

Spraying for Mealybug Control: Focus on chemical application rates and targeting

David Manktelow, Agribusiness Training

Background

The current best practice recommendations for spray applications for mealybug control are late dormant and/or one or two applications pre-flowering.

The spraying target for the late dormant application is trunks, crowns and canes, with emphasis on establishing an insecticide deposit in cracks and crevices, on and under bark and any older wood sites where mealybugs may have overwintered and may subsequently release crawlers. The most effective agrichemical at this stage remains the organophosphate tokuthion in combination with mineral oil and a suitable oil adjuvant.

The spraying target for the preflowering application(s) is the foliage and new growth. The most effective and appropriate agrichemicals at this stage are relatively persistent insect growth regulators that will kill young mealybug crawlers that colonise the new tissue.

Both dormant wood and new growth **should** be easy spray application targets. However there appears to be a remarkable variation in the efficiency with which sprayers are set up for these spray applications. In many cases it appears that efficacy is likely to be compromised by poor targeting and the delivery of too little chemical to the target. A spraying check list was presented in 2005 for botrytis control applications (<http://www.nzwine.com/focus>). The notes below provide a similar checklist for setting your sprayer up to target mealybugs, and then discuss how to adjust application rates for different canopies.

Is the sprayer output going in the right place and are you actually hitting the target?

One of the most common problems with grape sprayers is a complete failure to direct the spray plume to the target, or to somehow leave gaps in the output that will lead to areas being under-dosed.

Whatever nozzle plumbing arrangement you have on your sprayer it is possible to maximise deposits on target by stepping through the simple procedure below:

- 1) Park the sprayer in a typical row and turn off any nozzles that simply will not hit the target.
- 2) Adjust the output angles on the remaining nozzles to direct the spray into the target area from as many angles as possible¹. The more angles the spray comes in from the better, so usually it is best to try to use as many nozzles as possible to hit the target. Recently we have found that we can achieve excellent coverage using closely spaced flat fan nozzles (ca. 25-

¹ Remember you may need to loosen and turn most swingover nozzles to realign them, rather than just rotating them and risk partly shutting them off.

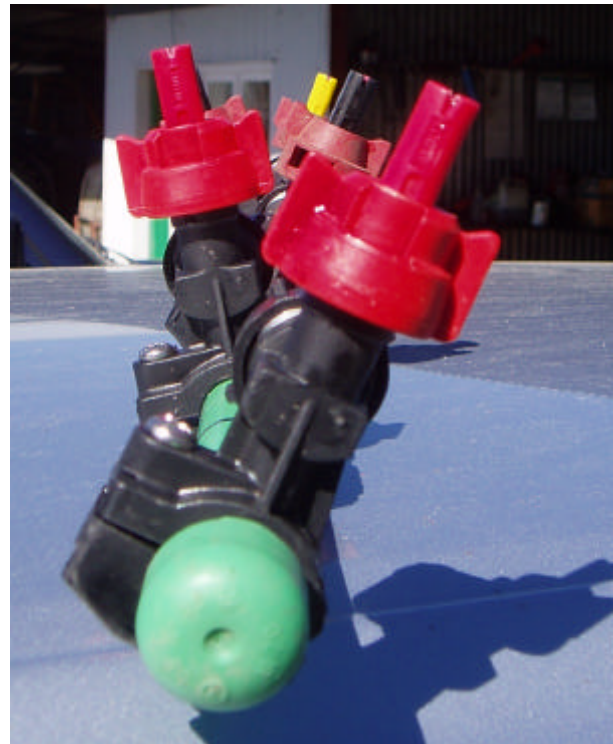
30 cm apart) which have been off-set to deliver a forwards and backwards angled spray plume (see photographs below). It is relatively easy to fit a boom like this to many existing sprayers and the little extra effort can be well rewarded.

