

Nursery News

April 2007

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Oregon
Department
of Agriculture

Nematodes: Summary of results from the 2006 Columbia root knot nematode survey

Robin Ludy and Cindy Fraley, ODA plant disease specialists

Survey history

Every fall for the last 25 years, the Oregon Department of Agriculture has sampled nursery fields for the presence of the Columbia root-knot nematode (CRKN, *Meloidogyne chitwoodi*). CRKN is a serious pest of several crops, including potatoes, onions, sugarbeets and alfalfa. Because this nematode causes major economic losses and has a limited distribution, CRKN is of regulatory importance. Many states and countries limit the movement of plants that may introduce this pest to an area. Currently, CRKN has been found in South Africa, Belgium, Netherlands, Mexico, and Argentina. In the United States, CRKN is found in California, Colorado, Idaho, New Mexico, Nevada, Oregon, Texas, Utah, Virginia and Washington.

Canada is currently free from CRKN and is a major importer of nursery stock from Oregon. To meet import requirements for Canada, ODA began sampling fields from nurseries that often ship to Canada. Soils are collected in

the fall from fields growing ornamentals, fruit trees, and bulbs and processed for the detection of CRKN. While looking for CRKN, any other plant parasitic nematodes observed in samples are noted. Results are sent to growers for their records.

CRKN was first described in 1980 in the Pacific Northwest. It is common in potato fields in the Columbia Basin, however, the ODA has never detected CRKN in nursery fields in Western Oregon.

CRKN biology and management

Columbia root-knot nematodes overwinter as eggs or larvae in the soil or in previously infested roots (or tubers). Larvae enter roots/tubers of their host plants to feed and become sedentary. As the nematodes mature, they induce alteration of the cells resulting in the formation of galls. Males leave the plant tissue to mate and can be found free in soil. Females swell and remain in the root/tuber tissue where they lay eggs. The entire life cycle takes three to four weeks.

CRKN is managed with nematicides and crop rotation. Nematicides reduce populations significantly, but often enough nematodes survive to cause damage when a suitable host is planted. Leaving ground fallow and planting unsuitable hosts is important to maintaining low levels of nematodes for long term control.

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Survey results

In 2006, 108 fields were surveyed for the Columbia root-knot nematode. No CRKN were detected. The Plant Health Lab did not detect any plant parasitic nematodes in 31 percent of the soil samples processed. The soil samples with plant parasitic nematodes (69 percent) usually had a single species of nematode, although samples from two fields had five different genera. The most common nematodes found were *Pratylenchus* followed by

Xiphinema (Table 1). *Pratylenchus* can be damaging to plants at high populations (~250-1500/L of soil), even causing plant death. *Xiphinema* can damage and reduce the volume of roots and stunt plants, but of greater concern, is the ability of *Xiphinema* to transmit viruses, such as tomato ringspot and cherry rasp virus. Table 2 outlines the symptoms that can develop on roots and above-ground tissues and the crop impact of the plant parasitic nematode genera we detected.

Table 1. Detection of nematodes in 108 nursery fields in western Oregon in 2006.

Plant parasitic nematode genera	Fields with nematodes detected (percent)	Population range (low-high) (# of nematodes/L of soil)	Average population count (# of nematodes/L of soil)
Helicotylenchus	1	12	12
Heterodera species	6	4-16 (4-12 cysts)	9 (6 cysts)
Heterodera humuli	1	350	350
Meloidogyne hapla	8	8-680	308
Mesocriconema	11	4-900	116
Paratylenchus	16	16-1600	193
Pratylenchus	58	4-2000	146
Rotylenchus	1	240	240
Scutellenema	2	16-60	38
Trichodorus	3	8-488	173
Tylenchorrynchus	8	16-600	244
Xiphinema	18	4-800	91

Table 2. Symptoms and impact of nematodes isolated from western Oregon nurseries in 2006.

