

Variation of Sampling Precision with Merchantability Classes in Relascope Estimates of Basal Area

A common timber cruising practice in the South is to tally trees in the 4- to 9-inch d.b.h. classes as pulpwood and trees in the 10-inch class and up as sawtimber. The results are then summarized and presented as cords per acre and board feet per acre, with the tacit implication that the two figures are equally valid, or approximately so. If the cordwood sampling precision is slightly less, that is considered acceptable because cordwood stumpage value is also somewhat less.

However, the percentage of trees in the stand which are of pulpwood size varies a great deal with mean stand diameter. This is shown in Figure 1 for two hypothetical stands in which the diameter distributions follow the normal probability curve. In stand A, mean d.b.h. is 10 inches, and 39.45 percent of the trees in the stand are of pulpwood size. In stand B mean d.b.h. is 20 inches, and only 0.55 percent of the trees are of pulpwood size, approximately 1/72 as

many. It seems reasonable to assume that in actual practice the sampling precision attained may be very different for the two merchantability classes, pulpwood and sawtimber, and that relative precision will vary with stand mean diameter.

A study was made in 25 timber stands in southern Louisiana and Mississippi to determine how sampling precision actually varied. Relascope plots were located randomly in each stand, and on each plot the d.b.h. of "count" trees was measured with calipers to insure accuracy in allocating basal area to the proper merchantability class. Sampling precisions attained, as indicated by coefficients of variation were calculated for pulpwood and for sawtimber in each stand. The results obtained are shown in Figure 2. In a stand with mean d.b.h. of 9.6 inches the sampling variation for pulpwood basal area was 2.2 times that of the sawtimber; stated conversely, sampling precision of the pulpwood was less

than half that of the sawtimber. In a stand of 12.3 inches mean d.b.h., the sampling precision of the pulpwood was less than one-fourth that of the sawtimber. For the stands studied, the larger the average diameter, the larger the ratio of pulpwood variability to sawtimber variability.

The change in relative sampling precision with variation in stand mean diameter will vary with a number of factors, among them the width of the pulpwood class, the shape of the curve of diameter distribution, and the sampling technique used. It seems highly probable that use of the relascope, or any fixed-plot system which utilizes smaller plots for small trees than for large trees, would tend to increase the disparity between the sampling precisions attained for the two merchantability classes.

This study indicated that sampling precision, and therefore reliability, of pulpwood basal area may differ greatly from that of sawtimber basal area, and that the relative precision for pulpwood decreased with increase in stand mean diameter.

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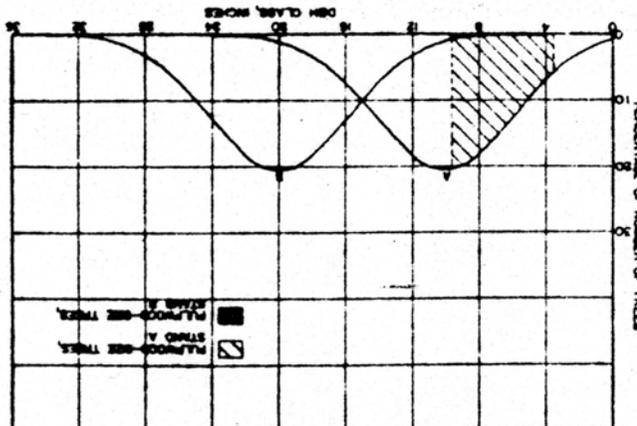


FIG. 1.—Percentage distribution of trees in a stand of normal diameter distribution. Stand A: mean d.b.h. 10 inches. Stand B: mean d.b.h. 20 inches.

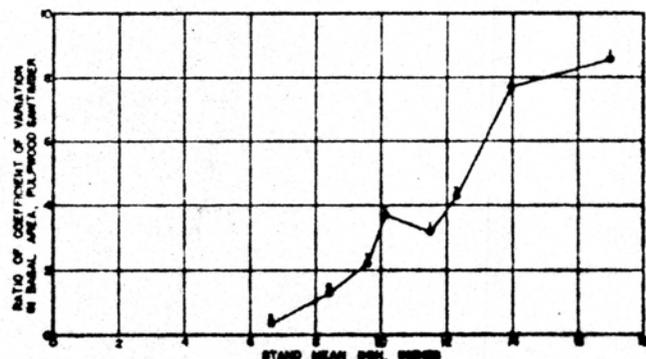


FIG. 2.—Relationship of variability in pulpwood timber to variability in sawtimber as a function of stand mean diameter.