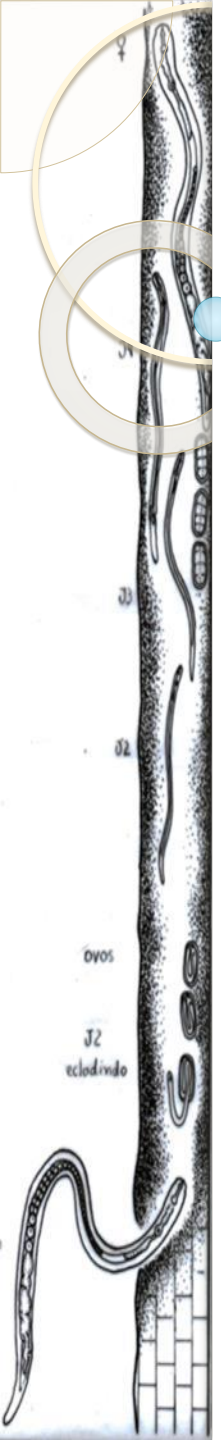


LFN-0512 Nematologia
Semana 16
Radopholus /Banana. *Tylenchulus* /Cítricos

Universidade de São Paulo
Escola Superior de Agricultura Luiz de Queiroz
Departamento de Fitopatologia e Nematologia
Piracicaba 4 Dezembro 2020

Sem.	Dia	Assunto LFN-0512
1	21ago	Informações gerais. *Meloidogyne*. Algodoeiro parte 1
2	28ago	*Rotylenchulus*. Algodoeiro parte 2
3	4set	*Pratylenchus*. Algodoeiro parte 3 / Soja parte 1
4	11set	*Heterodera*. Soja parte 2
5	18set	*Helicotylenchus* / *Scutellonema*. Soja parte 3 / Inhame
6	25set	*Aphelenchoides*. Soja parte 4 / Arroz
7	2out	Nematicidas sintéticos
8	9out	Nematicidas biológicos
9	16out	**Prova 1** (semanas 1-8)
10	23out	*Paratrichodorus*. Milho
11	30out	Cana-de-açúcar
12	6nov	*Bursaphelenchus*. Coqueiro / Dendezeiro. Quarentenários (Marcelo Oliveira / Apta)
13	13nov	Ornamentais (Marcelo Oliveira)
14	20nov	Transmissores de viroses (Marcelo Oliveira)
15	27nov	*Anguina* e *Ditylenchus*. Alho / Cebola
16	4dez	*Radopholus* / Banana. *Tylenchulus* / Cítricos
17	11dez	**Prova 2** (semanas 10-16)
18	18dez	**Repositiva**

Roteiro

1 *Radopholus*

2 Nematoides da bananeira

3 *Tylenchulus* / Nematoides dos cítricos

Radopholus

Radopholus similis é a única espécie importante do gênero

Bananeira e outras musáceas são as principais plantas hospedeiras, mas *R. similis* é uma espécie polífaga

Radopholus similis
Tombamento da Bananeira

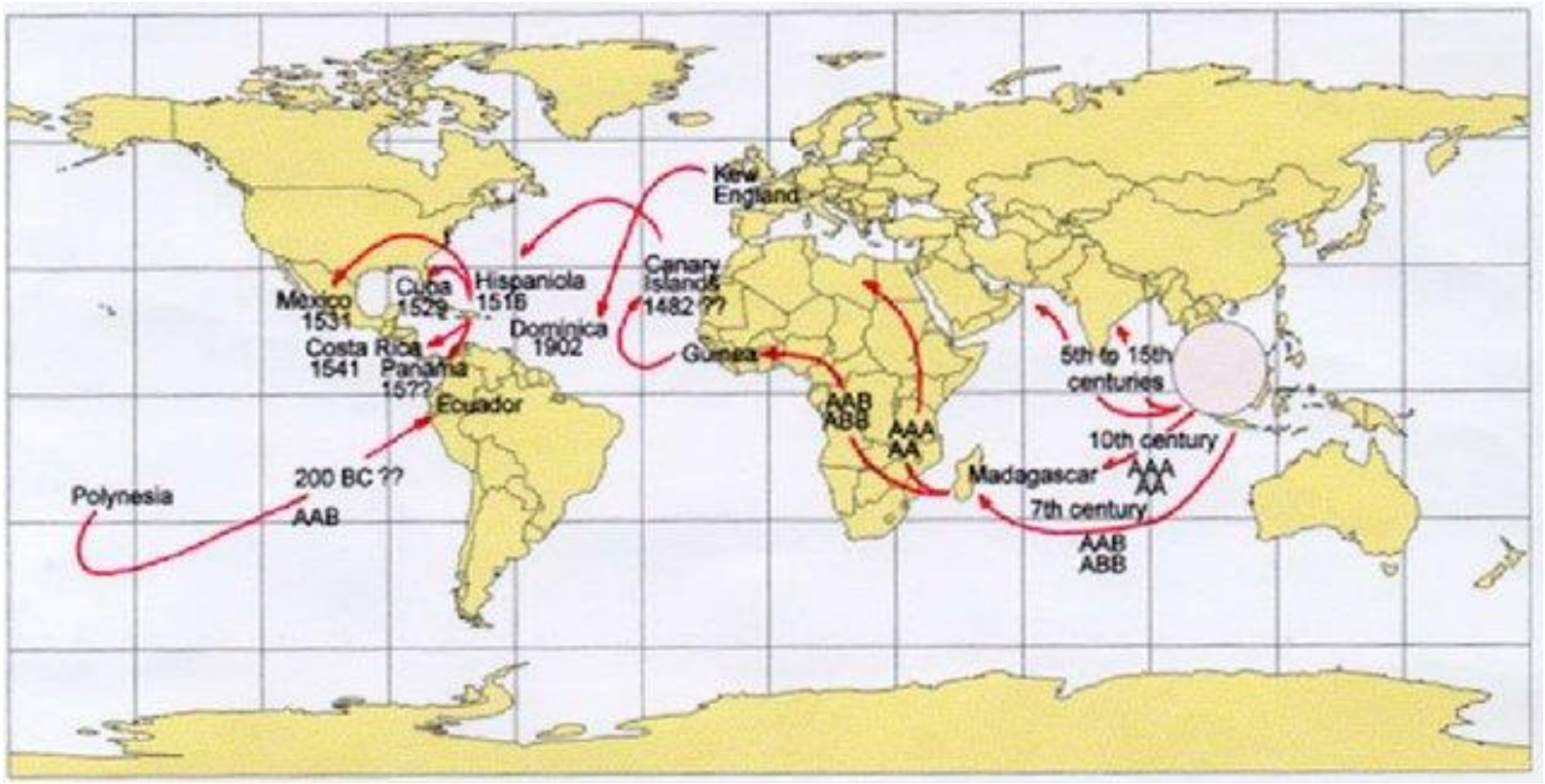
http://entnemdept.ufl.edu/creatures/NEMATODE/Radopholus_similis05.JPG

