



Foto 1

28. 7. 2001

## **Goals of winter pruning**

- **Maintain a canopy shape suitable to cultural practices**
- **Regulate vegetative growth**
- **Retain enough fruitful nodes**
- **Regulate cluster number and their size**
- **Producing grapes of the «desired» quality**

# **Winter pruning**

**«previous goals can be achieved by regulating number, length  
and position of each cropping unit (either spur or cane)»**

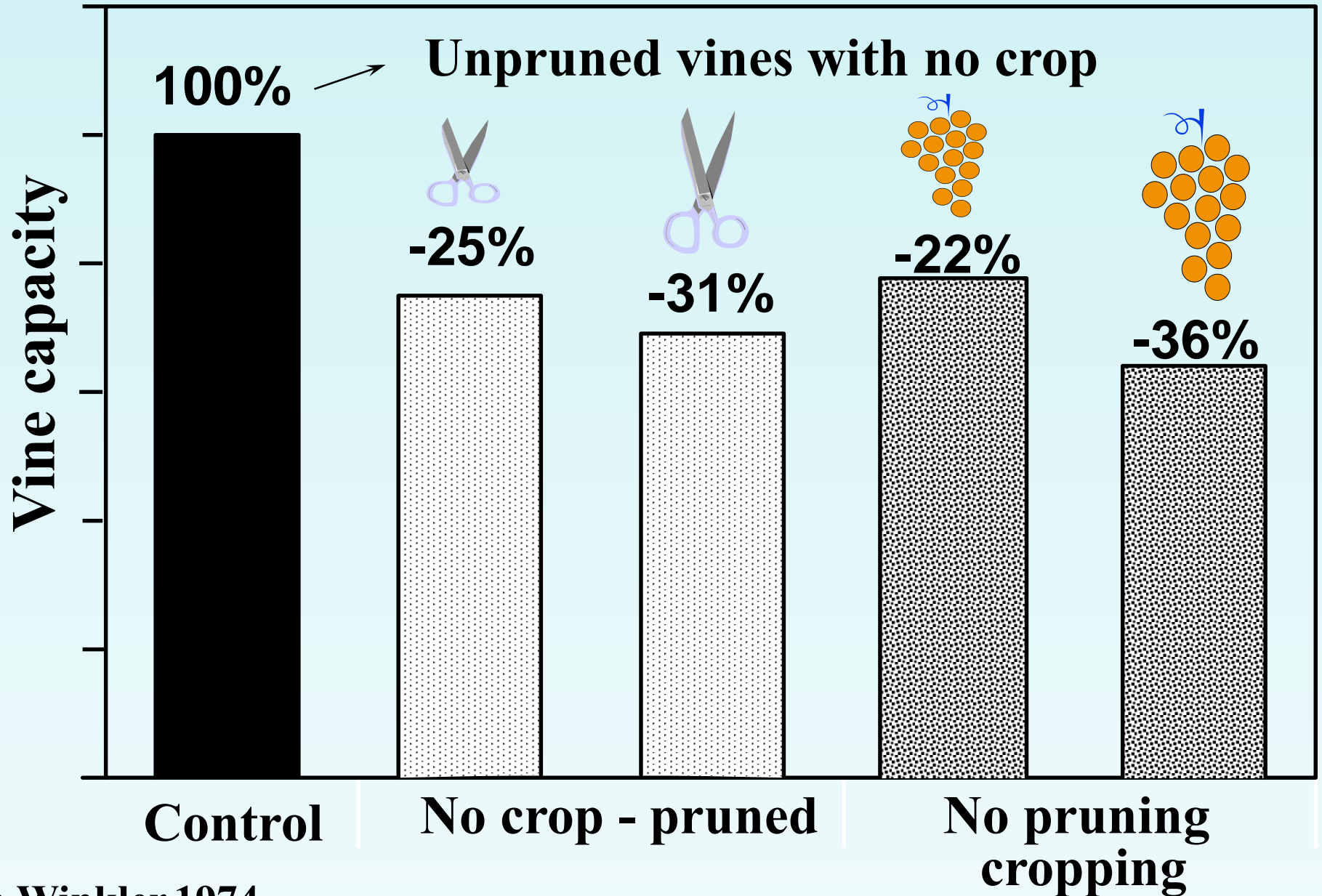




# **Principles of winter pruning**

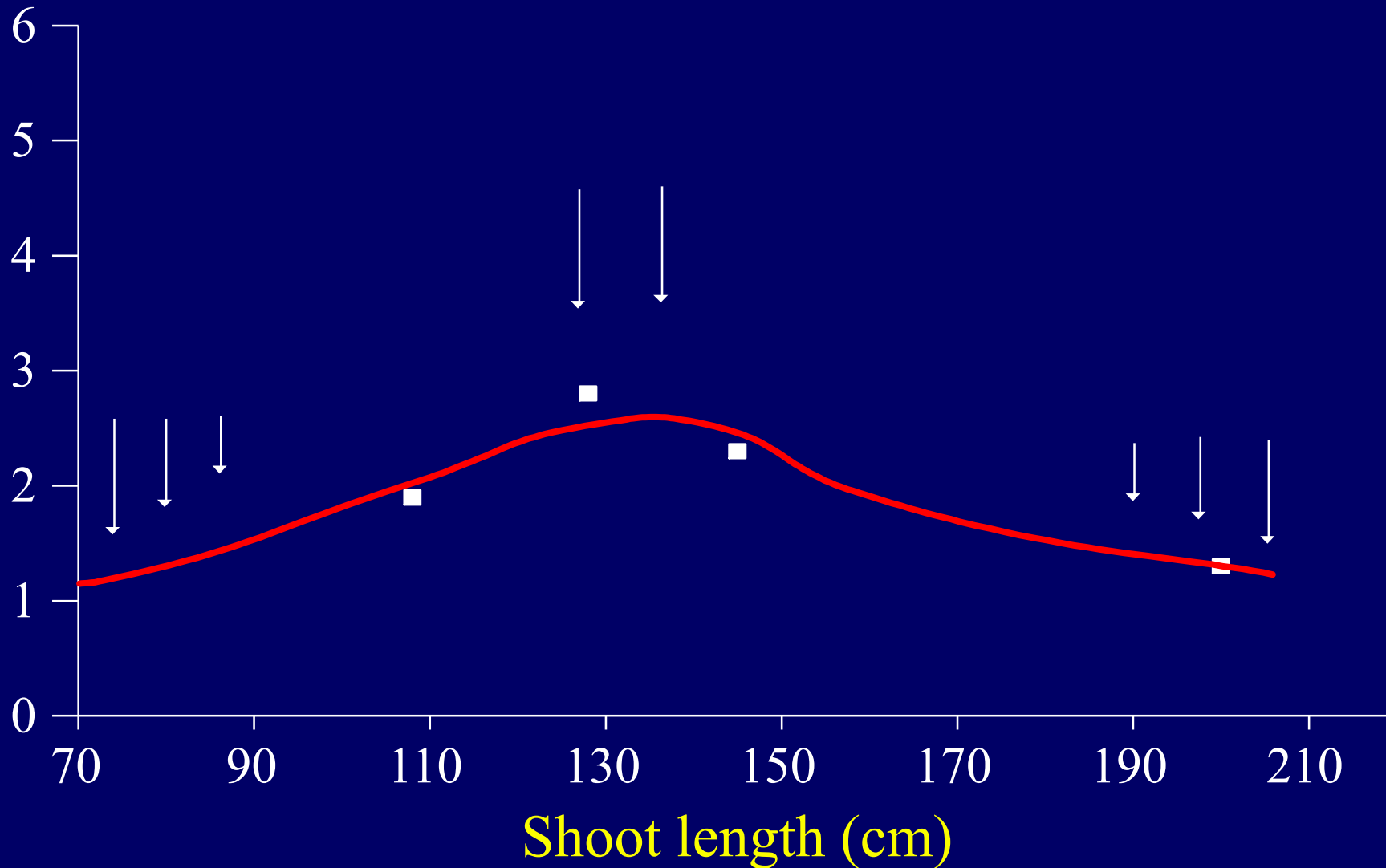
- **Pruning reduces vine capacity**
- **Crol level reduces vine capacity**
- **Fruitfulness relates to shoot vigor**
- **Shoot vigour is inversely correlated to shoot number and yield**
- **The grapevine self-regulates**
- **Shoot direction influences shoot vigor**

