

Summary

A Summary of Information Needs for the Management of *Heterobasidion annosum* in Coniferous Forests in Western United States¹

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The previous sessions in this symposium have provided valuable information of interest to researchers and land managers. During the course of the summary session, numerous questions dealing with various aspects of the disease were put forth by the participants. These questions summarized here dealing with various aspects of *H. annosum* hopefully will stimulate new research that addresses problems and concerns of land managers and forest pest management specialists.

What is the role of host stress (air pollution, moisture, etc.) on disease development and tree mortality?

What is the effect of *H. annosum* on long term-site productivity?

What is the nature and significance of interactions of *H. annosum* with *Armillaria mellea*?

Do "minor" or understory species influence spread of *H. annosum*?

What role does *H. annosum* play regarding ecological diversity in forest stands?

At what rate does *H. annosum* spread in commercially thinned western hemlock stands?

How do we identify genotypes of various affected tree species that are resistant to *H. annosum*?

What is the relationship between pathogenicity and biological species in *H. annosum*?

How are bark beetle population dynamics and *H. annosum* infection related in commercial coniferous tree species?

How do we accurately determine and report incidence of *H. annosum* and intensity of infection in the field?

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What is the role of conidia in the infection process?

What effects does fire have on annosus root disease development?

What are the relative competitive saprophytic abilities of the biological species of *H. annosum* and how do the biological species interact within stump root systems and within stands?

How do we rapidly diagnose biological species of *H. annosum* in the field?

Do we need to develop an annosus root disease model, and if so, what biological parameters must be obtained for accurate loss projections?

What are the principal fungal competitors of *H. annosum* in stumps and soil, and what are their roles in restricting disease development?

What is the impact of annosus root disease on mixed conifers in uneven-aged management regimes?

Why is annosus root disease more damaging in the east-side pine type versus west side pine?

What procedures do we use for hazard rating annosus root disease in pine?

Are rates of decay loss due to *H. annosum* known?

Can we successfully regenerate pine sites infested with annosus root disease?

What is the feasibility of using chemical or mechanical barriers in the soil to prevent spread of *H. annosum*?

What is the cost of living with annosus root disease?

What is the incidence of annosus root disease in upper slope forest types?

What is the relationship between tree size and disease center enlargement?

These questions represent an extensive, but not all encompassing, illustration of current gaps in our knowledge of this root disease. Despite the need for information that will contribute to minimizing losses to this disease, the current budget climate has resulted in a scarcity of funding for research on root diseases.

Participants in this symposium have contributed ideas and advice on ways we as researchers, and other workers dealing with root diseases, can increase the level of support for this important work. A summary of suggestions that arose from discussions during this session are presented below.

1) There is a need to do a better job of publicizing impacts of root disease and to increase general public awareness of forest health issues.

2) Research emphasis should be problem oriented.

3) Management should be better informed of consequences of root diseases. Loss information should be stated in terms of dollars for land management decision makers.

4) Pest management pathologists and researchers should work on getting disease loss data into stand projection models.

5) Researchers need to emphasize technology transfer and address root disease affecting non-timber resources.

6) Legislators need to be informed and dialogues between them and root disease workers need to be established.