Raízes de Bananeira Infectadas

Lesões Radiculares ➔
Nematoide Cavernícola

Tombamento da Bananeira

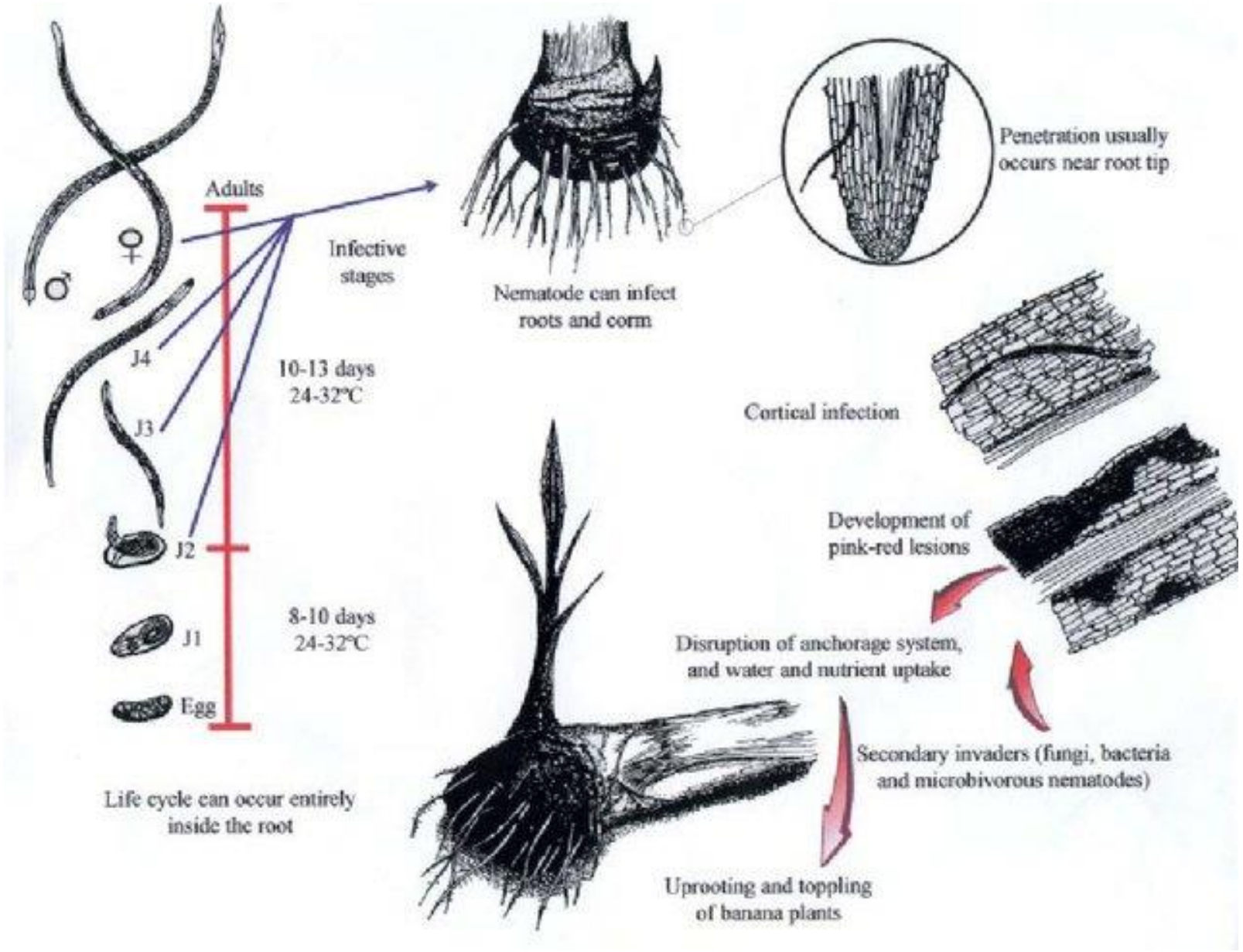
http://www.infonet-biovision.org/sites/default/files/styles/juicebox_small/public/plant_health/cropsfruitsvegetables/424.400x400_7.jpeg?itok=LmjkDQ2U



https://www.researchgate.net/publication/249303227_Dissemination_of_Bananas_in_Latin_America_and_the_Caribbean_and_Its_Relationship_to_the_Occurrence_of_Radophouls_similis/figures?lo=1

Austrália e ilhas da Oceania (Fiji, Nova Caledônia) são o centro de origem do gênero *Radopholus*

R. similis foi disperso por mudas de bananeira



https://www.researchgate.net/publication/249303227_Dissemination_of_Bananas_in_Latin_America_and_the_Caribbean_and_Its_Relationship_to_the_Occurrence_of_Radophouls_similis/figures?lo=1

Radopholus similis é polífago!

Outras hospedeiras

Palmáceas (*Cocos nucifera*, areca-bambu, *Areca catechu*), pimenta-do-reino, chá etc

Brasil

Gengibre, antúrio, anonáceas, marantáceas

Alerta!

Cuidado com suscetíveis em locais anteriormente cultivados com bananeira

Maranta

https://gd.eppo.int/taxon/RADOSI/photos

Antúrio

http://entnemdept.ufl.edu/creatures/NEMATODE/Radopholus_similis03.jpg

2015 Registro de *R. similis* em antúrio

Vale do Ribeira
Antúrio
Gengibre

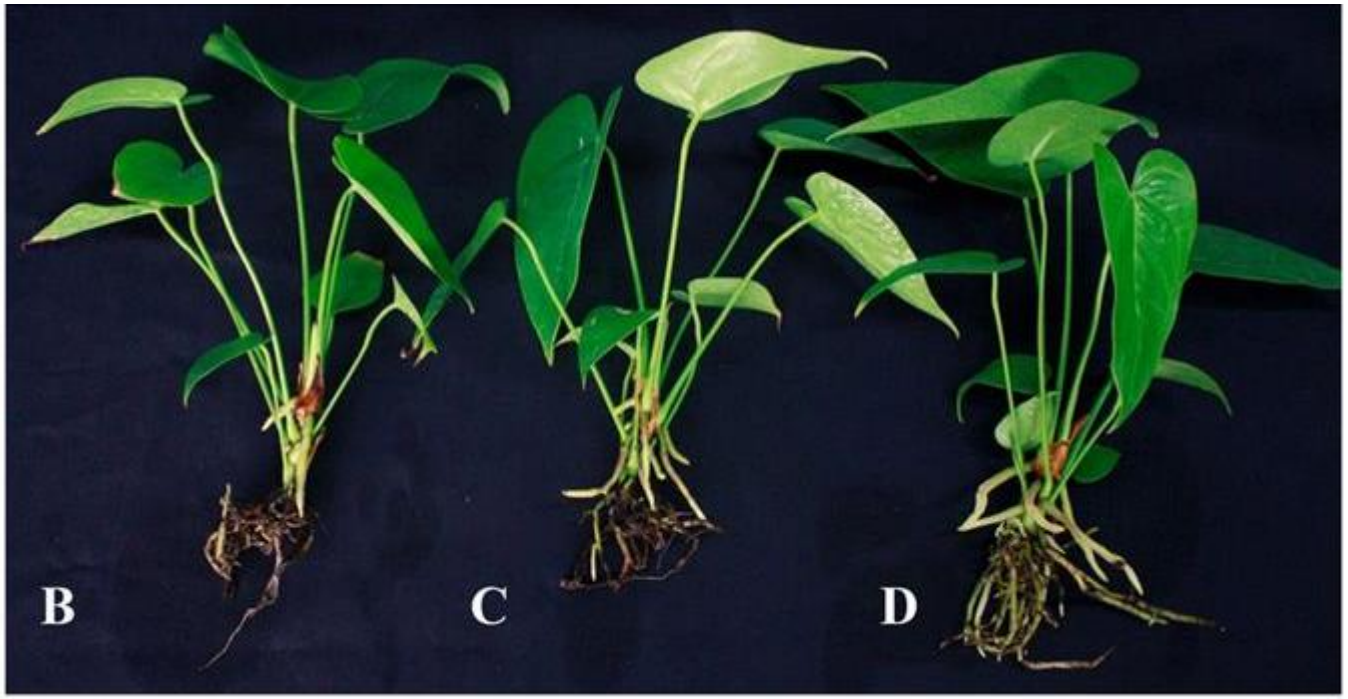
Chá
Pupunha???
Jussara???