## The Gold principles



From Winkler, 1974

## Next season bud fruitfulness (clusters/shoot)



# Yield per vine

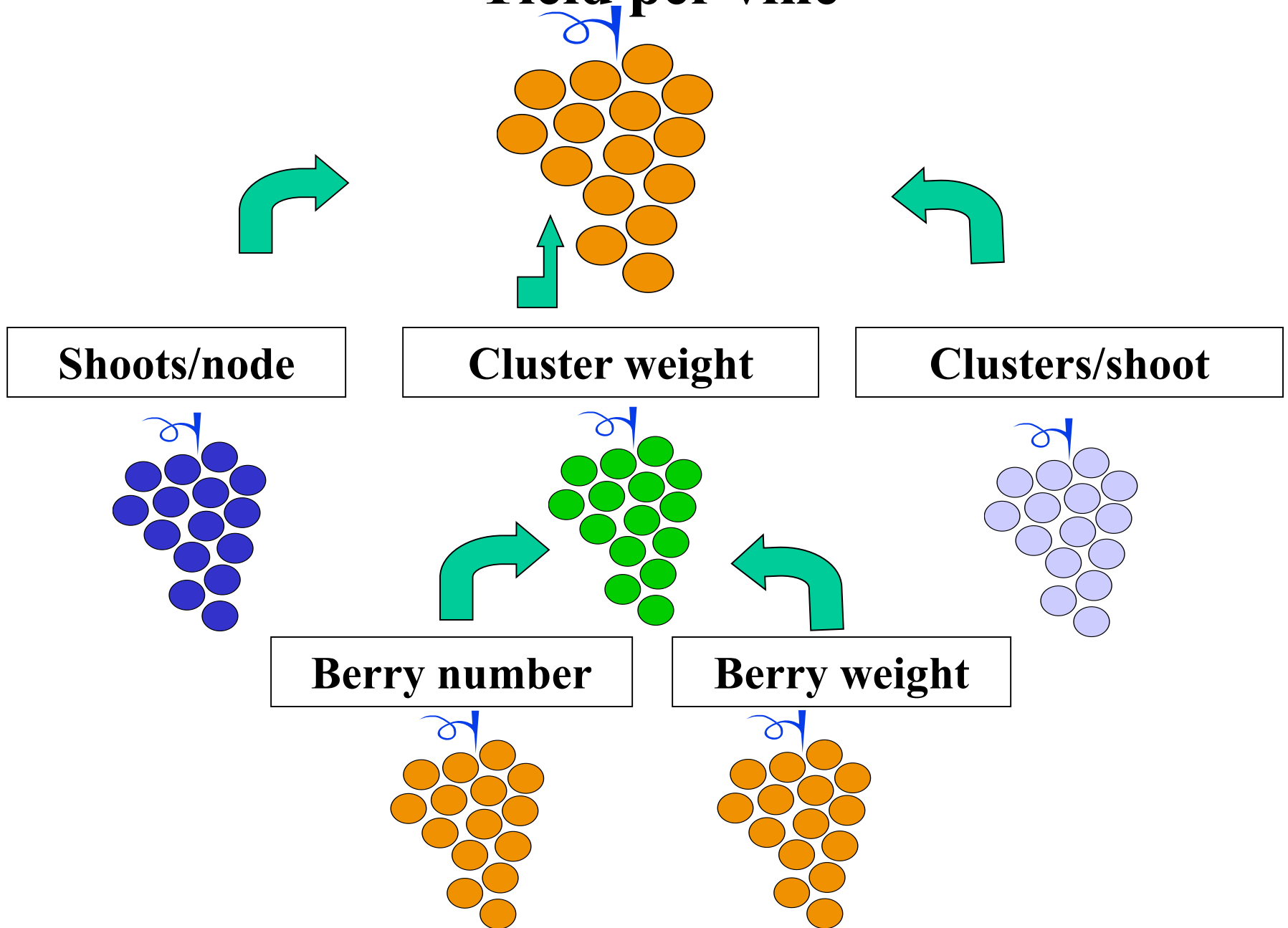




Table 1. Yield components per land unit and relative timing of determination. Numbers follow a chronological order. Modified from Tassie e Freeman, 1992.

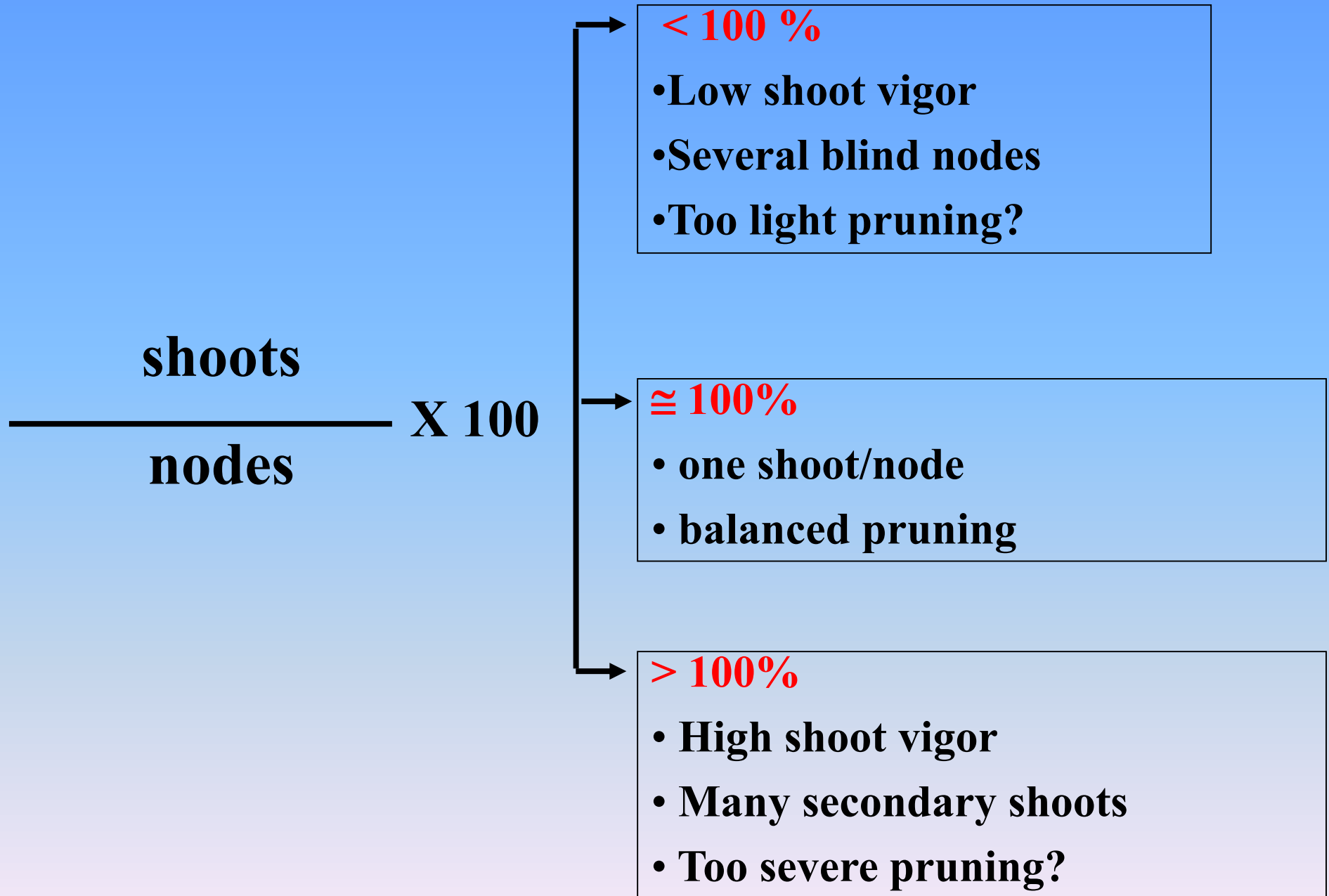
	<i>Yield component</i>	<i>Timing of determination</i>
①	Number of vines/ha	At planting
②	Numero di meters of canopy/m	At planting and training
③	Number of clusters/shoot	Bud differentiation (previous season)
④	Number of nodes per vine	Winter pruning prior to vegetative growth
⑤	Number of flowers per cluster	Prior and during bud break
⑥	Number of shoots/node	At budbreak (current season)
⑦	Number of berries/cluster	At fruit-set (current season)
⑧	Berry weight	From fruit-set to ripening (current season)

