Nursery News

October 2002

Oregon Department of Agriculture

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Invasive species news

Pigs and parrots, filling the cracks

by Dan Hilburn

One of the reasons Oregon's legislature created an Invasive Species Council is that some important biological threats fall through the cracks between the authority of existing agencies. The council has discussed two crack species this year already and a summary of the issues that have surfaced serves to highlight the difficulties of dealing with all invasive species, whether plant or animal.

On a field trip during our June meeting, a ranger directed our attention to a small patch of ground near a spring that looked like it had been rototilled. We were looking at the damage caused by feral pigs in the Crooked River National Grassland just east of Madras. Members of the Invasive Species Council listened attentively as he described how he had begun to notice similar patches of disturbed ground at several widely scattered locations in the Grassland. He had never seen the pigs and didn't know how many there were. They are apparently active at night and very secretive. Hunters have had limited success finding them, though one did bag a 400 pound boar!

Feral swine can be either barnyard pigs or European wild boars that escape from farms or private hunting ranches. In the wild, they revert to a phenotype that has exposed tusks and more hair. They are well established in the southeastern US and Hawaii. More recently they have invaded parts of the Midwest and California. Wilderness managers consider them one of the most destructive pests they deal with. Hunters consider them a valuable game animal.

Populations of feral swine are now established in Crook, Jefferson, Wasco, and Wheeler counties. ODA sponsored recent legislation that reclassified feral swine as predatory animals and created a control area that allows unrestricted hunting. That should help, though a study in California indicates hunters harvest about 40%, and populations continue to rise and expand unless the harvest rate reaches 70%. Damage is very limited in Oregon at this point, though the potential habitat for them is extensive especially in wetter, milder western Oregon. Should something more be done?

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A similar dilemma is posed by the monk parakeet colony at the Portland airport. It has been there for years. There are several huge communal nests high in a grove of oak trees. This species, also known as the Quaker parrot, is common in the pet trade. Wild populations started by escaped birds are common in Florida, Texas and several other states. They have overwintered as far north as Quebec. California has eradicated populations there. Bird lovers like to see them at feeders and tend to protest whenever control programs are proposed. In their native Argentina, huge flocks of these birds descend on grain fields and fruit orchards. They are considered a major agricultural pest.

For both of these species, there is no public awareness in Oregon of their potential harm. They are not on the radar screen of legislators, environmentalists, farmers, or land managers. Neither the Department of Agriculture nor the Department of Fish & Wildlife has clear authority to deal with feral pigs or parrots — the aforementioned "crack." The state budget is in bad shape anyway. Economic damage is at least several decades away even in a worst case scenario. Unfortunately, and this is a key point, if these populations expand to the point that economic damage becomes a reality, eradication will no longer be an option. What should be done?

Similar conundrums are waiting in the wings: the New Zealand mud snail colony on the Columbia, butterfly bush on the banks of the Middle Fork of the Willamette, pampas grass in clearcuts in Jackson & Josephine Co. and the list goes on… Stay tuned. Invasive Species Council meetings are open to the public, and include time for public input. The next meeting will be Janurary, 20 & 21, at the Wittenberg Inn in Keizer.

Pest Alerts

Hemerocallis Gall Midge *(Contarinia quinquenotata)*

by Sherrie Lewis

In the summer of 2001, Hemerocallis Gall Midge, a small fly that has been a pest of daylilies in Europe, was identified in British Columbia, Canada. The midge overwinters in the soil and adults emerge from May-June. The fly lays its eggs in developing daylily blooms. The maggots then develop inside the unopened flower buds causing them to become swollen, distorted, and unable to open properly. Damage was noted in BC from about April through July. Infested buds may contain many larvae, over a hundred or more, that are around 3 mm in length. There is only one generation per year and the pest seems to prefer early-blooming, yellow-flowered varieties. Management involves removing and destroying affected buds. There is no registered chemical control, but systemic insecticides may be effective.

Emerald Ash Borer *(Agrilus planipennis)*

In July 2002, a new exotic beetle from Asia was discovered feeding on ash trees in southeastern Michigan. Tunneling larvae produce galleries that girdle branches and can kill entire trees. The adults are a brassy, golden green color, with a darker, metallic, emerald green wing cover. They are about 7.5 to 13.5 mm long, a little larger than any of the native North American species. The larvae are cream-colored and flattened in appearance with a 10-segmented abdomen. Adult emergence begins in late May and continues through June. D-shaped exit holes can be noted at this time. Adults feed on foliage into July and leave irregularly shaped patches of leaf tissue with jagged edges. Adults live an average of two to four weeks. Eggs are laid in mid to late July and hatch in seven to 10 days. The larvae then feed on the phloem and outer sapwood for several weeks, overwintering as larvae.

