2014 Plant Health Program Annual Report

Market Access & Certification Program Area

The Plant Health Program provides official field inspections and laboratory testing for Oregon's specialty seed, grass seed, and nursery industries. For other commodities, such as potatoes and onion, we conduct surveys to establish pest-free status for the state or for specific regions or counties. These inspections, surveys, and lab tests are required for shipment to interstate and international markets. The Program's pathologists also provide commodity groups and trade negotiation officials with official statements to facilitate the opening of new markets for Oregon's agricultural commodities.

The Plant Health Program is responsible for several state quarantines, control area orders, and other regulations for plant pathogens. These administrative rules are designed to prevent exotic pathogens from being introduced or becoming established in the state and to provide quarantine pest-free production areas for Oregon growers. Other regulations also facilitate market access by ensuring products are free of pests of concern to interstate and international customers.

In cooperation with USDA Animal and Plant Health Inspection Service - Plant Protection and Quarantine (APHIS/PPQ), the Plant Health Program conducts statewide surveys for exotic pathogens. These surveys are federally funded and help provide crucial data to keep interstate and international markets open to Oregon's agricultural products.

We are also active in helping to shape national policy on important and emerging issues and programs such as the National Clean Plant Network and *Phytophthora ramorum*. Staff scientists are regularly consulted by APHIS/PPQ, and provide crucial input to national plant disease control efforts. Staff expertise is maintained and enhanced with a research program that develops and publishes new diagnostic protocols for regulated and emerging plant pathogens.

- The Plant Health Program received funds to purchase a soil steamer. This unit was used to effectively eliminated the federal quarantine pathogen *P. ramorum* and the recently reported boxwood blight (*Cylindrocladium pseudonaviculatum*) from nursery soils.
- The Plant Health Program continues to see increased requests for official seed testing for phytosanitary purposes. Compared to 2013, the number of seed lots submitted for testing increased 16.5%.
- The Federal Certification Program for *Phytophthora ramorum* in nurseries underwent significant revisions in 2014, with survey efforts now focused on nurseries in which *P. ramorum* has been detected since March 31, 2011. Non-host nurseries and nurseries in which *P. ramorum* has never been detected no longer required surveys.

In the meantime, *P. ramorum* continued to spread in Curry County, which will result in another expansion of the quarantine boundary.

With this consistently high workload, staff sustained the high level of competence expected of our program with no exported seed lots rejected at ports of entry for 2014. It is a privilege to serve with such an exceptional and dedicated group.

Thank you for all of your excellent work.

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Cooperative Agricultural Pest Surveys

Apple proliferation phytoplasma survey

A survey of apple nursery stock was conducted for apple proliferation phytoplasma (APP) because information received from the Canadian Food Inspection Agency implicated certified Oregon *Malus* rootstock as a potential source of APP. Although this information was later determined to be erroneous, an APP survey was conducted in nurseries that grow and export certified *Malus* nursery stock to verify freedom from this disease. The nurseries were visually surveyed once during the growing season, with samples collected from plants exhibiting suspicious symptoms. If no symptoms were observed, samples were collected randomly from asymptomatic plants. Samples were tested in the laboratory with a peer-reviewed polymerase chain reaction method that used a phytoplasma-specific primer set. If needed, suspect samples were forwarded to the USDA APHIS PPQ Regional Identifier for official confirmation.

A total of 631 samples were collected from 23 nurseries located in five counties (Clackamas, Multnomah, Polk, Washington, and Yamhill). This sampling rate provided a

95% confidence of detecting APP at a disease incidence rate of 0.5% or higher. All samples tested negative for APP. This data was entered into the National Agricultural Pest Information System (NAPIS).

Small grains survey

Funding for this survey was originally received in 2013, with survey work completed in 2014. A survey of wheat and oat fields in six counties was conducted for cereal cyst nematode (*Heterodera filipjevi*), Mediterranean cereal cyst nematode (*H. latipons*), British root knot nematode (*Meloidogyne artiellia*), and Philippine downy mildew (*Peronosclerospora philippnensis*). Composite soil and root samples were collected from each of the 15 fields inspected, with the soil sample consisting of 10 cores collected 55-m apart to a minimum depth of 6-in. The root samples were collected from plants within the same location. The composite soil samples were split in half with one half tested for *Heterodera* species and the other half and the root samples tested for *Meloidogyne* juveniles using standard laboratory methods. Morphometric measurements were used to identify suspicious nematodes to species. For Philippine downy mildew, each field was visually surveyed as described in the NSHS Reference Manual B: Seed Health Testing and Phytosanitary Field Inspection Methods. Foliar samples were collected from suspicious samples for transport to and identification in the lab.

The results of the field survey and sample testing are indicated below (Table 1). None of the target organisms was detected during this survey. Survey data were entered into NAPIS.

Table 1. Results of small grains survey, 2014.

County	No. of Fields	Host plant	Results	Target(s) found?
Umatilla	4	Wheat	*Pratylenchus* spp.	No
Morrow	2	Wheat	*Pratylenchus* spp.	No
Gilliam	2	Wheat	*Pratylenchus* spp.	No
Sherman	2	Wheat	*Pratylenchus* spp.	No
Washington	1	Wheat	*Pratylenchus* spp.	No
Washington	1	Wheat	*Meloidogyne hapla*, *Pratylenchus* spp., *Xiphinema* spp.	No
Washington	1	Oat	*Pratylenchus* spp.	No
Marion	2	Wheat	*Pratylenchus* spp.	No

Karnal bunt survey

Karnal bunt (*Tilletia indica*) is a fungal disease of wheat originally reported from India. After its discovery in Arizona wheat fields in 1996, a federal quarantine was adopted and a national survey strategy implemented to ensure US wheat export markets remained open. Oregon has participated in the national survey since its inception in 1996.

In 2014, we collected a total of 54 samples from 14 counties (Gilliam, Jefferson, Klamath, Linn, Malheur, Marion, Morrow, Polk, Sherman, Umatilla, Union, Wasco,

Washington and Yamhill). All samples were shipped to the national Karnal bunt-testing laboratory in Phoenix, AZ, and were found to be free of Karnal bunt. This is the nineteenth consecutive year Oregon has tested free of Karnal bunt. Survey results were entered into NAPIS.

Farm Bill projects

Solanaceous Pest Survey

One hundred eighty acres of seed potato fields and 100 acres of commercial potato fields were surveyed for the Solanaceous pests, *Globodera pallida*, *Globodera rostochiensis*, *Meloidogyne minor* and *Meloidogyne fallax* (Table 2).

Composite soil samples of ~5 lbs (1 sample/acre) were collected from each farm as described in the 2009 Pale Potato Cyst Nematode National Survey and Diagnostic Cyst Sample Forwarding Protocols. Nematode cysts were isolated from the soil using a USDA soil cyst washer. Any suspected cysts were collected and identified to genus and species. There were no *Globodera* species recovered from any of the sites.

Composite soil samples of ~500 ml were processed using the sugar centrifugation method for collecting soil nematodes. The samples were examined under a dissecting microscope. No *M. fallax* or *M. minor* where recovered.

