

CANOPY MANAGEMENT FOR BETTER YIELDS AND QUALITY. HOW TO DO IT ECONOMICALLY.....

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WHAT IS CANOPY MANAGEMENT?

Canopy management is a group of vineyard operations designed to manipulate **fruit and leaf exposure**.

It includes vine training and pruning, trellis use, shoot positioning, shoot thinning and leaf and lateral removal



WHY IS CANOPY MANAGEMENT IMPORTANT IN NE USA?

- It can help maximise the production of ripe grapes and better wine in a short growing season region.
- It can help ripen wood to overcome winter cold
- It is an economical management technique when well applied.

BASIC PRINCIPLES

- Maximise sunlight interception.

Your vineyard is an energy capture device, to turn *Sunlight into Wine (or Juice)*.

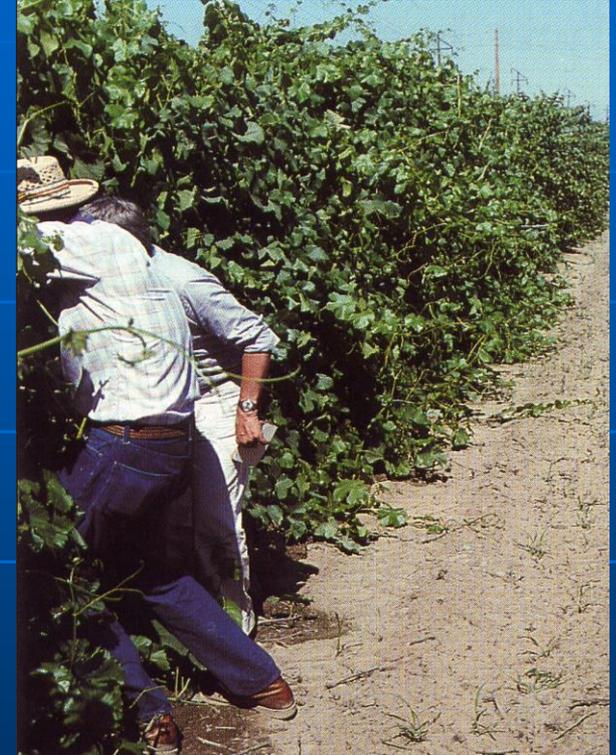
- Avoid shade which has all sorts of **nasty** effects, like reducing yield, reducing berry quality, and encouraging some diseases.
- Develop a **balance** between shoot and fruit growth

HOW GRAPEVINES LIKE TO GROW



- Vines have grown wild for around 60 million years
- Man has cultivated and selected them for around 12,000 years
- Vines were in dense forests and needed to climb to the light, hence tendrils, apical dominance etc
- Grapevines want to produce seedlings
- Primitive vines had red berries to attract birds
- Flavors important in dispersal.

CANOPY MICROCLIMATE CAN EXPLAIN VIGOR EFFECTS ASSOCIATED WITH WINE QUALITY



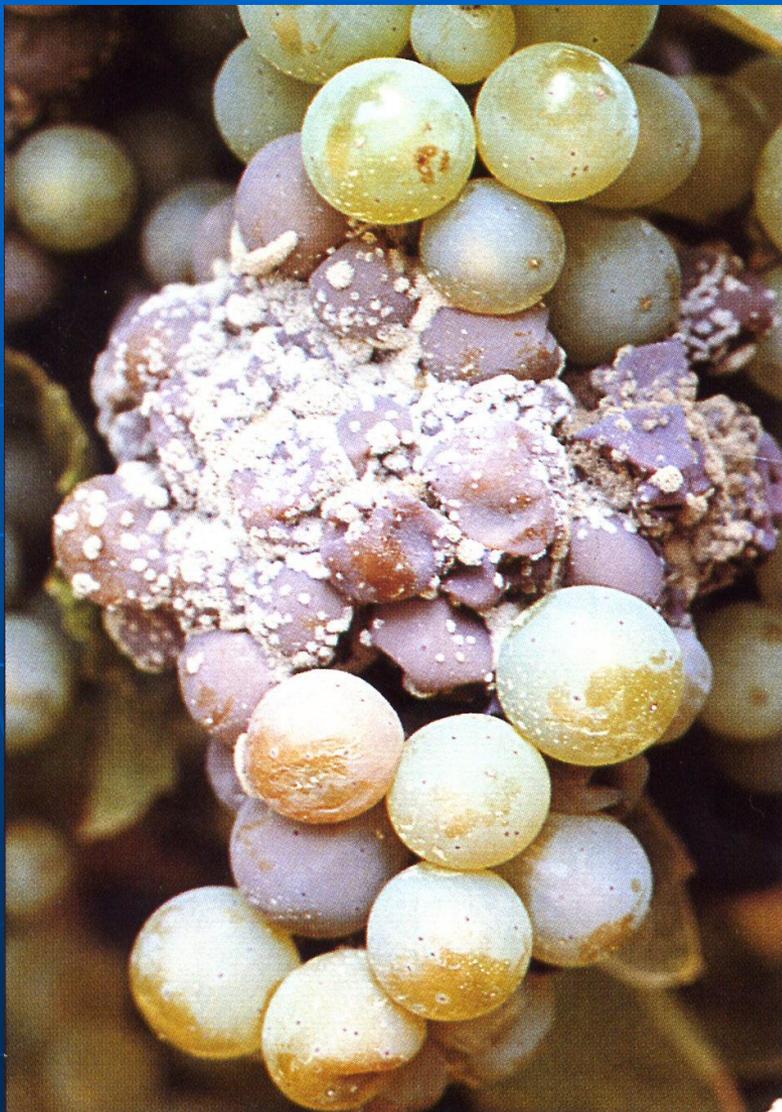
- Low vigor vines have most of the fruit and leaves well exposed
- High vigor vines (unless well trellised) have poor leaf and fruit exposure

