

Laboratory performance evaluation of 12 m tractor mounted boom sprayer for cotton crop

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■ **Abstract :** Cotton farming is a popular agri-business in India. It is one of the principal commercial crops in India. India is second largest producer of cotton in the world. The major reason for pesticide loss is use of inefficient spraying machines, which are unable to maintain specified nozzle pressure, nozzle discharge, nozzle height that affects spray pattern, droplet size, spray uniformity etc. The proposed sprayer was therefore tested using the instrument spray scanner, pump tester, pressure gauge tester, manometer adapter and droplet analyzer in the laboratory for cotton crop. Different tests were conducted such as liquid distribution under spray boom; pump testing, calibration of pressure gauge and droplet deposition on cotton crop. Liquid distribution under spray boom was scattered from average value, maximum pump discharge was 35.94 L/min at 950 rpm, and pressure gauge gave 520.6 kPa pressures for 600 kPa pressure of master gauge. The VMD, UC and DD for nozzle discharge 0.9 l/min and pressure 689.5 kPa was from 130.9-206.39 μm , 1.18-1.31 and 11-27 No/cm², respectively.

■ **Key words :** Boom sprayer, Spray scanner, Pumps tester, Nozzle discharge rate, Nozzle pressure

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Cotton crop is concentrated in semi-arid regions of the country. More than sixty per cent production is contributed by three states alone namely, Gujarat, Maharashtra and Andhra Pradesh. Early trend indicates better area coverage in North zone Punjab and Rajasthan. There are reports of reversal of trend of area shift in favour of cotton, in these states but the trend in major states like Gujarat and Maharashtra it is not so (AICCP Annual Report, 2007-2008).

Cotton is one of the principal commercial crops in India. Cotton plays an important role in the national economy providing large employment in the farm marketing and processing sectors. Although, there has been a significant growth in production, productivity and quality of Indian cotton during the last 50 years, it is way below the average world productivity and far below the general quality requirements.

■ METHODOLOGY

The proposed study was conducted with the technical assistance of ASPEE, Agricultural Research and Development Foundation, Mumbai. A 12 m tractor mounted boom sprayer

was selected for study and its performance was evaluated in the laboratory (Table A). The power for the operation of the boom sprayer was supplied by the power take-off (PTO) shaft of the tractor. The instruments namely, spray scanner, pump tester and master pressure gauge were imported from advanced agricultural machinery systems (AAMS), Belgium. The liquid distribution under a spray boom was measured with spray scanner, flow rate of the pump was measured by pump tester, and pressure gauge was calibrated with master pressure gauge tester. For spray, deposition on cotton crop independent variables were nozzle discharge rates 0.45, 0.7, 0.9 and 1.35 lpm, respectively, while the pressures of nozzle were 275.8, 413.7, 551.6 and 689.5 kpa. The experiment was replicated three times under laboratory condition on cotton crop.

Experimental set-up:

Different set ups were used in the laboratory for evaluating the performance of hydraulic boom sprayer. These were to measure liquid distribution, flow rate of pump, pressure and discharge measurement of nozzles, calibration of the commercial pressure gauge and spray deposition. In laboratory, the nozzles were tested for cone angle and