Table 2. Counties and acreage from which soil samples were collected for nematode testing in 2014.

County	Seed field acres	Commercial field acres
Klamath	85	30
Multnomah	0	30
Yamhill	0	10
Umatilla	0	10
Union	60	0
Jefferson	20	0

In the spring of 2015 we will collect the remaining 20 acres of soil from commercial fields and 15 acres of soil from seed fields.

In addition to the surveys of potato fields, Solanaceous nursery plants were tested for the presence of zebra chip disease (*Candidatus Liberobacter solanacearum*) and bacterial wilt (*Ralstonia solanacearum* Race 3 Biovar 2). Leaf tissue samples from tomato, eggplant, and bell pepper starts were collected from 10 nurseries located in five counties (Clackamas, Marion, Multonomah, Washington, and Yamhill). One hundred one samples were tested for zebra chip disease using a peer-reviewed PCR method. This sampling rate provided a 95% confidence of detecting >3% disease incidence. Zebra chip was not detected in the samples. One hundred samples will be tested for bacterial wilt in the spring of 2015.

Grapevine commodity survey

Funding for this survey was received during the summer of 2013. The survey focused on three viruses of state concern that affect grapevines: Grape leafroll-associated viruses 1 and 3 (GLRaV), grapevine virus B/grapevine corky bark agent (GVB) and grapevine fanleaf

virus (GFLV). Because environmental conditions affect the ability to detect different viruses within the grapevine, testing was divided between the fall (GLRaV and GVB) and the spring (GFLV). Fall testing was completed in 2013 at 14 nurseries located in seven counties (Clackamas, Douglas, Josephine, Lane, Marion, Polk, and Yamhill), which sell certified grapevine nursery stock. No GLRaV or GVB was found.

To complete the survey, in the spring of 2014, a total of 212 composite samples were collected from the same 14 nurseries and tested for GFLV using ELISA. This sampling and testing rate provided 90% confidence of detecting a disease incidence of 1% or higher. No GFLV was detected. Data were entered into NAPIS at the conclusion of the survey.

Apple proliferation survey

This survey was conducted to detect apple proliferation phytoplasma (APP) (caused by *Candidatus Phytoplasma mali*) in apple nursery stock. The survey was performed in response to information from the Canada Food Inspection Agency implicating US certified apple nursery stock as a source of APP in a Canadian apple orchard. Samples were collected following a standard protocol to determine the presence or absence of the pathogen. Twenty-three nurseries in Clackamas, Marion, Multnomah, Washington, and Yamhill counties were surveyed in 2014, with leaf samples collected and tested from each orchard. A total of 631 samples were tested using a peer-reviewed PCR technique; all samples were free of *Cadidatus Phytoplasma mali*. Survey results were entered into the NAPIS database.

Stone fruit orchard survey

Funding was received during the summer 2014 to conduct a survey for plum pox potyvirus (PPV) in Oregon stone fruit orchards. Because environmental conditions affect the ability to detect PPV, sampling and testing will take place the spring of 2015. The primary commercial stone fruit growing areas in the state will be surveyed following the Stone Fruit Commodity-based Survey Guideline (USDA APHIS CPHST, March 2012). We anticipate surveying a total of 25 orchards and collecting samples from eight trees per orchard. Samples will be tested with a commercially available ELISA test kit and results will be entered into NAPIS at the conclusion of the survey.

Blueberry nursery stock certification project

The Plant Health Program received funds to implement an official certification program for blueberry nursery stock following the guidelines established in the draft State Level Model Regulatory Standard: Systemic Pathogen-tested Certification Program for Blueberry Nursery Stock Production Systems (draft national standard). The goals of the pilot study were to: 1) Assess the nurseries for their ability to meet the requirements as outlined in the draft national standard; 2) Survey the nurseries to get an idea of the cost associated with implementing an official certification program; and, 3) Survey the nurseries for so-called canary viruses and nematode vectors according to the draft national standard and control an infestations found.

Fifteen blueberry nurseries volunteered to participate in the pilot study. During the nursery assessments, the following information was collected.

- All of the nurseries grew blueberry nursery plants in containers either in a screenhouse/greenhouse or under field conditions.
- Tissue culture was the main source for planting materials; other sources included buying in from other nurseries, cutting from the nursery's own plants or from field grown plants, and a Clean Plant Center.
- Most of the nurseries kept adequate records of plants' G-level and other detailed information about the cultivars grown.
- Most nurseries maintained adequate isolation distance, buffer zone, and clean cultivation in and around screenhouses/greenhouses. However, the screenhouses/greenhouses were generally not insect- and nematode proof.
- Nurseries with containers in the field maintained adequate isolation distances and buffer zones. However, a few had problems with broadleaf weeds or lacked clean cultivation.
- All of the nurseries had pest monitoring and management plans.

To survey for the canary viruses blueberry scorch and blueberry shock, a grand total of 3,581 samples were collected from 120 blueberry cultivars grown at the 15 nurseries. One sample consisted of five leaves collected from a single plant. This sample collection rate was in accordance with the requirements of the draft national standard for G4 nursery stock. The samples were tested using commercially available ELISA kits. All the samples were found free of blueberry scorch virus. However, blueberry shock virus was detected in six nurseries infecting 16 different blueberry cultivars; 52 plants in total tested positive.

In addition to testing plants, the potting mix in containers and the soil/gravel surface on which potted plants were placed were also tested for the presence of the virus-vectoring nematodes *Xiphinema* spp. and *Longidorus* spp. A total of 57 samples, 28 from potting media and 29 from soil/gravel were tested using standard laboratory methods. No plant parasitic nematodes were detected.

The results of the pilot study were shared with the participating nurseries. As an outcome of that meeting, an exploratory committee was proposed to discuss the implementation of an official certification program in Oregon.

Treating soil with steam for *Phytophthora ramorum* project

In 2013, the program entered into a multi-state project with Washington State University and the Dominican University of California (DUC) to test steam as a treatment for *P. ramorum* infestations in nurseries' soils. Previous research at the National Ornamentals Research Site – DUC (NORS-DUC) had demonstrated that steam-treating soil to a temperature of 50°C for 30-min to a depth of 15 cm was sufficient to eliminate *P. ramorum* contamination. However, the soil types in Oregon and Washington differ from those in California. Thus, funding was awarded to establish if this treatment regime would work in multiple soil types.

P. ramorum was detected in the soil at two interstate shipping nurseries in late 2013. In both nurseries, two different areas were contaminated for a total of four treatment sites (Table 3). Site #1 contained field-grown rhododendron plants, site #2 was a cull pile, site #3 was located in a lathe house, and site #4 was a retail area in front of the nursery's office.

Initial attempts to conduct the soil steaming treatments in the spring failed, likely due to the environmental conditions at the time. Thus, the decision was made to wait to conduct treatments until the ambient temperature was above 60°F.

Table 3. Characteristics of four *P. ramorum*-contaminated soil sites treated with steam in 2014.

