Ensuring good spray coverage

What is required when applying farm chemicals so they perform to expectations?

Good spray coverage involves uniformly distributing and depositing farm chemicals within the correct label rate range. This can be achieved only with well-serviced and calibrated sprayers and by operating them properly in suitable conditions.

Using more than the label rate wastes product, adversely affects the environment and hastens development of resistance in pest populations. On the other hand, using less than the label rate can result in poor control. Faulty equipment or poor application practices can result in spray being wasted and pests being missed or surviving.

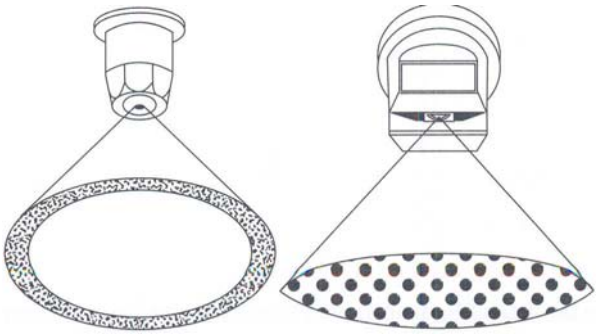
Providing that insecticide resistance is not present, three prerequisites affect the degree of spray coverage and ultimately influence the effectiveness of spray results.

1. Sprayer

Correct nozzle selection

The best nozzles for applying insecticides to vegetable or row crops are called **hollow cones**. Compared with flat-fan nozzles, hollow cones produce a finer droplet, which travels further and circulates more with air turbu1ence. Droplets from hollow-cone nozzles are better able to envelop plants and be deposited in the nooks and crannies where grubs hide, particularly if droppers are used on boom arms. Hollow-cone nozzles should produce most droplets in the 100-200 micron (or μm) size (request this specification when buying new nozzles).

Left: Hollow-cone spray pattern. Note the numerous *small spray droplets. Right: Flat-fan spray pattern. Note the larger and fewer spray droplets.*



Hollow-cone nozzles consist of two sections. the **orifice** and the **swirl plate.** Depending on the nozzle material, they should both be replaced after about 20 hours of use. Brass nozzles wear quickly and need to be replaced after about 5 hours of use. If nozzles are years old they are probably badly worn and produce a poor or erratic spray pattern.

Worn nozzles also produce larger, heavier droplets that fall quickly and do not cover the leaf surface as well as smaller droplets. Nor do they swirl around in turbulent air and enter the nooks and crannies.

Correct spray pressure

Another important piece of spray equipment is the pressure gauge. Generally, the maximum operating pressure for hollow-cone nozzles is 500 kPa (5 bars or about 75 psi). If too high a pressure is used, the droplet size decreases, producing too many fine droplets outside the desired size range. This can result in spray drift problems, poor target coverage, a wider spray pattern or fan angle, and an increase in the application rate.

If too low a pressure is used, then too many large droplets are produced, resulting in poor target coverage, excessive run-off, and a reduced rate of application. A narrow fan angle also results.

Correct spray pressure

If the boom is too low, crop coverage is variable or erratic and striping is likely to occur. If the boom is too high, spray drift can occur, less product covers the crop and coverage is patchy. The boom height should be set to suit the target crop size and to create the right amount of fan or spray pattern overlap.

Remember: By combining the correct spray pressure, nozzle and boom height, spray volume and nozzles. you achieve the right amount (the label rate) of spray mix output for effective coverage. In other words, more crop area can be sprayed before the spray tank needs to be refilled, and better spray coverage is achieved.

Note: Air-blast and shear sprayers generate good air turbulence around plants, creating better spray penetration and enhancing spray coverage.

2. Weather

Choose the best conditions for spray application. Try to spray when winds are no more than 8 km/h (a gentle breeze). This is usually in the early morning or the late afternoon. However, avoid spraying in dead calm conditions, as there will be no turbulence to help droplet travel, penetration and coverage-only the influence of gravity. Do not spray during the hottest part of the day or when temperatures are above 36°C. When the relative humidity is high, droplets last longer, because evaporation is slower than in low humidity. Target deposition and coverage are reduced when the humidity is low.

3. Surfactants

Cruciferous crops have waxy leaves, which are difficult to cover, as the spray tends to roll off in large drops or collect near the leaf tip. For this reason it is essential to use the right surfactant or wetting agent to optimise spray coverage and persistence ('stickability').

Note: Some pesticide formulations do not require the addition of any surfactant. **Read all the information on the label.** When too much surfactant is added to the spray tank, the surface tension and viscosity of the spray can be reduced to a point where spray droplet size is smaller than desired, leading to spray drift.

How can spray application be assessed for its effectiveness of coverage?

To ensure that spray coverage is consistently adequate, spray cards should be used regularly. These are water-sensitive and oil-sensitive papers that are stained by droplets landing on them. When placed in a crop, they provide a quick assessment of droplet density and size, and spray distribution and coverage.

A superior, but slower and less convenient, method of assessing spray coverage involves applying a special spray that fluoresces when illuminated by blacklight (DV light) at night.

Your local adviser, sprayer manufacturer or dealer can provide further information on methods of assessing spray coverage, including the use of tracer dyes.

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