Trees in Michigan lost about 30 to 50% of the canopy in one year and the entire tree is often killed after two to three years of infestation. Trees of various size and condition have been attacked by this species and it is thought to have been established for at least five years.

More information can be obtained from the Michigan Department of Agriculture web site, http://www.michigan.gov/mda.

A new turfgrass pest in Oregon

by Jim Labonte

The Oregon Department of Agriculture (ODA) has just detected a potentially serious pest of turfgrasses in Oregon. The black turfgrass *ataenius* (BTA), or black turfgrass beetle, *Ataenius spretulus* (Haldemen), a small scarab beetle, was known from all but seven of the 48 contiguous states, including California, but has never previously been known from Oregon. A large infestation of this beetle has recently been found damaging golf course turf in Medford. Damage probably attributable to the BTA has also been reported from lawns and a park in Central Point.

The BTA is native to the United States and Canada. BTA adults are about 1/4 inch long, about half that wide, are stocky and cylindrical, and are very shiny black when mature. Young adults may be reddish-brown. The grubs are about 1/3 inch long, C-shaped, with a reddish-brown head and grayish-white body with three pairs of slender legs just behind the head. They are similar to small Japanese beetle grubs. There are many native, non-injurious dung beetles that closely resemble BTA adults, requiring an entomologist to positively identify BTA. However, native beetle grubs are normally found only in dung, or are larger than BTA grubs if they are found in grass.

The means by which the BTA entered Oregon is unknown. The BTA was first recognized as a turfgrass pest in Minnesota in 1932, when it was found killing grass on greens and fairways. Since then, it has been recorded as causing damage in lawns, golf courses, parks, and similar settings in at least two dozen states. The grubs, the injurious stage, feed on the roots of annual bluegrass, Kentucky bluegrass and bentgrasses or bentgrass/rye mixtures. Initial symptoms appear in late spring and early summer as patches of turf that wilt despite ample water. Upon further feeding by the grubs and the onset of summer heat, the grasses die, forming irregular patches of brown that eventually merge to produce large areas of dead turf. Since the roots have been eaten away at the soil-thatch interface, this turf is easily pulled back, often revealing hordes of grubs and adult beetles on and in the soil. During heavy infestations, the turf can be rolled back like a rug. Grub densities reaching almost 600 per square foot have been recorded, although as few as 100 per square foot have been shown to cause extensive damage.

Control primarily involves treating for the grubs. Standard treatments for white grubs appear effective in other states. Check the PNW Insect Control Handbook for appropriate agents and dosages. Treatment should begin when early symptoms are observed, when 30-40 grubs per square foot are found, or about two weeks after adults are seen. Treatment thresholds may be lower in warmer or drier regions of Oregon.

Contact Jim LaBonte at ODA, 503-986-4749 if you have any questions regarding this new pest.

USDA-APHIS increases civil penalties

The USDA-Animal and Plant Health Inspection Service (APHIS) is reminding brokers, shippers, importers, other businesses and their employees of increased civil penalties for violations of U.S. agricultural regulations.

With the passage of the Plant Protection Act in 2000 and the 2002 Farm Bill that contained the Animal Health Protection Act, APHIS can now impose tougher civil penalties for agricultural smuggling and violations of domestic quarantines, laws and other agricultural regulations.

Any business or organization that violates these laws can now be fined up to $250,000 per violation and more than $500,000 per adjudication. Smugglers face fines of up to $250,000 per violation or twice the gross financial loss or gain caused by the violation.

Prior to passage of these two laws, the maximum penalty was $1,000 per violation. “USDA does not tolerate smuggling or any activities that put American agriculture at risk,” said APHIS administrator Bobby R. Acord. “These authorities strengthen our regulations, and smugglers will now pay harsh penalties.”

APHIS inspects imported agricultural cargo shipments for pests and diseases and quarantines any shipment that may be infested with a pest or that requires further inspection or treatment. Shipments cannot be moved without APHIS permission. Failure to comply with quarantine holds and inspection requirements will result in fines of up to $250,000.

