Leaflet No. 10/91-92

Government of the Union of Myanmar
Ministry of Forestry
Forest Department

A Comparative Study on the Durability of Earth-Oil and CCA Treated Timbers

U Win Kyi (2), B.Sc. [For.] [Rgn.], M.S. (SUNY)
Assistant Director,
Forest Research Institute
1992

ရေနံချေးနှင့်စီစီအေဆေးသွင်းထားသောသစ်တို.
ကြာရှည်ခံနိုင်မှုကိုနှိုင်းယှဉ်လေ့လာခြင်း

ဦးဝင်းကြည်(၂) (B.Sc. [For.] [Rgn.], M.S. [SUNY])
လက်ထောက်ညွှန်ကြားရေးမှူး
သစ်တောသုတေသနဌာန

စာတမ်းအကျဉ်းချုပ်

ရေနံချေးနှင့်(၃)ရာခိုင်နှုန်း Tanalith-CT 106 ဆေးသွင်းထားသောသစ်မျိုး (၂၈)မျိုးတို့၏ သစ်နမူနာတုံးများကို ဆေးမသွင်းမထားသော အဆိုပါသစ်တို့နှင့်အတူစိုစွတ်သော မြေတွင်မြှုပ်၍ စမ်းသပ်ခဲ့ပါသည်။ အပူပေးအခြောက်ခံထားသော အလေးချိန်မှလျော့နည်းသွားသည့် အလေးချိန် ရာခိုင်နှုန်းကို သစ်ဆွေးသည့်ပမာဏအဖြစ် တိုင်းတာရန်အသုံးပြုခဲ့ပါသည်။ ရေနံချေးဆေးသွင်း ထားသောသစ်တို့သည် ဆေးမသွင်းထားသောသစ်များထက် ကောင်းမွန်ကြောင်း တွေ့ရှိရသော်လည်း၊ စီစီအေဆေးသွင်းထားသော သစ်မျိုးအားလုံးခန့်သည် သစ်ဆွေးခြင်းမှ ကာကွယ်ရာတွင် ၄၄်းတို့ထက် သာလွန်ကြောင်း တွေ့ရှိရပါသည်။

A Comparative Study on the Durability of Earth-Oil and CCA Treated Timbers

U Win Kyi (2), B.Sc. [For.] [Rgn.], M.S (SUNY),
Assistant Director,
Forest Research institute

Abstract

Specimens of some 28 species of timber were treated with earth-oil and 3% Tanalith CT-106 and buried in the wet soil with the control specimens. Oven-dry weight loss-percentage was used as a measure of severity of decay. Although earth-oil treated woods were found to perform better than untreated ones, most of them were found to be inferior to CCA treated specimens in decay resistance.

Contents

1. Introduction

Owing to the systematic management of the forest and wealth of the nation having such durable species as Kyun, Pyinkado and Thitya-ingyin, preservation of timber has never become important in wood product industries in Myanmar. However, traditionally, earth oil has long been used extensively in the country as a wood protecting material.

Treatment of wood with imported wood preservatives was found in limited area such as Myanma Railways where creosote was used for the treatment of sleepers. Recently, Myanma Timber Enterprise has developed timber treatment plants using CCA. The imported chemicals are effective but expensive involving foreign exchange. Commercial exploitation of LKS, somehow. requires preservative treatment at reasonable cost since many of the LKS are not durable. It is of interest to know how well earth oil could protect wood compared to imported wood preservatives. The present study dealt with the fungal resistance of some 28 species of wood treated with earth oil and Tanalith CT-106.

2. Literature Review

CCA is the generic name of the wood preservatives which contain copper, chromium and arsenic compounds. Tanalith CT-106 is one of the CCAs' and it contains 45 percent sodium dichromate, 35 percent copper sulfate and 20 percent arsenic pentoxide, all in the hydrated forms. Numerous works have been done regarding the performance of CCA treated wood products through out the world (1-9). However, such efforts are relatively scarce in this country (10-11).

Due to its effectiveness against the board spectrum of biological wood destroying agencies and its permanence in the treaded timber CCA gains a grater acceptance by the wood preservation industries during the later part of the century. Over 20000 tones of CCA have been used annually in the United States alone (12). This is about 82 percent of the total consumption of all the water-borne preservatives in the States.

