Let's Review Tree Row Volume

What it is

What it isn't

How relevant is it today?

Dilute Application

- Applying a spray mixture at a certain volume per acre, where applying a gallon more will result in excess spray material “running off” the leaves and dripping onto the ground

How Much is Dilute?

The volume of water required to saturate an acre of trees planted 35’ apart, 23’ canopy width, 20’ high, to the point of run off, was determined to be 400 gallons/acre.

Buyers et. al/. 1971

Concentrate Application

Applying a fraction of a particular orchard's calculated dilute water volume requirement

1/2 Volume = 2X
1/3 Volume = 3X
1/4 Volume = 4X

If the dilute rate is 400 GPA, then:

2X Concentration = 200 GPA

3X Concentration = 133 GPA

4X Concentration = 100 GPA

This is the amount of **WATER** we are applying to each acre in our orchard.

We are not talking about spray materials……yet

Applications at dilute volumes offer at least the hope of 100% physical coverage of all plant surface area in the orchard

Applications at concentrated volumes offer at least the hope of getting some sleep during primary scab season

The trade off is:
coverage
vs
application cost

Alternate Row Middle

Skipping every other row middle so that you finish the acre in half the time. Of course, you are also reducing your total spray volume, water & spray material, by 50% per acre

Tree Row Volume

Adjusting the dilute water volume rate per acre to better match the reduced canopy volume of a high(er) density orchard

Dilute Application

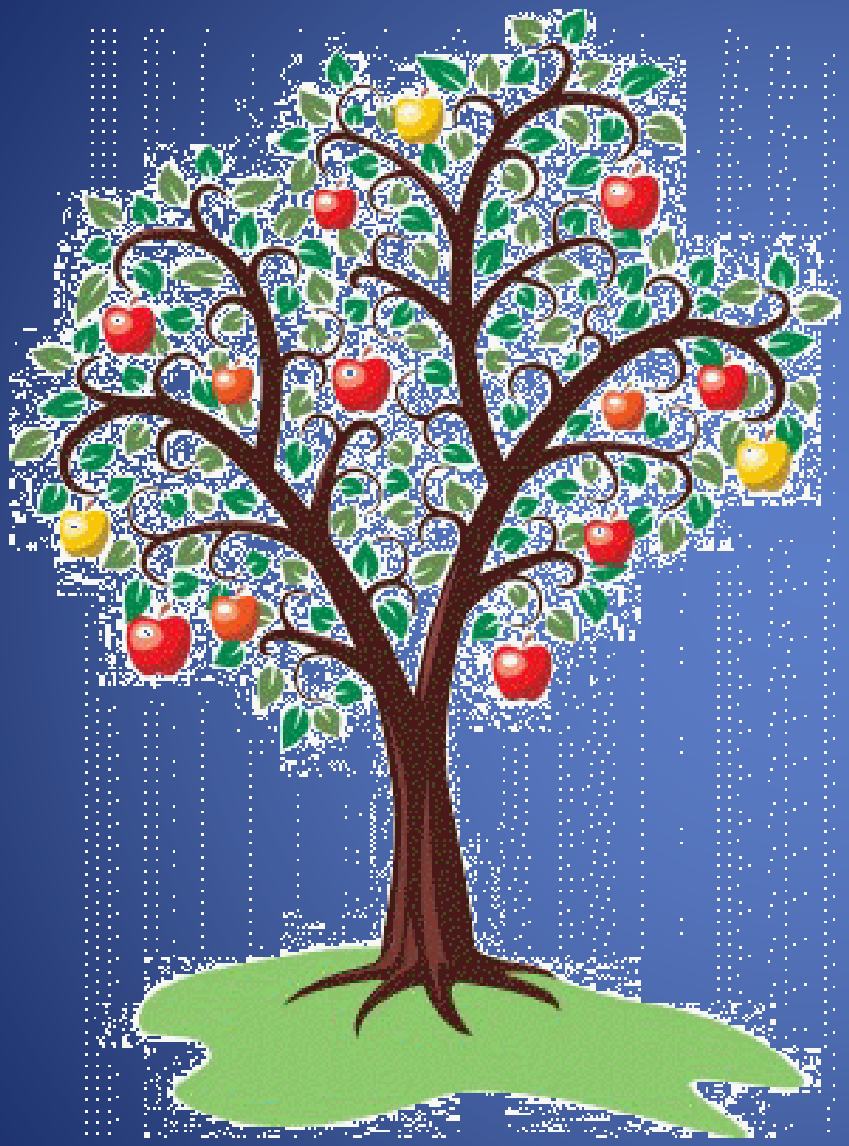
- Applying a spray mixture at a certain volume per acre, where applying a gallon more will result in excess spray material “running off” the leaves and dripping onto the ground

How Much is Dilute?