Characteristic	**Treatment site**			
	1	**2**	**3**	**4**
Size	24' x 35'	22' x 38'	9' x 12'	6' x 9'
Soil type	Clay loam	Silt loam	Clay loam	Sandy loam
Soil saturation	0.292 m/m^3	0.086 m/m^3	0.369 m/m^3	0.251 m/m^3
Gravel depth	0 cm	0 cm	10 cm	5 cm

Soil was collected from the sites and tested for the presence of *P. ramorum* 24-hr pre-steaming and sampled and tested again after the required time/temperature regime had been reached. Based on these test results, *P. ramorum* was identified in two of the four sites prior to treatment and *Phytophthora* spp. were identified in the other two sites (Table 4). After treatment, no *P. ramorum* was recovered. However, other *Phytophthora* spp. were still present in three of the four sites.

Table 4. *Phytophthora* spp. and *P. ramorum* present in four sites treated with steam pre- and post-treatment.

Organisms present in soil	**Treatment site**			
	1	**2**	**3**	**4**
Pre-steaming				
2" depth	*P. ramorum*	*Phytophthora*	*P. ramorum*	*Phytophthora*
6" depth	*P. ramorum*	*Phytophthora*	*P. ramorum*	*Phytophthora*
12" depth	*P. ramorum*	*Phytophthora*	*Phytophthora*	*Phytophthora*
Post-steaming				
2" depth	*Phytophthora*	None detected	None detected	*Phytophthora*
6" depth	*Phytophthora*	None detected	*Phytophthora*	*Phytophthora*
12" depth	*Phytophthora*	None detected	None detected	*Phytophthora*

Strawberry nursery stock certification project

In September of 2013, funding was received to develop a harmonized state level model regulatory standard for the certification of strawberry nursery stock as virus-tested. This project is being done in collaboration with the National Clean Plant Network (NCPN, see below). Similar efforts have been completed or are underway for virus-tested ornamental and fruit tree nursery stock, blueberry nursery stock, grapevine nursery stock, and other commodity groups operating under the auspices of the NCPN.

In 2014, the Plant Health Program hosted a regulatory workshop with interested stakeholders from academia, the nursery industry, the strawberry grower industry, state and federal regulators, and subject matter experts. Participants in the workshop came from the California Department of Food and Agriculture, the California nursery industry, North Carolina State University, USDA Agricultural Research Service, North Carolina Crop Improvement Association, Foundation Plant Services, Massachusetts nursery industry, and the National Clean Plant Network. The primary objective of the workshop was accomplished; the group developed a draft of the state level model regulatory standard. The

draft standard reflected the common pest concerns of the various strawberry-producing states while also allowing for regional differences in pest pressure. The draft standard is currently being reviewed by a larger group of interested stakeholders before being released for public comment.

Funding was received the fall of 2014 to initiate a pilot study using the guidelines established in the draft national standard in Oregon. The majority of work for this project will take place in 2015.

Latent viruses in certified nursery stock survey

A survey was conducted to determine the incidence of three latent viruses, apple chlorotic leafspot virus (ACLSV), apple stem grooving virus (ASGV), and apple stem pitting virus (ASPV), in G2 or higher level certified fruit nursery stock. A total of 350 leaf samples from 23 nurseries located in five counties (Clackamas, Marion, Multnomah, Washington, and Yamhill) were tested for ACLSV, ASGV, and ASPV using commercially available ELISA test kits. All the samples tested negative for the three latent viruses. This survey data was entered into NAPIS.

Similarly, a survey was conducted to determine the incidence of a fourth latent virus, cherry virus A (Capillovirus A, CVA), in stone fruit nurseries. A total of 350 leaf samples were collected from 14 stone fruit nurseries in four counties (Clackamas, Multnomah, Washington, and Yamhill) for testing using a peer-reviewed RT-PCR protocol. We anticipate completing testing before March 2015. This survey data will be entered into NAPIS.

Specialty crop block grant projects

Boxwood blight nursery cleanliness program

In the fall of 2012, the Plant Health and Nursery & Christmas tree Inspection programs were awarded funds to develop an audit-based nursery cleanliness program for the new disease boxwood blight (caused by *Cylindrocladium pseudonaviculatum*). The cleanliness program was based on nurseries adopting best management practices (BMP) to minimize the risk of introducing boxwood blight to their plants and empowering the nurseries to implement mitigation activities immediately if boxwood blight was detected. Participation in the program was voluntary although nurseries had to sign compliance agreements to participate in the program. The nurseries were later audited to ensure they were complying with their compliance agreement.

When the cleanliness program was first developed, the BMP that were described in the scientific literature and included in the official compliance agreements were designed for plants grown in pots. However, several nurseries in our program also grow plants in the field. Prior research had shown the boxwood blight fungus can develop specialized structures (microsclerotia) in infested leaves and twigs that allow it to survive in soil for up to 5-years. Based on this information, we determined the BMP in the official compliance agreement did not adequately address contaminated field soil.

Treatment trials were conducted to: 1) Identify a time/temperature regime that would

kill boxwood blight in infested leaves; and, 2) Verify the efficacy of the time/temperature regime with controlled experiments conducted in raised beds at the ODA's Hawthorne Facility.

Replicated trials were conducted in the laboratory to determine what time/temperature regime would effectively eliminate boxwood blight from infested leaves. To simulate natural conditions during heat treatment, one set of infested leaves was kept moistened (winter/spring conditions) while a second set was allowed to dry (summer/fall conditions). The leaves were then placed in a moist chamber to stimulate sporulation. Based on this experiment, the presence of moisture during heat treatment enhanced the pathogen's ability to survive (Table 5). However, extended exposure to temperatures of 40°C or higher effectively killed the pathogen in infested leaves, particularly if conditions were dry.

Table 5. Percentage of leaves sporulating after heat treatment in the laboratory under differing environmental conditions.

