

Concurrent Workshops - Session II

Wood-destroying Organisms in the New Millennium: Where Have We Gone since Bend 1989?

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At the joint meeting of the Western International Forest Disease Work Conference and the Western Forest Insect Work Conference, held in Bend, OR, on September 13, 1989, a symposium was convened entitled "Current Research on Wood-destroying Organisms and Future Prospects for Protecting Wood in Use." Presentations were made by three pathologists and nine entomologists. At that time the taxonomy of wood-decay fungi was primarily based on morphology; new techniques using genetic and immunological tests were introduced. Nondestructive evaluation for detection of wood decay and presence of termite infestations was put forward as a new concept. The idea of termites as beneficial organisms was discussed; they provide habitat for wildlife in Australia. Cuticular hydrocarbons were debuted as taxonomic characters for species determination in termites. Agonistic (not agnostic) behavior in termites was described as a means of differentiating colonies and species. Tunneling behavior of subterranean termites was discussed in the context of baiting. The use of baits for direct control of mound building termites in Australia was examined. The behavior and ecology of exotic subterranean termites in Canada was discussed and contrasted with native populations in the United States. Finally, the development of slow-acting pesticides and their role in baiting technology for control of subterranean termites in the United States was presented. These subjects provided the basis for presentations at this meeting in San Diego, CA, in 2004.

Wood-destroying Fungi - Beyond Bend 1989

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Dr. Micales-Glaeser gave an overview of research progress in the field of forest products pathology, concentrating on five major topics that were presented at the Bend, OR meeting as major research needs. These topics were: 1) education of users to reduce losses from decay; 2) development of nondestructive testing techniques; 3) new ways of protecting wood, including biological control and changes in wood chemistry; 4) development of new wood preservatives to replace toxic biocides that are being removed from the market and 5) increased knowledge of

wood decay fungi. Two additional topics that were not of major concern in 1989, but which are significant today, are the new awareness of molds and their possible health effects, and the devastating impact of *Meruliporia incrassata* in California.

Information is much more available to users of forest products than it was in 1989, due to development of the Internet. Many universities, federal laboratories in the U.S. and Canada, and providers of forest product materials have excellent websites that provide information about wood decay and how to increase the durability of forest products. The Advanced Housing Center at the Forest Products Laboratory (FPL) has become a clearinghouse for information about housing issues, including information on durability and moisture. The Internet must be used with caution, however, because of misinformation and commercialism disguised as scientific information.

Development of nondestructive techniques for evaluation of decay and measurement of engineering properties has progressed greatly since 1989. Techniques include stress-wave and acoustical analysis. Theoretical research is being conducted with x-rays, gamma radiation, and penetrating radar. Scientists at the FPL have developed a prototype scanner that uses acoustical waves to analyze decay in living trees. This tool would be a major aid to forest pathologists for hazard tree analysis. An immunological method of minimally destructive testing, in which a small amount of sawdust is removed from a structure and analyzed for a latent decay with monoclonal antibodies, will be commercially available soon.

New ways of protecting wood are being devised. Wood-plastic composites are used commonly and are engineered for diverse applications. This material is quite resistant to decay, but can be heavy and may pose disposal problems. Current research emphasizes using natural materials, including chicken feathers, to increase the hydrophobicity, and thus durability, of wood composites. Biological control has not succeeded for the control of wood decay, however, it is being used for the control of sapstain. Logs incubated with Cartapip[®], an albino strain of the blue stain fungus *Ophiostoma piliferum*, are resistant to colonization by other blue stain fungi and do not become discolored by fungal growth.

Development of new, effective, environmentally safe wood preservatives is a top priority. Many of the traditional preservatives, including penta and the arsenical salt CCA, have been banned and/or removed from the market. None of the currently accepted preservatives are as effective as penta or CCA. There is an increasing use of borates, copper-containing compounds, quaternary ammonium salts, and organic biocides. These can be used alone, or in combinations with other co-biocides, to offer some degree of wood protection. For the past several years the FPL has focused on the potential of N,N-(1,8-naphthaloyl)hydroxylamine (NHA) as a wood preservative and termiticide. NHA has a very specific mode-of-action that targets the metabolism of wood decay fungi; it effectively precipitates calcium in wood and prevents colonization by decay fungi. NHA is also toxic to termites and has been patented and licensed as a termite bait. The disposal of preservative-treated wood remains a major environmental problem.

DNA sequencing technology has greatly improved our understanding of wood decay fungi, and is being used to study the genetics and taxonomy of these organisms. It is now possible to sequence fungal DNA directly from wood and use established databases to identify many decay.

fungi. This is very useful for ecological studies of fungal succession in forests. Much work still needs to be done to define species and generic concepts and to develop sequence databases based on properly identified cultures and specimens.

A new concern has developed within the past five years: the prevalence of mold on wood and its possible health effects. This situation has been exacerbated by the media, large insurance settlements, and misinformation on the Internet. The presence of mold is indicative of a moisture problem, and the most effective control is long-term moisture management. Medical studies have shown that mold can be associated with allergies and asthma in sensitive individuals, but larger fears of cancer, memory loss, and bleeding of the lungs are unfounded. Development of effective mildewcides, that can be used when wood is in a high moisture area, could help alleviate this problem.

A situation that has recently evolved is the presence of the "dry rot" fungus *Meruliporia incrassata* as a major decay agent in California. This fungus is extremely destructive. *M. incrassata* can conduct water over large distances to the site of decay through a system of water-resistant, thick, hyphal strands called "rhizomorphs." This fungus is very difficult to control once it becomes established. Unfortunately, little research is being done on control strategies due to the closure of the University of California Forest Products Laboratory.

Forest products research has progressed significantly in the past 15 years. Many new products are now available that can help improve the durability of wood and wood products, and more information on wood protection is now available to the consumer. Wood is a renewable resource, and research needs to continue to make it a cost effective and desirable structural material.

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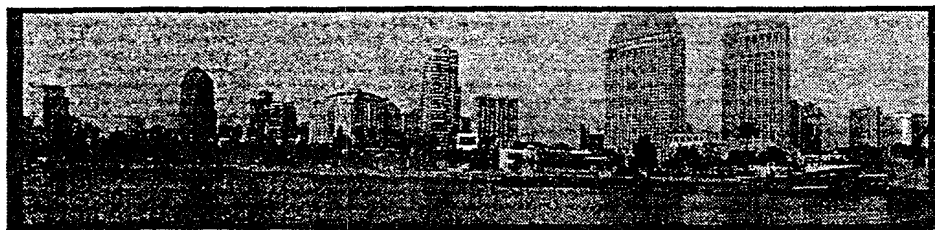
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