Domestic quarantines, such as those in place to stop the spread of plant pests like imported fire ant, plum pox and Karnal bunt, restrict the movement of certain products that could carry pests to other areas of the United States. All growers are encouraged to know and follow all federal and state quarantine requirements. Risking not only the health and safety of Oregon agriculture but also a possible hefty fine is not good business.

If you have any questions about Federal or State regulations, call the Oregon Department of Agriculture, Plant Division (503-986-4644) or look on the ODA website, <oda.state.or.us/plant>.

2002 Sudden Oak Death survey

by Dr. Nancy Osterbauer

Phytophthora ramorum, commonly known as the sudden oak death pathogen, is firmly established in 12 coastal counties in California. It has also been detected (and targeted for eradication) in a limited area in Curry County, Oregon. This pathogen has a broad host range that now includes 15 naturally infected host species in eight different plant families. Many of these hosts are important components of Oregon's nursery industry.

In response to this threat to the nursery industry, the Oregon Department of Agriculture has conducted a detection survey for *P. ramorum* in Oregon nurseries and other sites (e.g., botanical gardens) for the past two years. These surveys were done to ensure that Oregon nursery stock remains free of this pathogen.

In the spring of both years, nursery inspectors visually inspected a minimum of 2% of the susceptible host nursery stock present at a nursery or other site. In 2001, rhododendrons were surveyed whereas in 2002, 13 of the 15 now recognized host species were surveyed (Figure 1). The inspectors then collected and delivered any symptomatic host leaves, shoots, and/or other tissues to the ODA Plant Health Laboratory for analysis.

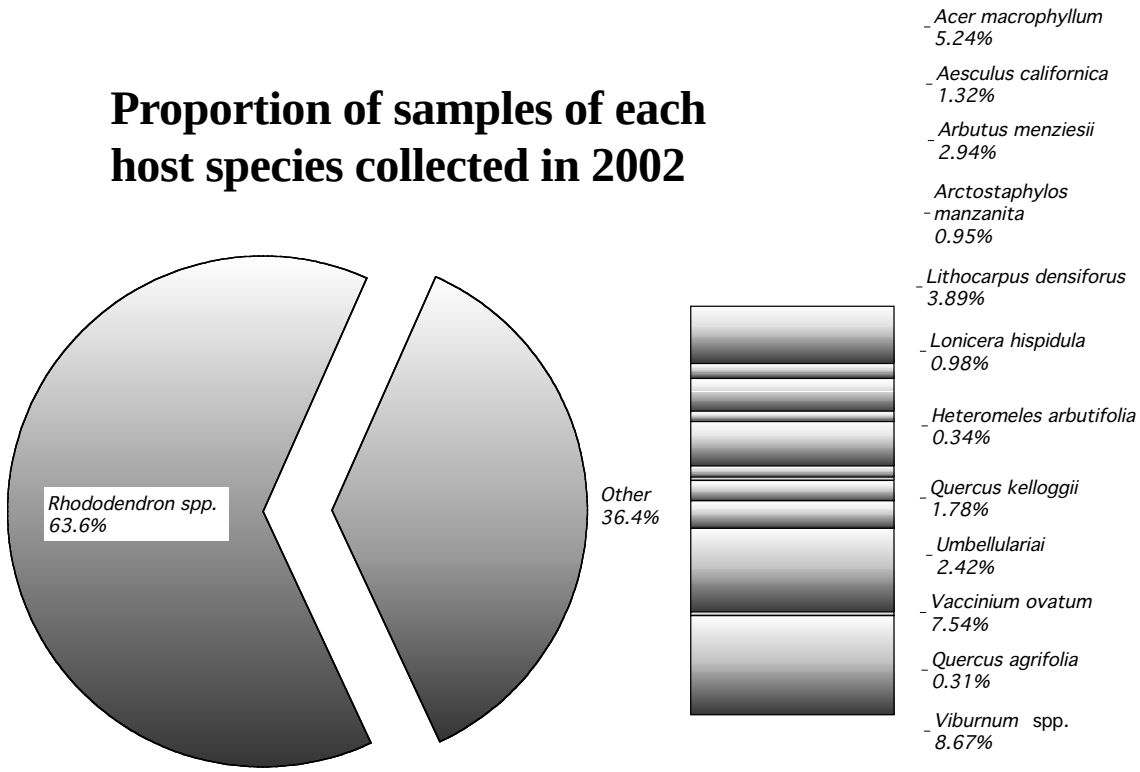
In 2001, 67 grower nurseries and other sites were visually surveyed for *P. ramorum*. A total of 2,254 samples were collected for an average of 34 samples per nursery. The SOD *Phytophthora* was not recovered from any of the samples submitted. However, other *Phytophthora* species with similar life habitats were found on samples from 30 of the 67 nurseries and other sites (Table 1). Multiple *Phytophthora* species were recovered from six of the 30 nurseries.

