Oregon Department of Agriculture

Plant Division

Annual Report 2005

April, 2005

Oregon Department of Agriculture

Plant Division

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Section one—Administration

Administrator's view

I'm very impressed by the number of projects documented in this report, their quality and level of success. Others have noticed too. This year the Oregon Invasive Species Council (OISC) gave the state an "A-" ranking, the highest ever, for activities related to keeping harmful invasive species out of the state—a primary function of our division. In addition, two of our employees (Dave Langland and Jim LaBonte) were recognized by the OISC for individual awards for "going above and beyond the call of duty to keep new invaders out of the state." Dave and Jim join eight other Plant Division staff members who have been similarly recognized since 2002. Unfortunately, we can't rest on our laurels.

Every year the OISC publishes a list of the 100 most dangerous invasive species threatening Oregon. Two thirds of the organisms listed are plant diseases, insect pests, or noxious weeds—Plant Division business. In other words, most of the responsibility for invasive species exclusion in Oregon is shouldered by our agency and carried out by this division. This year we completed survey and detection programs for 23 of these organisms and carried out eradication projects for nine species that were discovered. A truly impressive accomplishment, but what about the rest?

In recent years we've been very successful at piggybacking new surveys onto existing programs. If a survey technician is going to be hanging a gypsy moth trap in an area, it doesn't take much more time to hang a second trap nearby for a different target pest. Unfortunately, there is a limit to how far we can carry this strategy; there are no effective traps for many of the invasive species on the 100 Most Dangerous list. We're reduced to simply looking for signs and symptoms that may indicate the presence of undesirable organisms. This is a big state; if we were to spread the responsibility for detecting undesirable invasive species evenly across our staff, each of us would have to cover over a million acres! How can we address this gap?

In my opinion, the answer lies in public outreach and education. We need to raise the overall awareness of invasive species issues, so people are less likely to bring them in, more likely to report them, and more supportive of exclusion, detection, and eradication programs. I'm still amazed that some environmentalists oppose our eradication projects. Yes, we frequently use pesticides, but if we're successful, any environmental damage is short-term and reversible. On the other hand, if eradication fails, the invader becomes permanently established and the environment is degraded permanently and irreversibly. Though public awareness of the importance of biological pollution by invasive species has increased in recent years, it still lags far behind air pollution, water pollution, and other mainstream environmental issues. The "Silent Spring" of biological pollution hasn't yet been written.

The OISC has taken some steps to document public awareness. A poll they commissioned in 2005 found that only 6 percent of Oregonians felt that the issue of invasive species was being dealt with to a great extent; 54 percent chose somewhat and 40 percent not much, not at all or don't know. The OISC also hired a marketing firm to design a statewide awareness campaign plan. The estimated cost of the complete campaign was $200,000 to $500,000. Fundraising options are now being explored and the OISC is hoping to hire a staff person to pursue them. In the meantime, even with limited publicity, the statewide reporting hotline, 1-866-INVADER, now receives an average of 55 calls per month.

In a small way, I hope this annual report will help by opening the eyes of people it reaches. It is not "Starling Spring," but I think you'll agree that there is a lot going on in the Plant Division and that it is critically important to Oregon's environmental health and the agricultural/horticultural industries that depend on it.

Finally, I'd like to point out that the Plant Division houses many other fine programs not directly related to invasive species. Programs involving native plant conservation, biological control, certification of crops for export, and others completed many impressive projects this year. I hope you'll enjoy reading about the details in the pages that follow.

Dan Hilburn, Administrator
Plant Division

Section one—Administration

Performance measures

In our last five annual reports, we've tracked several performance measures. Once again it is time to review our progress.

A. Our first benchmark concerns the 10 worst weed and pest species that threaten to invade Oregon. These species are present in neighboring states or similar ecoregions and would have extremely serious negative impacts if they were to become established in Oregon (see the 2000 Annual Report for background information). Our goal is to keep them out as long as possible. Here is a progress report for 2005:

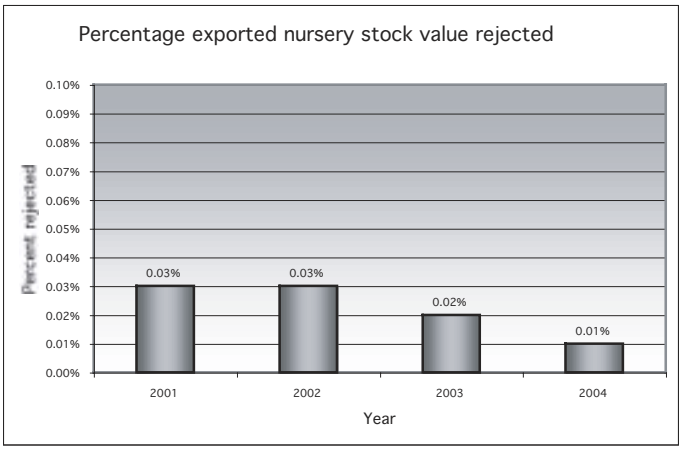
1. Gypsy moth—Treatments applied in Eagle Creek appear to have been successful, although another year of negative trapping will be required before we can declare the population officially eradicated. Only nine gypsy moths were trapped statewide. No eradication projects are projected for 2006. Future introductions are expected.
2. Japanese beetle—Four beetles were trapped near PDX this year. Treatments were applied to host material in the area. Future introductions are expected and public opposition to insecticide-intensive eradication programs is likely to grow.
3. Asian longhorned beetle—Survey results were negative.
4. Imported fire ant—No survey in 2005, but still not known to occur in the state.
5. Kudzu—Three infestations were found in 2000 and 2001. All were treated. Control at the sites has been nearly complete with only one small patch requiring retreatment in 2005.
6. Distaff thistle—Several dozen sites in Douglas and Jackson counties are being treated. The trend toward fewer plants appearing at these sites each year continues.
7. Purple starthistle—A site in Clackamas County is being eradicated. The trend toward fewer plants appearing at this site each year continues.
8. Hydrilla—This serious aquatic weed is established in both Washington and California. It is not known to occur in Oregon, but surveys have been irregular and incomplete. No organized survey was carried out in 2005.
9. Ramorum blight (a.k.a. sudden oak death)—Survey results indicate the eradication program in Curry County has succeeded in reducing the rate of spread. Eighteen infested acres were detected this year, down from 40 in 2001. Infestations at 15 nurseries and six landscape sites were eradicated.
10. Unknown—We must never forget that many exotic species could be harmful to the agricultural and native habitats of Oregon. Concentrating only on the known threats would leave us vulnerable to invasions by species currently not on our radar screen. Several general surveys, including that for exotic woodborers, improve our chances of finding unexpected invaders.
    2005 Grade: "A-"

Previous years: 2004: "A-"
2003: "A-"
2002: "A-" 2001: "A-"

B. Percentage of total exported nursery stock rejected at destination. Tracking this rate over time will measure the effectiveness of our nursery inspection and certification programs.

Formula: value exported nursery stock rejected / (gross nursery sales x percent exported) x 100 = percent rejected.

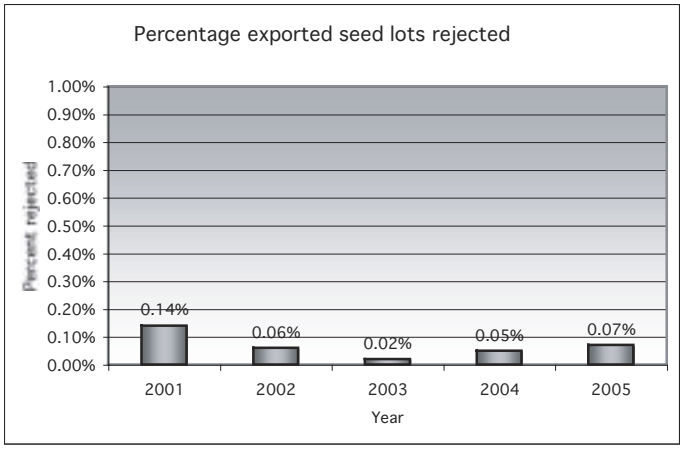
For 2004: $60,673 / ($904,000,000 x 0.73) x 100 = 0.01%.
Grade: "A"



C. Percentage of approved exported seed lots rejected at destination. Oregon exports the majority of the seed produced in the state. Comparing the number of exported lots rejected at destination to the total number of lots approved for export, measures the effectiveness of our laboratory testing and certification program.

Formula: number of exported seed lots rejected / number of seed lots tested and approved for export x 100 = percent rejected.

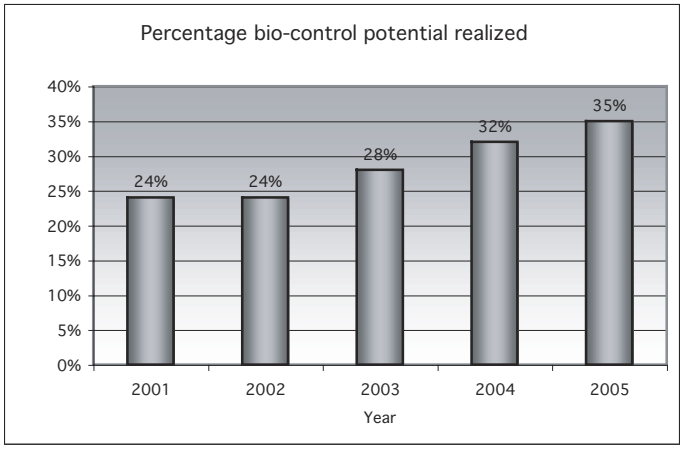
For 2005: 3/3,804 x 100 = 0.08% Grade: "A"



D. Percentage of biological control potential realized. For each available biological control agent, a county infested with its target weed is a potential habitat. We can measure the success of our biological control program by calculating the percentage of these potential habitats where biological control agents have become well established. The better we do at introducing and redistributing biological control agents, the higher this percentage will be. Over time, our program activities should cause the percentage to rise unless the number of new target weeds and agents grows more quickly than our success at establishment and redistribution. If that happens, the percentage will fall indicating our program is falling behind.

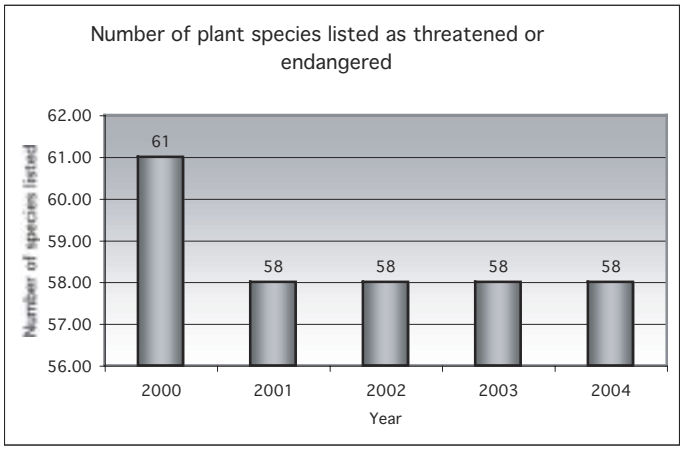
Formula: number of counties with each agent/weed combination well established / total number of counties with potential habitat x 100 = percentage biological control potential realized.

For 2005: 439 /1,261 x 100 = 35% Grade: "A"



E. Number of plant species listed as threatened or endangered in Oregon. This performance measure demonstrates the effectiveness of conservation programs relating to native plant species by identifying those that need protection and those that have recovered sufficiently to be removed from the list of threatened or endangered species. A declining number of threatened and endangered species indicates an effective program provided the species are recovering and not going extinct. The elimination of all non-grant funding in 2001 severely limited the effectiveness of this program. Replacement funding from lottery proceeds was approved by the legislature in 2005 and the program has expanded this year.

For 2005: 58 species listed as threatened or endangered
Grade: "B"



Conclusion

Overall, we're doing well. There is room for improvement, but in the current climate of shrinking budgets and increasing risk of invasive species introduction, just maintaining our "A's and B's" report card is going to be a challenge. Thankfully, we have a smart, creative, and dedicated staff. I'm confident we'll rise to the challenge.

Section one—Administration

Plant Division staff

Dan Hilburn, administrator

Office Support

Shannon Brubaker, office manager

Program Assistants

Steve Finch, IPPM & Plant Health
Sue Nash, Nursery/Christmas Tree
Jo Davis, Noxious Weed Control

Insect Pest Prevention & Management

Kathleen Johnson, supervisor

Entomologists 4

Barry Bai
Jim LaBonte
Alan Mudge
Helmuth Rogg

Entomologists 2

Diana Kimberling
Kerri Schwarz
Terri Stafford
Josh Vlach
Richard Worth

Entomologists 1

Todd Adams
Bill Giacomazzi
Bennett Huffman

Curatorial support technician

Steve Valley

Plant Health

Nancy Osterbauer, supervisor

Plant pathologists

Shawn Meng
Sid Sedegui

Plant Health certification specialist

Cindy Fraley

Plant Disease program specialist 2

Melissa Austin
Robin Ludy
Aaron Trippe

Plant Disease program specialist 1

Erika Berghauer
Rebecca Tippner-Hedges

Native Plant Conservation

Bob Meinke, supervisor

Conservation biologists

Kelly Amsberry
Rebecca Currin
Troy Maddux

Nursery & Christmas Tree Program

Gary McAninch, supervisor

Lead horticulturist

Jan Hedberg

Horticulturists

Christy Brown
Beverly Clark
Debbie Driesner
John Ekberg
Gary Garth
Dan Hawks
Sherree Lewis
Dennis Magnello
Karl Puls
Lisa Rehms
Eric Reusche
Scott Rose
Susan Schouten

Assistant horticulturist

Melissa Boschee

Noxious Weed Control Program

Tim Butler, Supervisor

Biological control entomologist

Eric Coombs

Projects coordinator

Tom Forney

Integrated weed management specialists

Bob Barrett
Ken French
Dave Langland
Glenn Miller
Bonnie Rasmussen
Dan Sharratt

Weed management technician

Beth Myers

Section two—
Nursery & Christmas Tree

Goals and objectives

The Nursery & Christmas Tree Program assists the nursery and Christmas tree industries in the production, marketing, and protection of Oregon nursery stock and Christmas trees. We accomplish this by:

- assisting nurseries in providing nursery stock that is free of dangerous pests and diseases
- providing pest and disease management information to the Christmas tree and nursery industries
- providing inspection and certification of nursery stock and Christmas trees grown and shipped from Oregon
- preventing the spread of injurious pests, plant diseases, and noxious weeds within the state of Oregon
- helping to prevent the introduction and spread of pests and diseases that could threaten Oregon's Christmas tree and nursery industries by inspecting incoming shipments of plant material for compliance with Oregon and US quarantines
- making information available to all licensed Christmas tree growers and nurseries relative to importation requirements of other states and countries.

Photo credit Gary Garth

Nursery & Christmas Tree Program highlights

- Inspection and export certification services were provided to Oregon's $143 million Christmas tree and $818 million nursery industries.
- Oregon nursery stock and Christmas trees were exported to 63 foreign countries.
- Horticulturists conducted 6,941 inspections and issued state and federal phytosanitary certificates.
- The Nursery Research Assessment Fund collected and made available approximately $222,000 for nursery related research grants.
- Nursery & Christmas Tree Program personnel staffed a booth at the Far-West Show—Oregon's largest nursery trade show.
- European brown garden snail, *Helix aspersa*, continues to be found in Oregon nurseries. During the past year, eradication efforts continued at an Oregon nursery.
- Inspections of grape blocks at 15 nurseries were completed to ensure compliance with certification requirements.
- Program horticulturists continue to survey for glassy-winged sharpshooter (GWSS), *Hoalodisca coagulata*, in nurseries shipping plant material to California under the California/Oregon Origin Inspection Program. No GWSS have been found at nurseries for the past four years.
- The program continues to provide certification for coniferous solid wood packing material going to the People's Republic of China. Eight hundred and ten solid wood packing material certificates were issued.
- The federal *Phytophthora ramorum* certification program was initiated. In order to meet the requirements of the federal order, a total of 922 host nurseries and 1,028 non-host nurseries were surveyed for *P. ramorum*.
- Fifteen Oregon nurseries were confirmed positive for *P. ramorum*, eight as a result of *P. ramorum* certification program inspections, four as the result of a retail nursery survey conducted by the Plant Health Section, and three as a result of trace back/trace forward investigations.
- Staff received notification of 3,799 shipments of nursery stock imported into the state. Twenty high-risk shipments were inspected for dangerous pests and diseases.
- Staff attended the annual meeting of the Western Chapter of the Horticultural Inspection Society in Missoula, Montana.

- Bev Clark and Christy Brown joined the program staff as horticulturists. Bev replaced Gordon Wogan following his retirement. Christie was assigned a newly created territory in Columbia County.
- Melissa Boschee was hired as assistant horticulturist to help with the coordination of the *P. ramorum* certification program.

Nursery & Christmas Tree Program staffing

The Nursery and Christmas Tree Program staff currently consists of 13 horticulturists, one assistant horticulturist, one lead horticulturist, one administrative specialist, and one program manager. The program has authorization to hire an additional horticulturist. Timing for the hiring of this position will depend on need and the availability of funding.

Photo includes: Melissa Boschee, Christy Brown, Bev Clark, Debbie Driesner, John Ekberg, Gary Garth, Dan Hawks, Jan Hedberg, Sherree Lewis, Dennis Magnello, Gary McAninch, Sue Nash, Karl Puls, Lisa Rehms, Eric Reusche, Scott Rose and Susan Schouten.

Nursery Program general information

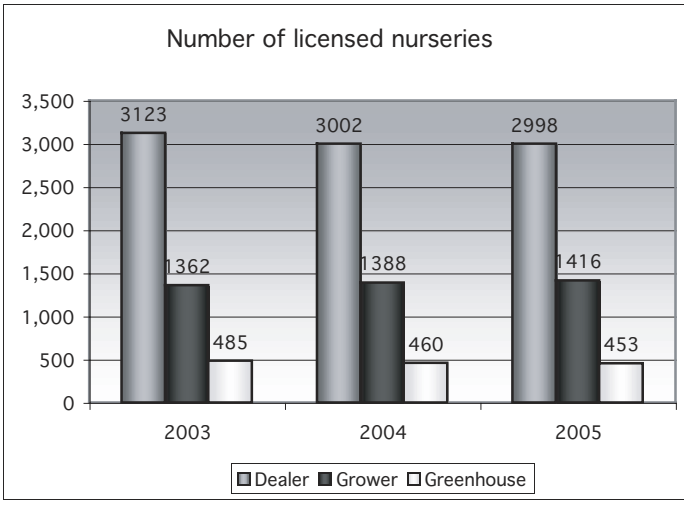
The nursery industry continues to be the largest segment of Oregon agriculture. ODA's nursery inspection program is funded entirely from nursery license and certification fees. Three different nursery license types are issued, depending on the nature of the nursery business. A dealer's license is required for businesses that buy and re-sell nursery stock. Dealer's licenses are purchased by garden centers, retail stores, florists, and landscapers. Dealer license fees are based on the purchase price (wholesale cost) of nursery stock. Cut flowers are exempt from the licensing program. Two types of nursery grower licenses are available through the department. One is a license specific for growers of greenhouse grown herbaceous plants, and the other is a license for all other nursery crops as well as collectors of native plants. The license for both of these types of licenses is based on the wholesale value of nursery stock sold.

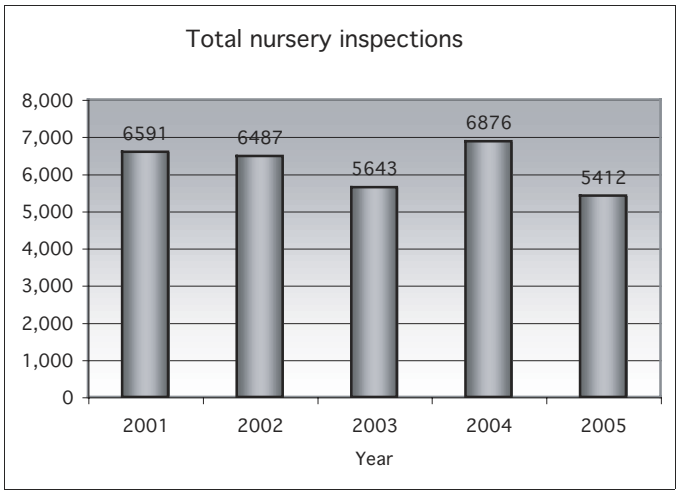
Horticulturist Christy Brown inspects strawberries near Klamath Falls. Photo credit Karl Puls

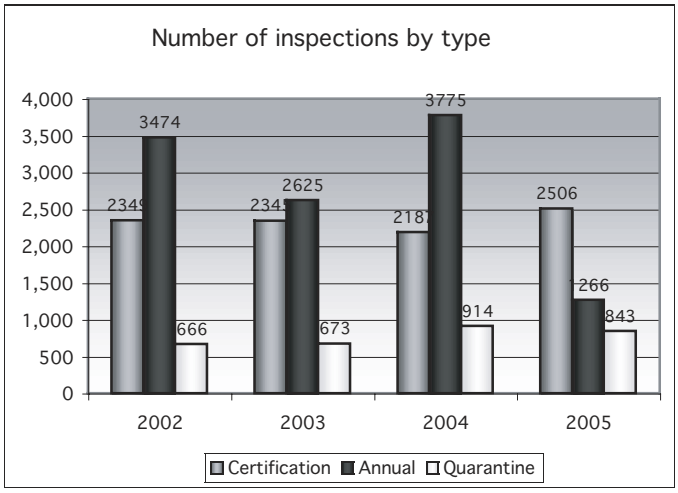
During the past calendar year, the Oregon Department of Agriculture (ODA) issued 2,998 dealer licenses ($186,390,959 reported purchases); 453 licenses were issued to greenhouse growers of herbaceous plants ($90,352,8023 reported sales), and 1,416 licenses were issued to nursery stock growers and collectors of native plants ($667,923,841 reported sales). The total value of nursery stock purchases and sales reported to the ODA in 2005 was $944,667,602. During the 2005 calendar year, the nursery program conducted 5,412 inspections. Inspections are divided into the following general categories: routine and requested inspections, 1,266; inspections for Oregon quarantine compliance, 843; and certification inspections, 2,506. The

remaining 797 were inspections conducted in association with *P. ramorum* surveys.

