WIND DAMAGE IN THE MANAWATU AND RANGITIKEI DISTRICTS

During the night of the 14th February, 1947, and the morning of the 15th, a southerly gale was experienced over the southern part of the North Island. It struck with greatest force along the west coast between Paekakariki and Wanganui. The maximum wind velocity recorded at Ohakea Aerodrome was 93 m.p.h. This aerodrome was towards the eastern edge of zone of greatest damage and it seems likely that even stronger winds developed along the coast.

The area principally affected is sandy country in which *Pinus radiata*, the chief forest and shelter tree, is deeply and strongly rooted, except where the water table or beds of clay or gravel are near the surface. Primary wind damage was not in the form of general uprooting,* but rather stem breakage at various heights from within a few feet of the ground; where uprooting occurred it was generally in "drives" initiated by breakage of a tree or trees on the windward margin.

In one stand of 20-year-old *P. radiata* thinned for the first time during the preceeding two years, an area of about 20 acres was flattened except for broken stumps.

A feature of the gale in this coastal area, where sand ridges run inland for several miles in an easterly direction, was that in the broader belts of trees the greatest damage occurred on the lee of such ridges.

In addition to actual breakage and uprooting, the whipping of tree crowns, while the cambium was active, resulted in a significant amount of barking leading to death of the tops.

Inland the only significant damage noticed was on Karioi State Forest, south-east of Mt. Ruapehu. This forest seems to have been in the line of maximum intensity on the coast and, at high altitudes, the gale was accompanied by a sharp heavy snowstorm. Severe damage was confined to the upper part of the forest where above 2,750 feet breakage of the current season's leading shoots and upper laterals occurred. The damage was greatest on *P. laricio* and *P. sylvestris*; *P. ponderosa*, *P. murrayana* and Douglas fir were less affected.

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* See *Wind Damage in Canterbury*, N.Z.J. For. Vol. V, No. 2, 1945. p. 154; also *An Exceptional Gale*, ibid. Vol. IV, No. 1, 1936, p. 32.

THE PLANIMETER FOR COMPUTING SAMPLE TREE VOLUMES.

The writer has lately been making considerable use of the planimeter for sample tree volume calculations and increment studies, and has found the method so rapid that it seems worth passing on.

The use of the planimeter in computing tree volumes is mentioned in Bruce & Schumacher's *Forest Mensuration*, and it seems a logical step to apply it to increment determinations.

The method is simple. The heights and corresponding basal areas for each measured section are plotted on a graph and the points joined up with a smooth curve. If cross sections have been taken, the basal area for each annual ring is marked in and curves drawn, thereby giving the outline of the tree for each year, distorted, of course, on account of basal areas and not diameters having been used. It is then a simple matter to take out the area under each curve and calculate the corresponding volume.

Should it be desired to ascertain the volume of a tree to any top diameter, it is simply a matter of cutting the diagram off at the appropriate basal area. There is the distinct advantage that, even if the necessary measurements have not been taken in the field, they can be easily found on the graph. For instance, if the position of the six-inch top, either over or under bark, is required, the curve is cut off at the corresponding 0.196 square feet.

The choice of a suitable scale is important. The ideal would be, of course, to have scales such that one square inch of graph area represented one cubic foot of volume. Thus, if we were to choose scales of one inch to 10 feet of height and one inch to 1/10th square foot of basal area, our square inch would then equal one cubic foot. But such scales would result in a curve too large to be within the range of most planimeters.

If on the other hand we used one inch to 10 feet of height as before and one inch to one square foot of basal area, we would have one square inch on the graph equal to 10 cubic feet; very convenient if it were not for the fact that the curve would be too small for accurate measurements.

The compromise of using one inch to 0.2 square feet of basal area seems to work out well, both from the plotting and the measuring standpoint. In this case one square inch represents five cubic feet.

Though the planimeter method of computing volumes is no quicker than the arithmetical one of using basal areas and sectional lengths when only one or two quantities are required—say total volume and volume to a 6-inch top—it is quicker when more are needed. When the sections are not 10 feet, as for example the 9 foot pulpwood used at Whakatane, the planimeter is the faster by far. When increment studies are required the arithmetical method would be laborious in the extreme.

A further advantage is that faulty measurements or abnormal tree form are readily apparent.

The writer has been using the above method for about two years and has found it entirely satisfactory. By way of comparison, the volumes of some two dozen trees were calculated by both systems. The greatest difference was found to be about 4%, while the average was in the neighbourhood of 1.5%. It would be quite possible for the planimeter method to be the more accurate.

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