This year, 81 nurseries and other sites were visually surveyed for *P. ramorum* with a total of 3,291 samples collected (average number of samples per nursery is 41). *Phytophthora ramorum* was not recovered from any of the samples submitted. Like last year, however, other *Phytophthora* species with similar life habitats were found on samples from 20 of the 81 nurseries and other sites (Table 1). Multiple *Phytophthora* species were recovered from three of those 20 nurseries.

Based upon these surveys, Oregon nurseries continue to remain apparently free of *P. ramorum*.

Table 1. *Phytophthora* species recovered during the 2001 and 2002 surveys of Oregon nurseries and other sites for *Phytophthora ramorum*.

Phytophthora Species	# nurseries found 2001	# nurseries found 2002
P. cactorum	11	4
P. cambivora	2	0
P. cinnamomi	1	2
P. citricola	9	3
P. citrophthora	0	1
P. hevea	4	2
P. nicotianae	1	5
P. ramorum	0	0
P. syringae	11	6



Douglas fir and coast redwood added to SOD host list

On September 4, 2002, University of California researchers announced that Douglas fir and coast redwoods are hosts for *Phytophthora ramorum*, the cause of sudden oak death. The pathogen causes needle blight and branch tip die back on the two conifers. The ODA and its state and federal cooperators have been actively surveying Douglas fir in the infested areas in Curry County and at random sites throughout western Oregon. *Phytophthora ramorum* has not been found on Douglas fir in our state. To learn more about this issue, please visit the University of Berkeley <www.berkeley.edu> and the ODA <oda.state.or.us> web sites.

Drumming up business?

by Eric Reusche

If you are traveling to California with plants for sale, but don't have a buyer, or want your customer to see a new variety of plant that they might be interested in but have not ordered, you may run into some problems at the border crossing. The same could happen with taking plants to a plant sale or society meeting, etc., even if you are not planning to sell anything. Here are some tips to make it easier for you:

1. Invoice all plants you have, even without a buyer, so California will know if there are any quarantine issues.
2. If it is a trade show, etc. have the name, address, and booth number of the show with you to help the inspector complete the required paperwork.
3. Have plants available for inspection.

This will be a time consuming process for the inspector, so California indicates that if there is too great a volume of plants to inspect without an identifiable destination, they will not let the shipment proceed. Otherwise, following these procedures should drastically cut down the time you will spend sitting at the California border.

What to look for now!

Fall (September to November)

INSECTS	LIFE STAGE	HOST	SYMPTOMS
Needle midge	Larvae	Douglas-fir	Purple, distorted or bent needles
Whitefly	All	Poinsettia	Look for presence of adults or nymphs on the underside of leaves
Apple ermine moth	Larvae	Malus	Webbing, leaf feeding
Twig weevil	Larvae	Douglas-fir, Noble fir	Dead needles and twigs
Rhododendron lace bug	Adults	Rhododendron	Yellow, stippled, dirty looking leaves

DISEASES	HOST	SYMPTOMS
Swiss needle cast	Douglas-fir	Defoliation, off-color needles
Chrysanthemum white rust	Mums	Yellowing on top of leaf, whitish pustules underside of leaf
Interior needle blight	True fir	Older needles yellowing, browning, remaining attached
Grovesiella canker	True fir	Sunken lesion on lower stem, dead branches
Nectria canker	Maple, mountain ash	Dieback, orange fruiting bodies

Abstracts

As part of the nursery licensing program through the Oregon Department of Agriculture, there is a "research assessment fee." This is money that the department collects and redirects to research projects benefitting the industry. The industry continues to recognize the importance of its role in directly supporting research and in helping to solve production problems. Over the years, the OAN has compiled data from member surveys in order to place priorities on specific research needs. Each year, research proposals are solicited throughout the country to address these needs. A committee of industry personnel, representing all aspects of nursery endeavors, meets several times annually to determine how this money will be allocated, based upon the merits of the proposals submitted. All licensees are encouraged to offer input in this process by contacting the department or any of the committee members. A general meeting is usually held in early October for the researchers to report on their results. The Department of agriculture maintains a record of past projects and has a compilation of each year's results for public record. Below is a summary of research projects that are in progress. Oral presentations of these reports were made during the week of September 9, 2002 at the NWREC in Aurora.

