FIELD-TESTING PHYTOSANITATION TREATMENTS ON CHILEAN RADIATA PINE.

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The United States forest industry is increasingly interested in importing unprocessed logs from Chile to the Pacific Northwest. A primary concern of the United States Department of Agriculture (USDA) is the accidental introduction of potential forest pests into northern forest ecosystems via Chilean imports. In response to this concern and in conjunction with the retiring of methyl bromide, the effectiveness of alternative phytosanitary treatments against specific Chilean pests was studied. Reported at this conference are results from the surface treatment and fumigation trials; however, the research team emphasizes that the project was designed to evaluate the candidate treatments as a component in an integrated pest management program. This was a cooperative research project between the University of Washington, Universidad Austral de Chile and the US Forest Service.

Candidate treatments were tested under field and industrial conditions in the region surrounding Valdivia, Chile. Plantation-grown Monterey pine (*Pinus radiata* D. Don) logs were used exclusively for product testing because this tree species will account for the bulk of any imports to the United States. Based on the United States Forest Service pest-risk assessment (USDA, Forest Service. 1993. Pest Risk Assessment of the Importation of *Pinus radiata*, *Nothofagus dombeyi*, and *Laurelia philippiana* Logs from Chile. Misc. Publication No. 1517), the project was designed to test product efficacy against three specific organisms; two bark beetle species, *Hylurgus ligniperda* (Fabricius) and *Hylastes ater* (Paykull) (Coleoptera: Scolytidae), and a blue-stain fungus, *Ophiostoma piliferum* (Fr.: Fr.) Syd. & P. Syd. (=*Ceratocystis pilifera* (Fries) C. Monroe).

Initial trials were conducted using pine bolts (26-28 cm dia. by 0.75 m) situated on raised platforms in wooded areas. Two types of bolts were used in this trial; completely de-barked and partially de-barked. Candidate surface treatments were applied to test bolts using backpack sprayers and then the treated bolts were left to weather for three months. During the three month weathering period samples were removed from test bolts and laboratory bioassays were conducted to determine if the treatment compounds were effective against bark beetles. Furthermore, field observation were made to monitor the candidate treatments' efficacy against blue-stain fungi.

Results from the initial trial indicated that the most effective surface treatment was a combination didecyl dimethyl ammonium sulfate + 3-iodo-2-propynyl butyl carbamate ('NP-1'®); chlorpyrifos ('TimberTreat'®) and borax. This combination continued to provide complete protection against bark beetles through the eleven week mark. Bolts treated with this combination displayed only 1.5% surface area staining by blue-stain fungi at the end of eleven weeks. Furthermore, the results indicated that de-barking was imperative to ensuring the success of the surface treatment.

Following the initial field trials, two more trials were conducted under industrial conditions using full-size logs (26-28 cm dia. by 4.4 m long, 28-32 cm dia. by 2.2 m long). The first industrial trial used the surface treatment combination of 'NP-1'®; 'TimberTreat'® and borax recommended by the initial trial. The full-size logs were treated with a dipping process. Following treatment, the logs were placed on raised rails in a sawmill yard and left exposed to weather. During the weathering period treatment efficacy was monitored with laboratory bioassays and observation. Results from the first industrial trial indicate that the surface treatment worked on full-size logs and could protect the logs following a limited amount of handling.

A second industrial trial was conducted to test whether or not sulfuryl fluoride ('Vikane'®) fumigation could be used in conjunction with the 'NP-1'®-'TimberTreat'®-borax surface treatment. During this trial, logs were first surface treated using a dip tank and then tent fumigated with 'Vikane'®. Trial results indicated that 'Vikane'® fumigation did not interfere with the efficacy of the surface treatment.

Given that the fumigant did not interfere with surface treatment efficacy, whole logs can be processed in a manner that dramatically reduces exposure to pest organisms. For example, a dipping treatment can immediately follow de-barking in mill production so that a protective chemical barrier to insect and fungal colonization immediately covers the exposed log surface. Once this protective barrier is in place, a sterilizing fumigation would destroy any resident organisms, effectively producing a sanitized export log.

With appropriate quality control measures, the NP-1'®-'TimberTreat'®-borax surface treatment in conjunction with a 'Vikane'® fumigation would be an effective component in an integrated pest management program designed to prevent the introduction of potential forest pest to the Pacific Northwest via Chile.

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