The Nursery & Christmas Tree Program field staff issued 4,994 state and federal phytosanitary certificates for consignment of nursery stock to foreign countries. In addition, 810 federal phytosanitary certificates were issued for shipments of lumber destined to foreign countries.







Phytosanitary certificates issued in 2005 (top ten countries)

Country	# of Certificates
Canada	3169
Japan	163
United Kingdom	89
Germany	46
Russian Federation	34
Netherlands	31
Puerto Rico	28
Italy	24
Sweden	22
France	21

Top ten foreign destinations for Oregon nursery stock.

Section two—Nursery & Christmas Tree

Nursery Research Assessment Fund

Twenty-six nursery research grant pre-proposals were received for the 2005 grant year. These requests were in competition for approximately $222,000 collected through nursery research assessment fees. The Nursery Research and Advisory Committee, in cooperation with the Oregon Association of Nurseries Research Committee, selected 17 research projects that met research priorities. The Advisory Committee also voted to provide a $30,000 grant to the National Horticultural Research Institute. Several research projects not funded, or only partially funded by ODA grant dollars, were recommended to receive funding from independent private sources including: the Oregon Association of Nurserymen, J. Frank Schmidt Memorial Trust, Tree Disease Fund, and private industry.

2005 nursery research projects

Project #	Title	Investigator	Total
2005-02	Investigation of flatheaded borer impact on phenology in Oregon nurseries	Rosetta	$ 8,000.00
2005-03	Evaluation of the fungus, Metarhizium anisopliae, as a rescue treatment for container-grown stock infested with black vine weevil	Bruck	$ 4,500.00
2005-04	Investigation of phenology and management of Rose Midge, Diasineura rhodophaga	Rosetta	$ 8,000.00
2005-06	Use of biocontrol and proprietary chemicals for controlling postharvest (Phytophthora) diseases of barerooted deciduous nursery plants	Fuchigami	$ 21,160.00
2005-07	Chemical characterization of Douglas fir bark in container production	Altland	$ 13,100.00
2005-09	Determining invasiveness habits of Buddleja cultivars in the Pacific Northwest	Altland	$ 8,052.00
2005-10	Determining the influence of water quality on container crop production	Altland	$ 16,700.00
2005-11	Determining the cause of marginal chlorosis in boxwood	Altand	$ 11,000.00
2005-12	Acidification of field soils through drip tape	Altand	$ 15,100.00
2005-13	Nursery research student internship at Oregon State University	Altland	$ 12,000.00
2005-14	Development of rapid diagnostic techniques for detecting bacteria that cause tumors, shoot proliferation and leafy galls in nursery plants	Putnam	$ 14,862.00
2005-16	Influence of soil mixes on the efficacy of chemical pesticides for preventative, rescue, and curative treatments for black vine weevils	Fisher	$ 5,000.00
2005-17	Development of new, superior cultivars of landscape plants	Pellett	$ 20,000.00
2005-18	Detection of Phytophthora in recirculating irrigation water and evaluation of bio-filters for water disinfection	Parke	$ 30,000.00
2005-19	Fungicide efficacy against Phytophthora ramorum	Regan/Parke	$ 8,000.00
2005-20	Effect of nitrogen fertilizer rates on shoot dieback of Fraxinus pennsylvanica	Regan	$ 1,600.00
2005-21	Evaluation of fungicides for control of Phytophthora syringae and Phytophthora citricola in Oregon nurseries	Regan	$ 15,000.00
	HRI Endowment		$ 30,000.00

Plant importation notification rule

Phytophthora ramorum has been found in Oregon associated with imported nursery stock on several shipments. In 2004, the Oregon Department of Agriculture adopted a notification rule (OAR 603-054-0027), allowing department inspectors the opportunity to inspect shipments of high-risk nursery stock shortly after they arrive. This rule requires recipients of imported tree and shrub nursery stock to notify the department of the shipment's arrival. Notification can be made by mail, email, or FAX and must occur no later than two business days after its arrival. The department will contact nurseries within one business day of receipt of the notification if the imported tree and shrub nursery stock must be held for inspection.

Notification rule summary

- During calendar year 2005 we received notification of 3,799 shipments of out of state nursery stock received by Oregon nurseries. This represents approximately 31 million plants.
- Program staff determined that 20 of the shipments were high-risk and inspections were conducted.
- Eleven official rejections were issued for quarantine violations.
- Seven shipments were either returned to the shipper or destroyed.
- The most commonly received plant genera were *Pseudotsuga, Tsuga, Juniperus, Picea* and *Thuja*.
- The top three shipping states from which we received notification were California (2,012), Washington (422) and Michigan (227).
- During the same time period, we received notification of plant material from six foreign countries including Canada (133), Holland (56), and New Zealand (5).

Phytophthora ramorum

On January 10, 2005, a new USDA federal order went into effect regulating the interstate movement of nursery stock from Oregon, California, and Washington nurseries. The purpose of the order is to prevent the spread and dissemination of *Phytophthora ramorum* through the horticultural trade. The order requires Oregon nurseries that grow host or associated host plants to be inspected, sampled, tested, and found free of *P. ramorum*. Those host and associated host nurseries determined to be free of *P. ramorum* are required to enter into a compliance agreement before certification is granted and interstate shipping allowed.

Nurseries that grow only non-host plant material are required to be visually inspected and determined free of *P. ramorum* before certification is granted and interstate shipments can take place.

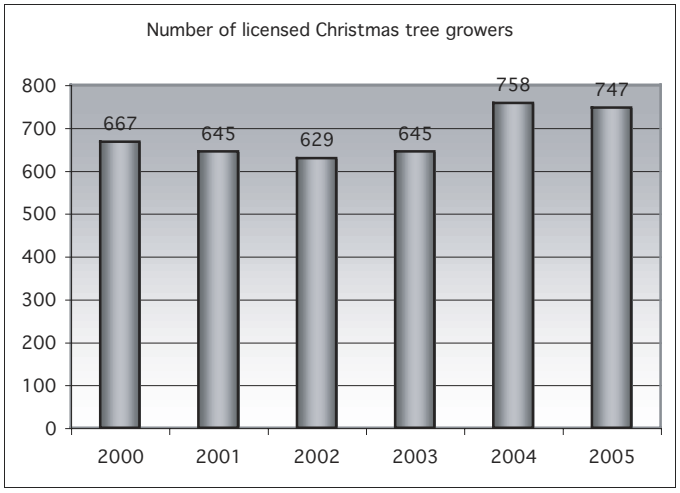
In order to meet the requirements of the *P. ramorum* Federal Order, ODA staff collected 51,645 samples from 1,021 host and 13 non-host growing grounds to test for the presence of the pathogen. Phytophthora species were detected at 156 (15 percent) surveyed sites, with *P. ramorum* found at eight (<1 percent) of the sites surveyed. The USDA Confirmed Nursery Protocol (CNP) was enacted and completed at the eight sites. Seven hundred and ninety-six host nurseries and 1,028 non-host nurseries have entered into federal compliance agreements and are eligible to ship plants interstate.

ODA has also completed trace-out investigations at nursery sites. Trace-out investigations are initiated at nurseries that have received host or associated host plant material from known infested nurseries. A total of 326 sites, including some landscape sites, have been surveyed with 9,060 samples collected for testing. *Phytophthora* species were detected at 25 sites (7.7 percent), with *P. ramorum* identified at nine locations (3 percent)—including three nurseries. The USDA Confirmed Nursery Protocol was implemented at the three nursery sites. Eradication has been completed or is nearing completion at all of the sites.

Photo credit Debbie Driesner

Christmas tree general information

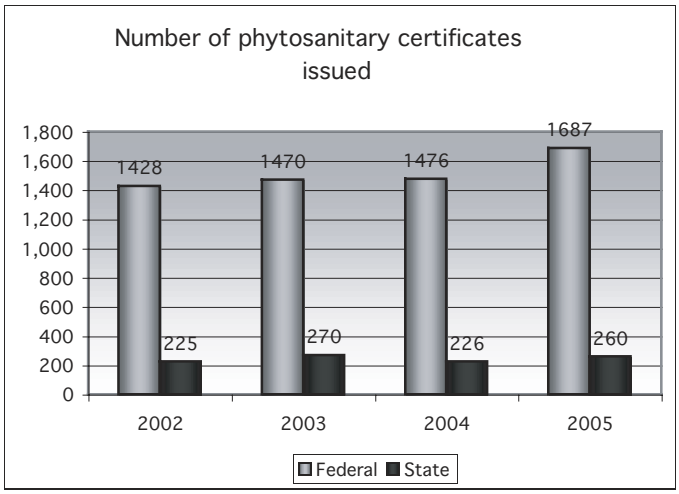
In 2005, the department issued Christmas tree grower licenses to 747 growers. Oregon's Christmas tree growers harvest over 7.3 million trees annually from about 45,000 acres. License fees are used to fund 1.5 FTE (field staff) and two 0.16 FTE (program supervisor and program assistant) who provide service to the Christmas tree industry. The estimated value of the 2005 crop had not been determined at publication time. However, the value for the 2004 Christmas tree crop was estimated to be $143 million, which ranked Christmas trees as sixth among all of Oregon's agricultural commodities. Nationally, Oregon is the number one producer of Christmas trees. License fees collected by ODA fund a program that provides inspection services to assist growers in the production of high quality Christmas trees. The program also provides certification services to growers who market their trees to other states and foreign countries.



Program activities are concentrated in the months of September, October, and November, and are generally completed by the first week of December. Some 90 percent of the Christmas trees harvested in Oregon are sold outside the state. The main activity of the Christmas tree program is certification of trees destined for foreign and certain domestic markets. Approximately 900,000 trees were prepared for sale, certified, and shipped to foreign countries during 2005. The table below shows the top six foreign destinations for Oregon Christmas trees.

Top six foreign destinations for Oregon Christmas trees.

Country	# of Phytosanitary Certificates
Mexico	1,490
Puerto Rico	66
Canada	52
Hong Kong	24
Guam	14
Singapore	10



European pine shoot moth certification

The Christmas tree program also provides a European Pine Shoot Moth (EPSM) Certification Program to growers who grow and ship pine Christmas trees to California, Nevada, Montana, and Hawaii. This program also addresses Mexico's EPSM phytosanitary certification requirements. Sixty-five Christmas tree growing sites were trapped for EPSM during the year. Based on positive trapping results, three of these sites were disqualified from shipping to California during the 2004 harvest/shipping season. As a result of shipping restrictions posed by EPSM and cereal leaf beetle, Oregon Christmas tree growers are reducing their pine tree acreage.

Christmas tree shipping season

Very few Christmas tree shipping problems related to phytosanitary issues were experienced during the 2005 season. Difficulty was experienced with a limited number of shipments going into both Puerto Rico and Mexico. The shipments in question were eventually released once treatment documentation was verified by Puerto Rican officials. Several shipments were delayed at the Mexican border, but to the best of our knowledge there were no Christmas tree shipments rejected. This is the fifth year in a row that the program had few problems shipping to Mexico. In addition, we are unaware of any shipments rejected or held for an extended time period at Arizona border inspection stations.

Christmas tree research

No Christmas tree research projects were funded during 2005.

Section three—Insect Pest Prevention and Management Section

Introduction

The purpose of the Insect Pest Prevention and Management Section (IPPM) is to protect Oregon's agriculture, horticulture, environment, and quality of life from damaging insect pests and to enhance or maintain the value of our agricultural and horticultural products. Our first set of defenses is regulatory, consisting of state and federal quarantines to exclude exotic pests from Oregon and state control area orders to slow their spread within Oregon. IPPM detection and survey programs provide a second line of defense to protect our natural resources and markets. When an exotic pest population is detected in Oregon, eradication and control programs are implemented when feasible.

Our professional personnel also perform identification services, pest risk-assessments, and inspections for several state and federal permit programs. Surveys for our agricultural and horticultural crops often meet the entry requirements of national and international customers. Sharing information with the public and with industry groups has become increasingly important in fulfilling our purpose. Our survey data are documented in IPPM databases and maps and nationally in the National Agricultural Pest Information System (NAPIS) database.

Highlights

- We successfully completed three aerial applications of the biological insecticide Btk on a 268-acre gypsy moth eradication area near Eagle Creek.
- No gypsy moth infestations were detected in 2005. For only the third time since 1980, we are planning no gypsy moth eradication program for 2006.
- A total of four Japanese beetles were trapped at the Portland International Airport.
- Our cooperative exotic woodborer trapping program continued for the ninth year. A scolytid screening aid was developed and training in its use provided for insect screeners primarily in the western region, but also nationally.
- ODA sought to eradicate an exotic woodborer, the granulate ambrosia beetle, using pesticide treatments in the vicinity of a railroad tie treatment plant in The Dalles.
- In support of the exotic woodborer eradication program, a record number of funnel traps (179) were set and woodborers identified in a timely manner to facilitate treatment decisions.
- Surveys did not detect apple leaf miner, apple tortrix, Asian longhorned beetle, blueberry maggot, dark fruit tree tortrix, emerald ash borer, European chafer, leek moth, Oriental beetle, or summer fruit tortrix, in Oregon. Apple ermine moth, apple maggot, cereal leaf beetle or cherry bark tortix surveys did not find any expansion of their ranges in Oregon.
- Two European wireworm species have now been detected in Multnomah and either Columbia or Clackamas counties, but not in traps placed in 17 other counties.
- A new survey found potato tuberworm moths in many of Oregon's major potato producing regions.
- The positive public response to press releases on brown marmorated stink bug showed that this orchard and nuisance pest is established in Portland.
- Identification of nontarget species in funnel traps in The Dalles (and subsequently in a 2003 exotic moth trap in Dufur) detected a new state record: *Hecatera dysodea*, whose larvae feed on the flowers and seeds of composites, primarily lettuce and sow thistles. New Western records for oak timberworm, hickory ambrosia beetle, and a hardwood-feeding platypodid, *Euplatypus compositus*, were detected in light traps in The Dalles. In Coos Bay the European cutworm moth, *Noctua pronuba*, first discovered in Oregon in 2002, was found in light traps.
- Over 64,751 acres in eight Oregon counties were found to be at risk of economic infestations of grasshoppers in 2006. Mormon cricket populations were recorded on over 4,709 acres in Baker, Gilliam, Malheur, and Wallowa counties.
- Technical advice on grasshopper infestation levels and control options was provided to land owners and managers. In the Klamath Marsh National Wildlife Refuge, grassland on 276 acres was protected from nymphal infestations using ground applications of Dimilin on 50 percent of the acreage at the end of June.
- Our second successful overwintering recovery of the cereal leaf beetle egg parasitoid occurred in the Banks field insectary after two previous years of releases. Parasitism rates reached 30 percent by late June and may

be a source of egg parasitoids for re-distribution within Oregon in 2006.

- The first insectary for cereal leaf beetle egg parasitoids in eastern Oregon was initiated at the OSU Agricultural Research Center in Union County
- The exceptionally high parasitism rates by cereal leaf beetle larval parasitoids in Multnomah, Union, and Washington county fields (84-100 percent) allowed us to begin re-distribution of this parasitoid between Oregon grain fields for the first time.

Fully staffed for the first time by mid-2005, our IPPM team met new challenges this year: planning and implementing six different eradication or control projects (one new) and over 22 survey programs (three new). Several new invasive insect records were also identified. National recognition was again earned, this time by our exotic woodborer taxonomic team, and seven papers published. In contrast to 20 years ago, when we fielded only five insect survey programs and conducted one major eradication project, our programs have become more complex. The dedication of our IPPM staff, their continued development of our excellence in technical and field expertise, and their positive collaboration with each other, cooperators, volunteers, and the public were essential to our successful implementation of these programs designed to protect and enhance Oregon's natural resources, economy, and quality of life. Thanks to each one of you. It is an honor to work with you. Special recognition is due Dan Hilburn and the entire ICS team for leading the early eradication effort in The Dalles and to Kerri Schwarz for facilitating our many programs with great GIS maps and for working with the field offices as they develop their own GIS capabilities. Thanks also to our volunteers and many cooperators in Oregon, nationally and internationally. We will again need everyone's best contributions to face, successfully, the challenges of 2006.

Back row (left to right): Josh Vlach, Terri Stafford, Diana Kimberling, Jim LaBonte.

Middle row: Bennett Huffman, Bill Rivers, Barry Bai, Steve Valley, Helmuth Rogg.

Front row: Todd Adams, Alan Mudge, Bill Giacomazzi, Kathleen Johnson, Kerri Schwarz, Rich Worth.

Rick Westcott and Steve Finch were not present for the photo.

Apple ermine moth

Apple ermine moth (AEM), *Yponomeuta malinellus*, is a European native first detected in North America (British Columbia) in 1985, and in Oregon in 1991. By 2003, AEM had spread to 18 counties in northwest Oregon. In 2005, 192 traps were placed in 15 counties to detect further spread and to monitor population levels. Most traps were placed in non-infested counties adjacent to counties with previous AEM catches. No new AEM were detected in uninfested counties.

Apple leaf miner

The apple leaf miner (ALM), *Leucoptera malifoliella*, occurs in middle and southern Europe, the Middle East, parts of the former Soviet Union, and northern China. A pest of apple, pear, and, to a lesser extent, plum, quince, and hawthorne, ALM could survive throughout the US wherever host plants occur. Commercial shipments of apples, nursery stock, or scion material from Europe are the most likely pathways. In 2005, 299 diamond traps were set in 12 counties; lures were changed once during the season. No ALM were detected in Oregon.

Apple maggot

During 2005, apple maggot (AM), *Rhagoletis pomonella*, trapping was conducted to provide certification of apples for fresh market sales to Washington and Arizona under the terms of those states' permits and to detect AM in apple growing areas where it has not been known to occur. In Hood River County two AM flies were trapped at two of 48 sites, compared to two AM at two of 61 sites in 2004. The host trees were cut down and removed. Neither detection was close enough to an orchard to have an impact on fresh market production. For the fifth year, no AM survey program in apples was conducted in Wasco County, where all the commercial apples were placed into cold storage. Trapping in northeastern Oregon continued for protection of commercial apple orchards. Six traps were set in Arlington in Gilliam County and 61 traps were placed in Adams (1), Athena (6), Milton-Freewater (21), Pendleton (25), Pilot Rock (3) and Weston (5) in Umatilla County; AM was not detected. In southwest Pendleton where AM was first detected in 2001, no further monitoring or treatment was conducted by ODA for AM in that area. However, bait attractancy studies for AM were conducted by OSU in this area of Pendleton in 2005. A special AM trapping program was conducted in Hood River and Wasco counties to assist in the marketing of cherry fruits to Mexico. Four AM flies were caught at one site (in hawthorn), which posed no threat to movement of cherries.

Apple tortrix

Apple tortrix, *Archips fuscocupreanus*, is a pest originally from Japan and Korea. It attacks apple, stone fruits, filbert, azalea, horse chestnut, potentilla, and other plants. This pest is considered the second most economically important pest of apples in Japan. Washington first detected apple tortrix in several western counties in 1995 during a statewide cherry ermine moth (CEM) survey. Because of the attractiveness of CEM lures to apple tortrix, 368 CEM traps were placed in 13 Oregon counties to detect both CEM and apple tortrix in 2005. Apple tortrix has not yet been detected in Oregon.

Asian longhorned beetle

In 2005, surveys continued for Asian longhorned beetle (ALB), *Anoplophora glabripennis*. A woodboring beetle native to China and Korea, ALB larvae feed on hardwoods, eventually killing them. Maple, poplar, birch, elm, willow, and horsechestnut are its preferred hosts. ALB infestations were found in Brooklyn and Amityville, NY; Chicago, IL; Jersey City, NJ; Toronto, Ontario, Canada; and the Carteret-Linden-Rahway-Woodbridge area, NJ in 1996, 1998, 2002, 2003, and 2004 respectively. Efforts to delimit and eradicate these infestations continue. ALB was first reported by a member of the public in Illinois, New Jersey, and New York, indicating how crucial an educated public can be in finding exotic pests. An ODA "Story of the Week" highlighting ALB was released in August 2005. Information and pictures of ALB are maintained on the Plant Division Web site for easy public access. As no effective traps are currently available, 13,513 host trees in 31 counties were visually surveyed for typical ALB damage at 6,369 sites where other pest detection traps (e.g. gypsy moth, Japanese beetle) were present. No ALBs have been found to date in Oregon.

A survey of high-risk sites for ALB and other exotic woodborers was reinitiated in 2005. Forty-six businesses receiving commodities with solid wood packing material (SWPM) primarily from China, Korea, and Europe were interviewed in December regarding their importation and SWPM handling practices and pest risk. ALB posters and pest alerts were left with each importer. Visual surveys of hosts were then conducted at five of the high-risk sites. Sites identified with various risk levels can be mapped to show "hot zones" and may be targeted for additional host visual surveys for ALB and/or surveys for other invasive insects.

