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A DURABILITY TEST OF WOOD POSTS IN HAWAII... third progress report

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Abstract: Round posts of 10 Hawaii-grown wood species were treated with copper chromate-copper arsenate by the double-diffusion process. These and untreated posts were exposed for 10 years. Except with two coniferous species, the treatment did not lengthen service life enough to be judged worthwhile.

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In September 1961, an exposure test of round fence posts of 10 species of Hawaii-grown wood was set up in Makiki Valley, Honolulu, Hawaii. The test compared untreated posts with posts treated full length in tanks with copper chromate-copper arsenate by the double-diffusion process.[1]

Results of this test were last reported in 1965.[2] At that time 15 of the original 205 untreated posts and 181 of the original 254 treated posts remained. In September 1971, after 10 years of exposure, only one untreated post–a robusta eucalyptus–and 69 treated posts remained in the test *(table 1).* Among the treated posts, only one species–sugi–has had no failures. Except for sugi and Norfolk-Island-pine, data on average life are now complete for the treated posts. The data on average life of the untreated posts were reported earlier.[2]

The untreated posts had an average life of from less than 1 to 3 years, depending on species. Treatment more than doubled the average life of robusta eucalyptus and silk-oak and at least tripled the average life of the other species. Except for sugi, on which we must reserve judgment, it is certain that some alternative preservative treatments would yield better results.[3] For example, ohia and robusta eucalyptus pressure treated with chromated-copper arsenate and pentachlorophenol and reported on after 5 years of exposure,[4] are all still sound after 9 years. The double-diffusion method of treatment has the advantage of relative simplicity and can be done on a farm or ranch. But it is not a low-cost operation. In 1961, treatment cost ranged from $0.30 to $0.82 per post, depending on the species treated and its ease of debarking.[5]

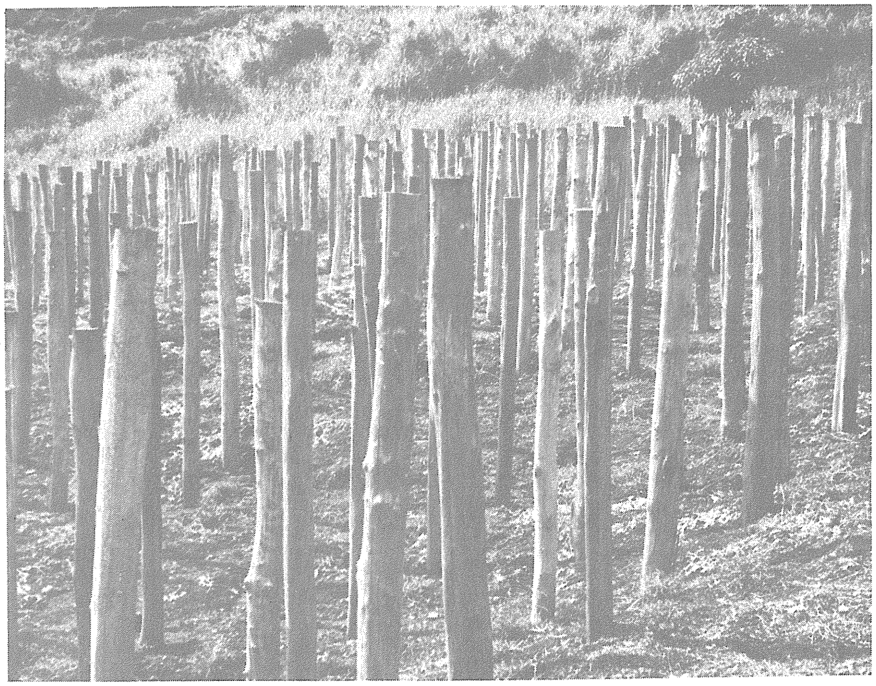
Since the greatest cost in fence building and repair is transporting and installing the posts, not the cost of the posts, the fence builder should use posts that will last as long as possible. Though the double-diffusion

Table 1—*Condition of round, 3- to 5-inch Hawaii-grown wood posts, untreated and preservative treated with copper chromate-copper arsenate by double-diffusion, Makiki Valley, Honolulu, Hawaii, September 1971*

