



# Master Gardener Program

University of California Cooperative Extension 

## HOME VINEYARDS - SPRING





# University of California Cooperative Extension UC MASTER GARDENERS OF NAPA COUNTY

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## Need more Information:

Help Desk

Monday, Wednesday, Friday

9:00 AM – 12:00 Noon

253-4143

**E-mail: [mastergardeners@countyofnapa.org](mailto:mastergardeners@countyofnapa.org)**  
**<http://NapaMG.org>**

WEB SITE: [WWW.IPM.UCDAVIS.ED](http://WWW.IPM.UCDAVIS.ED) Integrated Pest Management PEST NOTES



# What questions do you have for us??

- How many have vineyards?
- How Big?
- What varieties?
- Where are they located?
- Are you aware of Integrated Pest Management (IPM)?
- Do you sell your grapes?
- Vineyard Management (DIY or Professional)





# OUTLINE OF WHAT WE ARE COVERING TODAY

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- INTRODUCTION – Carolyn (9:30 – 9:40)
- CALENDAR OF EVENTS IN A VINEYARD, BASIC BOTANY , ANNUAL GROWTH CYCLE, - Carolyn (9:40 – 10:00)
- VINEYARD FLOOR MANGEMENT/ COVER CROP (10:00 – 10:10)- Carolyn
- FROST PROTECTION – Dan (10:10 – 10:30)
- PRUNING – Tony (10:30-10:40)
- CANOPY MANAGEMENT – Carolyn (10:40 – 11:00)
- PETIOLE TEST REVIEW – Barbara (11:00 – 11:10)
- VINE NUTRITION AND FERTILIZATION – Barbara (11:10 – 11:20)
- POWDERY MILDEW – Dan (11:20 - 11:30)
- INTEGRATED PEST MANAGEMENT– Carolyn (11:30 – Noon)

## **LUNCH (Noon – 12:30)**

- PRUNING IN THE VINEYARD – Team (12:30 – 1:00)
  - CROP LEVELS AND THINNING – Dan (1:00– 1:10)
  - IRRIGATION TIMING AND TECHNIQUES – Dan (1:10 – 1:20)
  - DROUGHT AND DRY FARMING – Carolyn (1:20 – 1:30)
  - Questions (1:30 – 2:00)
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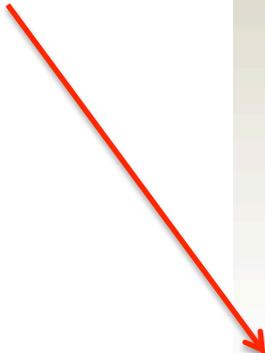


# Online Presentation

MG Website: NapaMg.org

Materials  
Access  
using our  
QR Code

Our Presentation



University of California  
Master Gardeners • Napa

UC Cooperative Extension Home **Need help with a garden problem?** Need

- Home
- 2017 Napa Fires Information Page
- Links, Napa County
- Dean Donaldson Endowment Fund
- Garden Questions?
- Gardening Resources
- Our Community Partners
- Events
- Become A Master Gardener
- Join Our E-mail List
- UC IPM Resources for Gardeners
- Members Area

**References and Slides  
Workshops and Events**

UC Master Gardeners of Napa County  
University of California  
Agriculture and Natural Resources • UCCES Master Gardener Program

FREE GUIDED  
TREE WALK

UC Master Gardeners of Napa County  
everyone with compassion and support help you recover  
**2017 Napa Fires Information**

The Master Gardener program is a volunteer program with the University of California Cooperative Extension. Its purpose is to extend research based knowledge on plant management, and sustainable landscape management to the people of California and to be guided by our core values and initiatives.

upcoming MG workshops

Home Vine







# CALENDAR OF EVENTS FOR VITICULTURE MANAGEMENT

- HARVEST
- VITICULTURE OPERATION
- PEST MANAGEMENT





# Calendar of Events

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## WEATHER

- Rain
- Or lack of !
- Frost Danger
- Heat spell hazard
- We will be covering this in detail today-



# Calendar of Events

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## HARVEST

- Wine Grapes
  - early** (sparkling wines)
  - mid season** (whites /pinot noir)
  - late** (Cabernet Sauvignon, Merlot)



# Calendar of Events

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## VITICULTURE OPERATIONS

- Shoot removal
- Plant Cover Crop
- Irrigation
- Pre Harvest vine preparation



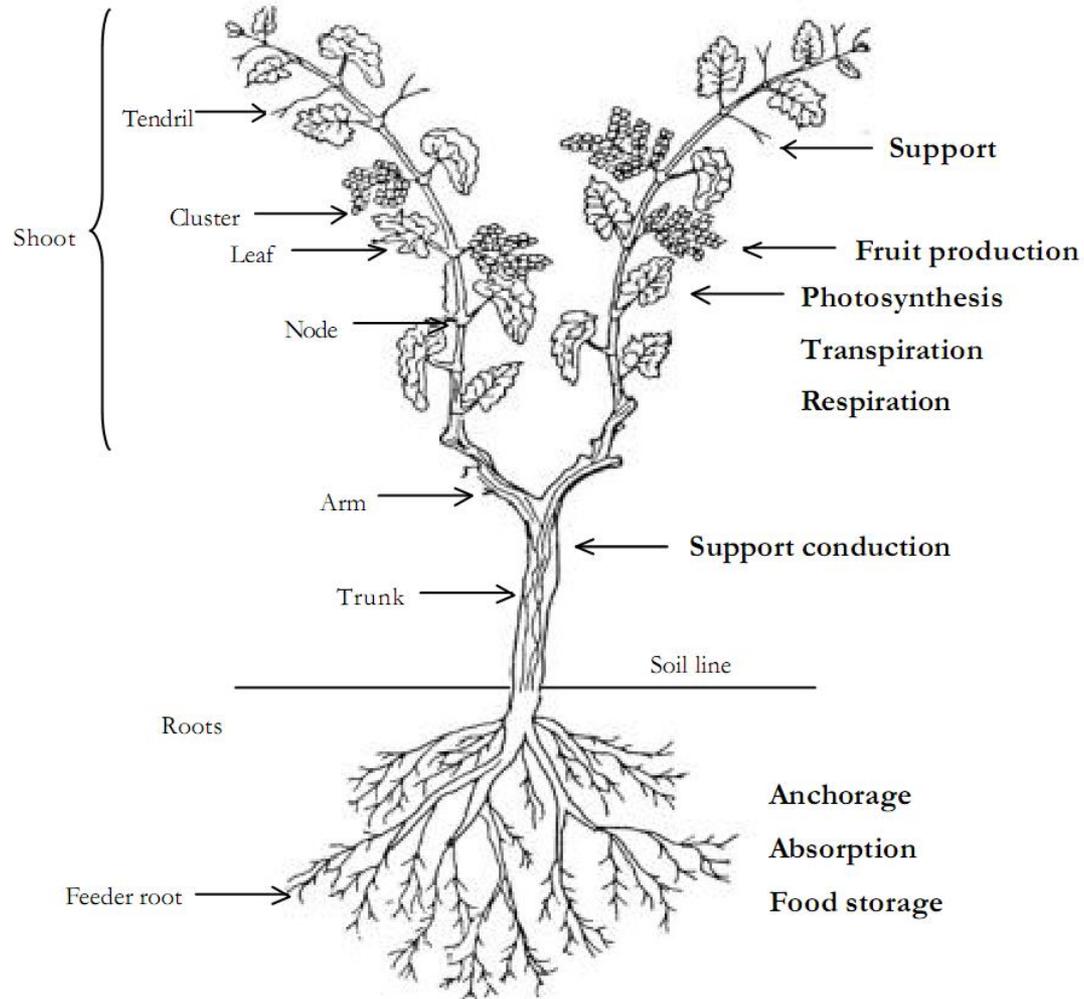
# Calendar of Events

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## PEST MANAGEMENT

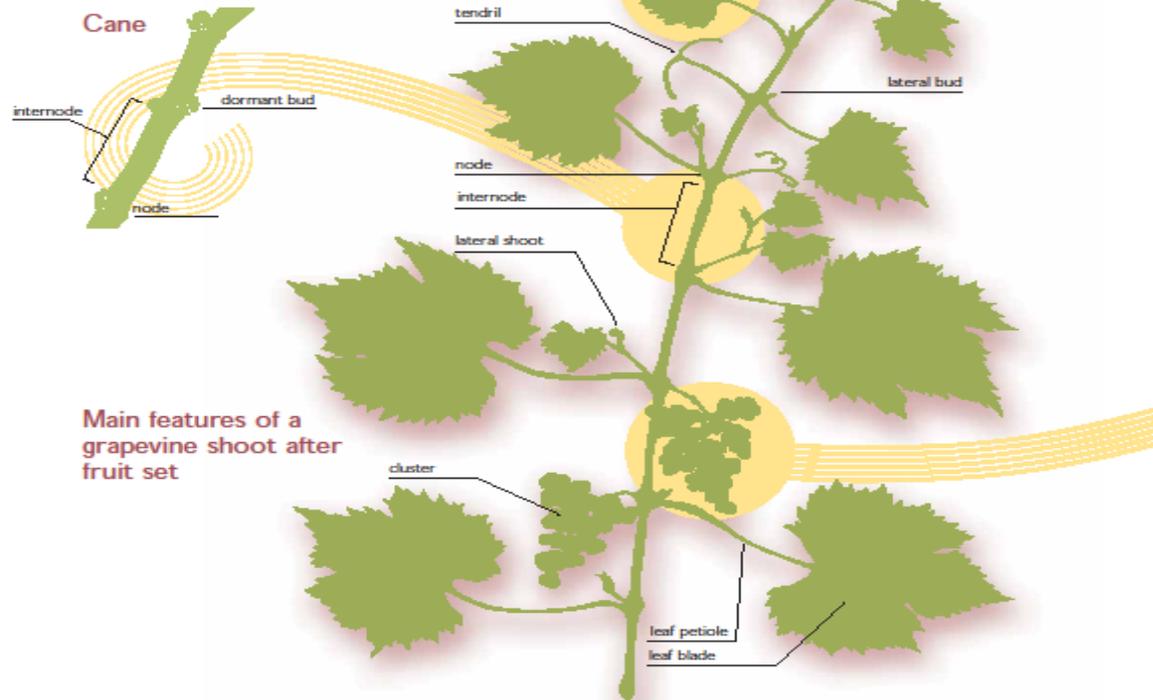
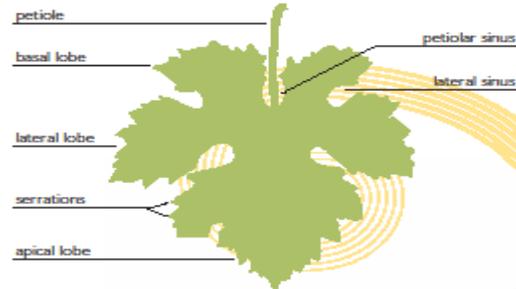
- Insects and Mites
- Nematodes
- Diseases
- Vertebrates
- Weeds

# Vine



# Wine Grapevine Structure

Typical vinifera grape leaf with five lobes



Main features of a grapevine shoot after fruit set



# BASIC BOTANY

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- What factors effect growth and ripening
- Temperature and light influences
- Carbohydrate nutrition
- Understand irrigation, nutrition, ripening and fruit quality