1. Healthy young anthurium plant with a good root system.

2. Typical root rots caused by the burrowing nematode on several anthurium plants. Note the extensive, brown root rots, yellow leaves, and stunted plants.

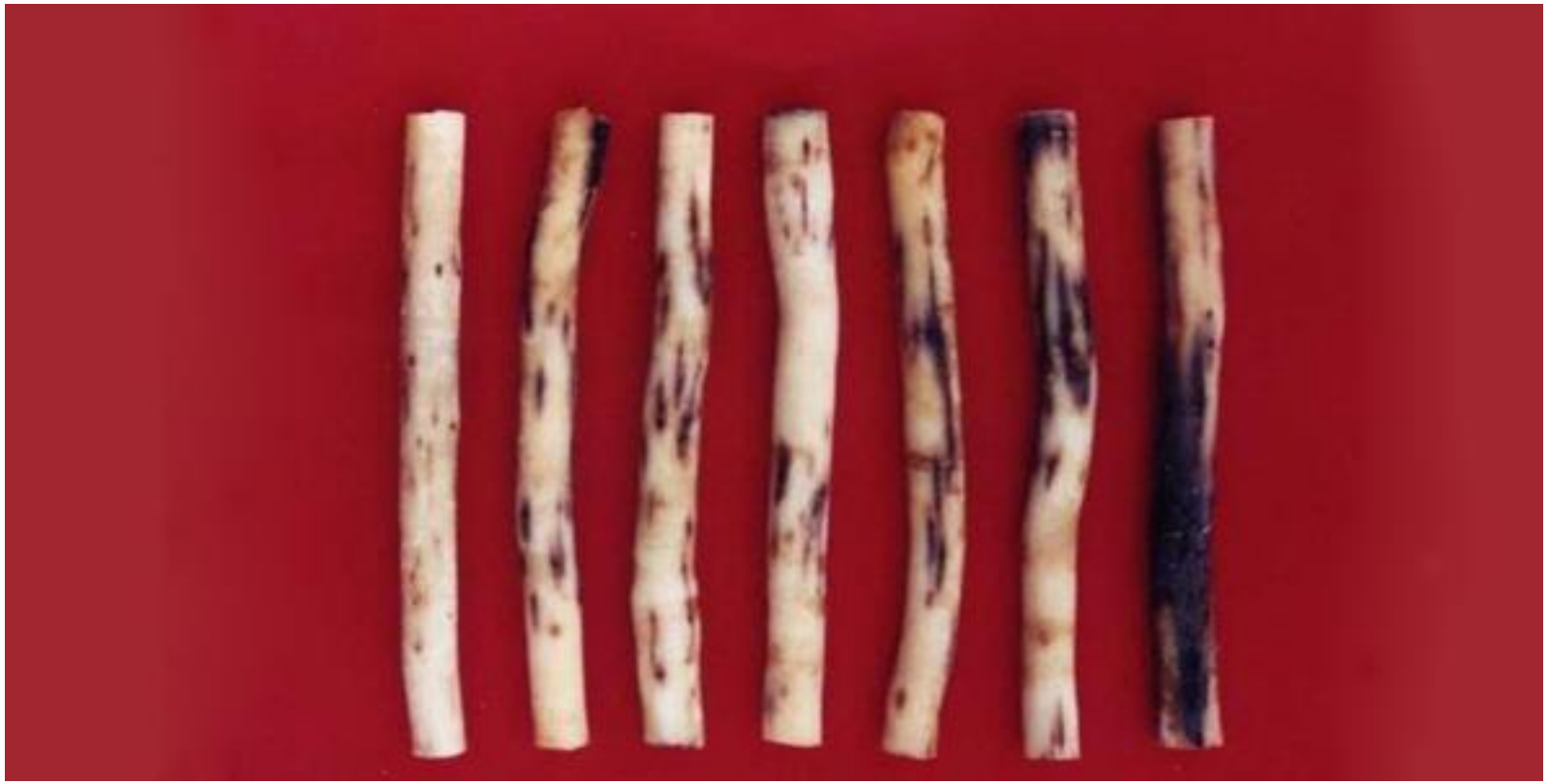
3. Anthurium root tip infected with burrowing nematodes.

https://www.ctahr.hawaii.edu/oc/freepubs/pdf/PD-24.pdf



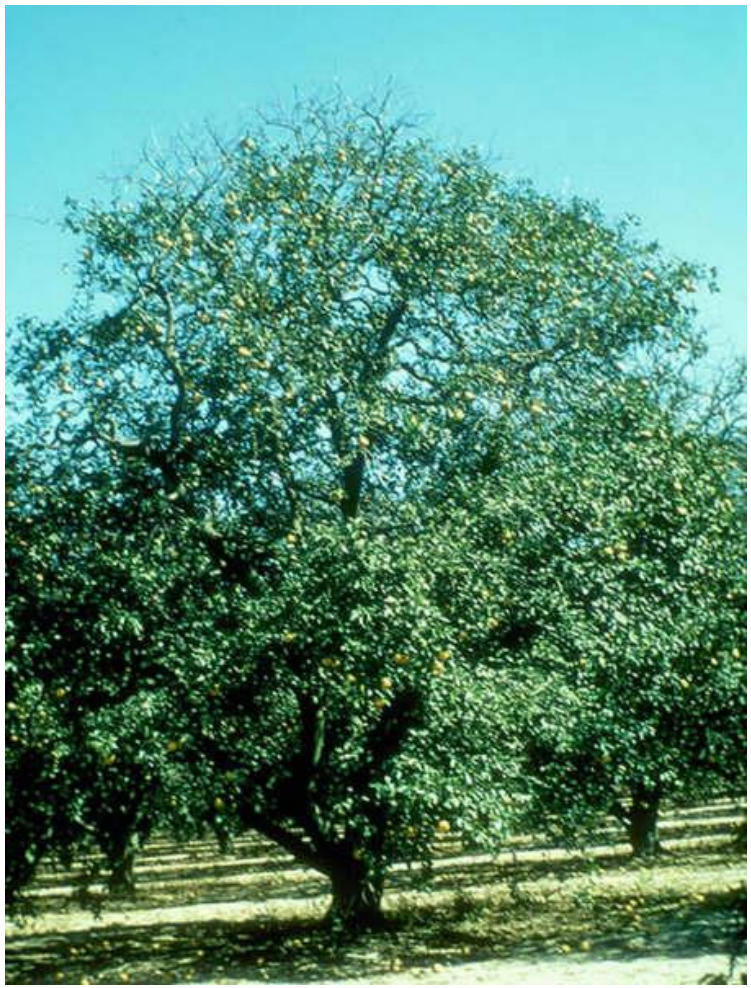
https://www.nature.com/articles/s41598-017-05093-7

