

3271. BURROWING AND RENIFORM NEMATODE

State Exterior Quarantine

A quarantine is established against the following pests, their hosts and possible carriers:

A. Pests. Burrowing nematode (*Radopholus similis*) and reniform nematode (*Rotylenchulus reniformis*), parasites of the roots of citrus and many other plants.

B. Area Under Quarantine. The States of Alabama, Arkansas, Florida, Georgia, Hawaii, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and the Commonwealth of Puerto Rico. See Appendix A below for supplementary information.

C. Articles and Commodities Covered. The following articles and commodities are restricted entry into California when arriving from the area under quarantine.

1. **All earth** (including sand and soil) and potting media.
2. **All plants and plant parts with roots** (including aerial roots).
3. **All parts of plants produced below the ground** or soil level.
4. **All plant cuttings** for propagation.
5. **Exemptions.** The following articles and commodities are exempt from the quarantine:
 - a. Industrial sand and clay.
 - b. Air plants (including certain orchids and other plants produced epiphytically) if growing exclusively in or on soil-free material such as osmunda fiber, tree fern trunk, or bark.
 - c. Aquatic plants (those species normally growing in, on or under permanent water, either rooted in soil or free-floating) if free from soil.
 - d. Plants secured by air-layering if roots are established and enclosed in the original soil-free moss wrappings.
 - e. Cuttings of ti (*Cordyline* spp.) if free from roots and soil.
 - f. Dormant bulbs and corms for propagation, if free from roots and soil, but not including taro corms for propagative purposes.
 - g. All fleshy roots, corms, tubers, and rhizomes for edible or medicinal purposes if washed or otherwise freed of soil.

See Appendix E for additional information on exemptions.

D. Restrictions.

1. **Certification Requirements for Commodities from Area Under Quarantine.** All commodities covered moving from the "Area Under Quarantine" listed in (B) above, whether moved direct from said area or by diversion or reconsignment from any other point (without regard to period of time held or grown at any intermediate point), are prohibited entry unless each shipment or lot is accompanied by a certificate issued by the authorized agricultural official of the state, district, or commonwealth where produced establishing that all material contained in the lot or shipment meets either (a), (b), or (c) below:

a. It has been determined through surveys, conducted at annual intervals (or during the one-year period prior to shipment), that burrowing and reniform nematodes do not exist on the property or premise or facility used to grow the nursery stock, and that the seed or plant parts used for production of the plants were determined by the certifying officer to be free from burrowing and reniform nematodes (the survey methods shall have been approved by the California Department of Food and Agriculture);

or

b. The plants or plant parts being shipped to California were protected from burrowing and reniform nematode infestation by all the following sanitation methods:

1. Propagated from clean seed or from cuttings taken at least 12 inches above ground level.
2. Planted in sterilized soil or other suitable material prepared or treated to assure freedom from burrowing and reniform nematode.
3. Retained in sterilized pots, containers, or beds.
4. Placed on sterilized benches or sterilized supports at least 18 inches from the ground or floor level.
5. Area beneath benches or supports holding plants treated at six-month intervals with a registered nematocide or other material having nematocidal value and approved by the origin state agricultural officials, except when smooth clean flooring of concrete is present.
6. Plants and growing media sampled using methods approved by the California Department of Food and Agriculture and found free of burrowing and reniform nematode.
7. Protected from contamination by burrowing and reniform nematode until shipped,

or

c. The shipment consists of only unrooted plant cuttings, provided that the cuttings were taken from that portion of the plant which is growing at least 12 inches above ground level and were protected from contamination until shipped.

ADDITIONAL QUARANTINE INFORMATION

APPENDIX A

01-10-00

The following areas are known to be infested with burrowing nematode: Florida, Hawaii, the counties of Cameron and Hidalgo in Texas, and the Commonwealth of Puerto Rico.

Listed below are the counties, by state, known to be infested with reniform nematode based on surveys. At this time Alabama, Arkansas, Georgia, Louisiana, North Carolina and South Carolina have had their sampling protocols approved for premise-free certification to certify plant material to California from their infested counties. For those nurseries located in infested counties, certification will likely be based upon negative sampling of the property, premise, or facility.