Blueberry maggot

The blueberry maggot (BBM), *Rhagoletis mendax*, is native to the eastern United States and Canada. Without pesticide treatments, in some fields in infested areas nearly all of the berries may be attacked. Infested berries become soft and mushy. Berries sold for processing in infested areas have a zero tolerance for blueberry maggots. A pest of blueberry, deerberry, and huckleberry, BBM is a serious threat to Oregon's blueberry industry. Oregon ranked fifth in the US for acres of blueberry harvested and first for yield per acre. In order to protect our high blueberry yield production and markets, Oregon has a blueberry maggot quarantine for infested states to prevent BBM from entering

and establishing in Oregon. In 2005, about 274 traps were placed in 17 western Oregon counties. No blueberry maggots were detected.

Brown marmorated stink bug

The first brown marmorated stink bug (BMSB), *Halyomorpha halys*, recorded west of the Mississippi River was collected in an exotic woodboring insect trap in SE Portland on August 4, 2004. Native to China, Japan, Korea, and Taiwan, the earliest known US specimens were collected in Pennsylvania in 1996 but later identified in 2001. Previously known to be established in Maryland, New Jersey, and Pennsylvania, BMSB were also discovered in 2005 in Delaware and West Virginia and intercepted in California.

A press release announcing the original Oregon detection was made in early January 2005. Additional Portland specimens (most from Multnomah County, but a few from Washington County) were subsequently found and reported by residents. A single specimen collected in Hillsboro, Washington County, in either 2001 or 2002 (precise data are lacking) was also found in the Washington County Extension Service insect collection. One BMSB specimen was found in Salem, Marion County. In June 2005, participants at a BMSB regional conference collected numerous specimens and acquired several new host records in the Portland area where the original specimen was found. This pest is clearly established in Portland. Results from searching in Hillsboro were negative and no further specimens of BMSB were found in Salem. A second press release in November 2005 resulted only in additional records from areas of Portland previously known to be infested. The lack of an effective trap and lure for BMSB limits our ability to survey for this pest.

BMSB is considered a major agricultural pest in Asia. An unselective feeder, BMSB attacks and damages a wide variety of crops (including tree fruits) and many plants important in Oregon's nursery industry. Having already caused heavy damage to some Pennsylvania organic peach orchards, BMSB could become an orchard pest here. This stink bug can also be a significant nuisance pest, invading houses in great numbers in the fall and winter. In fact, other than the record from 2004 and the specimens collected during the BMSB conference, all Oregon specimens were found by residents in their homes.

Cereal leaf beetle

Cereal leaf beetle, *Oulema melanopus* (CLB), was first identified in Michigan in 1962 as an introduced pest from Europe. Oregon first found CLB in 1999 in Malheur County. A statewide survey did not detect CLB in any new counties in 2005. To date, CLB has been detected in 19 counties: Baker, Benton, Clackamas, Columbia, Crook, Deschutes, Jefferson, Lane, Linn, Malheur, Marion, Multnomah, Polk, Tillamook, Umatilla, Union, Wallowa, Washington, and Yamhill.

ODA's Plant Division works with the Commodity Inspection Division to reduce the impact of the California Department of Food and Agriculture (CDFA) CLB quarantine on small grain, fresh corn, and hay and straw producers. A master permit was renewed to allow bulk shipments of small grains grown and stored in Oregon to be shipped to California from December 1 through April 30. A second master permit was renewed in 2005 to allow small grains and grass seeds from Oregon to be shipped in large containers (>100 pounds) year round. CDFA also renewed two permits for shipment of fresh ear corn from Linn and Marion counties to California. In 2003 CDFA modified their quarantine to exempt compressed, baled hay and straw. Nursery and Christmas tree growers were also affected by CDFA's quarantine. CDFA renewed a master permit to allow entry of pines one inch or less in diameter, if accompanied by the appropriate certification from ODA.

Biological control has been effective in the eastern US where CLB at first caused serious damage. The cooperative biological control program among ODA, USDA, and OSU for CLB in Oregon began immediately after its detection in 1999. The program now has six field insectaries, three for the egg parasitoid *Anaphes flavipes* in Washington and Union counties, and another three for the larval parasitoid *Tetrastichus julis* in Benton, Jefferson, and Union counties.

The natural increase of the overwintering egg parasitoid was monitored for a second year in the *Anaphes flavipes* insectary near Banks in Washington County, where it was first initiated in 2002. The parasitism rate peaked in late June to early July at about 30 percent, similar to the peak parasitism rate in 2004. An estimated 15,690 *A. flavipes* were released at the Scholls insectary, also in Washington County, for a second year. Releases were made there so as not to interfere with recovery efforts at the Banks insectary. Overwintering recovery efforts in Scholls did not detect overwintering of the parasitoid following the first releases there in 2004. The first release of the egg parasitoid in eastern Oregon occurred in 2005 at a new *A. flavipes* insectary at the OSU Agricultural Research Center in Union County, only

0.25 mile from the already established *T. julis* insectary. An estimated 16,214 *A. flavipes* were released at this new insectary.

The source for the *A. flavipes* releases was Colorado Department. of Agriculture's Biocontrol Lab in Palisade, Colorado. As in previous years, most of these *A. flavipes* wasps were released as parasitized CLB eggs on oat leaves and placed with a sponge inside small, modified paper milk cartons mounted on wooden stakes in the field. The rest were released as parasitized CLB eggs in small petri dishes inside the same carton and stake assembly.

Three insectaries for the larval parasitoid, *T. julis*, were active in 2005. OSU's Hyslop Farm insectary in Benton County was the only one that received *T. julis* releases. The Madras insectary field in Jefferson County had CLB numbers too low to release *T. julis* in 2005. For a second year the overwintering *T. julis* population at the Union County insectary was allowed to increase naturally. Although parasitism recovery rates were low in the Hyslop insectary field, the first overwintering recovery of *T. julis* in the Hyslop insectary occurred in 2005 after only one year of releases.

Widespread recovery of *T. julis* was achieved in 2005 with exceptionally high parasitism rates in some locations where it was previously released. The peak parasitism rates of *T. julis* found in each positive county were as follows: Baker (57 percent), Benton (1 percent), Linn (67 percent), Malheur (3 percent), Multnomah (100 percent), Union (91 percent), Washington (84 percent). *T. julis* was also recovered in Linn County where it had never been released before suggesting that it is now spreading through parts of western Oregon naturally.

Tetrastichus julis were released in four counties. The number of CLB larvae (and estimated number of *T. julis*) released in each county are: Benton, 2,987 (12,784); Linn, 850 (3,519); Malheur, 2,459 (3,566); Marion, 803 (3,291). Parasitized CLB larvae were acquired from Pennsylvania (20); Wyoming (1,012); Montana (2,459); and Oregon: Multnomah County (20); Union County (3,058); and Washington County (530). The parasitism rates among CLB release material from all areas, ranged from 29 percent to 100 percent.

Although moderate CLB populations exist in the insectary fields, CLB adults and larvae were collected and redistributed to the insectary fields to augment the number of eggs and larvae for parasitizing. The numbers of CLB moved to each field in 2005 were: Hyslop 8,800 (Benton County); Madras 9,700 (Jefferson County); Union 11,530 (Union County); and Banks 8,600, Scholls 10,100 (Washington County). We also sent 20,220 adults to Colorado to support the egg parasitoid production there.

Rich Worth, Barry Bai, and Helmuth Rogg at the new Anaphes field insectary at the Eastern Oregon Agricultural Research Center in Union.

Successful biological control is needed for a healthier farm and landscape environment. A pesticide warehouse survey by USDA in 2005 indicated that insecticide-treated acreage for CLB in Oregon had dramatically increased from none in 1999, to 1,390 acres in 2000, 12,217 acres in 2001, 26,703 acres in 2002, 38,309 acres in 2003, and 64,200 acres in 2004 but had gone down slightly in 2005 to 50,175 acres due to reduced grain acreage.

Cherry bark tortrix

Cherry bark tortrix (CBT), *Enarmonia formosana*, was first discovered in British Columbia in 1989 and in Washington in 1991. The first detection in Oregon was in 2000, when single CBT moths were found in each of two traps set about five miles apart in Multnomah and Clackamas counties. Intensive trapping in the positive areas resulted in 16 moths in 2001, 1,020 moths in 2002, 1,389 moths in 2003, and 792 moths in 2004. A collaborative survey and biological control program by ODA, Washington State University (WSU), and USDA Niles Bio-control Lab was funded by the Oregon Association of Nurseries and the Washington State Commission on Pesticide Registration for two years during 2002-2003. The main purpose of the program was to delimit the CBT infestation, slow the spread of CBT, and protect high value trees by releasing CBT egg parasitoids. This program was continued in 2004 and 2005 by ODA and WSU.

In 2005, about 1,001 CBT traps were placed in 13 counties in northwest Oregon, an increase from the 926 CBT traps placed in 2004. In Multnomah and Clackamas counties, 723 traps were set around the previously infested (epicenter) areas to delimit the spread and distribution of CBT. Detection traps were also placed in most adjacent counties. About 1,650 moths were trapped in 2005, all in the Portland metro area of Multnomah and Clackamas counties. Again, no new detections were made in Marion County where a single moth was trapped in Silverton, about six miles from the Clackamas County border in 2003. Clackamas, Marion, and Multnomah counties remain the only CBT-positive counties in Oregon.

ODA's cooperative project with WSU to find effective biological controls against CBT continued in 2005. Egg parasitoids, *Trichogramma cacoeciae*, were again released, from June to September 2005, in the infestation center in Portland. WSU was primarily responsible for releasing about three million parasitoids in heavily infested areas in 2005. Although the CBT population has increased gradually, it has not spread to any new counties in the last three years. These results suggest that these wasps have effectively slowed the spread of the CBT and stabilized the pest's population.

Cherry ermine moth

Cherry ermine moth (CEM), *Yponomeuta padellus*, was discovered in British Columbia in 1993, in Washington in 1994, and was found in Oregon in 1996 when a single CEM was trapped in Multnomah County. This insect was not caught in Oregon from 1997-2004. Survey technicians placed 368 cherry ermine moth traps in 13 counties along the Oregon/Washington border and throughout the Willamette Valley in 2005. One cherry ermine moth was trapped in southeast Portland, in 2005.

Kerri Schwarz makes GIS maps for IPPM survey and control programs

Dark fruit tree tortrix

The dark fruit tree tortrix, *Pandemis heparana*, a pest from Eurasia, was first detected in British Columbia, Canada in 1978 and in Whatcom County, Washington in 1994 during a general survey of apple pests. By 1996 it had spread south to Clark County, Washington, on the Oregon border. *Pandemis heparana* has only been found in Oregon in Washington and Multnomah counties among specimens reared from larvae collected from Prunus trees in 1997 and 1998. In the survey for exotic insects on Prunus trees, the *P. heparana* specimens were among many other similar-looking leafroller moths and were later identified in 2002 as *P. heparana*. Survey technicians placed 122 *P. heparana* traps in four counties in northwestern Oregon in 2005. Once again, *P. heparana* was not detected in traps in Oregon.

Emerald ash borer

In 2005, visual surveys continued for emerald ash borer (EAB), *Agrilus planipennis*. Native to Asia, this woodborer

attacks true ashes (*Fraxinus* spp.) and causes 100 percent mortality of infested trees. This serious pest was first identified in North America in July 2002, in southeast Michigan but has now been found established in nearby areas of Ontario, Canada (2002), Ohio (2003), and Indiana (2004). EAB is introduced into new areas through trade or other movement of infested materials such as firewood and nursery stock. Especially suspect are solid wood packing materials such as pallets and spools from Asia (or heavily infested areas in North America such as Michigan). Eradication of EAB found in Maryland in 2003 and in Virginia 2004, suspected to be from imported Michigan nursery stock, is continuing.

As effective traps are not currently available, 1,634 ash trees were visually surveyed for typical EAB damage at 745 sites in 18 counties where other pest detection or ash trees were present. Public education continues to be an important factor in detecting EAB and other invasive species. An ODA press release in August 2005 highlighting EAB encouraged anyone seeing possible signs of EAB to contact ODA. No EABs have been found to date in Oregon.

European chafer

European chafer (EC), *Rhizotrogus majalis* is a major pest of forage crops and winter grains in Europe. EC was first found in 1940 in New Jersey and has since spread to much of the northeastern US and adjacent Canada. It was recently found in Michigan, where it has rapidly become the most serious white grub pest of residential lawns. Where both are established, turf damage by EC rivals, or exceeds, that of Japanese beetle. It is a serious emerging pest of many row crops, especially winter wheat. Up to 80 percent loss has been documented in New York permanent pastures and small grains.

European chafer was found in southern British Columbia in 2001, where it is causing extensive damage to home lawns. Surveys for this species in adjacent Washington have so far been negative. Introduction pathways are similar to those for Japanese beetle and include public or private transport, move-ins, or the nursery trade. Dead EC adults have been intercepted on cargo aircraft at Portland International Airport. The current range of EC leaves no doubt it could establish and flourish in Oregon. In addition to damaging turf, EC threatens Oregon's grass seed, small grain, nursery, vegetable and field crops.

Peak adult activity occurs from June through July. Adults fly from turf or other areas on the ground where they shelter during the day and aggregate in trees at twilight for mating. Once settled in a tree, adults can be attracted using ultraviolet light (UV or "black-light") making UV light traps currently the most effective survey tool for EC. Twenty-five sites were surveyed for EC using one or more portable, battery-operated UV light traps per night. Traps were placed for one or more nights per site and rotated between sites for a total of 58 trap nights. Suitable trap sites must meet several criteria, i.e., they must be accessible, have trees large enough to stimulate aggregation, and be secure from trap-tampering at night. Sites surveyed included nurseries receiving nursery stock from British Columbia, golf courses and business parks adjacent to Portland International Airport, cemeteries, the Washington Park Zoo, as well as other sites. Trap samples were collected the following morning and screened in the lab for EC adults. No EC was found.

European wireworms

The larvae, or wireworms, of two species of European click beetles, *Agriotes lineatus* and *A. obscurus*, are among the most destructive pests of spring-planted seeds in Europe, destroying seeds, roots, and root and tuber crops. Both species have been established in southwestern British Columbia since at least 1950 and may have been present since before 1900. *Agriotes lineatus* is thought to have been introduced via ballast soil, while *A. obscurus* may have arrived with infested hops for agricultural research. *Agriotes lineatus* and *A. obscurus* can be readily transported in soil associated with nursery stock or residential ornamental and vegetable plants. In 1997, *A. obscurus* was found in northern Washington and both species are now known to occur in that area. In British Columbia, control efforts are necessary to prevent severe economic damage to corn, potatoes, and other crops. Significant damage to field corn and seed potatoes by European wireworms has been recently noted in northwestern Washington.

Oregon's first EWW survey was conducted in 2004 at 15 high-risk sites in the northwest Oregon. A more extensive survey of 54 high-risk sites took place in 2005 in Benton, Clackamas, Clatsop, Columbia, Coos, Hood River, Jackson, Klamath, Lane, Linn, Malheur, Marion, Polk, Tillamook, Umatilla, Wallowa, Wasco, Washington and Yamhill counties. These sites included agricultural experiment stations which may have imported research material from Europe, landfills that could have received infested soil or ballast, nurseries known to receive large volumes of stock from infested areas of Canada and Washington, and port areas near known or suspected historical ballast sites. Adults of both species are generally active from April through June, so traps were in place from mid-March through mid-July. As interference occurs between the species-specific pheromone lures, each Vernon beetle trap could only be used for a single

species. Thus, each site had two traps per species, with a total of 30 traps per species overall in 2004 and 108 per species in 2005. Unfortunately, the 2005 survey was flawed because many of the traps were defective due to a manufacturing error. This error was not discovered until about mid-season; defective traps were promptly replaced. Samples were taken every one or two weeks.

Both species of European wireworm were found in Oregon in 2004 and 2005. In 2004, eight specimens of *A. lineatus* were trapped at four localities in the vicinity of the Port of Portland, Multnomah County, and six specimens of *A. obscurus* were trapped at two nurseries in eastern Clackamas County. In 2005, four specimens of *A. lineatus* were trapped at a port area at Rainier, Columbia County, and at a nursery in Gresham, Multnomah County. One specimen of *A. obscurus* was trapped in 2005, at the same nursery in Gresham, Multnomah County. Given the sedentary nature of these beetles and the limited distance over which the traps are known to be effective, these detections likely indicate established populations.

Exotic woodboring insects (EWBI)

Since foreign and domestic timber and wood products continue to be imported into the Pacific Northwest, surveys for exotic woodboring and wood associated beetles and wood wasps using baited Lindgren funnel traps were conducted in 2005, as in the eight prior years. A new facet to the survey was added in 2004, using ultraviolet (UV or "black light") light traps to survey for exotic defoliating and stem/twig boring insects (especially moths) that might also be transported via wood products and packing materials, as well as associated commodities. This method can also be used to detect woodboring and wood associated beetles and wasps that might not be attracted to funnel traps and lures.

EWBI—general survey

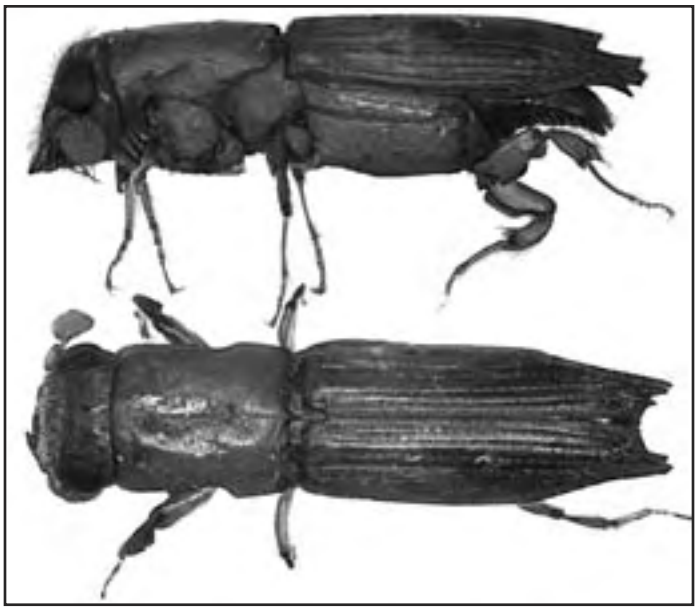
Four high-risk sites were selected for general EWBI funnel trap survey: one railroad tie treatment mill in The Dalles where many EWBI have been previously detected, a port area in Coos Bay that has not been trapped for several years, a dispersed urban forest site in Coos Bay and the Portland Zoo, a site which was deemed at high risk of importing potentially infested host material. Two sets of four 12-funnel Lindgren traps were placed at the mill. Only one set of four traps was placed at each of the three other sites. Each trap of a set was baited with a different lure, as follows: ultra-high release (UHR) ethanol alone, UHR ethanol with UHR alpha-pinene; exotic Ips pheromone, and 4 UHR ethanol lures together. The traps were sampled biweekly from initial placement in February until removal in mid-October. One intersecting panel UV bucket-style light trap, powered by a rechargable 12 volt DC battery, was set at intervals corresponding to the new moon phase from May through early October at the urban forest site in Coos Bay. The trap was run overnight twice during each sampling period, except October. Shell No-PestTM strips were used as the knock down and killing agent.

EWBI—pine shoot beetle

As in all years from 1997 on (although the results from 2004, all negative, at 47 sites in 11 counties, were accidentally omitted from last years' report), a specific survey targeting the pine shoot beetle, *Tomicus piniperda*, was conducted. Funnel traps using a five-component lure were placed at 53 high-risk sites in 14 counties. These sites included wood recyclers, port areas, and businesses importing goods from Europe that included solid wood packing material. Trapping was conducted from November 2004 through May 2005. Survey results were negative. Trapping for *T. piniperda* (as well as *T. destruens* and *T. minor*) commenced again in November 2005. Survey results for this new round of trapping have been negative through the end of 2005.

EWBI—delimitation survey in The Dalles

Following the detection of several exotic species in 2004, delimitation trapping was conducted in The Dalles. These species, *Euplatypus compositus* and *Oxoplatypus quadridentatus* (Platypodidae) and the bark beetles (Scolytidae), *Monathrum fasciatum*, *M. mali*, and *Xylosandrus crassiusculus*, pose risks to Oregon agriculture, particularly the fruit and nursery industries. This is especially true of *X. crassiusculus*, the granulate ambrosia beetle, an Asian species, which has become a significant nursery pest in the southeastern US and adjacent Texas. In addition to the regular sets of traps in The Dalles, 179 delimitation traps with single UHR ethanol lures were deployed from late March through mid-October. Traps on the tie plant premises and in the immediate vicinity (about 25) are being maintained from mid-October through the 2006 trapping season to detect activity of *X. crassiusculus* that may occur during winter warm spells. The full array of delimitation traps will be restored in March 2006. Two UV-light traps were deployed on plant premises from July through early October because of the risk of red oak borer (Cerambycidae: *Enaphalodes rufulus*) coming in with the oak ties from the Southeast. Protocols were similar to those for the general EWBI survey.



Euplatypus compositus, an eastern US pinhole borer that is a pest of hardwoods, found at The Dalles.

EWBI—eradication treatments in The Dalles

The large numbers of *X. crassiusculus* and small, but persistent, catches of *Euplatypus compositus* caught in 2005 led to development, in close cooperation with local industry and government leaders, of an eradication plan for these species in The Dalles. Two applications of Masterline Permethrin Plus-C were made to potential host shrubs and trees in the railroad tie treatment plant and vicinity and two applications of Perm-Up 3.2 EC to the raw railroad ties at the plant itself. ODA staff oversaw both applications, except for the first application on the tie plant itself. The first application to an 812 acre eradication area was accomplished in two phases: the area surrounding the tie treatment plant from July 6-9, 2005, by commercial applicators under contract by ODA and the tie treatment plant and railroad tie stacks in July by commercial applicators under contract with railroad owners. The second application, made on September 21-24, 2005, covered a 394 acre eradication area, including the tie treatment plant and nearby city park, roadside and commercial areas.