Use of biocontrol and proprietary chemicals for controlling postharvest diseases of barerooted deciduous nursery plants.

Leslie H. Fuchigami, OSU; Srisangwan Laywisadkul, OSU; Robert Lindermann, USDA ARS HCRL; Mark Mazzola, USDA-ARS tree fruit research lab; Walt Mahaffee, USDA ARS HCRL; Michael Wisniewski, USDA ARS

Abstract:

Two strains of *Phytophthora syringae*, isolate 97-76 and an isolate from Kalmia were screened for pathogenicity during the summer of 2002. Both isolates were inoculated in one-year-old dormant stems of 'Old Home Farmingdale (OHF97) 97' pear rootstocks and incubated at 5, 10, 15, 20, or 25℃ in the dark. The isolate from Kalmia produced greater stem lesions at all test temperatures, thus indicating that the isolate from Kalmia was more virulent than isolate 97-76. In another test OHF97 fully expanded leaves were inoculated with both isolates of *Phytophthora syringae* and stored at 5, 10, 20, and 25℃. This test also showed that the isolate from Kalmia was more virulent than the 97-76 isolate at all test temperatures. These tests showed that the best test temperature for infection occurred at 10℃.

Beginning fall 2002 the kalmia isolate will be used to determine the effect of nitrogen content and chemical defoliation on the pathogenicity of *Phytophthora syringae*. During the summer 2002 OHF97 pear rootstocks were fertigated with three levels of nitrogen (0, 10, and 20 mm nitrogen as ammonium nitrate). During October 2002, after terminal bud set, the plants will be treated with urea and copper chelate defoliant sprays followed by chemical and/or biocontrol agents and inoculated with the either *Phytophthora syringae* Kalmia strain and/or Pseudomonas syringae. After treatment the plants will be bare-root harvested and stored at 4-5℃ and evaluated for stem dieback at periodic timed intervals.

Investigation of Phenology and Management of Woolly Ash Aphid, *Prociphilus fraxinifolii*

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Abstract:

The goal of this project is to develop phenological data for the woolly ash aphid, a key pest in ash production, in the Willamette Valley and to use this information to aid growers in the management of this pest. Four nursery locations were sampled weekly from February 27, 2002 through June 5, 2002. Aphid populations were quantified through the season and the various morphs (aphid types) photographed. Hobo data loggers were placed in each site from February 2002 through trial duration. Additionally we noted phenological indicator plants in bloom. Analysis of this data is in progress.

Apterous (non-winged) aphids were found on April 3 at the Boring and Aurora sites, April 17 in Dayton, and April 23 in Yamhill. Alates (winged aphids) were found on May 8 at the Aurora site and May 15 at the Boring site. As there are several possible species of Prociphilus which might occur on ash, winged specimens have been collected and will be sent to Dr. Keith Pike at Washington State University for species identification. We noted damage occurring within one week of the aphid's appearance. A website is in design to aid growers in the identification and management of this aphid.

Development of Degree-Day Predictive Model for Honeylocust Pod Gall Midge, *Dasineura gleditschiae.*

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Abstract:

The goal of this project is to develop and validate a degree-day predictive model for honeylocust pod gall midge (HPGM), *Dasineura gleditchiae*, the key pest in honeylocust production. Degree-day models are used to predict key insect events based on heat unit accumulation over time. We have previously shown improvements in midge management by targeting specific life stages, namely application of oil to smother midge eggs and pre-emergent soil drenches to target the overwintering stage of the midge.

Honey locust trees at four nursery locations plus at NWREC were sampled weekly from March 13, 2002 through June 21, 2002. Samples were observed under a microscope and quantitative data gathered on life stages present. Hobo data loggers were placed in each site from February 2002 through trial duration in order to record both air and soil temperatures. Additionally we noted phenological indicator plants in bloom. Analysis of this data is in progress.