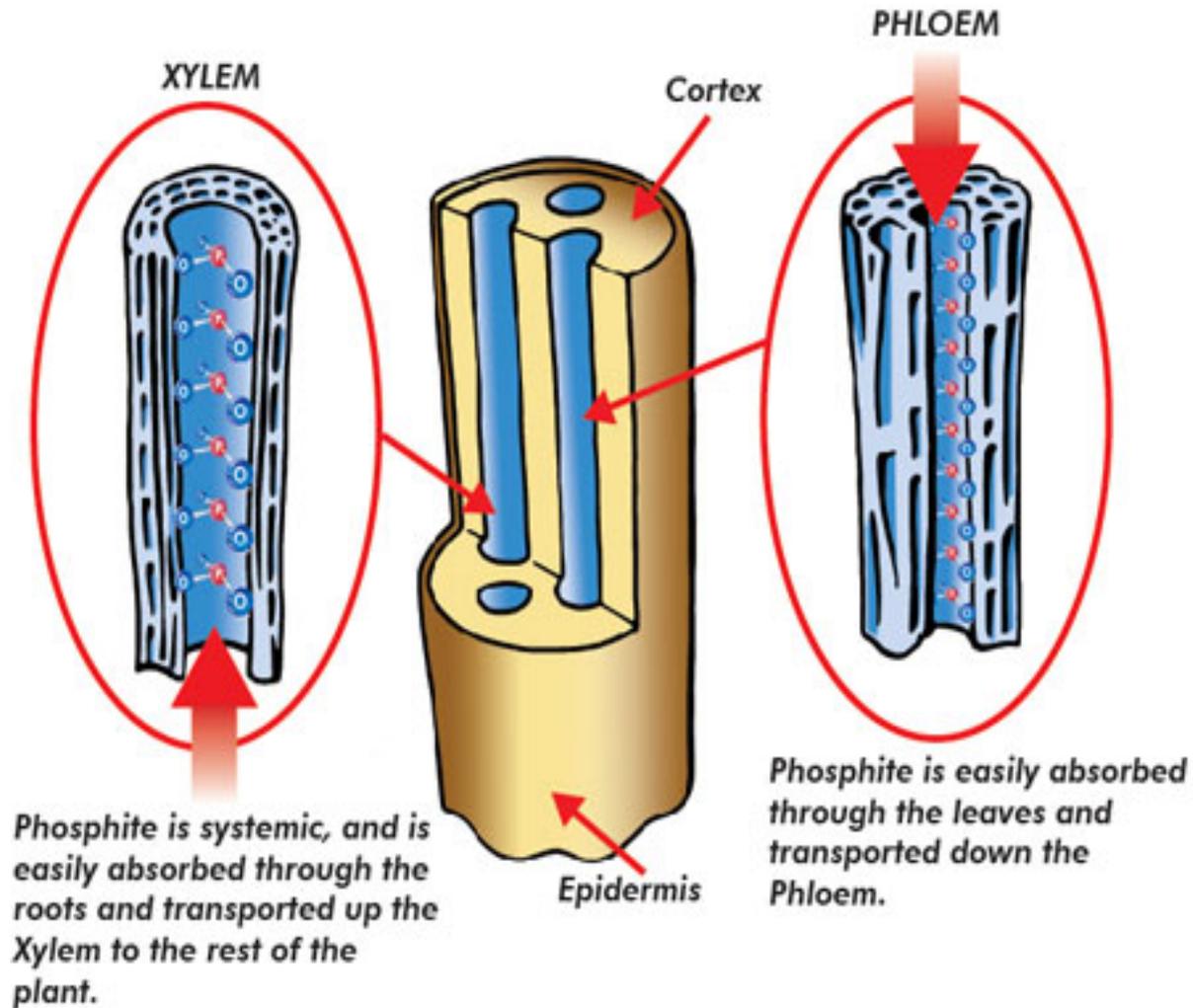


# TRANSLOCATION

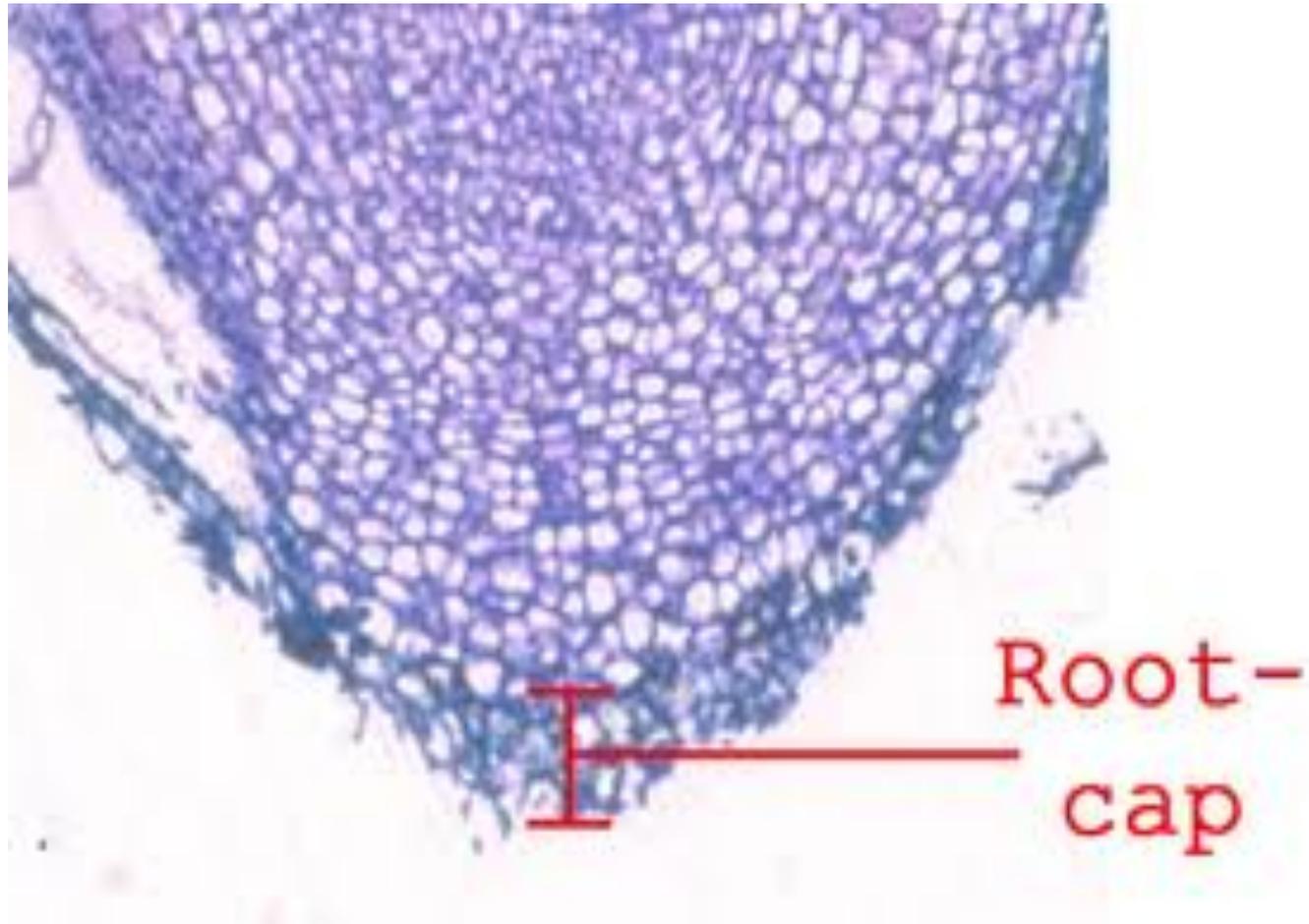
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- Movement of carbohydrates, some nutrients and hormones in the plant
- Occurs in the phloem
- Phloem is made up of living plant cells
- Moves upward and downward in plant
  
- PHLOEM= FOOD
  
- Sinks- food goes where needed- leaves, berries, roots

# Food Flow



# Root Growing Point





# Photosynthesis

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- *The process which enables plants to produce their own food*
- Energy from sun (light) is transformed into stored chemical energy (sugars, carbs)
- CO<sub>2</sub> (carbon dioxide) + H<sub>2</sub>O (water) in the presence of light and chlorophyll >>>> simple sugars or carbohydrates + O<sub>2</sub>
- Only during daylight Influenced by :Light-  
Temperature- Water status(wind)



# ANNUAL GROWTH CYCLE

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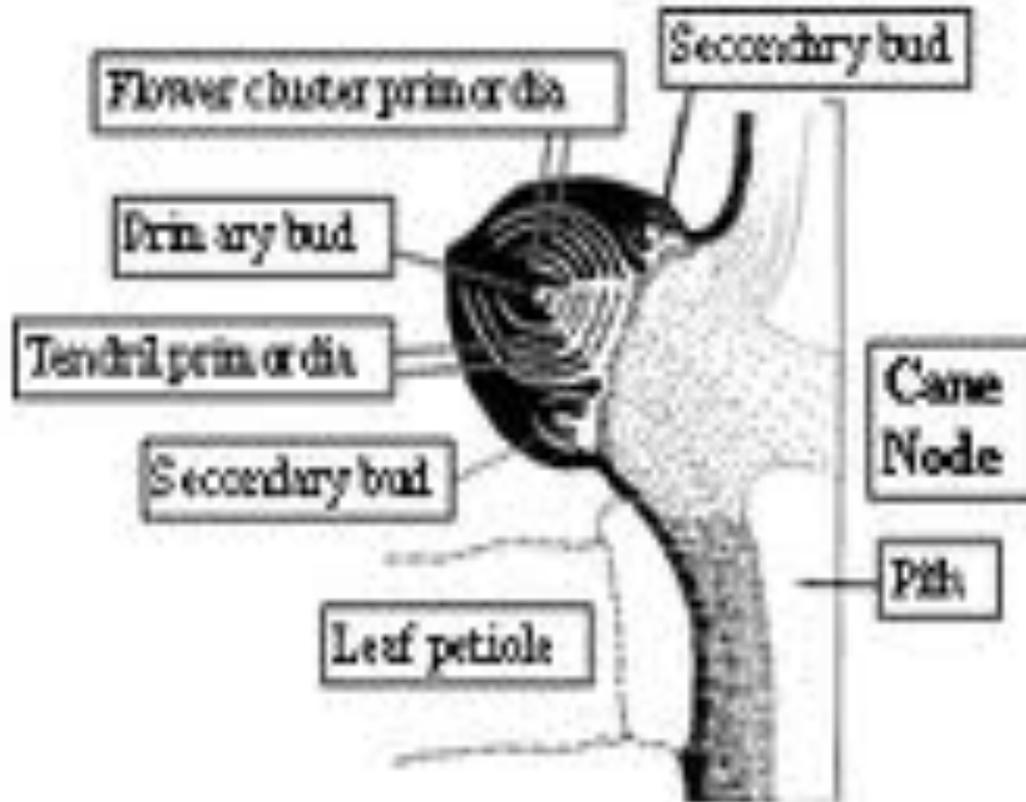
-----THREE INTEGRATED CYCLES-----

- VEGETATIVE GROWTH
- CLUSTER INITIATION
- FRUIT GROWTH AND DEVELOPMENT



# Bud

## Dormant Grape Bud



# Compound Bud



# Bud Break- Dormant bud

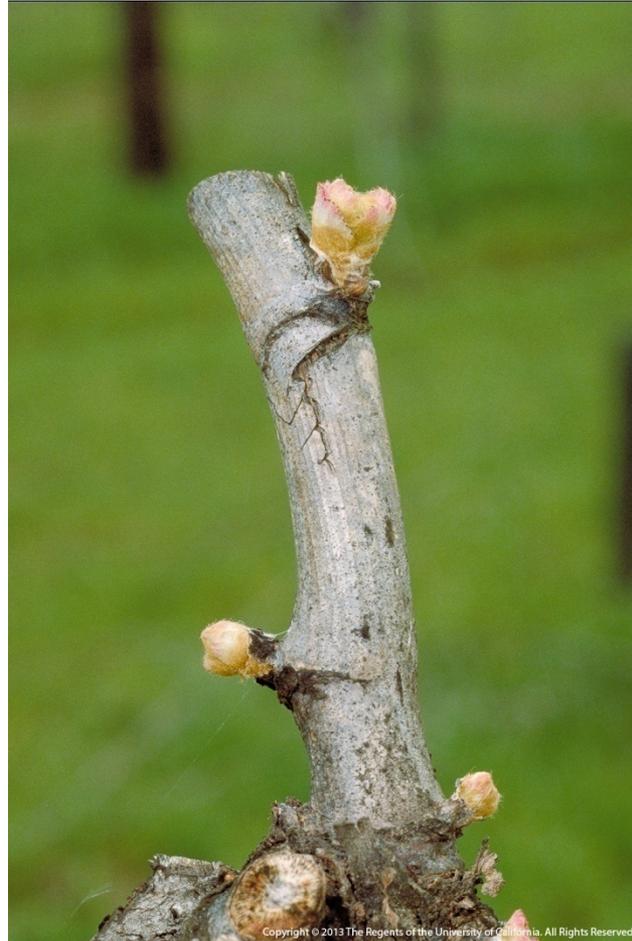
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# Bud Break

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# Early Shoot Growth- flat leaf stage

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# Early Shoot Growth- Six inch Shot





# Vine Growth at the beginning of bloom

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# ANNUAL GROWTH CYCLE

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## CLUSTER INTIATION

- ALL FORMED IN THE BUD – FRUIT CLUSTER OR TENDRIL
- INFLUENCED BY ENVIORMENT
- FLOWER CLUSTER FORMED THE YEAR PRIOR



# Bloom



# Bloom Pollination





# ANNUAL GROWTH CYCLE

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## FRUIT GROWTH AND DEVELOPMENT

- GRAPE FLOWERS ON CLUSTER
- SELF-POLLINATING
- FLOWERS BLOOM 6-10 WEEKS AFTER SHOOT GROWTH BEGINS
- FRUIT SET -20-30% FLOWERS REALLY BECOME BERRIES

# Fruit Set



# Fruit Developing





# ANNUAL CYCLE OF GROWTH

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## FACTORS INFLUENCING GRAPE BERRY GROWTH

- GENETICS
- BIOPHYSICAL CONSTRAINTS
- ENVIRONMENT
- SOURCE/SINK RELATIONSHIPS
- WATER STRESS

# Fruit Elements



# Fruit Fully Developed - Veraison





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# Vineyard Floor Management



# Floor Management Objectives

- Weed Control
- Soil Conservation
- Water Management



Weeds need to be managed to reduce competition for soil moisture and nutrients.



