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Northeastern Forest Experiment Station
FOREST SERVICE, U. S. DEPT. OF AGRICULTURE, 6816 MARKET STREET, UPPER DARBY, PA.

BARK THICKNESS RELATED TO TREE DIAMETER IN SUGAR MAPLE (*ACER SACCHARUM* MARSH.)

Abstract.—Bark thickness for sugar maple trees in Vermont was found to be related to tree diameter at breast height (d.b.h.). The relationship was positive—as the diameter increased, the bark thickness increased.

Foresters using outside bark diameters to determine forest tree parameters should be aware that bark thickness not only varies by stem size and individual species, but also by site quality and tree age (*2*).[1]

The majority of published material shows bark thickness to be a linear function of tree diameter at breast height (d.b.h.). In conifers, Johnson (*1*) found this to be true with Douglas-fir (*Pseudotsuga taxifolia* (Poir.) Britt.) while Ostlin (*3*) reported that, in birch (*Betula* Sp.) and associated conifers, bark thickness increased from better to poorer sites and also increased with tree diameter and age class. However, no information has been available concerning the relationship of bark thickness to d.b.h. for sugar maple.

In 1967 our Sugar Maple Sap Production project at Burlington, Vermont, conducted a study to determine this relationship in sugar maple. It was found that bark thickness of sugar maple trees in Vermont is positively correlated with tree d.b.h.; that is, as d.b.h. increases, so does bark thickness.

Methods and Results

Measurements were taken on a total of 209 trees ranging in d.b.h. from 5.0 to 39.0 inches. These trees were located on glaciated, medium quality sites having slopes of 15 percent or less.

[1] Italic numbers in parentheses refer to Literature Cited, p. 4.

Two bark thickness measurements were recorded for each tree—one on the north side and one on the south side at 4½ feet above the ground—to the nearest 1/32 inch (fig. 1). Tree diameters were measured with a diameter tape to the nearest 0.1 inch after all loose bark was removed from the measurement area. These data were analyzed by linear regression techniques, using average bark thickness values for each tree. This provided a total of 209 observations.

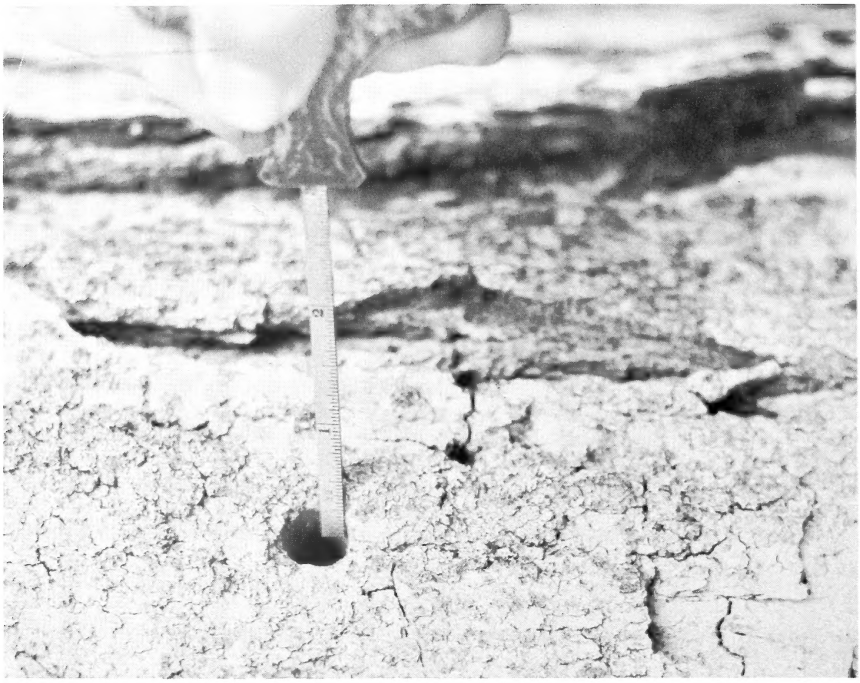

Figure 1.—Bark thickness data were measured by using a depth gage.

The following regression equation was developed from the data:

$$Y = .135 + 0.020X_1$$

where: Y = average bark thickness

X_1 = tree d.b.h.

The coefficient of determination (R^2) was found to be .51 for the equation, indicating that 51 percent of the variation in bark thickness was associated with d.b.h.

An analysis of variance was computed, yielding an F-value for variation due to regression of 433.