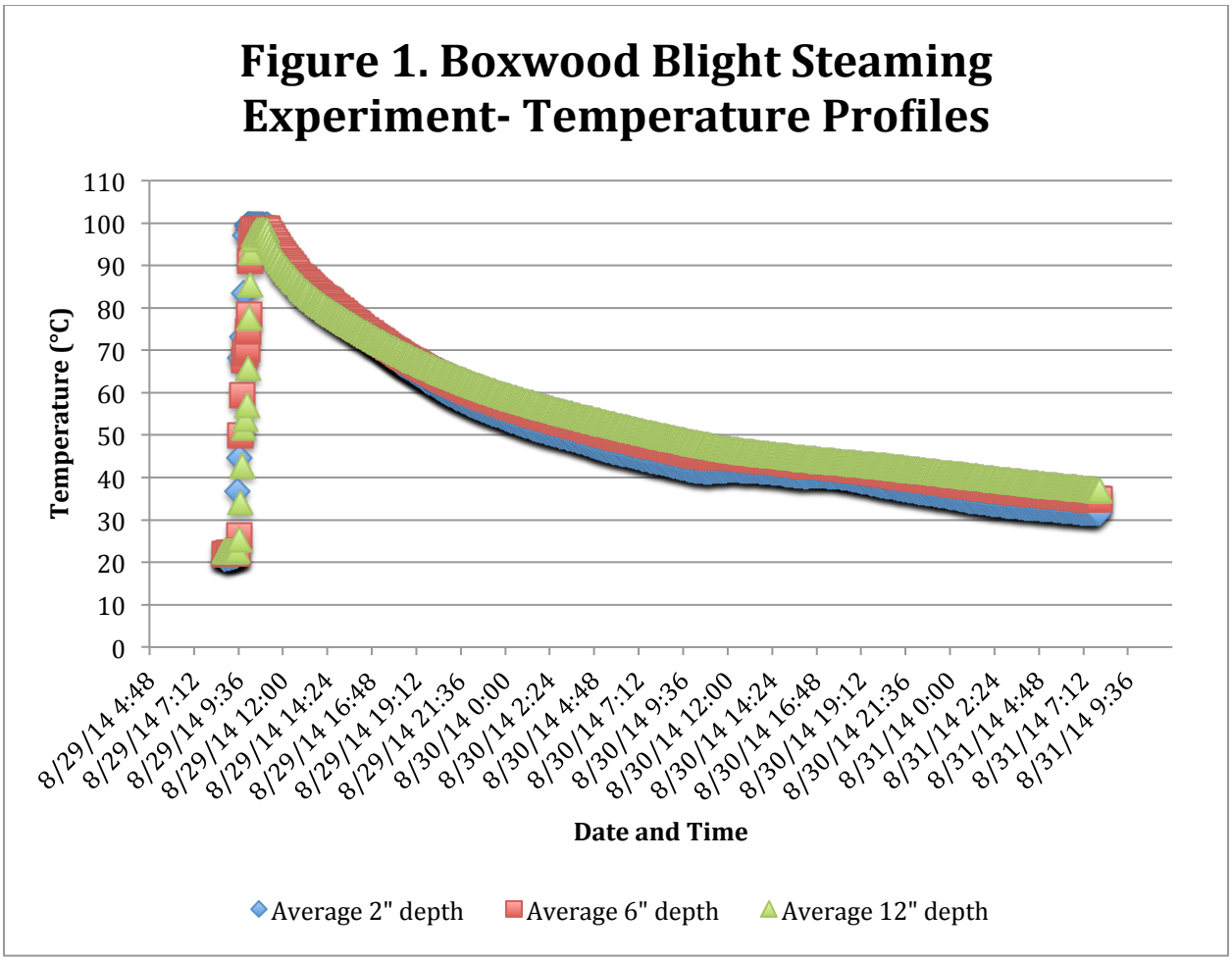
Time in heat treatment	Percentage of infested leaves sporulating post-treatment			
	High moisture conditions		Low moisture conditions	
	40°C	50°C	40°C	50°C
30-min	100	73	70	20
1-h	60	17	0	0
2-h	50	0	0	0
24-h	0	0	0	0

Steam treatment trials were conducted in a raised bed located at the ODA's Hawthorne Facility. The raised bed was 8' x 8' x 8" (L x W x D) in size and filled with native soil. For the experiment, a total of 45 sachets containing five infected leaves each were used. The sachets were located in the four corners of the raised bed as well as in the middle. At each location, the sachets were buried at three depths (2", 6" and 12") with three sachets placed at each depth. Following steam treatment, the sachets were removed and then plated out onto glucose yeast extract tyrosine agar to determine if the pathogen survived the treatment.

Based on the preliminary time/temperature data obtained from the laboratory experiments, 50°C was chosen as the target temperature and 60-min as the target time for steam treatment. To monitor the steam treatment, temperature probes were placed with the sachets at each location and depth, and then monitored at 5-min intervals to ensure the soil reached 50°C for at least 60-min (Figure 1).

Once the soil returned to near ambient temperatures, the sachets were removed and plated as described above. After 1-wk, the plated leaves were examined for *C. pseudonaviculatum*. The pathogen was not recovered from any of the leaves, indicating the steam treatment successfully eliminated the pathogen from the soil at all three depths. This experiment was replicated, with identical results from the second steam treatment; no *C. pseudonaviculatum* was recovered from the infested leaves.

Based on these results, steam treating soil to 50°C for 60-min is an effective way to eliminate boxwood blight inoculum from the soil.



Onion smut survey

Funding was received the fall of 2014 to conduct a survey for onion smut in Malheur County. A previous, unofficial report of this disease in the county resulted in the loss of the Australian market. The goal of this survey is to officially determine if onion smut is present in Malheur County and, if present, to implement mitigation measures to prevent further spread.

Because of the biology of the pathogen and normal farming practices for onions in Malheur County, this survey will take place the spring of 2015. Inspectors will follow a protocol established by and acceptable to Australia while conducting the survey. Australia's protocol requires 3-yr of survey data, so we anticipate continuing this survey effort in 2016 and 2017.

Each year, 10% of the onion fields planted in the county will be surveyed. The fields will be randomly selected. Within each field, 10% of the plants will be visually inspected as described in the NSHS Reference Manual B: Seed Health Testing and Phytosanitary Field Inspection Methods. Suspicious plants will be collected and examined in the laboratory for onion smut. Should the pathogen be detected, a delimitation protocol will be used to determine the extent of the infection and mitigation measures will be implemented to prevent further spread.

Field Inspection and Certification Programs

Allium White Rot Inspection

In 2014, ODA staff inspected a total of 64 garlic (*Allium sativum*) fields (1,507 acres) in seven counties for the presence of white rot caused by *Sclerotium cepivorum*. This voluntary certification program offers a 100% visual inspection designed to find single strikes (plants) infected with white rot in the field. Allium white rot was found in nine fields in 2014, with all infested fields found in Central Oregon (Crook and Jefferson counties) (Table 6). This certification program supports the interstate movement of garlic seed.

Table 6. Allium white rot inspection results for 2014.

County	No. of fields inspected	No. of acres inspected	No. of infested fields
Crook	3	120	1
Jefferson	32	825	8
Klamath	7	61	0
Marion	10	211	0
Morrow	7	166	0
Sherman	2	59	0
Yamhill	3	65	0

Potato Late Blight Inspection

In 2014, the ODA staff conducted surveys of potato (*Solanum tuberosum*) fields for late blight, caused by *Phytophthora infestans*. This survey supports the export of fresh potatoes to Taiwan. A total of 102 fields (6,181 acres) from four counties were inspected for late blight (Table 7). No potato late blight was found.

Table 7. Potato late blight inspection results for 2014.

County	No. fields inspected	No. acres inspected	Results
Klamath	57	2,969	No late blight found
Morrow	10	602	No late blight found
Umatilla	27	2,474	No late blight found
Washington	8	136	No late blight found

Seed Crop Field Inspections

In 2014, the ODA staff inspected 766 seed crop fields (14,193 acres) for the presence of seed-borne or seed-associated pests of concern. Inspectors surveyed for the presence of more than 100 different pathogens and other pests associated with 31 different host crops in 20 counties. Around 31% (238 fields) of the inspected fields were found with at least one pest of concern. The four most commonly observed diseases were pea downy mildew (*Peronospora viciae*), carrot bacterial leaf blight (*Xanthomonas hortorum* pv. *carotae*), scape

blight of onion (*Botrytis* sp.), and corn common smut (*Ustilago maydis*). Their disease incidences were 59%, 42%, 38%, and 29%, respectively (Table 8).