# Cover Crops

- Timing of seeding
- Benefits
- Mowing/tilling timing
- Water Management
- Erosion Control





# Compost and Mulch

*Mulch* is not tilled in

- Erosion control
- Improved moisture

*Compost* is tilled in to

- Improve porosity
- Add microorganism diversity
- Slow release of nutrients
- Apply 3-4 tons /acre





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# Frost Protection



# Frost Damage

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- #1 Cause of weather related economic losses for grape growers
- Freezing causes rupture of cell walls, cells get leaky and get dehydrated.
- Temp less than 32 degrees F (0 C).



# Freeze Damage





# Frost Damage Occurs Quickly!

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- Damage begins with air temperatures of 31 degrees for only ½ hour.
- Temps of less than 30 degrees lasting several hours will kill growing buds in the spring.
- More mature vines do better.
- Optimally hydrated vines also do better.





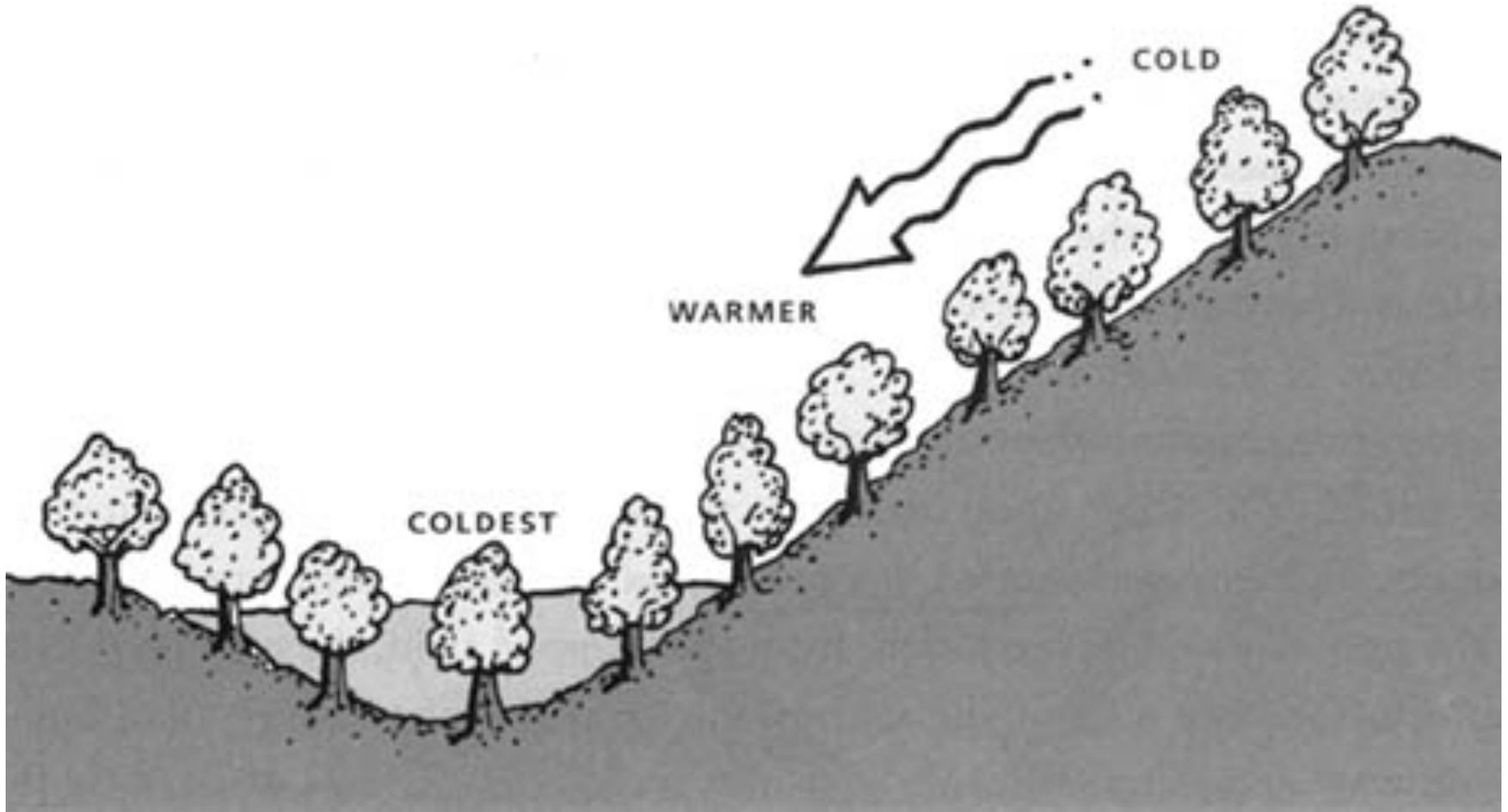
# Passive Frost Protection

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Often get you up to 2 degrees (often all needed):

1. Vineyard site selection – cold air is trapped in low areas and moves down a slope.
2. Clean/bare/firm/wet vineyard floor.
3. Plant later budding varieties.
4. Prune later/double prune – pruned vines bud earlier.

# Cold Air Movement





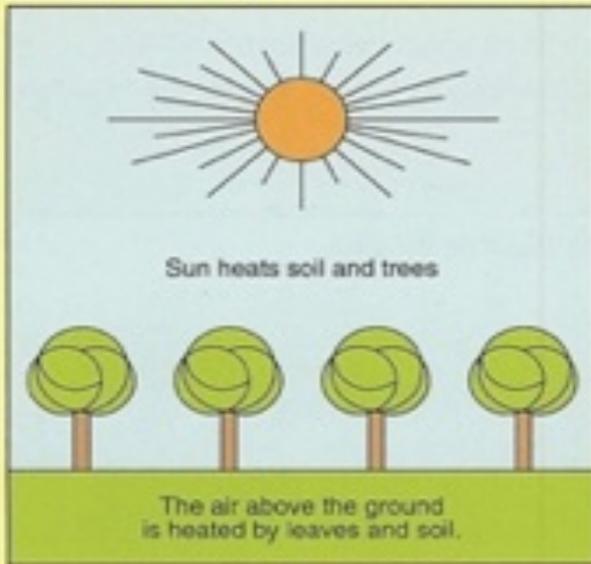
# Active Frost Protection

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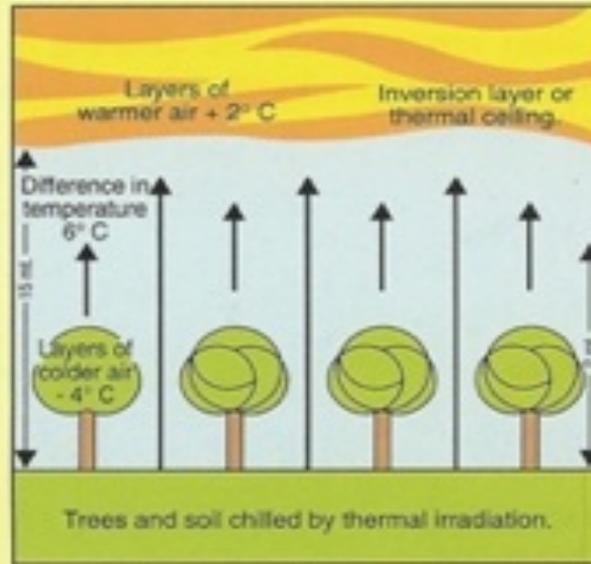
- Overhead Sprinklers – require a lot of water, can get up to 8 degrees of protection.
- Wind Machines – bring warmer air above the vineyard to the colder air at ground level. Good for 1 – 3 degrees protection.
- Heaters – not used much anymore.
- Frost Protection Sprays – (Cloud Cover/Copper)
- Garden Cloths/Lights – works for a few vines.

# How Wind Machines Work

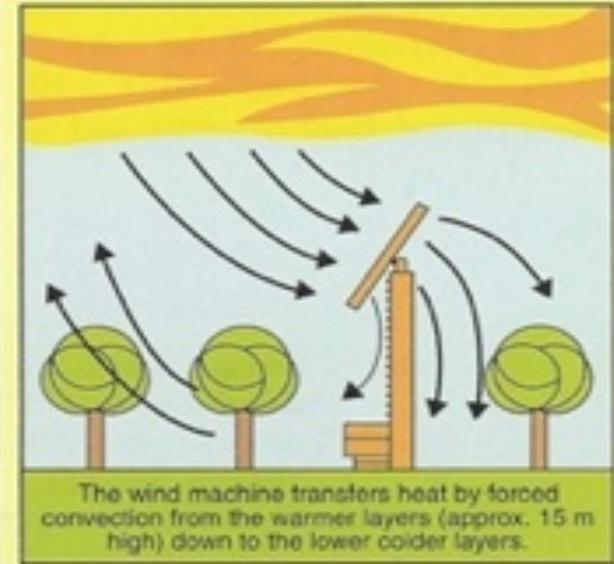
During the day



Night frost



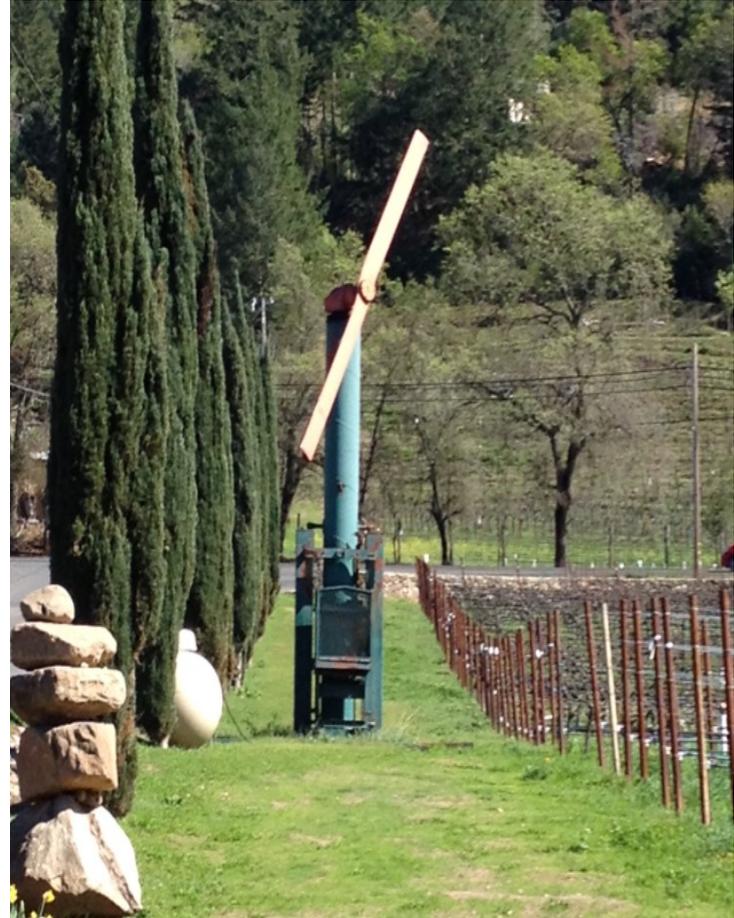
The effect of the wind machine



# FROST PROTECTION



# WIND MACHINES





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# Pruning

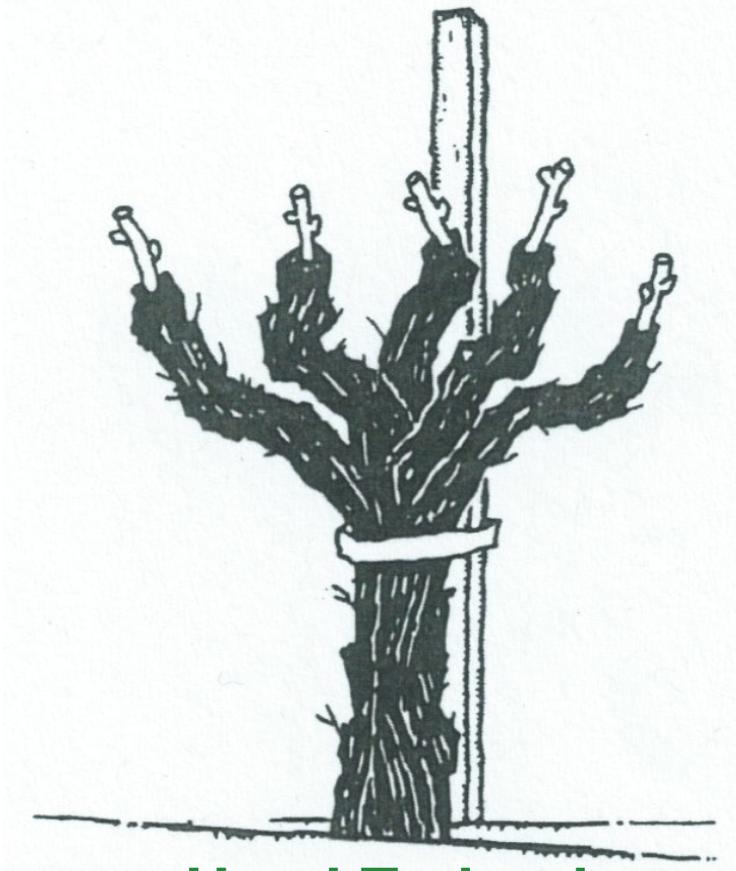


# Objectives of Pruning

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- Controlling the size and structure of the vine
- Regulate crop size
- Maintain a balance between vegetative growth and fruiting
  - maximizing the yield potential while maintaining the health of the plant
- Determined by trellis system