Cocos nucifera
Lesões nas Raízes



http://farmextensionmanager.com/English/Coconut%20technology%20bank/pest%20doctor/images/Burrowing%20Nematode.jpg

Não há registro de *R. similis* em palmáceas no Brasil



https://www.apsnet.org/edcenter/intropp/lessons/Nematodes/Pages/Burrowingnematode.aspx

https://www.alamy.com/stock-photo-agriculture-a-grapefruit-tree-dying-from-burrowing-nematode-injury-100408440.html

https://www.forestryimages.org/browse/detail.cfm?imgnum=5384273

Gengibre

Produção 2015	mil t
Índia	683
China	390
Nepal	235
Indonésia	233
Nigéria	160
Mundo	2.100

https://www.worldatlas.com/articles/the-leading-ginger-producing-countries-in-the-world.html

Nematoides

Meloidogyne incognita
M. javanica
M. arenaria
M. hapla
Radopholus similis
Pratylenchus coffeae
P. brachyurus

Brasil

M. incognita
R. similis

Radopholus similis

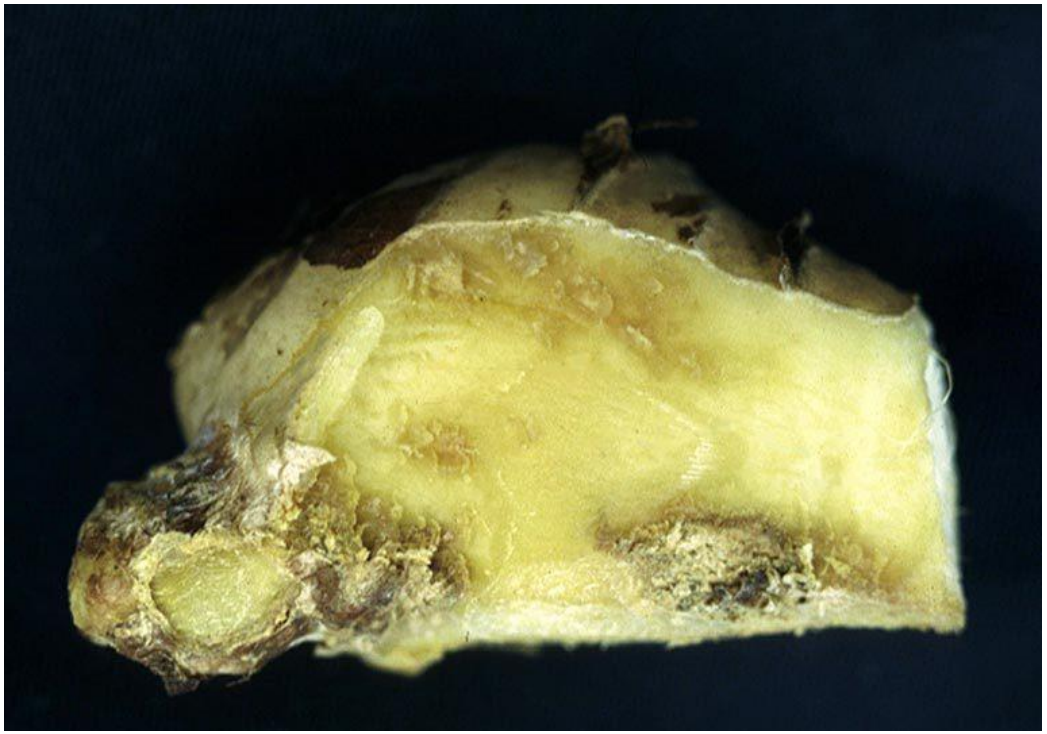
http://www.planetorganic.com/web-ginger-piece-100g/10081/

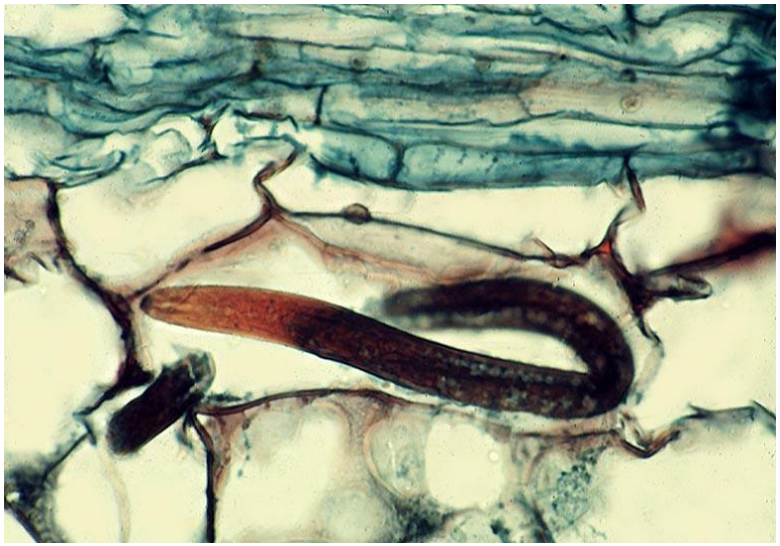
http://www.pestnet.org/fact_sheets/ginger_burrowing_nematode_161.htm

R. similis ataca as raízes e o rizoma

No rizoma, inicialmente pequenas manchas encharcadas

Depois, as manchas tornam-se castanhas, coalescem e destroem o rizoma





https://www.ipmimages.org/browse/subimages.cfm?sub=10859

https://link.springer.com/article/10.1007%2Fs13313-013-0206-2

Folhas pequenas e amareladas

Perfilhamento e crescimento lento

Ponteiro seca e morre

Maturação precoce

http://www.pestnet.org/fact_sheets/ginger_burrowing_nematode_161.htm

>Importância ➔ Danos rizoma

Perda de produção

Fiji

Origem de *R. similis* ?

