U. S. FOREST SERVICE

RESEARCH NOTE NC-93

NORTH CENTRAL FOREST EXPERIMENT STATION, FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE
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Relation of Light to Epicormic Sprouting in Sugar Maple

ABSTRACT. — A test of the influence of light intensity on dormant buds of young sugar maple trees showed that exposure to light is not essential for epicormic sprouting.
OXFORD: 181.63:181.21:176.1 *Acer saccharum*

Epicormic sprouts reduce the quality of sugar maple (*Acer saccharum* Marsh.) saw logs, so it is important to know how sprouting is influenced by stand treatment. Two conditions seem to stimulate sprouting: rapid loss of the live crown (Wahlenberg 1950) and sudden or excessive exposure (Blum 1963, Kramer and Kozlowski 1960).

It has been assumed that heavy thinning causes epicormic sprouting by letting too much light into the stand. However, variation in light intensity itself, except at low levels, is not known to influence breaking of dormancy (Vegis 1964). In other words, it does not seem likely that dormant buds sprout solely as a result of increased light intensity on the bud.

To test the relation between light and epicormic sprouting in sugar maple, a study was conducted on the Upper Peninsula Experimental Forest from May to August. The results show that direct light on dormant buds is not necessary for epicormic sprouting.

METHODS

Twelve codominant sugar maple trees about 5 inches d.b.h. were selected for study in the spring; these trees were in an even-aged stand of second-growth northern hardwoods. All dormant buds in a 5-foot study zone below the base of the live crown were counted, and existing epicormic sprouts removed. On May 4, about 2 weeks before budbreak, the following treatments were made: (1) thinning — all trees for a radius of 20 feet around four sample trees were removed, (2) "decapitation"—tops of four sample trees were cut off at the base of the live crown, and (3) no treatment — four sample trees were used as controls. On two of the four trees in each treatment, the 5-foot study zone below the live crown was covered with 8-inch diameter galvanized stovepipe painted black on the inside surface (fig. 1). The galvanized outer surface reflected sunlight, reducing the

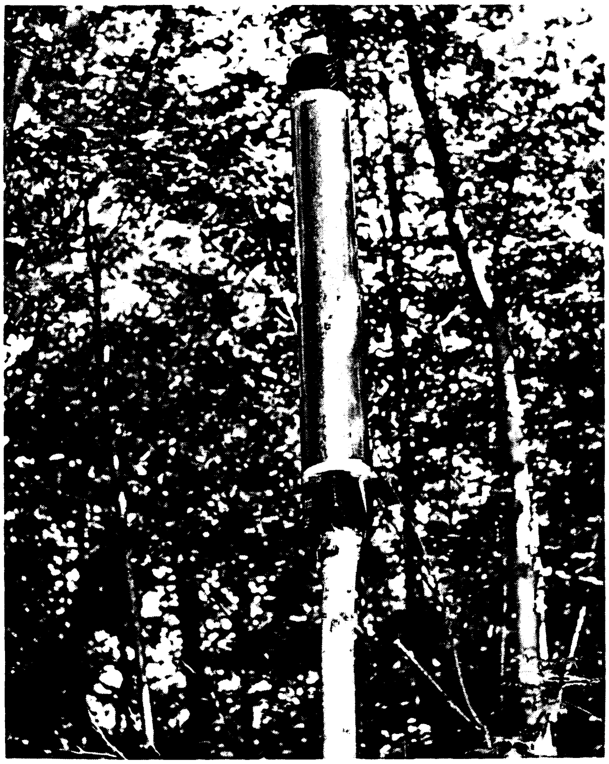

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Figure 1. — "Decapitated" tree with galvanized stovepipe covering a 5-foot section of the stem.

possibility of abnormally high temperatures at the tree surface. Black polyethylene was taped around the top and bottom openings of the stovepipe to exclude light; small holes in the polyethylene allowed some air circulation. The stovepipes were removed briefly three times in June and July while the buds were examined.

RESULTS

Thirty-five percent of all buds covered with stovepipe broke dormancy, thus indicating that light on the stem is not necessary for epicormic sprout production. (One bud even sprouted under the black polyethylene that was wrapped tightly against the bark.) However, light may have stimulated some sprout production, because 49 percent of all uncovered buds broke dormancy, although this difference is not statistically significant. Epicormic shoots from covered buds that broke dormancy were colorless, showing that little light penetrated the stovepipe covering.

Decapitation of the crown definitely stimulated epicormic sprouting; 88 percent of all buds (both covered and uncovered) on decapitated trees broke dormancy (table 1). Only four buds did not break dormancy on decapitated trees, and two of these swelled briefly but returned to a dormant state. Similar bud swelling has been observed by Church[1] and Church and Godman (1966).

Thinning had no significant effect on epicormic sprouting during the study period. Twenty-six percent of all buds on thinned trees broke dormancy, compared with 22 percent on untreated trees.

While this study does show that light on the bud is not essential for dormant bud break, it should not be inferred that thinning has no influence on epicormic sprouting. The physiological mechanisms controlling epicormic sprouting are complex and not yet fully understood. Many environmental factors, such as temperature and moisture, may have an effect on dormant bud break. In any event, sprouting appears to be primarily controlled by the crown, as evidenced by the response to the decapitation treatment.

Table 1.—*Dormant bud break on covered and uncovered trees by treatment*

Light condition	Number of buds	Buds that broke dormancy: Number	Buds that broke dormancy: Percent
DECAPITATED			
Covered	13	13	100
Uncovered	20	16	80
THINNED			
Covered	22	2	9
Uncovered	31	12	39
UNTREATED			
Covered	13	2	15
Uncovered	14	4	29

[1] *Church, T. W., Jr. An analysis of factors affecting epicormic sprouting in northern hardwoods. Problem analysis on file at N. Cent. Forest Exp. Sta., St. Paul, Minn.*

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