



Ambrosia Beetles Have Expensive Tastes

by

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In the Spring of each year, the ambrosia beetle usually takes flight in British Columbia, and attacks logs that happen to be stored in its flight path. The beetle attacks the logs by tunnelling through the bark into the sapwood, where it cultivates ambrosia fungus on which it feeds and raises its larvae.

The trouble with this is that it leaves holes in the log; even though they are only pinholes (as termed in lumber grading circles), they can effectively degrade the wood. The better, more valuable grades of lumber tolerate few if any pinholes, whereas the lower, less valuable grades are more tolerant. Veneer values are also reduced by the ambrosia beetle; but, as I have no data on economic losses in veneer, this discussion will be confined to lumber values.

The financial damage done by the ambrosia beetle depends on log quality as it relates to lumber grade yields, severity of attack, and the level of lumber prices when the log is converted to lumber.

Previous studies [1, 2, 3, 4] have reported on damage caused by the beetle, and others [5, 6] have indicated the benefits of water spray as a control measure.

The purpose of this paper is to render a current evaluation of losses in lumber values owing to ambrosia attacks, by updating a previous study [2], and to indicate the payoff from sprinkling.

SAMPLING

Logs were selected from along a logging roadway in the Cowichan Lake area of Vancouver Island. The logs, felled the previous autumn and winter, were under attack when selected in the spring of the year. Although several species of ambrosia beetles exist in the area, logs selected were attacked chiefly by *Trypodendron lineatum* (Oliv.), which was the most numerous and caused the most damage. Logs were transported to a nearby sawmill where they were debarked preceding assessment of attack intensity. Three classes of attack were recognised - **light**, corresponding to ≤ 14 beetle holes per square foot of surface; **moderate**, corresponding to 15 to 50 holes per square foot, and **heavy**, which was 51 or more holes per square foot.

Species, grade and numbers of logs, with attack severity were as follows:

Species	Grade	Number of logs	Intensity of attack
D. Fir	2	20	Moderate
D. Fir	3	45	Moderate
W. Hemlock	2	5	Moderate
W. Hemlock	3	15	Moderate
W. Hemlock	3	23	Light

The logs were then processed through the mill with rough, green lumber being tallied and graded by experienced lumber graders. The procedure was to grade each piece ignoring beetle holes, which was the Before Attack grade, and also to grade it as it actually was, the After Attack grade.

Lumber was graded under the West Coast Lumberman's Association (W.C.L.A.) List No. 15 Grading Rules for the north American market, and under the "R" list for the overseas markets. W.C.L.A. Rules have been superseded by the National Lumber Grading Authority (N.L.G.A.) Rules for the north American market; however, there is enough similarity between them to justify using the results of the previous study [2] to estimate current losses to ambrosia beetles.

RESULTS

Beetle tunnelling activity is concentrated largely in the outer 1.5 inches of the log, although some beetles penetrate 3 inches or more, particularly in hemlock.

Radial-depth distributions of beetle holes were as follows:

Radial Depth (in.)	D. Fir	W. Hemlock
	Percentage of Pinholes	
0.5	62.7	59.6
1.0	90.7	81.8
1.5	99.0	93.5
2.0	99.5	98.2
3.0	100.0	100.0

Lumber grade yields and values before and after attack are shown in Tables 1 and 2. Losses in value are summarized in Table 3.

Hemlock suffered to a greater extent than fir of the same grade, both moderately attacked, because there was greater degrade of the high value grades of clear lumber. Grade 3 logs suffered less than grade 2 of the same species and attack intensity because of the lower percentage of clear lumber in grade 3. Light intensity attack was considerably less damaging than moderate intensity in grade 3 hemlock. Losses under "R" List grading rules were appreciably greater than under List 15 rules, because of the more stringent grade requirements in the overseas lumber markets.

PROTECTION

Adequate protection from ambrosia beetle attack can be provided by the use of water sprays. A sprinkling system used in a study at Port Renfrew [6] on Vancouver Island was estimated to cost \$6000 at 1972 prices, and protected 720 cunits of logs, which was considerably under the system capacity.

Assuming costs have risen an average of 10% per year since 1972, current investment required for a similar system would be about \$10,000, and the volume protected could probably be at least 1000 cunits. Annual operating costs of \$1400 in 1972 would probably be around \$2500 now, for a total annual cost of around \$4500, or \$4.50 per cunit, if the system is written off over 5 years. If sprinkler coverage were 1500 cunits, cost per cunit would be \$3.00.

DISCUSSION

From Table 3, it is apparent that considerable savings can be effected by using water sprinklers to protect stored logs from ambrosia beetle attack. This is particularly so if much cutting for overseas markets is practised. Of course if no protection is given and ambrosia beetle damage occurs, it is obvious that the affected logs should be used in cutting for the North American market.