The volume of water required to saturate an acre of trees planted **35’** apart, **23’** canopy width, **20’** high, to the point of run off, was determined to be **400 gallons/acre**.

Buyers et. al/. 1971

23’ Width



20’
Height

400 GPA
vs
100 GPA

6’ Width

7’
Height

35’ Row

13’ Row

There is a Formula – Part 1

(Tree Diameter X Height)

X

(43560/Between Row Spacing)

=

Canopy Volume/Acre

There is a Formula – Part 2

(Calculated Canopy Volume / 1000)

X

Canopy Density Factor

=

Gallons per Acre Dilute

Canopy Density Factor (or quality of pruning)

The factor has a range of 0.7 – 1.0

1.0 = an unpruned orchard

0.7 = a well-pruned orchard

There is a Formula – Part 2

(Calculated Canopy Volume / 1000)

X

Canopy Density Factor

=

Gallons per Acre Dilute

A well pruned orchard requires less water volume

What About a Tall Spindle Planting?

- Between-Row Spacing 12’
- Canopy Height 12’
- In-Row Spacing 3.5’
- Canopy Density Factor 0.7

- **Calculated GPA for Dilute is 107 GPA**

According to Tree Row Volume……

- If your sprayer was calibrated to apply 50 GPA, and you are spraying a dilute = 400 gallon orchard, your concentration would be 8X

- If your sprayer was calibrated to apply 50 GPA and you were spraying a tall spindle orchard calculated at dilute = 100 gallons, your concentration would be 2X

How Many Acres per 500 Gallon Tank?

Exactly the same in our two examples

50 GPA, 500 Gallon Tank = 10 acres/tank

The amount of spray chemical we add to the tank is different for each orchard, and depends on our calculated dilute GPA for that orchard, along with the concentration factor

How Much Spray Chem / Acre?

- For a material with a label rate of 1 lb/100 gallons dilute spray, the 400 gallon trees would require 4 lbs of material/acre

- For a material with a label rate of 1 lb/100 gallons dilute spray, the 107 gallon trees in the tall spindle block would require 17 oz of material/acre

How Much Spray Chemical / Tank

- We're calibrated for 50 GPA, so 10 A/tank
- For the 400 gallon orchard, that's 40 lbs/tank
- For the 107 gallon orchard, that's 10 lbs 10 oz/tank

In Theory at Least, Using TRV Could Lead To:

- Reduced pesticide usage in high density plantings compared to traditional plantings.
- Reduced spray bills
- More acres sprayed per tank (at a given concentration), resulting in increased spraying efficiency and lower labor and machinery costs.

But Then Reality Hits……

- Does this simple model accurately reflect chemical deposition in the narrow rows and thin canopies of a high density orchard?
- This model was developed a long time ago, chemistries have changed, is it still applicable?
- What about the label?

What are the Complications?

- Tree Shape
- Stage of Seasonal Tree Growth
- Canopy Density as a Function of

  Tree Age and Pruning Status
- Does the Sprayer Technology Match the Characteristics of the Planting System

Crop Adapted Spraying Model

- Under development in by Dr. Jason S.T. Deveau at OMAFRA in Ontario, Canada
- Same method used to calculate canopy volume as the original TRV formula
- The coverage constant is 0.45, not 0.7, and is based on a summary of 25 international studies
- Tree shape adjustment factor of 0.5 – 1.0
- Fruit size/canopy density adjustment factor

Fruit Size/Canopy Density Factors

Fruit size < 25 mm: Factor = 0.8
Fruit size > 25 mm: Factor = 1.0

Canopy is Dense: Factor = 1.0
Canopy is Moderate: Factor = 0.7
Canopy is Open: Factor = 0.4

How Does Our 107 Gallon Tall Spindle Do Under the CAS Model?

- Base Dilute Gallons/A = 69 GPA
- Tree Shape Adj Factor of 0.75 = 52 GPA
- Early Season/Moderate Canopy = 29 GPA
- Later Season/Moderate Canopy = 36 GPA

The TRV Limbo:

Just How Low Can You Go?

Resistance Management

What Does the Pesticide Label Specify?

TRV Recommendations

- Take the time to evaluate the spray coverage in your high-density orchards using water-sensitive paper in the top, center, and bottom of the tree canopy

- Use streamer tape to check and adjust the direction of your sprayer's airflow

TRV Recommendations

- Match your concentration factor to the target pest and the chosen chemistry

- Unless running a hi-tech, completely optimized spray rig, driven slowly, and have tested the **do not drop your dilute basis below 150 GPA in bearing orchards**.