each of the genera *Paralongidorus* and *Xiphinema*. Among the 06 (six) genera that comprise the family of Longidoridae, 03 (three) occur in Senegal, including genera of *Longidorus*, *Paralongidorus* and *Xiphinema*. Species are distributed as it follows: one species of *Longidorus* (*Longidorus pisi*), four species of *Paralongidorus* (*P. bullatus*, *P. dakarensis*, *P. duncani*, and *P. sivestris*), and fourteen species of *Xiphinema* (*X. algeriense*, *X. americanum*, *X. basiri*, *X. bergeri*, *X. ebriense*, *X. elongatum*, *X. ifacolum*, *X. krugi*, *X. luci*, *X. mounporti*, *X. opisthohysterum*, *X. parasetariae*, *X. savanicola*, *X. setariae*). Among the fourteen regions of Senegal, the presence of nematodes of the Longidoridae family has been reported in ten of them (Dakar, Diourbel, Fatick, Kaffrine, Kaolack, Kolda, Saint-Louis, Tambacounda, Thiès and Ziguinchor). The following genera of host plants are registered: *Pennisetum* and *Sorghum* (for species of *Longidorus*); *Acacia*, *Agrotis*, *Andropogon*, *Arachis*, *Borreria*, *Combretum*, *Gossypium*, *Guiera* *Pennisetum*, *Sorghum* (for *Paralongidorus* species); *Abelmoschus*, *Agrotis*, *Apium*, *Arachis*, *Borreria*, *Brassica*, *Citrullus*, *Citrus*, *Combretum*, *Gossypium*, *Guiera*, *Hibiscus*, *Hypochoeris*, *Ipomoea*, *Nymphaea*, *Oryza*, *Pandanus*, *Pennisetum*, *Solanum*, *Tridax*, and *Vigna* (for *Xiphinema* species). Local keys identification characters include: body length and stylet length (for *Paralongidorus* species); genital branches shape, structure of labial region, structure of ovary, structure of uterus, structure of Z-Organ, tail length, and tail width (for *Xiphinema* species).

Keywords

Compilation, Longidoridae, *Longidorus*, *Paralongidorus*, Phytonematodes, Senegal, *Xiphinema*

1. Introduction

Since the description of *Anguina tritici* Needham, 1743, the study of parasitic plant nematodes has developed significantly in Europe and America. This fact is linked to the disastrous economic impact of the latters. Indeed, these nematodes that

can be ectoparasites, semi-endoparasites or endoparasites, constitute one of the most dangerous enemies of cultivated plant species; according to Sasser & Freckman [11], the annual decline in crop yields due to phytoparasitic nematodes

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is estimated at 12%, or annual monetary losses for global agriculture of about US\$100 billion. However, we can see that the study and knowledge of these pests has been remarkably late in Africa, particularly in West Africa and Senegal. In Senegal, a laboratory for nematological studies was erected in Dakar (the capital of Senegal) by France in 1974, and this in the framework of scientific research through the former French colonies. This laboratory was one of the research institutions of the "Office de la Recherche Scientifique et Technique d'Outre-Mer (ORSTOM)" [9], which became the "Institut de Recherche pour le Développement (IRD)" in 1998. The main task of this laboratory was to inventory plant parasite species in Senegal and its neighbouring countries.

Plant nematodes are classified into three orders: Order of the Rhabditida, Order of the Dorylaimida and Order of the Triplonchida. In this work, we are particularly interested in the nematodes of the family Longidoridae of the Order of Dorylaimida where a particular work has been carried out during the last two decades [3-7, 10]. Furthermore, of all the families of Dorylaimida, Longidoridae is the only plant parasite exclusively [8].

In the history of nematology in Senegal, a single assessment on phytonematodes occurring in Senegal was made by a French nematologist, Pierre Baujard [1]. The present synthesis work aims to:

- 1) make an inventory of the nematofauna of Longidoridae described so far in Senegal,
- 2) contribute to the knowledge of the geographic distribution of this nematofauna in Senegal as well as the host plants,
- 3) establish a simple local identification key for each of the genera *Paralongidorus* and *Xiphinema*.

In our work, the systematic position of the family Longidoridae is established according to the model of De Ley & Blaxter [2].

2. Inventory of Longidoridae Species Re-corded in Senegal

This synthesis work on Dorylaimida phytoparasites encountered in Senegal concerns two periods: species reported before 1994 and those described from 1994 till now (Table 1).

