

Pruning and Training Principles for Balanced Vines

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Definitions

Pruning can be defined as “**the annual removal of plant parts to obtain production objectives**”. These objectives include:

- Controlling the size & form of the grapevine.
- Optimize the production potential of the grapevine.
- Maintain a balance between vegetative growth and fruiting.

Training can be defined as “**the development of plant parts spatially**”. This is done to develop a structure that:

- Optimizes the exposure to sunlight that promotes productivity.
- Evenly distributes fruit-bearing units in the vine row space.
- Adapts to the characteristics of the grape cultivar.
- Promotes efficient & sustainable vineyard practices.
- Is economical to establish and maintain.

Definitions

Dormant Pruning can be defined as “the annual removal of dormant wood”

Summer Pruning can be defined as “the removal of green vine parts”.

- Shoot thinning
- Leaf removal
- Hedging
- Flower or cluster thinning

Reasons for Pruning

- 1. Control vine shape and size to facilitate the cultural operations**
- 2. Select fruiting units to optimize bud fruitfulness and space shoots and fruit over a larger area**
- 3. Regulate crop size**

Bulletin 119: Vine Pruning, 1897
F. T. Bioletti

“Physiological Principles of Vine Pruning (7)”



Vigor vs. Capacity

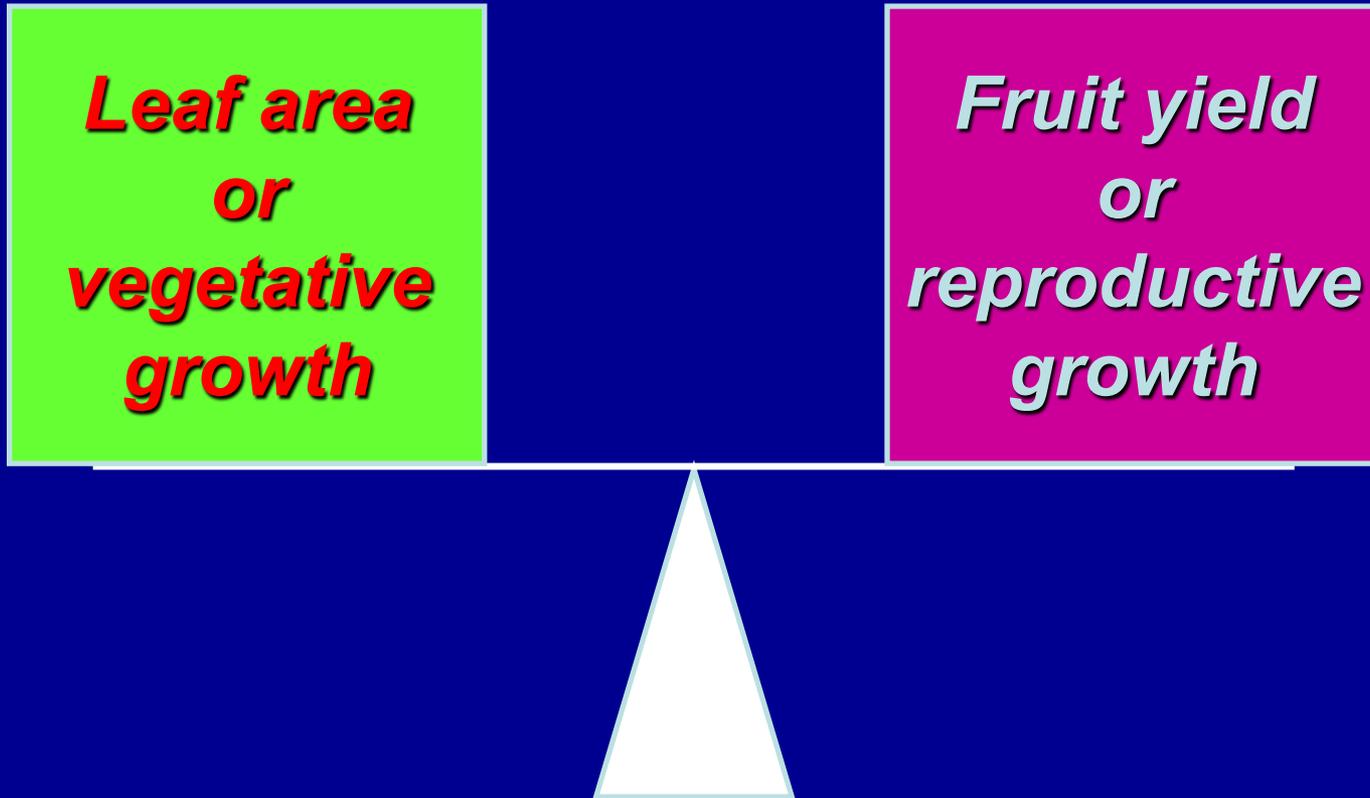
- **Vine vigor** is a measurement of the rate of vine growth.
- **Vine capacity** is the total annual vegetative and fruit biomass produced.

Capacity refers to the vine's ability for total production rather than rate of growth.