Plant parasitic nematode genera	Nematode classification*	Symptoms observed		
		Root damage	Above ground damage	Overall impact
Helicotylenchus	Migratory endo- and ectoparasite	Roots shriveled, short, discolored, few laterals	Mild-moderate stunting, leaf chlorosis	Rarely severe, feeding can allow other pathogens to become established
Heterodera	Sedentary semi-endoparasite	Roots poorly developed	Missing plants, chlorotic leaves, flowering delayed	Yields decreased, plants killed, cysts survive in soil up to 15 years
Meloidogyne	Sedentary endoparasite	Roots swollen and galled	Plants stunted, killed	More damaging in sandy soils, can increase infection by fungal pathogens
Mesocriconema	Migratory ectoparasites	Root new growth killed	Plants stunted to declining, reduction in fruiting and flowering	Feeding can allow other pathogens to become established, only a few species have proven to cause serious damage particularly on fruit and nut trees
Paratylenchus	Migratory ectoparasites	Roots shriveled, short and sparse	Slow plant decline	Usually not damaging unless populations are very high (thousands/L of soil)
Pratylenchus	Migratory endoparasites	Succulent roots killed	Leaves chlorotic, plants stunted, declining	Plants killed if heavy infestations (250-1500/L of soil)
Rotylenchus	Migratory ectoparasites	Roots shriveled, short and sparse	Slow progressive decline in vigor	Can be a serious pest on boxwood, fungi, e.g. <i>Cylindrocarpon</i> and <i>Fusarium</i> may enter wounds
Scutellenema	Migratory endo- and ectoparasite	Roots have brown necrotic lesions with reduced growth	Foliage necrotic	Serious pest in warmer regions
Trichodorus	Migratory ectoparasites	Roots short, stunted and stubby	Stunted, wilted	Transmit virus (such as Tobacco rattle and Pea early browning), rarely kills
Tylenchorrynchus	Migratory endo- and ectoparasite	Roots short and sparse, discolored and shriveled	Leaves chlorotic, defoliation and wilting	Populations need to be very high to have significant impact
Xiphinema	Migratory ectoparasite	Sparse, discolored fine feeder roots	Plant stunting and chlorosis	Can transmit virus (tobacco ringspot, grapevine fanleaf and cherry rasp leaf)

* Classifications were defined in article by Scott Rose in Oct 2006 newsletter.

Changes to *Phytophthora ramorum* federal shields

Melissa S. Boschee, ODA horticulturist

As of November 2006, USDA APHIS-PPQ is requiring each growing/shipping location to have a unique federal certificate for *Phytophthora ramorum*. Due to this change, we reissued federal shields to all qualifying *P. ramorum* host nurseries that submitted a new copy of the federal compliance agreement (PPQ form 519).

The new federal shields have unique numbers for each growing ground consisting of a two-digit county code, a six-digit license number and a three-digit growing location code (please see graphic at right, for details). This certificate will be used when shipping plant material from that assigned certificate's location.

These changes were put into effect January 15, 2007 to help track shipments from nurseries more efficiently. Thank you to those of you who responded and sent in your compliance agreement in a timely manner. If your federal shield does not have the new location number you will need to complete a new copy of the compliance agreement to obtain a new federal shield.

In addition to the changes to compliance numbers, the USDA approved an interim rule to extend the *Phytophthora ramorum* regulations beyond the federal order sunset date of June 2007. Due to the passing of the interim rule, the wording on the federal shields will also change (please see the graphic at right). Both shields will remain valid so there is no need to have your shield changed once again. We would like everyone to be aware of the changes and the fact that there are two different shields being used. To check the validity of a shield, please visit our Web site at http://oda.state.or.us/dbs/nursery_info/hitlist.lasso

Please contact Melissa Boschee at 503-986-4777 or by email at mboschee@oda.state.or.us if you have any questions.



Apples, the Canadian way

Christy Brown, ODA horticulturist

Since Oregon dropped its self-imposed apple ermine moth (AEM) quarantine last spring there has been some confusion about shipping *Malus* stock to Canada. In short, not much has changed. But, since we all appreciate clarity, allow me to clarify...

All Canadian provinces, other than British Columbia, regulate *Malus* imports for AEM. Your inspector must write a declaration on the phytosanitary certificate that states, "The plants are free of apple ermine moth (*Yponomeuta malinellus*) based on an inspection and chemical control program." For the past 15 years, Oregon's own AEM quarantine program met the requirements of the Canadian quarantine and provided justification for the declaration. Now that our quarantine is gone, we will focus on the Canadian quarantine regulations and make sure that we meet them. There are a few variations allowed for certification, but it is anticipated that most growers will use the following protocol:

1. A larval spray must be applied at the time of larval emergence—approximately at the time of tight cluster blossom stage. Most growers are already spraying an appropriate product. Contact your inspector if you have questions about this requirement.
2. Your nursery inspector must inspect a portion of your apple trees at the time that AEM tents would be present. This should happen before June 1. If AEM tents are detected, a second larval spray is required.
3. Treat with Asana XL and dormant oil as done under the Oregon quarantine. Two applications need to be made with at least seven days between treatments. Please keep clear records of your spray activity.

Free weed talk

The Oregon Department of Agriculture's Noxious Weed Control Program is offering a free presentation entitled "Beautiful Invaders: Ornamental Noxious Weeds of Western Oregon" to garden clubs, watershed councils, master gardener classes and any other groups in NW Oregon interested in learning more about this group of invasive plants.

