

# Viticulture 2

## Synthesis Spring term 04

*Jessica Cortell presentation on Within  
Vineyard Variability ALS Room-12 at 12 noon*

Anne Connelly  
OSU Viticulture Extension  
Department of Horticulture  
Oregon State University  
Corvallis, Oregon  
***wine.oregonstate.edu***

# Synthesis of Vit-2 spring term

- § Vine microclimate
- § Vine nutrient dynamics
- § Vine water relations
- § Ground management
- § Vineyard diseases and pests
  
- § Field trips- evaluate sites, production practices, and potential improvements

# Microclimate and wine quality

as reviewed by Smart and Robinson, 1998

## § Shade (*post establishment*) causes:

- Decreased brix
- Decreased anthocyanin and phenols (reds)
- Decreased TA
- Decreased Monoterpene flavor compounds
- Decreased varietal character (aroma and flavor)
- Increased pH
- Increased malic acid
- Increased 'herbaceous' character
- Increased incidence of Botrytis (leads to premature aging)

*Jessica Cortell (grad student in FST)- is looking at vine vigor and wine quality in the context of within block variability- see second presentation June 1, 2004*

# Canopy management and vine microclimate

- § Vine microclimate affected by canopy management
- § Considerations when *matching* site (soil), plant material (rootstock), and trellis system (single vs. divided canopies) to production goals (E.g. tons /acre)

# Differences in climate measurements from outside to inside dense canopies

*Carmo Vasconcelos covered in 2<sup>nd</sup> session Spring 04*

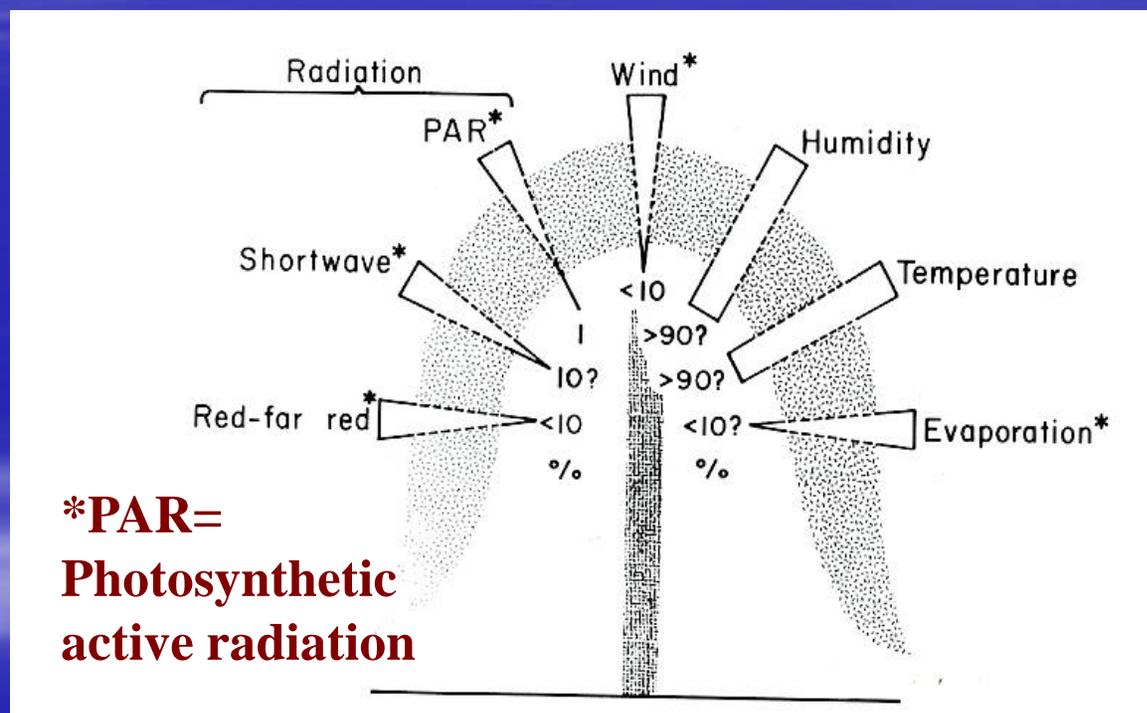
## PAR

Above canopy:

$2000 \mu\text{E m}^{-2} \text{s}^{-1}$

Center canopy:

$10 \mu\text{E m}^{-2} \text{s}^{-1}$



Smart & Robinson 1991

# How do we manage the vine canopy (microclimate)?

- § Trellis system (single vs. divided canopy)
- § Winter pruning (balance pruning)
- § Shoot thinning (spring)
- § Summer pruning (hedging shoot tips)
- § Shoot positioning (maximize sun exposure)
- § Leaf removal (in fruit zone)
- § Crop removal (reduce tons and reduce crowding fruit)
- § Management of vine vigor through farming  
(ground management, vine nutrition, and water use)

## Vertical Shoot Position (VSP) after shoot thinning secondaries & catch wires moved to first position



- Shoot spacing-good
- Shoot length-good
- Good light-flower initiation of buds for next year

# Matching site (soil) to wine grape plant material to optimize canopy microclimate

- § Consider production goals
  - What is the desired wine program?
    - Table wine vs. Reserve wine
- § Deeper soils and/or vigorous rootstocks may need a divided canopy (larger plant spacing) to achieve optimum vine microclimate conditions
- § Shallow soils and/or devigorous rootstocks can be planted closer with a single Vs. divided canopy (E.g. VSP Vs. Scott Henry)

# Vine nutrient dynamics

## § Nutrient functions (Macros)

- N Important for YANC (>150ppm)
- P is mobile in the plant but immobile in the soil
- Calcium, limiting, ratio to Mg & K

## § Micronutrients (<1000ppm)

Boron, common application for replacement is 1# B/ acre divided over 3 to 5 sprays

