# Crop Estimation and Adjustment for Balanced Growth and Yield

**Sarah Bowman**
Viticulture Instructor

**NCWGA Pre-Harvest Workshop**
June 12th, 2023

SURRY Community College™
Serving Surry and Yadkin Counties
www.surry.edu

# Setting a Sustainable Yield Target

**<u>What is a reasonable target tonnage per acre?</u>**

**Depends on…**

**Wine style and quality goal:** sparkling, rose, varietal…bulk or premium quality

**Variety:** low, medium, high vigor…early, mid, late ripener

**Climate:** arid, humid, cool, warm, hot climate… short, medium, long season

**Vineyard site characteristics:** slope aspect… soil type, drainage and depth

**Trellis system:** single or divided canopy

**Management:** canopy, nutrient, water, pest, disease

# Why is it important to estimate yield?

Growers need to know if their predicted yield is below, meets, or exceeds target:

- Vine balance goals
  - Do I need to cluster thin (remove clusters) to match vine capacity?

- Style and quality goals
  - Do I need to maintain modest yields to improve wine quality potential?

- Production goals
  - How many tons per acre do I need to produce to:
    - Pay off debts or have profit?
    - Satisfy demand of buyers/winery?

# Grape Grower or Vine Balancer?

- Grape quality and yield consistency are dependent on the balance between reproductive and vegetative growth
  - High Quality and Consistency
    - Balanced-crop: moderate shoot growth and yield
  - Low Quality and Inconsistency
    - Under-cropped: vigorous shoot growth, low yield
    - Over-cropped: weak shoot growth, excessive yield

# Vine Balance

- Canopy size (source supply)

Balanced With

- Yield (sink strength)

# Yield per Vine and Acre Calculation Factors

- **Cluster weight**: influenced by variety, fruit set, environmental factors
- **Clusters per vine**: influenced by variety, pruning, shoot and cluster thinning
- **Vines per acre**: influenced by vine and row spacing

**Yield per vine = (Cluster weight) X (Clusters per vine)**

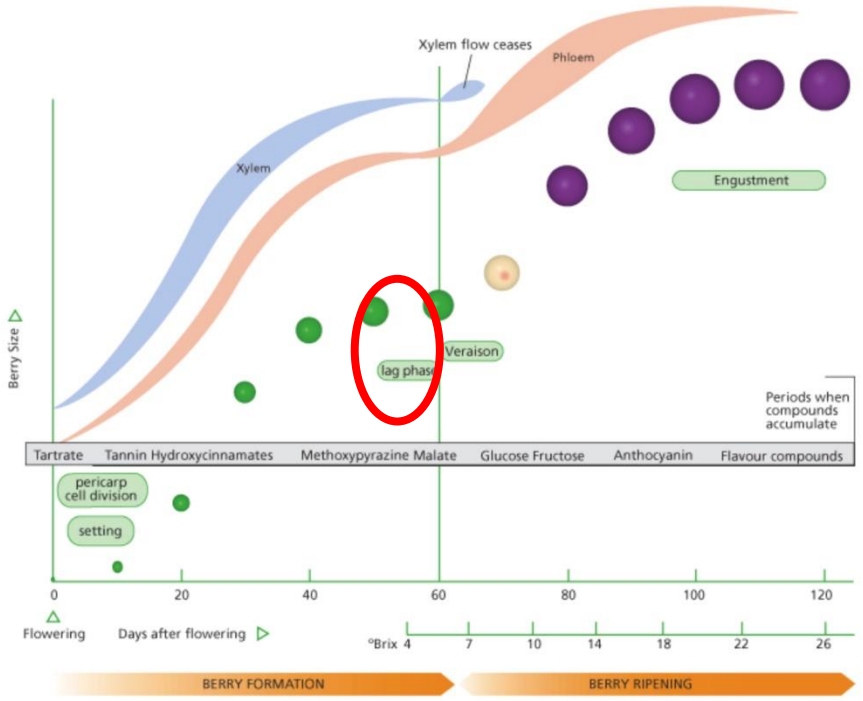
**Yield per acre = (Yield per vine) X (Vines per acre)**

43,560 $ft^2$

| Number of vines per acre by spacing | | |
|---|---|---|
| 6 x 9 = 807 | 7 x 9 = 691 | 8 x 9 = 605 |
| 6 x 10 = 726 | 7 x 10 = 622 | 8 x 10 = 545 |
| 6 x 12 = 605 | 7 x 12 = 518 | 8 x 12 = 454 |

# Crop Estimation Methods

- Lag Phase




AND/OR

## Vineyard Data Date

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variety: | | | | Block: | | | | |
| Row: | | | | Panel: | | | Vine: | |
| Training System: | | | | Cordon ft: | | | Pruning lbs: | |
| Vine Yield lbs: | | | | Cluster #: | | | Cluster lbs: | |
| Balanced Pruning Method | | | | | | | | |
| Balanced Pruning Rule: | | | | Buds/vine: | | | Buds/ft: | |
| Crop Load Ratio Method | | | | | | | | |
| Target yield lbs. | | / | Pruning lbs. | | = | Target Crop Load Ratio | | |
| Estimated yield/vine: | | / | Cluster lbs: | | = | Clusters to Retain: | | |

- Historical Data

# Lag Phase

Roughly 55 days after onset of bloom

Identified by resistance when slicing through berry

- Hardening seeds provide resistance

- Energy is devoted to embryo (seed) development
- Seeds reach final size
- Berry has attained about half of its final:
  - Size
  - Weight

- Excellent time to estimate yield!

