

A SHEATH NEMATODE,
HEMICYCLIOPHORA ARENARIA RASKI, PATHOGENIC TO CITRUS

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Introduction

Members of Hemicycliophora, collectively referred to as sheath nematodes, are common in many parts of the world. Adult females possess one or more cast cuticles, which loosely cover the nematode's body; thus the name sheath nematode. Some 90 species have been placed in the genus Hemicycliophora. H. arenaria Raski and H. nudata Colbran are recognized as parasites on citrus roots, causing conspicuous root galls. This circular deals with some aspects of H. arenaria, since very little is known about H. nudata.

H. arenaria was the first sheath nematode reported pathogenic to citrus. The nematode produces distinctive galls of the root terminals. It was first found from rough lemon seedlings, Citrus jambhiri Lush., taken from a nursery in the Coachella Valley in California. Subsequent surveys revealed the nematode in additional locations in the Coachella and Imperial Valleys on both cultivated and native plants.

Host-Parasite Relations

Plants infected by H. arenaria are easily recognized by prominent swellings or galls on lateral and terminal roots. These galls are readily distinguished from those caused by root-knot nematodes (Meloidogyne spp.) by always occurring at the tips of lateral and terminal roots rather than along the roots (fig. 1). H. arenaria can be found tightly attached to the galls of freshly dug roots. When soil is carefully removed from the roots of infected plants, the nematodes appear as fine strands from the galls, and can be seen with a hand lens.

Besides the obvious root swellings on the root tips there is a reduction in the total number of feeder roots and top growth. Growth of infected rough lemon seedlings was reduced by 36% after 5 mo at 30 C. Dry weight yield of infected tomato plants was reduced by 28%, and fruit yield was reduced 10-20%.

Feeding by H. arenaria occurs from the epidermal surface to a depth of 4-5 cells, and about 500 μ from the root tip. These nematodes prefer to feed on cortical cells or young endodermal cells. H. arenaria feeds and causes the death of cells, which stimulates the formation of new meristems by the pericycle. The continued formation of later meristems contiguous with the main active meristem is responsible for gall formation.

Susceptible and Resistant Plants

Greenhouse experiments conducted in California have established the relative susceptibility of some plants to H. arenaria. Gall formation occurred on all plants which supported reproduction of the nematode. Following are lists of susceptible and resistant plants.

Susceptible Plants	Resistant Plants
Citrus:	Citrus:
Rough lemon, <u>Citrus jambhiri</u> Lush.	Sweet orange, <u>C. sinensis</u> (L.) Osbeck
Dorshapo sweet lemon, <u>C. limettioides</u> Tan.	Sour orange, <u>C. aurantium</u> L.
West Indian Lime, <u>C. aurantifolia</u> (Christm.) Swing.	Marsh grapefruit, <u>C. paradisi</u> Macf.
Cleopatra mandarin, <u>C. reticulata</u> Blanco	Trifoliolate orange, <u>Poncirus tri-</u> <u>foliata</u> (L.) Raf.
Nansh daidi, <u>C. Taiwanica</u> Tan. & Shim	'Troyer' citrange, <u>P. trifoliata</u> (L.) Raf. X <u>C. sinensis</u> (L.) Osbeck
Alemow, <u>C. macrophylla</u> Wester	'Carrizo' citrange, <u>P. trifoliata</u> (L.) Raf. X <u>C. sinensis</u> (L.) Osbeck

Other Susceptible
Plants:

Severinia buxifolia (Poir.) Ten.
Tomato, Lycopersicon esculentum
Mill.
Pepper, Capsicum frutescens L.,
var grossum Bailey
Blackeye bean, Vigna sinensis
(L.) Savi ex Hassk.
Celery, Apium graveolens L.
Squash, Cucurbita moschata
(Duchesne) Poir.
Grape-Tokay variety, Vitis
vinifera L.
Cheesebush, Hymenoclea salsola
T. & G.
Coyote melon, Cucurbita palmata
Wats.

Other Resistant
Plants:

Grape-Thompson seedless variety
Vitis vinifera L.
Marigold, Tagetes sp.
Cotton, Gossypium hirsutum L.
Sweet corn, Zea mays L.

Control

Test results indicate that 3 gpa (technical) DBCP (dibromochloropropane) will effectively kill H. arenaria in sandy soils. Exposure of H. arenaria-infected citrus roots to hot water dip of 115 F for 10 min will eradicate the nematodes. Resistant citrus hosts are sweet orange, sour orange, Marsh grapefruit, trifoliolate orange, and 'Troyer' and 'Carrizo' citrange.

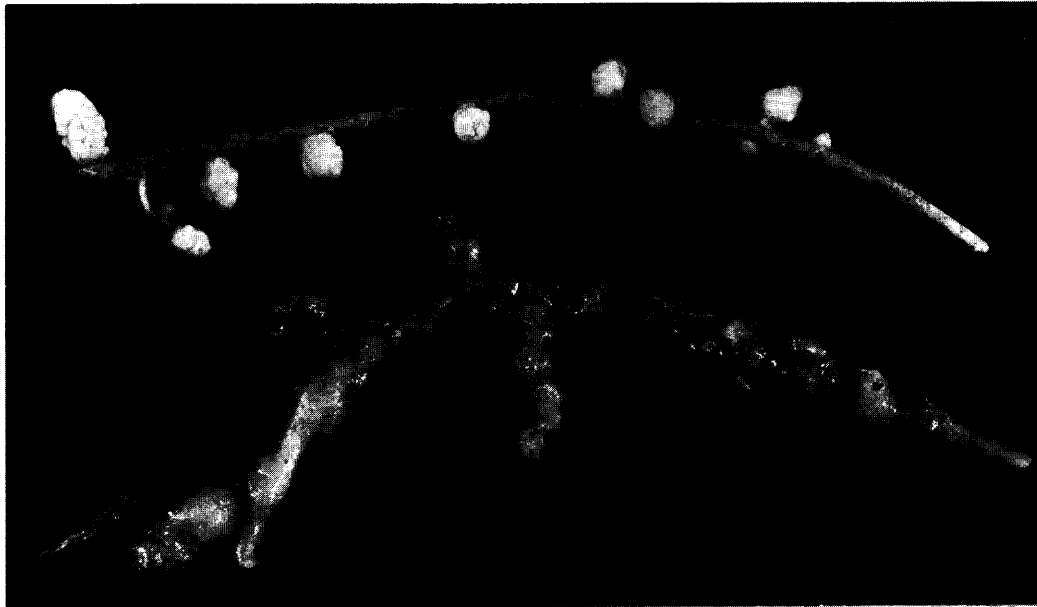


Fig. 1. Galls caused by Hemicycliophora arenaria (upper) occur at root tips as compared to galls induced by root-knot nematodes (Meloidogyne spp.) which are normally found along the root (lower). Photograph provided by courtesy of Dr. S. D. Van Gundy, University of California, Riverside.

References

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