

# Preface

Native and non-native pathogens, insects and animals continue to have serious negative impacts on forest ecosystems and planted forests worldwide. Climate change will alter host-pest relationships and may increase detrimental impacts from many biotic agents. Genetic variation in resistance within tree species is a key element to maintaining forest health. It is the primary natural method of tree defense and utilizing genetic resistance is one of the few viable management options available to combat the adverse impacts of pests. Resistance research programs, including resistance breeding, are vital since they increase the efficiency in utilizing genetic variation to restore forest health when mortality becomes unacceptably high. Resistance research and breeding has been underway in some forest tree species for over 50 years.

The Fourth International Workshop on the Genetics of Host-Parasite Interactions in Forestry: Disease and Insect Resistance in Forest Trees was convened to serve as the first major international gathering of researchers and technical specialists on this topic in the past 30 years. These Proceedings provide an update on many resistance programs at different stages throughout the world, with added insights and program examples from researchers in horticulture, plant genetics and evolutionary biology. Key past meetings that inspired this workshop, include:

**Breeding Pest-Resistant Trees. 1964.** University Park, Pennsylvania, USA.

**Biology of Rust Resistance in Forest Trees. 1969.** Moscow, Idaho, USA.

**Resistance to Diseases and Pests in Forest Trees. 1980.** Wageningen, The Netherlands.

Other related conferences:

**Breeding Insect and Disease Resistant Forest Trees. 1982.** Eugene, Oregon, USA.

**Mechanisms and Deployment of Resistance in Trees to Insects. 2000.** Iguassu Falls, Brazil.

An informal survey by the Food and Agriculture Organization of the United Nations (FAO 2008) provides a snapshot of the level of world-wide activity in pest resistance breeding (<http://www.fao.org/forestry/26445/en/>). In a recent review (Sniezko 2006), an update on four operational disease-resistance programs in the United States is presented. This Proceedings provides a much more comprehensive update. With climate change and continued invasion by non-native pathogens and insects, the contributions of resistance breeding to planted forests and natural ecosystems are needed more than ever. Long-term public support for these programs is essential to the success of these applied programs.

The purpose of this workshop was to advance progress in genetic resistance programs by fostering collaboration between scientists from throughout the world, and to provide an update to the forest community on resistance in forest trees. Updates on current status, issues and future plans for applied resistance programs, as well as research information and tools to fast-track the development and use of resistance in trees were presented and discussed. Presentations on the efforts in annual crops, as well as tree crops such as hazelnut (*Corylus avellana*) and rubber (*Hevea brasiliensis*), helped increase the breadth of understanding of the potential of genetic resistance in forest trees. The inclusion of topics in evolutionary biology broadened our perspectives. The conference field trip provided an opportunity to visit USDA Forest Service and USDI Bureau of Land Management facilities in Oregon to see some of the applied operational resistance programs that have been underway for decades, notably the white pine blister rust resistance work with *Pinus monticola*, *P. lambertiana*, *P. albicaulis*, *P. flexilis*, *P. strobiformis* and *P. aristata*; the *Phytophthora lateralis* resistance program for *Chamaecyparis lawsoniana*; and to see operational seed orchards of *Pseudotsuga menziesii*.

There are many people and groups to thank for the success of this workshop. The technical committee and local organizing committees provided essential inputs on planning and logistics. The generous support of the sponsors made possible the inclusion of some of the invited speakers. The early encouragement of Jerry Beatty and Charles G. Shaw and sponsorship of the USDA Forest Service, Western Wildland

Environmental Threat Assessment Center provided the impetus to undertake organization of this meeting. The IUFRO Working Parties 7.03.11 (Resistance to insects) and 7.02.15 (Breeding and genetic resources of five-needle pines) provided scientific sponsorship. Volunteers Rob Mutch and Wesley Clark organized and implemented the live webcast of this meeting – providing the opportunity for those unable to attend to see and hear the presentations and discussions ([http://ucanr.org/sites/tree\\_resistance\\_2011conference](http://ucanr.org/sites/tree_resistance_2011conference)). A special thanks to the USDA Forest Service, Pacific Southwest Research Station for production of this Proceedings, and also my co-technical editors Susan Frankel, Katie Palmieri, Janice Alexander, John Kliejunas and Alvin Yanchuk, whose many hours made both the conference and proceedings come to fruition. Lastly, I would like to thank all of the presenters, moderators and other participants, who took time out of very busy schedules to participate in the workshop and share their work.

It is my hope that the 2011 workshop will provide impetus for a continued dialog – initial planning is underway for a possible follow-up meeting in 2015 in France. For further information and to stay engaged in this topic, subscribe to the Pest Resistance in Trees (Insect or pathogen resistance) mailing list at [www.fs.usda.gov/goto/r6/dorena](http://www.fs.usda.gov/goto/r6/dorena). Stay tuned!

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## Literature Cited

**FAO. 2008.** Selection and breeding for insect and disease resistance. [www.fao.org/forestry/26445](http://www.fao.org/forestry/26445) (31 July 2012).

**Sniezko, R.A. 2006.** Resistance breeding against nonnative pathogens in forest trees — current successes in North America. *Canadian Journal of Plant Pathology*. 28: S270–S279.