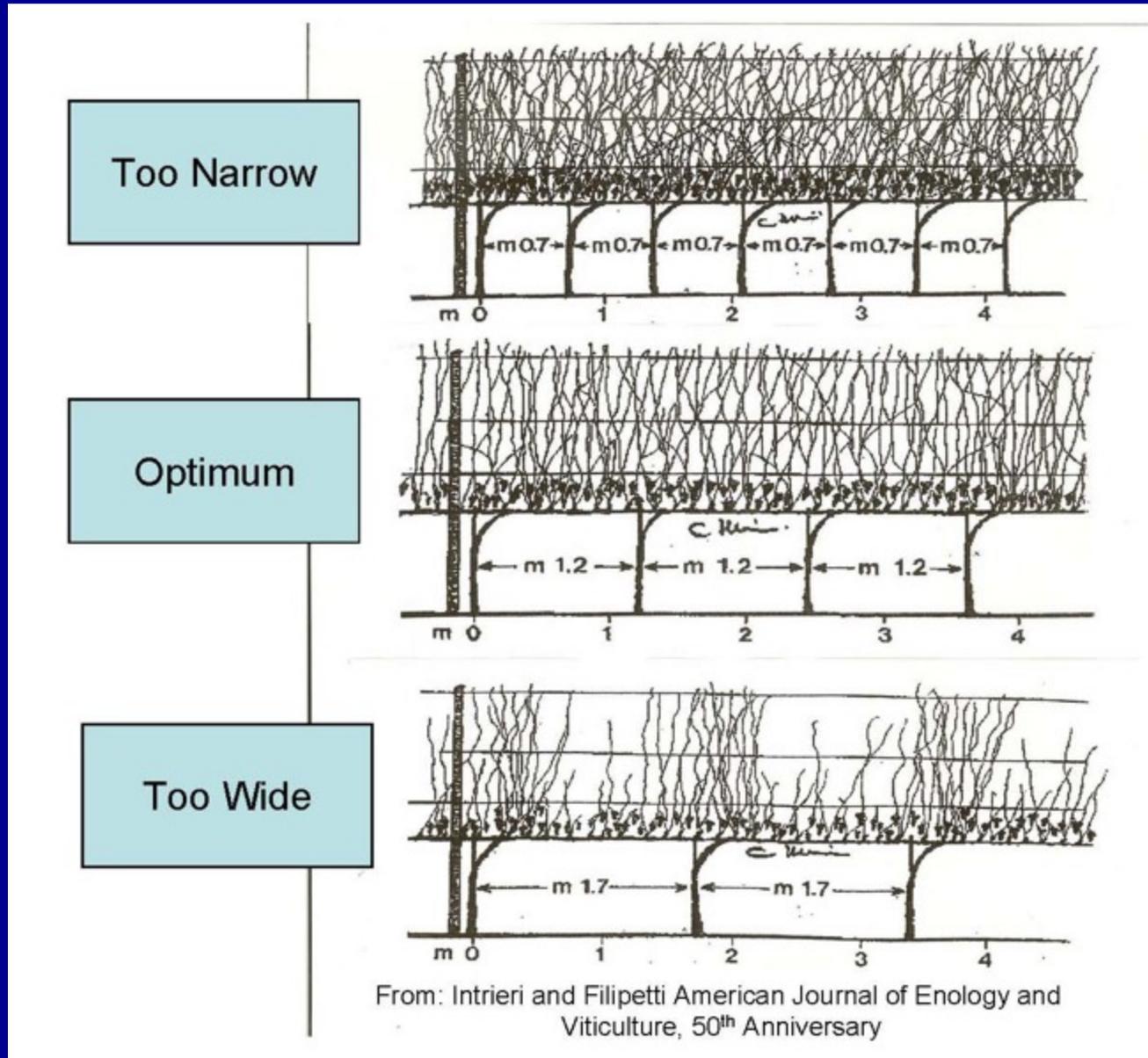
Principles of Pruning (Winkler)

1. **Grapevines have a fixed capacity**
2. **Pruning tends to depress growth**
3. **Production of crop depresses vine capacity**
4. **Fruitfulness varies with shoot vigor**
5. **Shoot vigor varies inversely with shoot number and crop load**
6. **Vine capacity is proportional to total growth**
7. **Vines can self-regulate**
8. **Direction of growth influences type of growth**

What is a “balanced vine” ?