## § Effect of pH on nutrient uptake

## § Water plays an important role

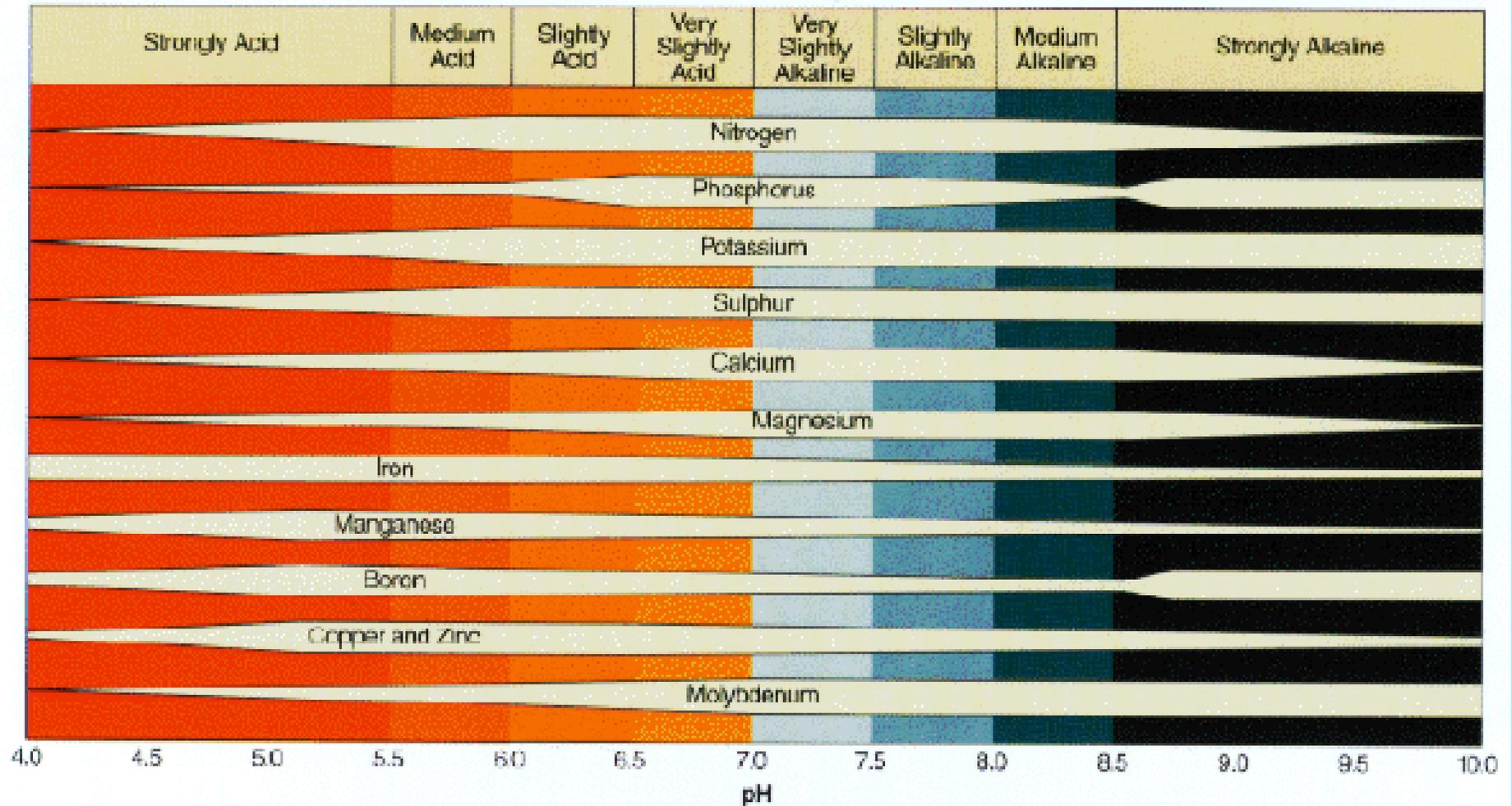
# The elements

Element	Symbol	Quantity	Ionic forms	Soil Mobility	Plant Mobility
<b>Macronutrients</b>		% dry weight			
Carbon	C	45.0%			
Oxygen	O	45.0%			
Hydrogen	H	6.0%			
Nitrogen	N	2.0-5.0 %	NH <sub>4</sub> <sup>+</sup>	Immobile	Immobile
			NO <sub>3</sub> <sup>-</sup>	Mobile	Mobile
Potassium	K	1.0%	K <sup>+</sup>	Immobile	Mobile
Calcium	Ca	0.5%	Ca <sup>++</sup>	Immobile	Very immobile
Phosphorus	P	0.2-0.5%	HPO <sub>4</sub> <sup>--</sup>	Very immobile	Mobile
			H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	Very immobile	Mobile
Sulfur	S	0.2-0.5%	SO <sub>4</sub> <sup>--</sup>	Mobile	Slightly Mobile
Magnesium	Mg	0.2%	Mg <sup>++</sup>	Immobile	Mobile
<b>Micronutrients</b>		ppm			
Chlorine	Cl	100	Cl <sup>-</sup>	Mobile	Mobile
Iron	Fe	100	Fe <sup>++</sup>	Very immobile	Immobile
			Fe <sup>+++</sup>	Very immobile	Immobile
Manganese	Mn	50	Mn <sup>++</sup>	Very immobile	Immobile
Zinc	Zn	20	Zn <sup>++</sup>	Very immobile	Immobile
Boron	B	20	H <sub>3</sub> BO <sub>3</sub>	Mobile	Very immobile
Copper	Cu	6	Cu <sup>++</sup>	Very immobile	Immobile
Molybdenum	Mo	0.1	MoO <sub>4</sub> <sup>--</sup>	Very immobile	Immobile
Nickel	Ni	?	Ni <sup>++</sup>		
<b>Others</b>					
Sodium	Na		Na <sup>+</sup>	Mobile	Mobile
Silicon	Si		H <sub>4</sub> SiO <sub>4</sub>		
Aluminum	Al		Al <sup>+++</sup>		

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# Effect of pH on nutrient uptake (in soils)

How Soil pH Affects Availability of Plant Nutrients



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# Sources of information on Oregon wine grape nutrition

