

Western WA Wine Grape Growers Workshop  
30 March 2011  
Mt. Vernon, WA

## Vineyard Sprayer Technology

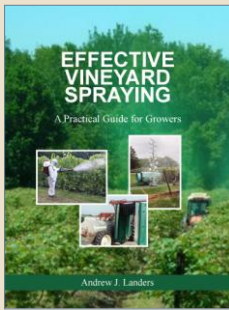
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### OVERVIEW

- Education Foundation
  - Sprayer components: Why they matter
  - How to prepare sprayers for the growing season
  - The importance of proper application
    - Spray coverage and deposition
    - How and when to apply sprays
    - Sprayer modifications

### VINEYARD RESOURCE BOOK



[www.effectivespraying.com](http://www.effectivespraying.com)

Most of this information can be found in this practical, for-grower, book.

## The Meat and Potatoes of Sprayers



### SPRAYER COMPONENTS

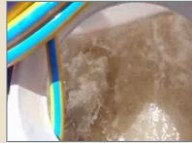
- Basic Sprayer Parts:
  - Tank
  - Agitator
  - Pump
  - Pressure regulator
  - Pressure gauge
  - Control valve
  - Distribution valves
  - Nozzles

### TANK

- Tank
  - Many kinds: Galvanized steel, aluminum, polyethylene, fiberglass, stainless steel.
  - Take capacity determines weight, refilling speed
  - Some include pesticide induction bowls
  - Shape of tank influences agitation
  - Sight gauge

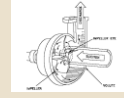
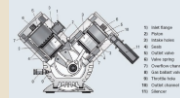
**AGITATORS**

- Agitators keep pesticides in solution
  - Mechanical agitators
  - Hydraulic agitators
  - Compressed air agitators
- Fill tank to 50% and start agitator before adding pesticides.



**PUMPS**

- Pumps create the pressure to propel spray
- Flow rate capacity should be more than the maximum needed
- Pumps are sensitive to the materials spray (abrasive or corrosive materials)
- Many pump types:
  - Piston, diaphragm, centrifugal, roller



**PRESSURE REGULATORS AND GAUGES**

- Pressure regulators protect pumps from excess pressure
- Regulating pressure, and knowing what your pressure is, is crucial for spray output
- Control and Distribution valves control flow rate to nozzle.



**NOZZLES AND FILTERS**

- Filters: they are everywhere!
  - Larger filter size at tank:
  - smaller at nozzle
  - Strain out debris
  - MUST CLEAN AND CHECK
- Nozzles:
  - Key in droplet size!
  - Must select appropriate nozzle for machine



**Sprayer Designs**



**AIRBLAST**

- Easy to adjust
- High speed air
- Standard nozzles



**AIRBLAST ADJUSTMENTS**



Reduce or redirect air flow

**DIRECTED AIR**

- Good canopy agitation



**TUNNEL/RECYCLING/HOODED BOOM**

- Can help reduce drift/pesticide loss



**ELECTROSTATIC**

- Helps reduce drift, increase deposition on plants



**BACKPACK/ SELF-MOUNTED**

- Cheapest alternative
- Hard to calibrate rates
- Recommended for small vineyards only



**Sprayer Calibration and Preparation**



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Operator Check Sheet for an Airblast Sprayer

Operator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Checkbook/Completed:  /  Needs Attention:  /   
 Adjusted:  Not Applicable:

**Key:**  = Not checked  = Checked

**Manufacturer:**

**General:**

- Is the manufacturer or how to service?
- Is the chassis and structure free of cracks and rust?
- Are the wheels and tires in good condition?
- Are guards, air filter, shock absorbers, springs and wheelwings?
- Hydraulic system
- Are the hoses and connections work or cracked?

**Electrical system:**

- Is the wiring undamaged & are all connections properly labeled?
- Do all the lights work properly?
- Are the engine and generator belts working under operating loads?
- Are the rods & chassis dampers secure?
- Have tires been?
- Does the belt fit securely and free from leaks?
- Is the engine proper (check injection)?
- Are the fan drive belts under pressure?
- Are the hoses and connections work or cracked?
- Are all valves and filters in good condition?
- Are all fittings in good condition?
- Are all hoses correctly connected?
- Are all check valves working properly?
- Is the spray distribution pattern visually correct?

**Fluids/Fluids:**

- Are the correct specific mixture working correctly?
- Are left & right nozzles working functioning?
- Can you read the pressure gauge easily?
- Are all labels appropriate and legible?
- Is the pressure adjustment visible?
- Pressure gauge reading easy?
- Chemical calibration system
- Are the screens and controls working properly?
- Are all labels appropriate and readable?
- Is the main system and container work correct working properly?
- Are all hoses connected properly?

**Final:**


- Tag out or safety system
- Done Completed
- Operator complete and file check sheet independent of the \_\_\_\_\_

Comments/Notes/Specific Items Requiring attention:

Andrew Landers, Cornell University, 2013-2015, Geneva, NY 14853

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**IMPORTANCE OF CALIBRATION/PREPARATION**



Only 1 airblast sprayer had 100% of their nozzles working properly.

