

# Briefing Paper: 2008 findings from Alaska

## A new species of *Phytophthora* related to *P. ramorum*, and more isolates of *P. alni* subsp. *uniformis*

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### New Findings:

A putative new species of *Phytophthora* previously unknown to science was found in Alaska during riparian *Phytophthora* surveys and confirmed in November 2008 by Dr. Gerard Adams, Michigan State University.

The Alaska *Phytophthora* was sent to the USDA APHIS-PPQ Plant Safeguarding and Pest Identification, National Identification Services Molecular Diagnostics Laboratory and also to Dr. Everett Hansen, Oregon State University. Both labs have analyzed DNA sequences of the ITS-rDNA and COX I & II regions and reached the conclusion that the unique sequence identifies this isolate as a member of Clade 8C, the *P. ramorum*/*P. lateralis* clade, but as a new member. The APHIS Lab and Dr. Hansen's Lab will assist with confirmation of morphological identification of the new species.

Dr. Adams has also found three more isolates of *P. alni* subsp. *uniformis* (PAU) in his first sequencing of the 2008 collections.

### Alder *Phytophthora* surveys in Alaska

Due to growing concern of possible cryptic invasion by the *Phytophthora* that devastates alder in Europe, surveys for alder *Phytophthora* in Alaska were conducted in 2007-08 by Dr. Gerard Adams. *Phytophthora* species were baited and trapped from roots, soils, and water sources using rhododendron leaves (*Azalea* spp.), bearberry leaves (*Arctostaphylos uva-ursi*), and alder twigs (*Alnus incana* subsp. *tenuifolia*). A total of 80 sites were sampled in 2007-08 across south-central and interior Alaska (Figure 1).

In late October 2008, we discovered several new research findings, all from baited soils. Dr. Adams found three more isolates of *P. alni* subsp. *uniformis* in his first sequencing of the 2008 collections, expanding the range to a second site on the Kenai Peninsula, Quartz Creek. This new site is within 20 miles of the other positive PAU Kenai Peninsula site, Cooper Landing/Russian River. Quartz Creek is an upstream tributary of the Kenai River which flows past the Cooper Landing/Russian River site. The three additional PAU findings from 2008 provides us with sufficient isolates, now six, to adequately compare American strains to European strains using AFLP analysis, microsatellites or other methods.

Equally interesting is the discovery of a new *Phytophthora* species at the Quartz Creek site with a sequence that aligns closest to several other tree pathogens of importance, including *P. lateralis*, a canker pathogen of Port Orford Cedar; *P. hibernalis*, a citrus pathogen that also can cause cankers on Port Orford Cedar; *P. foliorum*, a new species of unknown virulence and host range; and *P. ramorum*, an oak pathogen. It is agreed that the new *Phytophthora* isolate is unique and worth pursuing formal description. Since the new species is in the group (Clade 8C) which

contains *P. ramorum*, it may be used to improve the accuracy of detection assays for *P. ramorum*.

The isolate of the new species came from a multi-stemmed *Alnus incana* subsp. *tenuifolia* (genet 3) for which we had excavated nearly the entire root system while looking for root rot in 2008. Genet 3 had 40% top dieback and had *Valsa melanodiscus* cankers. It also had six roots with rot, four with Armillaria root rot and decay, and two with rot but no decay. While ELISA test kits for detection of *Phytophthora* were not used on genet 3, several other genets at the Quartz Creek site were positive for *Phytophthora* spp.

## Significance of these findings

The finding of more isolates of *P. alni* subsp. *uniformis* remains perplexing. Excavations of 100 alder root systems in Alaska in summer 2008 revealed little evidence of root disease caused by *Phytophthora* spp. Examination of plants for other symptoms of *Phytophthora* disease, such as collar rot and tar spots on the lower stems, has been negative.

We do not know the host range of this new *Phytophthora* species in Alaska other than the fact that it can infect rhododendron leaves. Rhododendrons do not occur in the native environment in Alaska, though several other ericaceous hosts are present. Perhaps the new *Phytophthora* sp. and *P. alni* subsp. *uniformis* have co-existed benignly in Alaska beneath alder and have not been noted due to the lack of surveys or the lack of conspicuous symptoms or death of alder or other associated plant species. Conversely, further analysis of the isolates may reveal that the organisms could have been introduced into America on wading boots or other equipment of European fishing tourists or other travelers. Risk models of invasive species apparently have not considered this potential route to introduction of forest pathogens.

## Current and Future Studies

There are many unanswered questions, particularly on the origin of these organisms, their ability to cause disease, and the corresponding host ranges. Additional samples from Alaska remain to be processed. Monitoring and further testing for *Phytophthora* in Alaska will continue in the future, including field examination for evidence of disease caused by *Phytophthora* species. Further study is needed to determine whether these organisms were introduced, how they might have been introduced, and whether these organisms are causing disease on alders or other plant species in Alaska.

Our understanding of *Phytophthora* spp. worldwide is rapidly shifting and evolving. As such, we fully expect that both new discoveries will be made and new literature will be published that will add to our growing knowledge of *Phytophthora* associated with forest ecosystems.

APHIS, USFS, AK DNR, and University staff will continue to collaborate with collecting and disseminating information related to these findings.

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Figure 1. 2007-08 *Phytophthora* survey locations in Alaska.

