

# Horticultural Crops Research Unit, Corvallis, Oregon



The mission of the Horticultural Crops Research Unit is to develop fundamental information on pathology, insect pests, physiology, genetics, and production of horticultural crops. Our emphasis is on small fruit and nursery crops grown in the Pacific Northwest of the United States. Our research focuses on (1) biology and management of plant diseases and insect pests; (2) plant growth and physiology; (3) germplasm evaluation and genetic improvement; and (4) development of improved horticultural practices.



RBDV

**Bob Martin, Research Leader, Research Plant Pathologist.**  
**Subject Area: Characterization, identification and control of viruses in small fruit crops**

**Contact: (541) 738-4041, bob.martin@ars.usda.gov**  
Bob's research focus is on the characterization, development of diagnostics, detection and control of virus diseases of small fruit crops. In many cases, virus diseases of berry crops are caused by virus complexes rather than by individual viruses. It is often not necessary to control all the viruses in a complex to control the disease. Identification of the critical viruses that lead to disease, the viruses in a complex that are easiest to manage and epidemiological studies of each virus are required to control disease in the field. Control strategies include production of virus-tested plants, identification and management of the vectors for one or more of the critical viruses in a complex that lead to disease. In nurseries all viruses need to be controlled.



Coho

**Chad Finn, Research Geneticist**

**Subject Area: Cultivar development and germplasm research in blackberry, red and black raspberry, blueberry and strawberry**  
**Contact: (541) 738-4037, chad.finn@ars.usda.gov**

Chad's research program has two broad, overlapping goals.  
-to develop cultivars of blackberry, red and black raspberry, blueberry and strawberry, primarily for the commercial industry.  
-to collect and evaluate *Rubus*, *Vaccinium*, and *Fragaria* germplasm from around the world, and, as appropriate, incorporate into breeding material.



Global migration of *Phytophthora ramorum* clones

**Niklaus Grunwald, Research Plant Pathologist**  
**Subject Area: Biology and control of *Phytophthora* pathogens in nursery and small fruit crops**

**Contact: (541) 738-4049, nik.gunwald@ars.usda.gov**  
Nik's research focus is on the biology and control of *Phytophthora* diseases affecting horticultural crops with particular emphasis on the Sudden Oak Death pathogen, *Phytophthora ramorum*. *P. ramorum* is a devastating exotic pathogen of many forest and nursery crops. Specific research objectives include: 1. Characterize epidemiology and genetics of *Phytophthora* spp. affecting nursery crops; 2. Functional genomics of *P. ramorum*; and 3. Integrate cultural, biological, and chemical control methods for management of *Phytophthora* diseases.



Blueberries irrigated by drip

**David Bryla, Research Horticulturist**  
**Subject Area: Physiology and production of small fruit crops**  
**Contact: (541) 738-4094, david.bryla@ars.usda.gov**

David's research focuses on irrigation and nutrient management in small fruit crops. The goal is identify practices that increase plant growth and yield potential; enhance fruit quality and food safety; promote efficient use of water, fertilizer, and soil resources; reduce problems caused by plant pests and diseases; and limit labor requirements associated with pruning, weeding, and harvest. A few of his current projects include irrigation methods for reducing *Phytophthora* root rot in red raspberry; weed, water, and nutrient management practices for organic blackberry production; design and management of fertigation systems for highbush blueberry; and sprinkler frost protection in cranberry.



Under Shelters Without Shelters  
Control of Bacterial Blight on Lilac

**Joyce Loper, Research Plant Pathologist**  
**Subject Area: Molecular Mechanisms of Biological Control of Plant Disease**

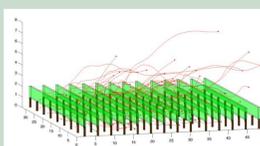
**Contact: (541) 738-4057, joyce.loper@ars.usda.gov**  
Joyce's research group works on two distinct groups of bacteria: those that cause diseases of horticultural crops and those that suppress plant disease. We focus on *Pseudomonas*, a diverse genus that includes plant pathogens, such as *Pseudomonas syringae*, and many other species including some strains that function as biological control agents. We use a combination of approaches from genomics, molecular biology, population biology, and plant pathology to identify mechanisms underpinning biological control and seek improved methods for disease management.



Rhododendron

**Carolyn Scagel, Research Plant Physiologist**  
**Subject Area: Physiology**

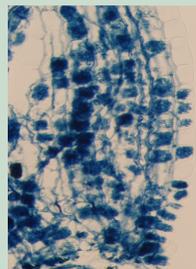
**Contact: (541) 738-4063, carolyn.scagel@ars.usda.gov**  
Carolyn's program investigates the influence of nutrition, hormone status, and root-associated organisms on root growth, productivity, and quality of small fruit crops. This research has three primary objectives: 1) Describe critical environmental aspects influencing regulation of fertilizer use and nutrition of woody ornamentals, 2) Characterize changes in plant metabolism associated with water use, cold hardiness, and adventitious root formation, and 3) Investigate physiological roles of mycorrhizal fungi on root initiation and growth, and nutrient use efficiency.



