

EFFECT OF NOZZLE HEIGHT AND TYPE ON SPRAY DENSITY AND DISTRIBUTION FOR A GROUND FIELD SPRAYER

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Abstract. *A field study was conducted to reveal the effect of nozzle type and height on spray density (application rate) and distribution utilizing a ground field boom sprayer. Six nozzle types (four flat fan nozzles numbered from 1 to 4 and two hollow cone nozzles numbered 5 and 6) were tested at four nozzle heights (15, 30, 45 and 60 cm). In addition to the conventional method of employing a spray patternator, water sensitive papers (WSPs) were also utilized as a second means to measure the two characteristics (density and distribution) of the spray application. For all nozzles tested, results revealed that the application rate error and uniformity of distribution (UD) of the spray liquid were proportional to nozzle heights. For instance, increasing the height of the hollow cone nozzle No. 5 from 15 to 60 cm caused an increase in the error in application rate from 10.9% to 47.6% and in the UD from 36.2% to 92.5%. On the average, the application rate for the middle nozzle was observed to increase with increasing nozzle height for all nozzles tested. That was attributed to increasing overlap from side nozzles. The average application rate for the flat fan nozzle No. 2 increased from 358.7 to 474.1 L/ha as the nozzle height increased from 15 to 60 cm. The tested flat fan nozzles exhibited a better spray distribution and lower error in application rate at all nozzle heights compared to the hollow cone nozzles. WSP analysis showed the same general trend revealed by the spray patternator method. WSP analysis showed that the application rate, expressed as a percentage of wetted area (Y), and UD values were proportional to nozzle height. Y and UD for nozzle No. 5 were found to increase from 55.6% to 59.1% and from 50.6% to 84.5%, respectively, as the nozzle height increased from 15 to 60 cm.*

Keywords. *Sprayer, Nozzles, Uniformity, Spray density, Spray distribution, Coefficient of Variation (CV), Water Sensitive Paper (WSP).*