Vine Spacing

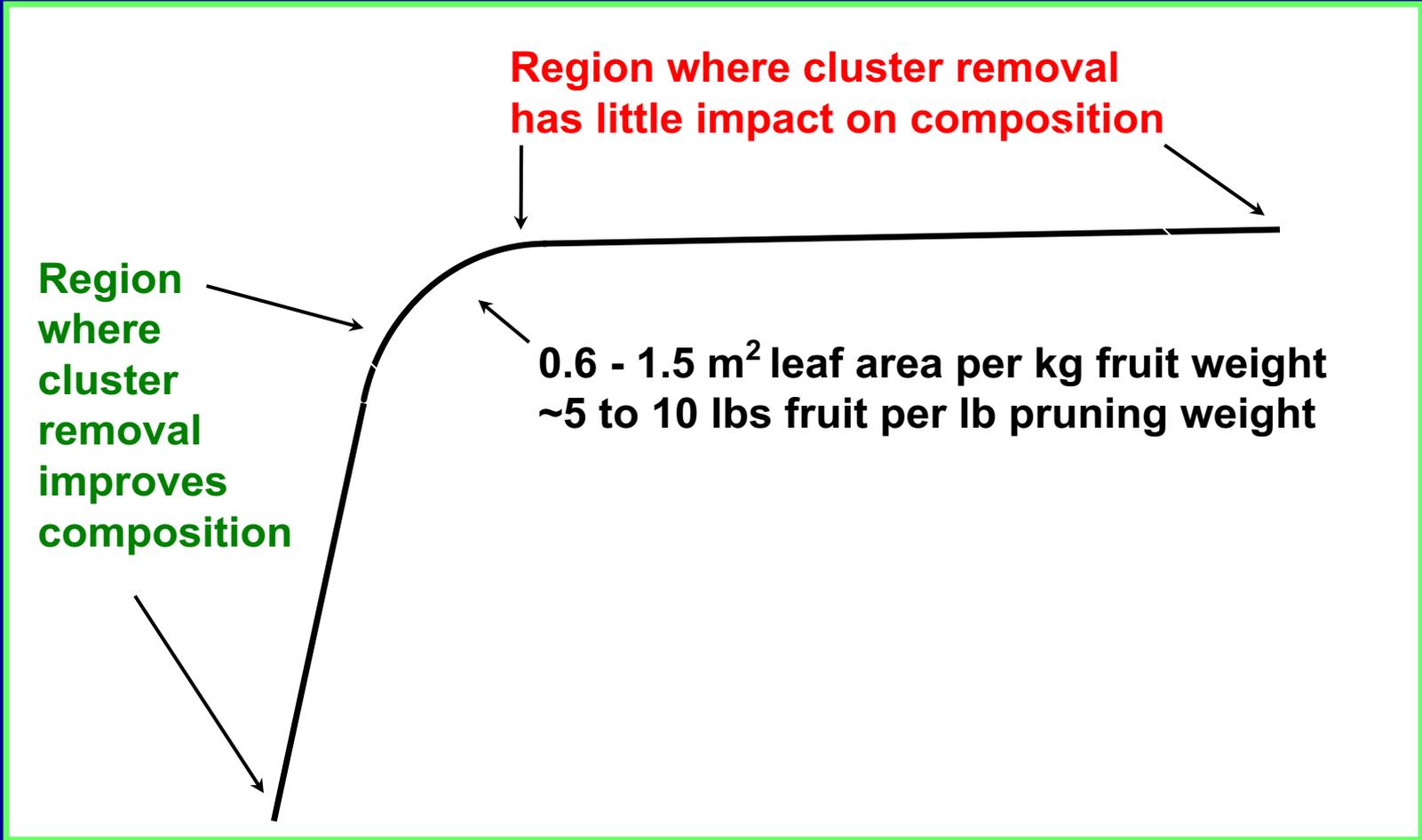


28 in

48 in

68 in

Berry size, sugar, color



Leaf area (m²) / kg fruit weight

Crop load indices

- Leaf area (cm²) : fruit wt (g)
- Fruit yield (lbs) : pruning wt (lbs)

CABERNET SAUVIGNON TRELLISING,
VINE SPACING, ROOTSTOCK TRIAL
OAKVILLE, CA

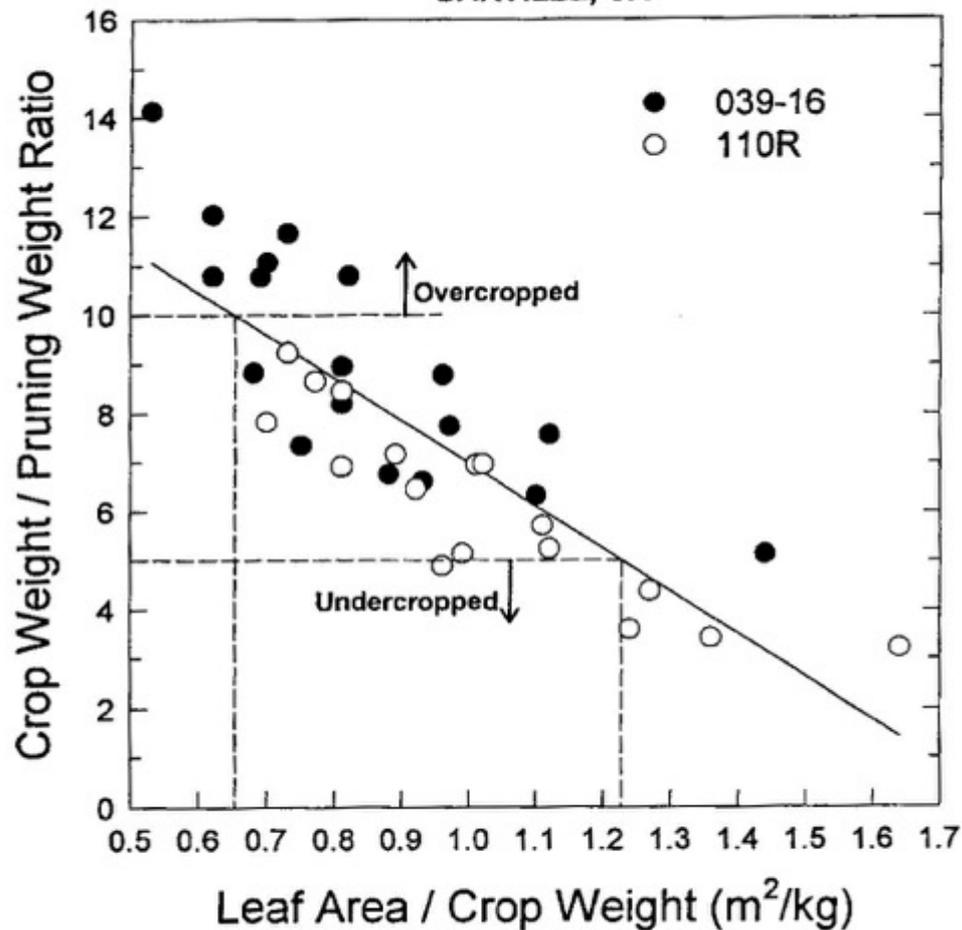


Fig. 12. Regression of crop weight/pruning weight ratios against leaf area/crop weight ratios of Cabernet Sauvignon vines for the 1994 season. Treatments regressed included six trellis training systems, three in-row spacings (1, 2, and 3 m), and two rootstocks (039-16 and 110R).