MICROCLIMATE AND YIELD

- **Shade reduces yield** and all of its components like budbreak, fruitfulness, fruit set and berry size
- Can be related to vines surviving inside a dense forest, as only well exposed, high shoots will produce ripe fruit



MICROCLIMATE AND DISEASES



- Shaded canopy interiors are more humid, dry more slowly, are more difficult for spray to penetrate
- Botrytis bunch rot is worse for interior fruit
- Powdery mildew is worse for shaded fruit and leaves (NY research)

MICROCLIMATE AND BERRY COMPOSITION / WINE QUALITY

- Demonstrated by many studies around the world with several varieties, red and white

Shade causes:

- Decreased sugar
- Decreased anthocyanin (color) and phenols
- Decreased tartaric acid
- Decreased flavor compounds, and varietal character
- Increased juice K and pH
- Increased malic acid
- Increased "herbaceous" character
- Increased Botrytis and premature ageing



RESULTS FROM A COOL AREA

Cabernet Franc, New Zealand

- The RT2T was balanced, the VSP was shaded with too much vigor
- Yield much greater for RT2T due to more open canopy
- Less Botrytis with RT2T
- Wine darker, more phenolics, more fruit flavor, strongly preferred for RT2T

	Dense VSP	Open canopy
Yield t/ac	6.3	11.8
% bunch rot	19	2
Wine pH	3.40	3.19
Wine Colour density	2.7	4.3
Anthocyanins mg/L	160	165
Wine phenolics	22	24
Sensory score ex 7	3.5	5.1

EXPOSURE (UV?) EFFECTS ON PIGMENTS



Exposed on top



Remove leaf



Assessing vigor and trellis system

Vigor ratings:

