Nematode Management

Louisiana Sweet Potato Production

Plant–parasitic nematodes can damage plants in many ways and are considered to be a serious threat to sweet potato production in Louisiana. Nematodes can cause serious problems in commercial and home gardens. These pests affect the total production and aesthetic quality of sweet potatoes. Damage occurs underground to the sweet potato roots and often goes undetected until harvest. The reniform nematode *(Rotylenchulus reniformis)* and the root-knot nematode *(Meloidogyne incognita)* are the primary culprits.

Reniform Nematode

The reniform nematode is currently the most threatening nematode of sweet potato production. It also is a serious pest of several agronomic crops and has spread significantly during the past decade. Reniform nematodes are now present in most sweet potato commercial production areas in Louisiana. They overwinter as eggs, juveniles and pre-adults. Their life cycle is completed in three weeks or less under ideal conditions, and they can build up to very high populations during one season.

Damage from this nematode is often difficult to recognize. In most cases, no distinct foliar symptoms or abnormalities can be detected on sweet potato roots. Reniform nematode infestations can result in poor sizing (bulking) of the crop and in a reduced number of marketable grade sweet potatoes. Damage from this pest also can manifest as deeply cracked roots, a reduction in the number of feeder roots and/or in a general discoloration of storage roots. In addition, reniform nematodes are resilient in that they can survive on equipment transferred from one field to the next and are thus inadvertently spread to other production sites utilizing common equipment.

Root-knot Nematode

The root-knot nematode can also negatively affect sweet potato production in Louisiana. Root-knot nematodes overwinter as eggs in production fields, and, under ideal conditions, the life cycle is completed in approximately 30 days. One female can lay up to 3,000 eggs.

Root-knot nematodes are widespread and are considered to be more serious problems in areas with sandier soil types. Unlike damage incurred by reniform nematodes, damage from this species is more recognizable and easier to detect. Foliar injury symptoms include a general yellowing and stunting of the plant. Plants affected by root-knot nematodes also may mimic plants expressing nutrient deficiencies. Roots damaged by root-knot nematodes have a rough texture and also can be malformed and cracked. If this nematode attacks the roots early in the growing season, small galls may be visible on the roots. This pest also can enter into enlarging storage roots later in the growing season. Root-knot nematode females are white to yellow and can often be found in corky areas within storage roots. On the variety Beauregard, root-knot nematode is found under raised areas or pimples on the storage roots. Root-knot nematodes are small, but can be seen without the aid of a magnifying glass.

Management Options

Sampling. All production fields and home gardens should be sampled for the presence of nematodes prior to planting. The best time to sample for nematodes is in the fall of the year following harvest of the currently planted crop. If fall sampling is not possible, spring sampling is also highly encouraged. If nematode populations are detected and found to be at or above threshold levels, a labeled and recommended nematicide should be applied prior to planting. In addition, producers should consider other management options, including resistant varieties (root-knot) and crop rotation.

Sampling using Veris cart technology, GPS sample points for reference and one-acre grid overlays can be used to improve accuracy when collecting nematode samples in commercial production fields. Veris apparent electrical conductivity (ECa) can be used as a substitute for soil type and is a helpful tool for locating zones of soil variability in fields, evaluating eroded ridges and identifying other problems in fields.

Thresholds. The threshold level for reniform nematode in sweet potato is 1,000 per pint of soil. The threshold level for root-knot nematodes in sweet potato is 150 per pint of soil, although any level may result in quality problems by the end of the growing season.

Resistance. A few commercially available sweet potato varieties, namely Evangeline and Bienville, express resistance to the root-knot nematode. Beauregard, the predominant commercial cultivar grown in Louisiana, is susceptible to both the root-knot and reniform nematodes. Currently, no varieties have any resistance to the reniform nematode.