# Trellis Systems

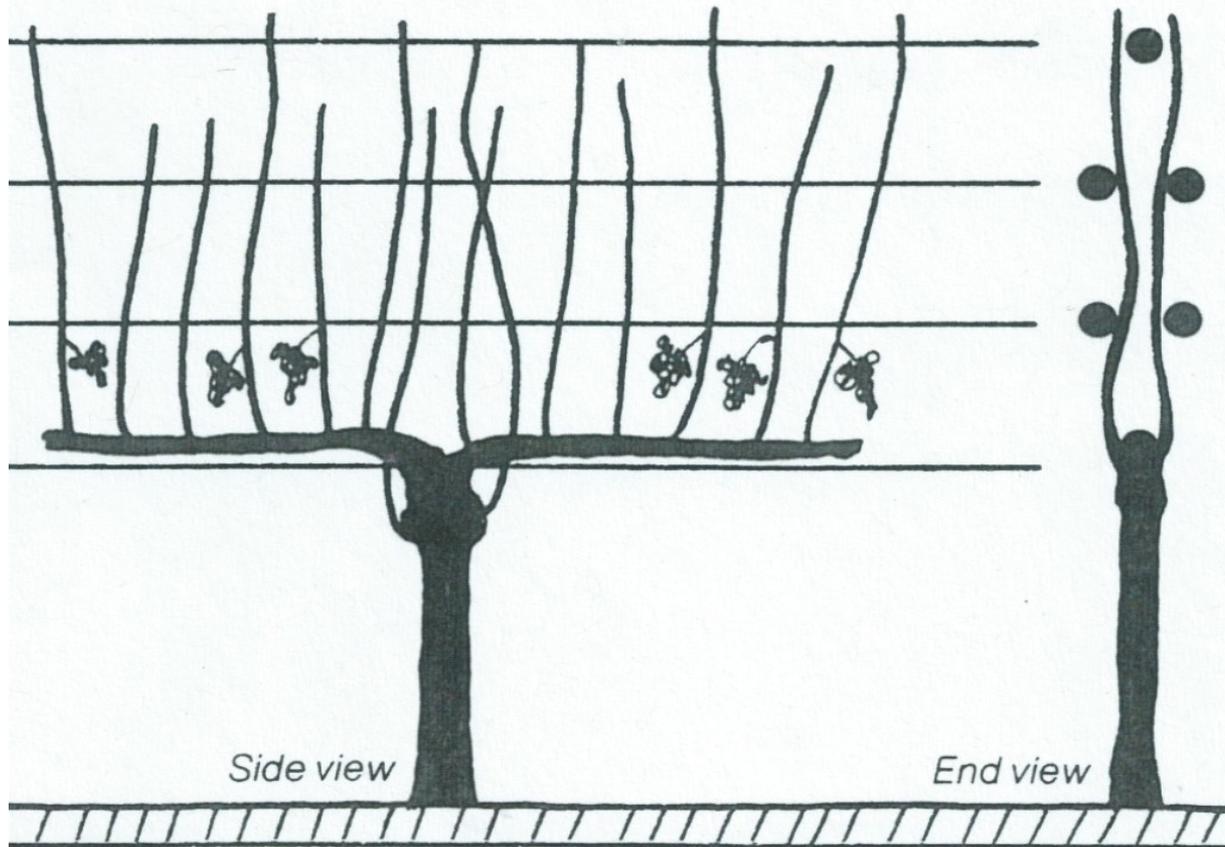


**Head Trained**

## Considerations

- Cultivar
- Site
- Vine vigor
- Harvesting method
- Maintenance
- Cost

# Vertically shoot positioned (VSP) trellis



- Dominate the North Coast and Central Coast
- Used in various row widths
- Adjustable side wires

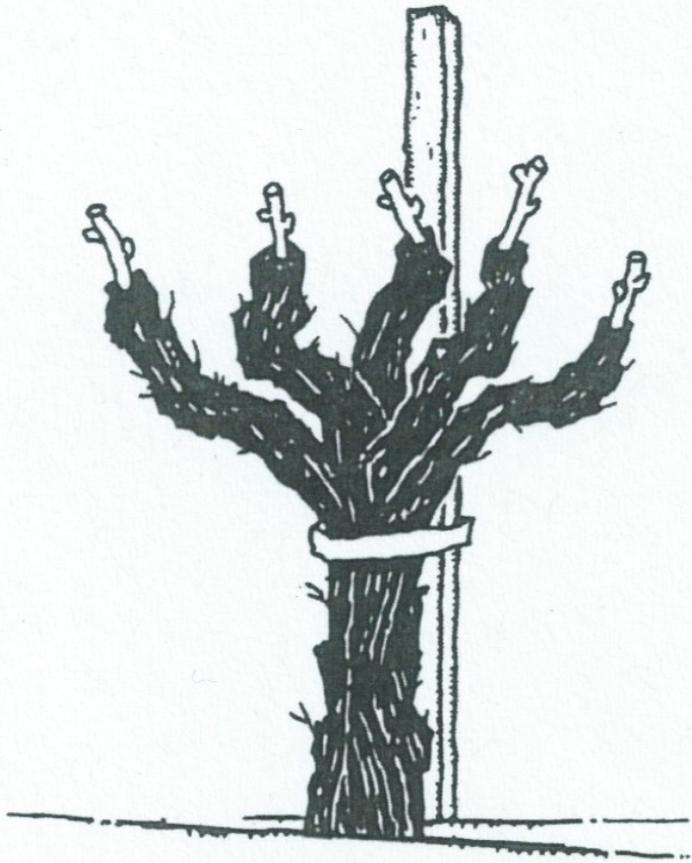
# Spur



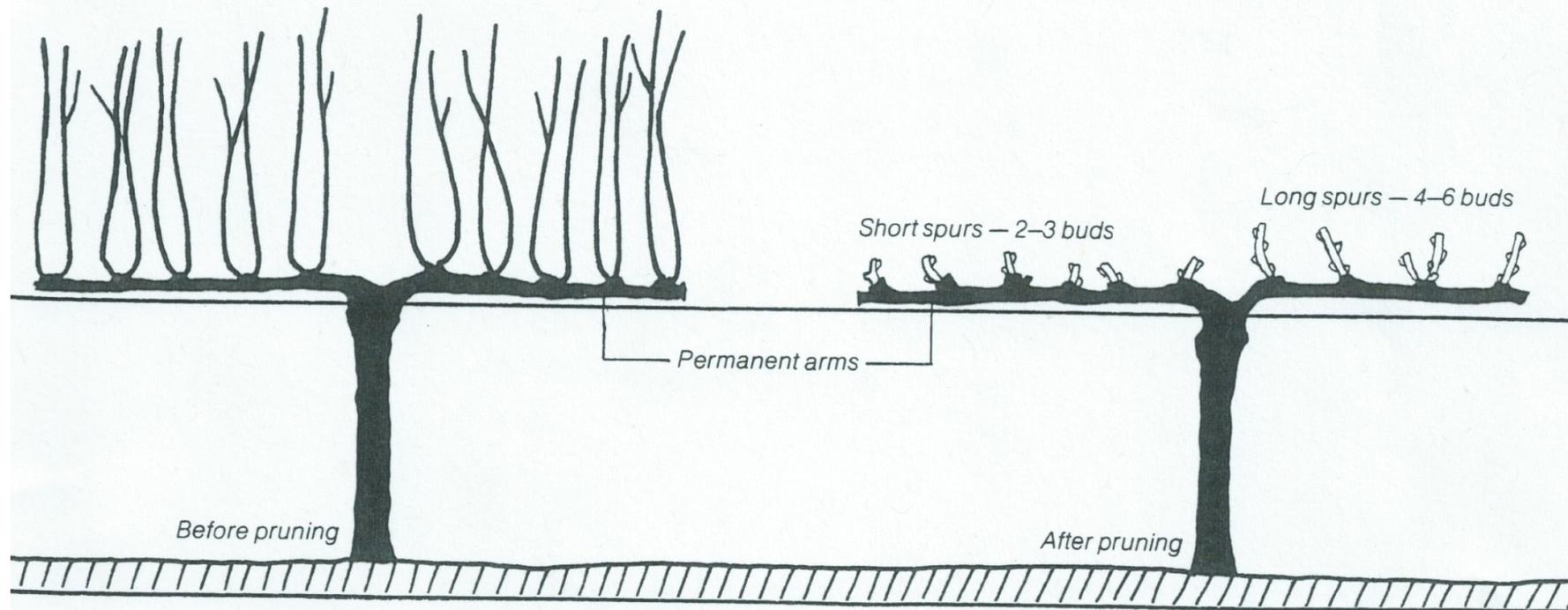
Length of spur  
is 2 clearly  
defined buds