Appearance of key life stages of Honey Locust Pod Gall Midge

	Oviposition	Pods	Pupal Cases
Dayton	4/10	4/24	5/22
Yamhill	4/10	5/8	5/15
Aurora	4/17	5/15	5/22
Boring	4/24	5/15	5/29

Possible phenological indicators: *Cornus americanus; Amelanchier x prunus* 'Forest Prince,' 'Smoke Cloud;' *Pyrus* 'Aristocrat,' 'Autumn Blaze.'

Progress report by the Landscape Plant Development Center

Activities on our research program to develop new, superior cultivars of landscape plants are summarized as follows:

1. Cooperators at the following institutions are evaluating segregating populations of second-generation pear hybrids for selection of promising individual plants that are well adapted to their respective regional conditions. (University of Georgia - Griffin; Cornell University, Penn State University, Texas A & M, Bernheim Arboretum, North Carolina State University - Mt. Horticultural Research Station, Iowa State University, Michigan State University, University of Minnesota, Arizona State University, and at the Center's research station in Oregon) These were planted in 2001. Figure 1 shows some of the *Pyrus* hybrids growing at our Oregon station.

Figure 1. Second generation Pyrus hybrids growing at our Oregon research station.

2. Many additional *Pyrus* crosses were made in the spring of 2002 between selected first generation hybrid plants growing at Washington State University - Puyallup. In 2001, Carlton Plants budded many of our selected *Pyrus* hybrids to produce plants for evaluation in different geographic regions. Several of these are performing better than *Pyrus calleryana* cultivars that are currently grown by the trade. Figure 2 shows the field of budded pear selections at Carlton Plants. We have made some additional selections of selected plants. These were propagated by budding in late August by Bailey Nurseries, Inc. and J. Frank Schmidt & Sons. Plans have also been made to look at the potential of some of the dwarf selections as dwarfing rootstocks for fruiting pears. Many additional hybrid seedlings were screened for tolerance to fireblight. Tolerant plants will be planted in the field this fall.

Figure 2. Budded Pyrus selections growing at Carlton Plants.

Figure 3. Maple hybrids growing at our Oregon research station.

3. Some of the *Acer* hybrids growing at the Oregon station are now flowering. Quite a few crosses were made this spring between selected individual plants. Figure 3 shows the maple hybrids growing at our Oregon research station.
4. Approximately 70 additional Carpinus hybrids were planted at the Oregon station this spring. Plans have been made for planting more this fall.
5. Hybrids between *Clematis integrifolia* and *C. hexapetala* continue to look very promising. Flowers are blue in color and upright facing. Selected plants are now being propagated by tissue culture for further evaluation. Figure 4 shows one of the promising

Figure 4. One of our promising Clematis integrifolia X C. hexapetala hybrids.

selections. In 2001, many crosses were made between the Clematis species and large flowered vine cultivars. Many of the seeds produced were not fully developed resulting in poor germination. A few of the resulting seedlings are now beginning to flower.

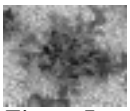

Figure 5. Hybrids between Physocarpus opulifolius 'Diablo' and P. opulifolius 'Dart's Gold'

6. We are currently establishing a cooperative breeding effort with Cornell University Department of Horticulture and the Cornell Plantation. The diverse plant collections at the Cornell Plantation will provide a broad germplasm base for our breeding program. This effort was started this spring with the assistance of several volunteers.
7. Breeding efforts initiated in 2001 to develop dwarf varieties of Weigela and colored foliage varieties of Cornus and Physocarpus resulted in some interesting seedlings. Figure 5 shows some of the Physocarpus seedlings and Figure 6 shows seedlings or redosier dogwood with golden foliage.
8. We are pursuing three approaches to develop sterile cultivars. The first method is to produce triploid plants by first doubling the chromosome number and then crossing the produced tetraploids with normal diploid plants. We have verified tetraploid plants of Spiraea bumalda and open pollinated seed were collected this past fall from plants growing next to diploid plants. We also have plants of Honeysuckle, Crabapple and Lilac that have been grown from microshoots treated with colchicine and oryzaline to produce tetraploids. We treated seedlings of crabapple, *Acer ginnala, Acer platanoides,* and *Lonicera tatarica* hybrids with oryzaline this past winter in an attempt to induce tetraploidy. We are estimating ploidy level of the treated plants by measuring stomata size. Further verification of the ones that appear to be polyploids will be done using flow cytometry techniques. We also initiated efforts to induce mutations by use of Ethyl Methane Sulfonate, a mutagenic agent. Sterility and dwarfness are often induced by mutagenic agents. We will expand mutation-breeding approaches during the coming year. The third approach that we are pursuing is to induce sterility by genetic transformation. We are cooperating with Dr. Alan Smith, Department of Horticultural Science at the University of Minnesota in that effort. The first step of this research is to develop sterility genes. Dr. Smith has applied the knowledge gained from the molecular analysis of tomato flower development toward the objective of producing sterility genes, which, when introduced into plants will cause male and female sterility. The sterility genes cause sterility by disrupting specific cells within either the stamen (male reproductive organ) or the pistil (female reproductive organ). Alan is initially testing the effectiveness of the genes that he is developing by introducing them into cultivars of Petunia. Petunia is an easy to transform horticultural crop. We are currently establishing tissue cultures of different woody plant species so that we can try the system on species where sterility would be desirous. We are also initiating cooperative efforts with Dr. Steven Strauss of Oregon State University for genetic engineering of sterile and dwarf cultivars.