Table 8. Seed crop field inspection results by crop and county for 2014.

Crop	County	No. fields inspected	Acres inspected	Pests of concern detected (No. of fields)
Alfalfa (*Medicago sativa*)	Baker	1	65	
	Gilliam	1	15	
	Jefferson	1	40	
	Lane	1	30	
	Malheur	3	136	*Ditylenchus dipsaci* (1), Alfalfa mosaic virus (1), *Cuscuta* sp. (1)
	Morrow	1	35	*Cirsium arvense*, *Cuscuta* sp.
	Umatilla	1	47	*Ditylenchus dipsaci*
	Union	5	154	*Cirsium arvense* (4)
	Wasco	1	70	
Allium – Elephant garlic (*Allium*)	Marion	2	99	*Sclerotium cepivorum* (1)
Allium – Onion (*Allium cepa*)	Jefferson	7	78	*Botrytis* sp. (2)
	Lane	1	3	
	Linn	2	33	*Botrytis* sp. (2)
	Malheur	6	61	*Botrytis* sp. (1)
	Marion	8	91	*Botrytis* sp. (4)
Bean (*Phaseolus vulgaris*)	Baker	2	2	Bean common mosaic virus (1), *Xanthomonas axonopodis* pv. *phaseoli* (1)
	Malheur	14	330	
	Morrow	2	113	
	Umatilla	1	27	
Beta-Beet (*Beta vulgaris*)	Washington	1	14	
Beta - Swiss chard (*Beta vulgaris*)	Clackamas	1	14	
	Marion	3	33	
Brassica – Arugula (*Brassica eruca*)	Clackamas	1	15	
	Marion	4	21	*Sclerotinia sclerotiorum*
Brassica – Cabbage (*Brassica oleracea*)	Clackamas	3	19	
	Douglas	3	17	*Leptosphaeria maculans* (*Phoma lingam*) (1)
	Lane	7	39	
	Linn	1	5	*Alternaria brassicicola* (*A. circinans*) (1), *Leptosphaeria maculans* (*Phoma lingam*) (1), *Mycosphaerella brassicicola* (2)
	Malheur	1	4	

	Marion	22	210	*Alternaria brassicae* (*A. herculea*) (1), *Leptosphaeria maculans* (*Phoma lingam*) (1), *Mycosphaerella brassicicola* (3), *Peronospora parasitica* (1), *Sclerotinia sclerotiorum* (3)
Brassica – Kale (*Brassica oleracea*)	Linn	1	33	
	Marion	3	45	*Altermaria brassicae*, *Sclerotinia sclerotiorum*
Brassica – Mustard (*Brassica* sp.)	Linn	1	10	
	Malheur	1	15	
Brassica – Turnip (*Brassica rapa)*	Malheur	3	120	
Carrot (*Daucus carota*)	Crook	7	185	
	Deschutes	5	110	*Sclerotinia sclerotiorum* (2)
	Jefferson	116	3,720	*Alternaria radicina* (13), *Xanthomonas campestris* pv. *carotae* (56)
	Klamath	2	18	*Xanthomonas campestris* pv. *carotae* (1)
	Malheur	6	63	*Xanthomonas campestris* pv. *carotae* (1)
	Marion	7	3	*Xanthomonas campestris* pv. *carotae* (2)
	Morrow	2	95	*Xanthomonas campestris* pv. *carotae* (1)
	Wasco	2	90	*Xanthomonas campestris* pv. *carotae* (1)
Clover (*Trifolium* sp.)	Clackamas	2	23	
	Lane	3	162	
	Linn	3	277	
	Washington	1	45	
	Yamhill	1	48	
Coriander (*Coriandrum sativum*)	Linn	7	257	
Corn (*Zea mays*)	Malheur	45	581	*Ustilago maydis* (37), High Plain Virus (5), virus symptoms (3)
	Morrow	12	146	*Ustilago maydis* (1), High Plain Virus (1)
	Umatilla	244	1942	*Ustilago maydis* (47), High Plain Virus (2), virus symptoms (3)
Corn salad (*Valerianella locusta*)	Jefferson	1	<1	
Cucurbit - Cucumber (*Cucumis sativus*)	Linn	3	36	*Pseudomonas syringae* pv. *lachrymans* (2)
	Marion	8	82	*Pseudomonas syringae* pv. *lachrymans* (1), Cucumber mosaic

				virus (1)
Curcurbit – Pumpkin (*Curcurbita* sp.)	Linn	1	3	Virus symptoms
Curcurbit – Squash (*Curcurbit sp*.)	Linn	2	16	*Pseudomonas syringae* pv. *lachrymans* (2)
Dill (*Anethum graveolens*)	Linn	2	17	
Lettuce (*Lactuca sativa*)	Malheur	5	81	
Oat (*Avena sativa*)	Marion	1	33	
Parsley (*Petroselinum crispum*)	Jefferson	1	10	
	Lane	3	28	*Septoria petroselini* (3)
	Linn	3	21	
	Marion	1	13	*Septoria petroselini*
Pea (*Pisum sativum*)	Lane	1	27	Pea Enation Mosaic Virus, *Peronospora viciae*
	Linn	11	84	Pea Enation Mosaic Virus (1), *Peronospora viciae* (9), multiple virus (1)
	Malheur	23	461	*Peronospora viciae* (3)
	Marion	12	122	Pea Enation Mosaic Virus (2), *Peronospora viciae* (9)
	Polk	1	85	*Peronospora viciae* (5)
	Umatilla	2	56	
	Washington	1	38	Pea Enation Mosaic Virus (1), *Peronospora viciae* (3)
Radish (*Raphanus sativus*)	Benton	1	27	
	Clackamas	2	38	
	Crook	1	13	
	Lane	7	132	
	Linn	8	172	
	Malheur	13	308	
	Marion	15	310	
	Yamhill	4	103	
Rocket (*Eruca sativa*)	Lane	1	10	
	Marion	1	10	
Rye (*Spinacia oleracea*)	Marion	1	17	
Rutabaga (*Brassica napus*)	Lane	1	12	
Spinach (*Spinacia oleracea*)	Benton	3	55	
	Lane	1	15	
	Marion	16	409	Virus symptoms (1), *Cladosporium* spp. (4)
	Union	1	15	
	Washington	1	4	

	Yamhill	2	90	*Cladosporium* spp. (1)
Sunflower (*Helianthus annuus*)	Marion	2	6	
	Morrow	2	250	
	Union	17	1150	
	Washington	1	5	
	Yamhill	1	5	
Bird's foot trefoil (*Lotus corniculatus*)	Linn	1	16	
Total: 31 crops	20 counties	766 fields	14,193 acres	

Laboratory seed testing

Export seed

In 2014, Plant Health staff conducted tests to detect specific seed-borne fungi, bacteria, nematodes, viruses, pests, weeds, and other miscellaneous problems. Seed were tested according to standard, officially accepted protocols for the target organism(s). A total of 11,780 tests were conducted on 9,551 seed lots from more than 15 different crops, mainly grasses and vegetables. Compared to 2013, this represents a 16.5% increase in the number of seed lots tested. About 4% of the lots tested positive for one or more organisms of regulatory concern (Table 9). The seed lots were tested at the request of Oregon seed exporters to meet the phytosanitary requirements of their international and interstate customers.