An important component of the eradication effort was the voluntary willingness of the tie plant to process first the raw hardwood ties from the Southeast, which were a potential ongoing source of target pests. All of the approximately one-half million high-risk ties were heat-sterilized and creosoted by mid-October. The tie plant also developed more stringent criteria for the quality of ties that it would accept and implemented protocols to immediately return or destroy substandard ties with visible woodborer damage, bark fragments, or rot pockets. As a precaution against emergence by target species during warm spells in late fall and winter, 25 of the delimitation traps in the core area in and near the plant remained active through the fall and winter, with samples being taken at the normal bi-weekly intervals. A third pesticide application and full-scale delimitation trapping is planned to begin in March-April 2006.

EWBI—2005 results

All funnel trap samples taken through the end of 2005 have been sorted and examined for target species. A total of 58,516 buprestids, cerambycids, playtpodids, scolytids, and siricids were identified in 2005 (including those from The Dalles delimitation traps). A single specimen of an eastern indigenous ash tree-attacking bark beetle, *Hylesinus criddlei*, was found in a pine shoot beetle trap in Hermiston (Umatilla County), near a regional airport. This was the first known record of this species from the western United States. Limited delimitation trapping for this species is planned for 2006.

Arrhenodes minutus, the oak timberworm, an eastern US pest of hardwoods found at The Dalles.

The remainder of significant or new exotic woodboring beetle records were from the delimitation efforts in The Dalles. These included a single specimen of the oak timberworm, *Arrhenodes minutus* (Brentidae) and several specimens of the hickory ambrosia beetle, *Xyleborus celsus* (Scolytidae). Both species are indigenous to eastern North America and these are the first Western trapping records. The oak timberworm is a known pest of various hardwoods and can be a vector of the oak wilt fungus. Both these species were captured in the UV-light traps instead of the funnel traps. Most of the *E. compositus* specimens were also collected via the light traps. These traps may become a valuable adjunct to our woodboring insect survey efforts in The Dalles and elsewhere.

A total of 54,122 woodborers were identified from The Dalles traps through the end of 2005. The totals of exotic target species trapped at The Dalles were, respectively: *Euplatypus compositus* (6), *Monarthrum fasciatum* (12), *M. mali* (17), *Oxoplatypus quadridentatus* (0), and *Xylosandrus crassiusculus* (109). No *M. fasciatum* or *M. mali* were trapped after June 29, *E. compositus* were captured from June 30 through September 2 (a peak of three in the July 19-August 3 sample period), and *X. crassiusculus* were trapped from April 18 through October 20 (a peak of 38 in the May 3-May 12 sample period). All *E. compositus* catches were confined to a small area along the northeastern edge of the tie plant premises. Although most were caught within the plant premises, several M. fasciatus and *M. mali* were trapped up to 1.5 miles from the plant. All but three *X. crassiusculus* were trapped on the plant premises or in the immediate vicinity thereof. One trap, about a half mile west of the plant, caught two *X. crassiusculus* and another trap, about a half mile east of the plant, captured one *X. crassiusculus*. Both of these trap catches occurred during the peak *X. crassiusculus* catch and neither trap caught *X. crassiusculus* thereafter. One *X. crassiusculus* was trapped during the sample period immediately following the last (mid-September) pesticide application. No pine shoot beetles were trapped.

The 2005 UV-light trapping centered in Coos Bay yielded no exotic species new to Oregon. While not a target species, the European cutworm moth, *Noctua pronuba* (Noctuidae), was the most abundant species of all moths in the Coos Bay samples. First discovered in Oregon in 2002, it has become widespread in the state. The rapid expansion and increased trap abundance of this exotic species suggests that it may become a significant garden pest.

Hecatera dysodea (D. & S.)

Another significant lepidopteran find is the noctuid *Hecatera dysodea* (Denis & Schiffermuller). Native to Europe and east to Turkmenistan and Kazakhstan and western and southern Siberia, it was found in numbers in the *Xylosandrus crassiusculus* delimitation traps in The Dalles in 2005. These catches led to the first North American record for this species; a single specimen was found in 2003 as a non-target catch in a *Helicoverpa armigera* trap in Dufur, Wasco County. It was not recognized as exotic *H. dysodea* until further investigation of the specimens from 2005. No *H. dysodea* were collected from our light trap at the railroad tie plant in The Dalles in 2004 or 2005, suggesting that this species may only be weakly attracted to ultraviolet light.

The current numbers and known distribution indicate that *H. dysodea* has likely been present since around 1999 or 2000, and that The Dalles is a likely point of introduction. The larvae feed on the flowers and seeds of composites, primarily *Lactuca* (lettuce) and *Sonchus* (sow thistles), most species of which are also exotic to Oregon. This species is not known to be a pest but may pose a risk to lettuce grown for seed.

Early Detection and Rapid Response (to exotic woodborers) Project (EDRR)

The continuing introductions of invasive, exotic woodboring insects pose grave threats to the health and productivity of North American forests, agriculture, and natural resources. While exclusion is the most effective strategy, it is impossible to exclude every exotic insect. The chances of eradicating or effectively controlling a newly introduced exotic species are greatly increased if it is detected soon after its introduction. In the spring of 2000, the National Plant Board and North American State Foresters requested that USDA, APHIS, PPQ, and Forest Service coordinate their agencies' invasive species efforts. Consequently, a pilot project for a national program to rapidly detect newly introduced or established exotic Scolytidae (bark and ambrosia beetles) was initiated in 2001. ODA-IPPM, as well as other agencies and institutions, cooperated with USDA Forest Service and APHIS, PPQ, to develop and implement this project. The basic detection, survey, and taxonomic protocols were developed and implemented in 2001 and refined in 2002 through 2004. Surveys and taxonomic efforts were regionalized for the Northeast, Southeast, and West.

In 2005, this project shifted from the pilot to the operational phase. Formerly referred to as the Rapid Detection of Exotic Scolytidae Pilot Project (RDESPP), it is now known as the Early Detection and Rapid Response program (EDRR). From 2001-2005, it has been responsible for many new state, regional, and national records of exotic ambrosia and bark beetles, as well as other wood borers. New national records include *Arhopalus syriacus* (Coleoptera:

Cerambycidae) and the ambrosia/bark beetles *Hylurgops palliatus, Scolytus schevyrewi, Xyleborus glabratus, X. seriatus, X. similis* (Coleoptera: Curculionidae: Scolytinae), and the European wood wasp, *Sirex noctilio* (Hymenoptera: Siricidae). These data indicate that the basic trapping protocols and methodologies are effective. Delimitation surveys have also been conducted under EDRR auspices for most of the new national exotics as well as some species already established in the US but new to particular regions, e.g., for *Xylosandrus germanus* in Oregon.

EDRR—Oregon's survey

The Oregon EDRR survey for 2005 focused on the horticultural and nursery trade, a potential pathway for introduction of exotic woodboring insects. Five nurseries in northwestern Oregon were selected for survey based upon their documented importation of large volumes of nursery stock from other countries (including Canada) and other regions of the US. Three funnel traps, baited respectively with the following lures, were placed at or in the immediate surroundings of these nurseries: UHR (ultra-high release) ethanol, four UHR ethanol lures, and UHR alpha-pinene and UHR ethanol lures. Samples were taken every two weeks and processed by IPPM staff. All specimens from the following families were identified to species: Buprestidae, Cerambycidae, Curculionidae: Scolytinae (Coleoptera); Siricidae and Xiphydriidae (Hymenoptera). All 2005 samples have been processed. A total of 24,325 specimens were identified.

The only new exotic woodborer record was for *Xylosandrus germanus* (Scolytinae) from Clackamas County. This pest had previously been trapped from several localities in Multnomah County and is believed to be established in Forest Park in Portland and another park in the easternmost part of the county. This insect has been established in the eastern US for decades and is becoming a significant pest of nursery and ornamental woody plants. The 2005 records are the first from a West Coast nursery. Since 57 specimens were trapped from late April to mid-August, we believe *X. germanus* is established at this site. Nursery stock and hosts in the immediate surroundings were examined by ODA nursery inspectors but no infested hosts were found.

EDRR—taxonomic support to other states

Since the inception of the EDRR project, IPPM has provided taxonomic support to other western region states lacking expertise with the target taxa. This support continued in 2005 to Alaska, South Dakota, Washington, and Wyoming for general EDRR surveys. IPPM also identified non-scolytid woodborers from special surveys in Alaska and Washington to develop better trapping methods for species of *Sirex* (Siricidae). Only a few samples were sent to IPPM's taxonomist for identification, totaling less than 500 specimens, other than for the siricid surveys in Alaska and Washington. This was in sharp contrast to previous years because of the use of a scolytid screening aid (developed by IPPM staff) by western states (see below). Identified specimens from the siricid surveys totaled 2,627. No new records for exotic woodboring insects were found in the samples forwarded to IPPM.

Jim LaBonte and Steve Valley designing a bark beetle identification aid with ODA's imaging system.

Limited taxonomic resources for woodborer identification was identified early as the resource limiting the expansion of the EDRR project from pilot to operational status. To address this challenge, the EDRR taxonomists developed screening aids to enable non-taxonomists to recognize and screen out the most abundant non-target species (which can make up as much as 95 percent of the specimens in samples) as well as to recognize and identify, at least provisionally, target species. This made sample processing much more efficient, enabling the taxonomists to focus on the relatively few remaining specimens so that non-target exotic species were not missed. These screening aids were image-supported in a PowerPoint format. Because of regional faunal differences, each screening aid was tailored for a particular region. The western region screening aid focused on 10 abundant species from the Pacific Northwest, but also included common species from Alaska and Colorado. The IPPM digital imaging system and staff were fundamental to the successful production and implementation of the western region screening aid. A workshop on the use of this aid was held in May at the IPPM Salem facilities. Participants included staff from Alaska Department of Natural Resources, California Department of Food and Agriculture, University of California (Berkeley), USDA

Forest Service (Colorado), and USDA APHIS-PPQ (Louisiana and South Dakota).

EDRR—North American Siricidae field guide and LUCID key

The discovery of an established population of *Sirex noctilio* in New York and Ontario (Canada) led to the recognition of the extremely limited taxonomic resources for siricid identification in North America and the awareness that these were inadequate to support national surveys for this important pest. Our IPPM staff began collaboration with USDA entomologists on the development of both a "hard copy" field guide for the North American Siricidae and a LUCID image-based key to this group, including exotic siricids that may be introduced into the North America. Using our advanced digital imaging system, IPPM will provide high quality images for this project as they did for the western region Scolytidae screening aid. An extensive library of siricid digital images has already been acquired by IPPM staff and the inclusion of those images into the field guide and LUCID key is beginning.

Sirex noctilio, the European wood wasp, a major exotic threat to pines that is now established in New York.

Grasshopper

The 2005 grasshopper survey season started in early May and ended in early September. ODA collaborates with the USDA in monitoring grasshopper populations in 17 counties in eastern Oregon each year. Based on the survey data, ODA and USDA provide technical assistance to landowners and land management agencies in the management of grasshopper populations. Upon request, ODA and USDA assist in the implementation of effective and environmentally sound grasshopper suppression programs on rangeland, pasture and crops. ODA generates survey maps and maintains historical survey data for grasshopper populations in Oregon. Data on grasshopper populations date back to 1953.

The 2005 adult survey showed economic levels of more than eight grasshoppers per square yard on 64,751 acres in eight counties of Eastern Oregon. The counties with the highest infestation levels were Klamath with 22,384 acres, Morrow with 16,066 acres, Baker with 12,340 acres, Union with 5,610 acres, Wallowa with 5,393 acres and Umatilla with 2,640 acres. Areas with significant infestations were located around the Umatilla Army Depot in Hermiston (2,000 acres), the US Navy Bombing Range (16,000 acres) in Boardman and in the Fort Klamath Valley where an estimated 20,000 acres of private pastureland showed levels between eight and 24 grasshoppers, predominantly *Camnula pellucida*, the clear winged grasshopper, per square yard. On September 7, 2005, landowners met with staff from Bureau of Reclamation, NRCS, USDA, and ODA to discuss recommendations for control of potential grasshopper outbreaks in 2006.

Infestations in the Klamath Marsh National Wildlife Refuge (NWR) were relatively low compared with previous years. Adult surveys in early September in the Klamath Marsh NWR showed an area of 81 acres at the old Lane Ranch infested with economic levels. A relatively wet spring may have delayed or prevented outbreaks on the refuge and adjacent private pastureland. Grasshoppers were observed hatching in late July. Economic levels of grasshoppers were also recorded in several areas in Baker, Union, and Wallowa counties. Most infestations were recorded on private pastureland with levels ranging between eight and 45 grasshoppers per square yard. The dominant species in the infested counties were, *Melanoplus sanguinipes, M. femurrubrum, M. packardii, Oedaleonotus enigma,* and *Aulocara elliotti*.

In 2005, for the first time in Oregon PDAs with GPS units were used to record grasshopper data. The La Grande field office is now equipped to quickly analyze survey data and generate survey maps using ArcGIS software.

In 2005, economic grasshopper infestations were reported for several new areas that included the Umatilla Army Depot, the US Navy Bombing Range and the Fort Klamath Valley. An aerial malathion application at the depot was approved and prepared by USDA following a request by the US Army. Due to logistical complications with the depot's weapons destruction program the aerial application was ultimately cancelled. However, private landowners adjacent to the depot applied malathion to control the grasshopper

outbreak. In the Klamath Marsh NWR, early-localized infestations of nymphs were treated with dimilin ground applications at the end of June. In total, 276 acres on the refuge were protected with dimilin using 50 percent ATV RAATs technique (138 acres treated). A 97 percent control rate was recorded for the dimilin applications. According to commercial pesticide applicators, approximately 1,800 acres of private land were sprayed in Eastern Oregon against grasshopper infestations with malathion and dimilin.

Mormon crickets (MC) were recorded in areas south of Arlington (approx. 3,100 acres), Gilliam County, south of Enterprise (766 acres) and Lostine (843 acres) in Wallowa County, in Halfway (one female caught), Baker County and in the Jordan Valley (unknown acreage), Malheur County. The MC in Arlington was identified as *Anabrus simplex*. Other MC species recorded in Oregon are *Anabrus cerciata* and *A. longipes*.

The table below shows an estimate of the acreages that had economic levels of grasshopper infestations in 2005 (>8 grasshoppers per square yard) based on the 2005 adult grasshopper survey results. In general, grasshopper outbreaks are difficult to predict because they are influenced by a large variety of biotic and abiotic factors. However, the identified areas with economic grasshopper infestations in 2005 serve as indicators of potential problem areas for 2006, and should be closely monitored in 2006.

Grasshopper populations in 2005

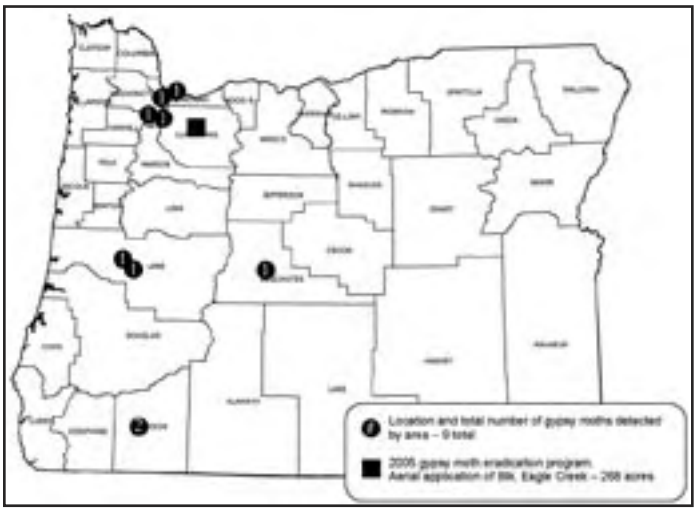
County	Acres infested
Baker	12,340
Harney	267
Klamath	22,384
Malheur	51
Morrow	16,066
Umatilla	2,640
Union	5,610
Wallowa	5,393
TOTAL	64,751 acres

Mormon cricket	
Wallowa	4,709

Gypsy moth

ODA maintains a high-level detection program for gypsy moth, *Lymantria dispar*, and its Asian strain (Asian gypsy moth). Early detection of infestations helps to keep eradication programs as small as possible. Nine gypsy moths were detected in Oregon in 2005, at eight new sites. All moths were submitted to the USDA Otis Pest Survey, Detection and Exclusion Laboratory and determined by genetic analysis to be of the North American strain.

Single gypsy moths were detected in NE and NW Portland (Multnomah County), Tualatin and Wilsonville (Washington County), Bend (Deschutes County) and at two sites in Eugene (Lane County). Two moths were found in a single trap in Shady Cove (Jackson County). The Wilsonville and Shady Cove detections occurred in RV parks suggesting RVs from the Northeast as the most likely pathway. These detections and the interception in 2004 of viable egg masses on nursery stock imported from Canada highlight the need for continued regulatory vigilance.



No moths were found in the Bull Run area near Sandy (Clackamas County), where three moths were found in a single trap in 2003 followed by a single moth in 2004. Despite considerable effort spent on public outreach to locate a possible move-in source and egg mass searching in this sparsely populated rural area, no connection to the Northeast was found. Considerably more traps were placed at this site in 2005. These included many walk-in traps placed by the US Forest Service, Mt. Hood National Forest, in non-roaded forested areas with steep terrain as well as along forest roads in the adjacent Bull Run watershed. Seven other sites with single detections in 2003 and/or 2004 were negative in 2005.

ODA has conducted numerous gypsy moth eradication programs since 1981. These have ranged from large-scale aerial spray programs of 225,000 acres to ground application programs of 10 acres. No moths were found at two 2004 eradication sites in Gresham (Multnomah County) and Eugene (Lane County). Following two consecutive years of negative delimitation trapping, these sites can now be declared eradicated. No moths were found at the 2005 Eagle Creek eradication site where three applications of *Bacillus thuringiensis* var. *kurstaki* (Btk) were applied to 268 acres by air, in the spring of 2005. Another year of negative delimitation trapping will be required before it can be declared eradicated. Gypsy moth pest alerts were distributed and information gathered from residents at

the NE Portland, Bend, and the RV park site in Shady Cove. No connection to the Northeast was discovered at the NE Portland or the Bend site. Egg mass searching was conducted within the RV park in Shady Cove as well as at a city park and two residential sites nearby. No other life stages were found. Unless other life stages are found no eradication programs are planned for 2006. Delimitation trapping will be conducted in 2006 around all 2004 and 2005 positive sites.

Wayne Estabrook serves as application team leader for gypsy moth eradication treatments for the last time after almost 20 years of service at ODA.

In 2005, approximately 18,367 gypsy moth traps were placed statewide. Oregon Department of Corrections inmate labor has constructed all gypsy moth traps since 1995 resulting in considerable cost savings and efficiency. Traps are concentrated in western Oregon where most population centers and preferred host plants are located. Other sites at high-risk for introduction such as national and state parks, public and private campgrounds and RV parks are also trapped each year. Major ports and waterways at risk from ships carrying Asian gypsy moth egg masses from the Russian Far East and other sources were also trapped. Asian gypsy moth was found in British Columbia in 1995 and 1996, in Washington in 1996, 1997 and 1999, in Oregon in 1991 and 2000, in California in 2003 and 2005 and in Idaho in 2004; Asian gypsy moth was also found in North Carolina in 1993 and 1994 and in adjacent South Carolina in 1994 and in Texas in 2005. In 2002, Asian gypsy moth egg masses were found in British Columbia on ships from Japan, highlighting the need for continued vigilance to keep Asian gypsy moth from entering and becoming established in Oregon.

Gypsy moth programs in Oregon, 1977-2005

Year	Number traps	Number GMs	Eradication acres
1977	100	0	0
1978	250	0	0
1979	300	2	0
1980	1,104	7	0
1981	3,000	1,023	20
1982	11,000	216	4,000
1983	17,000	299	50
1984	19,000	19,096	11,990
1985	32,000	1,628	225,000
1986	32,000	613	193,902
1987	32,391	80	11,771
1988	32,200	10	3,550
1989	22,250	2	4
1990	16,335	19	0
1991	15,445	29	4
1992	49,115	47	8,930
1993	44,522	78	328
1994	15,005	39	270
1995	14,384	21	86
1996	16,097	42	10
1997	17,368	30	70
1998	18,798	29	35
1999	18,384	13	19
2000	15,809	9	10
2001	16,914	8	1,070
2002	16,194	10	0
2003	16,837	28	706
2004	19,063	4	183
2005	18,367	9	268

Japanese beetle

Detection and eradication of new Japanese beetle (JB) introductions and prevention of new arrivals on aircraft and nursery stock from infested states remain a high priority. Western Oregon's relatively wet and mild climate, abundant suitable habitat and preferred host material are favorable for JB survival and establishment. Many of Oregon's top agricultural commodities and urban and rural environments would be affected if JB becomes established. ODA has trapped 202 JBs and has conducted three successful JB eradication programs, all in residential areas, since 1988.

