

Utilising handheld spray application equipment for the application of plant protection products authorised in the production of bedding plants.

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Introduction

This briefing note details trials of alternative handheld spray application equipment to determine its potential to improve spray application in the production of bedding plants.

Background

Previous research has highlighted that plant protection products are often applied by handheld equipment in the production of ornamentals. Large volumes of water (1000 L/ha and more) are applied by many spray operators using handheld equipment. This can be inefficient with significant losses and potentially low quantities of active substances retained on plants as a result. While automated booms are currently the best method of reducing volumes, the aim of this study was to identify manually operated equipment that could improve the performance of spray application through increasing plant deposition, whilst improving uniformity and efficiency.



Experiments were carried out on a commercial bedding plant nursery to capture current industry practice.

Findings

The variability of deposit across a bed sprayed using a Ripa nozzle at 1000 L/ha was found to be very high, potentially compromising performance. More volume was delivered to the centre of the bed than the edges.

The flow rate delivered by the nozzle and pistol used at the nursery where the experiments were conducted was different from that indicated by manufacturer's information. The pistol itself was different from the new one obtained by SSAU, despite being of identical specification, and so nozzle size alone was insufficient to determine flow rate. This emphasises the importance of regular calibration.

Combining our data with that previously obtained the maximum speed of an operator walking along the bed was 0.44 m/s. While small increases in speed might be possible with experience and training, this is likely to be close to the limit without automation. Reducing flow rate is therefore the only option.

In our study, reducing the flow rate of the Ripa from an average of 7.1 L/min (to deliver a target volume of 1000 L/ha) to 4.16 L/min (which would be expected to deliver a target volume of 590 L/ha) whilst maintaining constant dose increased the deposit of active substance by approximately 30%. No other measures of performance were compromised by this change.

None of the alternative equipment tested within this programme of work performed any better than spray pistols that are widely used by the industry, although further research and development could lead to improvements in the future.

Water volumes

Growers must calibrate spray operations regularly in different bed widths and with different spray operators to know the water volume being applied per hectare and thereby control the applied dose. It is widely acknowledged that a lower water volume confers many benefits - increased retention on the crop, reduced run off and lower application costs.

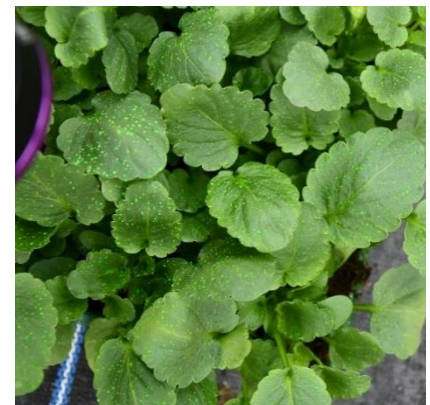
Recommendations

Reducing spray volumes from 1000 to around 500 L/ha has been shown to improve the spray retention on the crop (example images below). This is likely to lead to improved control of the target pest / disease, reduced costs (particularly when using products applied at a rate per litre), and lower costs associated with spray application.

The best way of reducing volume is to use an automated boom, which can move faster at a calibrated speed and achieve much higher levels of uniformity of spray distribution.

Lower water volumes can also be achieved with single-nozzle manual applications by increasing the speed of application where possible but mostly by reducing the flow rate of the nozzle used. Reducing pressure can help reduce flow rate, but very low pressures are likely to result in lower velocities and a shorter throw as well as droplets that are too large.

It is important to select a nozzle and pressure that gives both the right flow rate and the right droplet size, with a 'medium' quality spray being the most common recommendation for PPPs used for protected ornamentals. Avoid using equipment at pressures outside of manufacturer's recommendations without further information.



Spray deposits on pansy from: 1. high volume Ripa application; average 872 L/Ha (left), 2. low volume Ripa application; average 533 L/Ha (centre) and 3) very low volume, large droplet application with Birchmeier AS1200; average 151 L/Ha (right).