## **Timing of winter pruning**

- Shift of the annual cycle
- Amount of sap bleeding
- Induction of dormancy
- Escaping frost damage

## **Bud load**

- **Quantification (high, medium, low)**
- **Balanced pruning**
- **Indices (pruning weight, cane weight, LLN, yield-to-fruit ratio, leaf area to yield ratio)**



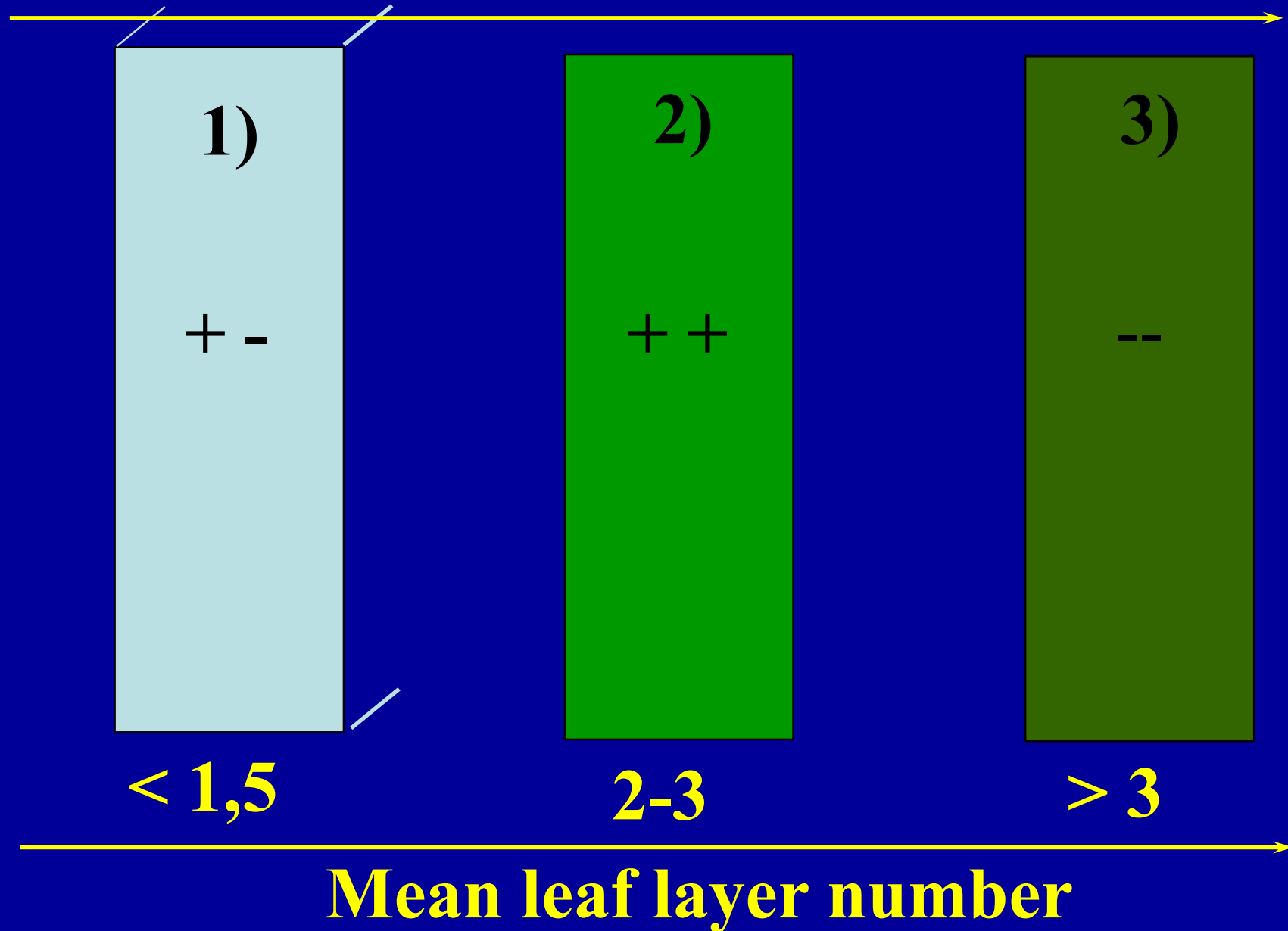








# Optimal canopy density







**Too dense!.....**





Single-canopy



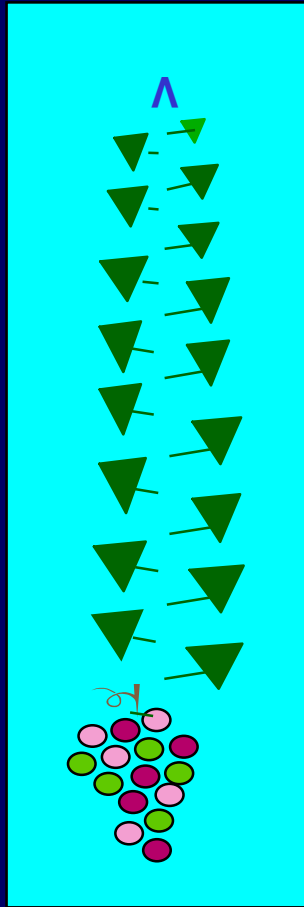
<i>Index</i>	<i>Optimal range</i>
Y/PW (kg/kg)	4-10
LA/Y (m <sup>2</sup> /kg)	0.8-1.2
PW/m (kg)	0.5-1.0
LA/m (m <sup>2</sup> )	2-5
LAD (m <sup>2</sup> /m <sup>3</sup> )	3-7