Eradication treatments continued at Portland International Airport's (PDX) Airtrans Center due to continued JB trap catches (three males, one female) in the area. This is the same area where 11 JBs were trapped in 2002, three in 2003 and three in 2004, prompting eradication treatments in each year. Eradication treatments initiated in 2004 were continued in 2005 at two new sites near PDX where JBs were found in 2004, the Portland Air National Guard (ANG) base adjacent to the Airtans Center (one JB), and Colwood National Golf Course adjacent to the Portland ANGB (four JBs). Treatments again consisted of two applications of Tempo® SC Ultra to all trees, shrubs, ground covers and turf (Tempo® 20 WP was used for golf course turf) for adult control and a single soil application of Merit 0.5G to all turf and landscape beds, followed by irrigation with ca. 0.5″ of water for grub control. These programs are costly, difficult to implement, and less acceptable to the public than other pest eradication programs due to repeated soil and foliar pesticide applications. Maintaining effective exterior quarantines, regulatory programs, and annual statewide detection programs are the best way to keep Oregon free from JB.

Due to the risk of beetles hitchhiking on aircraft, USDA, monitors JB populations at eastern airports each year. As soon as population levels pose a risk of live beetles entering aircraft, the airport is declared regulated. Air cargo carriers must then follow treatment and safeguarding protocols for at-risk aircraft destined for Oregon and eight other western states.

At the beginning of the season, ODA staff met with FedEx, UPS, and ABX Air and gave an overview of the JB regulatory program to ramp managers and/or their crews. Being aware of hitchhiking JBs on aircraft and cargo was stressed as well as the importance of collecting any JBs found and contacting ODA. These annual meetings help increase awareness about the JB regulatory program and obtain better cooperation from ramp managers and staff. These efforts have proved beneficial as several JBs have been found by FedEx employees on cargo containers, cargo, or in their sorting facility. These were collected and ODA was promptly notified. ABX Air, Wilmington, OH and Federal Express, Indianapolis, IN, were the only two cargo carriers with regulated flights to PDX in 2005. No notification of any regulated military flights was received in 2005. If two or more live beetles are found on a single aircraft, an Emergency Action Notification is issued requiring closure and re-treatment of the aircraft. No planes were re-treated at PDX this year. No live beetles and very low numbers of JBs were found on aircraft overall from 2003 to 2005 (46 found), compared to 2002 (208 found). Several factors are likely responsible for this decrease including the use of excluders and container covers and removal of traps adjacent to ramp areas in regulated airports.

Fifty-three aircraft inspections were performed in 2004 with 21 JBs found (20 dead, one moribund). Despite very heavy JB populations at all regulated airports with flights to PDX, no live beetles were found on aircraft in 2005. However a FedEx driver found a live JB underneath shrink-wrap covering on a wooden crate being delivered to a business in the Portland area. This is the first occurrence of a JB being intercepted by an employee delivering a package, highlighting the continued need for vigilance by all ramp employees and drivers for possible hitchhiking JBs. Non-target Coleoptera collected during aircraft inspections from 2003 through 2005 were also identified. Three other exotic scarab species of economic concern were found (all dead) during these inspections: European chafer (57), Asiatic garden beetle (23) and Oriental beetle (43). These interceptions and continued interceptions of JB on cargo, cargo aircraft, and in traps placed at airports highlight the need for continued cooperation, monitoring, information sharing, and commitment among state and federal regulators, industry representatives and private consultants.

About 5,126 JB traps were placed in 2005, most in western Oregon. However, all cities and towns statewide are considered at risk and are trapped at two traps/mi^2. No JBs were trapped at a commercial self-storage facility adjacent to the SE corner of PDX, where two female JBs were trapped in 2003. Soil eradication treatments were conducted there in August 2003.

Leek moth

The leek moth (LM), *Acrolepiopsis assectella*, native to Europe, is a known pest of *Allium*, including chives, leek, onion, garlic, etc. In some parts of Europe, levels of infestation can reach to 40 percent in onions and 70 percent in leeks. It was first detected in North America from eastern Ontario, Canada in 1993. The distribution of the pest now includes Asia, Africa, Europe, and Canada. Reports of leek moth being established in Hawaii are apparently false, resulting from a misidentification of *A. sapporensis*.

In 2005, 217 wing traps were set in 16 counties by July 1. The lures were changed every two weeks. No LM was detected in Oregon in 2005.

Onion maggot control order in Malheur County

The unusually good 2004 onion season produced large amounts of cull onions for the Ontario area. In numerous meetings with growers, the onion industry and OSU Extension Service in Ontario early in 2005, ODA's recommendations were presented to reduce the risk of onion maggot outbreaks in the 2005 season. Several fields were inspected for violations of the cull onion order in cooperation with Commodity Inspection Division staff in Ontario. After talking with those growers, the cull onion issues were quickly resolved.

Oriental beetle

The Oriental beetle (OB), *Exomala orientalis*, is an introduced pest of turfgrass, nursery stock, ornamentals, small fruits and other crops. Probably native to the Philippines, OB was reported as a pest of turfgrass in Japan in the late 1800s and as a pest of sugarcane in Hawaii in the early 1900s. The first mainland US records are from a Connecticut nursery in 1920, presumably due to importation of Japanese nursery stock. OB is now well established in the northeastern US where the root-feeding grubs have become the primary white grub pest species in New Jersey.

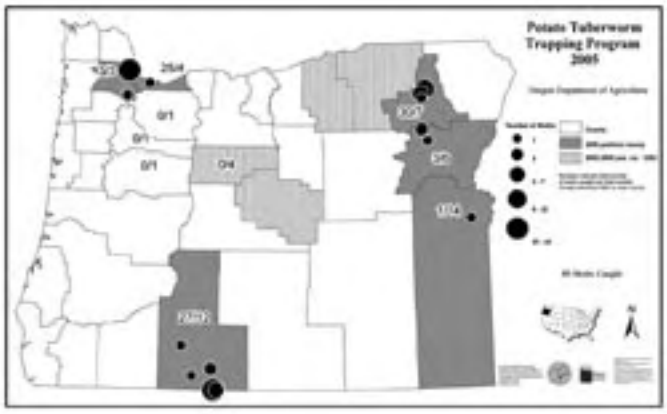
The pathways by which OB could be introduced into Oregon are similar to Japanese beetle (JB). In 2000, along with live JB grubs, live OB grubs were intercepted in nursery stock shipped from Connecticut to Oregon. Dead OB adults were also found in 2003-05 at Portland International Airport (PDX) during inspections of cargo flights from JB regulated airports in the eastern US. Since the flight periods for JB and OB overlap and lures for both species do not interact, it is possible to survey for both species simultaneously using a single JB trap resulting in considerable cost savings. Traps using the JB dual lure conveniently allow placement of a second rubber septa containing OB pheromone.

In 2005, 933 OB lures were "piggybacked" with JB lures in JB traps throughout the Portland metro area at sites with both JB and OB hosts. Traps were concentrated around PDX and surrounding area. No OBs were found. Plans are to expand this survey to other cities in 2006.

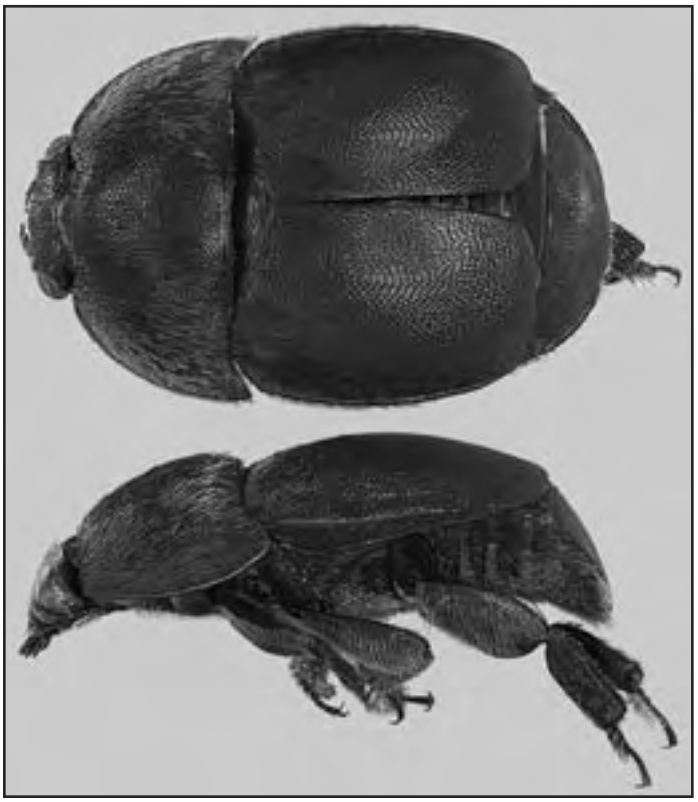
Potato tuberworm

The potato tuberworm (PTW), *Phthorimaea operculella*, originated in South America. The PTW has spread to many tropical and subtropical countries in the Americas, Asia and Africa, to Australia, New Zealand and Europe. In the US, PTW is recorded from at least 25 states from coast to coast. The PTW prefers potato as its host plant but can also attack other species of the Solanaceae family such as tomato, eggplant and nightshade.

Although recorded from California in 1933 and from Washington in 1913, PTW was first identified in Oregon in 2002 in the Columbia Basin area around Hermiston. In 2004, OSU Extension placed 35 pheromone traps catching several thousand specimens in Umatilla County. In 2005, ODA placed 53 PTW traps in potato growing areas of Baker, Clackamas, Jefferson, Klamath, Linn, Malheur, Marion, Multnomah, Union, and Washington counties. PTW were detected and confirmed in Baker, Klamath, Malheur, Multnomah, Union, and Washington counties. OSU Extension also detected PTW in traps in Morrow, Jefferson, Crook, and Umatilla counties.



Small hive beetle



Aethina tumida, the small hive beetle, a major pest of honeybees.

On April 15, 2005, several specimens of small hive beetle, *Aethina tumida*, were collected from an active honeybee hive in Medford (Jackson County). This is the first Oregon record of this extremely noxious honeybee pest. The Oregon specimens were from California hives sold to a Medford beekeeper earlier in the spring. No further specimens have been found and it is unknown whether small hive beetle is established in Oregon.

Small hive beetle is native to Africa. Adults and larvae feed on bee brood, pollen, and honey. Beetle activities foul and ferment honey, rendering it unmarketable. The first North American specimens were found in South Carolina in 1996. By 2003, it had been recorded from 30 states, most of which are east of the Mississippi River. Damage by this pest from 1998-2000 led to the destruction of at least 20,000 hives at the cost of many millions of dollars. Like other hive pests, good hive maintenance greatly reduces its effects. It is uncertain whether small hive beetle can permanently establish in Oregon, but given its already substantial range in the US, this is certainly a strong possibility.

Summer fruit tortrix

The summer fruit tortrix (SFT), *Adoxophyes orana*, is a major pest of apples and pears in most parts of Europe, parts of the former Soviet Union, and eastern Asia. This species damages up to 30 percent of leaves and flowers of apples in Ukraine, and from 10 to 20 percent fruit loss occurred in France and Germany. SFT has also been an economic pest of apples in the Netherlands. It is a known pest of lilac in the Netherlands and Belgium. SFT has the potential to be distributed throughout the US wherever the host plants occur. The damage to apple and pear fruit can be extensive and costly. The most likely pathway is through commercial shipment of apples, nursery stock, or scion material from infested regions in Europe and Asia.

In 2005, 299 diamond traps were placed in 13 counties having suitable sites and hosts. Lures were changed once if the traps were set before June 1. No SFT were detected in Oregon in 2005.

Miscellaneous insect identification and new records

In 2005, IPPM taxonomists identified over 2,370 insects and other invertebrates from samples or contacts via telephone, e-mail, or walk-ins. In general, these did not originate from specific IPPM programs, but instead were from ODA horticultural inspection programs, other government agencies, university and museum collections, commercial sources, the general public, and professional colleagues. Many of these contacts were the result of a pest alert and news releases regarding the discovery of brown marmorated stink bug in Oregon late in 2004. One IPPM taxonomist is also a collaborating scientist for the Systematic Entomology Lab, USDA. In this capacity, 118 identifications were made for flatheaded woodboring beetles, most of which were intercepted at US ports of entry.

In 2005, a staff vacancy at Oregon State University (OSU) led to an interim agreement by which IPPM taxonomists provided identifications and relevant information for insect and invertebrate samples submitted to OSU's Insect Identification Clinic. This arrangement started at the beginning of July. OSU intends to fill their staff vacancy in the near future, but until that time IPPM will continue to provide taxonomic support. IPPM identified or otherwise responded to 128 samples (including several digital and e-mail submissions) for OSU by the end of 2005.

Tapinoma melanocephalum, the ghost ant, a subtropical nuisance pest that has "hitchhiked" around the world, including to Portland!

In mid-February, a Portland resident reported that she might have an infestation of ghost ants, *Tapinoma melanocephalum*, a very common tropical and subtropical nuisance pest established in many areas of the world. The resident had recently vacationed in Hawaii and ghost ants readily "hitchhike" in luggage and cargo. In temperate climates, this pest is normally confined to heated areas such as homes and greenhouses. Specimens submitted to ODA were ghost ants, the first time they had been documented within Oregon. IPPM staff surveyed the site and found that the infestation was apparently confined to the single residence. A pest control company conducted an intensive eradicative treatment. A post-treatment survey by IPPM staff in the summer found no ghost ants, hopefully indicating that the infestation was successfully eradicated.

A manuscript prepared by two IPPM taxonomists, in collaboration with two taxonomists from other states formally documenting 219 species of beetles from Oregon, for the first time has been accepted for publication in early 2006. Numerous records are of specimens found in the course of IPPM insect pest surveys, including many exotic species, although most of the latter were not targets of the surveys. Such records show that the detection and recognition of many exotic insects can only be accomplished with a thorough knowledge of the native and known established Oregon fauna (supported in large part by IPPM's reference insect collection) and a broad spectrum approach to looking for newly introduced species.

Section four—Noxious Weed Control

Introduction

Our mission is to protect Oregon's natural resources from the invasion and proliferation of exotic noxious weeds. The Noxious Weed Control Section does this by

- providing leadership and coordinating noxious weed management
- serving as a technical resource for noxious weed issues
- providing public outreach, education, and awareness
- conducting weed risk assessments
- detecting new invaders and implementing rapid response control projects
- coordinating and implementing biological control of weeds
- administering the State Weed Board grant program.

From left to right rear: Ken French, Tom Forney
Middle: Eric Coombs, Dave Langland
Front: Glenn Miller, Jo Davis, Beth Meyers, Bonnie Rasmussen, Bob Barrett, Tim Butler, Dan Sharratt

The following is an overview of the Noxious Weed Control Program and a brief summary of major activities for 2005.

The Noxious Weed Control Program has 11 technical staff located in Salem, Canyonville, Klamath Falls, Redmond, Burns, and Union. The program also employs seasonal staff during the field season to assist in the implementation of noxious weed control projects statewide.

The Noxious Weed Control Program provides statewide leadership for coordination and management of state listed noxious weeds. The state program focuses on early detection and rapid response projects for new invasive noxious weeds, implementing biological control, implementing statewide inventory and survey, assisting the public and cooperators through technology transfer and noxious weed education, maintains noxious weed data, and provides assistance to land managers and cooperators with integrated weed management projects. The Noxious Weed Control Program also supports the Oregon State Weed Board with administration of the OSWB Grant Program, developing statewide management objectives, maintaining the State Noxious Weed List, and developing weed risk assessments.

Noxious weeds do not respect ownership and watershed boundaries; effective management requires support and participation from all affected parties. Cooperative management of noxious weeds allow for prioritizing activities and better uses of limited resources to meet the challenging needs of noxious weed management. Partnerships allow management across jurisdictional and ownership boundaries. For these reasons we seek to increase communication, improve coordination, gain cooperation, and assist planning and implementation of projects among cooperators. The State Noxious Weed Control Program encourages and supports partnerships between private landowners, state agencies, federal agencies, tribal governments, counties, weed management areas, watershed groups, conservation organizations, and other weed control entities in the state.

The Oregon State Weed Board (OSWB) is a seven-member board appointed by the director of the Department of Agriculture. The primary mission of the OSWB is to guide statewide noxious weed control priorities and to award noxious weed control funds. Priorities are developed in part through the state noxious weed control policy and classification system by listing and prioritizing noxious weeds.

Section four—Noxious Weed Control

2005 Weed Program highlights

During 2005, the Noxious Weed Control Program implimented 125 projects. A total of 888 noxious weed treatments were made by staff using integrated control. Of this, 798 sites were treated with herbicides and 90 sites were treated either manually or by mechanical methods. There were 555 treatments made on federal lands, and 333 treatments on private, county or state lands.

Biological agents were released at more than 108 sites in Oregon during 2005. Over 143 biocontrol sites were monitored to determine establishment and impact of biocontrol agents.

OSWB Grants: Reviewing noxious weed control grants and submitting recommendations to the Oregon State Weed Board for approval and monitoring of awarded grants were key accomplishments once again in 2005. The OSWB received 83 grant proposals in 2005.

Tansy ragwort

Western Oregon has experienced a resurgence of tansy. Monitoring has shown biocontrol agents are present and widespread.

Spartina

Two occurrences of *Spartina alterniflora* were found this summer.

Small broomrape, *Orobanche minor*

Two new sites were found this summer.

Blackberry rust, *Phragmidium violaceum*

In the spring 2005, an exotic pathogen that attacks Himalayan blackberry was detected in Curry and Coos Counties by ODA staff.

Giant hogweed, *Heracleum mantegazzianum*

Five new sites were found this field season, most occurring in the north Willamette Valley around Portland.

Kudzu, *Pueraria lobata*

Kudzu was identified for the first time in Oregon in 2000; follow-up monitoring found regrowth at one site in 2005.

Meadow hawkweed

During 2005, treatment of the Lolo Pass hawkweed site continued. Hawkweed was also a point of interest in Central Oregon. A Bend area nursery was found to be selling orange hawkweed.

2005 Noxious Weed List update

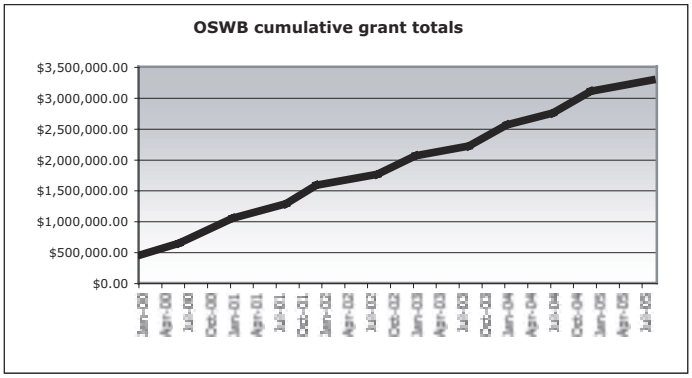
An important function of the Noxious Weed Control Program is identifying new invasive weed species before they become firmly established in Oregon. Plant risk assessments are tools that assist in the listing of new species by gathering background information. Priority activities include networking with weed professionals worldwide, identifying the highest risk species, and conducting yearly surveys to detect new populations as they occur.

Not all recently recognized invasive species are new to North America. Certain ornamental species that have been planted for years are now raising concerns because of their invasive nature. Species that have come to the forefront include English ivy, pampas grass, and butterfly bush. Discussions between ODA, State Weed Board, and the nursery industry are essential so that solutions acceptable to interested groups can be attained.

Noxious weeds are defined by the Oregon State Weed Board as exotic, non-indigenous plant species that are injurious to public health, agriculture, recreation, wildlife, public or private property. As of February 2005 there are 105 species of state-listed noxious weeds in Oregon.

Four weeds were added to the State Noxious Weed List in February 2005:

- Yellow flag iris, *Iris pseudacorus*
- Yellow floating heart, *Nymphoides peltata*
- Policeman's helmet, *Impatients glanulifera*
- Garlic mustard, *Alliaria petiolata*.



Noxious Weed Control grants

The Oregon State Weed Board (OSWB) will receive approximately $1.3 million of Measure 66 Lottery funds for noxious weed control grants in the 2005-2007 biennium. Priority projects were those that restore, enhance, or protect fish and wildlife habitat and watershed function. There continues to be substantial amounts of time allocated by noxious weed control program staff in the review, administration, and monitoring of the Noxious Weed Grant Program. The first of four grant cycles for the biennium was completed in 2005. Sixteen grants were awarded by the OSWB totaling $179,240.

Summary of early detection and treatment activities

Annual treatments for the control of "A" (highest priority) and "T" (target) designated weeds have reduced the net acreage of many large weed populations. Annual intensive control efforts for distaff thistle, *Carthamus lanatus*, and purple/Iberian starthistle, *Centaurea calitrapa*, *C. iberica*, have achieved 99 percent control on most sites. Douglas County contains most known distaff thistle sites; one site is known from Josephine County. Purple/Iberian starthistle is found only in Clackamas County and is fully contained. Purple/Iberian starthistle has the potential to invade 1.5 million acres in Oregon, which equates to a potential economic impact of $12 million per year.

Early detection and rapid response (EDRR) is a primary activity of the ODA program. ODA approaches EDRR by working with cooperators and developing partnerships to identify species of concern, distribute information, and implement projects. A primary activity is utilizing a risk assessment process with the Oregon State Weed Board to list species on the State Noxious Weed List as "A," "B," or "T." Priority listed species are incorporated into presentation and outreach activities to cooperators and the general public. Surveys for early detection are conducted; pest alerts and other information are produced and distributed to increase awareness in an effort to find and report infestations. Rapid response projects are implemented to eradicate or contain new invaders. An economic analysis reveals a 33:1 benefit to cost ratio for projects of this type.

