GRAPHICAL DERIVATION OF ROTATION, CUTTING AGE AND MEAN ANNUAL INCREMENT

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For the production of merchantable timber the technical rotation is usually chosen. That is the period between harvests or the period between regenerations which will give the greatest volume yield of merchantable raw products.

The technical rotation is often derived from yield tables by taking the intersection of the curve of mean annual increment with that of periodic annual increment and then adding to this age of intersection the expected regeneration delay. The result is less correct than would be obtained by graphical methods here illustrated. Basic data of yield tables are readings from volume over age curves (one curve for each site class). Each volume divided by its age may be called the *slope of a line* drawn from the origin to the

FIGURE 1. Situation where a regeneration delay is expected.

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curve value. Therefore the age for cutting to secure *maximum m.a.i.* is derived with significant accuracy by drawing the line tangent to the curve from the origin - slope being here the maximum - and dividing volume by time for the point of tangency to find the mean annual increment. A regeneration delay pushes the effective origin back behind zero years of age and a regeneration gain will do the reverse.

Figure 1 illustrates the situation where a regeneration delay is expected while figure 2 illustrates the situation for a regeneration gain where the entire merchantable volume of the overstory may be taken at each cut.

FIGURE 2. Situation where the entire merchantable volume of the overstory may be taken at each cut.

Note that the technical rotation is lengthened or shortened by more than the amount of the regeneration delay or gain; that is to say, cutting age for effective maximum m.a.i. over the rotation (or cutting cycle) is increased for a regeneration delay and reduced for a regeneration gain as compared with the cutting age for volume over age, maximum.

Other graphs could be drawn for situations where partial cuts are taken, where advanced immature is partly destroyed or where the natural curve of volume over age is otherwise expected to be distorted under management.

The absence of the precise point of intersection which is always illustrated on plots of the p.a.i. curve superimposed on the m.a.i. curve should be no cause for concern. A truer picture is presented in these illustrations for the zone of near-tangency between the line of maximum slope and volume over age curve simply illustrates the fact that cutting age may be varied through this zone for production of desired products without significant loss in yield capacity.

The method of deriving technical rotation, cutting age, and effective mean annual increment from volume over age data by the graphical method here illustrated should have many practical applications.

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Carl H. Winget was born on September 28, 1939, in Noranda, Quebec. He received grade school and high school education at Lennoxville High School, Lennoxville, Quebec and graduated in 1955 and entered U.N.B.'s Forestry course in the same year. Winget worked for the Ontario Dept. of Lands and Forests in 1956 and for the Federal Forestry Branch in 1958 and 1959. He received the Schlick Memorial Fund Award and the Quebec North Shore Paper Co. Scholarship in 1959. Carl is now attending the University of Wisconsin on a research assistantship and taking a master's degree in silviculture.