# Head Trained

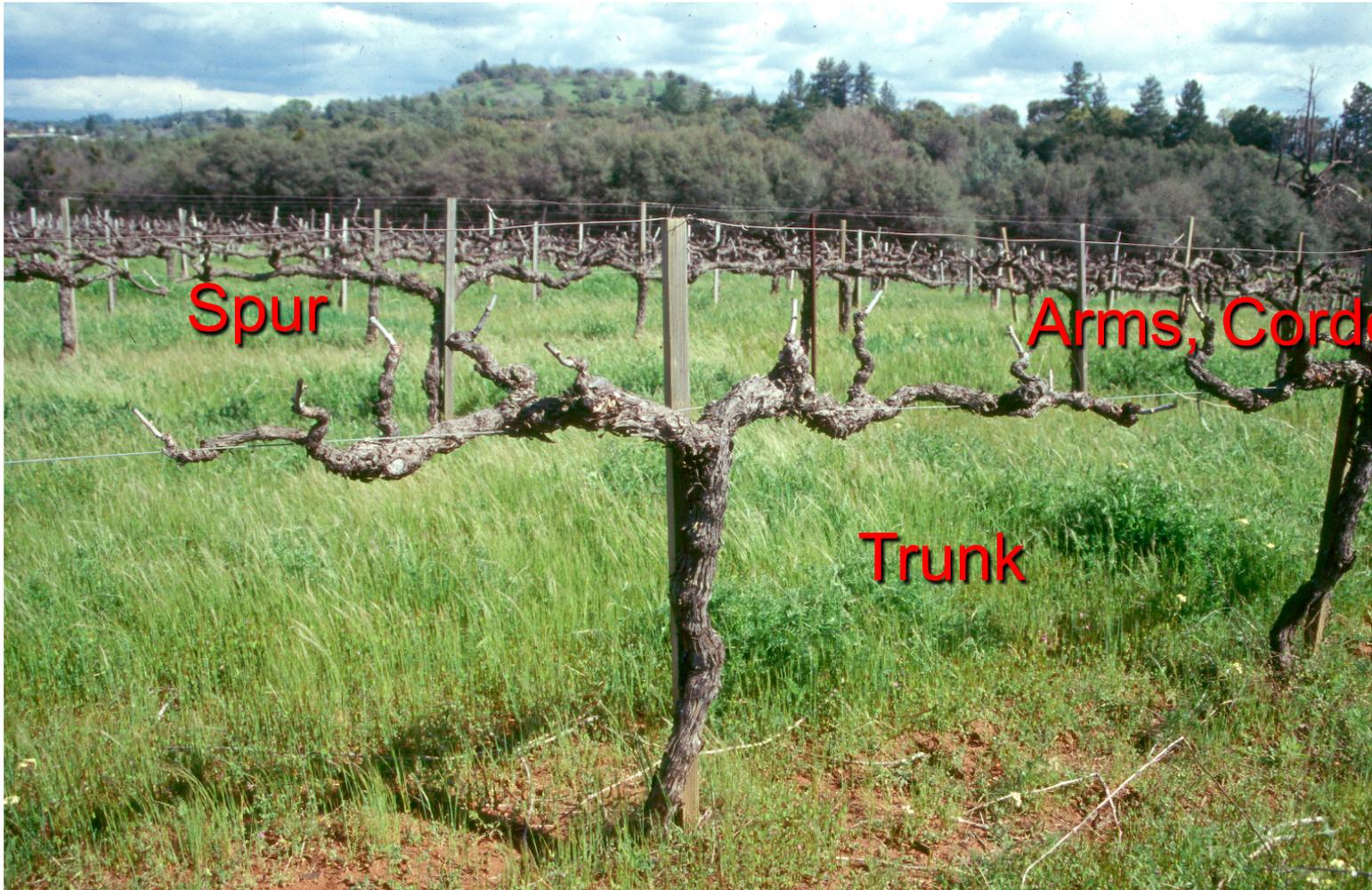
## Vine with Spur Pruning



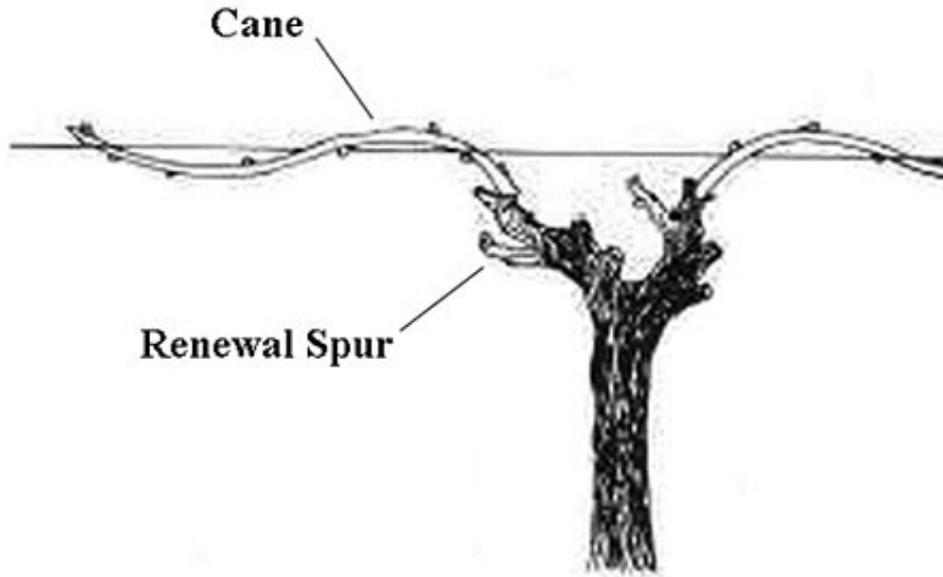
# Cordon Pruning



# Cordon Pruning



# Cane Pruning



# Bad Examples

Poor spacing of spurs



No sunlight in canopy  
Dead shoots



# Wrong Spacing



# Clusters well spaced





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# Canopy Management



# Canopy Management

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It is all about Balance

Shape, Orientation, Location of shoots  
and Leaves



# Canopy Management

## Why we do it

### For This Year

- ✓ To maximize wine grape yield, wine quality or both at the same time,
- ✓ Essential to being consistently successful from one year to the next.

A properly balanced vine, with the right ratio of shoots and leaves to fruit, is the goal, as well as striving for the right fruit exposure to light and maintaining the fruit within an optimum temperature range.



# Canopy Management

## Why we do it

### ☐ For Next Year

- ✓ Two critical elements:
  - Production of adequate fruit buds
  - Production of sufficient carbohydrate and nutrient reserves for the following year

# Canopy Management

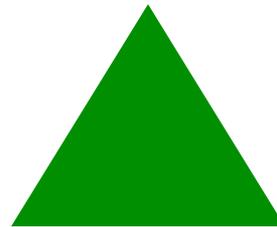
## What Affects Balance



Vegetative Growth



Fruit Production



# Canopy Management

## General Crop Load Indices

- ❑ 8 Leaves per cluster
- ❑ 10 – 14 cm<sup>2</sup> leaf area – gram fruit weight



# Canopy Management

Know your microclimate, Orientation to the afternoon sun

- ❑ When to Start
  - ✓ Just Prior To or at bloom
  - ✓ Increase light on the bloom
  
- ❑ During rapid shoot growth
  - ✓ Suckers
  - ✓ Water spouts
  - ✓ May need additional leaf pulling
  
- ❑ When to stop
  - ✓ Start of Veraison
  - ✓ Prior to Harvest





# Canopy Management

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## LEAF REMOVAL TIPS

- ✓ At the beginning of berry set take off leaves in the fruiting zone to expose grapes to sunlight as necessary.
- ✓ Be careful of too much leaf removal on the south or western sides because of potential sunburn.
- ✓ A dense canopy is also conducive to the development of bunch rot or mildew because it prevents the sprays from reaching the fruit. Air movement helps reduce moisture which leads to these conditions.



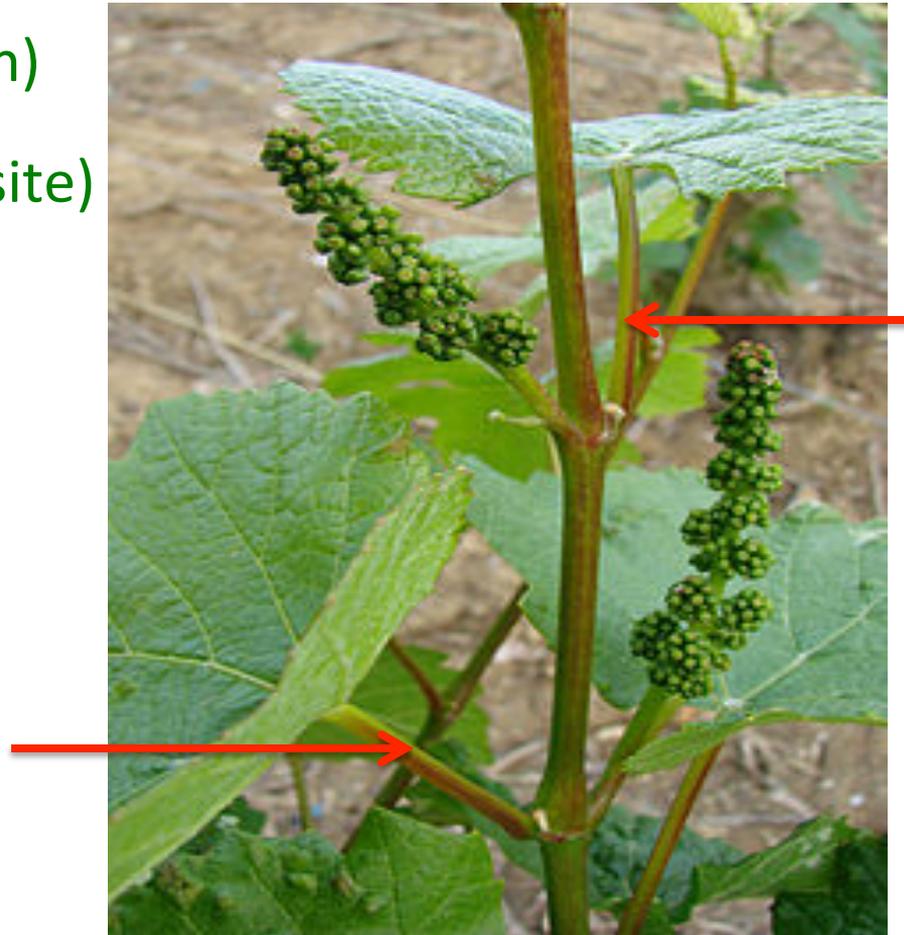
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# Petiole Test



# Petiole Test

- When (At Bloom most common)
- Which (Around cluster – opposite)
- How Many (75 – 100)
- Frequency (Annually)





# Petiole Analysis

Client   
 Property   
 Project Number

Date Sampled   
 Date Submitted   
 Date Reported

## Report of Plant Tissue Analysis

Sampling Date	Lab ID#	Description Block / Variety Rootstock / Growth Stage	N Total Nitrogen %	NO3-N Nitrate Nitrogen ppm	Cl Chloride %	P Total Phosphorus %	K Potassium %	Mg Magnesium %	Ca Calcium %	Na Sodium %	Fe Iron ppm	Al Aluminum ppm	Mn Manganese ppm	B Boron ppm	Cu Copper ppm	Zn Zinc ppm
5/15/15	3	4 / CS 110R / 90% BLOOM	1.01	555	0.13	0.80	2.79	0.62	4.12	0.01	33	18	57	46	8	44
5/11/15	1	1A / CS 3309 / 90% BLOOM	0.89	189	0.26	0.68	3.35	0.79	4.26	0.01	27	13	85	34	8	73
5/11/15	2	1B / CS 3309 / 80% BLOOM	0.95	413	0.27	0.60	3.06	0.83	4.39	0.01	29	20	98	33	7	72
5/11/15	3	2 D-F / ME 3309 / 85% BLOOM	0.92	247	0.32	0.54	3.78	0.76	3.75	0.01	28	19	97	34	7	102
5/15/15	1	2A / CS S04 / 65% BLOOM	0.90	31	0.07	0.50	3.31	0.66	3.78	0.01	34	21	66	37	7	44
5/8/15	1	2B / SB S04 / 80% BLOOM	1.13	107	0.13	0.74	2.72	0.57	3.94	0.01	40	25	147	30	7	56
5/15/15	2	2C / CS S04 / 70% BLOOM	0.85	28	0.11	0.53	2.65	0.62	3.72	0.01	30	21	125	29	6	49
5/8/15	2	2G / CF 3309 / 50% BLOOM	1.03	506	0.33	0.61	4.17	0.80	3.41	0.02	32	15	75	35	7	93
5/6/15	1	2H / CF 3309 / 90% BLOOM	0.95	486	0.35	0.65	3.94	0.51	3.78	0.02	41	31	86	39	6	82
5/6/15	2	3A-1 / CS 3309 / 50% BLOOM	1.03	578	0.28	0.57	2.56	0.67	3.80	0.01	39	26	71	30	7	66
5/8/15	3	3A-2 / CS 3309 / 40% BLOOM	1.09	181	0.30	0.67	2.72	0.58	3.80	0.01	32	20	96	33	6	38
5/6/15	3	3B-1 / PV 420A /	1.45	420	0.15	0.54	2.16	0.54	2.30	0.01	42	25	83	37	6	60
5/6/15	4	3B-2 / PV 3309 / 70% BLOOM	1.30	1014	0.25	0.64	3.65	0.66	2.44	0.01	40	28	65	39	9	72
Critical levels for Wine Grapes	Deficient		<0.5	<100		<0.15	<1.00	<0.20	<1.0		<30		<30	<25	<6	<15
	Marginal		0.5 - 0.75	100 - 200		0.15 - 0.25	1.00 - 1.50	0.20-0.30	1.0-1.5		30-40		20-40	25-40	6 - 8	15-50
	Adequate		0.75 - 1.25	200 - 600		0.25 - 0.60	1.50 - 2.50	0.30-0.80	1.5-2.5	<0.1	40-300	<300	40-500	40-70	8 - 20	50-100
	Elevated		1.25 - 1.50	600-1000	0.5-0.8	0.60 - 1.0	2.5-3.0	0.80-1.0	2.5-3.5	0.1-0.5		300-500	500-1000	70-150	20-500	100-150
	Excessive		>1.50	>1000	>0.8	>1.0	>3.0	>1.0	>3.5	>0.5		>500	>1000	>150	>500	150+



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# Vine Nutrition and Fertilization



# Grapevine Nutrition

What's Needed for Healthy Growth & Development

## Macronutrients

### Primary

- Nitrogen
- Phosphorus
- Potassium

### Secondary

- Calcium
- Magnesium
- Sulfur



dreamstime.com

## Micronutrients

- Iron
- Manganese
- Molybdenum
- Copper
- Zinc
- Boron



# Nutrient Requirements

Five critical questions to ask for proper grapevine nutrition.

- Which nutrients are required by the vine?
- What's the function of each nutrient?
- At which physiological stage is the nutrient is mostly required?
- When should I fertilize?
- How much fertilizer should I apply?



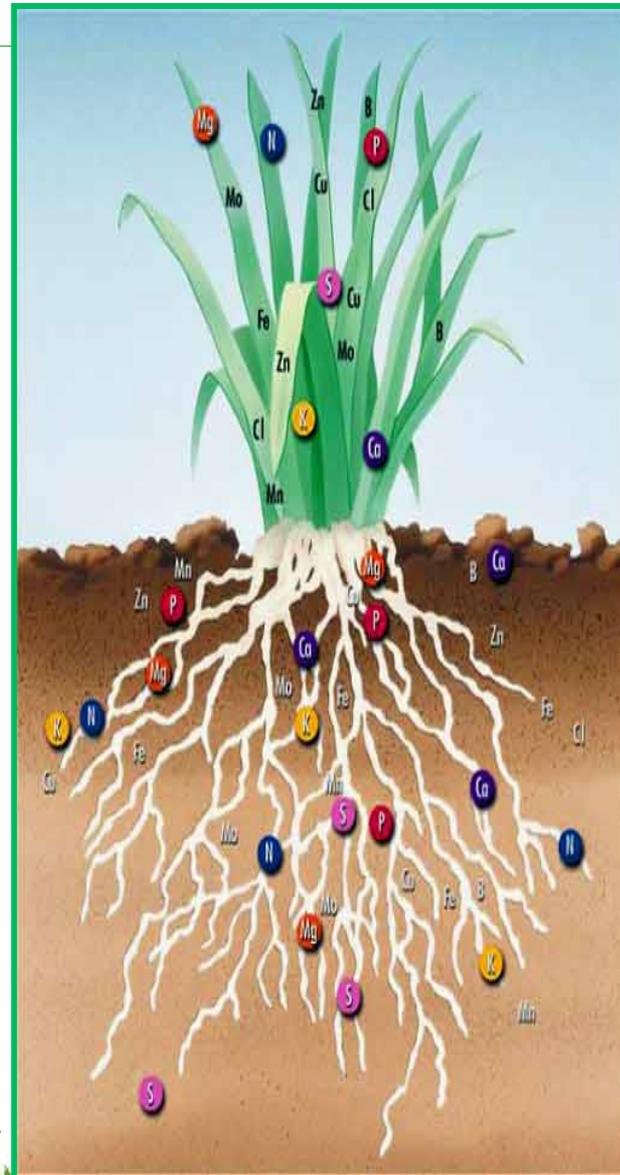


# When is the Nutrient Required?

Nutrients have different functions and are required during different times of the season.

