



Paintability of Two Hawaii-Grown Woods . . .

First Progress Report

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ABSTRACT: In a test of simulated vertical house siding, robusta eucalyptus and Australian toon panels appear to hold paint as adequately as redwood and Douglas-fir panels after 1-year exposure. The addition of anti-mildew agents to paints seems advisable--particularly in higher rainfall areas. Of the four systems of paint being tested, the self-primed latex appears to be the best to date.

House siding forms a possible new market for Hawaii-grown woods. Two local species that can be used for siding are robusta eucalyptus (*Eucalyptus robusta*) and Australian toon (*Toona ciliata* v. *australis*). But until recently, woods from these species had never been tested for their ability to hold paint. Nor had their paintability or paint-holding quality been compared with that of the commonly used house siding made from redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*).

We were interested mainly in wood behavior in this study, but we also tried several paint systems to determine if some were more compatible than others with the woods being tested. We also wanted to compare the performance of oil base paints and latex (water base) paints. Latex paints are reputed to be mildew-resistant, but allow bleeding of some extractives in the wood; oil base paints resist bleeding of extractives but not mildew.

Panels of robusta, toon, redwood, and Douglas-fir were coated with oil base and latex paints and set out on a continuing exposure site in Honolulu, Hawaii. After 1 year of exposure, it appears that robusta and toon are about equal to redwood and Douglas-fir in their ability to hold paint. Conditions appear favorable--at least at the test site--for mildew to form on the oil base paints.

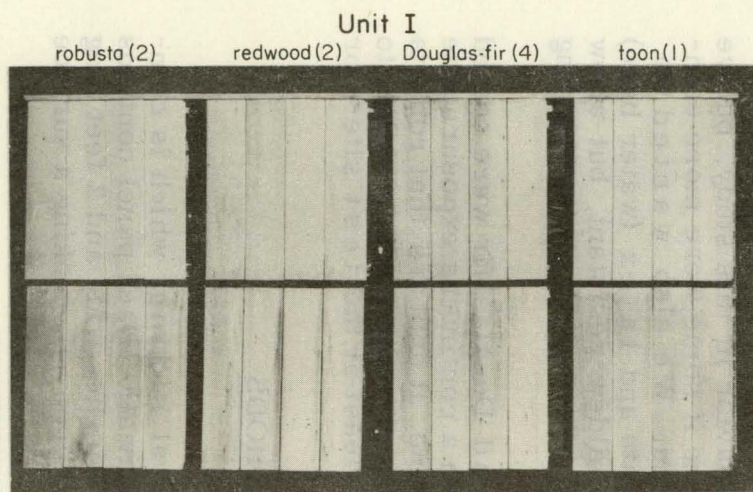
MATERIALS AND METHODS

PANELS

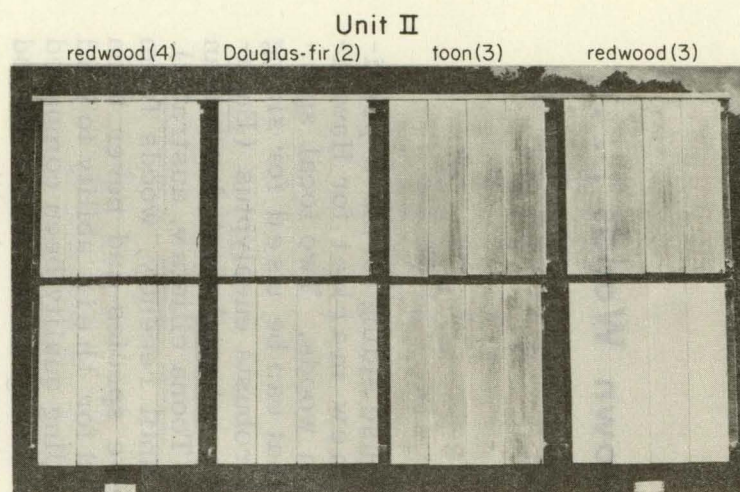
In this study, 32 panels simulate vertical siding, which is commonly used in single-family dwellings in Hawaii. Each panel contains four flat-sawn boards of the same species, 6 inches wide and 2 feet long (fig. 1). These boards are joined tongue and grooved, making a surface area of nearly 4 square feet.