The one to one-and-a-half hour presentation will give a brief overview of the noxious weed problem in Oregon and offer information on the identification and impacts of state-listed noxious weeds that were originally introduced as ornamental plants.

For more information or to schedule a talk, please contact Beth Myers-Shenai at 503-986-4621 or smyers@oda.state.or.us

Field notebook: some 2006 plant pest observations

Beverly Clark, ODA horticulturist

The following pests were observed during the past growing season:

Flat headed borers were observed in 'blue star' juniper in September as a result of drought/heat stress. This is probably the flatheaded cedar borer (*Chrysobothris nixa*) usually found damaging commercial productions of junipers and arborvitae. Damage is often located near the base of the plant. Shrubs weakened from drought, injury or other stresses are more susceptible to borer damage.

1. Miscanthus mealybug (*Miscanthiococcus miscanthi*) is a major emerging pest for Miscanthus ornamental grass. This soft-bodied, white, wooly insect is found between the clasping leaf sheath and stem in the lower portions of the grass. Heavy infestations stunt plant growth, resulting in bunched foliage and twisted flowers that open within the foliage rather than above it.
2. False spider mites (*Pentamerismus erythreus*) were found on a variety of coniferous host

plants: arborvitae, juniper, sequoia, spruce and chamaecyparis. This is an elongate, orange-red mite that is barely visible to the naked eye. Heavy infestations may cause browning of foliage if left unchecked.

3. Sirococcus shoot or tip blight caused by the fungus (*Sirococcus conigenus*) occurs on a wide variety of conifers. The fungus infects new shoots causing shoot dieback and bleeding cankers on the stems. Young seedlings can be killed. Deodar and blue atlas cedar are commonly afflicted, and this past growing season it was seen on Colorado blue spruce as well.
4. Rhizosphaera needle cast fungus (*Rhizosphaera kalkhoffii*) was observed defoliating inner needles of grafted spruce late last summer. This is a common disease of ornamental spruce, particularly Colorado blue spruce. Trees are not usually killed by this disease; however, premature needlecast results in trees that are not marketable.

Attention all interstate importers of woody plants:

Notify the ODA!

Notification regulations assist plant health officials by targeting potential entry points for some of the most undesirable plant pests and diseases. Department inspectors are given the opportunity to inspect shipments of high-risk nursery stock shortly after they arrive.

For example, if you are receiving plant material from states quarantined for Japanese beetle, the shipper must pre-notify the ODA with the consignees name and address, shippers name and address, number and type of plants being shipped and the official JB certification. Similarly, ODA must be pre-notified if you are receiving grape or blueberry stock from any state. However, the broadest reaching notification rule was adopted in 2002 as a reaction to *Phytophthora ramorum* (sudden oak death). It pertains to all trees and shrubs imported from any state.

603-054-0027

Notification of Imported Trees and Shrubs

- (1) Recipients of tree and shrub nursery stock imported into the state of Oregon from any out-of-state source are required to notify the Oregon Department of Agriculture. Notification shall be via mail, fax or e-mail to: Nursery Program Supervisor, Plant

Division, Oregon Department of Agriculture, 635 Capitol St. NE, Salem, OR 97301; fax 503-986-4564; e-mail: quarantine@oda.state.or.us.

- (2) For purposes of this section, "tree and shrub nursery stock" means woody forest and ornamental trees, shrubs and vines grown or kept for propagation or sale, including bareroot, balled and burlaped, and containerized plants, liners, budwood, and cuttings. Fruit, seeds and tissue culture plantlets are not included.
- (3) Notice under (1) of this section must be received by ODA no earlier than two business days prior to arrival of the shipment and no later than two business days after its arrival. Notification shall include the species of plant(s), quantities, source, and recipient's contact information. Copies of regular shipping documents, e.g. load lists, with this information are encouraged.
- (4) ODA will contact nurseries within one business day of receipt of notification if the tree and shrub nursery stock must be held for inspection under ORS 571.220 and 570.305. Recipients are not obligated to hold the imported tree and shrub nursery stock for inspection unless contacted directly by an ODA inspector, except that the imported tree and shrub nursery stock must not be sold or distributed to untraceable buyers, e.g. final consumers, for one business day after notifying ODA
- (5) Failure to comply with this rule shall be deemed to be a violation of ORS 571.220 and could result in criminal penalties authorized in 571.991 of up to \$5,000. Violation of this rule by a licensed nursery

Phytophthora ramorum certification 2007

Melissa S. Boschee, horticulturist and Gary L. McAninch, program supervisor

For the past two years, the Oregon Department of Agriculture (ODA) has conducted *Phytophthora ramorum* inspections at Oregon nurseries in order to meet mandatory federal *P. ramorum* certification requirements. Because of anticipated changes to USDA *P. ramorum* certification procedures and uncertainty of future federal funding, the ODA is changing its *P. ramorum* certification program for 2007.