Species	Posts in test	Average preservative retention[1]	Average groundline, diameter	Serviceable	Posts removed because of–			Average life[2]
					Decay	Decay termites	Termites	
	No.	*Lb./cu. ft.*	*Inches*	*Percent*				*Years*
TREATED POSTS								
Bluegum eucalyptus *(Eucalyptus globulus)*	24	0.61	3.9	33	8	59	0	10.0
Brushbox *(Tristania conferta)*	25	.79	3.9	16	80	4	0	7.0
Longleaf casuarina *(Casuarina glauca)*	25	.65	3.7	8	84	8	0	4.5
Norfolk-Island-pine *(Araucaria excelsa)*	24	.93	4.1	62	38	0	0	12.0*
Ohia-lehua *(Metrosideros collina)*	26	.73	4.2	8	92	0	0	8.5
Robusta eucalyptus *(Eucalyptus robusta)*	25	.57	3.6	4	76	20	0	6.0
Saligna eucalyptus *(Eucalyptus saligna)*	25	1.03	4.1	0	96	4	0	6.0
Silk-oak *(Grevillea robusta)*	26	91	3.8	4	65	31	0	6.0
Sugi *(Cryptomeria japonica)*	26	.77	4.2	100	0	0	0	–
Turpentine-tree *(Syncarpia glomulifera)*	26	1.15	3.4	38	54	8	0	8.0
UNTREATED POSTS								
Bluegum eucalyptus *(Eucalyptus globulus)*	25	–	3.9	0	32	48	20	3.0
Brushbox *(Tristania conferta)*	24	–	4.1	0	71	29	0	1.7
Longleaf casuarina *(Casuarina glauca)*	10	–	3.8	0	100	0	0	1.0
Norfolk-Island-pine *(Araucaria excelsa)*	10	–	4.6	0	10	10	80	1.4
Ohia-lehua *(Metrosideros collina)*	25	–	4.2	0	96	4	0	2.4
Robusta eucalyptus *(Eucalyptus robusta)*	25	–	4.0	4	60	36	0	2.4
Saligna eucalyptus *(Eucalyptus saligna)*	25	–	3.7	0	92	8	0	.8
Silk-oak *(Grevillea robusta)*	10	–	4.5	0	20	80	0	2.2
Sugi *(Cryptomeria japonica)*	25	–	4.1	0	36	20	44	2.9
Turpentine-tree *(Syncarpia glomulifera)*	25	–	3.5	0	88	12	0	1.9

[1]Source: Baechler, R.H., and Gjovik, L.R. *The chemical analyses of posts of Hawaiian species treated in tanks by double-diffusion*. U.S. Forest Serv. Forest Prod. Lab. 4 p. 1962.

[2]Average life is when 60 percent of posts were removed; if less than 60 percent, but more than 10 percent were removed, asterisk indicates estimate was made from figure 3 in MacLean, J.D. *Percentage renewals and average life of railway ties*. U.S. Forest Serv. Forest Prod. Lab. Report 886. 1957.



Round posts of 10 Hawaii-grown species were set up in Makiki Valley, Honolulu, in 1961, top. *Some posts had been treated with copper chromate-copper arsenate by the double-diffusion process. After 10 years,* bottom, *only a few posts remain. The missing posts broke off at ground level from decay or termite attacks, and were removed. Another wood durability test underway is shown in the background.*

method was better than no treatment for the eight hardwood species tested, its use would be unwise when still better treatments are available at not too great a difference in cost.

It is possible that the softwood posts—sugi and Norfolk-Island-pine—are outlasting the hardwoods because the fungi that attack them are less resistant to the inorganic preservatives used than are the hardwood-destroying fungi.[6] If such is the case, better results might be achieved by using the same process, but with different chemicals.

It is noteworthy to compare termite attack, by treatment and tree species. The subterranean termites *(Coptotermes formosanus)* attacked bluegum, silk-oak, and robusta heavily whether the posts were treated or not, though they were somewhat deterred by the preservatives. So far, termites seem to be avoiding treated Norfolk-Island-pine and sugi. When untreated, these two were the species most heavily attacked. This difference is primarily only of academic interest because subterranean termites are not yet an important threat to fence posts on most farms and ranches in Hawaii. They have not yet spread that far from their centers of introduction.

NOTES

[1]Baechler, R. H., *How to treat fence posts by double-diffusion.* U.S. Forest Serv. Forest Prod. Lab. Rep. 1955, 6 p., illus. 1962.

[2]Skolmen, R. G. *A durability test of wood posts in Hawaii. . .second progress report.* U.S. Forest Serv. Res. Note PSW-91, Pacific SW. Forest & Range Exp. Sta., Berkeley, Calif. 3 p. 1965.

[3]Blew, J. O., and J. W. Kulp. *Service records on treated and untreated fence posts.* U.S. Forest Serv. Forest Prod. Lab. Res. Note FPL-068, 52 p. 1964.

[4]Skolmen, R. G. *Preservatives extend service life of ohia and robusta posts.* U.S. Forest Serv. Res. Note PSW-171, Pacific SW. Forest & Range Exp. Sta., Berkeley, Calif. 2 p. 1968.

[5]Skolmen, R. G. *Treating costs and durability tests of Hawaii-grown wood posts treated by double-diffusion.* U.S. Forest Serv. Res. Note 198. Pacific SW. Forest & Range Exp. Sta., Berkeley, Calif. 5 p. 1962.

[6]Baechler, R. H., and H. G. Roth. *The double-diffusion method of treating wood: a review of studies.* Forest Prod. J. 14(4): 171-176. 1964.

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