Canopy Characteristics

Indices	Measure
<u>Fruit yield</u> pruning weight	Production efficiency
<u>Exposed leaf area</u> Total leaf area	Canopy efficiency -fruit ripening capacity
<u>Exposed clusters</u> Total clusters	Fruit exposure -composition and flavor

Measuring “balance”

Yield / Pruning Weight ratios

- Lbs of crop / lbs of prunings per vine

<3 Undercropped

4-8 Normal

>10 Overcropped

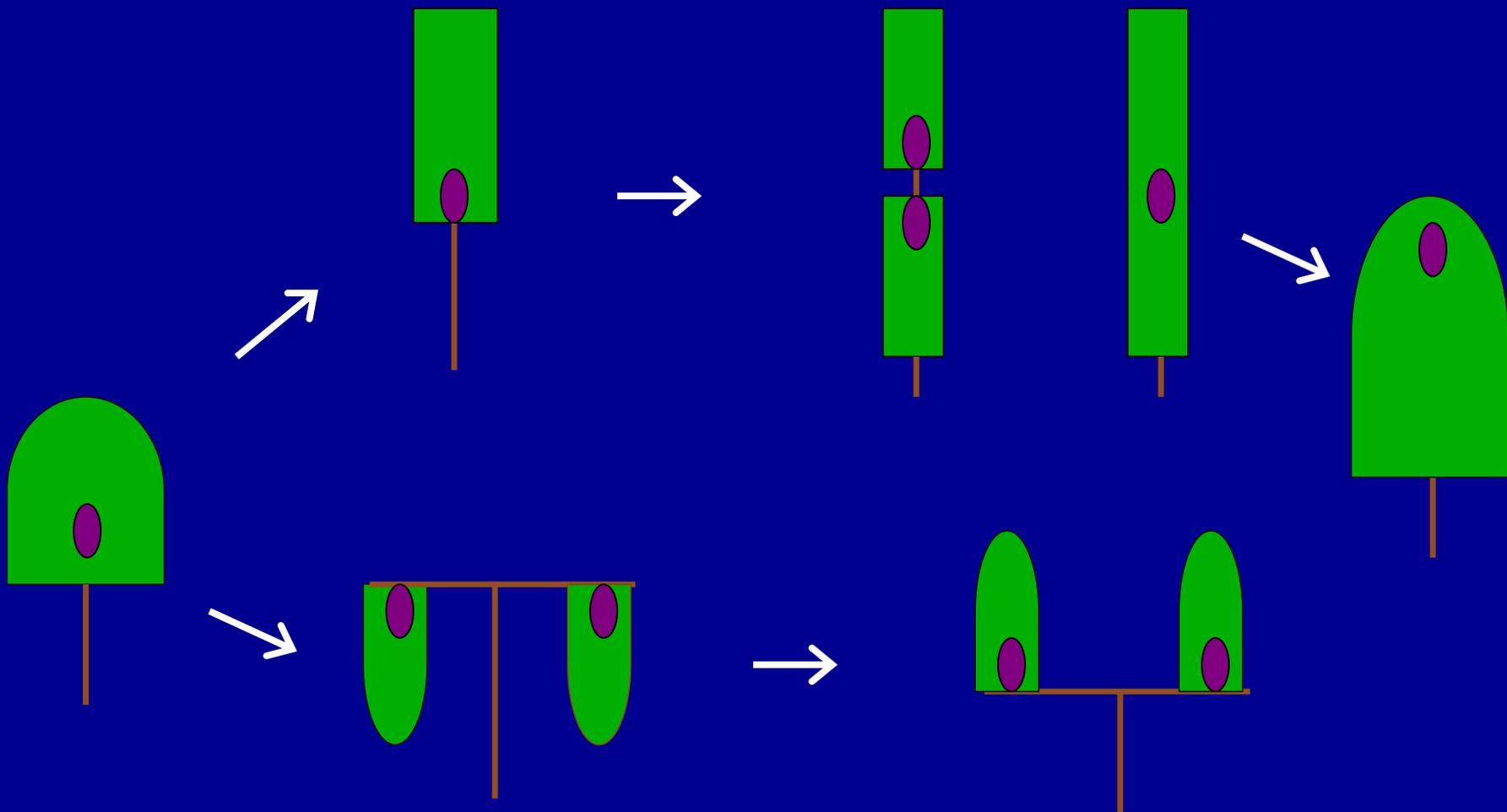
Reds generally lower than whites

Characteristics of the Ideal Wine Grape Canopy

Canopy Character	Optimal Value
Shoot density	~ 5 shoots per foot
Shoot length,	15 to 20 nodes
Lateral shoot development	None to very minimal
Growing shoot tip presence	Ideally none
Ratio of leaf area to fruit weight	3 to 8 ft ² /lb (0.6 to 1.5 m ² /kg)
Leaf layer number	1-2
Percent exterior leaves	80-100%
Percent exposed clusters	50 to 80%
Cane weight	0.7 to 1.4 oz (20 to 40 g)
Internode length	2.4 to 3.1 in 6 to 8 cm
Pruning weight	0.2 to 0.4 lb/ft (0.3 to 0.6 kg/m)
Ratio of crop weight to pruning weight	5-10