Counties not listed have been surveyed and found free of reniform nematode; therefore, the states can certify, where possible, based upon countywide freedom from infestation. The survey information received to date is as follows:

- Alabama** The counties of: Autauga, Baldwin, Barbour, Bibb, Blount, Bullock, Butler, Chambers, Cherokee, Chilton, Choctaw, Clarke, Clay, Cleburne, Coffee, Colbert, Conecuh, Coosa, Dale, Dallas, De Kalb, Elmore, Escambia, Etowah, Fayette, Franklin, Geneva, Houston, Jackson, Jefferson, Lamar, Lauderdale, Lawrence, Lee, Limestone, Lowndes, Macon, Madison, Marengo, Marion, Marshall, Montgomery, Morgan, Perry, Pickens, Pike, Randolph, Saint Clair, Shelby, Sumter, Talladega, Tallapoosa, Tuscaloosa, Walker, Washington, Wilcox, and Winston.
- Arkansas** The counties of: Ashley, Jefferson, Lonoke and Monroe.
- Georgia** The counties of: Baker, Bleckley, Brooks, Burke, Calhoun, Charlton, Clarke, Clay, Colquitt, Cook, Decatur, Dodge, Dooly, Dougherty, Early, Emanuel, Grady, Houston, Jefferson, Lee, Macon, Marion, Miller, Mitchell, Morgan, Newton, Oconee, Pierce, Pulaski, Randolph, Richmond, Screven, Seminole, Stewart, Sumter, Tatnall, Taylor, Terrell, Thomas, Tift, Twiggs, Walker, Walton, Washington, Wayne, Webster, and Worth.
- Louisiana** The parishes of: Acadia, Ascension, Assumption, Avoyelles, Beauregard, Bossier, Caddo, Calcasieu, Caldwell, Catahoula, Concordia, East Baton Rouge, East Carroll, East Feliciana, Evangeline, Franklin, Grant, Iberia, Iberville, Jefferson, Lafayette, Lafourche, Madison, Morehouse, Natchitoches, Orleans, Ouachita, Plaquemine, Pointe Coupee, Rapides, Red River, Richland, Sabine, Saint Bernard, Saint Charles, Saint Helena, Saint John, Saint Landry, Saint Tammany, Tangipahoa, Tensas, Terrebonne, West Baton Rouge, West Carroll, and Winn.
- Mississippi** The counties of: Adams, Alcorn, Attala, Benlon Bolivar, Calhoun, Carroll, Chickasaw, Coahoma, Copiah, Covington, DeSoto, Forest, George, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Issaquana, Itawamba, Jackson, Jones, Lafayette, Lee, Leflore, Lowndes, Madison, Marion, Marshall, Monroe, Noxubee, Okabbaha, Parola, Perry, Prentiss, Pontotoc, Quitman, Rankin, Scott, Sharkey, Sunflower, Tallahatchie, Tunice, Tippah, Union, Warren, Washington, Yalobrusha, and Yazoo.
- North Carolina** The counties of: Cumberland, Harnett, Hoke, Johnson, Richmond, Robeson, Sampson, and Scotland.
- South Carolina** The counties of: Calhoun, Orangeburg, Clarendon, Darlington, Dillon, Florence,

Kershaw, Lee, Marlboro, Sumter, and Williamsburg.

Texas The counties of: Brazos, Burleson, Cameron, Fort Bend, Hidalgo, Lynn, Robertson, Starr, Terry, Wharton and Willacy.

FLORIDA NEMATODE CERTIFICATION

APPENDIX B 10-08-96

The Florida Department of Agriculture and Consumer Services does not provide California nematode certification to nurseries that ship "field dug" nursery stock or balled and burlaped nursery stock, unless CDFA has authorized it through the special permit process.

Florida will provide California nematode certification to growers of day lilies based on annual negative sampling of the growing site and on the condition that the plants are shipped bare-root.

If certified "field dug" or balled and burlaped nursery stock is found with Florida certification and a special CDFA permit is not presented, the shipment must be held and the accompanying documents retained for further investigation and the CDFA Pest Exclusion Branch notified.

