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To | Date

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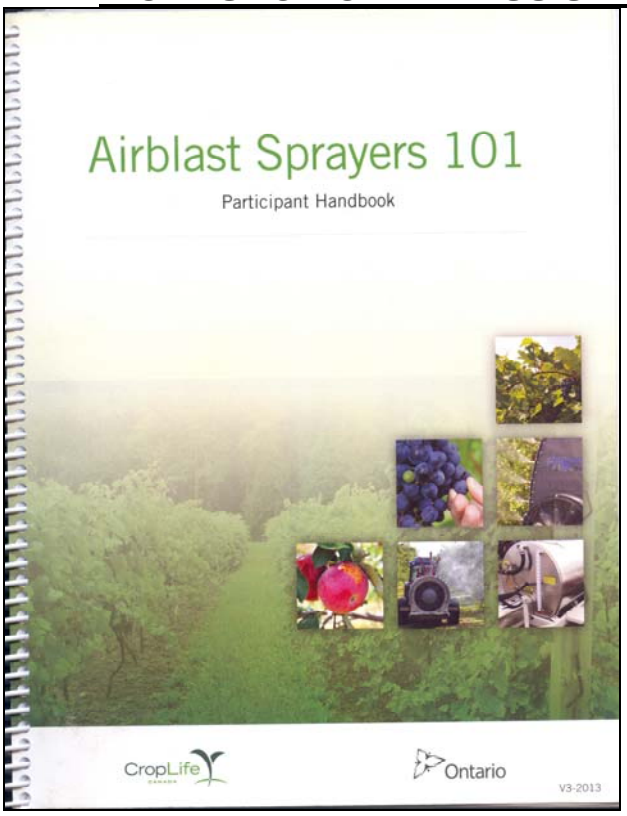
4 pages from Mario Lanthier

WORKSHOP ON AIR ASSISTED SPRAYER CALIBRATION



The event was held in Simcoe, Ontario on February 14 and hosted by Jason Deveau, (sprayer technology specialist) at Ontario Ministry of Agriculture.

The day was organised by CNLA (Canadian Nursery Landscape Association) as a "train-the-trainer" session. It was attended by 5 persons including 2 sponsored by the nursery grower group of Landscape Alberta.

Jason shared the materials he developed for calibration of airblast sprayers commonly used in tree fruit orchards, vineyards, berry fields and nurseries.

All materials from Jason Deveau, including the training presentations, videos and background articles, are available at the website http://sprayers101.ca/, partly funded by Crop Life Canada.

The focus is on coverage

For Jason, the most important part of sprayer calibration is to obtain adequate coverage of the plant.

The sprayer should deliver enough spray solution to adequately wet the leaves and obtain good efficacy on the target pest. Too much spray and the liquid will coalesce on the leaves then run-off on the ground. Not enough spray and the pest is not controlled.

Traditional sprayer calibration uses formulas to calculate tractor speed, delivery per minute, litres per hectare and number of hectares sprayed. For Jason, formulas are secondary and almost not necessary. If plant coverage is not good, adjust sprayer speed, pressure and nozzles to obtain the desired coverage.

Adjusting air stream

A common cause of poor coverage is over-spraying the target plant.

Airblast sprayers, also called air assisted sprayers, have a powered fan or turbine which generates an air stream. The purpose is to create an air current to carry the spray into the target area.

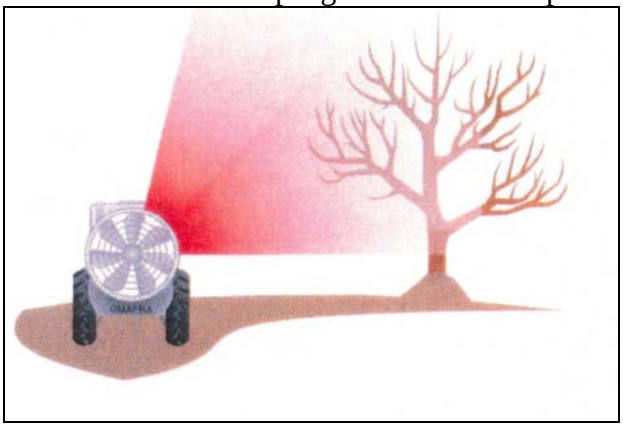
The air speed and volume should be matched to the amount of foliage on the plant. Generally, more air volume but less air speed will result in better coverage. A lower air speed can be achieved by using a lower PTO speed (from 540 rpm down to 375 rpm), or by gearing up and throttling down.