3D spore dispersion from a turbulence resolving numerical simulation of a vineyard (Baily et al 2010).

**Walter Mahaffee, Research Plant Pathologist**  
**Subject Area: Biology and control of foliar and fruit diseases of horticultural crops**

**Contact: (541) 738-4036, walt.mahaffee@ars.usda.gov**  
The foliar pathology group is focused on improving the economic and environmental sustainability of horticultural crop production systems. Projects include the development of methods for assessing inoculum presence and quantity in grower fields and correlation to disease levels, disease forecasting of powdery mildews, cultural management of disease and modeling particle dispersion. We address these projects through collaborations with mechanical engineers, meteorologists, horticulturists, entomologists, and other pathologists.



Arbuscules in grape root

**Paul Schreiner, Research Plant Physiologist**  
**Subject Area: Below-Ground Physiology of grapevines and small fruit crops**

**Contact: (541) 738-4084, paul.schreiner@ars.usda.gov**  
Paul's research focus is on the nutritional requirements of grapevines and the factors that control root and mycorrhizal function (growth, nutrient and water uptake, nutrient storage) in small fruit production systems. An improved understanding of the nutrient requirements needed to produce high quality fruit, and the factors that affect the ability of roots to supply those needs will lead to more sustainable production systems.



*Pratylenchus* sp.  
Photo by William Wergen, Nemapix, Vol 1

**Inga Zasada, Research Plant Pathologist**  
**Subject Area: Biology and management of plant-parasitic nematodes in small fruit crops**

**Contact: (541) 738-4051, inga.zasada@ars.usda.gov**  
The nematology research program is focused on the development of management strategies for plant-parasitic nematodes affecting grape, strawberry, raspberry, and *Vaccinium* species. Development and evaluation of chemical and non-chemical management options is a goal of this research. Management strategies being investigated include modified cultural practices that promote root health and encourage the establishment of plant-parasitic nematode suppressive environments (crop rotation, green manures, and soil amendments) and the identification of genotypes with host plant resistance.



Tannin extraction

**Jungmin Lee, Research Food Technologist**  
**Subject Area: Characterization, identification, and application of factors to improve fruit quality**

**Contact: (208)-722-6701 ext 282, jungmin.lee@ars.usda.gov**  
Jungmin Lee's food chemistry program focuses on plant secondary metabolites. Her program works toward understanding and defining the quality of fruit and fruit products by analytical method development, compositional analysis, and its relationship to improving quality. Current projects examine the management of polyphenolics, evolution of tannins, and investigate the influence of cultivar, vine physiology, cultural practices, plant diseases, and nutrients on the chemical components of food.



Verticillium Wilt of Smokebush

**Jerry Weiland, Research Plant Pathologist**  
**Subject Area: Biology and management of soilborne pathogens**

**Contact: (541) 738-4062, jerry.weiland@ars.usda.gov**  
Jerry's research program is focused on soilborne pathogens of the woody ornamental nursery industry. The overall goal is to integrate pathogen biology, epidemiology, and ecology in order to develop and refine disease management strategies. Current projects include quantification and characterization of *Verticillium dahliae* and *Pythium* species in nursery field soils and the influence of environment on pathogen populations.



Grapevine flower clusters

**Julie Tarara, Research Horticulturist**  
**Subject Area: Microclimate and grapevine biology, Vineyard production systems**

**Contact: (509) 786-9392, julie.Tarara@ars.usda.gov**  
Julie's research focuses on grapevines and berry crops, and their response to the environment (temperature, radiation, humidity, wind). As in many horticultural crops, cultural practices are used by small fruit growers to modify the microclimate of the vineyard or field. Their goal in so doing is to improve the quality of the fruit at harvest. As in many specialty crops, maximum quality can be more important than maximum yield. Julie collaborates with horticulturists, plant physiologists, and food chemists to conduct field experiments to increase our knowledge of how the physical environment affects grape and berry biology.



Brown Marmorated Stink Bug

**Jana Lee, Research Entomologist**  
**Subject Area: Biology and control of insect pests**

**Contact: (541) 738-4110, jana.lee@ars.usda.gov**  
Jana's goal is to improve biologically-based methods for pest management of foliar pests and invasive pests. Research focuses on the ecology, physiology, feeding and dispersal behavior of pests and natural enemies. Understanding pest-natural enemy dynamics will enable us to develop cultural, biorational, habitat manipulation, or augmentative tools for growers.



Particle film coating

**Krista Shellie, Research Horticulturist**  
**Subject Area: Viticulture (wine grapes)**

**Contact: 208-722-6701, krista.shellie@ars.usda.gov**  
The goal of Krista's research is to identify viticultural practices that optimize wine grape productivity & fruit quality. Her program addresses wine grape production physiology under warm, short-season, semi-arid growing conditions with risk of winter cold injury. Current projects include: deficit irrigation strategies that optimize water use efficiency, particle film application for alleviation of heat stress, and genotype evaluation.

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