Century old recognition of earth oil as a wood preservative in Myanmar has, somehow, proved its effectiveness in the protection of wood against biological deterioration. In fact, waxy nature of earth oil would, certainly, impart wood water repellent property which is one of the requirement for decay resistance of timber.

3. Materials and Methods

Some common species of timber available at Pyinmana area were chosen for the experiment. Timbers were air-dried and cut to the specimen size, ½ x ½ x 1 cubic inches. Twenty specimens were chosen for each species and each treatment. The selected specimens were oven-dried and the corresponding weights recorded.

One set of specimens were treated with Tanalith CT-106 as follows:

(a) 3% Tanalith CT 106 solution was prepared and pumped into the laboratory vacuum-pressure treatment plant.
(b) The retort was loaded with the wood specimens and vacuum (28 in Hg) was applied to it for 15 min.

(c) It was followed by the release of the preservative solution into the retort
(d) Pressure was applied to the treating solution at 200 psi for 1 h.
(e) The preservative solution were drained and a final vacuum was applied for 15 min.
(f) The specimens were kept overnight in the retort for further diffusion and treated weight recorded.

Another set of specimens were boiled in earth oil for 1 h. and cooled down in the same retort. The excess earth oil on the surfaces of the specimens was cleaned and the treaded weight recorded.

The last set was kept as control specimens.

Each set of specimens were buried in the soil in the laboratory. The moisture content of the soil was maintained at 25-30%. The temperature of the room was maintained at 75-85 ˚F.

Untreated specimens were taken out of the soil at the end of 16 week exposure period and weighed. Oven-dry weight was also recorded again. Weight loss percentage was regarded as the parameter measuring the severity of decay.

Intermediate inspections were made for the treated wood specimens at 8 week intervals. According to the results of such inspections, exposure period of the treated wood was decided. Weight measurements of earth oil and Tanalith CT-106 treated specimens were thus made at the end of 32^{nd} and 80^{th} week respectively.

4. Results and Discussion

No appreciable weight loss was found for the treated woods at the end of 16^{th} week when untreated specimens were removed from the soil. Considerable weight losses were found for the earth-oil treated specimens and for some of the CCA treated specimens at the end of 32^{nd} and 80^{th} week respectively. Mean oven-dry weight loss percentages of the specimens of each species were shown in table (1).

Generally, treated woods were found to last longer than untreated ones. However, effectiveness of earth oil was found to be inferior to that of CCA. Out of 28 species treated with earth oil, only Letpan, Panga, Hnaw and Thitsein were found to receive adequate protection against the decay fungi in the wet soil. While untreated Yinzat, Myauk-ngo and Thitsi were by themselves durable (Weight loss less than 10%), earth oil was found to help prolong the service life of the woods.

Almost all the CCA- treated specimens tested were found to be durable at the end of 32^{nd} week and still sound at the end of 80^{th} week. However, Thabye, Taung-thayet and Panga were found to suffer noticeable attack (weight loss more than 20%) at the end of 80^{th} week. Non-durable species such as Letpan, Baing, Kuthan and Hnaw were found excellent when treated with CCA.

5. Conclusion

Generally, earth oil treatment was found to be not as efficient as CCA treatment to protect wood which was in contact with the soil. However, earth oil was found to have specific protection to some species against the decay fungi in the test soil. Letpan, Panga, Hnaw and Thit-sein were included in such group. CCA was found to extend the service life of most of the species tested by, at least, five times. Letpan, Baing, Kuthan and Hnaw were found to be the most compatible species with CCA treatment.

Table 1. Mean weight losses of the control, Earth-oil and CCA treated timber specimens at the end of specified period in the wet soil.

