Orchard Pesticide Spray Rates

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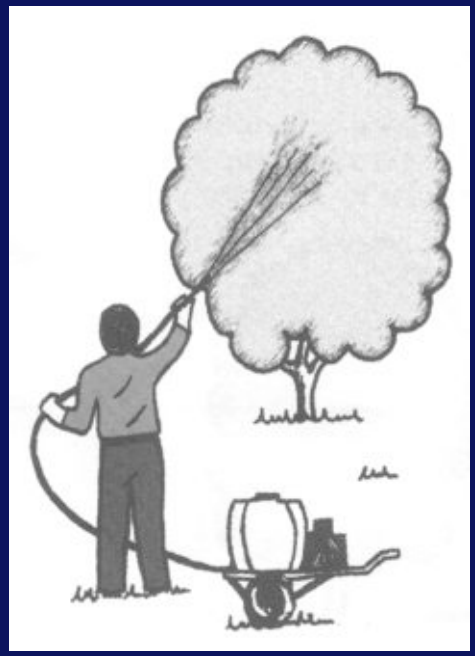
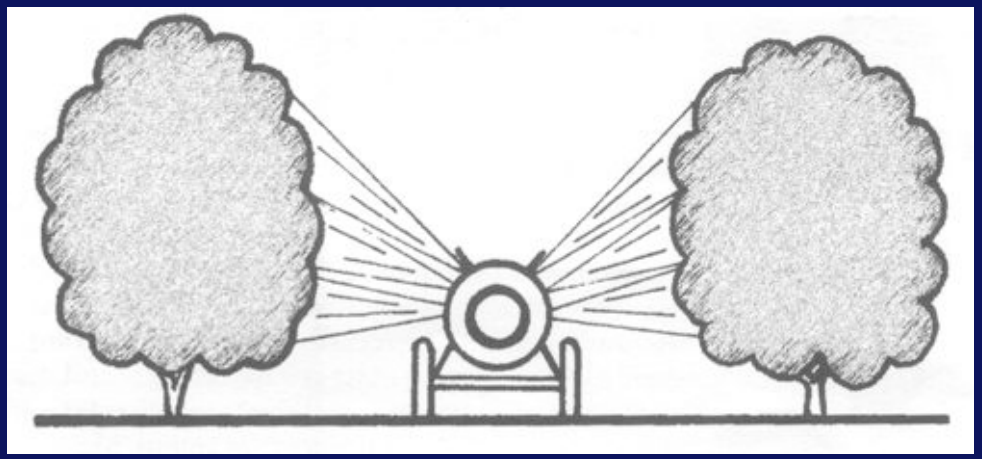
Pesticide Rates

- **Amount per 100 gallons** (the dilute rate)
- **Amount per acre** (the concentrate rate)

Types of Application

- **Dilute = point of runoff**
- **Concentrate (low volume)**





Standard Conversion from Dilute Rate to Per Acre Rate

Based on assumption that it takes 400 gal/A of water to spray apple trees to point of runoff

Rate of pesticide per acre = (Rate per 100 gal water) x (400 gal/acre)

Example, Guthion 50WP: (0.75 lb/100 gal) x (400 gal/A) = 3.0 lb/A

Orchards & Spraying: Historical Perspective

	Old days	Now
Tree size	Big	Small
Tree spacing	Wide	Narrow
Sprayer	Handgun	Airblast
Volume to runoff	400 gal/A	100-250 g/A

Dilute Volume for Fruit Crops

Crop	Dilute volume
apples	400 gal/A
peaches	300 gal/A
berries	200 gal/A

Customized Application

- **Based on assumption that small apple trees take less than 400 gal/A to reach the point of runoff**

Customized Application

- **1st step: determine what volume per acre to runoff in YOUR trees**
- **Must be done even if you never actually make a dilute application**
- **This is basis of calculating how to do a customized low-volume concentrate spray**

Dilute Spraying

- **How much water?**
  - **Standard (400 gal/A)**
  - **Customized**
- How much pesticide?

