SURVIVAL OF THE PINEWOOD NEMATODE IN CCA-TREATED SHORTLEAF PINE LUMBER

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The pinewood nematode (PWN) (*Bursaphelenchus xylophilus*), the causal agent of pine wilt disease, has been intercepted in pine chips, unseasoned pine lumber, and wood packing material (WPM). Likewise, the PWN's insect vectors, *Monochamus* spp., have been found in pallets, crates, and dunnage. As the result of these interceptions, the European Union and other countries regulate the import of all coniferous chips, logs, sawn wood, and WPM to protect their forest from the PWN and other exotic pests. Various mitigation procedures have been investigated such as prevention, host selection, and treatment by fumigation, irradiation, chemical dips, and elevated temperature (Dwinell 1997). However, the efficacy of inorganic arsenicals for mitigating PWN has not been investigated. The most commonly used inorganic arsenical is chromated copper arsenate (CCA), a chemical mixture (arsenic, chromium, and copper) that protects wood from dry rot, fungi, molds, and other pests that can threaten the integrity of wood products.

The primary objective of this study was to determine if the pinewood nematode could survive in air-dried pine lumber that had been commercially pressure-treated with chromated copper arsenate (CCA), a commonly used waterborne wood preservative.

Materials and Methods. In the summer of 2000, several shortleaf pines (*Pinus echinata*) were felled at an experimental forest near Athens, Georgia. The boles were subsequently colonized by pine sawyers, *Monochamus* spp., that transmitted the PWN during oviposition. In June 2001, the logs were sawn into cants (4 x 4 x 36 inches) and boards (2 x 4 x 36 inches). The mean wood moisture content of randomly selected freshly sawn boards was 65 percent (dry weight basis). The boards were stacked and dried to 20 percent moisture content prior to the CCA treatment.

The lumber was sampled for the PWN immediately after sawing, after drying to 20 percent moisture content prior to CCA treatment, and after drying to 20 percent moisture content following the CCA treatment. A 2.5 cm deep hole was drilled with an auger bit at three locations on the surface of each cant and board. The borings within each piece of lumber were pooled, and the PWN was extracted using the Baermann funnel procedure (Dwinell, et al. 1994). Borings were also plated on malt extract agar and examined for fungal growth after 7-8 days.

The cants and boards were pressure-treated with CCA (The Applied Research Group, Inc., Charlotte, NC) by Barnett Lumber Co., Commerce, Georgia. The cants and boards were divided between three charges (replications) and were included in commercial runs. Each charge included one cant and twelve boards. The lumber was loaded onto a small rail car. Using a forklift, the rail car was pushed into a large horizontal treating cylinder. The chamber door was sealed and a vacuum applied to remove most of the air from the cylinder and the wood cells. Preservative solution was then pumped into the cylinder and the pressure raised to 150 pounds per square inch for 20 minutes, forcing CCA into the wood. The whole process took about 40 minutes. The total CCA concentration was 2.071 percent (% Cr = 0.867; % Cu = 0.377; % As = 0.819). The lumber was stacked after treatment. When the wood moisture content had returned to about 20 percent, the lumber was again sampled for the pinewood nematode.

Results. The PWN did not survive in CCA-treated shortleaf pine lumber. The nematode was extracted, however, from all of the untreated lumber, whether green or air-dried to 20 percent moisture content (Table 1).The most frequently isolated fungus from the CCA-treated wood was *Aureobasidium pullulans*, a common fungus from soil, plant material, wood chips, paints, and plastics (Wang and Zabel, 1990).

Conclusions. The PWN did not survive in air-dried pine lumber that had been pressure-treated with CCA. It should be noted that some 90 percent of southern pine lumber is kiln-dried prior to pressure treatment with CCA. However, many western conifer species are not kiln-dried prior to treatment with CCA. In special cases, pressure treatment of air-dried lumber with CCA may be an alternative for methyl bromide.

References.

Dwinell, L.D. 1997. The pinewood nematode: Regulation and mitigation. Annu. Rev. Phytopathol. 35:153-166.

Dwinell, L.D., S. Avramidis, and J.E. Clark. 1994. Evaluation of a radio-frequency/vacuum dryer for eradicating the pinewood nematode in green sawn wood. Forest Prod. J. 44:19-24.

Wang, C.J.K., and R. Zabel (eds.). 1990. Identification manual for fungi from utility poles in the eastern United States. American Type Culture Collection, Rockville, MD.
356 pp.

Table 1. Extraction of the PWN from shortleaf pine lumber that was green, air-dried, or pressure-treated with chromated copper arsenate (CCA).

Lumber (number)[a]	PWN before drying	PWN after drying[b]	PWN after CCA
Cants (3)	100%	100%	0%
Boards (36)	100%	100%	0%

[a]Total number of cants and boards in three charges (replications).
[b]The lumber as air-dried to a moisture content of 20 percent prior to CCA-treatment.