Pimenta-do-Reino

https://www.fast-growing-trees.com/Black-Pepper-Plant.html

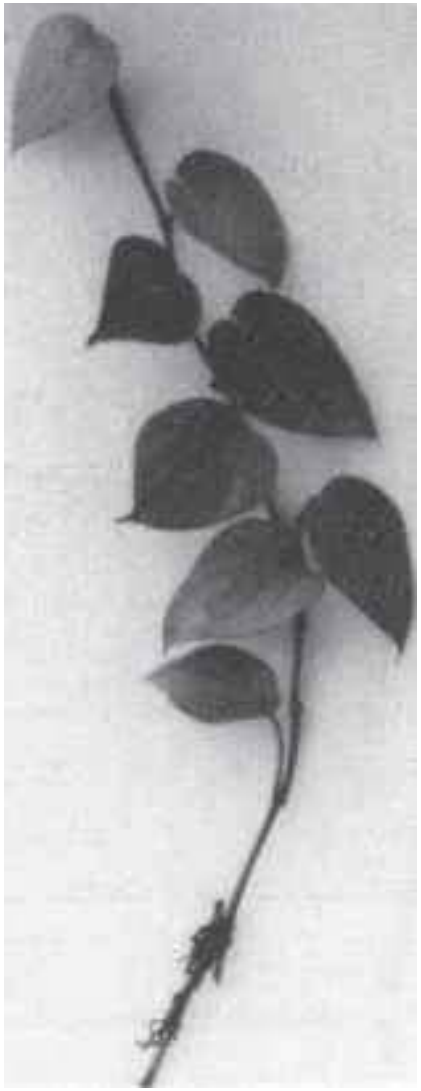
Produção 2015	mil t
Vietnam	328
Indonésia	88
Índia	58
Brasil	42
China	34
Sri Lanka	29

https://www.indexbox.io/data/category/

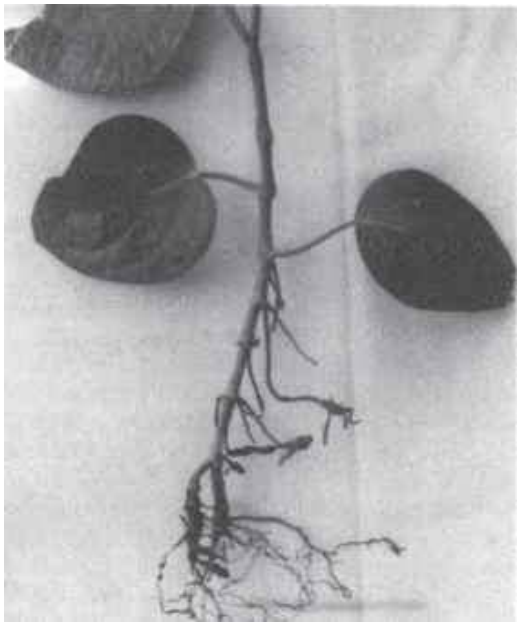
Nematoides

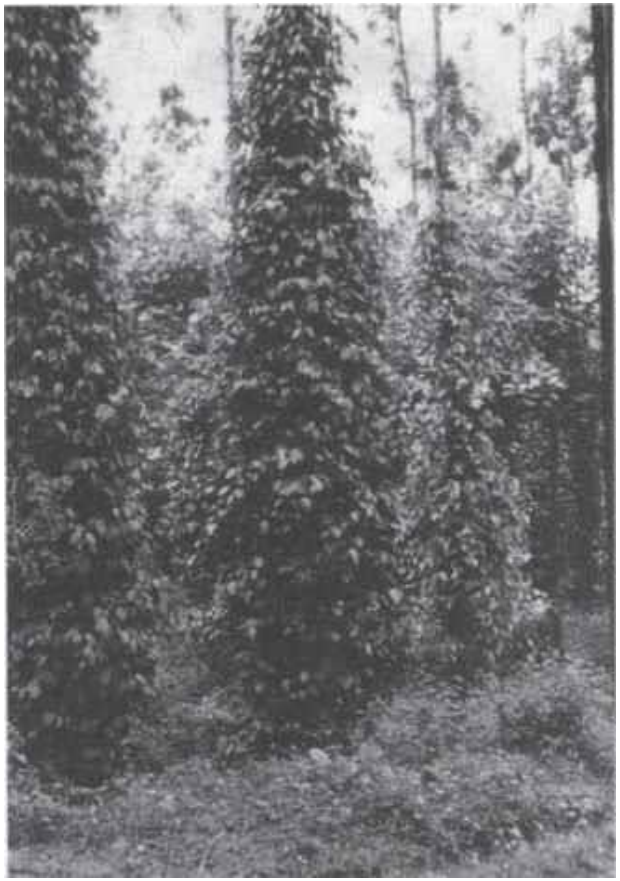
Radopholus similis
Meloidogyne incognita
M. javanica
M. arenaria
M. piperi

Radopholus similis e *Meloidogyne incognita*



Índia (slow decline)





https://www.medicinalplantsarchive.us/black-pepper/india-1.html

http://www.cpsskerala.in/OPC/pages/pepperDiseasesSlowdecline.jsp

Índia (slow decline/slow wilt)
Clorose internerval, flacidez, morte descendente dos ramos; galhas e/ou necrose nas raízes; morte em 2-5 anos

Causa (*R. similis* e/ou *M. incognita*) + seca + deficiência nutricional + (*Fusarium* sp. e/ou *Rhizoctonia* sp. e/ou *Diplodia* sp.)