How to know dilute volume for a specific orchard

1) Experiment with sprayer
2) Use chart of common spacings
3) Use equation

Dilute volume chart

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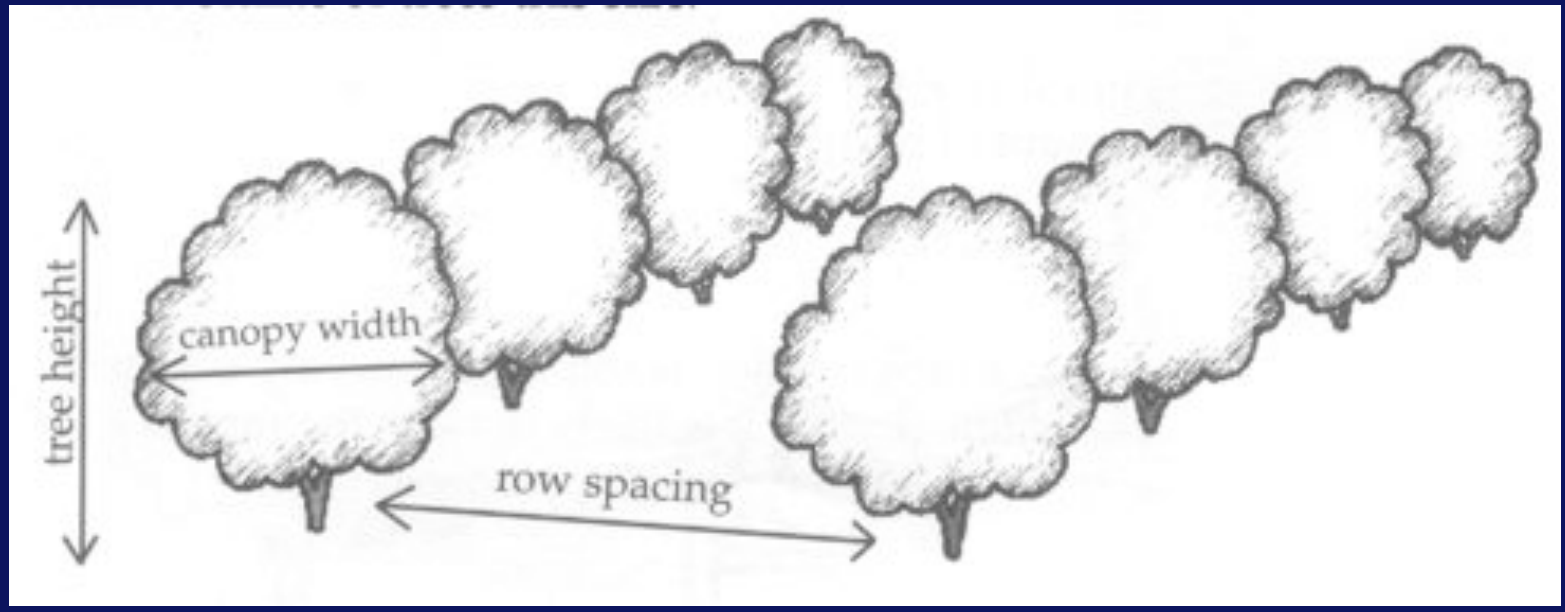
Row spacing	Canopy width	Tree height	Minimum Dilute Gal/Acre
30’	20’	20’	407
20’	12’	12’	220
16’	8’	8’	122

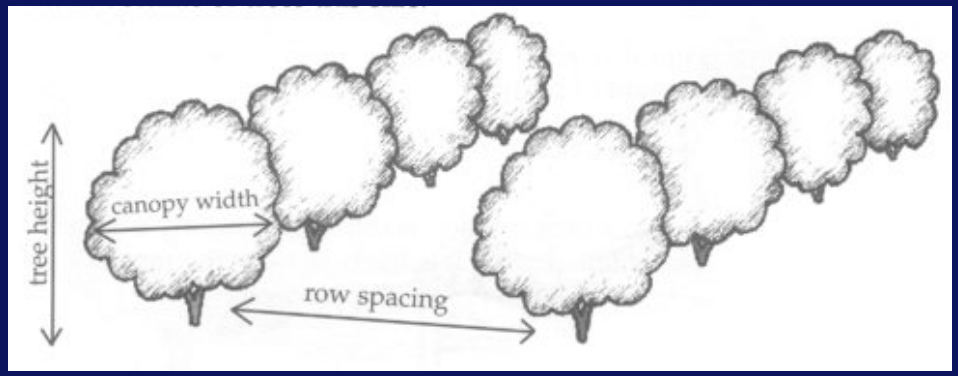
Equations



Step 1: get measurements

- Canopy width [ft]
- Tree height [ft]
- Row spacing [ft]

Equations



Step 2:

Canopy Width [ft] **x** **tree height** [ft] **x** **43,560 sq.ft./A** / **row spacing** [ft]

= tree row volume [cu.ft./A]

Step 3:

TRV x 0.7 gal/1000 cu ft

= minimum dilute volume [gal/A]