Figure 6. Hybrids between Cornus Hessei 'Garden Glow' and C. sericea 'Cardinal.'

9. Although we had hoped for better flowering on barberry plants established at the Oregon station for use in breeding efforts to develop thornless varieties, we are able to collect some open pollinated seed from the thornless green barberry that hopefully have hybridized with the interplanted red-leafed varieties.

Root weevil control and survey of root weevil species complex in Oregon nursery production sites.

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Abstract:

The goal of this project was to evaluate the efficacy of new chemical compounds to existing standard pesticides for adult root weevil control. Additionally, we continue to survey the root weevil species complex in Oregon nursery production sites. In June of 2002, adult stages of black vine and strawberry root weevils were established in 1-gallon containers of *Euonymus* 'Emerald Gaity.' Treatments included untreated control, Talstar, Scimitar, Flagship, Dursban, and Orthene. Treatments were applied at 21:30 hours on the evening of June 12 with a CO2 sprayer at 42 psi. Air temperatures were 79.9 degrees F. Treatments were evaluated for adult mortality at seven and 14 days (June 19 and June 26, respectively). Additionally, the untreated control and the Scimitar treatment were "re-challenged" with 10 fresh weevils on July 1 and evaluated July 10. Analysis of this data is in progress.

As part of the root weevil species survey, root weevils were reared to adults from infested plant materials received from various sites. Donated material came from three counties (Clackamas, Marion, and Washington) and six nursery sites. Nine species of plants were surveyed. We began harvesting black vine weevil on April 10, 2002, strawberry root weevil on April 10, 2002, rough strawberry root weevil on April 12, 20002, small Woods

weevil on April 10, 2002, and juniper root weevil on May 29, 2002. Of the sites investigated, five of six sites had populations of black vine weevil, three of six sites had populations of rough strawberry root weevils, and two of six sites had populations of strawberry root weevil. One site also had populations of small Woods weevil and juniper root weevil.

Biology and nursery management of *Phytophthora syringae* in Oregon shade tree nurseries.

Richard Regan[1], Paul Reeser[2], Thirza Collins[1], and Alison Henderson[1]. Oregon State University. [1]Department of Horticulture, North Willamette Research and Extension Center. [2]Department of Botany and Plant Pathology.

The major goal of this project is to investigate pathogen epidemiology and fungicide efficacy in preventing *Phytophthora syringae* disease on flowering pear, white ash, and crabapple. A research block of container-grown trees and field-grown trees was established at the North Willamette Research and Extension Center, Aurora, Oregon. 750 one-year-old, bare-root trees were potted into #7 containers on February 28, 2002. Each of the three tree varieties (*Pyrus calleryana* 'Chanticleer,' *Fraxinus americana* 'Autumn Applause' and *Malus* 'Spring Snow') has been grown under typical nursery production practices under a retractable roof structure. Irrigation is applied with micro-spray sprinklers located at the potting medium surface of each tree. Leaves attached to the main stem and side-shoots were removed to about a height of three feet. Trees were also topped at six to seven feet to keep growth standardized within species. The trees were arranged into treatment groups and the first Aliette fungicide application was made on September 5, 2002 at the rate of 100 gallons of water per acre. A total of nine treatments will evaluate different rates and application timing. All trees will be wound-inoculated in November, December, and January. *Phytophthora* syringae isolate PC97-76 (from Malus) is being grown on V8S agar (15% V-8 juice neutralized with 0.013 g CaCO3/ml and centrifugally clarified, 1.5% agar, 30 ppm b-sitosterol) at 17°C in the dark for eight days. Inoculum not used immediately will be stored in a refrigerator until used. In addition, a field planting was established on February 12, 2002 at the North Willamette Research and Extension Center, Aurora, Oregon. 90 'Chanticleer' flowering pear trees were planted in a field with moderate drainage. The site was irrigated with overhead sprinkler irrigation about every two weeks throughout the summer. This site will also be inoculated during the winter. This site will serve as a pathogen biology study area.