This value is highly significant, indicating that the variation accounted for by fitting the regression line to the data was significantly greater than the remaining unexplained variation. Figure 2 is a graphic presentation of the regression equation.

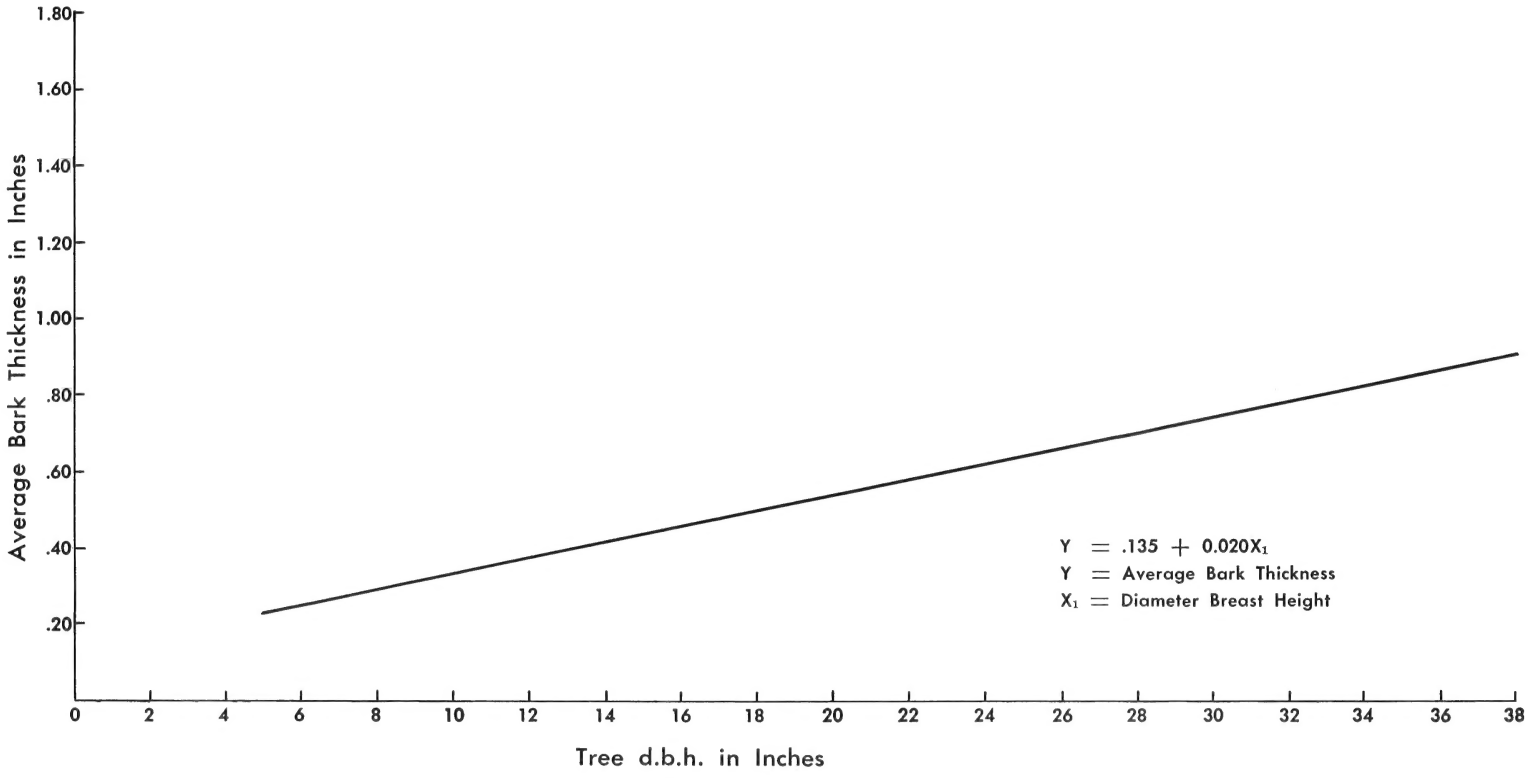

Figure 2.—Relationship between bark thickness and d.b.h. for average bark thickness of sugar maple in Vermont.

In summary, bark thickness for sugar maple trees in Vermont is strongly correlated with tree d.b.h.—and the relationship is positive. As the diameter increases, the average bark thickness increases. When radial inside bark parameters are desired, single bark thickness should be used. But when diameter inside bark measurements are desired, the bark thickness must be doubled.

Those desiring exact inside bark parameters should measure and compute the bark thickness, d.b.h. relationship, for the locale involved.

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