Endophyte testing

In 2014, the Plant Health Laboratory received 53 seed lots of forage grass seed varieties to be tested for the presence of the endophyte fungus, *Epichloe* sp. Endophyte species grow in the grass tissue and produce alkaloids that can be toxic to livestock. To qualify for an endophyte tag, no more than 5% of the seeds in a lot can be infected with the fungus. Eight seed lots tested positive for Epichloe sp. and were ineligible to receive the endophyte tag.

Official certification and testing programs

Virus certification of nursery stock

Twenty-three nurseries participated in Oregon's virus ornamental and fruit tree certification program in 2014. *Malus* (apples and crabapples), *Prunus* (fruiting and ornamental cherries, fruiting and ornamental plums, peaches, apricots, etc.), *Pyrus* (domestic pears, Asian pears, and flowering pears), and *Cydonia* (quince) are included in the testing program.

Individual *Prunus* mother trees (scions) and rootstock are tested each year for *prune dwarf virus* (PDV) and *Prunus necrotic ringspot virus* (PNRSV). *Malus*, *Pyrus*, and *Cydonia*

scion and rootstock plants are tested for *tomato ringspot virus* (ToRSV). Foliar samples were collected in the spring and tested for the target viruses using commercially available ELISA test kits. About 0.003% of the field samples were PDV-positive out of 1,705 samples collected, 0.003% were PNRSV-positive out of 1,702 samples collected, and 0.00% were ToRSV-positive out of 7,527 samples collected. In addition, no positive detections were found during a spot check of *Malus* for apple chlorotic ringspot virus (629 samples) this season.

Table 9. Laboratory tests conducted on grass, vegetable, and other seed lots in 2014.

Pathogen/pest test	**# tests conducted**	**# tests passed**	**# tests positive**
Pest & Disease + Soil	7,013	6,686	327
FUNGI			
Israel seed wash	50	44	6
Korea seed wash	224	210	14
Tilletia sp.	1,311	1,283	28
Urocystis sp.	125	125	0
Ustilago sp.	13	0	13
Gloeotinia sp.	232	199	33
Phoma/Kabatiella grow out	83	83	0
Other fungi	152	146	6
Subtotal	2,190	2,090	100
NEMATODES			
Anguina sp.	603	595	8
Ditylenchus sp.	409	409	0
Other nematode	1,047	1,044	3
Subtotal	2,059	2,048	11
BACTERIA			
Corynebacterium rathayi	235	227	8
Clavibacter sp.	25	22	3
Pseudomonas sp.	44	39	5
Xanthomonas sp.	35	33	2
Subtotal	339	321	18
WEEDS & PARASITIC SEED PLANTS			
Orobanche minor	111	111	0
Glyceria declinata	23	23	0
Subtotal	134	134	0
VIRUS	28	28	0
GRANT TOTAL	11,768	11,312	456

Audits of the nurseries were conducted to ensure compliance with current regulations (OAR 603-051-0855 to -0859). Growers were notified of any areas of non-compliance; the most common issue identified was the presence of broadleaf weeds in blocks of certified plants. Follow-up visits by ODA staff are underway to verify the nurseries have taken corrective actions.

A summary of the virus-free varieties grown by each participating nursery is sent yearly to state, federal, and Canadian officials to facilitate the movement of the nurseries' products.

Blueberry virus testing

In 2014, we continued the official testing program of blueberry nursery stock for the viruses, blueberry scorch and blueberry shock. The program was implemented in 2004 at the request of nurseries to comply with the regulatory requirements of other states and countries. Nursery inspectors collect official samples from participating nurseries and submit the samples to the laboratory for testing. All testing is done with commercially available ELISA test kits. The sampling protocol was updated to streamline testing and provide for more uniform sample collection this year. The new protocol was based on the requirements described in the draft State Level Model Regulatory Standard: Systemic Pathogen-tested Certification Program for Blueberry Nursery Stock Production Systems for G4 plants.

In 2014, 1,578 leaf samples from twelve nurseries were tested. For each nursery, individual leaf samples from five plants of the same cultivar were combined into a single composite sample for testing. Of the composite samples tested, 22 were infected with Blueberry Shock Virus. The infected samples came from seven nurseries located in three counties (Clackamas, Marion, and Washington). The nursery owners were informed of the positive samples. No samples were positive for Blueberry Scorch Virus.

Fresh blueberries to Korea program

In 2014, the Plant Health Program continued to provide support for the export of fresh blueberries to Korea. This was the third year of shipping products to this new market. Orchards and packing houses must meet specific Korean phytosanitary requirements prior to export, including mandatory inspections of orchards for *Phytophthora ramorum*, tobacco ringspot virus, and tomato ringspot virus. Korean requirements stipulate the official inspection of 10% of all blueberry orchards in the state (a minimum of 650 acres in total) for these three pests.

To meet these requirements, Shipping Point Inspection staff visually inspected a total of 881.6 acres of blueberry orchards in nine counties (Benton, Clackamas, Linn, Marion, Morrow, Multnomah, Umatilla, Washington, and Yamhill). A total of six plant samples were collected and submitted to the laboratory for testing, four for *P. ramorum* and two for tomato ringspot virus. All samples tested negative for the pathogens of concern. The survey and testing results were submitted into NAPIS.

For 2014, 15 orchards and five packing houses met the requirements to ship fresh blueberries to Korea.

Survey and disease containment programs

Phytophthora ramorum – Curry County

This year was the second of the new *P. ramorum* Survey and Containment Program in Curry County as described in OAR 603-052-1230. The effort in Curry County changed in 2013 because of a lack of adequate funding to continue an eradication effort. Instead, the program transitioned to one of slow-the-spread, where treatment and survey efforts focused

on the leading edge of the infestation; in areas with established infestations (i.e., the generally infested area, GIA), treatments were left up to the land owners.

At the start 2014, the GIA was a 56 mi^2 area in and around the town of Brookings. As of September 17, 2014, aerial, ground, and stream-bait surveys conducted by the Oregon Department of Forestry (ODF) detected 34 new infected trees in and around the existing quarantine boundary. Several infestations were found within 1 mi of the quarantine boundary and one was found 0.3 mi outside of the quarantine boundary. The disease also intensified within 1 mi of the northern boundary of the GIA. These new detections will require a change to the quarantine boundary and to the GIA for 2015. Looking at the disease's epidemiology, preliminary analysis indicates the rate of disease spread has roughly doubled in the last 2-yr. This suggests disease spread may be more rapid with the slow-the-spread effort than with the previous eradication effort.