Divided

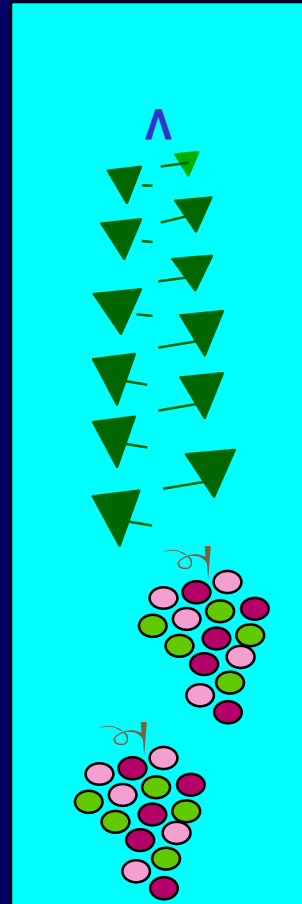


<i>Index</i>	<i>Optimal range</i>
Y/PW (kg/kg)	5-10
LA/Y (m <sup>2</sup> /kg)	0.5-0.8
PW/m (kg)	0.4-0.8
LA/m (m <sup>2</sup> )	2-4
LAD (m <sup>2</sup> /m <sup>3</sup> )	3-6

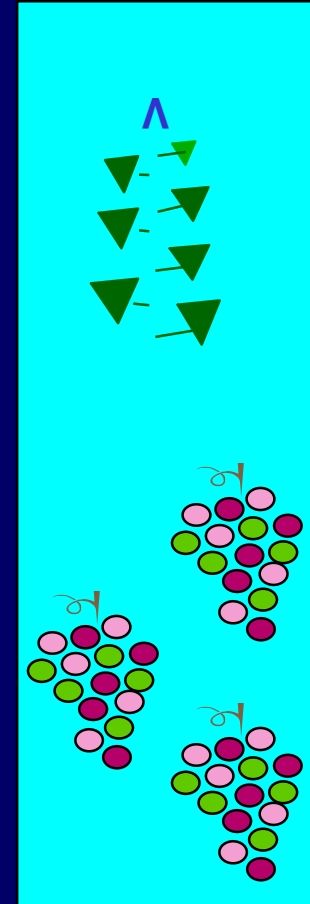
# A very popular vine-balance index



$< 5$



$5 - 8$



$> 8$

Yield-to-pruning weight ratio







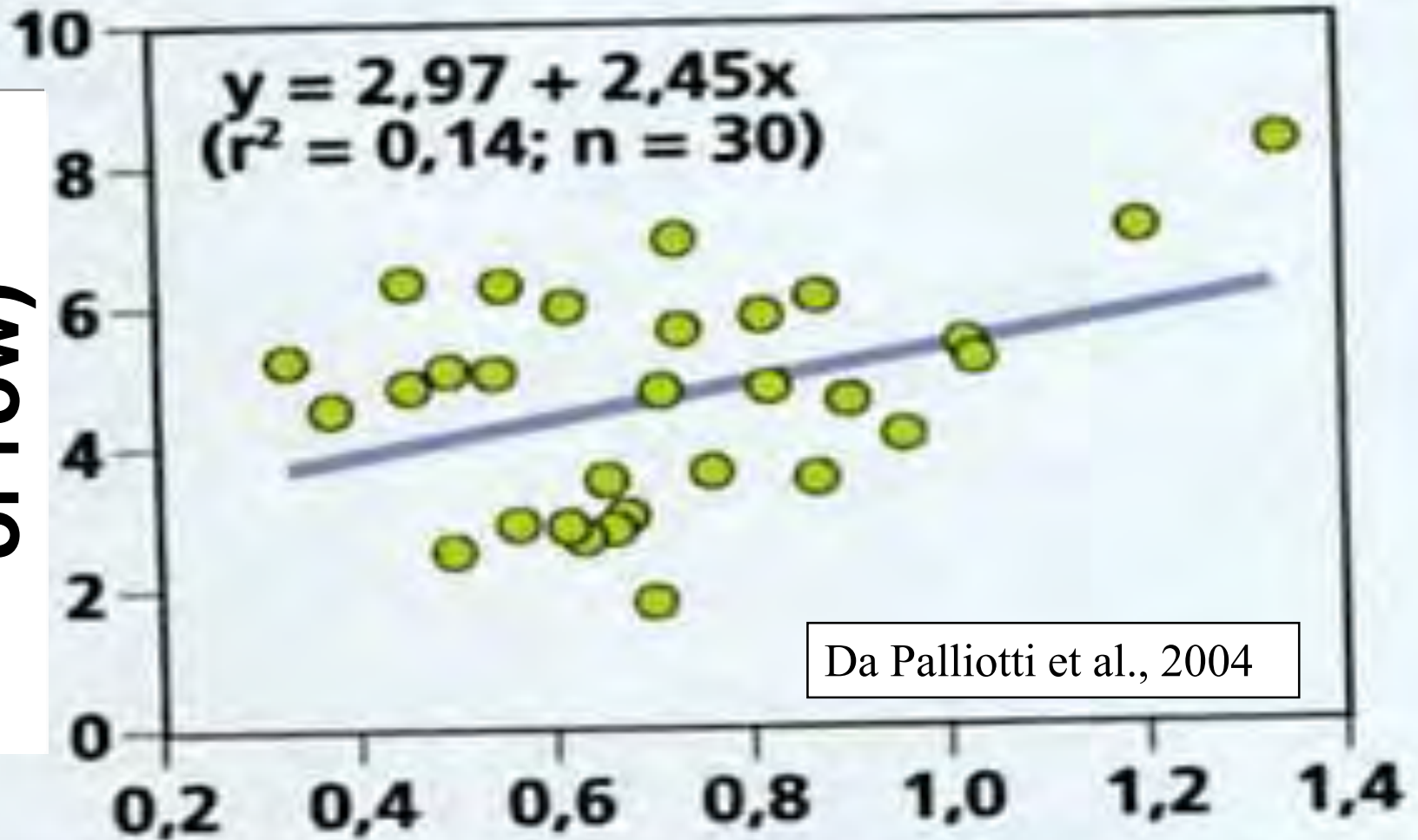






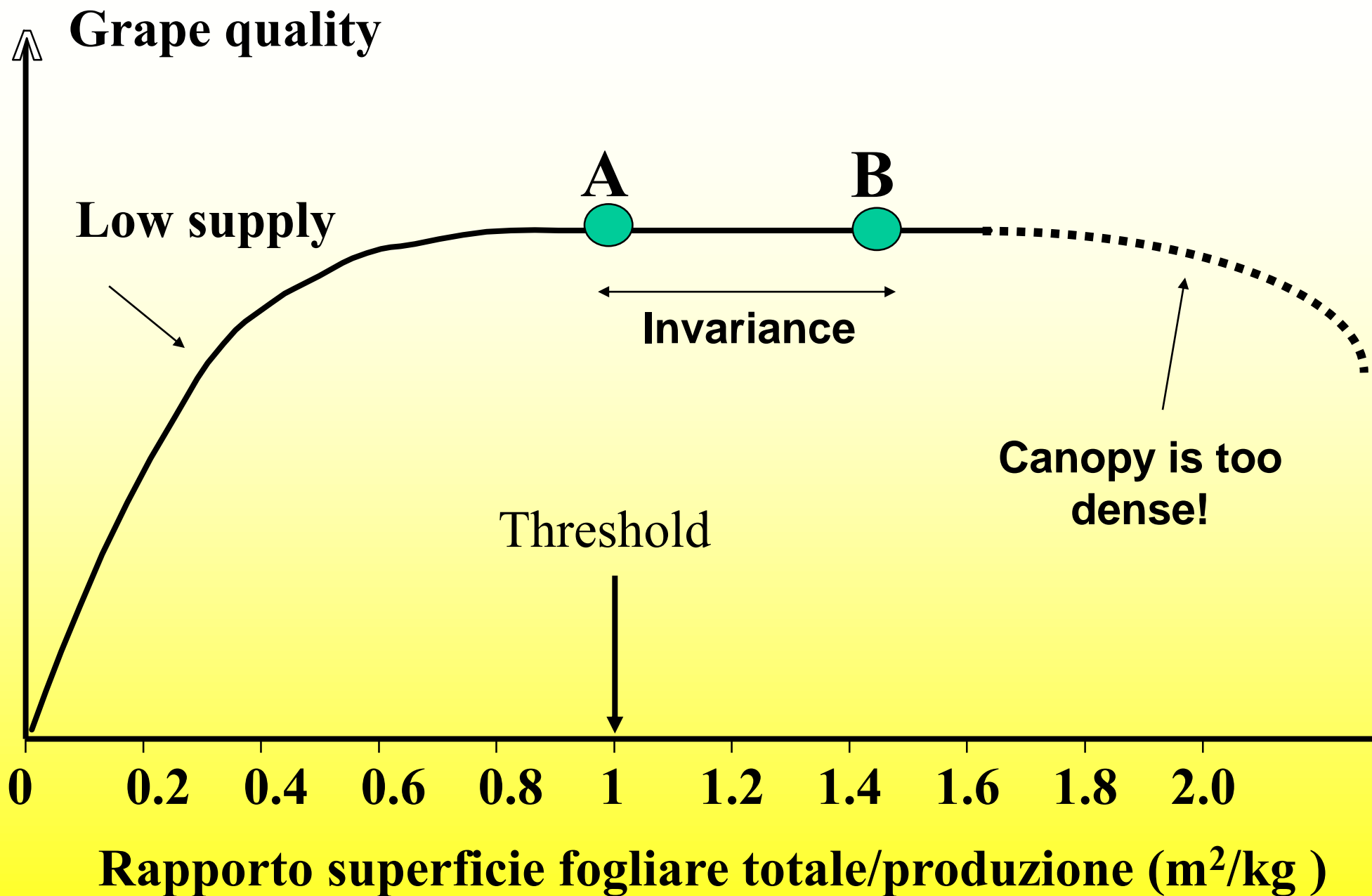


Leaf area (m<sup>2</sup>/m  
of row)



Da Palliotti et al., 2004