Most common periods for fertilizer applications are:

- After bud break
- After fruit set
- After harvest
- Foliar applications through the growing season





# When is the Nutrient Required?

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- Macro elements (N, P, K, Ca, Mg) should be applied to the soil for uptake by roots
- Micro elements (B, Zn, Mn, Fe, etc.) are required in small amounts and can be applied through foliar sprays
- Applications of macro elements should be during periods of active root growth
  - After bud break
  - After harvest
- Applications must be done with irrigation to ensure infiltration to the root zone



# All Nutrients are not Created Equal

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## **The Nutrients we Really Care About:**

- Nitrogen
- Potassium
- Magnesium
- Boron
- Calcium
- Zinc

## **The Nutrients we Somewhat Care About:**

- Phosphorus
- Iron
- Manganese
- Molybdenum



# Grapevine Nutrition Assessment

**Visual** - Abnormalities of the plant – trunk, stems, leaves, fruit.

***Phosphorus***



***Potassium***



***Nitrogen***





# Grapevine Nutrition Assessment

**Soil Test** - Reflects the nutrient content present in the soil but not necessarily available to the plant.

- Normally done before planting.
- Not normally done after planting unless visual symptoms indicate a problem.

## SOIL ANALYSIS REPORT

Analytical Method(s):  
Mehlich 3

Date Received: 09/ /2010

Date Of Analysis: 09/ /2010

Date Of Report: 09/ /2010

Sample ID Field ID	Lab Number	Organic Matter			Phosphorus				Potassium		Magnesium		Calcium		Sodium		pH		Acidity		C.E.C			
		%	Rate	ENR lbs/A	McNich 3 ppm	Reserve Rate	ppm	Rate	ppm	Rate	ppm	Rate	ppm	Rate	ppm	Rate	ppm	Rate	Soil pH	Buffer Index	H meq/100g	meq/100g		
TOP		1.7	L	54	36	M			208	H	149	M	866	L				4.7	6.32	6.1	12.2			
Sample ID Field ID	Percent Base Saturation					Nitrate		Sulfur		Zinc		Manganese		Iron		Copper		Boron		Soluble Salts		Chloride		Aluminum
	K %	Mg %	Ca %	Na %	H %	NO <sub>3</sub> N ppm	Rate	S ppm	Rate	Zn ppm	Rate	Mn ppm	Rate	Fe ppm	Rate	Cu ppm	Rate	B ppm	Rate	SS ms/cm	Rate	Cl ppm	Rate	Al ppm
TOP	4.4	10.2	35.5		50.0			26	H	1.9	L	45	H	228	VH	5.0	VH	0.4	L					1261
																								807



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# NUTRIENTS WE CARE ABOUT



# Primary

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## Nitrogen (N)

Essential to fruit development. Helps improve leaf quality so the grapevine can better convert sunlight into nutrients.

## Phosphorous (P)

Helps roots grow deep and strong and ensures the grapes will develop sufficient sugars to be sweet and succulent when ripe.

## Potassium (K)

Works to build a healthy vine, helping it resist disease. Also helps the vine grow higher-quality grapes.

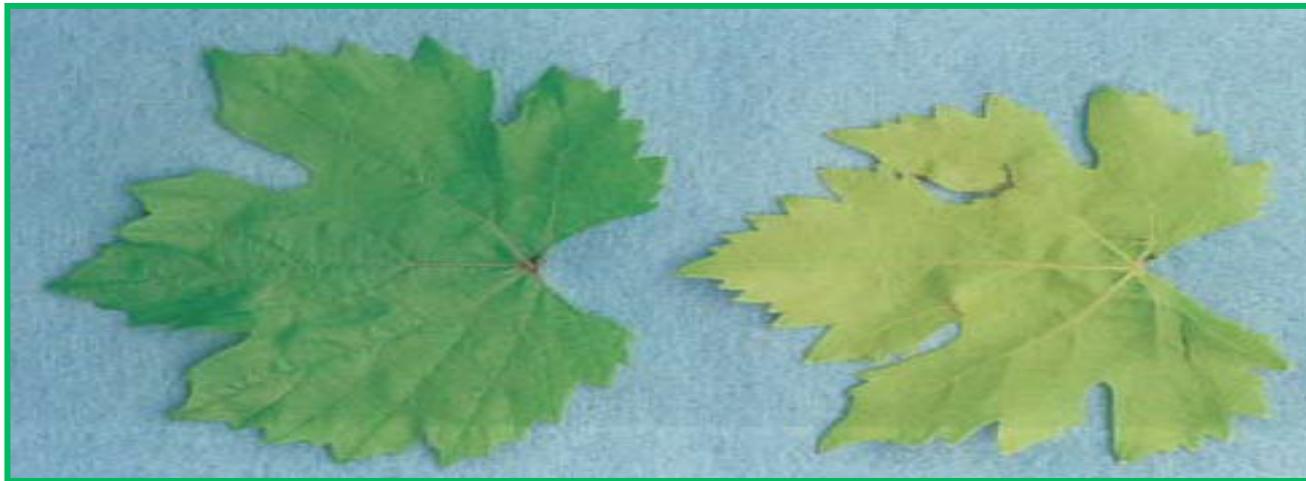


# Nitrogen

Too little – pale green color, weak canopy growth, lower yields.

*Good Leaf*

*Bad Leaf*

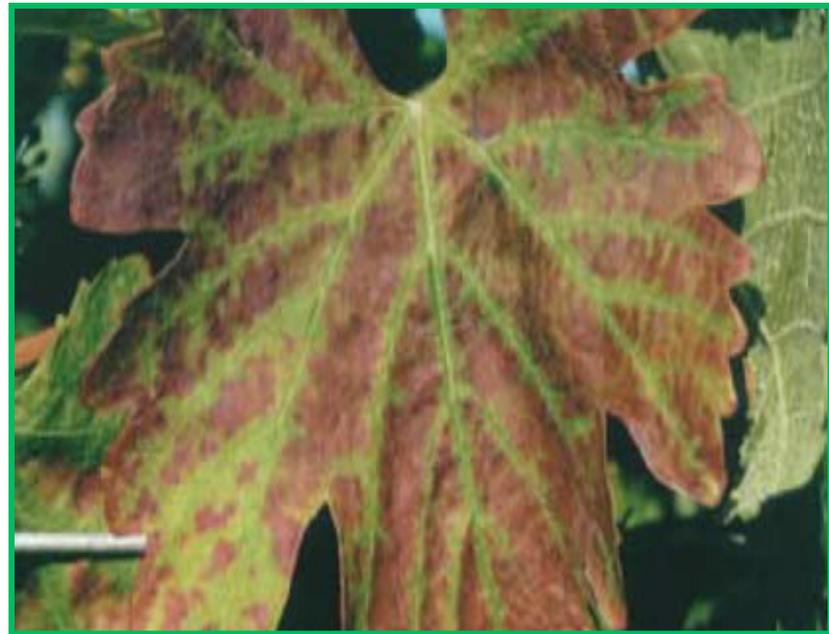


Too much – excessive vigor, fruit shatter, delayed fruit maturity.



# Phosphorus

Deficiency: rare in Napa. Usually found in soils with very low or very high pH or originated from volcanic ash.





# Potassium

Deficiency: usually found when grapevines have been heavily cropped. Shallow, poorly drained soil and water stress contribute.





# Boron

- Essential for plant growth and development.
- Small window between deficiency and toxicity.
- Only a small amount is needed (.4 ppm to 1.0 ppm is toxic).
- Deficiencies occur usually in early spring drought or later in the season with a soil deficiency.
- Toxicities can occur in Napa as we have high levels in soil & water.

## Deficiency



## Toxicity





# Calcium

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- Important in organs (shoots, leaves, roots), especially leaves
- Constituent in cell membranes, permeability of cell membranes
- Important for survival during dormant period
- Strength of berry skins



# Zinc

- Essential for plant protein synthesis, the production of some plant hormones and in pollination and fruit set.
- Deficiency causes distortion of leaves as well as interveinal chlorosis.





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# FERTILIZATION



# Fertilization Guidelines

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- Before applying an ounce of fertilizer STOP and ask “why am I doing this?”
- There is no recipe for nutrition management.
- Low to moderate fertility can improve wine quality.
- Multiple applications are better than a single large one.
- Soil treatments are usually more durable than foliar.
- Foliar feed micronutrients and soil treat the macronutrients
- Most fertilizers, soil and foliar, are best applied between fruit set and veraison, with the exception of Boron and Zinc.
- Don't pollute. Manage nutrients as you would pesticide.



# Fertilization Calendar

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## December, January & February

- Apply boron spray to soil beneath vines if petiole analysis indicates need.
- Apply zinc sulfate to vine cuts if there are indications of need.

## March, April & May

- Mow cover crops
- Apply pre-bloom zinc and boron foliar spray. Usually mixed with wettable sulfur.
- Send petiole samples to laboratory for tissue analysis.

## June, July & August

- Apply potassium sulfate, if petiole test shows need.
- Apply organic fertilizer or compost directly beneath drip emitters after bloom.



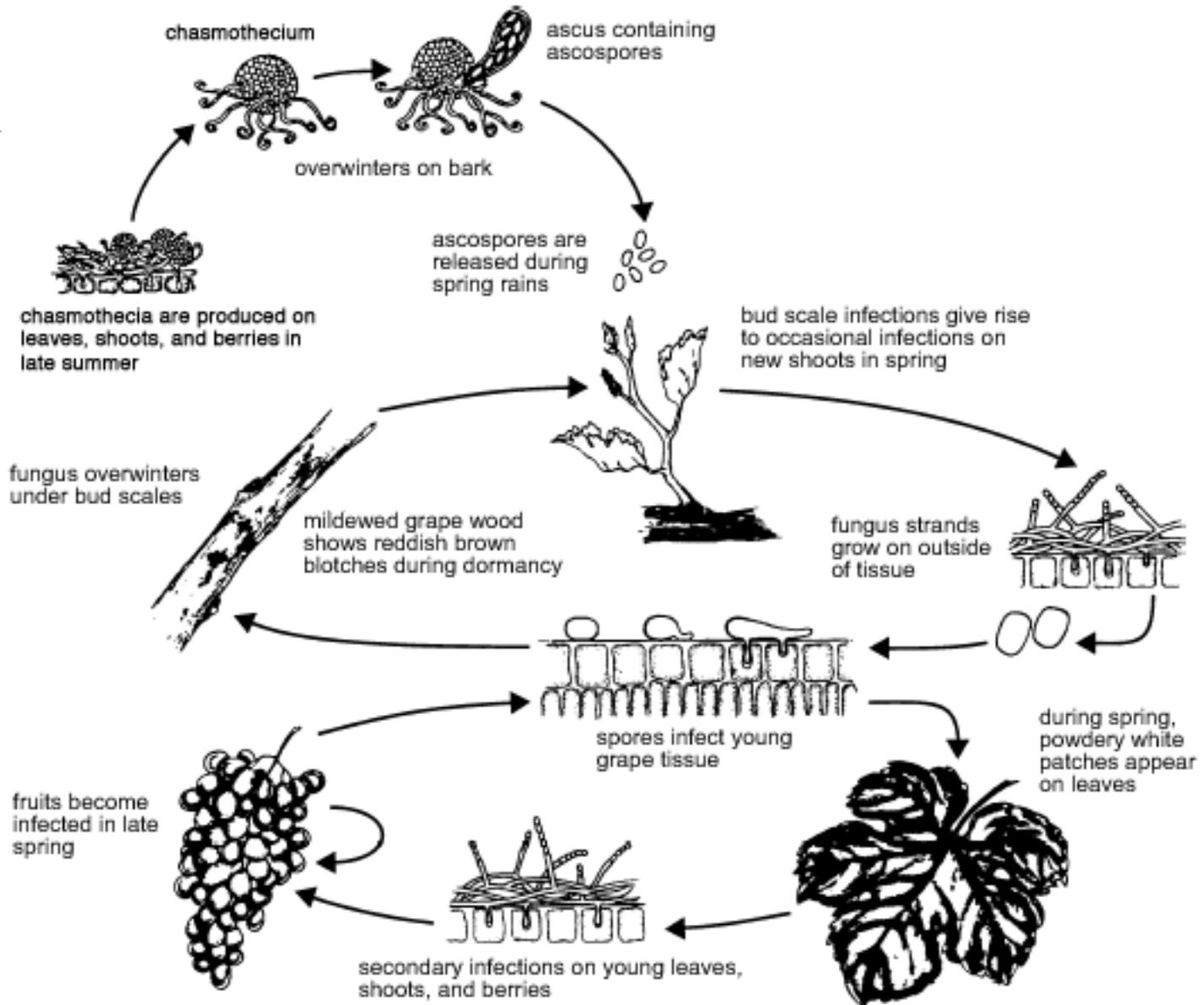
# Integrated Pest Management

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## Powdery Mildew

*Uncinula necator*

POWDERY MILDEW DISEASE CYCLE



# Initial Infection



UC Statewide IPM Project  
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# Powdery Mildew



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# Heavy Mildew Infection



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# Powdery Mildew



Figure 21.8 Scarring on canes resulting from shoot infection



# Management

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## FUNGICIDES

- Sulfur – actually a protectant, won't kill an active infection but prevents new infection.
- Oils – kills fungal colonies (includes horticultural oils (i.e.: Saf-T-Side Spray Oil, Neem oil, Jojoba oil etc.)
- Synthetic Fungicides
- Other – biologicals, etc. (i.e.: Serenade)

## CULTURAL PRACTICES

- Adequate trellis system/training
- Shoot thinning/leaf removal
- Appropriate hedging



# When Do You Spray?

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## Commercial/Sophisticated Approach:

- UC Davis Powdery Mildew Risk Index Model
- Weather Station

## Small Home Vineyard Empirical Approach:

- Start spraying at bud break/continue approx. every 2 weeks until grapes get to 12 Brix. Vary interval by temp/humidity.