https://www.cabi.org/isc/datasheet/46685

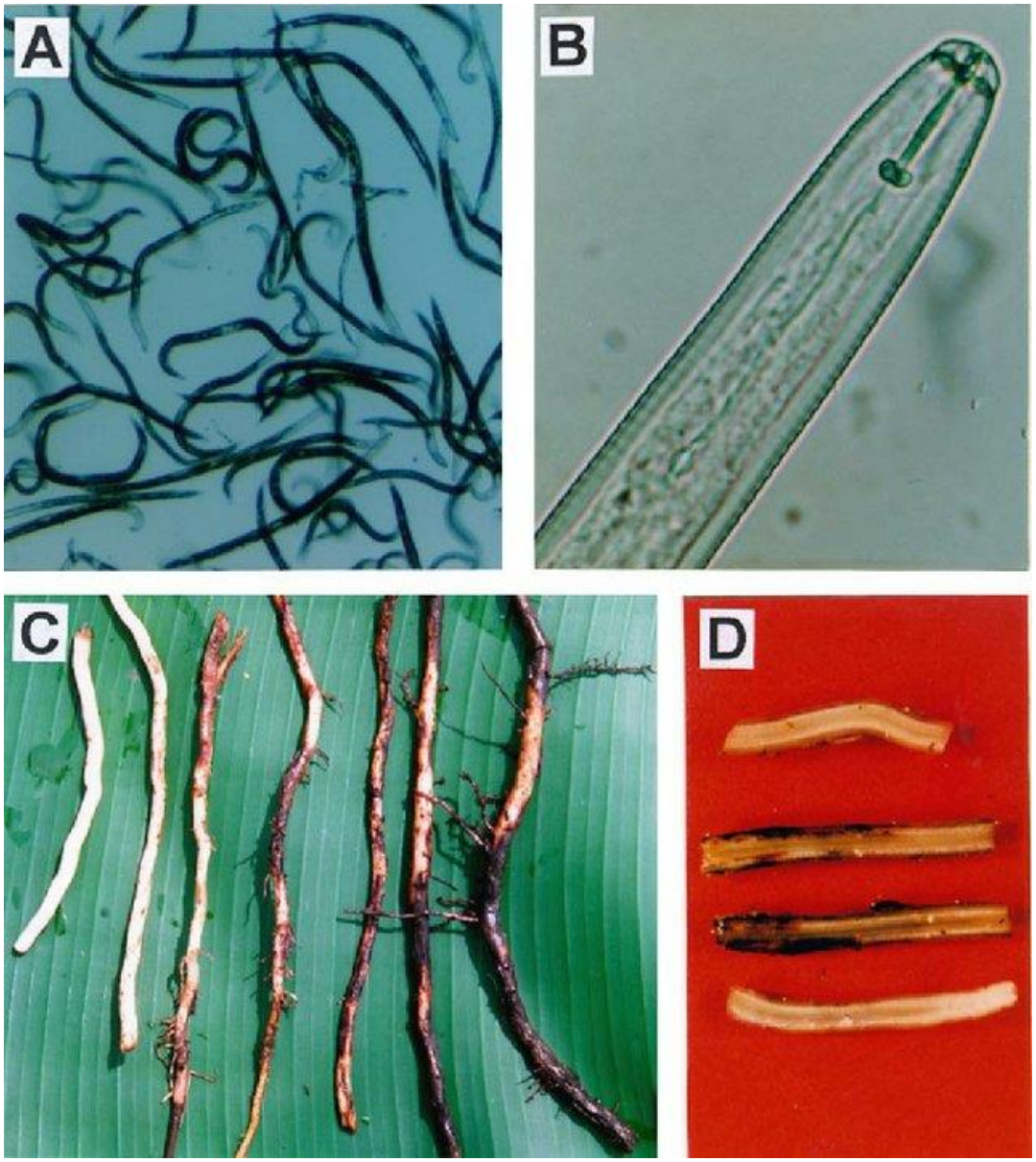
Murcha pimenta-do-reino (Indonésia) (*R. similis* e/ou *M. incognita*) + (*Fusarium solani* e/ou *Fusarium oxysporum*)

Ocorrência de *R. similis*

Dispersão por mudas de banana?

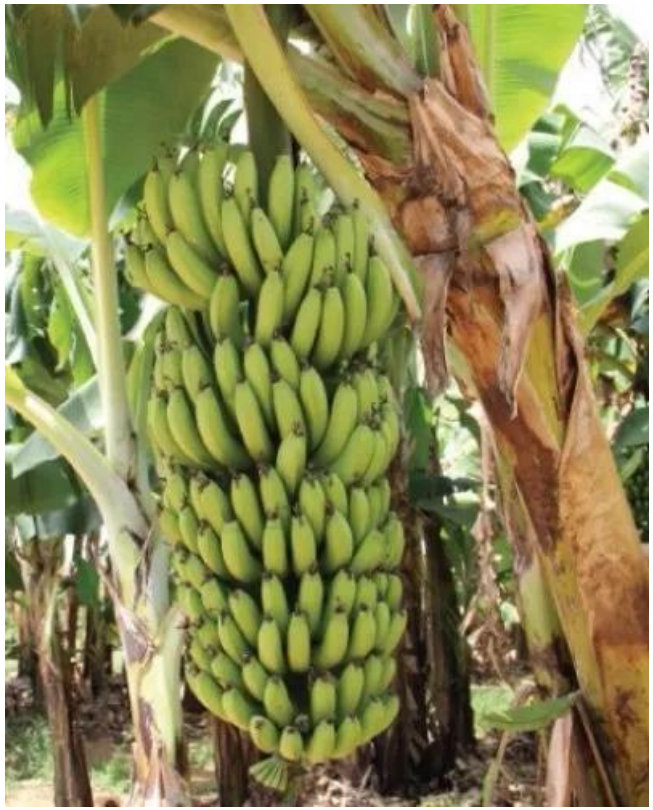
Fiji e Nova Caledônia ➔ possíveis centros de origem do nematoide

Nematoides da Bananeira



https://www.researchgate.net/publication/249303227_Dissemination_of_Bananas_in_Latin_America_and_the_Caribbean_and_Its_Relationship_to_the_Occurrence_of_Radophouls_similis/figures?lo=1

Nanica (Nanicão) x Prata



https://produto.mercadolivre.com.br/MLB-1122220514-kit-super-bananas-nanico-grande-nine-10-rizoma-muda-fazenda-_JM

http://www.sbwbrasil.com.br/pdf/ficha-tecnica-Prata-Gorutuba.pdf

Figura 3. Localização do adubo nas bananeiras: Planta nova (A) e Planta adulta (B).

https://www.infoteca.cnptia.embrapa.br/infoteca/bitstream/doc/1015213/1/DOC21429114AnaLucia20152APEM12052015.pdf

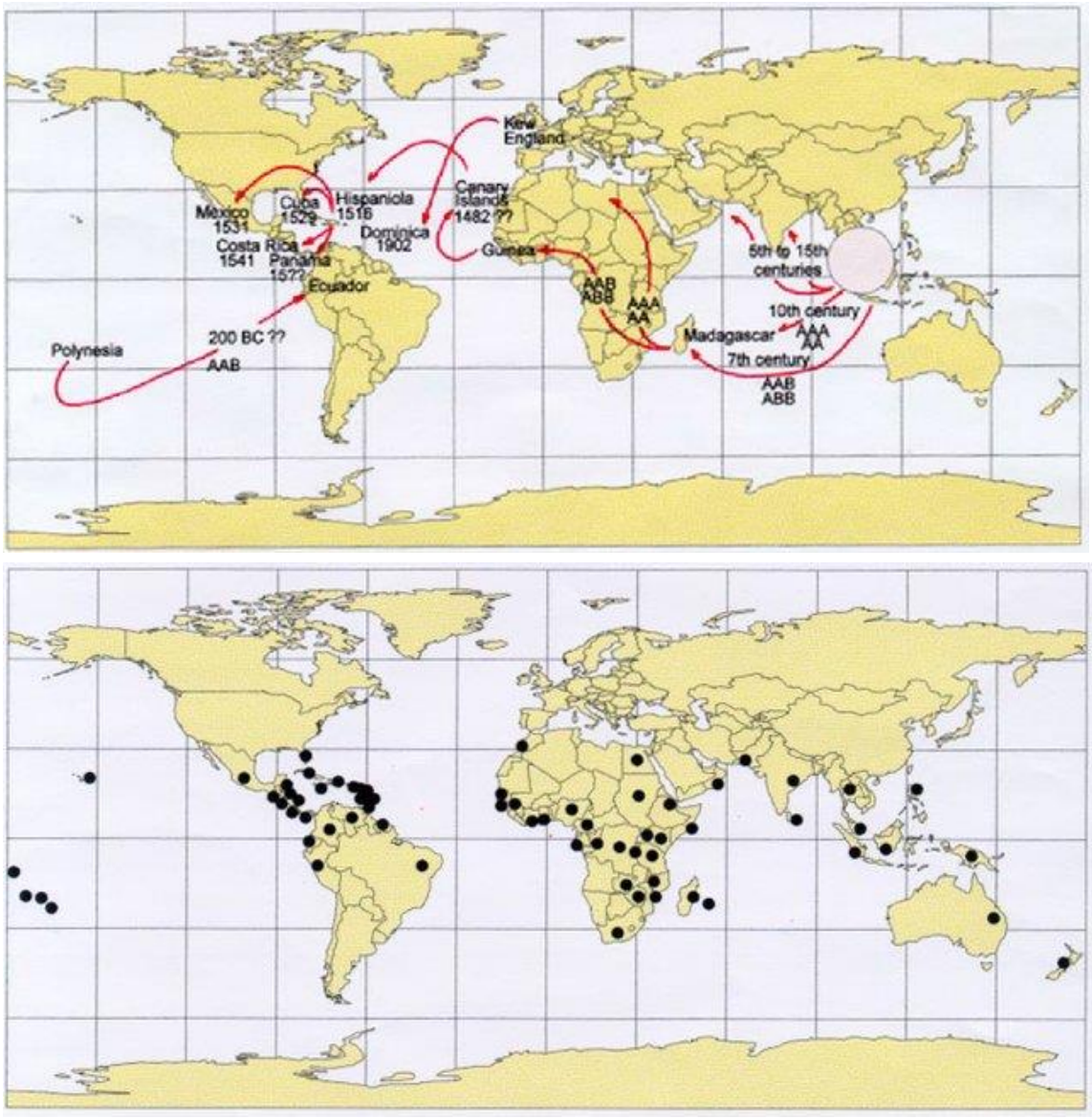
Fig. 5- 1. An old banana farm with plants propped up with sticks to avoid toppling due to severely nematode-damaged root systems that cannot handle heavy bunch weight.