ODA continues to meet program goals to limit or reduce acreages of all "A" rated weeds and implement project for "A" and "T" listed species. Statewide management plans for "T" weeds are updated each January to identify priorities for the field staff as new problems arise. Weed awareness and weed site reductions continue to be achieved through public education, implementation of chemical control and containment projects, and biological control projects targeting susceptible weed species. The following are a few highlights of "A" and "T" weed projects for 2005.

Paterson's curse

Paterson's curse, *Echium plantagineum*, is a new invading weed in Oregon. It was first detected in August of 2003 in Linn County. In 2004 a second infestation was confirmed on hillside pasture in Douglas County. Paterson's curse is originally from Western Europe and the Mediterranean region; it is widespread in temperate zones and extends into the tropics. In Australia it has become a serious weed of grazed pastures, grain production areas and natural areas. Since the 1800's, it has spread rapidly; it is now estimated to cost Australia $30 million annually in lost production. Paterson's curse is a prolific seeder and can germinate under a broad range of environmental conditions. Once established, it is quite drought tolerant and competitive with other species.

Delimiting surveys were completed for the project area in central Linn County in 2003 and additional survey was done at the new site location in Douglas County during 2004 to determine the distribution and spread of the population. The Linn County population is limited to four locations on field boarders in the Lebanon area. All of the locations were intentionally planted as part of a wild flower seed mix. The populations were treated to prevent seeding and to control the existing plants. In May 2004, a large infestation consisting of 100 net acres/300 gross acres of Paterson's curse was identified Southeast of Dillard in Douglas County. Meetings were held with landowners and neighbors. Eighty net acres of the project area was sprayed with a helicopter in 2004, with 20 net acres of additional ground treatment. All 2005 treatment was done by ground application, with most areas requiring five treatment sessions for complete control and to prevent seed set. Roseburg Forest Products supplied some contract labor. The Cow Creek Band of Umpqua Tribe of Indians contributed funds for some contract labor, while DCSWCD helped with contract administration.

Central Oregon orange hawkweed

In September 2005 a new detection of orange hawkweed, *Hieracium aurantiacum*, a state "A" listed noxious weed, was found being sold at a nursery in Deschutes County. Oregon Department of Agriculture staff confiscated and destroyed 157 orange hawkweed plants. ODA staff worked with the nursery, which was very cooperative in resolving the issue.

Section four—Noxious Weed Control

Program staff developed and distributed a noxious weed alert sheet on orange hawkweed and this was distributed to cooperators through our weed list serves and through a letter and mailing to all the nursery producers and retailers throughout Oregon. There was also a newspaper article in the Bend paper that generated 16 calls from private landowners who thought that they could have orange hawkweed in their ornamental plantings. Through site visits, program staff confirmed 12 new orange hawkweed sites in the Bend area. Some treatment was done on these sites during the fall and additional monitoring and follow up is scheduled for 2006.

A and T list
Oregon Department of Agriculture

NOXIOUS WEED ALERT

ORANGE HAWKWEED

HAVE YOU SEEN THIS WEED?

Please report suspect sites or finds to:
Oregon Department of Agriculture
Noxious Weed Control Program
503-986-4621 or 1-866-INVADER
http://oregon.gov/ODA/PLANT/weed_index.shtml

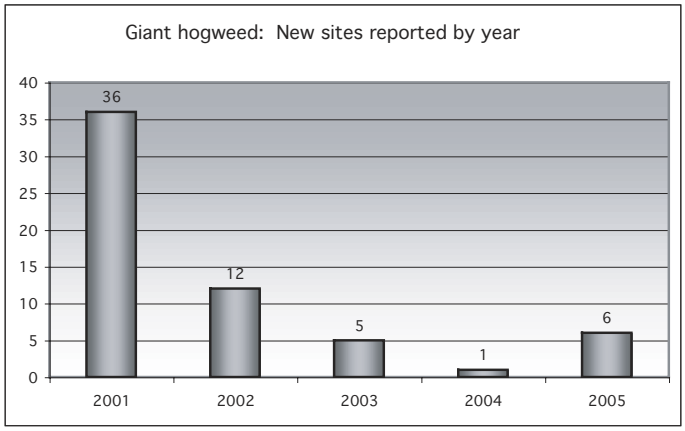
Yellow floating heart

Yellow floating heart, *Nymphoides peltata*, is an ornamental pond plant. The first wild population was reported in 2004 in a pond adjacent to Fanno Creek in Washington County and was listed as an "A" weed by the OSWB in 2005. The Washington county site was treated in late summer. Fall monitoring showed re-growth and indicated a need for additional treatment for 2006. A second site was detected in 2005 near Springfield in Lane County. A treatment plan for the site will be implemented in 2006.

Giant hogweed

Giant Hogweed, *Heracleum mantegazzianum*, is an Oregon state "A" listed noxious weed, a federal listed noxious weed, and is on the western region CAPS pest list. Hogweed is a human health concern; the sap is highly toxic and the plant is also invasive in natural areas and can be a pest in agricultural and recreation areas. Giant hogweed survey and treatment continued for 2005 with the assistance of USDA funding. Five new sites were found this field season, four occurring in the north Willamette Valley around Portland and one in Polk County.

All 53 previously known sites (70 properties) were monitored and received chemical or mechanical treatment. Two areas received a high degree of attention in 2005 for survey efforts. Fanno Creek, a tributary of the Tualatin River was intensively surveyed and delimited in June 2005. 3500+ plants were found along the surveyed section, mostly seedlings. No plants were found along the Tualatin River. The plants that were found were treated with herbicide; no seed heads were present. A follow-up treatment was performed in late September. The second area of focus was survey efforts in Polk County. The first Polk County site was detected in June 2005 by a county road. Over 3100 acres were surveyed in Polk County with a focus on the area around the infestation; no additional sites were found.



An early detection survey was completed for 2005. The project provided a comprehensive survey to delimit previously known sites in western Oregon. With active and passive survey methods, additional areas in western Oregon were also surveyed. ODA consulted with cooperators, and provided outreach and technical assistance to private landowners. Land managers and private landowners were provided technical support to treat the known hogweed populations. A limited number of herbicide treatments were implemented by ODA to control and contain priority infestations. Technical bulletins and pest alerts were

distributed and articles on giant hogweed were published in newspapers while the plant was in its most prominent growth stage. A presentation for garden clubs and other interested parties was developed and talks are being scheduled for spring 2006.

Kudzu

In July 2000, kudzu, *Pueraria lobata*, was detected on a road bank in Clackamas County. This was the first infestation detected west of Texas. Kudzu is an aggressive climbing vine that smothers other plants. It is a native of China and Japan and is a major problem in the southeastern US where an estimated seven million acres are infested. In August 2000, the second kudzu site for Oregon was detected in Multnomah County, and in June 2001, a third site was detected in Multnomah County. All sites were initially treated with the selective herbicide clopyralid, which is very effective for kudzu control.

Survey and detection efforts were conducted throughout western Oregon during 2005 and no new sites were detected. All three known sites were monitored throughout the 2005 season and one will require follow-up treatment in 2006.

Spartina survey and treatment

Ken French, ODA and Venessa Howard, PSU survey area near Coos Bay for Spartina alterniflora (tagged by ribbon)

Two occurrences of *Spartina alterniflora* were confirmed this summer. One site was regrowth from a historic site in Florence and a new site was detected in Coos Bay. ODA crews also worked with TNC to compete the covering of the large Spartina patens meadow and small outlying patches on Cox Island in Siuslaw Bay, Florence.

The historic *S. alterniflora* site known from Siuslaw Bay near the Port of Florence was first identified in 1990 and controlled by 1994. Subsequent monitoring found no regrowth until July 2005. The infestation was small and plants were removed by digging. The second *S. alterniflora* site was detected in June 2005 just east of the Charleston marina in Coos Bay. A follow-up investigation indicated unintended transplant of the Spartina from the Florence site to Charleston with native plugs dug for an ODOT mitigation project in Coos Bay. A comprehensive survey by helicopter, boat, and ground found no additional populations in Coos Bay. *S. patens*, known to exist on the Cox Island since the 1930s, is currently under management by The Nature Conservancy. The site is receiving active treatment by TNC and will require ongoing treatments to control the population.

During 2005 additional comprehensive surveys of Oregon estuaries for Spartina were completed and no additional sites were detected. This survey and detection effort is a primary goal identified in the Spartina Response Plan that was completed in 2003. Four exotic, invasive species of *Spartina spp.* (cordgrass) have been present in estuarine areas of the US west coast for over a century. During this time, they have significantly altered estuarine habitat and continue to pose threats to native wildlife and human commercial and recreational interests. The response plan provides historical and current information on West Coast populations of Spartina, reviews the biology of this group, and lays out a comprehensive, coordinated process to prevent, detect, identify, and treat this invasive weed. The plan identifies ODA as the lead agency in this effort, with other state and federal agencies providing assistance as needed.

Plumeless thistle

Plumeless thistle, *Cirsium acanthoides*, was known to exist only at one site in Fox Valley (Grant County) prior to 2004. In 2004 new sites were found prompting ODA to take a lead in the project. As a result of these expanded infestations, ODA staff undertook an intensive survey of much of Fox Valley and alerted landowners of the expanding population. Plumeless thistle was found and treated on 0.8 acres scattered over 1,200 acres in the south end of Fox Valley and four very small populations in the north valley on five private ranch properties. John George, Grant County Weed Control, and ODA attempted to regain the upper hand in the battle with Plumeless thistle in Grant County in 2004. Some 50 acres were treated on six ownerships. John left the program in late fall of 2004 and Shannon Springer took over. In 2005, Grant County made the spring treatment at all of the sites treated in 2004. ODA joined with Grant

County to cover the affected area when the plants were easily identifiable. The 2004 treatment was very effective, with rosette numbers being markedly reduced. Treated acreage was not reduced much because the thistle rosettes were scattered and mixed with other thistles in many sites. Landowner interest and cooperation is high in Fox Valley with many of the new sites coming from local ranchers. Grant County Weed Control staff has changed again this fall. ODA will be partnering with the new Weed Staff, Tom Rush, to ensure that Plumeless thistle remains contained in Oregon.

Squarrose knapweed

Squarrose knapweed, *Centaurea virgata*, has been found at five locations in Oregon in the past. The largest site is near Long Creek in Grant County, in good quality bunchgrass range on three private ranches. This site has been under intensive treatment since the late 1980s to contain the spread and reduce the infestation. During the 2005 field season the containment area was intensively surveyed to find and treat existing plants. The 2004 treatment was very successful yielding a reduction from 15 acres treated in 2004 to three acres in 2005. Grant County performed the summer survey under ODA direction picking up outlier populations and skips at the Long Creek site.

Special projects for 2005

The weed control program works on a variety of special projects and with a host of public and private cooperators to implement noxious weed control projects around the state. The following are a few of the projects completed in 2005.

Blackberry rust survey

In spring 2005, an exotic pathogen that attacks Himalayan blackberry was detected in Curry and Coos counties by ODA weed specialist Ken French. After consultation with state and federal pathologists, the pathogen was identified as *Phragmidium violaceum*. This is the rust that has been used in Australia and Chile as a biological control agent for wild infestations of blackberries (*Rubus fruticosus* group). Earlier this year, the pathogen was also detected in New Zealand, where it arrived as an unapproved adventive natural enemy. In Oregon, it has been found to occur on two species of blackberry, Himalayan (*Rubus procerus, = R. armeniacus, = R. discolor*) and on a thornless variety of evergreen blackberry (*R. laciniatus*). No one knows how the rust arrived in Oregon, or when, but it is suspected to have been around for at least two years. The rust has been found in all western counties of Oregon except Jackson and Josephine. It has been found in Washington and recently as far as 300 miles south of the Oregon boarder in California. The rust can cause die-back on blackberries and severely reduce fruit set. Affected vines have shriveled leaves covered on the underside with orange rust pustules that rain a yellowish-orange powder when disturbed. It is expected that the rust will be widespread by next year, as spores are spread by the wind throughout western Oregon. The full economic and ecological impacts are not yet known. Scientists at OSU are working with caneberry producers to find fungicides to help protect the evergreen blackberry crop. This pathogen is not an approved agent for biological control of blackberry and it should not be moved around because of the risk to native Rubus and crop species. In Australia, susceptible varieties of the weedy blackberry were reduced 50 percent after several years of exposure to the rust fungus. However, resistant varieties required the introduction of additional strains of the rust to provide additional control. (See related article in the Plant Health Section).

Japanese and giant knotweed survey and control

Members of the Polygonum family, giant and Japanese knotweeds, *Polygonum cuspidatum*, *P. sachalinense*, are tall plants that form clonal patches excluding other vegetation. Most invasive in riparian areas, the species establishes along streams and rivers and can overtake native and desirable streamside vegetation through aggressive growth and dominating height.

In western Oregon the knotweeds are established in many watersheds and threaten to invade new areas of healthy riparian communities or newly restored sites. East of the Cascades, Japanese and giant knotweed are uncommon and invading only a few riparian sites. ODA is approaching knotweed control from a watershed and regional approach focusing on outlying populations as a priority. In western Oregon, ODA is working with cooperators to provide technical assistance, implement watershed surveys and create demonstration control projects with the primary emphasis on identifying high priority watersheds and areas of control. In eastern Oregon, the knotweeds are being treated as new invaders to the region. ODA is assisting by increasing awareness with state and federal cooperators, county programs, and cooperative weed management areas (CWMAs). ODA is implementing or providing assistance for early detection surveys and treatment projects. State and private funds are assisting ODA in partnering with land managers and have helped leverage Resource Advisory Counsel funding, Oregon State Weed Board grants,

and Oregon Watershed Enhancement Board grants to implement knotweed projects.

Lists of eastern and western Oregon knotweed projects in 2005

Eastern Oregon

- Knotweed Early Detection & Treatment
- Hell Canyon Survey and Project Plan Development
- Mitchell Oregon Knotweed Treatment
- Homestead Survey and Treatment
- Tri-County WMA Knotweed Treatment

Western Oregon

- Knotweed project to assist county programs, SWCDs, watershed groups and CWMAs in knotweed control.
- NOIWMP Western Oregon Knotweed Awareness, Survey and Treatment
- Linn County Knotweed Survey and Treatment
- Clatsop County SWCD Knotweed Demonstration and Treatment
- Crabtree Knotweed Multi-agency and Private Timberland Treatment
- Middle Fork of the Willamette Knotweed Survey and Treatment
- Nelson Creek/State Lands Knotweed Treatment
- Columbia County Working Group Knotweed Control
- Mid-Coast CWMA Knotweed Survey and Treatment
- Coos River Watershed Council Knotweed Control

Owyhee River Whitetop/Perennial Pepperweed Treatment

White top, *Lepidium draba* and *L. appelianum*, and more recently perennial pepperweed, *Lepidium latifolium*, have been targets of treatment along the lower reach of the wild and scenic Owyhee River from just above Rome to near the upper end of Owyhee Reservoir, below Birch Creek. The majority of the treatments are completed in and adjacent to areas on the river that are accessible by foot and ATV. The number of river miles covered each year are expanded by hiking up and down river from access points using backpack sprayers for treatment. In addition a stretch from Ryegrass down to Bogus landing has been floated, allowing treatment to a significant amount of the most heavily infested river corridor. This combination of techniques allows treatment of virtually everything except 10 river miles from Sand Spring to Hole in the Ground. These treatments have been coordinated by ODA and have involved BLM contractors. Several other invaders are being treated as encountered. These include Scotch thistle, *Onopordum acanthium*, Musk thistle, *Carduus nutans*, Saltcedar, *Tamarix ramosissima*, and Russian knapweed, *Acroptilon repens*.

The river level during the optimum treatment time for white top is usually lower than floaters prefer. This usually occurs after Memorial Day, which is the usual end of the recreational float season on the Owyhee. This year early warm temperatures brought white top into bloom earlier and unseasonable rain in May brought the river level up. The Owyhee was attracting a lot of float traffic and the weeds were ready for treatment prior to Memorial Day. There was some concern about interaction with recreational floaters and sprayers so we tried to maintain a low profile. It was very pleasant to find that everyone we spoke to, whether on the river or when working near camps, was very supportive of our efforts to hold the line on invasive plants. Unfortunately, some of our sites, particularly of Pepperweed, were submerged. The river was high enough to allow floating the stretch from Ryegrass to Bogus, and treating the remains of the heavily infested area there. In 2005, 3.7 net acres were treated over a 775 total acres treatment area.

WeedMapper

WeedMapper (www.weedmapper.org) is a Web site that provides distribution maps of all state-listed weeds in Oregon, as well as, information on the identification and impacts of those weeds. It also provides a weed sighting report form to allow land managers to notify ODA quickly and easily of a new weed sighting. The Web site is a joint project of the Oregon Department of Agriculture and Oregon State University.

In May 2005 a redesign of an earlier version of the Web site was launched, allowing maps to be accessed by any type of computer. Weeds are mapped at the state and county levels. In December 2005 the final set of map pages were completed; these maps will be updated yearly.

Weed maps are shown at two different resolutions depending on the availability of specific weed location data: when GPS data is plentiful, maps are produced with each weed location pinpointed with a red dot; when GPS data is scarce, more general state distribution maps are used that show the abundance of a weed by county. Noxious Weed Control Program Staff provided the distribution information for the counties in their respective areas.

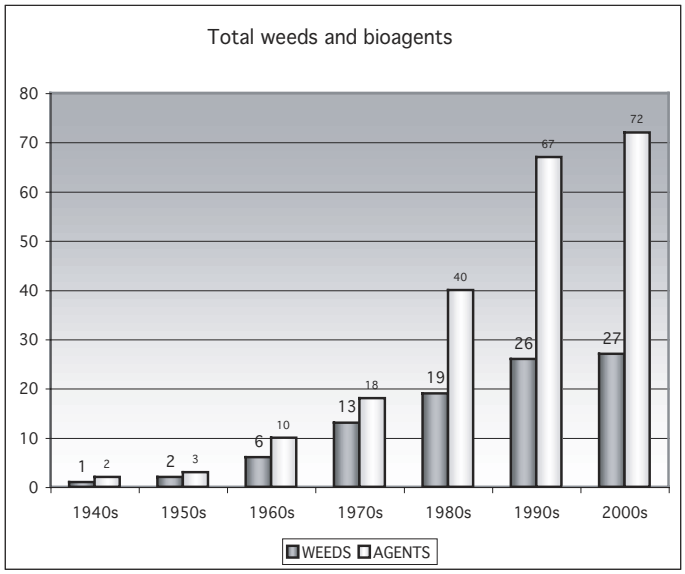
GPS data is accepted from many different cooperators. Currently WeedMapper maps are compiled from data from ODA, USFS, BLM, county weed programs, SWCDs, cities and non-profit groups such as weed working groups. Cooperative Weed Management Areas are anticipated to provide additional information in the future. Data will also be accepted from the weed sighting report form after it is reviewed for completeness and reliability.

In November 2005 a presentation on WeedMapper was given at the Oregon Vegetation Management Association conference and a call for data was sent through the Oregon weed list-serve. Offers of data soon followed.

The response to the launch of WeedMapper has been overwhelmingly positive. Land managers report that it is a valuable tool and are eager to assist in its development by sharing what information they have.

Biological control

Since 1947, 72 species of classical biological control agents have been introduced against 27 species of noxious weeds. Several of these biocontrol agents have become reassociated with six additional species of weeds for which they were not originally introduced. ODA manages over 110 biocontrol projects (weed/agent combinations), the most of any state in the US. The ODA biocontrol database contains more than 11,400 records of biocontrol agent releases. Several biocontrol projects have been successful in controlling targeted weeds, including tansy ragwort, St. Johnswort, musk thistle, Mediterranean sage, purple loosestrife, yellow starthistle, and diffuse knapweed, especially at sites that are managed to improve competitive vegetation. ODA strives to adhere to the International Code of Best Practices for classical biological control of weeds in order to better implement a safer and more effective biocontrol program.



Cumulative number of weeds targeted and cumulative number of classical biological control agents released in Oregon by decade.

New releases and recoveries

Rush skeletonweed

The root boring moth *Bradyrrhoa gilveolella* was released in the Rivergate District of Multnomah County. This was the first release in Oregon. A batch of 200 eggs was transferred to plants in the field. The Nez Perce Biocontrol Center and University of Idaho provided laboratory stock for this experimental release to determine if the moth can adapt to plants and climate in Western Oregon. Additional releases (if available) will be made in 2006.

Salt cedar

The leaf beetle *Diorhabda elongata* was released in 2003 for the first time in Oregon. An experimental field cage release was made near Adrian, Malheur County, in conjunction with Dr. Tom Dudley, USDA-ARS. ODA agronomist Dan Sharratt is monitoring the project in cooperation with USDA-APHIS and BLM. The beetles were recovered in the cage in 2004, but a severe flash flood in late summer

destroyed the colony. Three additional releases were made in Malheur County in August of 2005, after meeting extensive pre-monitoring requirements set by US Fish and Wildlife Service. Additional releases from Lovelock, Nevada are planned for 2006.

Significant accomplishments

Biological agents were released at more than 108 sites in Oregon during 2005. Over 143 biocontrol sites were monitored to determine establishment and impact of biocontrol agents. The USDA biocontrol program, under the direction of Gary Brown, remains a very important partner in implementing biocontrol in Oregon. ODA and USDA typically supply surplus biocontrol agents to many local agencies and other states. The ODA program continues to work on cooperative research projects with Dr. Jeff Miller and Dr. Peter McEvoy and his staff at Oregon State University. The ODA biocontrol program also serves as the state level biological control of weeds data center for the US.