# Spray Residue/Damage





# Integrated Pest Management

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# Integrated Pest Management (IPM)

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- Prevention
  - Correct plant in correct place
  - Maintain tree & garden health (correct watering, fertilization, pruning, and sanitation; balanced eco-system)
- Minimize and Target Intervention

# Vine Mealybug



UC Statewide IPM Program  
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Vine mealybug, *Planococcus ficus*, honeydew and white wax on infested grapevine after mechanical harvest. *Photo by Larry L. Strand.*

# Grape mealybug



# Grape, Obscure, and Vine Mealybug



Figure II. Reddish orange fluid excreted by grape mealybug (photo: JKC).



Figure III. Clear fluid excreted by obscure mealybug (photo: Kent M. Daane).



Figure IV. Vine mealybug colony in the axils of the petiole and cane (photo: Mark Battany).

# Leafroll



# Redblotch



# Sharpshooters



# Sharpshooters



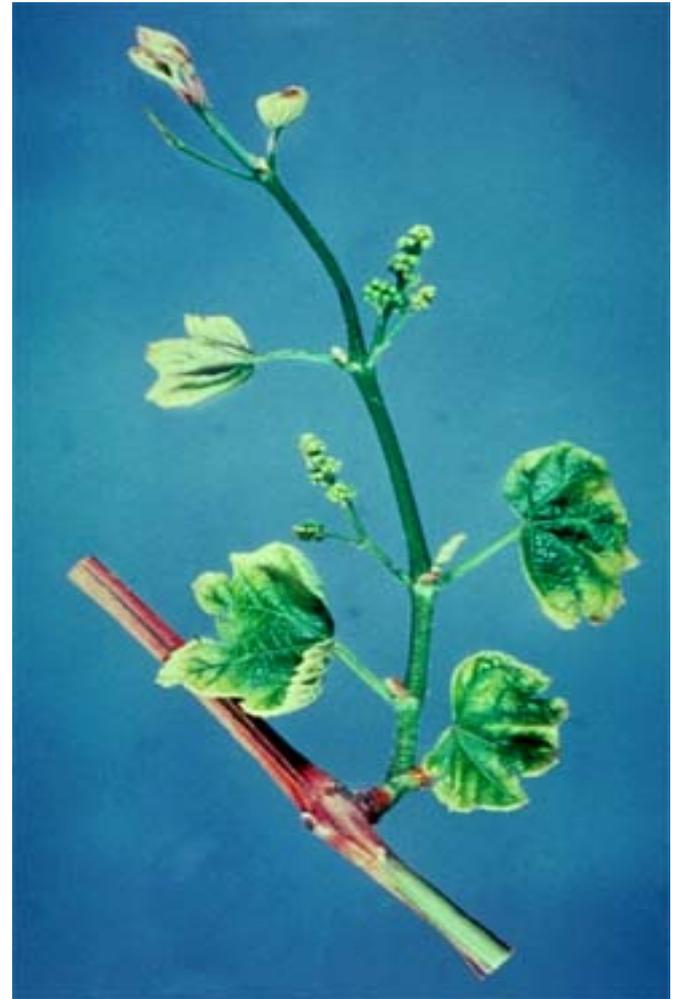
# Pierce's disease



# Mites



# Eutypa





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# Vertebrate pests



# Vertebrate pests

- Birds
  - COVER THE AREA



# Vertebrate pests

- **MANAGEMENT**
  - Protective Netting
  - Frightening Devices
  - Shooting
  - Trapping
  - Repellents



# Vertebrate pests

- Deer Proof the area  
Chicken Wire on Ground



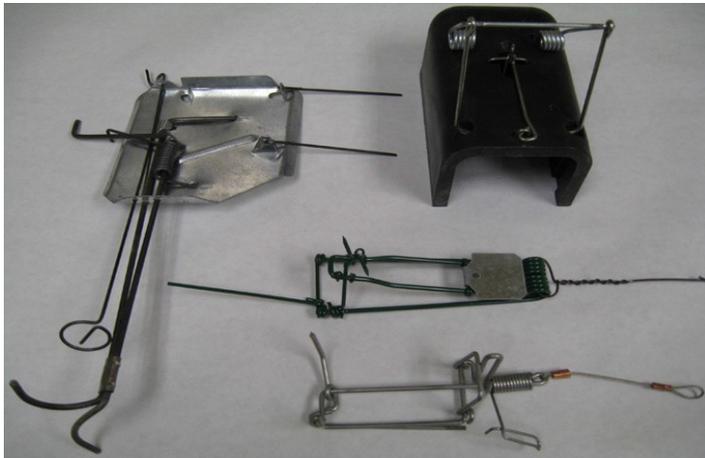
# Gophers



Adult pocket gopher, Thomomys species.



Top view of a pocket gopher mound



Types and brands of gopher traps include (clockwise from upper right) Victor Black Box, Macabee, Go-phinator, and Cinch.



Top view of a mole mound.

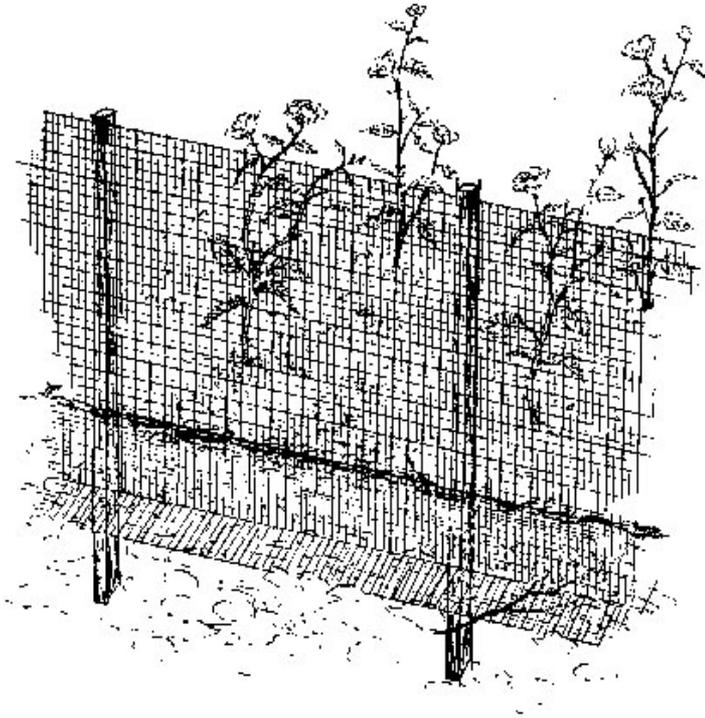


# Vertebrate Pests - Rabbits

- Jack
  - Prefer open to semi open
  - Areas
  - 3 – 7 pounds
  - Long black-tipped ears
  - Breed – Jan – August
    - 2 – 3 /litter
    - 5 litters/year
- Cottontail
  - Prefer dense cover, bushy
  - areas
  - 1 ½ - 3 pounds
  - Rounded shape
  - Breed – Dec – June
    - 3 – 4 /litter
    - 6 litters/year



# Vertebrate pests



- Rabbit Management
  - Rabbit Resistant Plants
  - Exclusion
    - Fencing
    - Trunk Guards



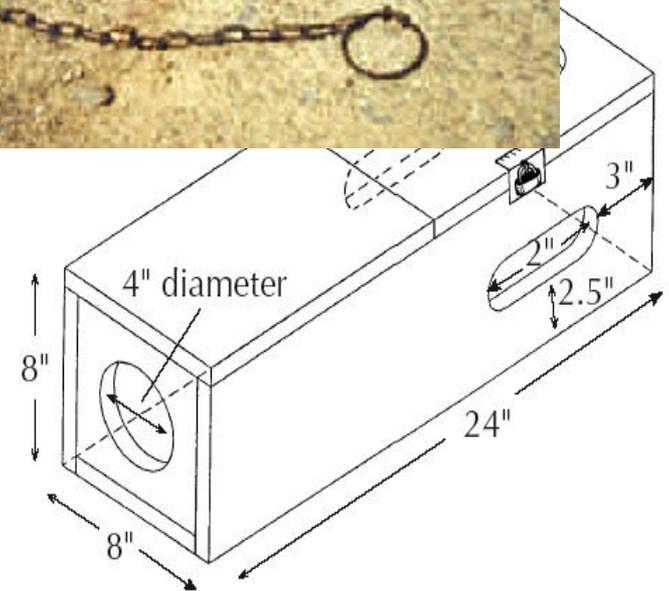
# Vertebrate pests

- Rabbit Management
  - Trapping (cottontails)
    - Box plus conibear trap



- Rabbit Repellents

- Chemical with unpleasant taste
- Application before damage
  - Reapply often
  - Not for plants intended for human consumption



# VOLE





# VOLE DAMAGE- girdled trunk





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# Lunch





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# In the Vineyard Pruning Exercise





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# Crop Levels





# Over cropping

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- *Over cropping = having too much fruit on the vine to ripen*
- *Balance of the canopy to the fruit enough canopy for photosynthesis to ripen the fruit*
- *Too much vegetation can result in undesirable flavors in the wine.*

# Crop Thinning

- In June after berry set, remove bunches over two per cane.
- If there is shatter or poor set, leave 3 bunches per cane.
- If the crop is especially heavy or the variety produces large bunches, the bunch arm can also be removed.