SAMPLING AND LABORATORY INSPECTION FOR BURROWING AND RENIFORM NEMATODES FROM ALL SOURCES

APPENDIX C 10-09-18

Infestations of burrowing and reniform nematodes detected in California nurseries have been repeatedly traced to subtropical ornamental plants or unrooted cuttings secured from shipping points outside of the infested area. Burrowing and reniform nematodes have also been found repeatedly in laboratory examination of samples taken from certified shipments originating in infested states.

To protect California crops and nurseries from serious losses, it is necessary to require that samples for laboratory examination be collected from all incoming shipments from regulated areas. Plants, rooted cuttings, unrooted cuttings, or cane sections should be sampled according to this protocol.

In addition, inspectors are requested to take samples from any other plants or plant materials which are, for any reason, suspected of being infested with burrowing and/or reniform nematodes.

This inspection procedure does not modify the requirements of the California Burrowing and Reniform Nematode Exterior Quarantine.

Sampling Procedure For Laboratory Inspection. The number of plants, rooted cuttings, or unrooted cuttings which should be sampled is to be determined by reference to the table in this protocol.

Different kinds or varieties of plants comprising a single shipment may be from different sources. Therefore lot and sample sizes should be determined individually and separate samples collected from each kind or variety.

In the case of plants with roots, the sample taken from each plant should consist of a representative part of its root system. In the case of unrooted cuttings (or canes for division) the sample from each should consist of (1) any root primordia or

root nubbins, any aerial roots or (2) the basal section cut from the cane to include at least one node.

The composite samples may be handled in the county laboratory or by the state nematology laboratory in Sacramento. Root samples should be processed by mist extraction, in certified chambers, or the Baermann funnel or jar incubation procedure as outlined in "Standard Procedures for County Plant Nematology Work" (P1 Path-B-61-6) with an incubation period of at least 48 hours. Stem sections should be cut into pea-size pieces and processed in Baermann funnels.

Sampling Nursery Stock for Nematodes

Definitions

- Lot: A lot refers to all plants of a single plant species contained in a truckload that originated from one shipper.
- Shipment: A shipment refers to several lots that originated from the same shipper. A shipment may be contained in a single or multiple truckload arriving the same or next consecutive day.
- Species: A botanical group of plants given the same species epithet within a genus. Plant varieties are grouped within a species.
- Sample: A sample or composite sample is a mixture/composite of subsamples of soil and plant roots collected from a number of plants belonging to the same plant species within a lot. The number of subsamples comprising a composite sample is based on the sampling table (below). A composite sample may comprise of subsamples collected from a single variety and/or container size belonging to one plant species, or subsamples collected from different varieties of the same plant species and/or different container sizes of the same plant species. The discretion of the County Inspector is greatly encouraged in selecting the appropriate composition of a sample (i.e., one or all varieties and/or container sizes within a plant species) as the detection of an actionable nematode species may result in the rejection or destruction of the entire plant population represented by the sample.
- Sub sample: A single collection of soil and/or plant roots from one plant.

Sampling Table for Examination of Plants, Rooted or Non-rooted Cuttings Nursery Stock for Nematodes

The sampling table lists a required minimum number of subsamples collected per lot size. When possible, the collection of numbers greater than the required minimum is highly encouraged.]

Lot Size (number of plants in lot)	Minimum number of subsamples collected to comprise one composite sample	Range of percentage sampled to comprise one composite sample	
		From	To
1-10	(Sample all plants) 1-10	100	100
11-100	11	100	11
101-200	12	11.9	6
201-300	13	6.5	4.3
301-400	14	4.7	3.5
401-500	16	4.0	3.2
501-600	18	3.6	3.0
601-800	18-20	3.0	2.5
801-1,000	20-22	2.5	2.2
1,001-5,000	22-100	2.2	2
5,001-10,000	100-200	2	2
>10,000	200	2	2