Range from manufacturer specifications = -43.1% to 44.5%

Even with a defined maintenance schedule still problems

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**Proper Spray Application**



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**PROPER SPRAY APPLICATION**

- Proper application consists of:
  - The right equipment
  - Proper calibration
  - Appropriate droplet size
  - Reducing drift to reduce loss
  - The right material
  - The right timing
  - Documentation


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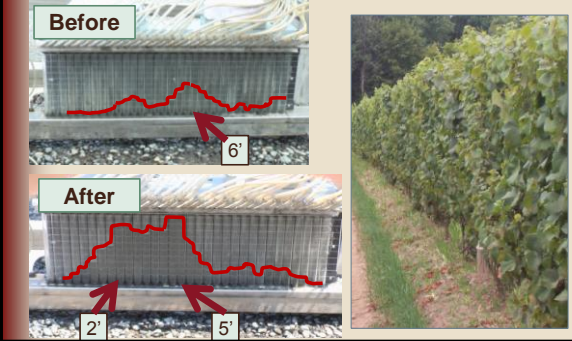
**ADJUSTING NOZZEL ORIENTATION**



- Spray Patternator helps to determine where your nozzles are directed.
- Can adjust them if shooting above or below the canopy

Photo courtesy of Dr. Andrew Landers, Cornell University-NYSAES

SPRAY PATTERN AND CANOPY SHAPE



SPRAYER ALTERATIONS

- Minimize air volume
- Redirect air

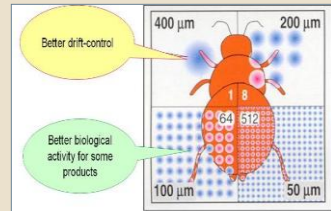


SPRAY DEPOSITION

- Droplet size matters
  - >350 um will bounce
  - <150 um will drift

•Very Fine	•<119 μm	Insecticides/ Fungicides
•Fine	•119-216 μm	Herbicides/ Post- emergence
•Medium	•217-353 μm	Herbicides/ Soil Applications
•Coarse	•354-464 μm	
•Very Coarse	•>464 μm	

SPRAY DEPOSITION



Higher pressure=smaller droplet size.  
Controlling pressure is crucial!

DRIFT

- In early season, reduce water volume
- Turn off fan on airblasts for pre-bloom applications; drive faster to deflect air if fan is on



SPRAY RATE VS. CONCENTRATION

- Rates are a LEGAL obligation
- Rates are effectively a concentration based on land area (i.e. 3oz/Acre)
- Concentration is based on water volume used. This is adjustable.
- Reduced water volume (i.e. higher concentration) helps reduce drift in early season
  - However, you are still applying the same RATE. (3 oz/A/30 gal vs 3 oz/A/50 gal)



MANAGING PESTICIDE RESISTANCE DEVELOPMENT

- Pests and pathogens can quickly develop resistance to pesticides
  - A result of the rate and coverage of application
  - A result of generation time
  - A result of repeated exposure
- Irresponsible management of pesticide programs ruins it for EVERYONE.

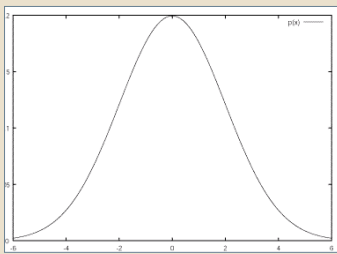


MANAGING PESTICIDE RESISTANCE DEVELOPMENT



- Ways to reduce pesticide resistance development:
  - FOLLOW LABEL INSTRUCTIONS
  - Rotate through chemistries with different modes of action
  - Do not reduce rates below recommendations

WHY RATES MATTER



Proper Spray Rate

Illegal Spray Rate

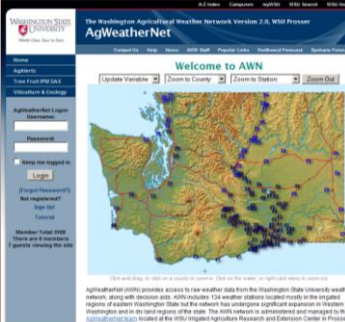
PLANNING

Don't be caught off guard!



Easy to make adjustments from a set program, hard to make them on the fly.

MONITORING THE WEATHER



- AgWeatherNet [www.weather.wsu.edu](http://www.weather.wsu.edu)
- What was the weather last week? Now? Forecast?
- Weather is important!

WEATHER AND DRIFT

- Wind speed: Avoid spraying >10mph (best is 3-10mph)
- Temperature Inversions= Stable, stagnant atmosphere. Potential long-distance drift of smaller particles
- High temperature can cause volatilization
- Cold temperature can cause inactivity
- Low humidity may increase drift

**RECORD KEEPING-IT'S THE LAW**

- You **MUST** record all pesticide applications.
  - Sample records and forms are available at: <http://agr.wa.gov>
- Additional things that are worthy to note:
  - Past and present weather conditions
  - Vine development
  - Notes on disease or pest pressure

**CONCLUSIONS**

- Know sprayer components for maintenance
- Many sprayer types are available
- Calibration and adjustment is critical
- Proper spray application is more than just hitting the target

**QUESTIONS?**