Among the six (06) genera of the Longidoridae family, three are present in Senegal (*Longidorus*, *Paralongidorus* and *Xiphinema*):

- 1) The genus *Longidorus* is represented by a single species, *Longidorus pisi*.
- 2) The genus *Paralongidorus* includes four species.
- 3) The genus *Xiphinema* consists of 14 species.

Table 1. List of Longidoridae species occurring in Senegal.

Species reported before 1994	Species reported after 1994
Gender <i>Longidorus</i> Micoletzky, 1922	Gender <i>Longidorus</i> Micoletzky, 1922
	<i>L. pisi</i> Edward, Misra & Singh, 1964.
Gender <i>Paralongidorus</i> Siddiqi, Hooper & Khan, 1963	Gender <i>Paralongidorus</i> Siddiqi, Hooper & Khan, 1963
<i>P. bullatus</i> Sharma & Siddiqi, 1990.	<i>P. dakarensis</i> Faye & Mounport, 2007
<i>P. duncani</i> Siddiqi, Baujard & Mounport, 1993.	<i>P. silvestris</i> Faye & Mounport, 2010
Gender <i>Xiphinema</i> Cobb, 1913	Gender <i>Xiphinema</i> Cobb, 1913
<i>X. algeriense</i> Luc & Kostadi nov, 1982.	<i>X. americanum</i> Cobb, 1913.
<i>X. basiri</i> Siddiqi, 1959.	<i>X. ebriense</i> Luc, 1958.
<i>X. bergeri</i> Luc, 1973.	<i>X. ifacolum</i> Luc, 1961.
<i>X. elongatum</i> Schuurmans Stekhoven & Teunissen, 1938.	<i>X. mounporti</i> Faye, Barsi & Decraemer, 2012
<i>X. krugi</i> Lordello, 1955.	<i>X. opisthohysterum</i> Siddiqi, 1961.
<i>X. luci</i> Lamberti & Bleve-Zacheo, 1979.	<i>X. setariae</i> Luc, 1958.
<i>X. parasetariae</i> Luc, 1958.	
<i>X. savanicola</i> Luc & Southey, 1980.	

3. Geographical Distribution and Host Plants of Longidoridae from Senegal (Table 2)

Table 2. Species of Longidoridae occurring in Senegal: localities and host plants.

Genders	Species	Localities/Regions	Host plants
Longidorus	<i>L. pisi</i>	Diourbel, Fatick, Thiès.	<i>Pennisetum glaucum</i> , <i>Sorghum bicolor</i> .
	<i>P. bullatus</i>	Dakar, Thiès, Diourbel, Fatick, Kaolack, Kaffrine, Tambacounda.	<i>Arachis hypogaea</i> , <i>Gossypium hirsutum</i> , <i>Combretum micranthum</i> , <i>Pennisetum glaucum</i> , <i>Sorghum bicolor</i> .
<i>Paralongidorus</i>	<i>P. dakarensis</i>	Dakar	<i>Borreria verticillata</i> , <i>Agrotis</i> sp.
	<i>P. duncani</i>	Dakar, Thiès, Diourbel, Fatick, Kaolack, Kaffrine, Tambacounda.	<i>Andropogon gayanus</i> , <i>Guiera senegalensis</i> .
	<i>P. silvestris</i>	Kaolack	<i>Acacia seyal</i>
	<i>X. algeriense</i>	Diourbel	<i>Pennisetum glaucum</i>
<i>Xiphinema</i>	<i>X. americanum</i>	Dakar	<i>Borreria verticillata</i> , <i>Agrotis</i> sp.
	<i>X. basiri</i>	Kolda, Tambacounda.	Fallow field, <i>Combretum imberbe</i> .
	<i>X. bergeri</i>	Diourbel, Ziguinchor.	<i>Solanum lycopersicum</i> , <i>Oryza sativa</i> .
	<i>X. ebriense</i>	Tambacounda	<i>Combretum micranthum</i>
	<i>X. elongatum</i>	Dakar, Thiès, Diourbel, Saint-Louis, Fatick, Kaolack, Kaffrine, Tambacounda, Kolda.	<i>Solanum melongena</i> , <i>Brassica oleracea</i> , <i>Citrus limon</i> , <i>Abelmoschus esculentus</i> , <i>Vigna unguiculata</i> , <i>Hibiscus sabdarifa</i> , <i>Pennisetum glaucum</i> , <i>Guiera senegalensis</i> , <i>Citrullus lanatus</i> , <i>Ipomoea batatas</i> , <i>Solanum lycopersicum</i> .
<i>X. ifacolum</i>	Ziguinchor	<i>Oryza sativa</i>	<i>X. ifacolum</i>
<i>X. krugi</i>	Saint-Louis	<i>Citrus limon</i>	<i>X. krugi</i>
<i>X. luci</i>	Dakar, Diourbel.	<i>Apium graveolens</i> , <i>Pandanus utilis</i> .	<i>X. luci</i>
<i>X. mounporti</i>	Ziguinchor	<i>Oryza sativa</i>	<i>X. mounporti</i>
<i>X. opisthohysterum</i>	Dakar	<i>Hypochaeris</i> sp., <i>Tridax procumbens</i> .	<i>X. opisthohysterum</i>
<i>X. parasetariae</i>	Dakar, Thiès, Diourbel, Fatick, Kaolack, Kaffrine, Tambacounda, Kolda	<i>Gossypium hirsutum</i> , Fallow field <i>Pennisetum glaucum</i> .	<i>X. parasetariae</i>
<i>X. savanicola</i>	Dakar, Thiès, Diourbel, Fatick, Kaolack, Kaffrine, Tambacounda.	<i>Arachis hypogaea</i> , gombo, <i>Vigna unguiculata</i> , <i>Pennisetum glaucum</i> , <i>Citrullus lanatus</i> , <i>Solanum lycopersicum</i> .	<i>X. savanicola</i>
<i>X. setariae</i>	Kaolack	<i>Nymphaea</i> sp.	<i>X. setariae</i>