Sampling Guidelines

Pre-sampling preparations

1. Equipment: Hand trowel, sampling tube with 2 cm (3/4 inch) inner diameter and semi to heavy duty tip for compacted soils or double-twist soil auger, hand-held clippers, disposable hand gloves, polyethylene bags, bucket, cooler, refrigerant ice packs wrapped in paper, spray bottle containing 70-90% ethanol (disinfectant), water-resistant marker pen, equipment for documenting official samples, Pest and Damage Record (PDR) and county forms, clipboard, paper towels for clean-up, large garbage bag.
2. Obtain and review list of plants (bill of lading) shipped to nursery.
3. Visually inspect all plants in lots (species, varieties, containers) to be in accordance with bill of lading. All plants must be loaded off truck and made available for inspection.
4. Determine the number of subsamples needed to comprise one composite sample based on lot size.
5. Where a shipment consists of multiple truckloads from the same source/origin arriving at the nursery on the same or consecutive day, the sampling procedure must be applied to all plant species in the first truck followed by a few random confirmatory samples of the same plant species (approximately 11 subsamples to comprise 1 composite sample) from the other trucks. If there are different plant species in the other trucks, then the sampling protocol must be applied to those.

Sampling

1. Collect subsamples from randomly selected plants.
2. Collect soil and roots from apparently 'healthy' and 'less healthy' plants.
3. Ascertain that sample includes roots and soil from all varieties and container sizes within a lot.
4. For non-rooted cutting, sample entire cane containing at least one node.

Sample amount

1. Collect approximately 5–100 g (5-100 ml by volume) of soil and roots from each plant/subsample. The composite sample amount should be at least 950 ml (1 quart by volume) of roots and soil.

Sampling plants in small, 4-6 inch containers

1. Remove selected plant from other plants to a separate working space covered with paper to collect spilled-out soil and debris.
2. Remove plant from container by placing hand over open end and carefully inverting container, or by placing container sideways and gently tapping and pulling plant and soil mass out of container.
3. Collect soil and roots from inner mass. Do not collect only peripheral roots on soil surface and inner circumference of container, although some may be included in sample.

Sampling plants in large, 10-14 inch containers

Plants in large containers are packed either in potting soil/media or lava rock. Both potting media present challenges to sample collection: large plants packed in potting soil/media may be root bound and not easily penetrated with a sampling tool, while plants in lava rock cannot be penetrated at all and must be un-potted.

1. Remove selected plant from other plants to a separate working space covered with paper to collect spilled-out soil and debris.
2. If plant is packed in potting soil, either use a sampling tube or double-twist auger, or carefully un-pot the plant to collect a soil and root sample from the inner root mass (see # 3 & 4 below). Insert sampling tube or auger through surface of potting media while applying adequate pressure. A double-twist auger may provide better penetration of a tightly root bound potted mass.
3. If plant is packed in lava rock, carefully un-pot the plant by laying it on its side and pulling it out of the container.
4. Collect soil and roots from inner mass. Do not collect only peripheral roots on soil surface and inner circumference of container, although some may be included in sample.
5. It is not necessary to disinfect sampling tools and change gloves between collections of sub samples of a composite; however, gloves must be changed, and sampling tools must be disinfected in between composite samples.

Sampling seedlings in seedling flat containers

1. Collect entire seedling with potting medium. Destructive sampling is necessary. Do not pinch off root from seedling.

Care and handling of samples

1. Put sample in durable plastic bag. Seal bag.
2. Attach label to outside of bag.
3. Do not rough handle sample.

4. Keep samples cool after collection. Place samples in cooler with frozen refrigerant 'ice pack' wrapped in paper to avoid chill injury of samples through direct contact with frozen pack.
5. Send samples to processing lab as soon as possible.
6. Do not wrap roots in paper.
7. Complete sample and shipment information needed. Ascertain that complete information is included on PDR form: host, origin, collector name, activity and situation codes, etc.

SAMPLE PRIORITY GUIDELINES

APPENDIX D

12-23-14

Samples should be taken at random according to the sampling table found in Appendix C.

From highest to lowest priority, plants for sampling should be selected as follows:

- *Plant material for farm planting,
- *Perennial plants for non-farm planting,
- *Annuals for outdoor landscaping,
- *Indoor decoratives for indoor use.

(Southern California counties receiving indoor decorative plants which are routinely planted outdoors may want to classify these plants under one of the other categories for sampling purposes)

ADDITIONAL INFORMATION ON EXEMPTIONS

APPENDIX E

Exemptions on air plants and air layered plants are listed because plants produced in this manner should not be contaminated by BN or RN. This type of plant material produced in earth (including sand and soil), potting media, or subject to higher-risk conditions (e.g. grown on the ground) is regulated and must be properly certified.