Equations, example

- **Row spacing** 20 ft
- **Canopy width** 10 ft
- **Height** 12 ft
- **TRV = 10’ x 12’ x (43,560/20’)**
  = 261,360 cu. ft.
- **TRV x (0.7 gal/1000 cu.ft.) =**
  183 gal/A

Dilute Spraying

- How much water?
- **How much pesticide?**
  - **(Dilute rate) x (dilute volume)**

Customized Dilute Spraying, example

- **How much pesticide?**

  (Dilute rate) x (YOUR dilute volume)

- **How much Guthion?**

  - **(0.75 lb/100 gal) x (183 gal/A) = 1.4 lb/A**

Concentrate Spraying

- Also called ‘low volume spraying’
- Airblast sprayer
- Typically 40-80 gallons per acre
- As amount of water per acre decreases, but the amount of pesticide stays the same, the spray mix becomes more concentrated than in a dilute spray

Concentrate Spraying

- **Amount of water to use?**
  - Depends on sprayer
  - Whatever volume needed to give adequate coverage
  - Typically 40-80 gallons per acre

Concentrate Spraying

- **What is the concentration?**
  = (amount of water per acre in your sprayer for dilute application) / (amount of water in your sprayer for concentrate application)
- **Example:**
  - **Your dilute volume = 180 gal/A**
  - **Your concentrate volume = 60 gal/A**
  - **Your concentration = 180 / 60 = 3x**

Concentrate Spraying

- **Amount of pesticide to use?**

What rate does label state?

- 3 typical answers:
  - Amount per 100 gal only
  - Amount per acre only
  - Both
- If only the amount per acre is given, then use this rate
- Trend??

Concentrate Spraying

- **Amount of pesticide to use?**
- **4 possibilities:**
  - **Label rate per acre**
  - **Standard conversion**
  - **Standard conversion less 20%**
  - **Customized by tree row volume**

Standard Conversion from Dilute Rate to Full Per Acre Rate

Based on assumption that it takes 400 gal/A to spray apple trees to point of runoff

Full Rate of pesticide per acre = (Rate per 100 gal water) x (400 gal/acre)

Example, Guthion 50WP: (0.75 lb/100 gal) x (400 gal/A) = 3.0 lb/A

Standard Conversion Less 20%

- Control with airblast often good with less than the full rate
- Common in 1970s & 1980s
- Example:
  - Guthion full rate = 3 lb/A
  - Guthion full less 20% = 2.4 lb/A
- Risky unless known by experience

Tree Row Volume

your customized amount of pesticide per acre =

The dilute rate [amount of pesticide per 100 gallons]

x

<u>your</u> dilute volume

Tree Row Volume, example

- Captan 50WP
- Dilute rate: 1.5 lb/100 gal
- Your dilute volume: 183 gal/A
- your customized amount of pesticide per acre =
  (1.5 lb/100 gal) x (183 gal/A)
  = 2.74 lb/A

Tree Row Volume, alternate method

- Use percentage of standard
- Determine your dilute volume
- % of standard =
  (your dilute volume) / 400 gal/A
- Then multiply this by the full rate of pesticide per acre

Tree Row Volume, alternate method

Example:

- **your dilute volume = 183 gal/A**
- **Your % of standard = 183 / 400 = 0.46 = 46%**
- **Captan 50WP, dilute rate = 1.5 lb/100 gal**
- **Captan full rate = (1.5 lb/100 gal) x (400 gal/A) = 6 lb/A**
- **Your rate = 0.46 x 6 lb/A = 2.76 lb/A**

3 Final Examples, #1:

- **Provado 1.6F, 2 oz/100 gal**
- **How much for a dilute application to big old trees that require 400 gal/A to runoff?**
- **(2 oz/100 gal) x (400 gal/A) = 8 oz/A of Provado**

3 Final Examples, #2:

- **Provado 1.6F, 2 oz/100 gal**
- **How much for a dilute application to semi-dwarf trees that require 180 gal/A to runoff?**
- **(2 oz/100 gal) x (180 gal/A) =**
  3.6 oz/A of Provado
- **Note, this is less than the 8 oz/A of Provado needed for big trees in example #1**

3 Final Examples, #3:

- Provado 1.6F, 2 oz/100 gal
- How much for a concentrate spray to semi-dwarf trees that require 180 gal/A to runoff, if sprayer applies 60 gal/A?
- (2 oz/100 gal) x (180 gal/A)
  = 3.6 oz/A of Provado
- Note, compared to #2, this is same amount of Provado but in different amount of water
- What is the concentration? 180 / 60 = 3x

Orchard Spraying

Spray mix = water + pesticide