RESEARCH in Progress

Advanced Housing Research Center
Forest Products Laboratory
Madison, Wisconsin

Environmentally Benign Wood Preservation Without Heavy Metals

A second generation of wood preservatives—one based on copper and organic mixtures—is currently entering the treated-wood markets. Second-generation preservatives include ammoniacal copper quat (ACQ), oxine copper, copper azole, and copper borates. A new generation of wood preservatives will need to be developed and tested to replace this second generation. The compound N'N-napthaloylhydroxylamine (NHA) is one example of a potential preservative that contains no copper, chromium, or arsenic metal component.

Field test of environmentally benign wood preservatives without heavy metals.

Background

Although wood is a strong, durable, and renewable building material, it is susceptible to weathering, fungal decay, and insect damage. Wood exposed to exterior environments needs to be chemically treated to preserve its strength and longevity. Environmental restrictions, both in the United States and international markets, are limiting the use of broad-spectrum biocides for wood preservation, primarily due to problems of disposal. Until February 2002, the principal wood preservative in use was water-borne chromated copper arsenate (CCA). An agreement between the U.S. Environmental Protection Agency (EPA) and the wood preservation industry will restrict CCA use to commercial applications of utility poles, railroad ties, and marine pilings. Residential uses of CCA-treated wood was terminated at the end of 2003, leaving most the wood preservation industry dependent upon a new generation of preservatives combining copper and organic mixtures. However, the new copper-containing preservatives will likely face additional environmental restrictions in the future.

Objectives

The objectives of this project are to test and evaluate NHA, in its sodium and acid forms, against wood decay and mold fungi in a variety of laboratory and field settings. Materials to be treated include solid wood and composites like medium density fiberboard (MDF). NHA will also be tested as a nonrepellant termite bait, in combination with other potential wood-preserving termiticides, against Eastern and Formosan subterranean termites.

Approach

Testing to determine the protective capacity of NHA alone and in boron compounds will include (1) soil-bottle testing of brown-rot and white-rot wood decay fungi and (2) laboratory termite testing of Eastern and Formosan subterranean termites. Long-term field tests will be expanded beyond the 5-year test protocols already in place. Additional leach testing will determine the retention of NHA and boron compounds following combined and sequential pressure treatments.

Expected Outcomes

This research project will evaluate the potential of NHA as part of a new generation of preservatives that contain no heavy metals. Results will show (1) efficacy of NHA for wood protection against common decay fungi, subterranean termites, and mold colonization; (2) retention of NHA following ASTM leach testing and field testing; and (3) environmental weathering of NHA-treated southern yellow pine in aboveground decking applications compared with CCA-treated decking. Patent applications already on file will be open for licensing during and after these studies.

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Timeline

This project represents a 2-year study. Most studies will be underway in FY 2003 and completed by the end of FY 2004.

Cooperators

Cooperators include the Southern Regional Research Center, USDA Agricultural Research Service, in New Orleans, Louisiana.

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