# Lag Phase Method

For Each Variety

- At lag phase randomly harvest 100 clusters per acre from zone/block
- Weigh the 100 clusters together
- Divide weight by 100 = average cluster weight at lag phase
- In general…multiply by 2

  Multiply average cluster weight at lag phase by 2 = average cluster weight at harvest

# Estimating Average Cluster Weight

<u>100 clusters weigh 20 lb.</u>

**<u>Example</u>**

(20 lb.) / (100 clusters)

**<u>= 0.2 lb. average cluster weight at lag phase</u>**

(0.2 lb.)x(2)

**<u>=0.4 lb. estimated average cluster weight at harvest</u>**

# Estimating Yield per Vine

❖Count number of clusters on 20 representative vines

700 clusters on 20 vines

**Example**

(700 clusters) / (20 vines)

**= 35 clusters per vine**

(35 clusters per vine)x(0.4 lb. average cluster weight)

**=14 lb. fruit per vine**

# Estimating Yield per Acre

$$\frac{(\text{vines per acre}) \times (\text{lb. fruit per vine})}{2000 \text{ lb. per ton}} = \textbf{tons fruit per acre}$$

**Example**

$$\frac{(726 \text{ vines per acre}) \times (14 \text{ lb. fruit per vine})}{2000 \text{ lb. per ton}} = \textbf{5.082 tons fruit per acre}$$

# Historical Data Method

- Establish Sentinel Vines: the same individual vines utilized to collect yield and vine size data every year
- Randomly select 20 vines from within the uniform acre/zone/block that are representative of average vigor and health
- Do not sample outside rows or vines at end of rows
- Mark and map vines

# Historical Data Method

- Utilize historical data to predict and plot trends over time:
  - *Estimate yield based on previous years' average cluster weight*
  - ***STILL REQUIRES CLUSTER COUNTING TO ESTIMATE CURRENT SEASON YIELD!!!***

- Utilize sentinel vines to measure:
  - Yield per vine *at harvest*
  - Cluster number per vine *at harvest*
  - Average cluster weight *at harvest*

lb. fruit per vine

cluster number per vine

**= average cluster weight**

**Example: Petit verdot on VSP**

13.68 lb. fruit per vine

72 clusters per vine

**= 0.19 lb. average cluster weight**

# Grape Grower and Vine Balancer!

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# Vine Balance

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Balanced With

- Yield (sink strength)

# Manipulate Source : Sink Ratio to Achieve Vine Balance

Yield potential is adjusted several times throughout the growing season

- First at Pruning
  - Number of buds per vine → number of shoots per vine → number of clusters per vine
- Second at Shoot thinning
  - Number of shoots per vine → number of clusters per vine
- Finalized at Cluster thinning
  - Number of clusters per vine

# Should You Cluster Thin?

Yes, in general if…

- Vines are under two-years-old

- Vines are weak: Shoots are less than 2 ft. long, have less than 12 leaves

- Experience tells you: the variety is notorious for over cropping, very large cluster size, or high shoot fruitfulness

**Cluster thinning must be performed prior to or at veraison to impact vine balance and wine quality!!!**

# How Much Should You Cluster Thin?

Consider your goals…

- Vine balance goals! Remember vine capacity!
  - Vigorous vines can support more yield, rarely require cluster thinning
  - Weak vines only capable of supporting low yield, and require cluster thinning

- Style and quality goals. Remember quality can be achieved at different yields, but depends on variety, regional climate, vineyard site, grower management!
  - Do I need to cluster thin (maintain modest yields) to improve wine quality potential?
  - What is the Intended wine style: Sparkling Wine vs. Bulk blender vs. Fine Wine?

- Production goals. Remember don't be greedy! Vine balance and fruit quality are long-term priorities.
  - How many tons per acre do I need to produce to:
    - Pay off debts or have profit?
    - Satisfy demand of buyers?

# Cluster Removal to Achieve Target Tonnage per Acre

**Example:**

**Estimated Yield 5.082 tons per acre**

**Target Yield 3.0 tons per acre**

(3.0 tons per acre) X (2000 lb. per ton)

**= 6000 lb. fruit per acre target**

6000 lb. fruit per acre

726 vines per acre

**=8.26 lb. fruit per vine target**

8.26 lb. fruit per vine estimated

0.4 lb. average cluster weight estimated

**=20.65 clusters to retain per vine to reach target**

35 clusters per vine – 21 clusters

**=14 clusters to remove per vine**

**Preferentially remove clusters from weak shoots, areas with cluster crowding and diseased clusters**

# Predicting Marketable Yield

## Estimated yield may not match marketable yield due to:

- Poor timing of sampling or poor sampling technique → improve with experience!
- Lots of missing vines → use actual number of bearing vines per acre in calculations
- Non-uniform vineyard, → increase sample size,
- Imprecise multiplier for lag phase method → more years of data may lead to more precise multiplier
- Animal depredation → try to estimate and document % loss
- Disease and pest pressure → try to estimate and document % loss
- Weather conditions → document rainfall, temperature
- Varietal response to management change→ impact of pruning, shoot thinning, leaf removal!

## Within 15% margin of error is considered a good prediction

## Predicting marketable yield is superior to guessing and crucial to:

- Maintaining vine balance and fruit quality goals
- Maintaining grower/winemaker relationship
- Maintaining vineyard economic/business plan

# Be a Grape Grower and Vine Balancer!

- Set targets wisely!
- Remember your goals!
- Don’t get greedy!
- Be committed to long-term vine balance and wine quality!