No.	Species	16 weeks	32 weeks		80 weeks
		control	Earth oil	CCA*	CCA
1.	Sandawa	0.98	7.16	-0.25	0.35
2.	Ye-pyinma	0.99	7.84	-1.06	-1.98
3.	Thitsi	2.06	-1.46	-0.71	2.51
4.	Yindaik	2.59	10.52	10.46	0.66
5.	Kyun	2.67	11.16	0.63	-8.56
6.	Thadi	3.60	13.77	0.69	2.98
7.	Nabe	4.11	28.91	0.86	6.02
8.	Chinyok	4.11	22.46	2.25	3.82
9.	Myauk-ngo	4.28	3.33	0.87	3.69
10.	Thitkado	5.16	19.12	-0.58	-3.23
11.	In	5.47	12.09	0.55	3.98
12.	Zinbyun	5.94	11.49	-0.28	9.16
13.	Yemane	6.73	20.94	-0.42	1.19
14.	Yinzat	9.03	6.83	-0.03	3.88
15.	Pyaukseik	10.17	12.35	1.22	0.52
16.	Kanyin-byu	10.95	21.65	1.58	12.94
17.	Bonmeza	13.25	41.31	2.56	10.01
18.	Baing	13.50	13.64	-3.18	-4.86
19.	Zaungbale	13.91	11.25	3.74	11.35
20.	Panga	14.84	-0.10	1.89	20.52
21.	Hnaw	14.99	4.48	0.00	4.71
22.	Thitsein	16.88	7.48	4.07	12.31
23.	Taung-thayet	18.05	20.90	4.34	24.83
24.	Thabye	20.76	13.70	5.96	27.86
25.	Kuthan	21.51	11.95	0.66	5.13
26.	Mau-kadon	26.48	25.90	9.72	11.85
27.	Didu	31.90	35.33	-2.80	2.42
28.	Letpan	39.80	-13.90	-1.57	-3.61

*Spot check only.

References

1. Butcher, J.A and T. Nilsson (1982). Influence of Variable Lignin Content Amongst Hardwoods on Soft-rot Susceptibility and Performance of CCA Preservatives. Document No. IRG/WP/1151.
2. Drysdale, J.A., D.J. Dickison, and J.Levy (1980). Microdistribution of a CCA Preservative in Five Timbers of Varying Susceptibility to Soft-rot Material and Organismen 15(4): 287-303.
3. Carlos, V.J., F.R. Niederaurer , and J.P.P. Wehr (1985). Performance of CCA Treated Eucalyptus Round Ties. Document No. IRG/WP/3342.
4. Leightely, L.E and J. Norton (1983). High CCA retention and the Protection of Eucalyptus Power Poles. Document No. IRG/WP/3226.
5. Barnacle, J.E., G.C. Jonhnson and M.A. Tighe (1983). Soft-rot in Heartwood of preservative treated Pole Stubs of *E. cypellocarpa* L. Johnson. Document No. IRG/WP/1204.
6. Gray, S.M. and D.J. Dickson, (1982). CCA Modifications and Their Effect on Soft-rot in Hardwoods. Document No. IRG/WP/ 3201.
7. Gray, S.M and D.J. Dickson (1983). CCA Modifications and Their Effect on Soft-rot in Hardwoods. Part 2. Document No. IRG/WP/3244.
8. Smith, D.N.R and A.I. Williams (1973). The Effect of Composition on the Effectiveness and Fixation of Copper-Chrome-Arsenic and Copper-Chrome Preservatives. Part 1. Effectiveness Wood Science and Technology. Vol. 7: 60-76.
9. Smith, D.N.R. and A.I Williams (1973). The Effect of Composition on the Effectiveness and Fixation of Copper-Chrome-Arsenic and Copper-Chrome Preservatives. Part 2: Selective absorption and Fixation. Wood Science and Technology. Vol.7: 142-150. Springer-Verlag.
10. ဦးဝင်းညွှန့်နိုင် နှင့် ဦးတင်ထွဋ်(၂) (၁၉၈၈) အင်သစ်အမျိုးအစားအား Tanalith.C ဆေးဖြင့်ဆေးသွင်းပြုပြင်ရာမှ တွေ့ရှိချက်များ သစ်လုပ်ငန်း ကော်ပိုရေးရှင်း။
11. Nyunt, A. (1979). Treatability and Performance of In, Kanyin and Taung- thayet. FRI leaflet No. 4/87-88.
12. Wilkinson, J.G. (1979) Industrial Timber Preservation. The Rentokil Library, London.