Crop Rotation. Crop rotation is a viable management option for both the reniform and the root-knot nematode. When a rotation crop is selected as a management option, that crop should be planted for two consecutive years following sweet potato. Cotton and soybeans are preferred hosts of the reniform and root-knot nematode and should be avoided as rotation crops with sweet potato when possible. Corn, grain sorghum and fallow fields are not preferred hosts of the reniform nematode and are considered good rotation schemes for managing this pest; however, corn is a host for root-knot nematode. Winter wheat is a host to root-knot nematode. If winter wheat is used in a rotation, plant it closer to the end of the recommended planting date (November 15) for all locations within Louisiana. Soil temperatures are not as favorable for the nematode at this time and will lessen the potential for buildup on wheat. Home gardeners should be aware that most vegetables are susceptible to root-knot nematode with some varieties of either tomato or Southern pea being resistant. A few vegetables appear to be resistant to the reniform nematode including beet, broccoli, corn, okra, pepper, radish, spinach, turnip and watermelon.

Table 1. Host potential of several crops to nematodes in Louisiana.

Crop	Reniform	Root-knot
Sweet potato	Yes	Yes
Cotton	Yes	Yes
Corn	No	Yes
Wheat	No	Yes
Soybean	Yes*	Yes*
Grain sorghum	No	No
Fallow	No	No

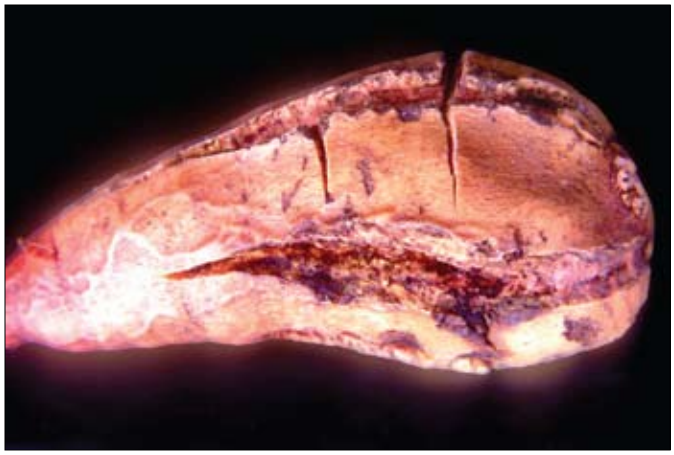
*Most varieties are susceptible to reniform or root-knot nematode; occasionally, some varieties may have some resistance.

Chemical Control Options. Sometimes, producers have no choice but to use a nematicide. Fortunately, several nematicides are labeled to use in commercial sweet potato production. Home gardeners cannot use any of these nematicides and must use other management options. Available fumigants include Telone II, Vapam HL, K-Pam HL and Pic-Clor 60. All must be applied before planting. Vapam HL and K-Pam HL are general fumigants and require application at least 21 days prior to planting to prevent injury to the crop. Telone II requires a waiting period of seven to10 days before planting. Telone must be applied to a depth of at least 12 inches beneath the row or soil level. Pic-Clor 60 is a combination of 1,3-dichloropropene (same active ingredient as Telone) and chloropicrin. It needs to be applied to a depth of at least 12 inches beneath the row or soil level and applied at least seven days prior to planting. Reduced rates (from the broadcast amounts) of the fumigants can be used when application occurs only beneath the row.

Temik (aldicarb) and Mocap (ethoprop) are also labeled for use in sweet potato to manage nematode populations. These products should be applied on a 12- to 15-inch band in the row. Please read and follow all label instructions for all chemical management options.

Table 2. Labeled nematicides in Louisiana for sweet potatoes. *Please read and follow all label directions.*

Nematode species	Nematicide	Rate per Acre	Timing and Method of Application
Reniform Root-knot	Telone II	*See manufacturer's label for rates	Apply at least 12 inches deep, 7-10 days prior to planting
	Temik 15G	10-20 lb	Apply in a 12-inch band on an open row and cover immediately
	Mocap 15G	20-26 lb	Apply in a 12-15 inch band 2 to 3 weeks prior to planting
	Mocap EC	1-1.5 gal	Apply in a 12-15 inch band 2 to 3 weeks prior to planting
	Vapam HL	*See manufacturer's label for rates	Must be applied at least 3 weeks prior to planting
	K-Pam HL	*See manufacturer's label for rates	Must be applied at least 3 weeks prior to planting
	Pic-Clor 60	*See manufacturer's label for rates	Needs to be applied at least 12 inches beneath the row and at least 7-10 days prior to planting

