Spray Equipment and Its Use in Grapes

with the TRV calibration method

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Considerations

• The amount of spray required will depend on
  — Label Directions
  — Growth stage of the plant
  — Method and equipment used to apply
The “foundation” for applications

• Dilute application
  — Amount of pesticide per gallon or 100 gallons (from the label)
  — Spray foliage to the point of “run off”

• Concentrate applications are based on the dilute application rate, and adjusted according to the “concentration factor”
“to the point of run off”

Spray is applied until it just begins to drip from the leaves

DO NOT spray beyond this point
  • Waste if chemicals drip on ground
  • Knocks drops off the leaves, less stays on the plant
Some equipment

- Backpack sprayers
- Wrap-around sprayers
Powered Sprayer

Some perspective from 1943 and ‘45
Concentrate Spraying

• Apply the same amount of Pesticide per acre
• Use less water as a carrier
• Use air to carry the spray to the plant
• The “concentration factor” is the factor by which the spray volume is reduced
  — Usually 2X to 6X; can be up to 10X
  — 4X = 4 times less spray, or ¼ the dilute application (same amt. of pesticide)
Concentrate equipment

- Tractor mounted or drawn
- Axial fan
- Hydraulic nozzles designed for higher pressures
Concentrate equipment

• Propeller fan with Rotary nozzle
• Can aim to direct spray
Concentrate equipment

- Centrifugal fan
- Directed spray
- Air-Shear Nozzles
Coverage

• Want uniform coverage for good protection
Determining the Application Rate

- The amount of spray you will need depends on the amount of foliage the plant has at the time you spray. This will vary...
  - Foliage growth through the season
  - Age/Fullness of plant
  - Cultural practices, such as pruning
Spraying a “volume” of foliage

- Some situations require more gallons than others
Trial method

• Spray (with clean water) a representative “average” part of the vineyard to the point of runoff with water to determine the application rate.

• Can find the gallons needed per 1000 cubic feet of foliage
What about charts

• Be very careful- charts can give you a general idea of gallons needed, but can be off
• Keep detailed records for your vineyard (pictures even) for reference. These can be more useful than generic charts
• Remember, each year is a little different.
TRV method

• Originally used in tree/orchard spraying, stands for “Tree Row Volume”

When spraying, consider we are spraying a “volume” of space filled with foliage
TRV step 1

- Calculate the linear feet of row per acre

\[ L = \frac{43,560 \text{ sq.ft. per acre}}{\text{row spacing}} \]
TRV step 2

• Calculate the cubic feet of foliage per acre

\[ \text{TRV} = L \times D \times H \]

Note: “D” is the distance across a row; the width of the grapes, in this case; “H” is the height of the plant or portion of the plant you want to spray.
TRV step 3

• Determine the gallons of spray the foliage can hold (per 1000 cubic feet)

\[
DF = \frac{1000 \times \text{dilute gallons required}}{\text{Volume of foliage treated}}
\]

This is called the “Density Factor” since the amount of water depends on the density of the foliage.
TRV step 4

• Calculate how much spray one acre will require for a dilute application

\[ \text{TRV gallons} = \frac{\text{TRV} \times \text{DF}}{1000} \]
TRV step 5

• Determine the amount of pesticide to apply per acre

$$\text{Pesticide per acre} = \frac{\text{pesticide per hundred gal} \times \text{TRV gal}}{100 \text{ gal}}$$

(note: this illustrates a pesticide label recommendation for amount of pesticide per 100 gallons spray. If the label recommendation differs, your calculation will differ)
TRV step 6

• If spraying using an air carrier sprayer, determine the concentrate application volume

\[
\text{Concentrate gal. per acre} = \frac{\text{dilute gal. per acre}}{\text{concentration factor}}
\]
Operating an Air Carrier Sprayer

• The air from the sprayer should displace the air within the plant canopy
  — Too much air will carry pesticide past the plant
  — Too little air won’t carry the pesticide into the canopy, resulting in poor coverage

• Controlled with tractor speed
  — But don’t go faster than 3 mph
Keeping the spray in the vineyard

• Aim the spray
  — Keep from spraying the ground
  — Don’t place nozzles in the part of the air stream that over-shoots the plant
Avoiding Drift

• Carefully aim the spray—don’t over- or under-shoot the plants
• Turn off spray immediately on turns at row ends
• Monitor the wind speed and direction
• Spray the outside rows so the spray is directed in toward the rest of the vineyard
Keep the spray in the vineyard

• Don’t spray when it’s too windy, or completely calm
• Pay special attention to drop size:
  — small enough or numerous enough for coverage
  — large enough for drift resistance
Avoid Drift of Herbicides

- Select nozzle to increase drop size
- Increase flow rates - higher application volumes
- Use lower pressures
- Use lower spray (boom) heights
- Avoid adverse weather conditions
- Consider using buffer zones
- Consider using new technologies