4. Local Specific Identification Keys for Longidoridae from Senegal

4.1. Local Identification Key to Species of the Genus *Paralongidorus*

1) Stylet < 100µm*Paralongidorus duncani* Siddiqi,

Baujard & Mounport, 1993

Stylet > 100µm2

2) Stylet > 150µm..... *Paralongidorus bullatus* Sharma & Siddiqi, 1990

Stylet < 150µm3

3) 2000 ≤ L ≤ 3600µm*Paralongidorus dakarensis* Faye & Mounport, 2007

L > 3600µm *Paralongidorus silvestris* Faye & Mounport, 2010.

4.2. Local Identification Key to Species of the Genus *Xiphinema*

- 1) Genital branches unequal2
Genital branches equal4
- 2) Anterior genital branch reduced but complete.....3
Anterior genital branch reduced and without ovary.....*Xiphinema krugi* Lordello, 1955
- 3) Bipartite uterus*Xiphinema bergeri* Luc, 1973
Tripartite uterus.....*Xiphinema mounporti* Faye, Barsi & Decraemer, 2012
- 4) Uterine differentiation present5
Uterine differentiation absent 8
- 5) «Pseudo-Z» Organ present..... *Xiphinema basiri* Siddiqi, 1959
«Z-Organ» present..... 6
- 6) $c' < 1,6$ *Xiphinema ebriense* Luc, 1958
 $c' \geq 1,6$7
- 7) Labial region separated by a light depression*Xiphinema ifacolum* Luc, 1961
Labial region separated by a neat constriction....
Xiphinema algeriense Luc & Kostadinov, 1982
- 8) Ovary with symbiotic bacteria9
Ovary without symbiotic bacteria11
- 9) $c' > 1,4$ *Xiphinema opisthohysterum* Siddiqi, 1961
 $c' < 1,4$10
- 10) Tail length $> 22\mu\text{m}$*Xiphinema luci* Lamberti & Bleve-Zacheo, 1979
Tail length $< 22\mu\text{m}$*Xiphinema americanum* Cobb, 1913
- 11) $c' > 4$...*Xiphinema savanicola* Luc & Southey, 1980
 $c' < 4$12
- 12) $3 < c' < 3,7$*Xiphinema parasetariae* Luc, 1958
 $c' < 3$ 13
- 13) Conoid tail, not digitised..... *Xiphinema elongatum* Schuurmans Stekhoven & Teunissen, 1938
Conoid tail, digitised *Xiphinema setariae* Luc, 1958

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Conflicts of Interest

The authors declare no conflicts of interest.

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