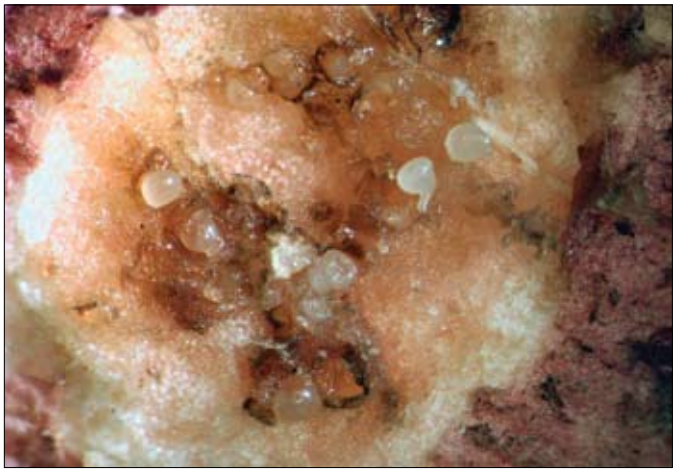


Cracking of the variety Centennial from root-knot nematode.

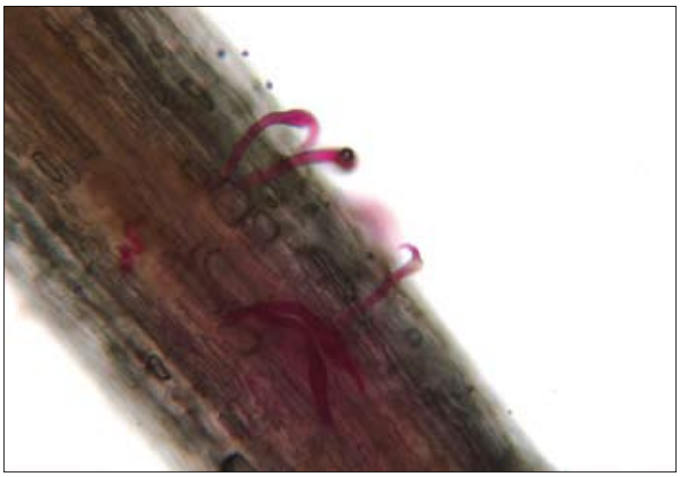
Root-knot galls visible on young sweet potato plant.

Root-knot nematodes (stained red) developing inside a sweet potato root.

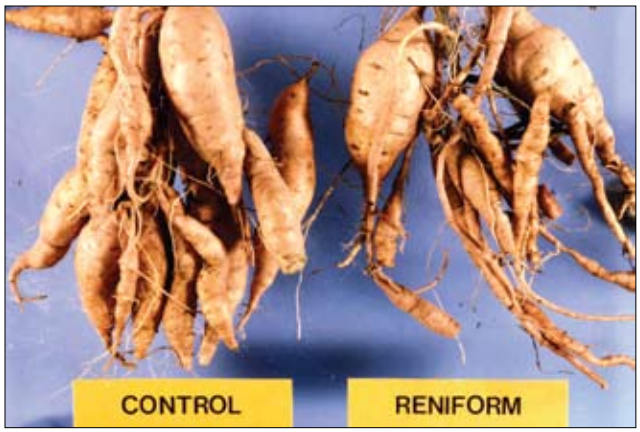
Numerous raised areas or pimples on storage root associated with root-knot nematode. Slight cracking of the storage root is also evident.



A number of white root-knot females evident beneath one of the raised areas (pimples).



Reniform nematode females (stained red) are visible in a small root.



The delay in development of storage roots caused by reniform nematode.

Delay in vine development of a very susceptible breeding line in association with reniform nematode. The row on the right was fumigated compared to the untreated row on the left.

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