Pruning weight (kg/m)







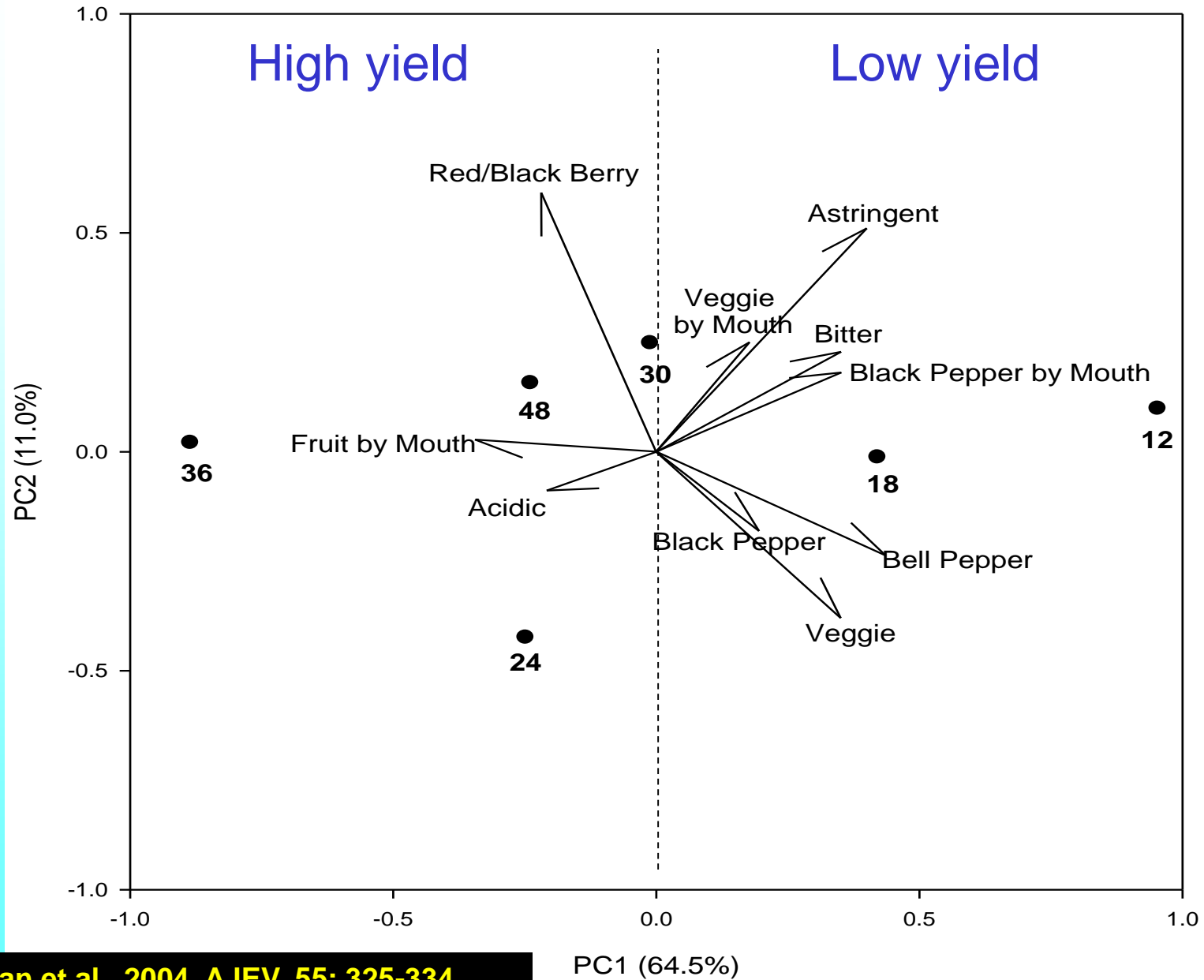














Too high – *Incomplete ripening (< °Brix, < phenolics, ecc.) and, in the worst cases, negative effects on root growth and next year bud induction.*



Supra-optimal – *Delayed yet full ripening.*



Optimal – *Regular and full ripening.*



Sub-optimal – *Full ripening sometimes associated to atypical flavor.*



Too low – *Under high vigor environments it can also achieved low quality due to too dense canopies and/or too prolonged vegetative growth.*