- 3) It is entirely sensible to use different nozzle outputs to direct most of the spray into the areas where you have the largest potential mealybug targets. Using the same nozzles across an entire vertical spray band is usually not appropriate.
- 4) If you can adjust the air output from your sprayer, use the minimum amount of sprayer air assistance required to carry the spray to the target on the upwind side of the sprayer. Too much air forces spray droplets to line up with the air stream and tends to create coverage blind spots on the leeward side of rigid obstacles like posts and trunks. Note that this is especially a problem with over-row sprayers as both sides of the vines are treated from the same direction of travel.
- 5) Try, if possible, to see the spray plume stalling and settling within the canopy rather than being projected beyond it. If you have an over-row sprayer, aim to interact the nozzle outputs at the canopy. This helps increase droplet angles and to stall the plume at the canopy. Generally forward (up to 20°) and/or backward (up to 15°) angling the nozzles relative to the direction of travel will improve penetration and coverage over sprays aimed directly into the canopy.



Five nozzle boom used for mealybug application.

Note use of closely spaced flat fan nozzles, with largest output nozzles used to target the area of greatest wood/canopy.



Detail showing split output angles on nozzles.

Note this provides forward and backward trajectories to the spray plume with full overlap in both directions.

- 6) Confirm that the parts of the canopy you want to hit are being covered by getting off the tractor and getting someone else to drive as you watch the spray plume from the row end in each of your different blocks. You will see a lot more this way than from on the tractor.

- 7) Finally, have a good look at the canopy just after the sprayer has passed and confirm that you are wetting all the target areas. If not consider adjusting nozzle heights, output angles, output volumes, air assistance speed and orientation, travel speeds or any of the other variables under your control until you optimise targeting.

What water volumes and chemical application rates are required?

The label application recommendations for Tokuthion, Applaud 40SC and Ovation 50WDG are listed below.

Tokuthion

“Apply as a high volume dilute spray”

“Thorough and uniform spray coverage is essential for optimum results”

“Use 100 ml/100 litres of water plus 1% oil. Apply during dormancy ensuring complete coverage by using at least 1000 litres of spray mix per hectare on mature vines”

Applaud 40SC

“Rates suggested are for high volume spraying to run-off. For concentrate spraying adjust dilution rates accordingly, but for maximum effect complete wetting of all surfaces inhabited by insects pests is required”

“Use 30 ml/100 litres of water – a minimum of 1000 litres of spray mix per hectare”

Ovation 50WDG

“Use 25 g/100 litres for high volume application to the point of run-off. For concentrate applications adjust dilution rate accordingly”

For grape mealybug “Apply in a minimum of 1000 litres of water (250 g/ha minimum)”

While it is apparent that all of the recommendations above are anchored around an arbitrary 1000 litres per hectare, **the emphasis is on dilute spraying to the point of run-off**. The point of runoff occurs when the outer leaves (or exposed wood) are starting to drip, the inner leaves are well wetted and a quick bang on the cordon can easily shake free drops of spray. It is assumed that there will be **NO** obviously dry areas of wood or leaves when the point of runoff has been reached.

The 1000 litre per hectare figure can be assumed to relate to a moderately vigorous, mature VSP canopy planted on a 3 m row spacing (3.3 km of canopy row per hectare). This implies that more chemical will be needed if you have more cordon length per hectare – if you have VSP on a 2 m row spacing (5 km of row per hectare) you will need more chemical per hectare to achieve the same chemical application rate per metre of canopy row. Likewise, if you have young vines with small trunk diameters and crown development, you can expect to achieve adequate wetting and chemical dose with lower volumes.

It is entirely appropriate and sensible to adjust application volumes (and hence chemical application rates) to match row length and canopy size. By far the easiest way to do this is to use the distance calibration method developed by Geoff Furness from SARDI Australia (this is an evolution from the Vine Row Volume spraying calibration system he developed). A guide to this is included in the seminar handout on the following pages and can also be freely downloaded from <http://www.croplands.com.au/documents/DistanceCalibration.pdf>.

It is important to note that the coverage factors (volume of spray required per 100 m of row length) listed in this Australian guide are conservative (ie application volumes may be higher than required) and do not contain any guidelines for adjustments on the basis of canopy size. A spreadsheet tool for making these adjustments for NZ canopies is available on the focus vineyard website (<http://www.nzwine.com/focus>).