**Oregon Viticulture, edited by: Ed Hellman**

**Website to order: [oregonwinegrowers.org](http://oregonwinegrowers.org)**

**Chapter 18 by: Alan Campbell & Daniel Fey**

**Website for: [WWW.LIVEinc.org](http://WWW.LIVEinc.org)**

**Website: [berrygrape.orst.edu](http://berrygrape.orst.edu)**

**(May 2002 Viticulture newsletter)**

**Website: [wine.oregonstate.edu](http://wine.oregonstate.edu)**

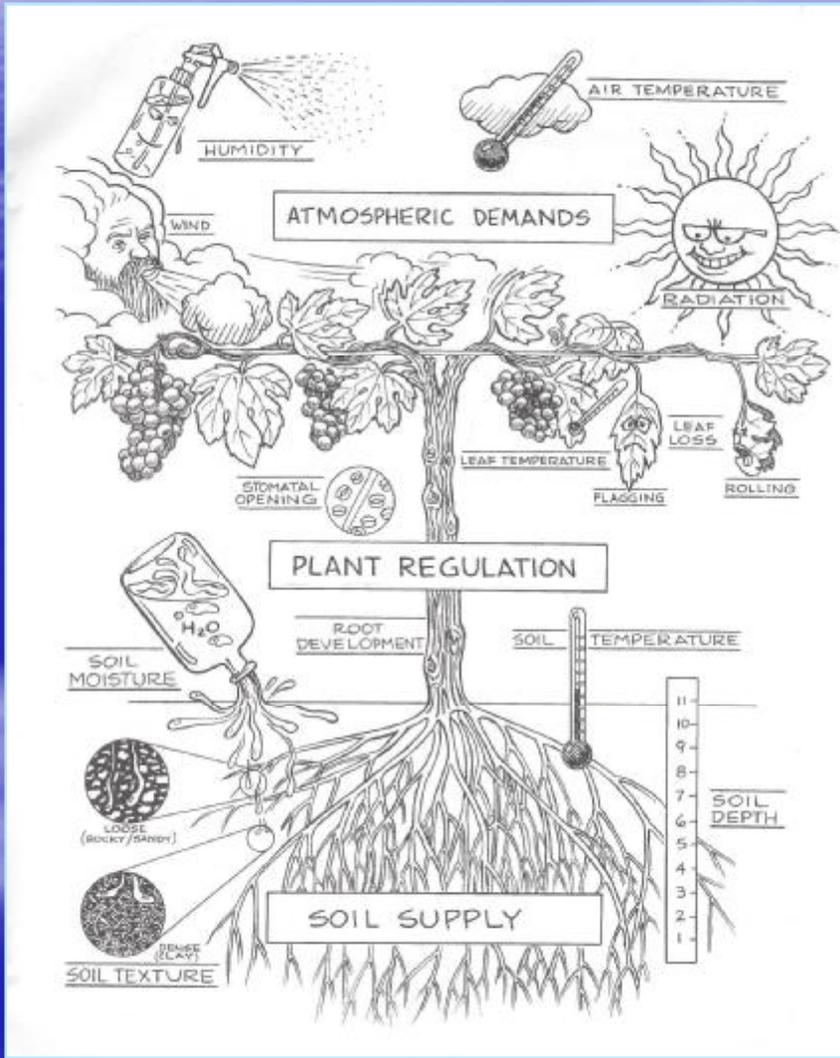
**Websites for: Tilth, OMRI, and IOBC**

**OSU Grape Day March 4th 2004 2-5pm Peter Christensen**

# Vine water relations

- § Timing and amount of drip irrigation will affect wine quality
  - Methods to calculate applications
    - § ET (weather stations)
    - § Soil moisture probes
    - § Plant response to soil moisture- pressure chamber
- § Wine grape research on RDI and PRD
  - Australia, California, Eastern Washington, & else where
  - Long term results of RDI and PRD still being researched