## **Modalità di potatura**

- **Manuale**
- **Meccanica (con o senza rifinitura)**
- **"Minima"**

2

Renewal cane

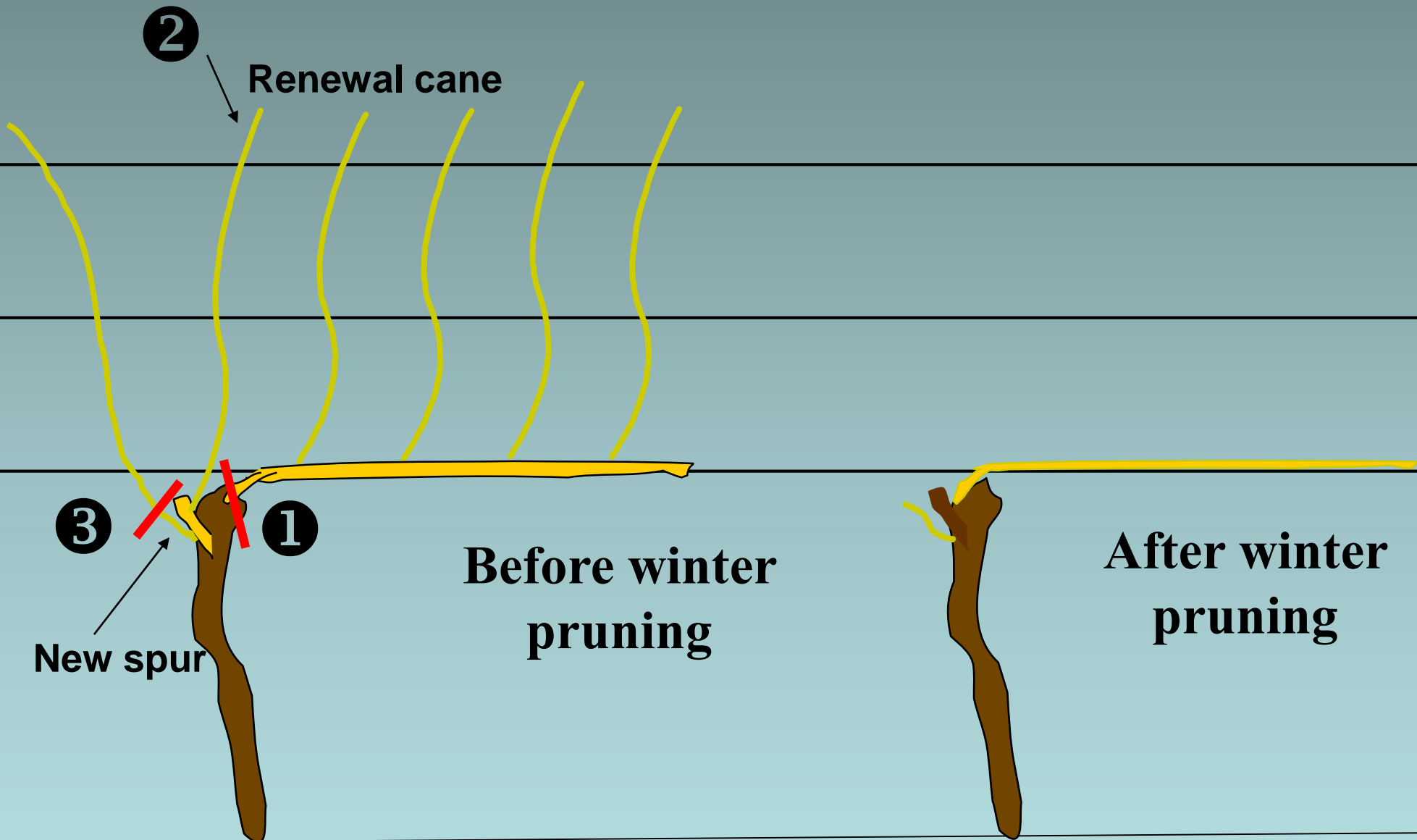
3

New spur

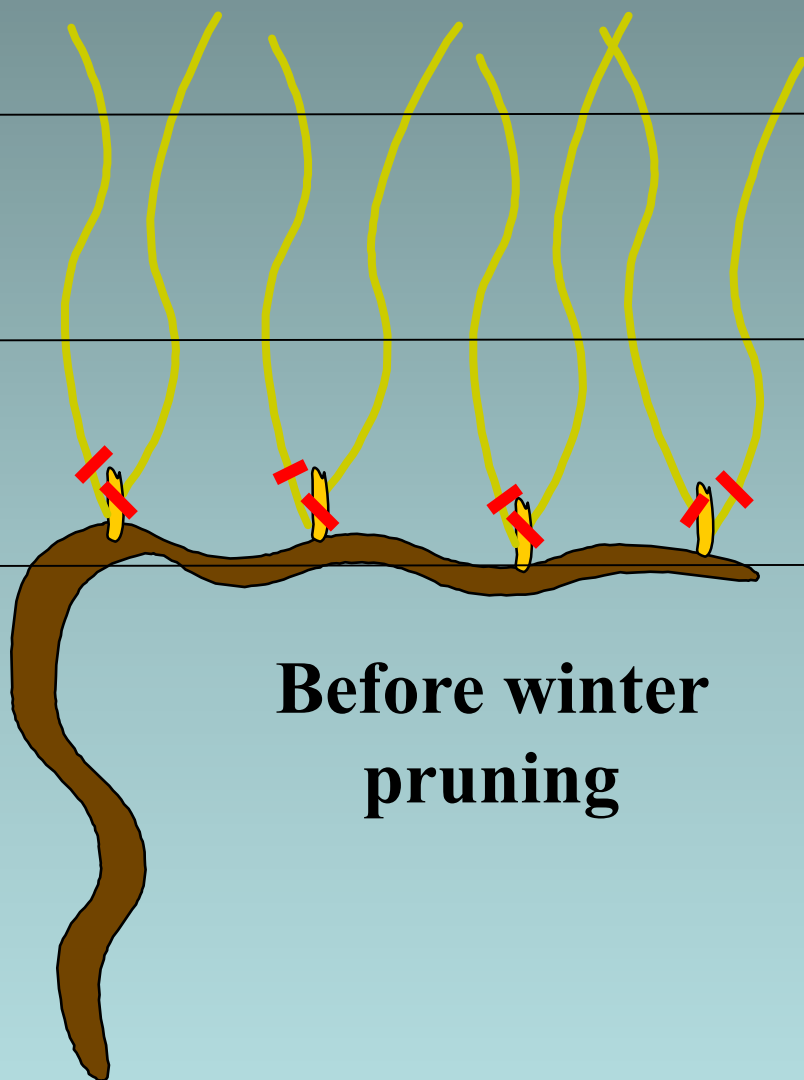
1

Before winter  
pruning

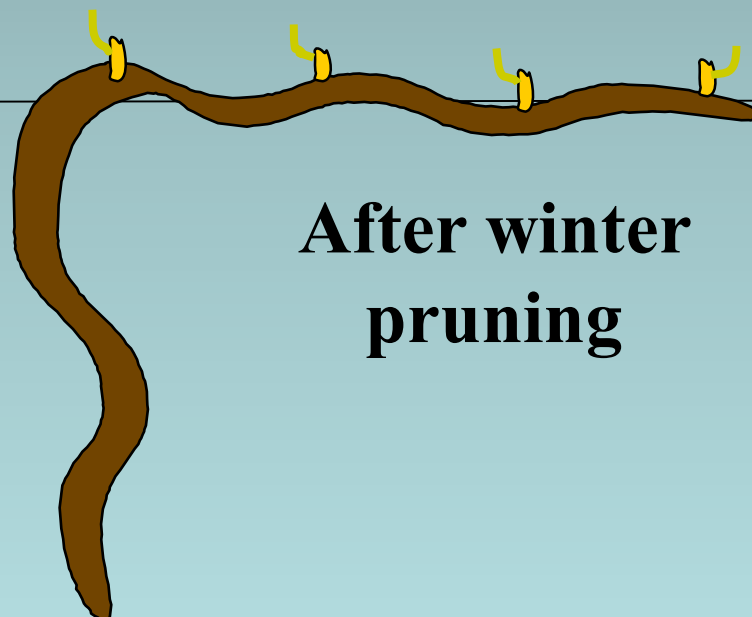
After winter  
pruning



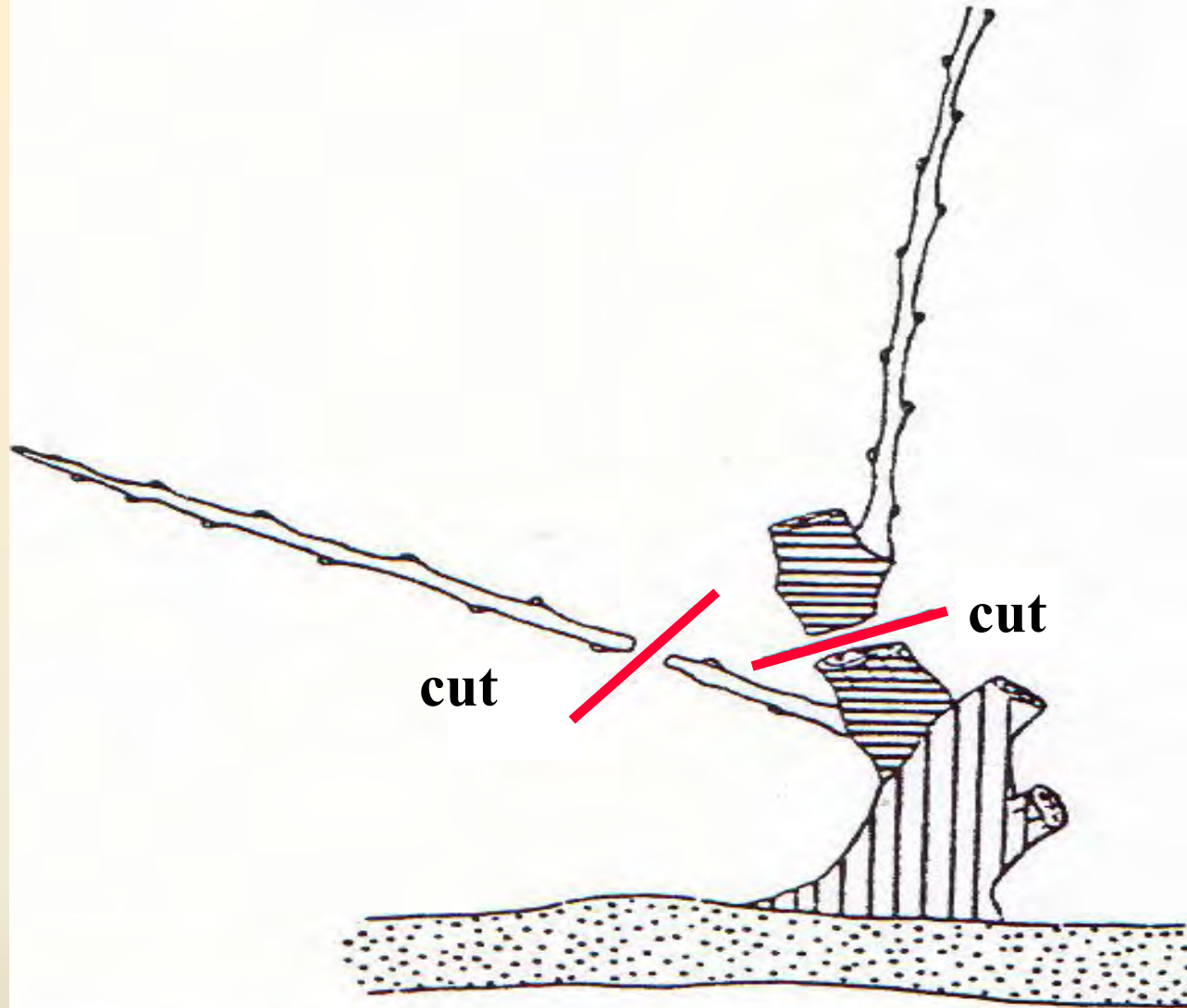




