

# Principles and Practices of Pruning Grapevines

Bruce Bordelon  
Purdue University

# Common Pruning Questions

- What?
- Why?
- When?
- How?
  - what to leave
  - what to remove
  - etc. etc.



## What is Pruning?

- “Dormant Pruning” = Annual removal of wood during the dormant season.
- Dormant pruning is most important and most expensive vineyard management practice.

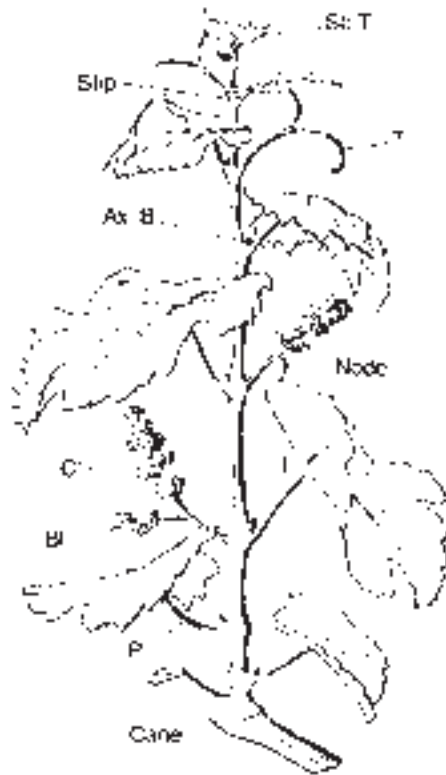
## Why Prune?

- To control or regulate crop size - Avoid overcropping.
- To achieve a “balance” between shoot growth and fruit production.
- To maintain vine shape consistent with the chosen training system.

# Grape Biology

Each bud should grow a primary shoot (ex blind nodes)

Secondary shoots should grow if primary is damaged



## When to Prune?

- **Dormant period: leaf fall - bud break**
  - Fall-pruned vines are more susceptible to winter injury than unpruned vines
  - Delayed pruning allows for compensation in case of winter injury
- **Best time: Late winter – early spring**
  - Prune hardy varieties before tender ones
  - Finish initial pruning and wood removal before bud swell to avoid bud breakage
  - Double pruning helps avoid damage from late frost

# Assessing Winter Injury



Live primary bud



Dead primary bud

## Adjusting for Winter Injury

- Leave additional buds to make up for losses of 20% or more
- If 50% or more buds are damaged then only minimally prune until full extent of damage can be determined.



# Double Pruning to Avoid Frost



# Apical Dominance

Buds at distal ends of long canes tend to develop before those at base, delaying development by up to two weeks in some years.



## How to Prune?

- Manual
  - hand pruners, loppers
- Semi-mechanized
  - Pneumatic or electric pruners
- Mechanized
  - Various tractor mounted pruning devices

## What to Retain?

- Select canes exposed to sun, located on outside of vine canopy
- Select canes with good wood maturation
  - Dark brown\* periderm (\*appropriate for variety)
  - Short to medium internodes (4" to 6")
  - Cane diameter of 1/4" to 1/2"
- Select canes with less persistent laterals

## Good Quality Canes



# Balanced Pruning

- Number of buds retained depends on “vine size”
- Vine size = weight of 1-year-old cane prunings
- Use of “Pruning Formula” for specific variety

## Balanced Pruning Formulas

| Grape Variety  | Pruning Formula | Cluster Thinning |
|----------------|-----------------|------------------|
| American       | 30 + 10         | No               |
| French Hybrids | 20 + 10, 15 + 5 | Yes/No/Maybe     |
| New Hybrids    | 20 + 20?        | Yes/No/Maybe     |
| Vinifera       | 20 + 20         | Yes/No/Maybe     |

## Example of Balanced Pruning

- Pruning Formula:  $30 + 10$ 
  - Leave 30 nodes (“count buds”) for first pound of canes removed plus an additional 10 for each additional pound
- Pruning wt = 1 lb – leave 30 nodes
- Pruning wt = 2 lb – leave 40 nodes
- Pruning wt = 2.5 lb – leave 45 nodes
- Pruning wt = 3 lb – leave 50 nodes



## Sound Simple?

- Unfortunately, it is more complicated
- Works best on American-type varieties
- Hybrids tend to be more fruitful
  - More clusters per shoot
  - More shoots per “count” node
- Hybrids require more management to maintain “vine balance”

# One shoot per node



# Non-count shoots



## Non-count shoots



## Problem with balanced pruning formulas:

- On small vines they tend to suggest a very low number of shoots, which would produce far below the optimum leaf area for the vine. (e.g. 5+10 for Seyval)
- They don't take into account non-count buds

## Another approach to balancing vines

- Instead of applying a formula to determine number of buds, why not leave enough shoots to fill the trellis space then use a formula to adjust the number of clusters to meet a targeted “crop load” value?
- That will help maximize “vine capacity” (leaf area) without causing vine imbalance.

## Using Target Crop Load Approach

1. Prune and thin to 40-50 shoots per vine (at 8 ft vine spacing)
2. Use long-term average cluster weight data to calculate number of clusters needed for yield that will give a desired “crop load ratio” based on “vine size” data.
3. Thin clusters to appropriate number

### Required data:

- Vine size (pruning weight)
- Vine yield (crop weight)
- Cluster weight (number of clusters per vine)

## Variety Performance over 12 years Southwest Purdue Ag Center

| Variety     | Yield (lb) | Vine Size (lb) | Crop load ratio | Cluster wt (lb) | Clusters per vine | Clusters for crop load ratio =10 |
|-------------|------------|----------------|-----------------|-----------------|-------------------|----------------------------------|
| Chambourcin | 19         | 1.1            | 17              | 0.41            | 47                | 24                               |
| Chardonel   | 17         | 1.0            | 17              | 0.39            | 44                | 26                               |
| Seyval      | 22         | 1.0            | 22              | 0.45            | 49                | 22                               |
| Norton      | 17         | 3.2            | 5               | 0.19            | 90                | 168                              |
| Foch        | 24         | 2.2            | 11              | 0.21            | 115               | 105                              |
| Frontenac   | 12         | 1.2            | 10              | 0.29            | 41                | 41                               |

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## Variety performance over 6 yrs at Lafayette

| Variety      | Yield (lb) | Vine Size (lb) | Crop load ratio | Cluster wt (lb) | Clusters per vine | Clusters for crop load ratio =10 |
|--------------|------------|----------------|-----------------|-----------------|-------------------|----------------------------------|
| Cayuga White | 24         | 1.0            | 24              | .32             | 75                | 31                               |
| Corot Noir   | 18         | 1.2            | 16              | .31             | 58                | 39                               |
| Frontenac    | 12         | 0.9            | 13              | .17             | 71                | 53                               |
| LaCrescent   | 12         | 1.3            | 9               | .18             | 67                | 72                               |
| Noiret       | 15         | 2.5            | 5               | .31             | 48                | 80                               |
| Traminette   | 14         | 2.2            | 6               | .22             | 64                | 100                              |

# Summary

- Pruning and crop load adjustment are the most important management practices for achieving vine balance and good fruit quality.
- Goals
  - Balance fruit production with vegetative growth
    - Produce maximum yields of highest quality fruit possible
  - Maintain consistent vine balance
  - Reduce fruit and vine variability
- Growers need to collect data on yield, pruning weight, cluster weight, shoots per vine, etc.