U.S. Forest Service research in Hawaii is conducted in cooperation with the Division of Forestry, Hawaii Department of Land and Natural Resources.

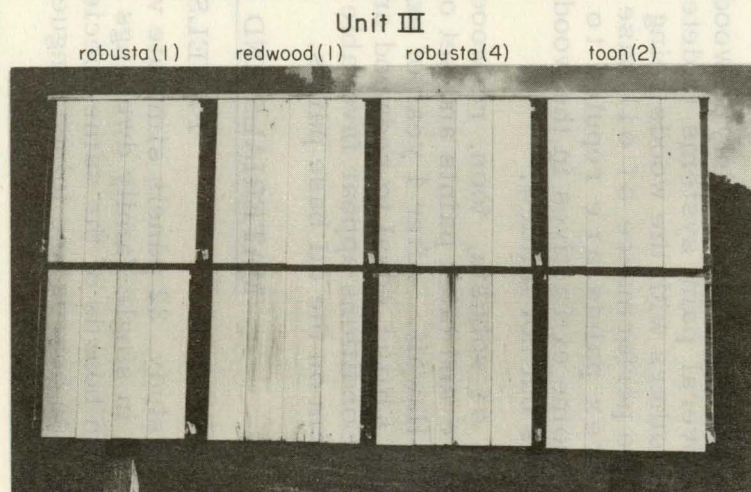
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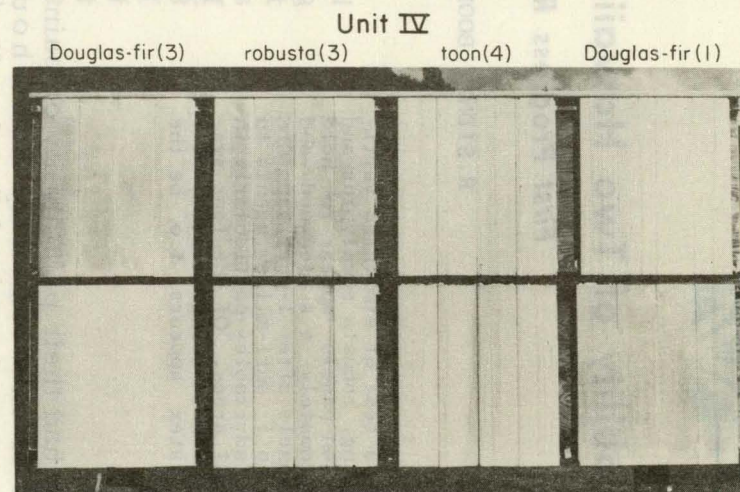
redwood (3)	toon (1)	Douglas-fir (4)	toon (3)
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robusta (4)	robusta (1)	Douglas-fir (3)	toon (2)
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Douglas-fir (1)	redwood (2)	redwood (4)	robusta (2)
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Douglas-fir (2)	redwood (1)	toon (4)	robusta (3)
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Figure 1. --Appearance of panels in the four test units after 1 year of exposure, November 1965. Each panel is identified by species, and by treatment as follows: (1) three coats of oil base paint; (2) three coats of latex paint; (3) one coat of oil base, two coats of latex; (4) two coats of oil base.

PAINT SYSTEMS

Four commonly used paint systems are being tried in this study. They are suggested by the U. S. Forest Products Laboratory. The four systems are:

- One prime coat of Federal Specification TT-P-25a oil base paint and two coats of white exterior Federal Specification TT-P-102a oil base paint;
- three coats of Fuller¹ 9220 or equal exterior self-primed latex paint;
- one prime coat of TT-P-25a oil base, and two coats of Fuller 9220 or equal exterior latex paint; and
- one prime coat of Federal Specification TT-P-25a oil base, and one coat of Federal Specification TT-P-102a oil base paint.

We applied all paint by brush on the exposed face only. No mildewcide or fungicide was added to any of the paint used.