**Assessed by
pruning weight**

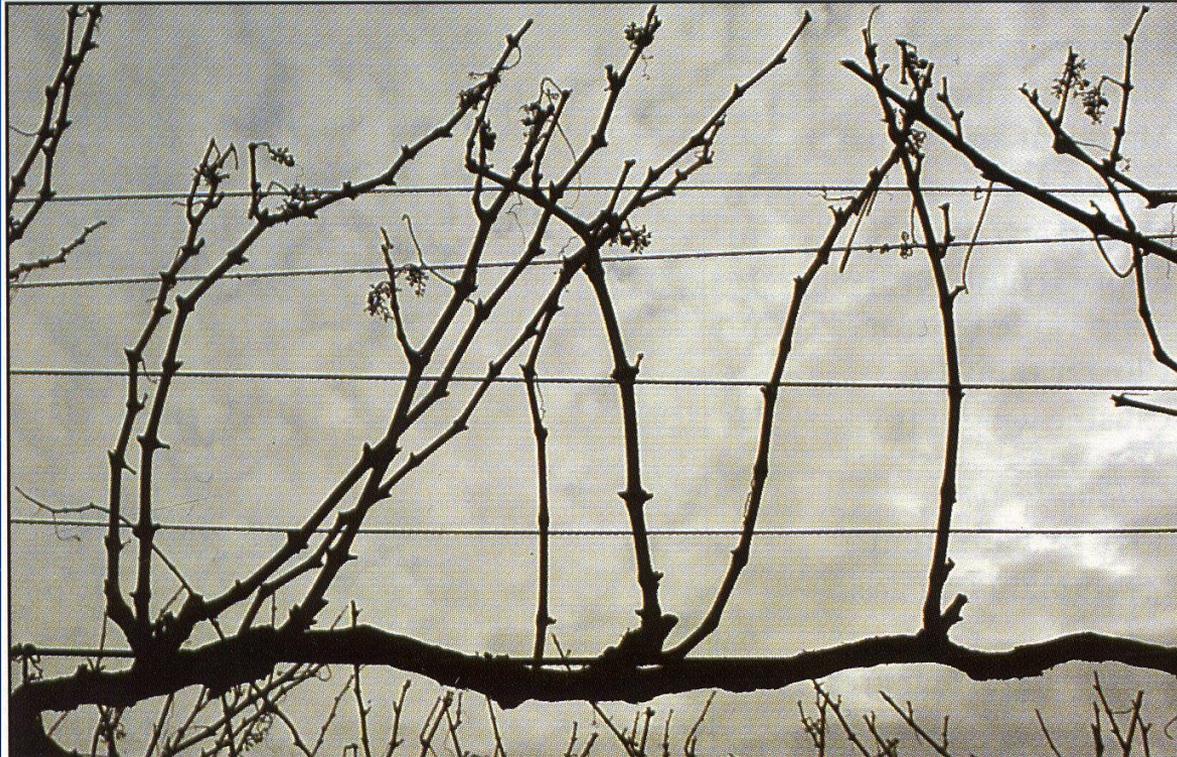
Low, less than 0.5
kg/m, use VSP,
"sprawl"

Medium, to 1.0
kg/m, use Scott
Henry, Smart
Dyson, Lyre

High, more than
1.0 kg/m, use
GDC



VINE BALANCE



A balanced vine has:

Yield: pruning ratio (Ravaz index) of around 5:1

Mean cane weight of about 45 g (0.1 lb)

Vine is pruned to about 12 buds per lb pruning weight

AN IDEAL CANOPY...

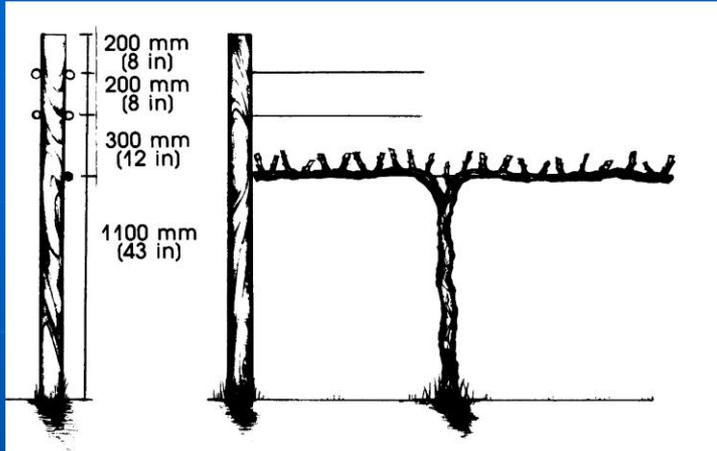
- Growth is balanced
- Intercepts much sunlight
- Shoots spaced each 2.5 in, or 4.5 shoots per foot (15 shoots per m) canopy
- About 40 % canopy gaps, 60 % fruit exposure
- Shoots should be 15 nodes long, about 100cm"
- Avoid fruit exposure to mid afternoon sun ie to west