Training/Pruning Systems





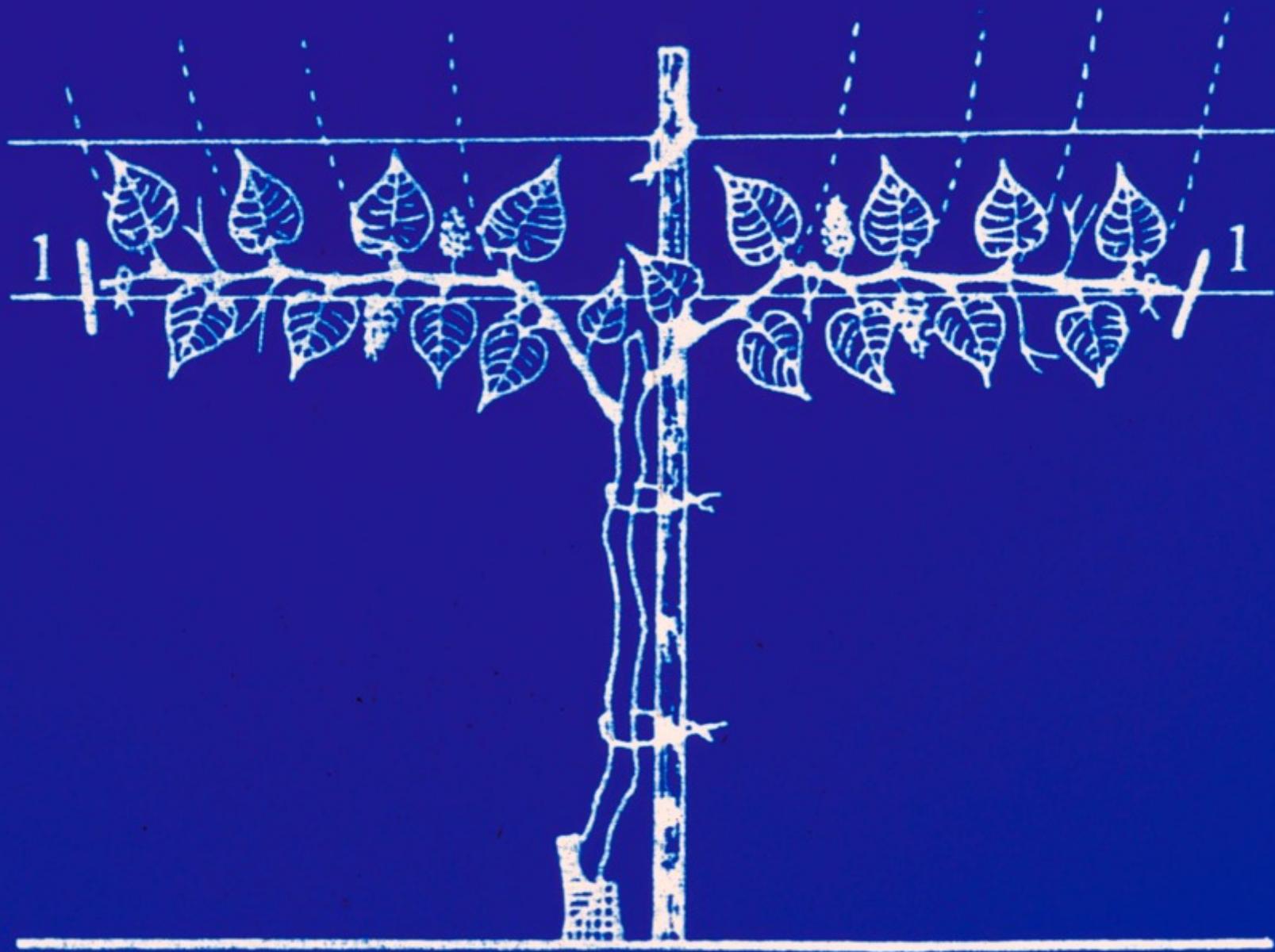
Trellis Options

Cordon Training

Unilateral

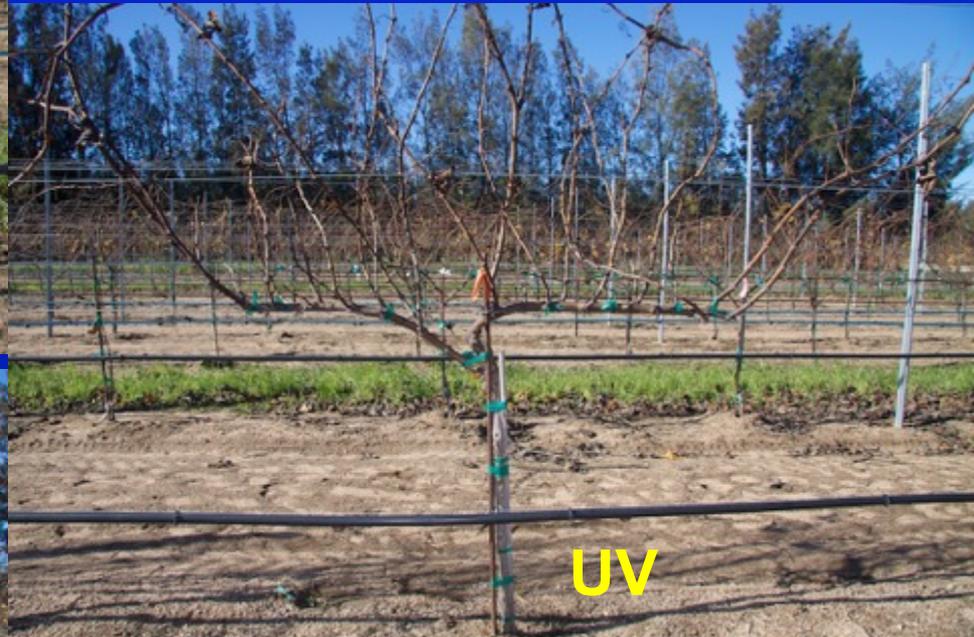
