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GROWTH OF CANKERS CAUSED BY *HYPOXYLON PRUINATUM* ON ASPEN AND SPORULATION OF THE FUNGUS[1]

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Introduction: Hypoxylon pruinatum (Klot.) Cke causes cankers on the trunks and cankers of various species of *Populus* throughout the range of these trees, and is second only to heartrot as a cause of loss in aspen (*Populus tremuloides Michx.*) in the Lake States.

About 90% of the cankers originate in or around branch axils; once established, the fungus invades and decays the bark, cambium, and wood, and kills the tree. The cankers develop much more rapidly longitudinally than they do laterally and it is not unusual to find cankers 4 to 5 feet long on trees only 4 or 5 inches in diameter. There is little information on the rate of development of the cankers, the time of year during which canker development is most rapid, or when conidia and ascospores are produced. The study here reported is aimed to gather information on these points.

Methods: In March, 1959, 16 young cankers were selected for study. A nail was driven into the trunk at the approximate center of each canker, near where infection apparently had occurred, and the areas where conidia or perithecia were evident were marked with paint. The increase in size of the cankers was measured during the following year, and the appearance of new patches of coremia (on which the conidia are produced) and of perithecia was recorded.

Results: The major results are summarized in Tables 1 to 3. The cankers increased an average of about 25 centimeters in length and 7 centimeters in width during the year. The maximum increase in length was about 52 centimeters. Growth upward and downward was about the same. Longitudinal advance of the cankers was judged by external symptoms (discoloration and collapse of the bark), although the outer bark was shaved off from the borders of several cankers and the fungus was observed in the inner bark 5-7 cm. in advance of any outward symptoms. The cankers elongated most rapidly from June through September, more slowly from March through June, and about the same from October to March as from March through June.

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TABLE 1. Increase in length and width of cankers produced by *Hypoxylon pruinatum* from March, 1959, to March, 1960.

	Increase in length			Increase in width
	Upward	Downward	Total (centimeters)	
Average	12.2	12.8	25.0	7.2
Range	0.0–25.9	0.8–26.6	0.8–52.5	0.5–15.2

TABLE 2. Average monthly increase in size of cankers produced by *Hypoxylon pruinatum* from March, 1959, through March, 1960

Month	Increase in length			Increase in width
	Upward	Downward	Total (centimeters)	
March-June	1.2	1.2	2.4	0.2
June-September	1.8	1.6	3.4	0.8
September-October	0.6	1.3	1.9	0.2
October-March	0.5	0.6	1.1	0.8

TABLE 3. The production of new coremia by *Hypoxylon pruinatum* from March, 1959, through October, 1959.

Canker No.	March Initial reading (Old coremia)	May	June	August (New coremia)	September	October
1	—	+[1]	—	—	—	—
2	+	—	—	+	—	—
3	—	—	—	—	—	—
4	—	—	—	—	—	—
5	—	+	—	+	—	—
6	—	—	—	—	—	—
7	—	++	++	+	—	—
8	—	++	++	+	—	—
9	—	—	—	+	—	—
10	—	++	+	+	+	+
11	—	+	—	—	—	+
12	—	++	++	+	—	—
13	+	—	++	+	—	—
14	—	++	+	+	—	—
15	+	—	+	—	—	—
16	+	++	++	+	—	—

[1] + Few scattered patches of coremia.
++ Large continuous area of coremia.

Patches of coremia were present on four of the cankers at the beginning of the study, and were found on nine of the sixteen cankers by the middle of May. They were abundant on six of the cankers and sparse on the other three. They continued to be produced into June, after which their production declined rapidly; new coremia developed on only one canker in September and on two in October. Three cankers did not produce coremia.

On two cankers on which perithecia were present when the study

began, new perithecia began to develop in June, and more perithecia continued to develop on these cankers throughout the summer and fall. On two cankers, on which no perithecia were present at the beginning of the study, perithecia began to develop during September, and reached a maximum of development in October. These perithecia matured during the winter and early spring.

Discussion and Conclusions: The study was preliminary in nature; it included only a few cankers on trees in a limited area. Its most important function was to provide a basis for future work. On the basis of results obtained, however, several tentative conclusions seem justified: 1. Cankers elongated most rapidly from June through September, but increased in length almost as much from October through February as from March through May; evidently the fungus is not entirely dormant through the winter. 2. Coremia, the conidial fruit bodies, were produced most abundantly in the spring; very few developed in the summer and fall. 3. Perithecia arose during the summer on cankers which previously had produced perithecia, but new perithecia, on cankers which had not previously produced them, appeared only during late fall, and these perithecia matured during the winter. Presumably, inoculum in the form of conidia would be most abundant relatively early in the spring, while inoculum in the form of ascospores would be available throughout the year.