

Study of the Calibration of Knapsack Sprayer

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Sprayer calibration

Sprayer calibration determines the volume of water that will be applied on a given area by a given applicator under a given condition.

Factors affecting the volume of water applied by a sprayer

1. Walking speed: An increase in walking speed results in less spray mixture applied to a given area. Conversely, a decrease in walking speed results in application of a greater volume applied per unit area.

2. Sprayer pressure: Increasing in sprayer pressure results in a greater volume of spray mixture applied to a given area. Conversely, a lower pressure results in less spray mixture applied. The sprayer should be operated to give as steady pressure as possible.

3. Nozzle size: The use of a large nozzle opening increase the volume of spray mixture applied to a given area. Smaller openings deliver a smaller spray volume.

Techniques for calibrating a sprayer

Fraser and Burrill (1977) developed a well-tested technique for calibrating a sprayer is as follows:

Step-1: Make sure that the sprayer is in good working condition (no leaks, no blocked nozzles, etc). Calibration should be done on a surface similar to the field to be sprayed. Measure and mark out an area of 100 m² (10 m × 10 m). Trace with a stick the rows on which rice normally would be sown in the field. The row width should be the one you will use in planting rice.

Step-2: Place the sprayer on a level ground and put in 10 liters of clean water. Mark the outline of the sprayer on the ground to the same spot can be found later. Put the sprayer on your back. Pump the sprayer to develop pressure. Being spraying the plot you have marked, adjusting the height of the nozzle to cover whatever swath width you desire. Maintain a constant nozzle height. Walk at a comfortable pace, which you must maintain throughout the application, and later in actually spraying the field. Spray the 100 m² plot once. When you have completed spraying the plot, place the sprayer back on the ground in its outlined position and measure the water level.

Step-3: Determine the application rate by subtracting the volume of water remaining the sprayer from the amount you started with. For example, if the amount of water in the tank before spraying was 10 liters and the amount after spraying is 8 liters, then the amount of water used was 2 liters.

$$\begin{aligned} \text{The sprayer output per hectare} &= \frac{\text{Liters of water used} \times 10,000}{\text{m}^2 \text{ of area sprayed}} \quad [\because 1 \text{ ha} = 10,000 \text{ m}^2] \\ &= \frac{2 \times 10,000}{100} \text{ liters/ha} \\ &= 200 \text{ liters/ha} \end{aligned}$$

Step-4: Make sure your walking pace is uniform by repeating Step-2 a few times until you are putting exactly two liters of water on the calibration plot every time you spray it. If you use more than 2 liters, you should increase your walking pace while spraying. If you use less than 2 liters, you should walk more slowly. If the rate remains on the liters mark your walking pace is uniform.