Bilateral

Multiple Cordon Systems





spur



UV

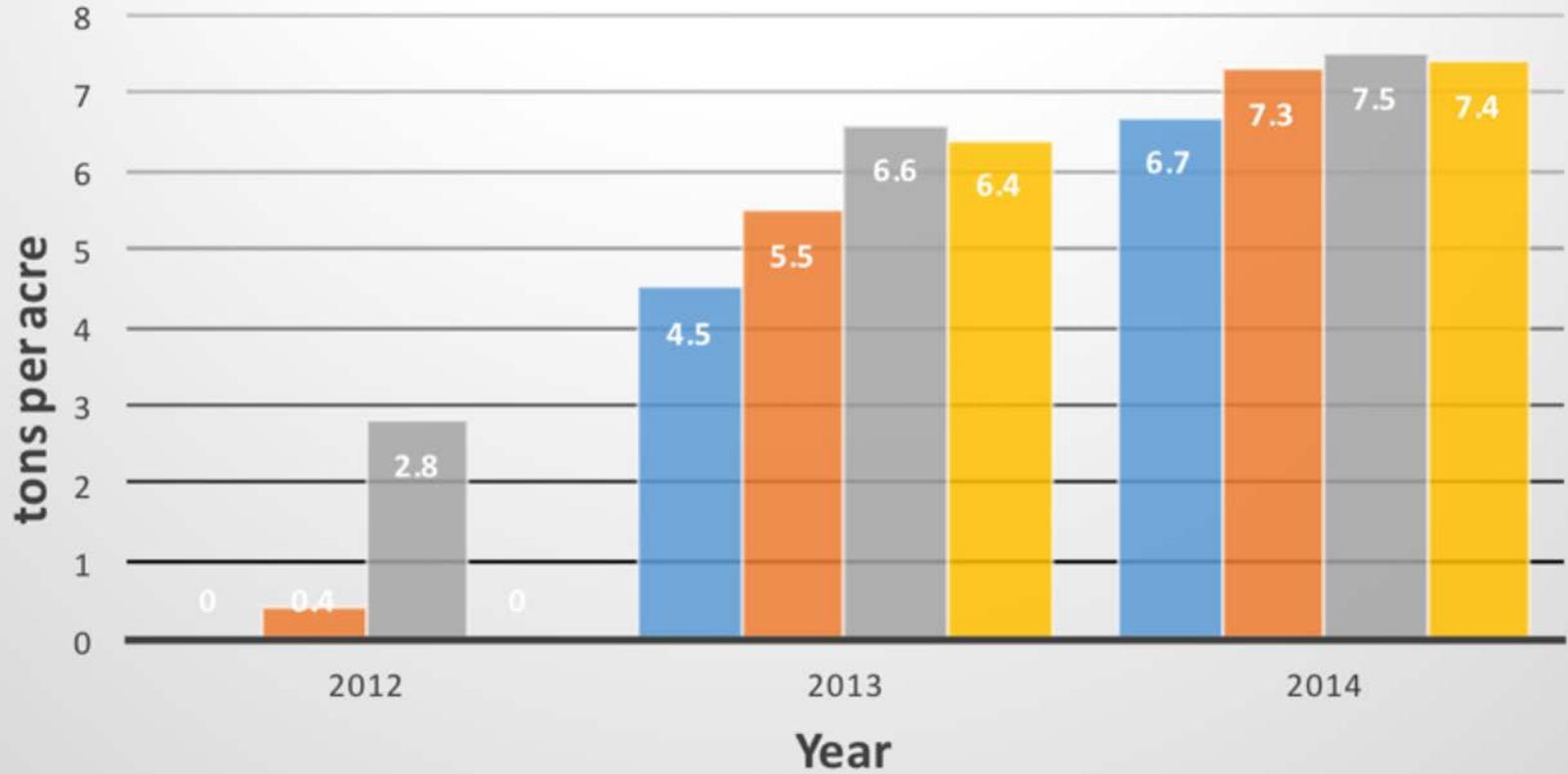


trunk

End of second year (2012)

(12-18-12)