**Before winter  
pruning**



**After winter  
pruning**



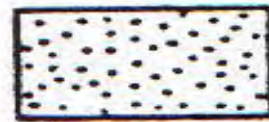
**1-yr-old**



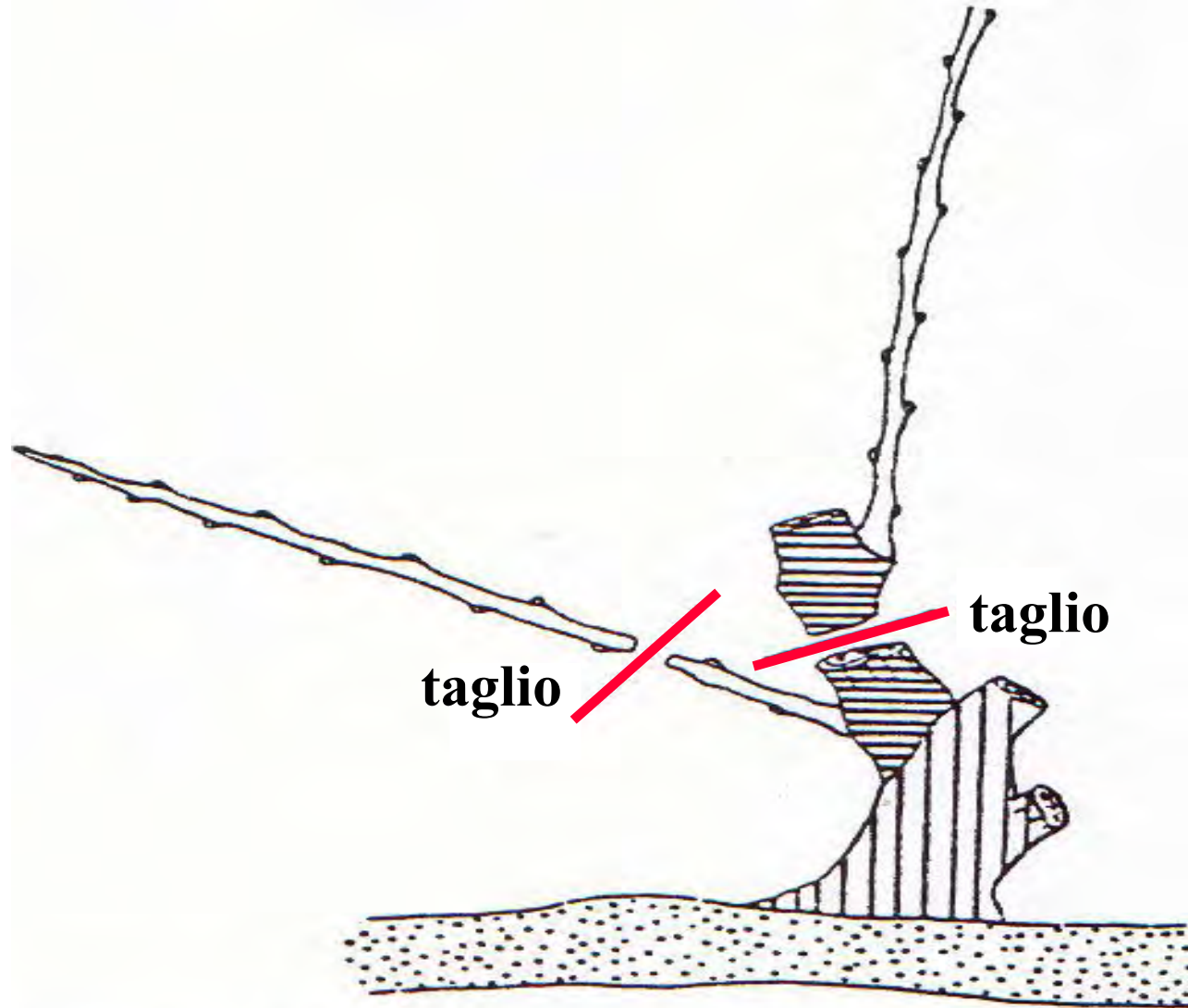
**2-yr-old**



**3-y old**



**cordon**



**legno di 1  
anno**



**legno di 2  
anni**



**legno di 3  
anni**



**cordone  
permanente**



Is this OK or it could  
be better?







