RESEARCH NOTE NC-12

NORTH CENTRAL FOREST EXPERIMENT STATION, FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE

Folwell Avenue, St. Paul, Minnesota 55101

Effect of Staining Caused by Sapstreak Disease on Sugar Maple Log and Lumber Values

Sapstreak, a killing disease of sugar maple (*Acer saccharum* Marsh.), caused by the fungus *Ceratocystis coerulescens* (Munch) Bakshi, was first described by Hepting in 1944 in North Carolina. It was reported in the Lake States by Kessler and Anderson in 1960 and in the Northeast by Houston and Fisher in 1964. It has also been found on occasional yellow-poplars (*Liriodendron tulipifera* L.) in scattered locations in Tennessee and North Carolina (Roth *et al.* 1959). In 1963, Ohman and Kessler reported several new cases in the Upper Peninsula of Michigan, including one stand in which the incidence was probably about 10 percent. They also presented evidence indicating that the fungus enters primarily through root wounds caused by logging.

Since 1963 sapstreak has been observed in over 100 living or recently killed sugar maples throughout Upper Michigan. All but two of these trees were in stands partially cut 3 to 10 years previously, and the fungus appeared to have entered through low stem or root wounds caused by logging. Two trees were found in old-growth stands that had never been logged; in both cases, windfalls of nearby trees had caused similar wounds that served as entry courts for the fungus.

The fungus causes extensive staining in infected but still living trees (Hepting 1944, Ohman and Kessler 1963). It is a common cause of sapstain in hardwood lumber throughout the East (Davidson 1935), and the fungus is very common on recently cut surfaces of stumps and logs (Ohman and Kessler 1963, Shigo 1962). However, the stain caused by the fungus in living trees is not superficial and is much darker than that found in dead material. Since such discoloration would obviously cause reductions in log and lumber quality, this study was made to obtain some idea of the magnitude of such loss. Mr. Leo Gannon, President, Gannon Lumber Corp., Marquette, Mich., cooperated in the mill phase of the study.

During a 2-year period, 14 sugar maple saw logs infected by sapstreak (fig. 1) were brought to the mill. These were segregated from normal logs and later sawed separately. Most were from a tract of old-growth northern hardwoods in which all merchantable eastern hemlock (*Tsuga canadensis* (L.) Carr.) had been logged 5 years previously.

F-503781

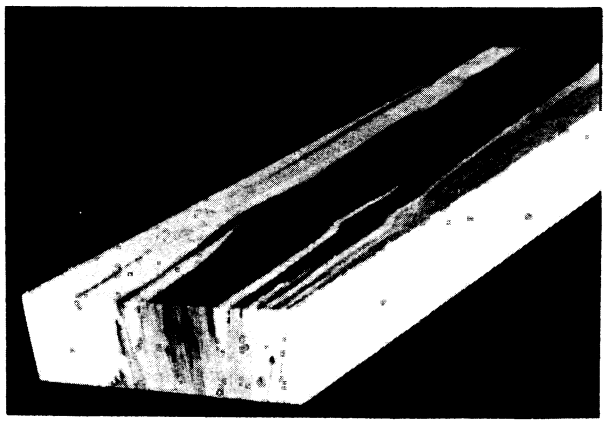
FIGURE 1. — Cross-sections showing characteristic stain patterns caused by sapstreak in living sugar maples. *Left*: Large end of a 16-foot butt log. *Right*: Scaling end of same log. Note the many narrow points extending toward the cambium. On freshly cut surfaces the apices of these points are green. Reddish to gray radial streaking is present within the main body of tan to brown discoloration. The circular, darker stain in the center is dark heart and not caused by sapstreak.

Each infected log was scaled, then graded, using log grades developed by the Forest Products Laboratory (1959), in two ways: as the log actually appeared and as it would have been graded had the sapstreak stain not been a defect. Lumber obtained from these logs (figs. 2 and 3) was measured and graded by National Hardwood Lumber Association (1962) rules and also graded as if the sapstreak stain was no defect.

All infected logs had heavy stain extending to the cambium, well beyond the allowable limits for grade 1 and 2 logs and these were thus reduced one grade. Four grade 1 logs were reduced to grade 2, and six grade 2 changed to grade 3 (table 1). The four grade 3 logs were unchanged. Value of all the logs was reduced by 32 percent based on 1966 log prices, f.o.b. mill.