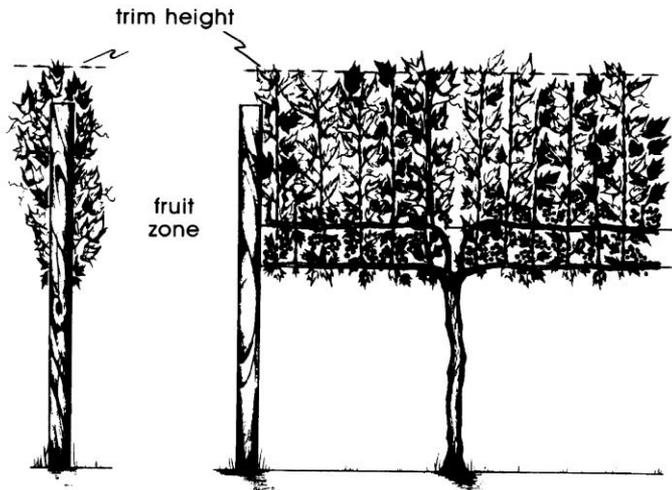
VERTICAL SHOOT POSITIONING VSP

- Suited to low to moderate vigour, Requires 1 fruit, 4 foliage wires, 1.8m post ex ground
- Need 30 in minimum post height above cordon
- Suited to cordon training and spur pruning
- Easy to mechanize Winter Prune (WP), Summer Prune (SP), Harvest (H), Leaf Removal (LR)

VERTICAL SHOOT POSITIONING



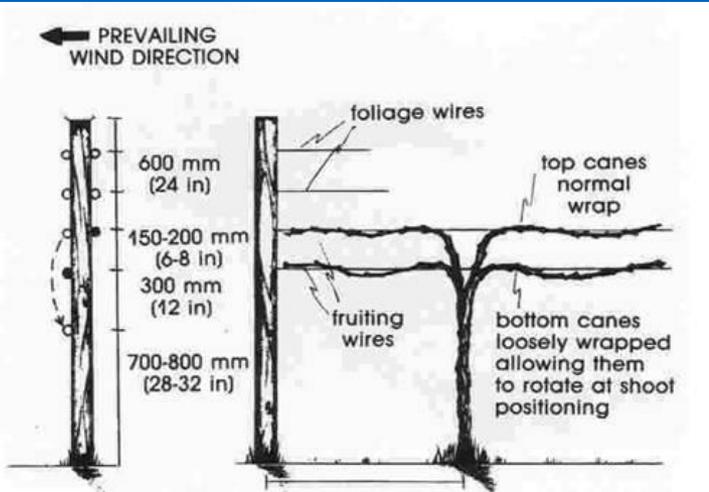
Front and side view for VSP trellis showing spur pruning.



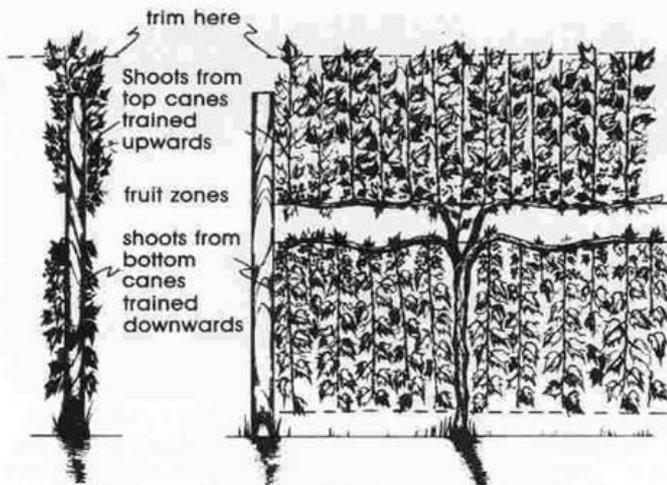
SCOTT HENRY

- Suited to moderate vigour,
- Suited to cane pruning and so cooler climates
- Requires 5 foliage wires, 2 fruiting wires, 6 ft post
- Mechanize summer prune, leaf removal, harvest
- Will produce typically 30% higher yield than VSP, with improved quality