Highlights for 2007 include:

- Nurseries that do not ship plants out of state are no longer required to be certified. Starting this year, we only plan to certify out of state shippers.
- Nurseries that grow *P. ramorum* host plants and ship out of state will receive an annual certification inspection sometime between February 20, 2007 and October 15, 2007.
- Nurseries that grow non-host plants and ship out of state will receive an annual inspection during calendar year 2007.
- Because *Rhododendrons* and *Camellias* are high-risk host plants, nurseries that ship out of state and grow either, will receive two additional inspections during 2007.
- Nurseries under a compliance agreement may only receive host plants from other certified nurseries, or, if that is not possible, the nursery must hold host plants from uncertified sources pending an ODA inspection and sampling.

This season we are lucky to have six technicians working full time from mid-February through mid-October. They will be covering the whole state to perform host and high-risk inspections. Four of the six technicians are returning for their third year of inspections, one technician is returning for her second year and one technician is brand new. Several technicians have experience working in the nursery industry for various nurseries or working with nurseries through other divisions of the ODA.

On February 20th our technicians began making phone calls to arrange appointments with your nurseries. If they have not already scheduled with you, it is necessary and helpful to have the following information available when they call:

1. Do you ship plants out of state?
2. Are you a host nursery?
 - a. A host nursery is any nursery which grows host or associated host material—please see the USDA APHIS-PPQ Web site for the updated list.

3. Have you used any fungicides in the last 30 days?
 - a. If no, please tell your technician
 - b. If yes, please have a list of what has been applied and the dates of application.
4. Do you have additional growing grounds?
 - a. If no, please tell your technician
 - b. If yes, please have a list of your additional growing grounds and their locations including a physical address and zip code.

While it is not necessary, it would be helpful to our staff, and will expedite your inspection, if you could do, or provide, the following:

1. Provide a map of the nursery layout with host and associated host material clearly marked.
2. Have all host and associated host material clearly labeled in the nursery
3. Furnish a staff member to answer the technician's questions.
4. Please do not apply any pesticides to any area of your nursery for 72 hours prior to your inspection and sampling appointment time. By doing this we are assured of complete access to all nursery stock present without violation of pesticide reentry rules.

Once samples have been collected and received by our lab, we begin with an ELISA prescreen to determine if any species of *Phytophthora* is present. If no *Phytophthora* is present then the sample is declared free from *P. ramorum* and the results are mailed out to the nursery. If the ELISA screen is positive for *Phytophthora* then the sample is moved to another round of testing using polymerase chain reaction (PCR), which looks specifically for *P. ramorum* DNA. PCR negative samples (*P. ramorum* not found) are then declared free from and test results are mailed to the nursery. If a positive PCR test result (sample has *P. ramorum*) is found, then we will contact the nursery directly and arrange to begin the confirmed nursery protocol. Test results for your nursery should be completed within 10 to 14 business days.

For additional information about *Phytophthora ramorum*, please visit the following Web sites:

USDA APHIS *P. ramorum* Web site
http://www.aphis.usda.gov/plant_health/plant_pest_info/phytophthora_ram/index.shtml

ODA *P. ramorum* Web sites
http://oregon.gov/ODA/PLANT/NURSERY/reg_sod.shtml
 ODA host list

http://oda.state.or.us/dbs/nursery_info/hitlist.lasso
 ODA non-host list

http://oda.state.or.us/dbs/nursery_info_no_host/hitlist.lasso
 California Oak Mortality Task Force
<http://nature.berkeley.edu/comtf>

Oregon Department of Agriculture
635 Capitol Street NE
Salem, Oregon 97301-2532

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Finally, a great place to get a dot on a map

Beth Myers-Shenai, ODA weed specialist

WeedMapper has been available in its current format since spring of 2005 and has grown from 20 data contributors to over 80. It has been enthusiastically received by land managers, students and private landowners who find the Web site a useful tool in researching weed distribution in their areas of interest. The project wouldn't be possible without the cooperation of the many organizations and individuals who share weed location data, and ODA encourages nursery owners to utilize this resource. Visit WeedMapper, click on maps, and have a look at the information available. Report new weed observations and make history.

WeedMapper (www.weedmapper.org) is a data-collection project and Web site that provides distribution maps of all state-listed weeds in Oregon as well as information on the identification and impacts of those weeds. It also provides a weed sighting report form to allow land managers and concerned citizens to notify ODA quickly and easily of a new weed sighting. Weeds are mapped at the state and county levels. The Web site is a joint project of the Oregon Department of Agriculture and Oregon State University with support from BLM, USFS and many data contributors.