The ODF has requested a meeting with the ODA, USDA Forest Service, and Oregon State University subject matter experts to discuss the future of the survey and containment program in Curry County.

P. ramorum – nurseries

Since 2004, all interstate shipments of Oregon nursery stock have been subject to the requirements of 7 CFR 301.92, the federal quarantine for *Phytophthora ramorum*. The quarantine established a quarantine area in Curry County, which encompassed the *P. ramorum* infestation in the mixed tanoak-conifer forests in and around the town of Brookings. It also regulated nursery stock grown throughout the entire state, mandating that each interstate shipper of host and associated host plant nursery stock be annual inspected and certified as free of *P.* ramorum.

In 2014, this federal program underwent a significant change. The USDA APHIS issued Federal Order DA-2014-2, which limited the requirements for annual inspection and certification to only those interstate-shipping nurseries that were found infested with *P. ramorum* on or after March 31, 2011. These nurseries would undergo an enhanced inspection and sampling protocol designed to identify all sources of *P. ramorum* infestation within their growing grounds and would be surveyed twice a year. The nurseries would also be required to enter into a compliance agreement with USDA, agreeing to certain activities in order to continue shipping interstate. If *P. ramorum* is found at the nursery, the compliance agreement must include best management practices to address identified sources of *P. ramorum* contamination in the nursery. If a nursery that has been positive for *P. ramorum* since March 31, 2011, chose to stop shipping plants interstate, that nursery would fall under Oregon's state quarantine and be subject to inspections under state authority.

According to USDA APHIS, 18 nurseries fell into the category of positive for *P. ramorum* since March 31, 2011. One nursery had gone out of business. Three nurseries chose to ship plants intrastate only (opt-out) and 14 nurseries chose to participate in the federal certification program (opt-in). Nursery & Christmas tree Inspection Program staff inspected all remaining nurseries as required to receive their annual licenses.

In March 2014, three opt-out nurseries were inspected as required to meet state quarantine requirements (OAR 603-052-1230). A total of 89 samples (87 plant tissue and two water) were collected and tested for *P. ramorum*. The pathogen was detected at one nursery infecting *Pieris* 'Little Health', 'Forest Flame', and 'Flaming Silver', *Pieris* sp., and

Rhododendron 'Holden'. The USDA Confirmed Nursery Protocol (CNP) was enacted at the nursery and another 149 foliar, one water, and 10 soil samples were collected during the delimitation survey. Infected *Viburnum* sp., *Leucothoe axillaris*, *Rhododendron* 'Baden Baden', and soil substrate were found. The nursery decided to treat the positive soil using solarization. The infected plants were destroyed and neighboring plants put on hold for 90-d as required by the CNP. During the required hold period, another infected *Rhododendron* plant was found. A second delimitation survey was conducted and 23 plant, one water, and five soil samples were tested with no additional positives found. A hazard assessment conducted at the nursery found that susceptible host plants had been placed back into an area that had previously housed infected plants.

Fourteen nurseries participated in the federal *P. ramorum* certification program at its inception in March 2014. During the spring, 2,868 samples were collected from plants, used pots and potting media, and water sources. The pathogen was detected in five nurseries infecting: *Gaultheria shallon* (15 plants),*Rhododendron*, and *Rhododendron azalea* 'Hahn's Red' at nursery #1; *Rhododendron* sp. (3 plants) and used potting media at nursery #2; *Pieris taiwanensis*, *Pieris* 'Valley Valentine', *Pieris* 'Valley Rose', and a retention pond at nursery #3; *Rhododendron* sp. (2 plants), *Rhododendron* 'Lost Forest Holding', and used potting media at nursery #4; and used potting media at nursery #5. The USDA Confirmed Nursery Protocol (CNP) was enacted at the nurseries. Delimitation surveys detected additional positives in two *Rhododendron* sp. at nursery #2 and in *Pieris* 'Valley Valentine,'*Pieris* 'Valley Rose,' and soil substrate in two areas at nursery #3.

Of the five positive nurseries identified during the spring sampling period, three nurseries (#1, #2, and #5) elected to opt-out of the federal program and ship intrastate only, one nursery (#3) opted to participate in the multistate soil steaming pilot study, and one nursery (#4) had its federal compliance agreement revoked. At Nursery #4, a *Rhododendron* 'Purple Lace' was found infected during the 90-day hold period. Additional positive plants (*Rhododendron* 'Repen x Nygo Chief,' 'Unique,' and 'Scyntillation') and contaminated soil substrate were detected during the second delimitation survey. Nursery #3 also underwent a hazard assessment after eradication activities were completed, which identified mandatory best management practices (BMP) the nursery was required to include in their federal compliance agreement.

Ten nurseries were surveyed for *P. ramorum* during the fall sampling period for the federal certification program, with 2,016 plant, soil, and water samples collected. The pathogen was detected in two nurseries infecting: *Rhododendron* at nursery #7; and *Rhododendron* and a retention pond at nursery #8. The USDA CNP was enacted at the nurseries and additional positives were found. Nursery #7 had infected *Rhododendron* (eight plants), *Rhododendron*'Unique' (two plants), and soil substrate beneath the infected plants. Nursery #8 had infected *Rhododendron* (four plants) and stream runoff from the retention pond. After eradication activities were implemented, hazard assessments were conducted at both nurseries with mandatory BMPs included in their federal compliance agreements.

In addition to the required inspections of the nurseries positive for *P. ramorum* after March 31, 2011, ODA staff conducted trace forward/back investigations at several nurseries and residential sites as well as annual inspections at the remaining 3,185 nurseries. Foliar samples were collected for testing if suspicious symptoms were observed. For the trace forward/back investigations, 20 samples were collected from 11 sites, with *P. ramorum* detected infecting a *Camellia sinensis* 'Sochi' at a residence in Coos County; the infected

plant had been received from a positive nursery in Washington state. The homeowner voluntarily destroyed the plant prior to receiving their test results. The USDA Confirmed Residential Protocol was enacted at the site, with no additional positives found. For the annual nursery inspections, 232 foliar samples were collected from 17 nurseries. *P. ramorum* was detected infecting two plants (*Rhododendron* 'Roseum Elegans' and 'Roseum 2') at one nursery. The USDA CNP was enacted at the nursery with no additional positive plant, water, or soil samples found. Despite the negative results, the nursery opted to fumigate the soil beneath the infected plants as a precautionary measure. This nursery is now included in the federal certification program.

Of the eight positive nurseries identified during federal certification and licensing surveys, four opted out of, or were removed from, the federal program. These four nurseries are now subject to Oregon's state quarantine requirements for *P. ramorum*, which includes mandatory testing to ensure there is no intrastate movement of the pathogen from these locations. The other four are currently operating under modified compliance agreements that include mandatory BMPs to address specific hazards at their nurseries. Seven nurseries tested pathogen free and continue to participate in the federal program.

Data from the *P. ramorum* survey activities were entered into NAPIS.

