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Aerial Topdressing Measurement Trials

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AERIAL topdressing of hill country with fertiliser, particularly superphosphate, has been a regular practice in New Zealand since 1949. During the development stages and in the years since, the Department of Agriculture has conducted experiments to measure the spread of this fertiliser on the ground. The results of some of these trials have been published in detail (see "References"), but others have only been reported privately to those concerned with the particular trial. It is desirable to have all the results available together, and this article summarises all the main results of the trials conducted before 1957.

DIFFERENT types of aircraft have been used to drop superphosphate in many different forms. The spread and the accuracy with which material is dropped on to a given target area are greatly affected by both the weather at the time of the drop and the range and average size of the particles in the material. A precise comparison of the relative efficiency of the different aircraft would be fair only if measurements of spread were made when each was flown at its best operating height and speed and when using the material most suitable to it for any given conditions. Unfortunately it has not been possible to conduct enough trials to determine the best conditions for the different aircraft.

The performance of each aircraft has been assessed only under the conditions stated and for the specific types of material dropped, and results must not be considered to be generally applicable to all conditions.

Methods of Measuring Spread

Though the greatest advantage of using aircraft for dropping fertiliser is in the topdressing of hill country on which wheeled vehicles cannot be taken, most measurement trials are conducted on flat or nearly flat areas. In hill country it is too difficult to measure distances accurately and to find areas sufficiently uniform that local variations do not upset results, though in practice local irregularities in the ground cause extra variability in the density of material from point to point. In trials, where only a very small fraction of the target area is included in the sample taken for measurement, it is obviously desirable to eliminate these effects, particularly where comparisons are being made.

In each trial a target area was marked out and catchers placed in a regular pattern. Canvas catchers were used in the first experiment, then cardboard boxes, and finally kerosene tins. The tins appear to be the most satisfactory catchers.

The pattern in which the catchers were set out was also changed from experiment to experiment, but in most trials it was made up of rows at right angles to the line of flight of the aeroplane. The object was always to obtain a general pattern of fertiliser distribution, but in the later experiments attention was directed particularly to determining width of swath from one run of the plane.

The fertiliser collected in each catcher was taken to the laboratory for accurate weighing and results were then converted to equivalent rate per acre. Traces of fertiliser often drift over quite a large area, but the rate of application over much of it is so small as to be worthless. Therefore it is convenient to set ½ cwt. per acre as the minimum effective rate. The area receiving ½ cwt. per acre or more and the width of spread to ½ cwt. per acre limits are used as criteria in this report.

In some trials sample catches were sieved to determine the distribution of particle size.