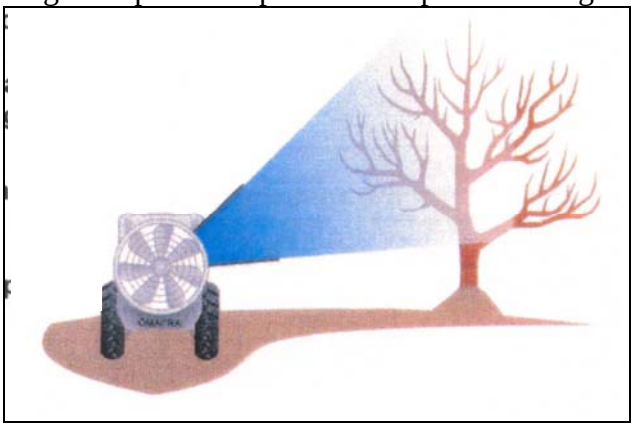
Some sprayers are equipped with a control for the fan speed. The lower fan speed is used in spring when there is less foliage and the higher fan speed is used in summer when there is more foliage.

Left: In spring, if too much wind is produced, the spray will blow through the plant instead of settling.
Right: Short ribbons (25-cm length) are attached at each nozzle position to show air direction.
Nozzles that are not required should be turned off or oriented to match the target shape.

Coverage of the plant surface is improved by adjusting nozzle size, placement and direction.

- Pressure should be 100 to 150 psi to optimize droplet size and minimize wear on equipment.
- Pressure over 150 psi generates more output and smaller droplets that are more prone to drift.
- Pressure under 100 psi generates less output and larger droplets that provide less plant coverage.

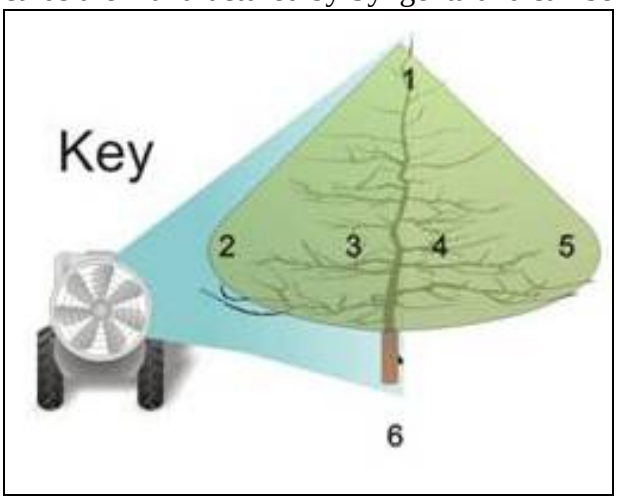


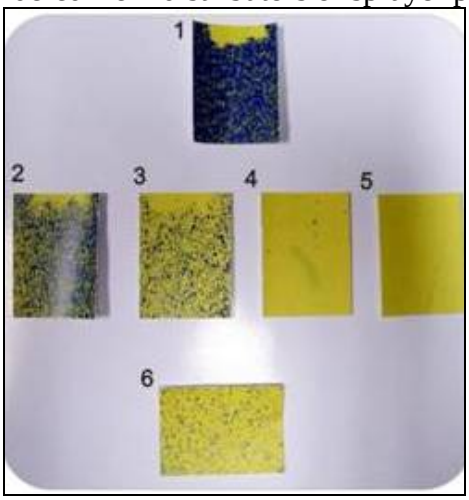


Pictures above: Adjusting nozzles to match the target (drawings from J. Deveau).
Some sprayers are equipped with adjustable outlets or deflectors to direct the air towards the target.

Assessing plant coverage

A good method to verify plant coverage is the use of water-sensitive paper. The cards turn a blue colour when contacted by water (or skin oil). The cards are placed inside the plant ahead of spraying with water only, or during regular pesticide spraying (wear adequate protective clothing). The cards are manufactured by Syngenta and can be ordered from distributors of sprayer parts.