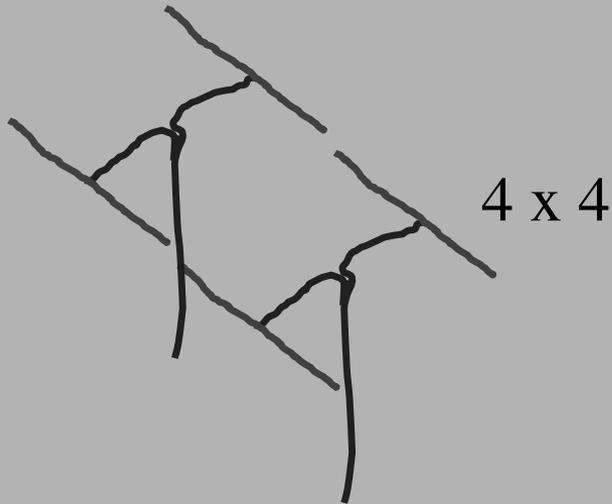
Yield



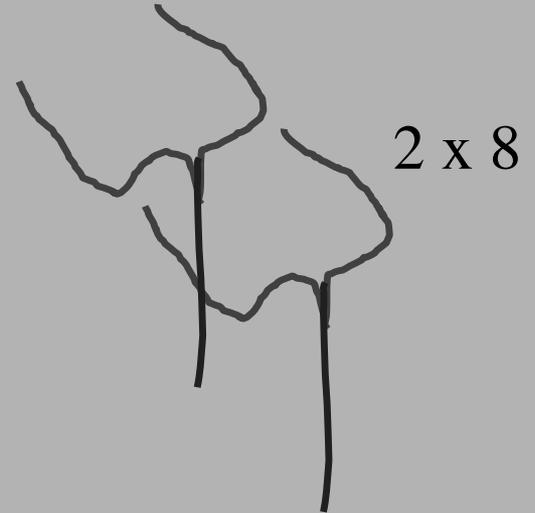
■ spur ■ trunk ■ UV FC ■ UV OC



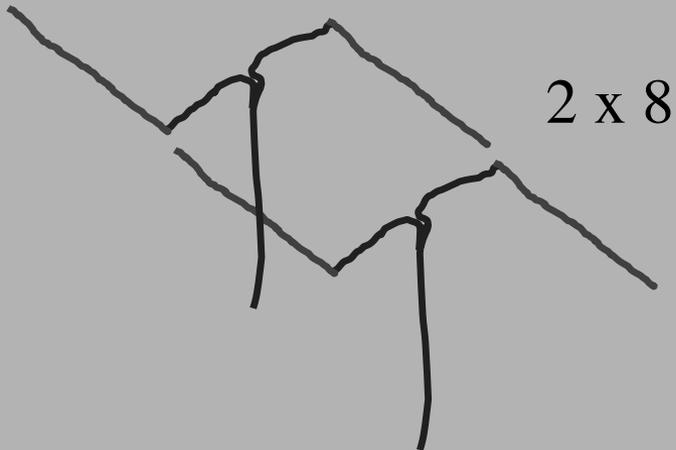
Split Canopy Configurations



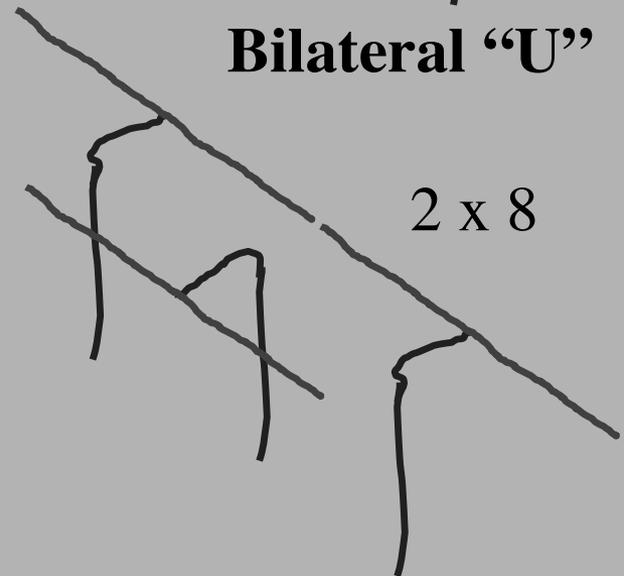
Standard Quadrilateral



Bilateral "U"



Bilateral "S"



Alternating Bilateral

Head Training

Spur Pruning

Cane Pruning

Head Trained - Spur Pruned



Head Training







Head Trained - Cane Pruned



Pruning Systems

Cordon

Spur

Spur/Cane combination

Mechanical

Head

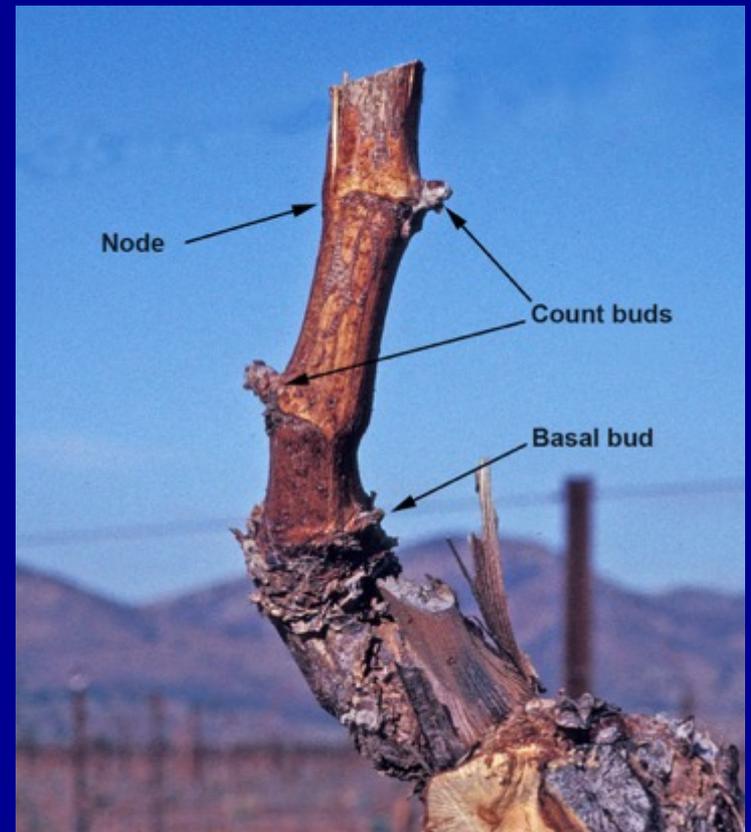
Spur

Cane

Fruiting Units

1. Spurs

2. Canes



Cordon Pruning

Advantages

- Pruning can be mechanized**
- Lower labor hours**
- Even budbreak**
- Requires less skill to prune**