# Grape vines and their relationship to environment



Pressure chamber takes into account atmosphere

Water & nutrition interaction

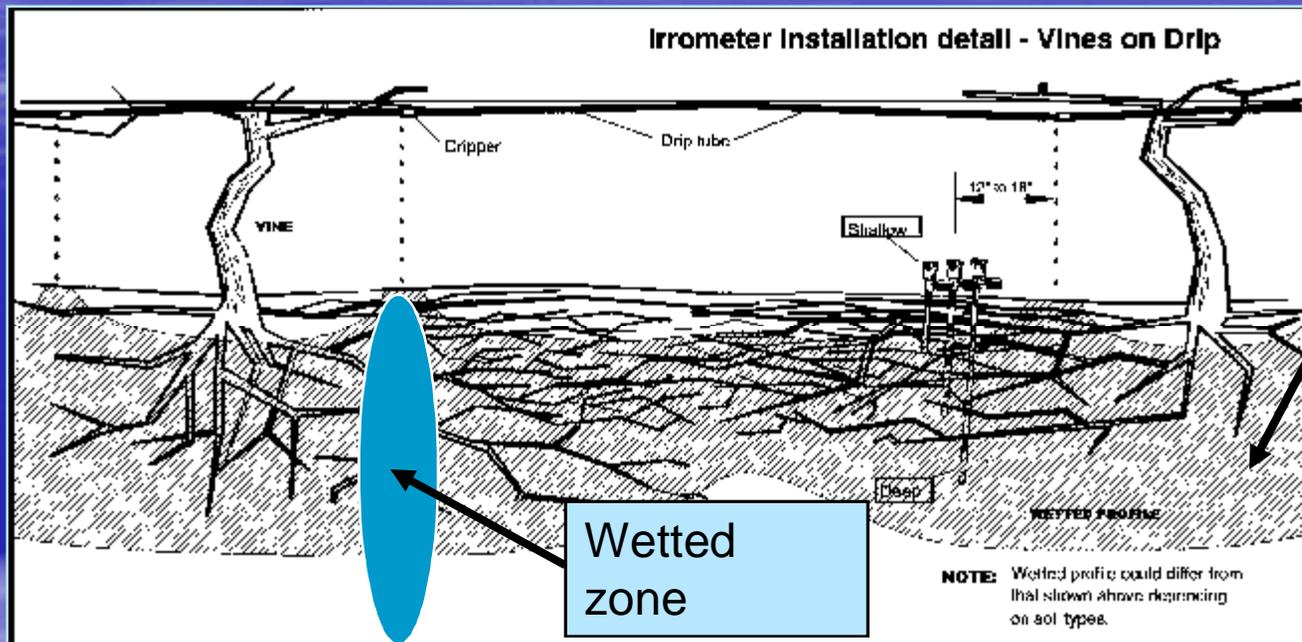
Scion / Rootstock

Soil texture, depth & water holding capacity

Roll of soil biology

Thanks to PMS Corvallis OR for graphics

# Position of soil moisture probes important in drip irrigated vineyards in Oregon



Wetted Zone NOT LIKE SHOWN HERE!

Wetted zone

Wetted zone can be widened via pulse irrigation – *Class discussion*

**Ground management in Oregon vineyards has become increasingly important since 1998 due to summer draught conditions**



Aerial photo by: John Luna

**Every other row mowing or cultivation in early to mid spring has become common practice**

**Integrated Production (IP) practices in Europe encourage cycles of ground management strategies in vineyards**

## Zones of ground management in the vineyard currently represent between-row and in-row



### Management decisions:

#### Between-row:

- 1) perennial cover,
- 2) annual cover crops or
- 3) cultivation or
- 4) combination?

- In-row: 1) herbicide, 2) cultivation, 3) mulch, or 4) burn?

# Vineyard diseases and pests

Number one pest issue for Western Oregon wine grape growers:

1. Grape Powdery Mildew- Fungicide programs are in place for sustainable (LIVE), organic (USDA), and conventional grape growing in W. Oregon

See [wine.oregonstate.edu](http://wine.oregonstate.edu) (Go to 'other links')

## Discussion of secondary pests and control measures

Botrytis or Bunch rot- Control by increasing canopy air flow, and/ or use pesticides at fruit cluster stages, before berries touch during expansion & veraison

Crown gall- Vineyard air and water drainage, clean plant material

Phylloxera- Use grafted plants with resistant/tolerant rootstocks

Other disease complexes-

Young vine decline, Armillaria, Eutypa, Phomopsis, Major & minor viruses, & Other

Other pests-

Nematodes (Know which species!)

Spider mites, Eriophyde mites, & Thrips

# Important references for Oregon

§ 2004 Pest management for wine grapes in Oregon

*See [wine.oregonstate.edu](http://wine.oregonstate.edu) (go to other links)*

§ Strategic use of sulfur in Integrated pest disease management (IPM) programs for grapevines

– Final Report to GWRDC

§ Grape & Wine Research & development Corporation

§ Project No.: DAV 98/1 December 2003

*See [wine.oregonstate.edu](http://wine.oregonstate.edu) (go to IPM for link to document)*

# What's next in the vineyard

## § Bloom

- 110 days from first bloom to harvest (Pinot noir)

- § Depending on year's climate and plant maturity

## § Lag phase

- Mid point during berry development

- § Between cell multiplication and cell enlargement

- § Seed begins to harden when berry is sliced with a fine blade

- § Cluster weights X 2 (approximately) = harvest weights

## § Veraison

- Color change

- § Onset of ripening, advancing 1° Brix every 5 to 7 days

## § Harvest

- 19 to 24° Brix (champagne to table wine, respectively)

- § Acids and pH important for wine stability

- § Disease pressure (*Botrytis*) & *The Birds* (*Alfred Hitchcock*)

- § Weather factors (dehydration, rain & fall frosts)