F-514380

FIGURE 2. — **Surface view of sugar** maple boards from infected logs. *Left*: Board cut from the main body of the discoloration. The stain is tan to brown with reddish to gray streaks. *Right*: Board cut from a zone nearer the cambium includes green streaks.



F-514381

FIGURE 3. — End view of a board similar to that shown in Figure 2, right.

Most of the lumber derived was also deeply stained and so did not yield the required percentages of clear cuttings for the higher grades (table 2). Based on current prices, f.o.b. mill, lumber value was reduced by 57 percent with most of the change occurring in the highest value lumber. Nearly all of the number 1 and better grades dropped to 3B common, the lowest grade.

These results suggest that value loss due to sapstreak stain is so great that salvage of infected trees for lumber is not feasible, even if they are located and removed before death. Infected logs cut during logging operations would probably best be utilized for pallet lumber, industrial blocking, or chemical-wood if a market is nearby.

Literature Cited

Davidson, Ross W.
1935. Fungi causing stain in logs and lumber in the southern states including five new species. J. Agr. Res. 50: 789-807.

Forest Products Laboratory, U. S. Forest Service.
1959. Hardwood log grades for standard lumber. Rep. D1737, 15 pp.

Hepting, George H.
1944. Sapstreak, a new killing disease of sugar maple. Phytopathology 34: 1069-1076.

TABLE 1. — *Value loss from sapstreak stains based on change in log grade*

Sapstreak stain no defect				Sapstreak stain a defect				
Log grade	No. logs	Board feet[1]	Value[2]	Board feet[1] in log grade			Value[2]	Value loss (percent)
				1	2	3		
1	4	590	$ 64.90	-	590	-	$ 41.30	36
2	6	640	44.80	-	-	640	28.80	36
3	4	290	13.05	-	-	290	13.05	0
Total	14	1,520	$122.75	-	590	930	$ 83.15	32

[1]Net scale, Scribner Dec. C.

[2]Based on f.o.b. mill prices for log grade No. 1, $110/MBF; No. 2, $70/MBF; No. 3, $45/MBF.

TABLE 2. — *Value loss from sapstreak stains based on change in lumber grade*

Sapstreak stain no defect			Sapstreak stain a defect					
Lumber grade	Board feet	Value[1]	Board feet in lumber grade				Value[1]	Value loss (percent)
			1C & Better	2C	3A	3B		
#1C & Better	652	$ 136.92	30	22	84	516	$ 36.36	73
#2C	382	31.32	-	148	-	234	22.67	28
#3A	116	6.96	-	-	99	17	6.71	4
#3B	385	17.32	-	-	-	385	17.32	0
Total	1,535	$ 192.52	30	170	183	1,152	$ 83.06	57

[1]Based on f.o.b. mill prices for #1C & Better, $210/MBF; #2C, $82/MBF; #3A, $60/MBF; #3B, $45/MBF.

Houston, David R., and Kenneth D. Fisher.
1964. Sapstreak of sugar maple found in the northeast. Plant Dis. Reporter 48: 788.

Kessler, K. J., Jr., and R. L. Anderson.
1960. *Ceratocystis coerulescens* on sugar maple in the Lake States. Plant Dis. Reporter 44: 348-350.

National Hardwood Lumber Association.
1962. Rules for the measurement and inspection of hardwood lumber, cypress, veneers, and thin lumber. 126 pp. Chicago, Ill.

Ohman, John H., and K. J. Kessler, Jr.
1963. Current status of the sapstreak disease of sugar maple in the Lake States. U.S. Forest Serv. Res. Note LS-10, 4 pp. (Lake States Forest Exp. Sta.)

Roth, Elmer, George H. Hepting, and Richard E. Toole.
1959. Sapstreak disease of sugar maple and yellow poplar in North Carolina. (Abstract.) Phytopathology 49: 549.

Shigo, Alex L.
1962. Observations on the succession of fungi on hardwood pulpwood bolts. Plant Dis. Reporter 46: 379-380.

JOHN H. OHMAN
Principal Plant Pathologist
A. BRUCE SPIKE
Consulting Forester
Marquette, Mich.

September 1966