https://cms.ctahr.hawaii.edu/wangkh/Research-and-Extension/Banana-IPM/Guidebook/CHPT5-IPM-Nematodes

Foto: Gustavo Araujo Rodrigues

Figura 10. Escoramento da bananeira utilizando fita de polipropileno.

https://www.infoteca.cnptia.embrapa.br/infoteca/bitstream/doc/1015213/1/DOC21429114AnaLucia20152APEM12052015.pdf

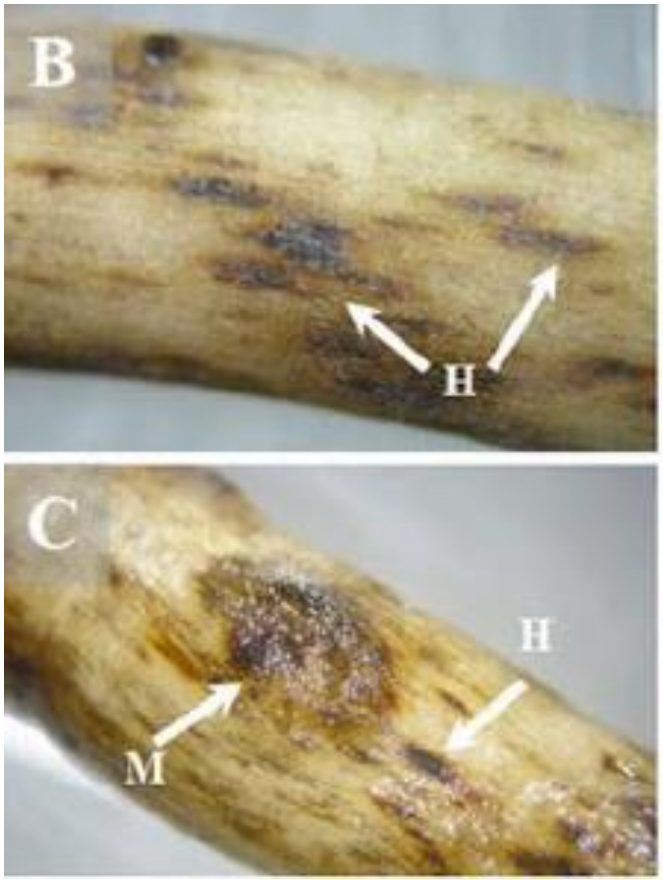


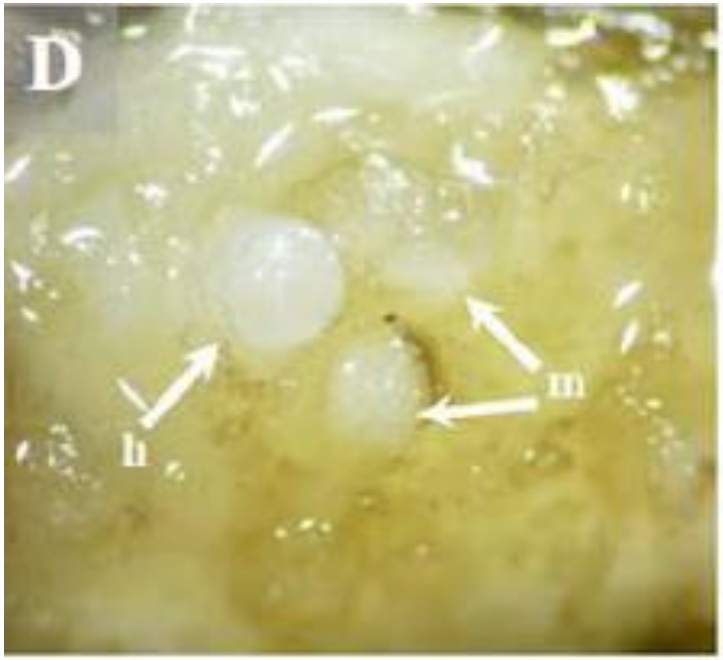
https://www.researchgate.net/publication/249303227_Dissemination_of_Bananas_in_Latin_America_and_the_Caribbean_and_Its_Relationship_to_the_Occurrence_of_Radophouls_similis/figures?lo=1

https://www.vitaoliva.com.br/kit-20-mudas-de-banana-prata-nanica-e-maca-monte-seu-kit-apos-compra

https://www.hfbrasil.org.br/br/banana-cepea-ventania-atinge-bananais-no-vale-do-ribeira-061118.aspx

Helicotylenchus multicinctus e *Meloidogyne* spp.