Given limited resources, the strategy should be to sort logs by grade and protect the higher grade logs first. Although this study showed that hemlock suffered to a greater degree than fir, further studies would be needed to verify if this was habitual or simply a result of log selection for the study.

Although water sprays are effective in discouraging beetle attacks, they are not always feasible, particularly in areas of limited water supply, poor drainage conditions or where environmental considerations mitigate against them. In such areas, alternate protection methods, such as the application of environmentally acceptable chemicals, may be considered.

TABLE 1

Lumber Grade Yields and Values For Douglas-fir
Before and After Ambrosia Beetle Attack

Log Grade	Moderate Beetle Attack Fir Grade 2		Fir Grade 3	
	Before	After	Before	After
	Percentage Lumber			
<u>Lumber Grade</u>				
			<u>List 15 Rules</u>	
C CLR. & BTR.	24.7	15.4	6.0	1.2
D CLR.	3.3	11.4	1.0	4.5
No. 2 & BTR. Struct.	65.8	67.0	89.9	91.2
No. 3	6.2	6.2	3.1	3.1
\$/M fbm	312.88	303.80	264.43	258.56
Difference \$/M fbm		<u>9.08</u>		<u>5.87</u>
			<u>"R" List Rules</u>	
No. 3 CLR. & BTR.	24.7	12.8	6.0	0.7
No. 2 & BTR. Merch.	69.1	75.5	90.9	86.7
No. 3 Common	6.2	11.7	3.1	12.6
\$/M fbm	307.10	273.23	262.68	242.30
Difference \$/M fbm		<u>33.87</u>		<u>20.38</u>

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<u>List 15</u>		<u>"R" List</u>	
	\$500/M fbm		\$500/M fbm
C CLR. & BTR.	425	No. 3 CLR. & BTR	250
D CLR.	250	No. 2 & BTR. Merch.	175
No. 2 & BTR. Struct.	175	No. 3 Common	
No. 3			

TABLE 2

Lumber Grade Yields and Values for Western Hemlock
Before and After Ambrosia Beetle Attack

Log Grade	Moderate Beetle Attack		Hemlock Grade 3		Light Beetle Attack	
	Hemlock Grade 2	Hemlock Grade 3	Hemlock Grade 3	Hemlock Grade 3	Hemlock Grade 3	Hemlock Grade 3
Lumber Grade	Percentage Lumber					
	Before	After	Before	After	Before	After
List 15 Rules						
C CLR. & BTR.	23.3	8.8	17.0	3.6	13.5	10.3
D CLR.	2.1	13.6	2.4	12.6	2.4	5.3
No. 2 & BTR Struct.	73.7	76.7	77.1	80.3	71.5	71.8
No. 3	0.9	0.9	2.8	2.8	12.1	12.1
Economy	—	—	0.7	0.7	0.5	0.5
\$/M fbm	262.50	247.42	247.46	232.93	234.58	231.76
Difference \$/M fbm	<u>15.08</u>		<u>14.53</u>		<u>2.82</u>	
"R" List Rules						
No. 3 CLR. & BTR.	23.3	5.3	17.0	2.9	13.5	7.4
No. 2 & BTR. Merch.	75.8	88.5	79.5	84.6	73.9	76.4
No. 3 Common	0.9	6.2	2.8	11.8	12.1	15.7
Economy	—	—	0.7	0.7	0.5	0.5
\$/M fbm	259.56	217.68	244.10	208.39	231.22	215.94
Difference \$/M fbm	<u>41.88</u>		<u>35.71</u>		<u>15.28</u>	

Lumber Prices January 1978

List 15		"R" List	
C CLR. & BTR.	\$425/M fbm	No. 3 CLR & BTR.	\$425/M fbm
D CLR.	350	No. 2 & BTR. Merch	210
No. 2 & BTR. Struct.	210	No. 3 Common	150
No. 3	150		
Economy	100		

TABLE 3

Summary of Losses in Lumber Grade Values

Species	Grade	Attack Intensity	Value Losses			
			List 15		"R" List	
			\$/M	\$/Ccf*	\$/M	\$/Ccf*
D. Fir	2	Moderate	9.08	5.45	33.87	20.32
D. Fir	3	Moderate	5.87	3.52	20.38	12.23
W. Hemlock	2	Moderate	15.08	9.05	41.88	25.12
W. Hemlock	3	Moderate	14.53	8.72	35.71	21.42
W. Hemlock	3	Light	2.82	1.69	15.28	9.76

* At .6 lb Yields

Based on January 1978 Lumber Prices

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