RAPID ESTIMATE OF VOLUME IN RED PINE PLANTATIONS

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A simple method² of computing volumes of coniferous plantations up to 35 years of age has been proposed for use in the Lake States as follows:

$$Vuc = (d/2)^2(h/100)n$$

where Vuc = unpeeled cubic feet per acre

d = average d.b.h. in inches

h = average height in feet

n = number of trees per acre

The applicability of this formula to red pine plantations was tested by comparing Vuc values with inside bark volume computed in the normal manner for a series (24 values) of plantation plots at the Petawawa Forest Experiment Station, Chalk River, Ontario. The plots had a range in spacing from 5 to 14 feet, and a range in age from 14 to 25 years. The average diameters for Vuc were obtained by dividing the sum of diameters by the number of trees, and the average height was the corresponding value read from the height/diameter curve for each plot. For the standard computation of peeled cubic volume per acre, local volume tables were made for each plot by applying the plot height/diameter curve to form-class volume tables³, according to the average form class measured on the plot.

FIGURE 1—Regression of total volume on Vuc .

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² Rudolf, P. 1950. Forest plantations in the Lake States. U.S.D.A. Tech. Bull. No. 1010.

³ Dominion Forest Service. 1948. Form-class volume tables. 2nd. ed. Canada Dept. Mines and Resources, Mines, Forests, and Scientific Services Branch.

Aggregate differences between the paired values ranged from 0.3 to 16.5 per cent of actual volume, and averaged 4.6 per cent. For the relationship as a whole, Vuc gave slightly higher values, averaging about one per cent more than actual volumes. The regression of actual volume on Vuc (Figure 1) was as follows:

$$\begin{aligned}\text{Total volume} &= 1.0224 \text{ Vuc} - 56.7 \\ \text{Standard error of estimate} &= \pm 121.6 \\ \text{Standard error of regression} &= \pm 0.0221 \\ t &= 46.2 \text{ (22 d.f.)} = \text{V.H.S.}\end{aligned}$$

It is concluded that Vuc is satisfactory for obtaining approximate values of total volume in red pine plantations. However, since the regression is highly significant, an adjustment to the formula should provide more accurate estimates from samples taken in the range of conditions described. The adjusted formula, made by substitution, gives the following relationship:

$$\text{Total volume} = 0.002556d^2hn - 56.7$$

In application, average height (h) and diameter (d) should be obtained as outlined above, and together with the number of trees (n) substituted in the adjusted formula.

This procedure provides a rapid method for approximating volumes from a relatively small amount of field data, without the need for taking form-class measurements, and entailing little compilation.