Disadvantages

- Buds can be less fruitful**
- Low bud fruitfulness can result in high vigor cycle**

Spur Selection





Cane Pruning

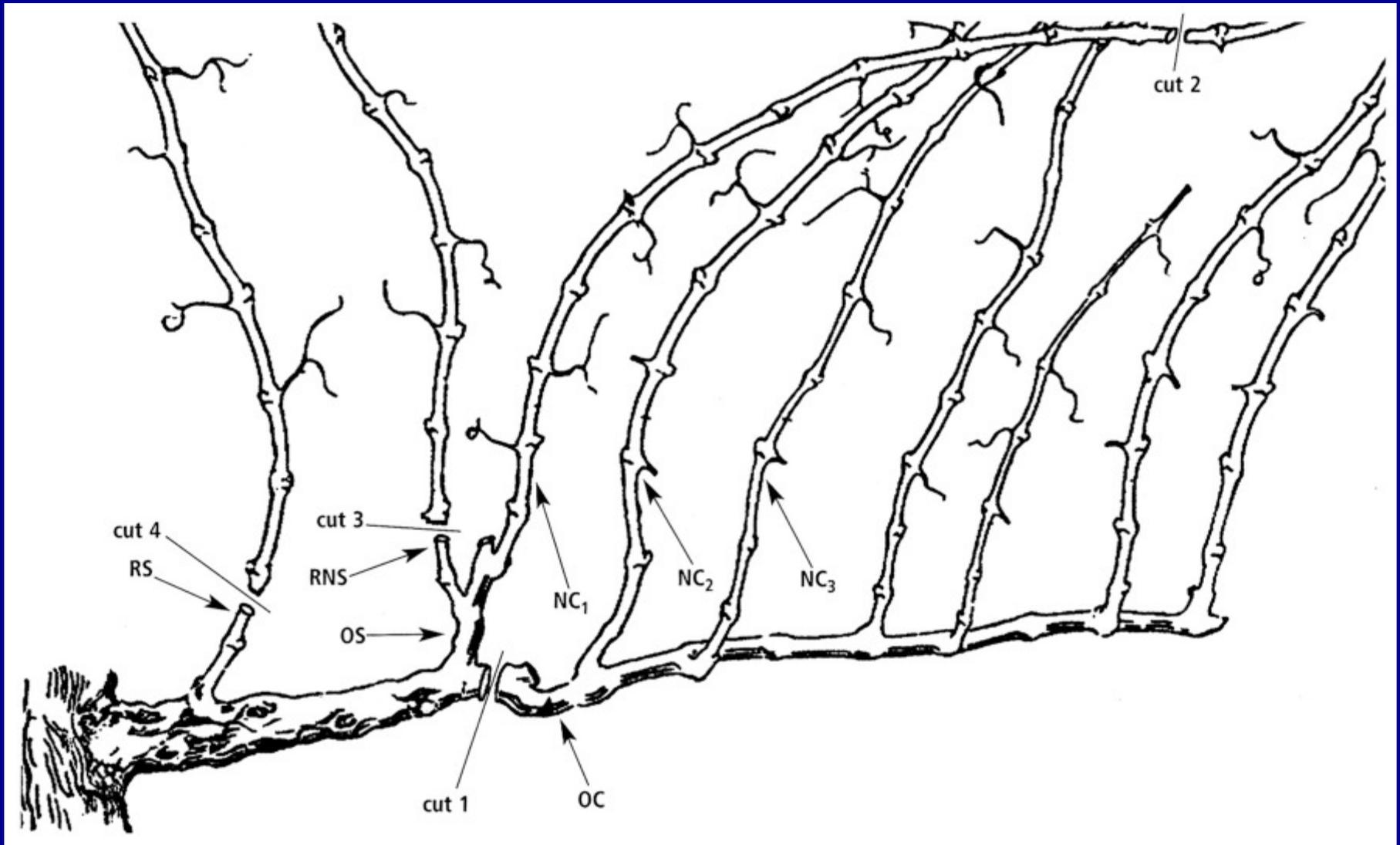
Advantages

- Retains the most fruitful buds**
- Yield advantages**

Disadvantages

- More labor hours to prune**
- Pruning more difficult to mechanize**
- Poor budbreak on canes**
- Requires more experienced pruners**

Cane Pruning



Pruning level depends on:

- 1. Cultivar**
- 2. Climate**
- 3. Site conditions/vigor**
- 4. Trellis - training system**

Pruning Level Criteria

1. **Balanced pruning (30 + 10)**
2. **Yield: Pruning ratio (5-10)**
3. **Golden rule of viticulture (Smart)**
 - a. **12-16 buds/lb. pruning weight**
 - b. **5 buds/ft. of canopy**