Dalmatian toadflax

The stem-boring weevil, *Mecinus janthinus*, has been recovered in several counties. This promising bioagent caused significant stand reductions at several sites in Oregon in 2005. Collection for redistribution in Oregon is expected to begin in 2006 and continue for several years.

Knapweeds

Large-scale collection and redistribution of the seed head weevils, *Larinus minutus, L. obtusus*, and *Bangasternus fausti*, have been made throughout Oregon on diffuse, spotted, and meadow knapweeds. The weevils have caused declines in diffuse knapweed density at several sites near Heppner and The Dalles. Despite resurgences associated with late rainfall at numerous sites in 2005, improved control is expected. The root boring moth *Pterolonche inspersa* was rediscovered near Mosier in 2005. The moth has been undetectable during the past five years. Additional research on collection and redistribution is planned for 2006.

Knotweed

Prerelease studies on Japanese knotweed and its allies were initiated at several sites in Oregon in cooperation with ODA. This study is necessary before any new agents can be released in Oregon. It was conducted by Dr. Fritzi Grevstad, University of Washington, funded by USFS, and is expected to continue in 2006.

Meadow knapweed

Experimental releases of the spotted knapweed seedhead weevil, *Larinus obtusus*, in 2001 proved successful in Douglas County. We began a cooperative program with OSU, USFS, and BLM, targeting meadow knapweed in western Oregon. Over 100 releases were made during the past four years. This is the first biocontrol agent that has shown any promise against this weed. The weevil was recovered for the first time in the Willamette valley in 2004.

Mediterranean sage

An ongoing cooperative study with Dr. Jeff Miller, OSU Department of Range Science, is studying the regional long-term impacts of the root/crown weevil *Phrydiuchus tau*. Many ODA release sites from 1970-1983 have shown significant control at sites now dominated by perennial grasses and shrubs. Results from regional studies will be submitted for publication in 2006.

Purple loosestrife

The *Galerucella* leaf beetles have reduced numerous infestations of purple loosestrife throughout Oregon by more than 90 percent. Cooperative biocontrol projects continued with USDA staff and Dr. Peter McEvoy of OSU to monitor and redistribute the biocontrol agents throughout the lower Columbia River area. Many purple loosestrife stands are declining following severe defoliation by the leaf beetles. A 10 acre stand of loosestrife was completely defoliated by leaf beetles within a few weeks at Horseshoe Lake, in Marion County. Tens of thousands of surplus beetles were provided to other states.

Tansy ragwort

In 2005, numerous sites in the Willamette Valley experienced a resurgence of tansy ragwort, especially in Marion County. Biocontrol agents were found at all of the recalcitrant infestations. Fewer ragwort rosettes were observed during fall of 2005, therefore the severe local outbreaks are expected to be short-lived. No livestock deaths associated with the 2005 outbreak have been reported to ODA.

Staff Entomologist, Eric Coombs, served as chief editor of *Biological Control of Invasive Plants in the United States* and authored several chapters, therein. It was published in late 2004. The Weed Program provided copies to numerous cooperators in 2005 as part of Weed Awareness Week.

Economic benefits

Classical biological control of weeds has a good safety record, but a somewhat scanty track record of documented economic benefits. Most of the funding for biocontrol projects is utilized during the foreign exploration, host specificity testing, and introduction phases, with little appropriated for long term efficacy studies. Reported benefit-cost ratios from around the world vary from 112:1 to 2:1. Biocontrol of tansy ragwort in Oregon yielded an 85 percent internal rate of return and a 15:1 benefit-cost ratio. On successful long-term projects, benefits can occur as steady stream returns, i.e., $5 million/ year for the ragwort project in Oregon, where annual agency expenditures on this weed are now less than $20,000 per year.

Where feasible, it is economically advantageous to implement biocontrol in order to reduce annual losses. By actively redistributing ragwort biocontrol agents, ODA accomplished a successful regional project 5-10 years sooner than by the natural spread of the insects, averting $25-$50 million in losses to agriculture.

A partially successful biocontrol project, i.e., one that reduces weed infestations by variable percentages over large areas, can provide a positive benefit-cost ratio, even though the degree of weed control may be less than desired. If biocontrol in Oregon reduced the top 12 weeds by 30 percent, annual losses could decrease by $20 million.

Section five—Plant Health

The Plant Health Section provides official field inspections and laboratory testing for Oregon's seed, nursery, and Christmas tree industries. This testing is required for shipment to interstate and international markets. The section'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 Section has responsibility 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.

In cooperation with USDA, the Plant Health Section 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.

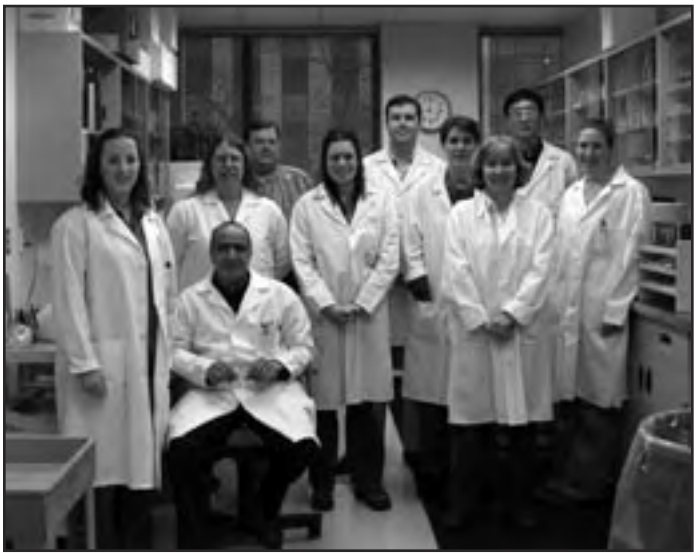
We are also active in helping to shape national policy on important pathogens such as *Phytophthora ramorum* and Potato Virus Y^n (necrotic strain). Staff scientists are regularly consulted by PPQ, and provide crucial input to national plant disease control efforts. Staff expertise is maintained and enhanced with an active research program that develops and publishes new diagnostic protocols for regulated and emerging plant pathogens.

Highlights

- In 2005, *P. ramorum* was detected in 21 nursery and related sites. Quick responses by the Plant Health and Nursery & Christmas Tree sections allowed for the eradication of *P. ramorum* from most of these sites. A few were identified late enough in the year that they will remain under federal regulation into early 2006. Eradication efforts in Curry County continue.
- Blackberry rust, an exotic fungal disease, was discovered infecting wild Himalaya and commercially grown evergreen blackberries in Western Oregon. Plant Health and Noxious Weed Control staff worked together to identify the rust and the extent of the infestation.
- The number of seed lots tested for export phytosanitary certification rose 4 percent in 2005. The number of requests for seed field inspections rose 7 percent. Participants in the blueberry virus testing program grew 44 percent from last year.
- Plant Health continued to revise rules in 2005. Most notably, the control area order for *Allium* white rot in central Oregon, our main production area, was repealed in favor of a statewide White Rot of Vegetative *Allium* Seed Certification program.
- The section went through staff changes. Cindy Fraley was promoted to Certification Specialist within the section. Robin Ludy took over Cindy's Natural Resource Specialist (NRS 2) position working with Dr. Xiangqi (Shawn) Meng. Beverly Clark, NRS 2 working with Dr. Mohamed (Sid) Sedegui, was promoted to Nursery Inspector. Melissa Austin was hired to replace Bev. Rebecca Tippner-Hedges (NRS 1) also joined our staff to work with Dr. Sedegui. For the first time in more than two years, the Plant Health Section was at full staff.

With this dramatically increased workload, the staff managed to sustain the high level of competence expected of our section, maintaining a remarkably low laboratory test error rate of 0.08 percent. It is a privilege to serve with such an exceptional and dedicated group. Thank you for all your hard work.

Nancy K. Osterbauer, Ph.D.
Senior Plant Pathologist



Current Plant Health Section staff. Seated: Sid Sedegui. First row: Melissa Austin, Cindy Fraley, Rebecca Tippner-Hedges, Nancy Osterbauer, Robin Ludy, Erika Berghauer. Second row: Steve Finch, Aaron Trippe, Shawn Meng.

Eradication programs

Phytophthora ramorum

Phytophthora ramorum, the cause of sudden oak death (SOD) and related diseases, was first discovered in Curry County, Oregon in 2001. Since then, the ODA, Oregon Department of Forestry (ODF), USDA Forest Service, Oregon State University, and the affected landowners have been trying to eradicate the pathogen from the infected forest areas. Since 2001, a total of 88 acres (including 2005 data) have been treated for the disease. Treatment consists of cutting, piling, and burning host plants within each infection center and asymptomatic hosts within 50- to 100-feet of each infection center. Tan oak stumps are also treated to prevent re-sprouting. The sites have been monitored periodically since being treated. Surveys in and around the sites showed that the treatments effectively limited the spread of the pathogen on most sites and apparently eliminated it on others including a site (1.4 acres) that has remained free of *P. ramorum* for two years post-treatment. Of the 951 samples collected within the sites in 2005, two soil samples from one site were positive for the pathogen, post-treatment. The eradication and monitoring efforts will continue in 2006.

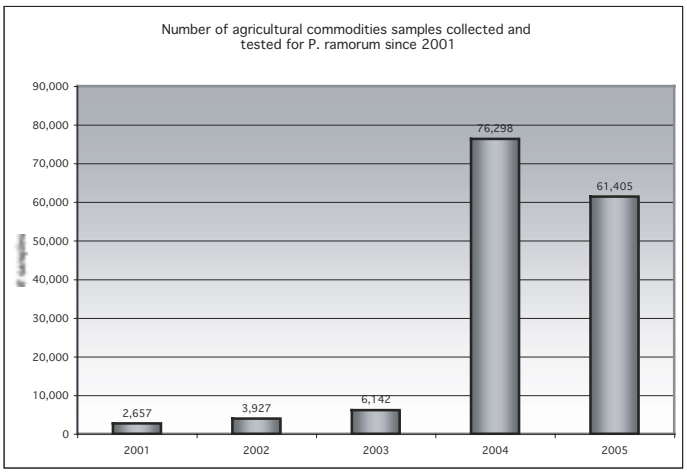
In 2005, aerial, ground, and stream surveys for *P. ramorum* were conducted in southwestern Oregon. The ODF led this effort with cooperation from the other agencies. The aerial survey covered 1.16 million acres. All dead tan oaks identified from the air were then checked on the ground. Ground checking of those suspicious trees identified another 18 acres (including expansion of nine previously identified sites) that required treatment for *P. ramorum*. Stream surveys were conducted on waterways within and outside of the quarantine area. Four stream positives were found; one within the quarantine area and three outside. Two infected tan oaks were found associated with one of the streams outside the quarantine area. The remaining two streams and surrounding flora continue to be intensively monitored. These findings will lead to an expansion of the quarantine area in 2006. All positive sites were treated as described above. The sites will be monitored for the pathogen for the next two years. If *P. ramorum* is not detected during that time, the pathogen will be declared eradicated.

On December 21, 2004, the USDA adopted a federal order requiring that all West Coast nurseries shipping plants interstate be surveyed for *P. ramorum*. Nurseries growing plants susceptible to *P. ramorum* (host nurseries) had to be visually surveyed for suspicious symptoms and a minimum number of samples collected for testing in the laboratory using USDA-approved methods. Nurseries growing non-host plants had to be visually surveyed as well. However, samples were collected only if suspicious symptoms were found. Nurseries found to be *P. ramorum*-free then had to enter into a Federal compliance agreement in order to ship interstate (see related article in the Nursery & Christmas tree Section).

ODA staff collected 51,645 samples from 1,021 host and 13 non-host nursery growing areas to test for the presence of *P. ramorum* using the USDA-approved ELISA and nested PCR tests. The USDA requires that all nested PCR-positive samples be sent to their laboratory for official confirmation. Phytophthora species were detected at 156 (15 percent) and *P. ramorum* at eight (<1 percent) of the sites surveyed. The USDA Confirmed Nursery Protocol was enacted at the eight sites. All eight have completed the protocol. Seven hundred ninety-six host nurseries and 1,028 non-host nurseries have entered into federal compliance agreements and are eligible to ship plants interstate.

In May 2005, the ODA surveyed Christmas tree plantations planted in *Abies spp.* and *Pseudotsuga menziesii* for *P. ramorum*. Plantations in 22 counties were surveyed. The number of plantations surveyed in each county varied depending upon the total acreage of Christmas trees grown within the county. A total of 103 plantations were visually inspected according to the standards of the 2005 USDA National Survey Protocol for *P. ramorum*, with 4,170 samples collected for testing as described above. *P. ramorum* was not detected in any of the samples, nor was any other Phytophthora. This is the fourth consecutive year that no *P. ramorum* has been found in Oregon Christmas tree plantations.

Throughout the state, the ODA surveyed retail nurseries that sell plants susceptible to *P. ramorum*. One hundred thirty-six retail nurseries were visually inspected according to the standards of the 2005 USDA National Survey Protocol, with 5,590 samples collected for testing as described above. Phytophthora species were detected at 24 (18 percent) and *P. ramorum* at four (3 percent) of the sites surveyed. The USDA Confirmed Nursery Protocol was enacted at the four sites. One nursery has yet to complete the requirements of the USDA protocol.



In addition to the agricultural commodities surveys described above, the ODA has completed trace-out investigations to both nursery and landscape sites. Three hundred twenty-six sites have been surveyed with 9,060 samples collected for testing as described above. Phytophthora species have been detected at 25 sites (8 percent) and *P. ramorum* at nine sites (3 percent). Of the nine positive sites, three were nursery and six were landscape. The USDA Confirmed Nursery and Confirmed Residential and Landscape protocols were enacted at the nine sites as appropriate. Two landscape sites and two nurseries have yet to complete the requirements of the USDA eradication protocols.

Based on the nursery surveys and trace out investigations described above, a total of 21 nursery and landscape sites were infected with *P. ramorum* in 2005 and the appropriate USDA eradication protocol enacted at each site. ODA staff collected and tested a total of 18,790 samples to meet the requirements of the USDA eradication protocol.

ODA staff also surveyed 10 shipments of nursery stock for *P. ramorum*, collecting 170 samples for laboratory testing. No *P. ramorum* was detected. The ODA, in cooperation with ODF, also conducted enhanced perimeter (forest) surveys around the 21 infected nursery and landscape sites according to the USDA Forest Service National Survey Protocol. Of the 53 samples collected for testing, none were infected with *P. ramorum*.

Survey results were posted in the National Agricultural Pest Information System (NAPIS).

Certification and survey programs

Blackberry rust

In 2005, blackberry rust caused by the exotic fungus *Phragmidium violaceum* was identified for the first time infecting wild Himalaya and commercially grown evergreen blackberries in western Oregon. This rust forms several spore types on susceptible blackberries. The spores infect the flower buds, leaves and stems of the primocanes and floricanes. Foliar symptoms include circular purplish leaf spots with yellow to tan centers on the upper leaf surface accompanied by yellowish-orange pustules on the lower leaf surface. Pustules may also form on the flower buds and canes. Continuous defoliation as well as stem infections by the pathogen may cause cane dieback. Black pustules develop in the late summer/early fall on infected leaves. The rust has been officially identified in 16 counties in western Oregon indicating the disease is established in the state. (See related article in the Noxious Weed Section).

Blackberry rust infecting the blossoms, leaves, and canes of Himalaya blackberry.

Columbia root-knot nematode

Nursery Program staff collected 90 nematode samples from Oregon production nurseries in 2005. Plant-parasitic nematodes were detected in 70 percent of the samples with *Pratylenchus* spp. being the most abundant (present in 57 percent of the samples). Meloidogyne species were detected in four samples. No Columbia root-knot nematodes (*M. chitwoodii,* CRKN) were detected in Oregon nurseries based on morphometric analysis of juveniles. This annual survey is conducted at the request of Canadian agricultural officials to demonstrate that Oregon production nurseries are free of CRKN.

Region-wide nematode survey

Staff members collected 132 nematode field samples from Oregon alfalfa, bean, beet, cabbage, carrot, chicory, corn, garlic, mint, onion, pea, potato, radish, sorghum, spinach, and Swiss chard fields. Plant parasitic nematodes were detected in 76 percent of the samples with *Pratylenchus spp*. and *Paratylenchus spp*. being the most abundant (present in 70 percent and 22 percent of the samples, respectively). Other plant parasitic nematodes detected included *Tylenchorynchus, Meloidogyne, Helicotylenchus, Ditylenchus, Heterodera, Mesocriconema, Trichodorus,* and *Rotylenchus*. *Meloidogyne chitwoodii* was detected in potato fields in three counties: Klamath (two fields), Baker (one field), and Morrow (two fields). Results were posted in NAPIS.

Allium white rot

In 2005, the ODA adopted rules for White Rot Certification of Vegetative *Allium* Seed to replace the control area order (CAO) for central Oregon. The CAO, which included quarantine language, was repealed because the disease is established in central Oregon and the certification program adopted because a vegetative *Allium* seed industry still exists in that part of the state. Department staff inspected 47 fields (1,563 acres) of garlic and onion for the presence of white rot, *Sclerotium cepivorum*, in central and eastern Oregon. The inspection is a 100 percent inspection, designed to find single strikes of white rot. All fields inspected were found to be free of the pathogen and received certification documents.

Mint Verticillium wilt

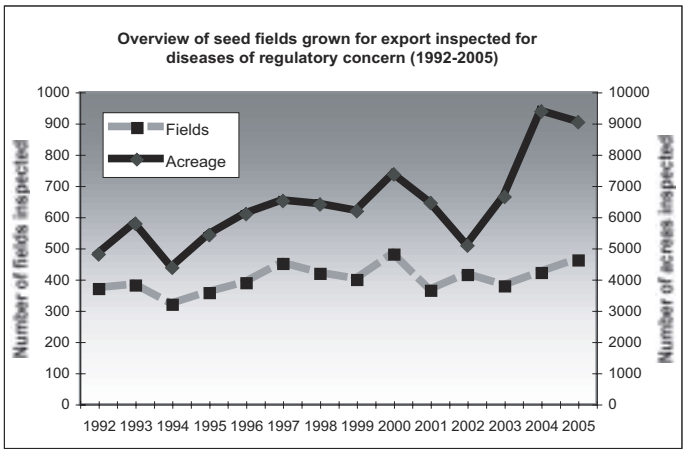
The Plant Division offers a mint rootstock field inspection service to detect *Verticillium* species in established control areas. Under the provisions of the control area order, any fields confirmed as *V. dahliae*-positive cannot be used as a rootstock source. Mint growers in Union County submitted requests to inspect 10 fields. Growers in Klamath County submitted requests to inspect three fields. The total acreage inspected was 382. *Verticillium* species was detected in two fields in 2005.

Potato late blight

Staff from ODA's Commodity Inspection and Plant divisions conducted field surveys for potato late blight fungus, *Phytophthora infestans*, in northeast, south-central, western, and northwest Oregon. A total of 71 fields and 5,924 acres were inspected in 2005. The most common varieties inspected included Russet Norkotah and Yukon Gold. No potato late blight was found.

Seed field inspections

Staff from Plant Health inspected 463 seed fields (9,030 acres) for the presence of seed-borne or seed associated pathogens of concern in 2005. This represents a 7 percent increase in the number of seed fields surveyed from the previous year. Inspectors surveyed for the presence of 100 different pathogens of concern on 26 different host crops. Surveys found 149 seed fields with at least one disease of concern. The majority of fields (68 percent) were free from disease. The most common pathogens observed were *Xanthomonas campestris* pv. *carotae* causing bacterial blight of carrot, *Erwinia carotovora* subsp. *carotovora* causing soft rot of carrot, *Botrytis porri* causing neck rot of onion and garlic, *Sclerotinia sclerotiorum* causing stem rot of cabbage, and *Ustilago maydis* causing common smut of corn.



Onion smut survey

In July 2005, 14 onion fields in Morrow and Umatilla counties (698 acres representing 14 percent of the planted acreage) were surveyed for onion smut caused by *Urocystis cepulae*. No onion smut was identified in these fields. This survey was requested for fresh onion export to Australia and will be continued in 2006.

Chrysanthemum white rust

In 2005, a survey was conducted for chrysanthemum white rust (CWR), caused by *Puccinia horiana*. Three thousand one hundred fifty-four plants grown by 21 hobbyists were visually inspected in the spring and/or fall for the disease and suspicious plants brought back to the laboratory for official confirmation. No CWR was found. This is the first official detection survey for CWR in Oregon since 2001.

Karnal bunt

Karnal bunt, *Tilletia indica*, is a fungal disease of wheat. After its discovery in Arizona, many countries implemented quarantines to prevent the introduction of this disease. In response to those quarantines, Oregon began participating in a national survey program that certifies wheat as free from Karnal bunt. Oregon has participated in this program since 1996 and has never found Karnal bunt. In 2005, 36 samples were obtained from 12 counties that produced commercial quantities of wheat and were sent to the federal testing laboratory in Texas for processing. Karnal bunt spores were not found in any of the wheat samples examined.

Virus certification of nursery stock

Twenty-three nurseries participated in the fruit and ornamental tree virus certification program in 2005. *Malus* spp., *Prunus* spp., *Pyrus* spp. and *Cydonia* spp. are included in the testing program. This year, 3,452 individual *Prunus* mother (scion) trees and 8,363 *Malus* spp., *Pyrus* spp., and *Cydonia* spp. individual trees were tested for Tomato ring spot virus, Prune dwarf virus (PDV), and Prunus necrotic ring spot virus (PNRSV) using ELISA. PDV was detected in 90 trees and PNRSV in 44 trees. A summary of the virus-free varieties grown by each nursery is sent yearly to state, federal, and Canadian officials to facilitate the movement of the nursery's products.