Nursery Research Student Internships at Oregon State University

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Abstract:

The nursery research internship program at the North Willamette Research & Extension Center gives students educational and work experience in nursery crop research and production. During the course of the internship, students work on an independent research/extension project allowing them to focus on a topic of specific interest. In addition, the principles of research and technology transfer are explained.

During the summer months of 2002, the NWREC hosted one research intern, Kathy Von Arx (Oregon State University). Kathy worked on many projects during her internship, though she was given sole responsibility for implementing her own project titled "Influence of fertilizer placement on crop growth and weed control in containers." With her project, Kathy demonstrated that dibbling controlled release fertilizers (Apex 20-10-10) resulted in superior weed control compared to topdressing or incorporating fertilizers. Dibbling controlled-release fertilizer also resulted in similar crop growth compared to topdressing and superior growth compared to incorporating.

Sudden Oak Death in Oregon Nursery Crops: Evaluating the Potential for Disease, Detection, and Control

from Jennifer L. Parke[1], Robert G. Linderman[2], and Everett Hansen[3]

Our research on Sudden Oak Death includes testing the susceptibility of nursery plant species to this disease. We have now determined the potential susceptibility of more than 50 nursery plant species to *Phytophthora ramorum* using detached leaf assays. Leaves were inoculated with *Phytophthora ramorum* using mycelial plugs or zoospores. After one week or two weeks incubation in a moist chamber, we evaluated leaves for the extent of necrotic lesion development. Disease symptoms were compared with those on known hosts (Rhododendron "Cunningham's White," evergreen huckleberry) included as positive controls. We confirmed that the detached leaf assay is a valid way to test plant response by comparing results with inoculation of whole plants (selected species) in controlled growth chamber trials. In addition, we have compared inoculation with *Phytophthora ramorum* to inoculation

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with other *Phytophthora* species (*P. cactorum, P. citricola, P. citrophthora, P. syringae, P. heveae, P. parasitica,* or *P. cinnamomi*) that commonly occur in PNW nurseries, to determine the relative risk associated with this new pathogen.

Results to date indicate that a wide range of nursery plants is susceptible to *P. ramorum*: of the 50 species tested, only 9 did not develop symptoms after inoculation with *P. ramorum* zoospores. Tests including several *Phytophthora* species indicated that *P. ramorum*, *P. citrophthora*, and *P. citricola* were the most aggressive pathogens in these assays, suggesting that they pose the greatest risk to nursery and landscape plants should they become more widespread. Preliminary results show that *Viburnum davidii* and *V. plicatum* 'tomentosum' are susceptible only to *P. ramorum*. Within a single genus, and even among different cultivars of the same species, there can be considerable variation in susceptibility to *P. ramorum*. For example, in the genus *Vaccinium*, evergreen huckleberry (*V. ovatum*) (a known host in nature) and lingonberry (*V. vitis-idaea*) are highly susceptible, whereas results to date indicate that cranberry (*V. macrocarpon* "Stevens") is resistant. Highbush blueberry (*V. corymbosum*) cultivars range from resistant ("Bluecrop") to susceptible ("Brigitta"). Similar variation is likely to occur within the genus Rhododendron, as preliminary research by us and by others indicate that evergreen azaleas express relatively mild symptom development as compared to certain deciduous azaleas and rhododendrons.

Results on host susceptibility are important for several reasons. First, they indicate that a wider range of nursery and landscape plants should be surveyed for early detection of *P. ramorum* and other aggressive species of *Phytophthora*. Second, they identify possible sources of resistant germplasm for future plant breeding or cultivar development. Third, our results indicate that plant quarantines might need to be species-specific or even cultivar-specific to reflect the variable response within plant genera.

Additional research is aimed at developing early detection methods and control measures for this disease should it ever occur in Oregon nurseries.

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