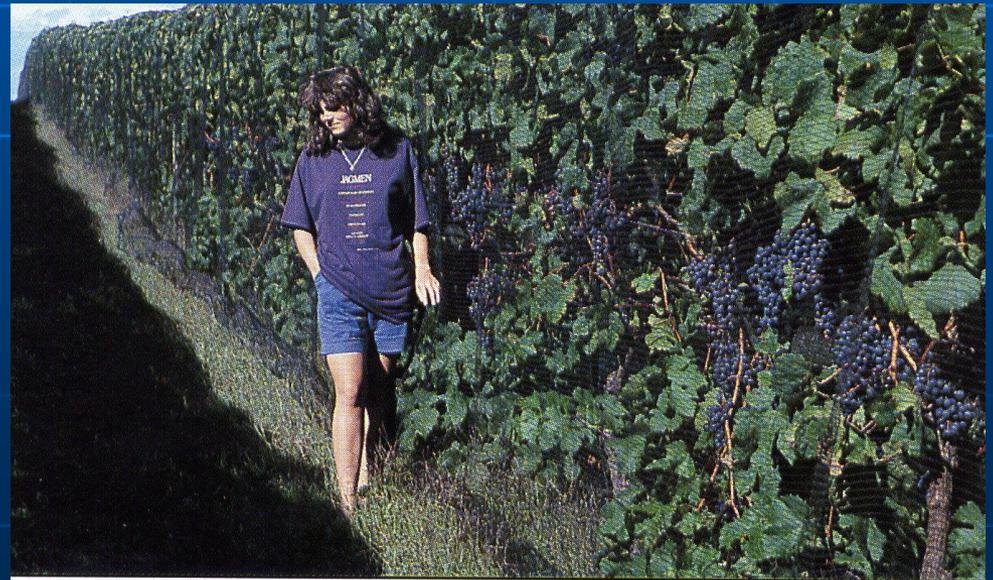
SCOTT HENRY



End and side view of cane pruned Scott Henry system. Note top canes can be tightly wrapped but bottom ones should be loosely wrapped. The distance from the soil to bottom fruiting wire should be a minimum of 1000 mm (39 in), to allow for at least 12 internodes per shoot.



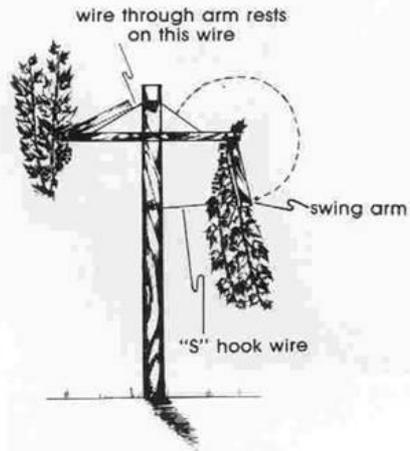
End and side view of Scott Henry during summer to show trimming plane and fruit zone.



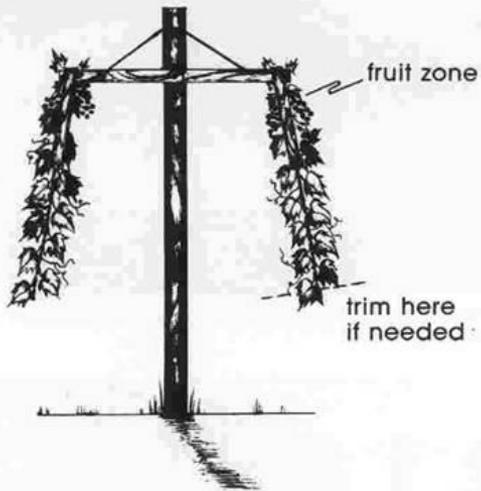
GENEVA DOUBLE CURTAIN GDC

- Is used for high vigor sites
- Requires 5 ft post ex ground, 3 ft cross arm with braces, plus 2, 18 inch swing arms
- Requires 2 fruiting and 2 foliage wires
- Can lead to excessive fruit exposure, especially in first years of formation
- Can be very productive as buds are of high fertility
- Mechanize: Harvest?, summer pruning, winter pruning, leaf removal
- Is best suited to high vigor situations

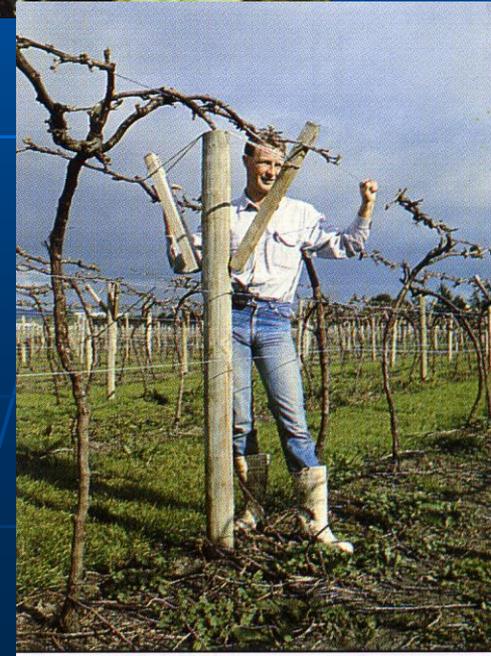
GENEVA DOUBLE CURTAIN



End section to show how the movable foliage wire on the swing arm is pulled down and secured at about flowering to achieve downward shoot positioning. Left side before positioning, right side after.



End section appearance of a GDC vineyard. Shoots can be trimmed but this is generally not needed.