INSTALLATION AT EXPOSURE SITE

We mounted the panels vertically on four sheets of plywood, eight panels to the sheet or unit. These panels were set out in November 1964. They face south, with a minimum of 18 inches ground clearance, and no roof overhang. The exposure site is in Makiki Valley, in Honolulu. Annual rainfall there during an 8-year period averaged 68 inches. The rainfall for 12 months--the period covered by this note--was 86.8 inches, with a low of 1.35 inches in March and a high of 18.07 inches from November 1-15.²

EXPERIMENTAL DESIGN

The design used is a randomized block consisting of two blocks. Each wood species and each paint system are represented once in each block. Block I consists of the 16 panels in the upper row and Block II is the lower row.

Inspections were made monthly for the first 6 months. Since then, inspections have been made quarterly.

RESULTS AND DISCUSSION

A method developed by the U. S. Forest Products Laboratory defines four stages in deterioration of paint coatings. It is being used in this study. These four stages are "good," "fair," "poor," and "bad." The coating is rated "good" in integrity as long as no bare wood is revealed from crumbling, flaking, or scaling of the coating. The rating

¹Trade names and commercial enterprises or products are mentioned solely for necessary information. No endorsement by the U.S. Department of Agriculture is implied.

²Records from Hawaii Division of Forestry.

is "fair" as long as magnification is required to see bare wood, or if there are no more than scattered small patches of bare wood that can be seen by the unaided eye. The rating is "poor" if small bare patches are readily visible on nearly all parts of the test area or if some of the bare areas have become conspicuous. Conspicuous bare areas in many parts of the test area require a rating of "bad." Using this rating method, all panels are judged "good." While the FPL method has been the main criteria, such supplementary data as time and extent of checking, peeling, discoloring, etc. have also been noted.

Of the 32 panels, 6 show small areas of checking in the paint coating. And on four of these six panels, this checking extends across the bottom 1/2 to 3/4 inch of all four boards. One other panel has checking on the bottom 1/4 to 3/4 inch of only one board; and the other has some checking near the top of the panel. There does not appear to be any correlation between the different woods or paint systems or both for this first sign of deterioration.

The difference in appearance of the panels (fig. 1) is due to the difference in paint systems--not the wood. The panels can be classed in three broad categories: (a) uniformly white; (b) spots or streaks of mildew; (c) uniformly gray.

Panels that are uniformly white were painted with three coats of exterior latex. Except for some bleed-through of extractives on the redwood panels (fig. 2), this paint system looks the best among the four used in the study after 1 year of exposure.

Panels that show spots or streaks of mildew were painted with one prime coat of oil base paint and two coats of oil base white exterior (fig. 3), or with one prime coat of oil base paint and one coat of oil base white exterior. The streaks are avenues of water runoff, which favor the development of the mildew. This streaking appears only on these two paint systems.

Panels that appear a uniform, rather than spotty, gray were painted with one prime coat of oil base paint and two coats of exterior latex. After 2 months, these panels were noticeably darker than those using the other paint systems. After 6 months, the panels had become so dark that the average homeowner probably would consider the paint system unsatisfactory.

After the 6-month inspection, the discoloration of the paint systems using oil base paints was identified as a green algae on the paint surface with a sooty mold growing on the algae.³ After the 1-year inspection, we again consulted Dr. E. E. Trujillo for a more extensive examination of the discoloring agent. He identified them as four genera of sooty molds: Fumago sp., Fusicladium sp., Pullularia sp., and Hormiscium sp. No green algae was found at this inspection.

³ Personal correspondence with Dr. E. E. Trujillo, Plant Pathology Department, University of Hawaii, Honolulu, May 1965.