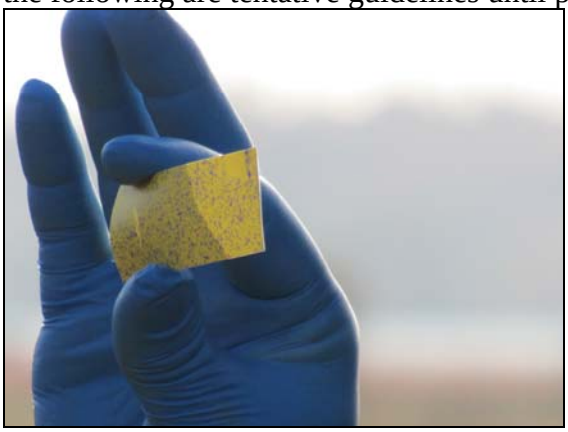


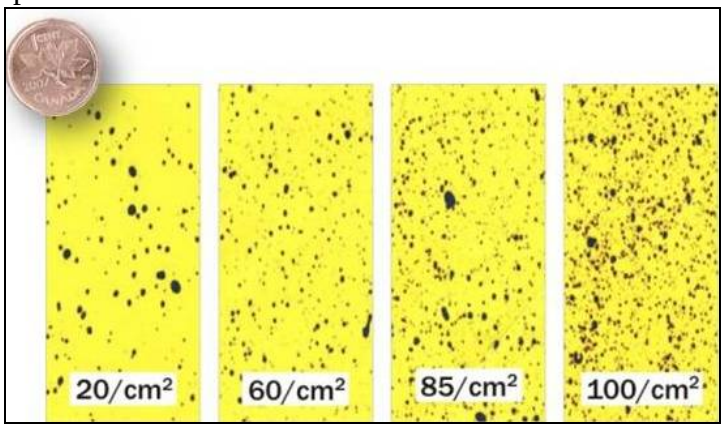
Left: Place at various locations on the tree, including on the ground (drawing from Jason Deveau). Right: The card is wet closest to the sprayer, adequate in the middle of the tree and dry on the opposite side of the tree. The card on the ground shows some blue colour from dripping, but not excessive. In this example, it will be necessary to spray from both sides of the tree to ensure adequate coverage.

Measuring plant coverage

Using water sensitive yellow cards is one thing, interpreting the results is another story. There is currently no recognized format to read the cards and interpret the results. What may be acceptable in one situation may not be adequate in another situation, depending on the type of spray and the crop.

The best interpretation at this time comes from a study conducted in vineyards in Spain. Thus, the following are tentative guidelines until proper research establishes accurate criteria.





Above left: The cards can be cut into strips. Wear gloves to prevent contact with skin oil or sweat. Right: 85 droplets per cm^2 with total coverage of 10 to 15% should be sufficient for most foliar sprays. Below 85 droplets/cm^2 is likely not sufficient coverage, over 85 droplets is likely more than necessary.

Nozzles

Nozzles are made from a variety of materials and have various spray patterns.

Nozzles have a limited useful life before wearing to the point of delivering a poor pattern or excessive spray. Wear is most rapid when using solid pesticide formulations such as wettable powder or dry flowable, or when operating at higher pressures. If a nozzle tip is worn 10% and the spray cost $35 per acre, the waste is $3.50 per acre. Nozzle tips should be replaced when the output is 15% higher than manufacturer specification. On farms where sprays are applied regularly, the best approach is to replace nozzle tips every year.

Nozzle material	Wear resistance	Hours of use before recalibrating or replacing
Brass	Poor	25 hours of use
Plastic or polymer	Poor	50 to 75 hours of use
Stainless steel	Good	100 to 150 hours of use
Hardened stainless steel	Good	200 to 350 hours of use
Ceramic	Very good	500 to 2500 hours of use
Tungsten carbide	Excellent	5000 to 6000 hours of use

Modified from BC Ministry Environment (2005), Utah State University Extension "Spray Nozzle Operating Life" (1999)

Moulded nozzles are now found more frequently on sprayers. The nozzle disc, core (swirl plate) and seal are together in one piece making replacement easier. The different nozzle sizes are colour coded, making it easier to provide instructions to staff using the sprayer.

Another recent addition to sprayers is the air induction nozzle. An opening at the base of the nozzle draws air into the body of the nozzle where it is mixed with the spray solution. The resulting spray has air-filled coarse droplets and fewer smaller droplets. The application would be appropriate on farms where drift management is important, for example near residential areas or to reach tall trees.

Message from Jason Deveau: go with moulded nozzles equipped with ceramic tips.

Picture to left: Nozzle on left is hollow cone opening, typical of airblast and appropriate for insecticides and fungicides. Nozzle on right is flat fan opening, common on boom sprayers to spray herbicides. Right: Air induction nozzles with ceramic tips. Note the air opening at the base (picture from Teejet).