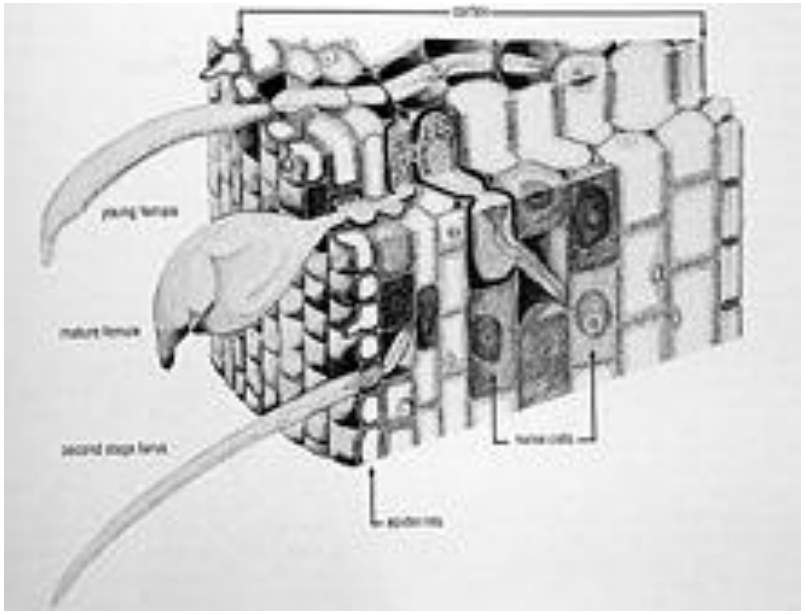
https://www.smf.org.mx/rmf/ojs/index.php/RMF/article/view/21

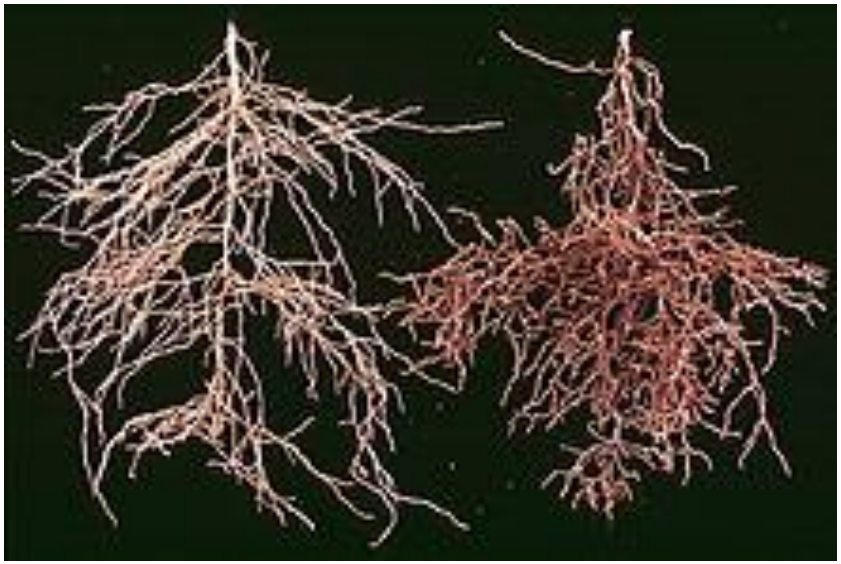
https://www.researchgate.net/publication/316788019_Banana_Diseases_and_Pests_Field_Guide_for_Diagnostics_and_Data_Collection_Improvement_of_banana_for_smallholder_farmers_in_the_Great_Lakes_Region_of_Africa_Improvement_of_banana_for_smallholder_farmer

Tylenchulus
Nematoides dos Cítricos

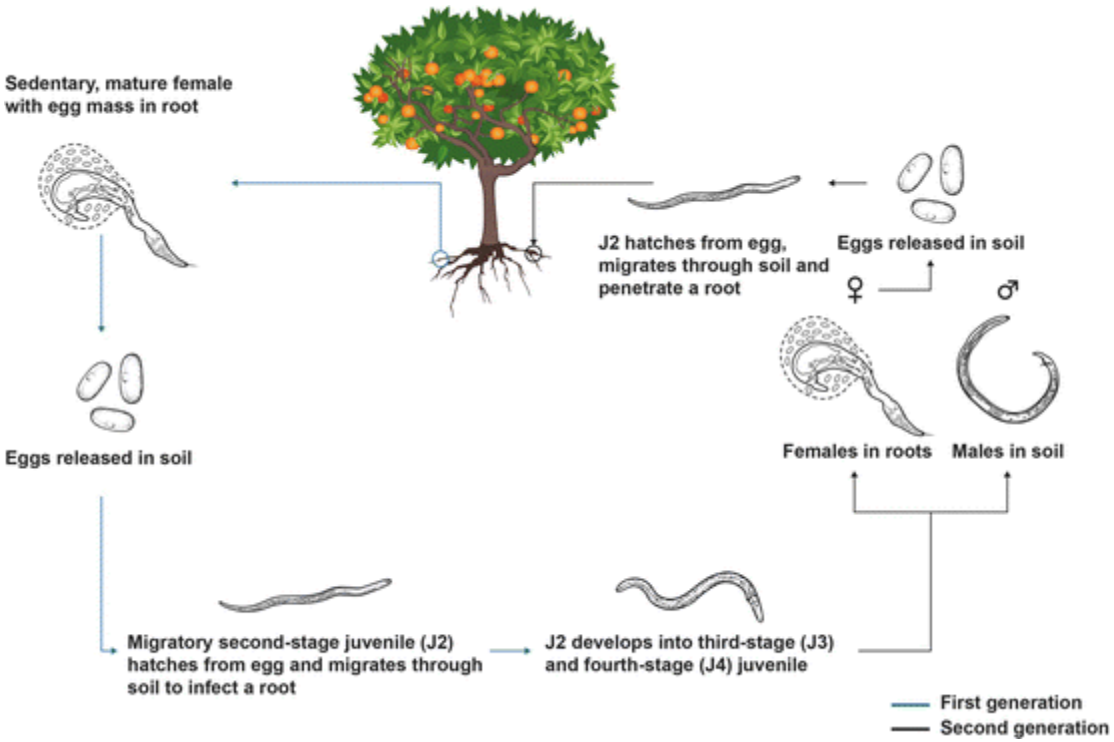
Tylenchulus semipenetrans é a única espécie importante do gênero

Cítricos são as principais plantas hospedeiras. Outras hospedeiras são o caquizeiro e a videira.





https://enacademic.com/dic.nsf/enwiki/6519916



https://link.springer.com/book/10.1007/978-3-319-44210-5

https://www.facebook.com/fitosanidad/
Efecto de Tylenchulus semipenetrans en cítricos

https://www.redagricola.com/cl/efectividad-momento-aplicacion-rugby-200-cs-control-del-nematodo-los-citricos/

https://alchetron.com/Tylenchulus-semipenetrans

https://www.slideshare.net/pomerian/nematicides

https://minhasfrutas.blogspot.com/2018/05/producao-de-mudas-de-citros.html

Figura1: Caracteristcas do citrumelo, A- plântula; B-Planta adulta com frutos.

https://www.bambui.ifmg.edu.br/jornada_cientifica/2015/resumos/jornada/AGRONOMIA/19.pdf

https://phys.org/news/2016-06-huanglongbing-affects-oranges-detachment-fruit.html

P. jaehni
Limoeiro-Cravo

http://docentes.esalq.usp.br/sbn/nbonline/ol%20323/212-219%20co.pdf

BOM FINAL DE SEMANA