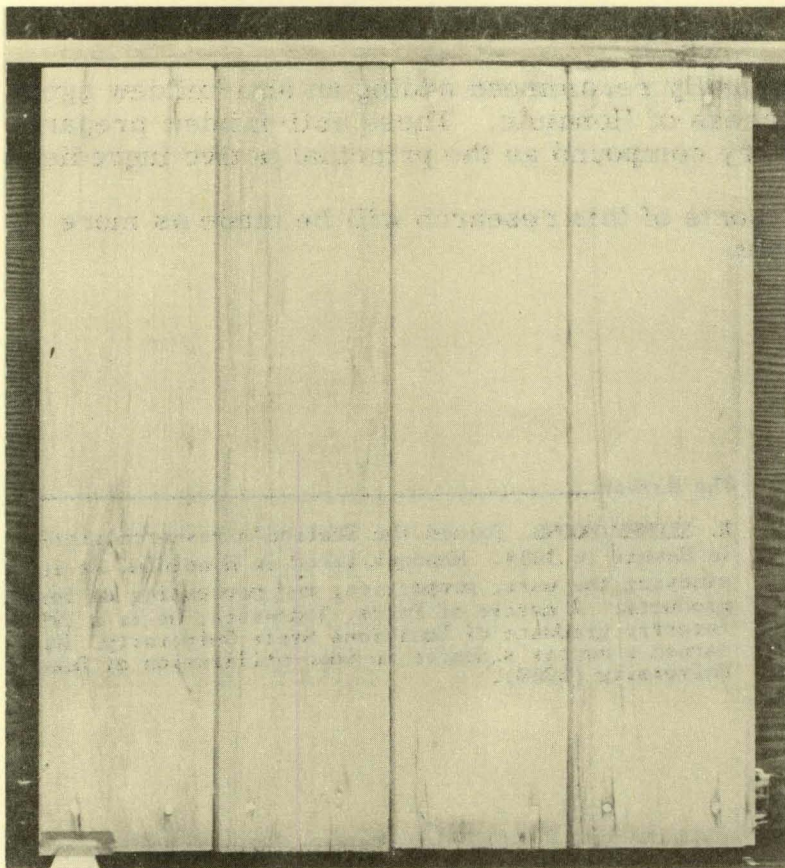


Figure 2.--Three coats of latex on redwood, after 1-year's exposure.

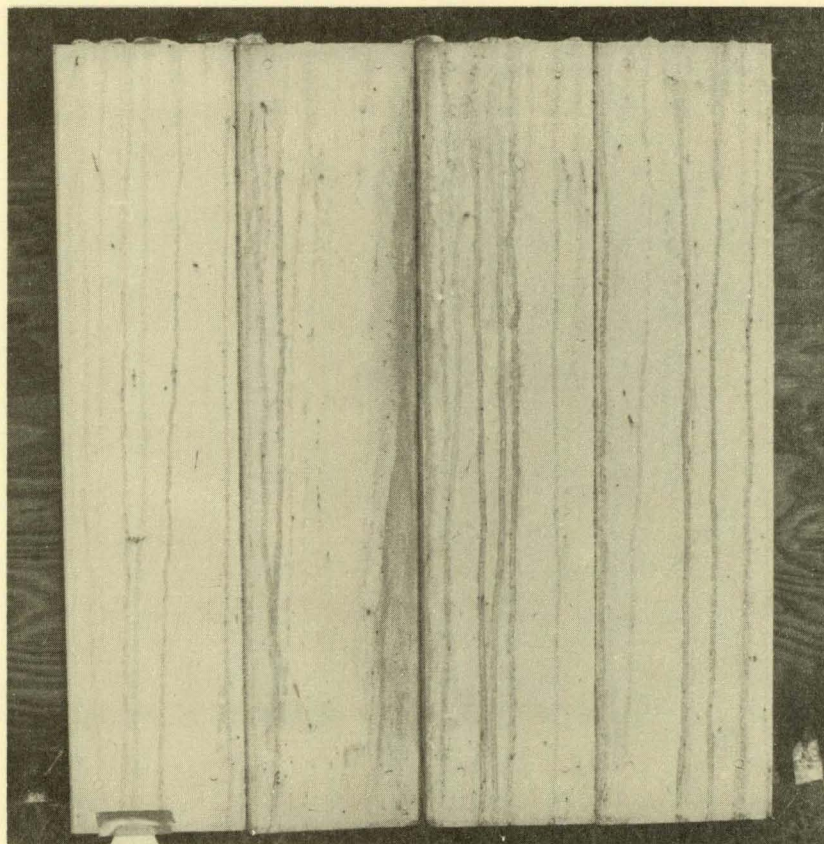


Figure 3.--Panel of toon painted with one prime coat oil base, and one coat of oil base white exterior paint, after 1-year's exposure.

Local paint dealers normally recommend adding an anti-mildew agent to paints used in the wetter areas of Honolulu. These anti-mildew preparations have a copper or mercury compound as the principal active ingredient.

Additional progress reports of this research will be made as more information becomes available.

*The Author*_____

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