We are beginning the second year of a survey for apple chlorotic leaf spot virus (ACLSV). This virus was added because of a new quarantine requirement imposed by the Washington State Department of Agriculture (WSDA) and to comply with Canadian and Mexican regulations for the import of plant material from the USA. This survey is conducted in the fall due to higher levels of the virus in dormant buds. As of the end of the year, we had collected and tested 1,329 field samples of *Malus* and *Pyrus* rootstock and stool bed materials using diagnostic techniques and sampling procedures required by WSDA. One hundred six samples were positive for ACLSV.

Blueberry virus testing

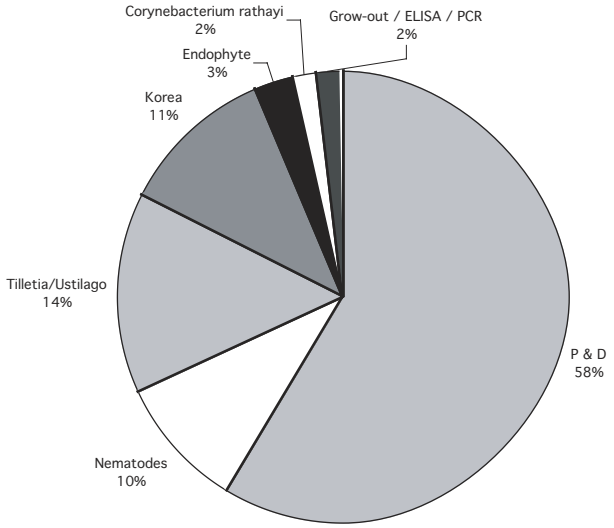
Nine nurseries participated in the testing program for blueberry scorch Carlavirus (BlScV) and blueberry shock Ilarvirus (BlShV) in 2005. The testing is done at the request of nurseries to comply with the regulatory requirements of other states and countries. A total of 18,601 samples were collected by nursery inspectors and submitted to the laboratory for testing. BlShV was detected in 135 field samples from one nursery using ELISA.

Potato virus Y

The USDA Animal & Plant Health Inspection Service (APHIS) and the Canadian Food Inspection Agency entered into an agreement to survey all potato-growing states for Potato Virus Y (PVY) and its variant PVY^N (necrotic strain). We are entering the second year of the survey. The USDA is requiring random testing of field-grown potatoes from lots fourth generation or higher. The department, with the help of the Oregon State University Seed Certification Program, identified and tested 3,503 tubers collected in 2004. Another 901 tubers from Washington were also tested. PVY was detected in 13 percent of all tubers tested (based on two tubers/test) and PVY^N in 0.2 percent (one tuber/test). PVY- and PVY^N-infected tubers were found in both Oregon and Washington. The ODA anticipates testing about 1,500 tubers from both states in 2005-2006.

Laboratory grass seed testing

In 2005, Plant Health staff conducted more than 7,000 laboratory tests to detect specific seed-borne fungi, bacteria, nematodes, viruses, pests, diseases, and other miscellaneous problems. A total of 3,804 seed lots of more than 15 different crops were tested. There were 3,804 tests conducted for pest and disease plus soil and an approximately equivalent number of other miscellaneous detection tests conducted. Two hundred ninety-four seed lots out of 3,804 tested were positive according to approved testing protocols for one or more pathogens of regulatory concern or for other problems. These tests were requested by Oregon seed producers to meet the phytosanitary requirements of their foreign customers.



Percent of different tests performed

Endophyte testing

In 2005, the Plant Health Laboratory received 175 seed lots of forage grass seed varieties to be tested for the presence of the endophyte fungus, *Epichloe* sp. The endophyte fungus produces alkaloids that can be toxic to livestock. This year, the section switched to a new, more reliable testing technique based on immunoblotting. To qualify for an endophyte tag, no more than 5 percent of the seeds in a lot can be infected. Fourteen seed lots out of 175 tested positive, with more than 5 percent of seeds infected.

Dutch elm disease

Dutch elm disease, a deadly tree disease caused by the fungi *Ophiostoma novo-ulmi*, and *O. ulmi*, has been found in Oregon's Willamette Valley. It was first detected in 1978 in Portland. Its normally rapid spread has been slowed by a diligent survey and eradication program supported by a state quarantine. In 2005, 45 out of 52 samples submitted to the laboratory were infected. Two infected trees were removed in Corvallis as were 43 infected trees in Portland in an effort to slow the spread to other, currently healthy elm trees in the immediate area.

General diagnostic tests

The Plant Health Laboratory provides a general diagnostic service for the nursery industry, various governmental agencies, licensed landscapers, and other customers. Many tests are conducted in addition to those required by specific survey and certification programs. The laboratory activities related to certification programs are summarized elsewhere.

This year the Plant Health Laboratory performed 273 general diagnostic and nursery tests. Tests performed included screening for nematodes (mist chamber and sucrose filtration), fungi and bacteria (microscope and media), and visual analysis for pests and abiotic problems. Plant pathogens were found associated with 56 percent of the samples tested. Nematodes (32 percent) and fungi (12 percent) were recovered the most often. Other plant pathogens recorded included bacteria (4 percent) and viruses (less than 1 percent). No phytoplasmas or parasitic plants were detected in the samples for 2005. Of the other plant disorders, abiotic symptoms comprised 6 percent, while insects accounted for 1 percent. No pathogens were found on 37 percent of the samples.

Permits for genetically modified organisms

ODA does not have specific regulations for transgenic organisms, but we cooperate with USDA in their permit process. In 2005, 33 notifications and permits for transgenic plants were reviewed by ODA. Nine different crops and one bacterium were modified for a wide variety of traits (see table). The notifications and permits were reviewed to ensure that the transport and/or growth of the transgenic organisms would not violate any existing state quarantines and control area orders and would not pose a significant risk to Oregon agriculture. Along with USDA officials, ODA representatives also inspected the research sites of several transgenic permit and/or notification holders.

Crop species genetically modified, number of applications, and traits added in 2005

Crop/other	No. of applications	Trait added*
Canola	3	HR
Corn	4	IR, AP, HR, FR, MG, OO, PQ, HT
Creeping bentgrass	3	HR, AP, MG
Kentucky bluegrass	1	AP, HR
Poplar	10	MG, HT, AP, OO, PQ
Soybean	4	AP, PQ, HR, FR, MG, IR, OO, NR, BR
Sugarbeet	6	HT, HR
Sweetgum	1	OO
Agrobacterium tumefaciens	1	AP

*HR=herbicide resistant, IR=insect resistant, AP=agronomic properties, FR=fungus resistant, MG=marker gene, OO=other, PQ=product quality, HT=heat tolerant, NR=nematode resistant, and BR=bacteria resistant.

Quarantines and control area orders

Staff reviewed Plant Health Section quarantines and control area orders (CAO) to determine if the rules needed to be updated or repealed. This process began in 2003 and resulted in the repeal of several inactive or ineffectual quarantines and CAOs. In 2005, the Dutch elm disease, peach rosette phytoplasma, *Phytophthora ramorum* and peach yellows quarantines were updated to reflect new information about the pathogens and their known distribution. The bean disease CAO for Malheur County was updated to add new pathogens and to mirror a complementary rule in Idaho. The *P. ramorum* regulated area for nursery stock was updated to reflect changes in the federal regulations for this pathogen. The control area order for *Allium* white rot in central Oregon was repealed in favor of a statewide white rot of vegetative *Allium* seed certification program.

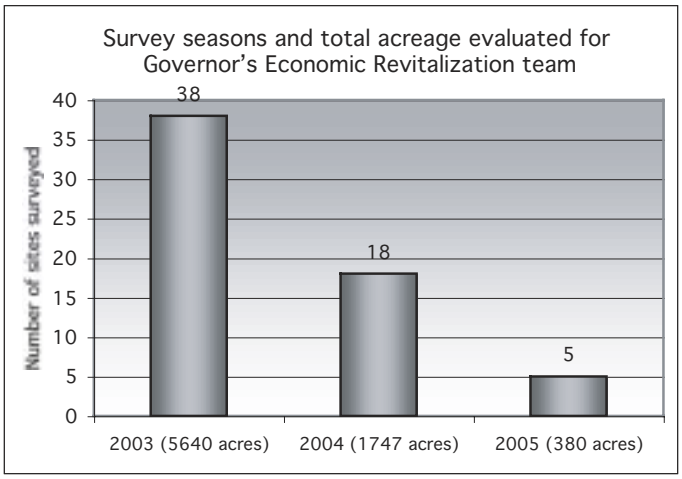
Section six—Native Plant Conservation Program

The Native Plant Conservation Program (NPCP) at ODA emphasizes conservation and protection of naturally occurring plant species in Oregon. Developed in 1987, the NPCP focuses on (1) developing conservation plans for state-protected species; (2) reviewing research and commercial activities associated with listed species on state lands; (3) providing support to state and local agencies (and the general public) in dealing with native plant protection issues required by federal and state law; and (4) reviewing and commenting on federal regulations regarding listing and conservation decisions for Oregon plants under the Endangered Species Act (ESA).

NPCP staff (OSU and ODA): Upper, left to right: Bob Meinke (Program Lead); Liz Martin (OSU graduate student); Troy Maddux (ODA staff); Ian Silvernail (OSU graduate student). Below, left to right: Stephen Meyers (OSU graduate student); Rebecca Currin (ODA staff); Kelly Amsberry (ODA staff).

Special projects in 2005

ODA field botanists continued working on clearance projects in 2005 that support state programs for improving Oregon's economic outlook. In the late spring and summer, NPCP leader Bob Meinke and staff once again were on temporary special assignment for the Governor's Economic Revitalization Team, reviewing the environmental quality of publicly-owned industrial sites across the state. In the last three years, ODA botanists have completed 70 detailed site surveys in support of this program. With each successive year, the numbers of parcels and acres to be surveyed have become fewer, as ODA has helped significantly reduce the backlog of public properties awaiting clearance under state environmental regulations.

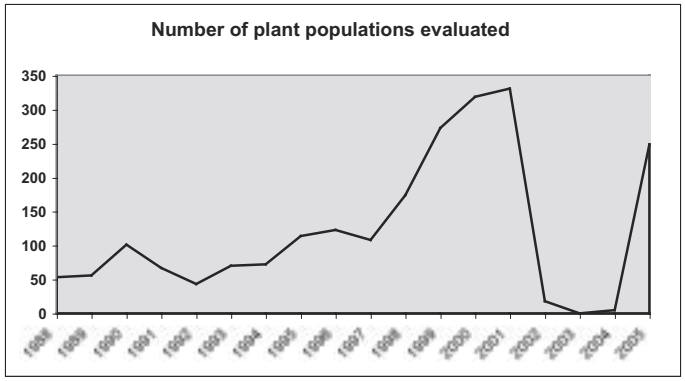


The 2005 sites, ranging from 30 to nearly 300 acres in size, are considered prime prospects for development and (as in 2003 and 2004) are largely located in economically challenged areas. The sites were thoroughly assessed by ODA staff for the presence of sensitive biological resources, particularly endangered plant species, as part of the clearance process. No protected species were found in 2005, and the sites were cleared for development by the end of the summer.

Collaborative outreach

NPCP staff collaborated with OSU, US Fish and Wildlife Service, and the California Department of Fish and Game in a program designed to develop conservation plans for several native species in the economically important legume family from Oregon and California. Species of special conservation concern in both states were evaluated by OSU staff and students, in consultation with ODA botanists who had previously worked with these plants in arid regions of eastern Oregon. Legumes include beans, peas, alfalfa, and other key species, and many wild members of this group are being increasingly investigated as crop and forage alternatives. NPCP staff also served as advisors to the Oregon Department of Fish and Wildlife in 2005, helping to prepare a state-wide plan (sponsored by the federal government) describing the conservation status of Oregon's native animal and plant resources. NPCP staff will serve on an interagency team that will evaluate the plan as it is implemented in 2006.

Section six—Native Plant Conservation Program



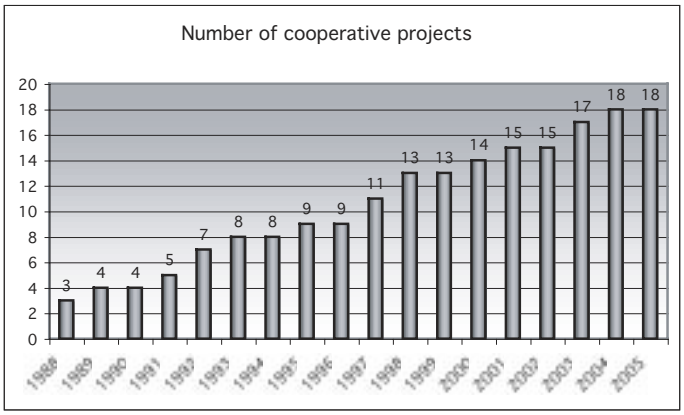
Five-year status review

Oregon law requires ODA to reassess the protective status of species listed as endangered or threatened at least every five years. A key component of this process is an annual field survey program, where known populations of the 58 protected plant species in Oregon are revisited and measured to determine their relative health and vigor, as well as their need for continued listing. After a brief hiatus due to budget reductions, populations were once again evaluated by NPCP staff in 2005, with a goal for 2006 of making necessary adjustments to the state list of endangered and threatened plants. Since 1988, the NPCP has conducted 2,162 on-site monitoring evaluations of listed plant species populations in Oregon.

Measure 66 initiatives

Lottery funds made available through Measure 66 were received in 2005 for use in native plant and vegetation restoration projects. Projects that were initiated in latter 2005 (and which will be continued throughout the 2005-07 biennium) include the following:

- Improving habitat and riparian areas in the Calapooya Creek watershed for federally listed species through outplanting and exotic brush removal. This is a cooperative project with USFWS and DSWCD oriented towards habitat restoration in the Sutherlin area;
- Completion of a series of upland rehabilitation projects in partnership with the City of Jacksonville, BLM, the Herbert Stone Nursery (US Forest Service), and OSU, to reduce or eliminate extensive weed populations (and replacing them with native shrubs, forbs, and grasses), with the intent of improving the overall condition of selected slopes along the Jackson Creek drainage;
- A cooperative project including BLM, USFWS, and others in Douglas County east of Wilbur, focusing on weed management, grazing, native plant restoration efforts, and hydrologic modifications designed to improve and maintain sensitive habitats in the North Umpqua watershed;
- A joint project with Roseburg BLM District to establish control techniques for pennyroyal (mint family), a recently introduced, aggressive weed invading western Oregon wetlands and marshes;
- Restoration of native semaphore grass populations, a rare meadow grass with forage potential, was continued in 2005 in riparian areas of Lake and Grant counties. After initial field work in 2004 and 2005, ODA began tiller production in late 2005 for use in outplanting efforts over the next two years. This is part of a cooperative partnership with the Burns Paiute Tribe, the BLM, and USFWS; and
- A cooperative project to collect and cultivate seed and bulbs of several native species for restoration efforts in various state watersheds. Areas where these plant materials will be used include Jackson County (Jackson Creek watershed); Baker County (Powder River Valley); Josephine County (Illinois River drainage); and Deschutes County (lodgepole pine forests south of La Pine).



Cooperative conservation efforts

Finally, NPCP staff continued to work on a wide array of cooperative projects in 2005, with a total of 191 major plant conservation initiatives now completed or in progress since the inception of the program in 1988. Projects have been completed in 32 Oregon counties. In 2005, NPCP staff worked directly with federal and state agencies, universities, and private organizations on 18 field-oriented and other conservation ventures. These projects, largely supported through external grants, provide important opportunities to improve state plant conservation efforts in many areas, and

allow ODA to provide management input for endangered species on federal and state lands. Notable was the renewal of the Section 6 agreement between ODA and the federal government, which under the provisions of the Endangered Species Act, greatly facilitates recovery actions and status evaluations of federally-protected species in Oregon by ODA staff. Projects of note that were initiated in 2005 include:

- Developing a weed management plan and maintaining a cultivation facility for the federally-listed Gentner's fritillary (lily family) in the Jacksonville area;
- Monitoring and recovery work, conducted jointly with Baker County and NRCS staff, of native greasewood habitat and remaining populations of Howell's thelypody, a nearly extinct member of the mustard family found only in isolated pockets of northeast Oregon; and
- Working with ODOT to develop a management plan for Cook's desert parsley, a federally protected species occurring along state and county highways in Josephine County.

Gentner's fritillary, a federally-protected member of the lily family, which will directly benefit from the habitat improvement work underway in Jackson County.

A degraded slope above Jacksonville in southwest Oregon, with ODA staff and city volunteers removing yellow starthistle and replanting local native shrubs and trees, including ponderosa pine, buckbrush, madrone, and oak.

Kelly Amsberry (ODA) and Dave Speten (Burns Paiute Tribe) measure recent outplantings of Oregon semaphore-grass, a native species from eastern Oregon marshes being evaluated for use in meadow and riparian improvement projects.

Section six—Native Plant Conservation Program

Site of a cooperative weed suppression and native plant re-introduction project in the North Umpqua watershed (Douglas County), coordinated by ODA and involving DSWCD, Roseburg BLM, and US Fish & Wildlife Service.

Alan Bahn (NRCS), examines native outplantings near the Powder River (a cooperative project between ODA, US Fish & Wildlife Service, Baker County, and NRCS), designed to reduce the impact of weeds and improve habitat for native, salt-tolerant forb species.

Pennyroyal, an invasive weed now affecting thousands of acres of natural wetlands in Western Oregon, is the subject of an ODA pilot project (in cooperation with the Roseburg BLM District) designed to reduce the spread and impact of this aggressive species.

Section seven—Miscellaneous

Employee training

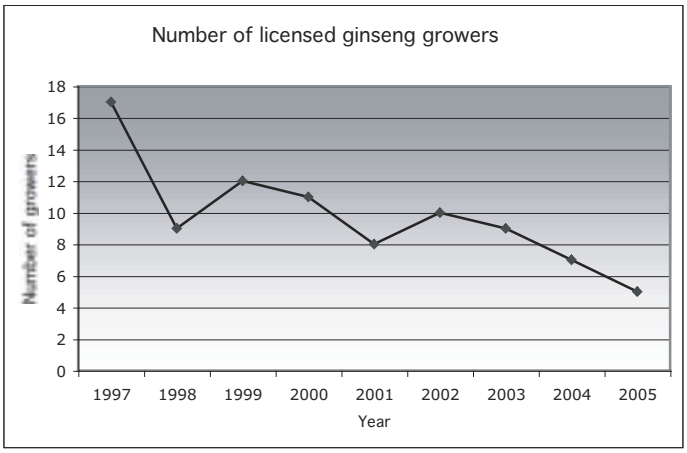
Staff members have taken advantage of a variety of training opportunities such as: SAIFer driving, export certification, ICS 100, 200 & 700, administrative rules, pesticide applicator and consultant licensing, and meth alert (warning signs). In addition, staff have attended a variety of professional society meetings including the Oregon Vegetation Management Association, CAPS, Entomological Society of America, Western Horticultural Inspectors Society, and Western Plant Board. Employee training, continuing education and career development remain a high priorities of the Plant Division

Oregon Invasive Species Council

Plant Division Administrator, Dan Hilburn, has served on the Oregon Invasive Species Council since it was created in 2002. Shannon Brubaker, our Office Manager, provides administrative support for the council. Information about the council and its activities in 2005 is available online in the council's annual report card: <oregon.gov/OISC>

Ginseng

Since 1997, the Plant Division has administered a small Ginseng Management Program. The purpose of the program is to allow Oregon-grown, cultivated ginseng to be certified for export. Licensed growers are supplied with certificates of origin and can self-certify their ginseng crop. Though, the number of licensees has shrunk to only a handful in recent years and we have not been able to fill seats on the Ginseng Advisory Committee, we will continue to provide service to the growers that need it



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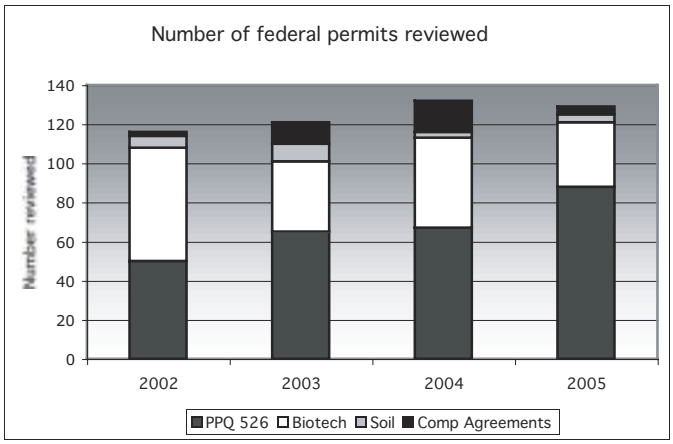
ODA Plant Division Web page

In 2005, the Plant Division Web page was maintained and updated by a team of five staff members; Kerri Schwarz, Jo Davis, Bonnie Rasmussen, Lisa Rehms, and Shannon Brubaker. The team continued efforts toward migration to the new <oregon.gov> format, added new pages and continued looking for new ways to bring our programs to the public. Also, in 2005 Shannon Brubaker took on the added responsibility of content management for the Oregon Invasive Species Council <oregon.gov/OISC>. There are many new and exciting ideas to be implemented in 2006. Stay tuned.

Federal permits and compliance agreements

In 2005, Plant Division staff reviewed 88 PPQ 526 applications to import live plant pests or noxious weeds. Seventeen of those applications were for butterflies. Four permits to import soil and four federal compliance agreements were also reviewed. Thirty-three biotech permits or notifications for genetically modified crops were also reviewed.



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