BAND AID CANOPY MANAGEMENT

Cures the symptoms,
not the cause

- Is the most expensive option, typically high annual costs and labor requirement
- Includes shoot (and cluster) thinning
- leaf removal



SHOOT POSITIONING

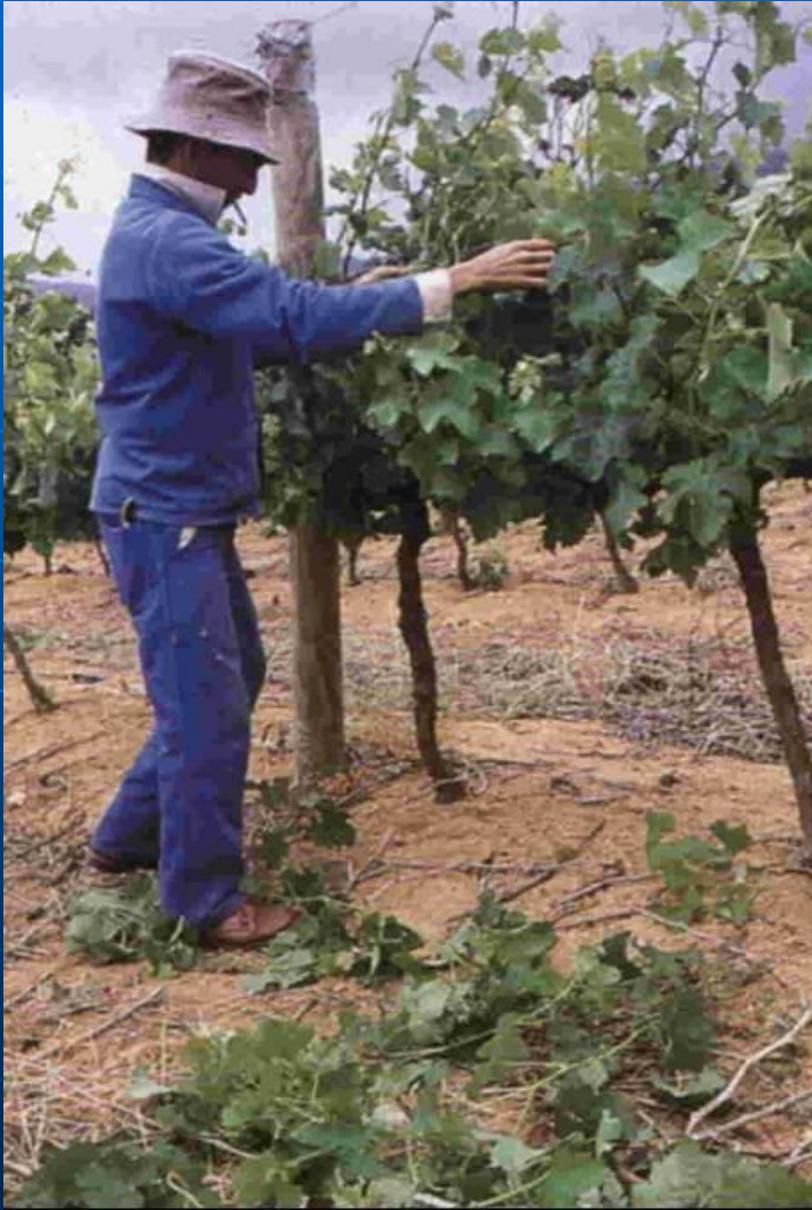


- Typically done too late by “amateurs”
- Requires tight wires
- Can be done with one finger or too late!
- Do not store wires on ground
- 2-3 passes requires 12 man hrs per acre
- Will be mechanised in the



**One canopy
shoot
positioned,
one not!!**

SHOOT AND CLUSTER THINNING



- Shoots are best thinned early in season 3-6" long
- Thin clusters typically soon after set if a large amount is to be removed
- Most effective cluster thinning is before veraison, follow up at veraison
- Typically there are small gains but large losses with cluster thinning
- Greater psychological than physiological benefit
- Balanced vines typically do not need thinning

LEAF REMOVAL

- Typically done too severely
- Best done say 3 weeks pre veraison
- Also done by lateral removal when shoots are about 1 ft long
- When done severely is an unnecessary expense and is harmful to sugar level
- Can cause excessive exposure, with loss of red colour, and high phenols in whites



CONCLUSION

- Canopy management can help you grow grapes more profitably, and make better wine in NE USA