Other programs

Columbia root knot nematode

Nursery inspectors collected 69 soil samples for nematode testing from Oregon production nurseries in 2014. This annual survey is conducted at the request of Canadian agricultural officials to demonstrate that Oregon production nurseries are free of Columbia root knot nematode (CRKN, *Meloidogyne chitwoodii*). Plant-parasitic nematodes were detected in 83% of the samples with *Pratylenchus* spp. being the most abundant (present in 39% of the samples). *Meloidogyne hapla* was detected in three samples and *M. nassii* in 2 samples. No CRKN were detected in Oregon nurseries based on morphometric analysis of juveniles. Other nematodes detected included *Paratylenchus*, *Xiphinema*, *Mesocriconema*, *Hemicyclophora*, *Heterodera* juveniles and cysts, *Scuttelonema*, and *Tylenchorhynchus*, in order of most to least abundant. In addition, 79 root samples were collected from *Malus* rootstock being exported to Canada and submitted for testing. All were found free of CRKN.

National Clean Plant Network

The Plant Health Program continues to play a leading role in the development and governance of the National Clean Plant Network (NCPN). The goals of the NCPN are to 1) protect US specialty crops from the spread of economically harmful pests and diseases, and 2) ensure the global competitiveness of US specialty crop producers by creating high standards for our clean plant programs. Currently, there are five commodity groups that are a part of the NCPN: the Fruit Tree Clean Plant Network (NCPN-FT), the Hop Clean Plant Network, the Citrus Clean Plant Network, the Berries Clean Plant Network (NCPN-Berries), and the Grapevine Clean Plant Network (NCPN-Grapes). The Plant Health Program has representatives on the Tier II Governing Boards for the NCPN-FT and the NCPN-Berries.

The Plant Health Program was involved with two NCPN-related projects in 2014. The first project was the development of a draft national standard for the certification of strawberry nursery production systems. The second project was a pilot study that explored the benefits and costs associated with implementing an official blueberry certification program based on the draft national standard developed by the NCPN-Berries Tier II Governing Board. For both projects, more information is available in the **Farm Bill Projects** section.

NPDN and WPDN

The National Plant Diagnostic Network (NPDN) was established in 2002 by legislative mandate in response to the need to enhance agricultural security through protection of the health and productivity of plants in agricultural and natural ecosystems in the U.S. The specific purpose of the NPDN is to provide a nationwide network of public agricultural institutions with a cohesive, distributed system to quickly detect high consequence pests and pathogens that have been introduced into agricultural and natural ecosystems, identify them, and immediately report them to appropriate responders and decision makers. The NPDN also worked with the USDA APHIS Center for Plant Health Sciences and Technology to develop the System for True, Accurate, and Reliable Diagnostics (STAR-D), a federally-recognized accreditation system for plant diagnostic laboratories.

The Western Plant Diagnostic Network (WPDN) is one of five NPDN regional centers. The Oregon State University Plant Clinic is considered a hub laboratory for Oregon, Washington, Alaska, Idaho, and Montana, with the Plant Health Program considered the overflow laboratory in the region.

The Plant Health Program received sufficient funds from WPDN for three employees to receiving training in the STAR-D Laboratory Accreditation system. The employees attended a gap audit at Texas A&M University, which taught them how to conduct audits and what auditors are looking for. This experience will prove valuable as the Plant Health Program continues to work toward STAR-D accreditation. The program also received funds to send another employee to a NPDN *Phytophthora ramorum* and *P. kernoviae* identification workshop.

Plant Health laboratory diagnostics

Plant samples are submitted to the Plant Health Laboratory for disease assessment to meet export requirements or for general diagnostics. In 2014, 390 samples were submitted to meet export requirements, certification program requirements, Oregon importation requirements, and/or general diagnostics. Of those samples submitted, 2.2% had problems caused by abiotic/environmental issues, 0.5% by bacteria, 7.7% by fungi, 0.3% by insects, and 1.1% by nematodes. The laboratory also tested 26 samples for the presence of the Liberty Link® PAT/bar gene to support the export of non-genetically engineered rice from California to India. All samples tested free of the PAT/bar gene.

Quarantines and control area orders

Several regulations were reviewed and updated in 2014. Housekeeping changes (e.g., updating a scientific name or adding newly infested states to the quarantine area) were made to the following quarantines and control areas: chestnut blight (OAR 603-052-0075), oak wilt (OAR 603-052-0120), hazelnut nursery stock (OAR 603-052-0825), and blueberry nursery stock (OAR 603-052-1245). The *Phytophthora ramorum* quarantine (OAR 603-052-1230) was updated to harmonize our state quarantine with new federal orders; these changes also made it possible to repeal the *Phytophthora ramorum* regulated area for nursery stock (OAR 603-052-1250). A new quarantine was developed and adopted to protect the grass seed industry from the bacterial pathogen *Rathayibacter toxicus* (OAR 603-052-1241). The grape quarantine was amended to include and update testing requirements for *Xyllela fastidiosa* (OAR 603-052-0051); these same requirements were removed from the glassy-winged sharpshooter quarantine (OAR 603-052-1221). The Malheur County bean disease control area and procedures were updated to include requirements for growing non-*Phaseolus* beans and to harmonize our regulations with Idaho's (OAR 603-052-0385). A temporary rule was adopted for the Willamette Valley Protected District (OAR 603-052-0882) to help protect crucifer crops from the disease blackleg (caused by *Leptosphaeria maculans*); this temporary rule will expire January 3, 2015.

Permit reviews

The Plant Health Program continues to provide reviews of federal permits to import plants, pathogens and parasites, and genetically modified (bioengineered) organisms to our state. The permits are reviewed for compliance with existing Oregon quarantines and regulations. In all, 154 permits were reviewed; 91 for live pests and noxious weeds, nine for plants for post-entry quarantine, seven for soil, 10 for importing restricted or unauthorized plants, and 37 for genetically engineered organisms. Staff members also participated in federal inspections of facilities and fields where permitted organisms, such as genetically engineered organisms or a regulated pathogen, were to be received and/or grown.

Exported timber inspections

In 2014, staff from the Plant Health and Nursery & Christmas Tree Inspection programs inspected conifer logs bound for China. China requires that all conifer log shipments also be tested for the presence of pine wilt nematode (PWN, *Bursaphelenchus xylophilus*) prior to importation. Inspectors are required to collect a composite sample of wood shavings from the shipment for laboratory testing. The number of logs sampled depends upon the size of the shipment, with a maximum of 29 logs sampled per shipment. Plant Health Program staff conducted 17 log inspections while the laboratory received and processed 34 composite samples for PWN using a modified pie pan method. No PWN was found.

Publications

Osterbauer, N.K., S. Lane, and A. Trippe. 2014. *Phytophthora ramorum* identified infected Eastern teaberry (*Gaultheria procumbens*) plants shipped to Oregon. Plant Health Progress 15(1):9-10 doi:10.1094/PHP-BR-13-0109.

Osterbauer, N.K., M. Lujan, G. McAninch, S. Lane, and A. Trippe. 2014. Evaluating the efficacy of the systems approach at mitigating five common pests in Oregon nurseries. J. Environ. Hort. 31(1):1-7.