Better?

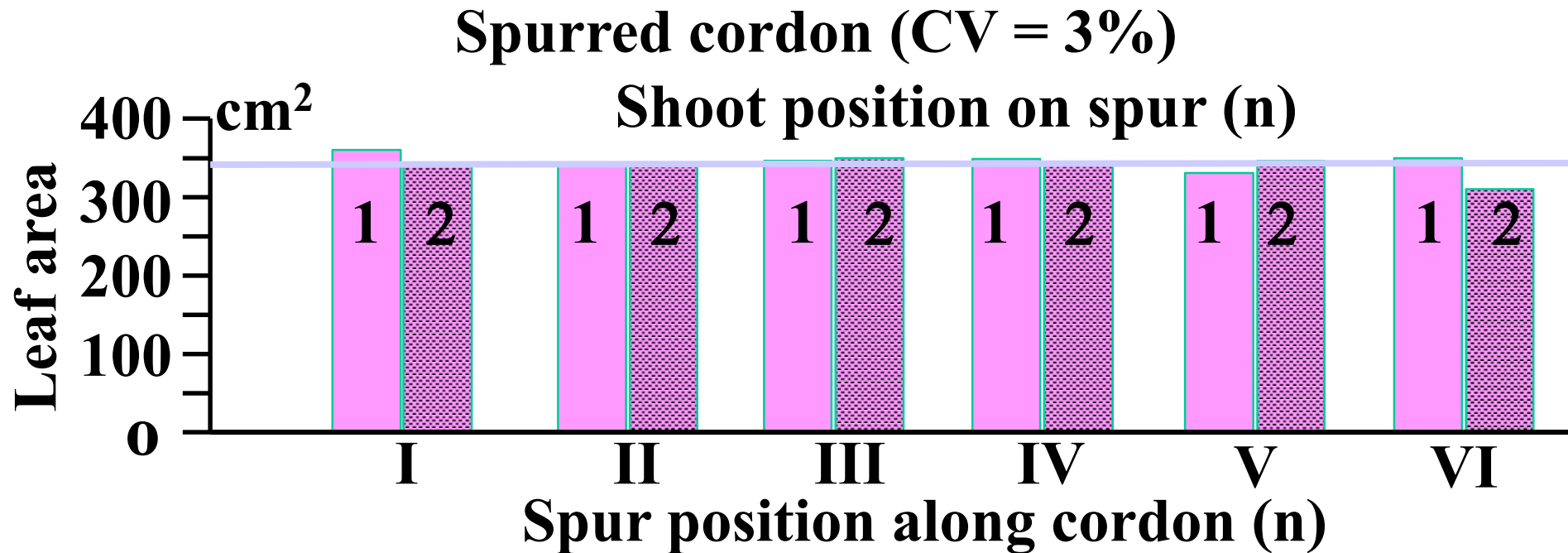
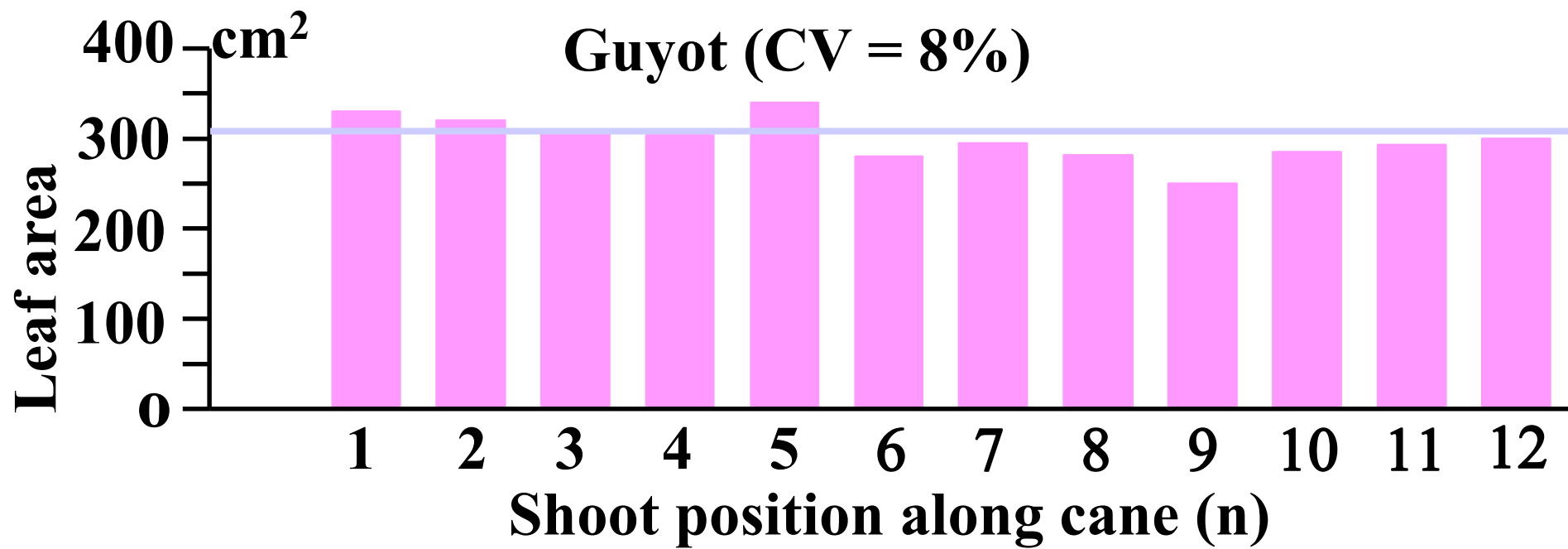








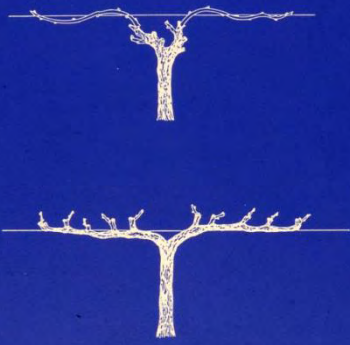




**WRONG!**







## **Long vs short pruning: which is best?**

- ☐ Cane pruning is easier, psychologically more acceptable and assures cropping (i.e. the problem of low fruitfulness is by-passed)**
- ☐ Cane pruning hinders full mechanization and aggravate physiological unbalances as compared to short pruning**
- ☐ Short (spur-pruning) is not so easier to perform (cordon maintenance ) and psychologically less accepted**
- ☐ If well conducted, short pruning should lead to more uniform shoot growth, hence ripening.**
- ☐ Short pruning has also the advantage of building over time larger carbohydrate reserves**