APPLICATION OF ORCHARD SPRAYS.

III. SPRAY NOZZLES—*continued.*

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DEPTH OF PENETRATION.

DEPTH of penetration refers to the distance to which spray is driven from the nozzles and serves to indicate the suitability of any nozzle for driving spray to the highest parts of trees and forcing it amongst the foliage, into bark crevices, bud-scales, &c.

In order to eliminate the influence of wind when making comparisons between different nozzles it was found necessary to take measurements under windless conditions, the maximum vertical height to which spray was driven being taken as an index of penetration. Thus measurements given in the following pages only indicate relative depths of penetration and cannot be taken as the actual distances to which spray would be driven under normal working-conditions.

EXPERIMENTAL METHOD.

A pole, marked in feet and 25 ft. in length, was erected in a perpendicular position. Close to the base of the pole the nozzles were fixed so that they pointed vertically upwards. Measurements of penetration were taken from the maximum height to which spray was actually driven, any drift in excess of this height being ignored. Owing to variations caused by slight air-movements, tests were repeated on two or three different days and the average measurements taken.

Nozzle-pressures were measured and adjusted, and the construction of different nozzle parts varied, by methods identical with those previously described for testing distribution and fineness of spray droplets (see this *Journal,* Vol. 53, p. 68).

RESULTS.

Pressure.—Increase in pressure from 50 lb. to 300 lb. caused a marked increase in depth of penetration (Fig. 18). The rate of increase was greatest as pressures were increased from 50 lb. to approximately 100 lb.

Increase in penetration with increasing pressure was highest where disks having the greatest diameter of apertures were used (Fig. 18).

Disk Aperture.—The depth of penetration increased as the diameters of the disk apertures were increased from $\frac{4}{64}$ in. to $\frac{6}{64}$ in. and $\frac{8}{64}$ in. The rate of increase with increasing diameter of disk aperture was highest where whorl-plates with the greatest diameter openings were used (Fig. 19).

Thickness of Disk.—Increase in disk-thickness from $\frac{2}{64}$ in. to $\frac{4}{64}$ in. caused a slight increase in penetration. Further increase in thickness to $\frac{6}{64}$ in. had no measurable effect.

Depth and Shape of Whorl-chamber.—Increasing the depth of the whorl-chamber from approximately 0·08 in. to 0·24 in. caused only a slight increase in penetration.

Alteration in the shape of the whorl-chamber by means of a $\frac{1}{4}$-in.-diameter pin projecting 0·04 in. from the centre of the whorl-plate did not cause any appreciable variation in penetration. With the pin projecting 0·08 in. penetration appeared to be slightly reduced.