

Nematode Parasites of Daylily Roots¹

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INTRODUCTION: Daylilies, *Hemerocallis* spp., are perennial ornamentals grown for commercial and landscape uses in all parts of Florida. These monocots are subjected to extensive hybridization programs implemented by nurseries or by small groups of daylily growers for the production of new cultivars. New daylily releases often have great economic value and are exchanged among the daylily breeders for the production of new improved cultivars. Several phytonematodes have been reported associated with daylilies in Florida nurseries. The most common species are *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949; *Ogma serratum* (Khan and Siddiqi, 1963) Raski and Luc, 1967 (= *Criconea sulcatum* Golden and Friedman, 1964); and *Scutellonema brachyurus* (Steiner, 1938) Andrassy, 1958. The reniform nematode, *Rotylenchulus reniformis* Linford and Oliveira, 1940 has been detected occasionally in daylily operations of Central and North Florida (Loughman, Tampa, Gainesville, Quincy, St. Augustine, and Tallahassee) and in South Florida (Miami Beach) (Esser 1985; Division of Plant Industry records). In spite of these reports, it is unknown if daylilies are hosts to the reniform nematode. Information on the host status of ornamentals and daylilies to the reniform nematode is very useful for the ornamental growers to avoid the production of plants infected by this pest, which is restricted by several states (Arizona, California, and New Mexico) and countries (Chile and Switzerland). The ornamental industry of southern and northern Florida is particularly adversely affected by these restrictions because the reniform nematode occurs commonly in the Rockdale and marl soils of South Florida and in the fine-textured soils with higher organic matter content of northern Florida (Heald and Robinson 1990; Kinloch and Sprengel 1994).

NEMATODE PARASITISM: Reniform nematodes were recently found associated with daylilies in regulatory samples collected from a nursery in Seminole County. Examination of daylily roots with the aid of a stereomicroscope revealed the presence of sedentary mature females and egg masses of *R. reniformis* protruding from the root surface (Fig. 1). Nematode root densities ranged from < 1 female and 2 eggs per gram of fresh roots to 10 females and 110 eggs. These findings indicate that daylilies are a suitable host for the reniform nematode. However, root nematode densities on this ornamental were lower than those reported on a good host, such as cowpea (*Vigna unguiculata* (L.) Walp.), with numbers >100 females and 1000 eggs per gram of fresh roots (Inserra *et al.* 1994). Daylily roots infected with reniform nematodes were also inhabited by the root-knot nematode, *M. incognita*, which did not induce obvious galls on the roots of this host. Root-knot nematode females were easily spotted on the roots because of the large egg masses covering the posterior portion of their body. We also observed specimens of the spiral nematode, *Helicotylenchus dihystera* (Cobb, 1893) Sher, 1961 with the anterior portion of the body penetrating the roots. Specimens of *S. brachyurus* were found adhering

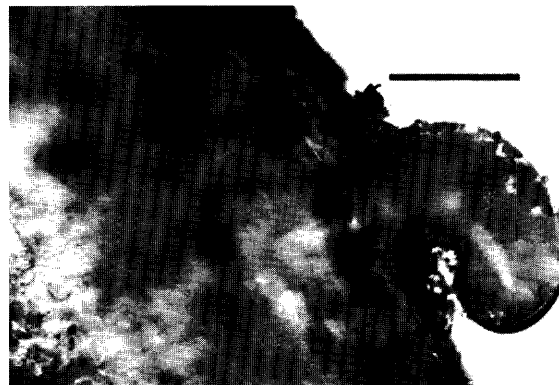


Figure 1. Daylily (*Hemerocallis* sp.) root infected by a swollen female of the reniform nematode, *Rotylenchulus reniformis*. Scale bar = 130 μ m.

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on the root surface without evidence of body penetration into the root tissues. The parasitic habits of the nematodes listed above favor their spreading with infected daylily propagative material, since these nematodes remain attached to the roots.

SYMPTOMS AND DAMAGE: Nematode pests of daylilies do not produce specific aboveground symptoms. Root-knot nematode infection on roots is easily overlooked without the aid of a stereomicroscope because of the absence of obvious root symptoms. Symptoms of malnutrition with stunted plants and chlorotic leaves are commonly associated with severe nematode infections. Unfortunately, there is a lack of information on the severity of nematode damage to daylilies. Daylilies, as in the case of other plants, can tolerate moderate nematode infections, especially those by spiral nematodes, *H. dihystra* and *S. brachyurus* (O'Bannon and Inserra 1989; O'Bannon and Duncan 1990). During our observations, we noted severe root decay of plants heavily infected by *M. incognita* alone or in association with *R. reniformis*, *H. dihystra*, and *S. brachyurus*. In plant problem samples from other localities, the nematodes listed above have been found associated with several pathogenic fungi, such as *Fusarium* spp. and *Sclerotium rolfii* Sacc., which suggests a possible disease complex. The following fungi were identified (N.E. El-Gholl, personal communications) in our samples: *Cylindrocarpon* sp., *Fusarium oxysporum* Schlechtend.: Fr., and *Pythium* sp., all known to cause daylily root decay (Alfieri *et al.* 1994). Reniform nematode root infections, even at small population levels, should be of particular concern to ornamental growers because shipments of reniform nematode-infected daylilies are rejected by certain states and countries resulting in serious financial losses for the growers.

PREVENTIVE MEASURES AND CONTROL: Daylily growers of South and North Florida should be particularly concerned about contamination risks of daylilies by reniform nematodes through exposure to infected weeds, infected ornamentals, and detritus which may contain populations of *R. reniformis* (Inserra *et al.* 1989, 1994; Heald and Robinson 1990; Kinloch and Sprengel 1994). The exchange of reniform nematode-infected daylily selections should be prevented to avoid the spread of this pest to clean daylily operations. The most effective practice to exclude reniform nematodes and other damaging nematode pests from daylily operations is to grow clean daylily plants in clean soil and in containers not in direct contact with the ground or other sources of nematode contamination. The lack of effective nematicides registered for use in ornamental nurseries make nematode control for regulatory purposes difficult in established daylily operations infested by nematodes. Hot water treatments (50° C (122° F) for 10-15 minutes) of infected daylily cuttings after root removal can be effective. It is a good precaution to test the effect of this treatment on small groups of plants before treating large number of daylilies, because the tolerance of new daylily cultivars and hybrids to hot water is not known.

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