# Crop Levels and Thinning

## BUNCH THINNING

- After veraison (coloring) review crop loads



# Crop Levels and Thinning

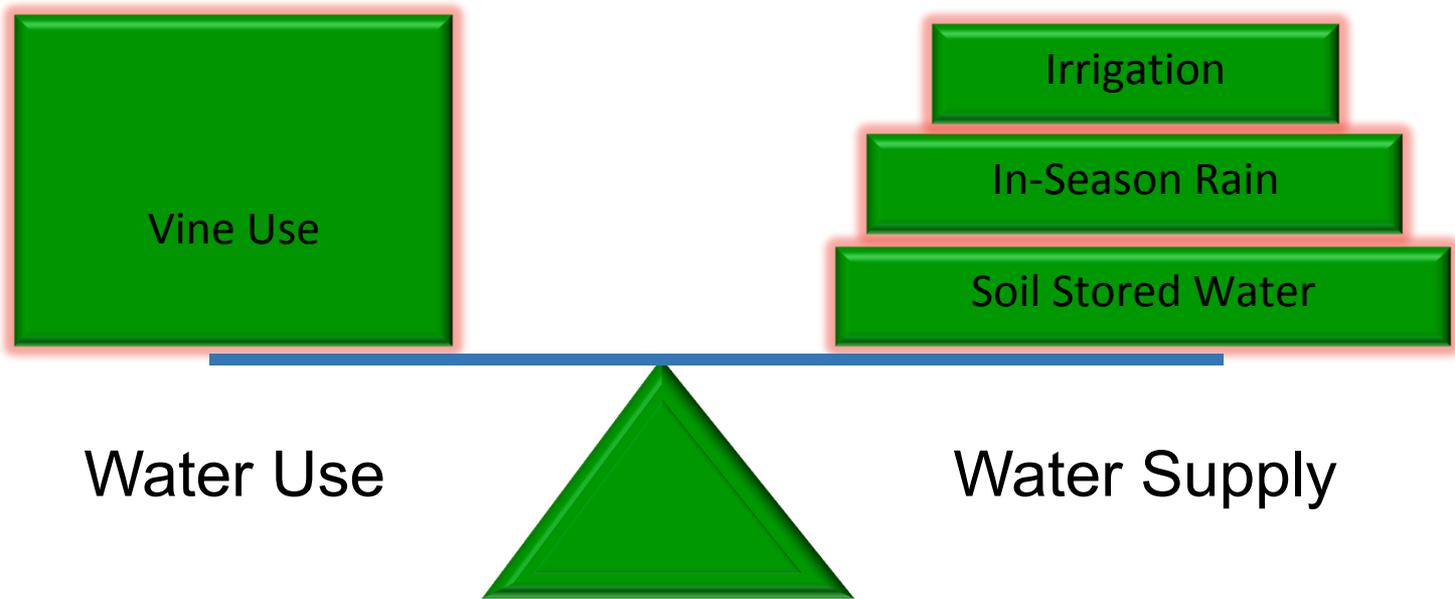




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# Irrigation Scheduling and Maintenance

# When and How Much





# Vine Water Use

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- *Transpiration* = water loss by plants through their stomata.
- *Evaporation* = Water loss from the leaf surface
- *Evapotranspiration* relates to the rate of water use. It includes the evaporation of water from the soil surface and the movement of water from the soil through the plant and out through the leaves.
- Vines are drought resistant plants. Water only when necessary.
- The best thing is to know your plants: make visual assessments



# When to begin

**During rapid shoot growth**

**Visual Assessments**

**Growing Season**

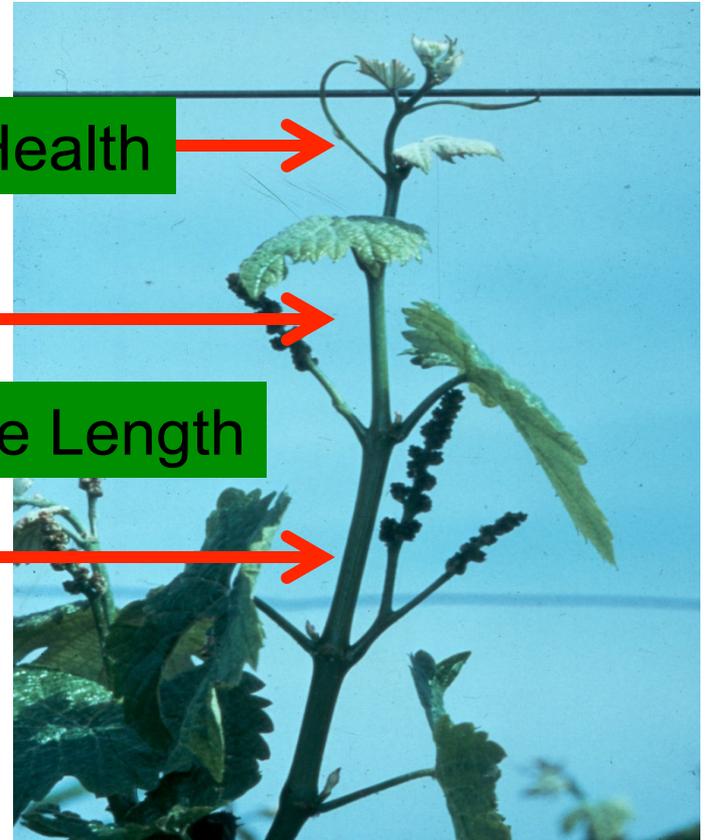
**Shoot Length influenced  
by water deficits**

**Shoot tip condition**

**Test Soil Moisture**

**Tendrils Health**

**Internode Length**





# How Much

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## Know your microclimate

- Each vineyard can be very different in location (climate), soil-water capacity, vigor and trellis design.

## Production Goals

- Variety and wine program to which the fruit is destined.



# Know your soil

## Soil Texture affects water-storage capacity

### Textures

### Holding Capacity

### Irrigation Needs

Sandy

Less

**More**

Loamy

Clayey

**More**

Less



# How Much

## New Vines – First Year

<u>Soil Type</u>	<u>First Six Weeks</u>	<u>Second Six Weeks</u>	<u>Remainder of Season</u>
Sandy	1.5 Gals/per Day	1.5 Gals/2 <sup>nd</sup> Day	1.5 Gals/3 <sup>rd</sup> Day
Loamy	1 Gal/ per Day	1 Gal/2 <sup>nd</sup> Day	1 Gal/3 <sup>rd</sup> Day
Clayey	.75 Gal/per Day	.75 Gal/2 <sup>nd</sup> Day	.75 Gal/3 <sup>rd</sup> Day



# How Much

## New Vines – Second Year

<u>Soil Type</u>	<u>June 1* - Six Weeks</u>	<u>July 15<sup>th</sup> until October</u>
Sandy	1.5 Gals/3 <sup>rd</sup> Day	2.5 Gals/5 <sup>th</sup> Day
Loamy	1 Gal/3 <sup>rd</sup> Day	2 Gal/5 <sup>th</sup> Day
Clayey	.75 Gal/3 <sup>rd</sup> Day	1.5 Gal/5 <sup>th</sup> Day

\* Start time can vary based on rainfall



# When

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## Scheduling

- When we talked about irrigation for this workshop
  - It depends on:
  - the weather
  - the soil
  - the spacing
  - the rootstock....



# When

## Bloom to Veraison

- Irrigate as needed to continue development of canopy
- Active growth slows down approaching veraison

## Veraison to Harvest

- Irrigate to maintain canopy, but not encourage growth
- Too much water can deprive roots of oxygen
- Encourages bunch rot give a vegetate flavor to the fruit from too much canopy



# Finding Balance

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Excessive shoot growth recognized by:

- Large leaves
- Long internodes
- Excessive lateral shoot growth

But – watch weather conditions, dig to determine moisture soil levels

- Don't Overly Stress vines –Shriveling and yield reduction
- Consider watering to “hang” the fruit until harvest ripeness



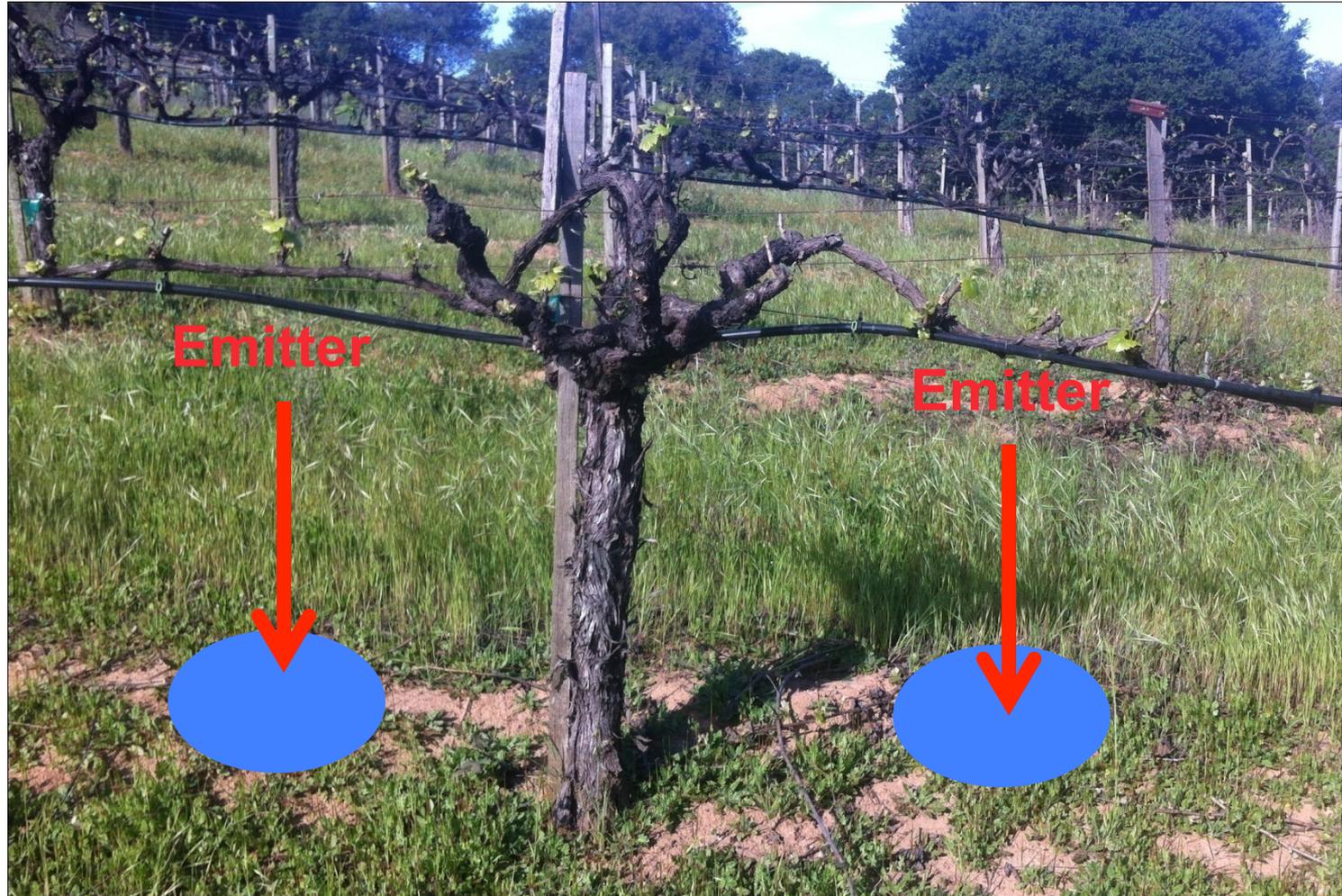
# Post Harvest

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- Irrigate to maintain the foliage for carbohydrate accumulation during the fall.
- 4-8 hours. Drip irrigation
- DO NOT water when plants are dormant



# Where - Established Vine



# Where - Young Vine

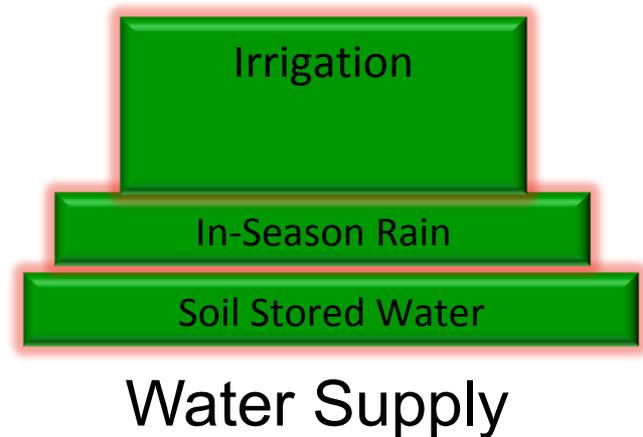


Do not stress new vines



# Drought & Dry Farming

- We may need to start prior to bloom
- Check soil moisture levels now
- May need to adjust crop load to available water
- Dry Farming assumes rain!
- Dry farming is typically implemented over a number of years after vines are established





# SMALL HOME VINEYARD WORKSHOP

Thank you for your time!

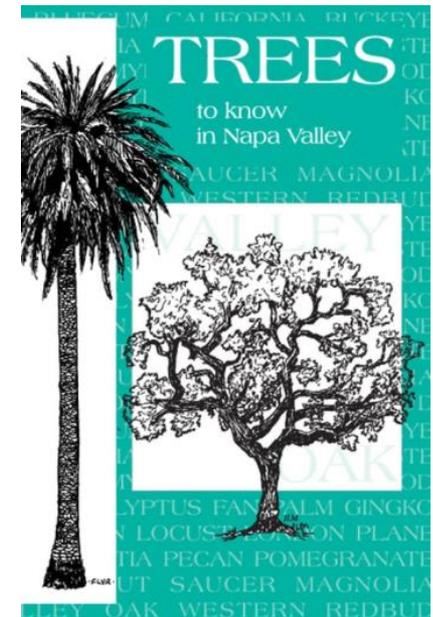
Our Next Workshop: August 11th

**Plant Sale – April 14th**

**UC Master  
Gardeners of Napa  
County**



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**On Sale Now**

A poster for a "TOMATO PLANT SALE". It features two tomatoes, one yellow and one red, in the center. The text includes "Locally Grown" on the left and "25+ Varieties" on the right. At the bottom, it says "1710 Soscol Ave - 9AM 'til Sold Out", "Next to Central Valley Hardware", "Saturday, April 14th", and "Info: NapaMG.org". There is a QR code on the left and the UC Master Gardeners Napa County logo on the right.

**TOMATO PLANT  
SALE**

Locally Grown      25+ Varieties

1710 Soscol Ave - 9AM 'til Sold Out  
Next to Central Valley Hardware  
**Saturday, April 14<sup>th</sup>**  
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Please complete our course evaluation