

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

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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 2nd session Spring 04

PAR

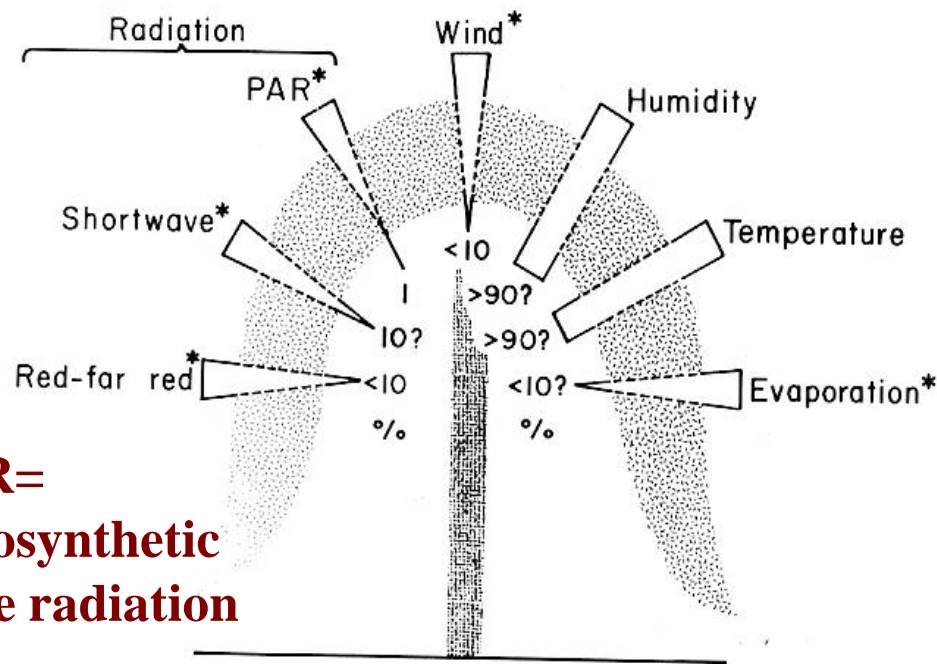
Above canopy:

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

Center canopy:

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

***PAR=**
Photosynthetic
active radiation



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



June

- 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

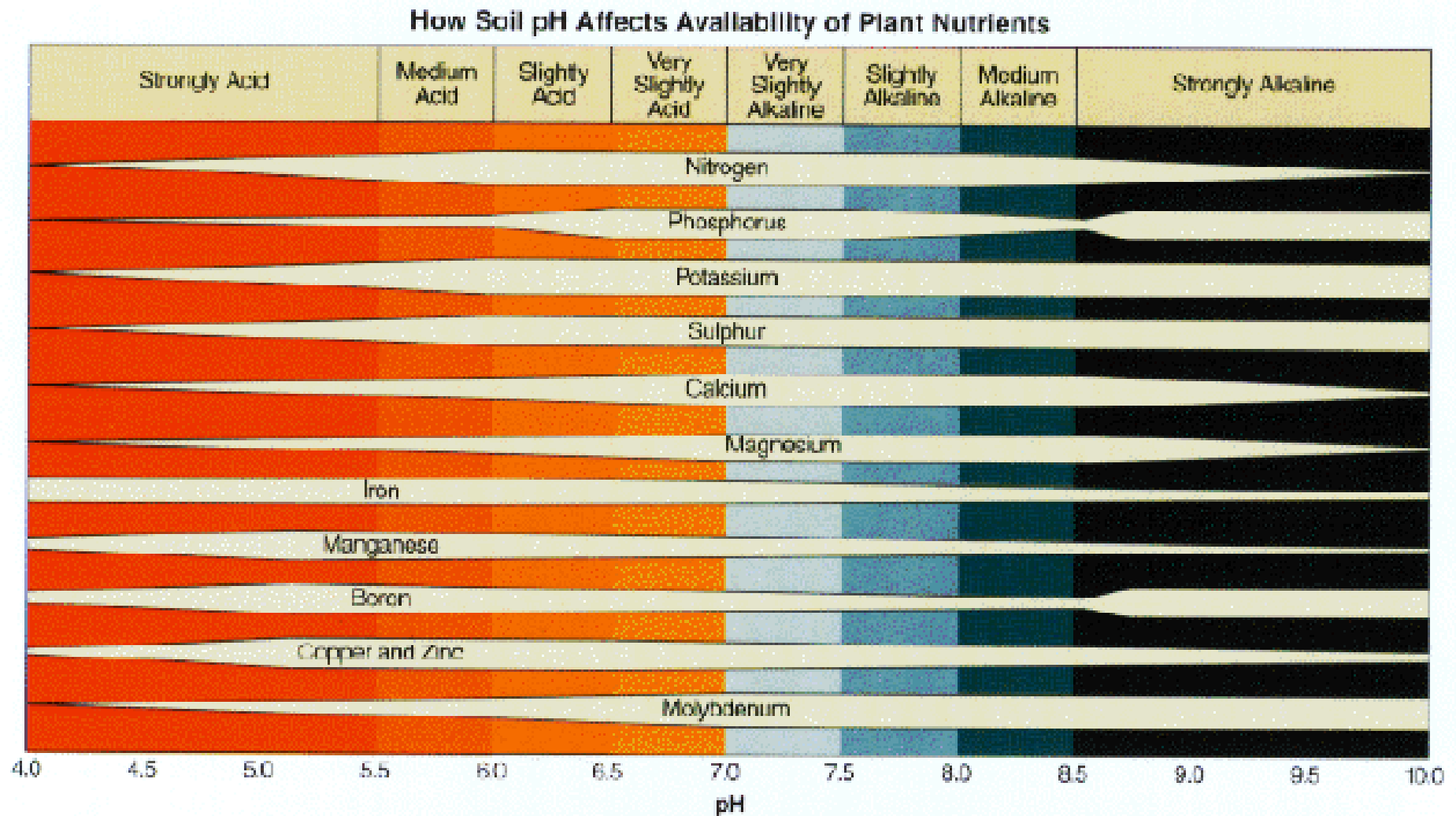
§ Water plays an important role

The elements

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

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Effect of pH on nutrient uptake (in soils)



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Sources of information on Oregon wine grape nutrition

Oregon Viticulture, edited by: Ed Hellman

Website to order: oregonwinegrowers.org

Chapter 18 by: Alan Campbell & Daniel Fey

Website for: WWW.LIVEinc.org

Website: berrygrape.orst.edu

(May 2002 Viticulture newsletter)

Website: wine.oregonstate.edu

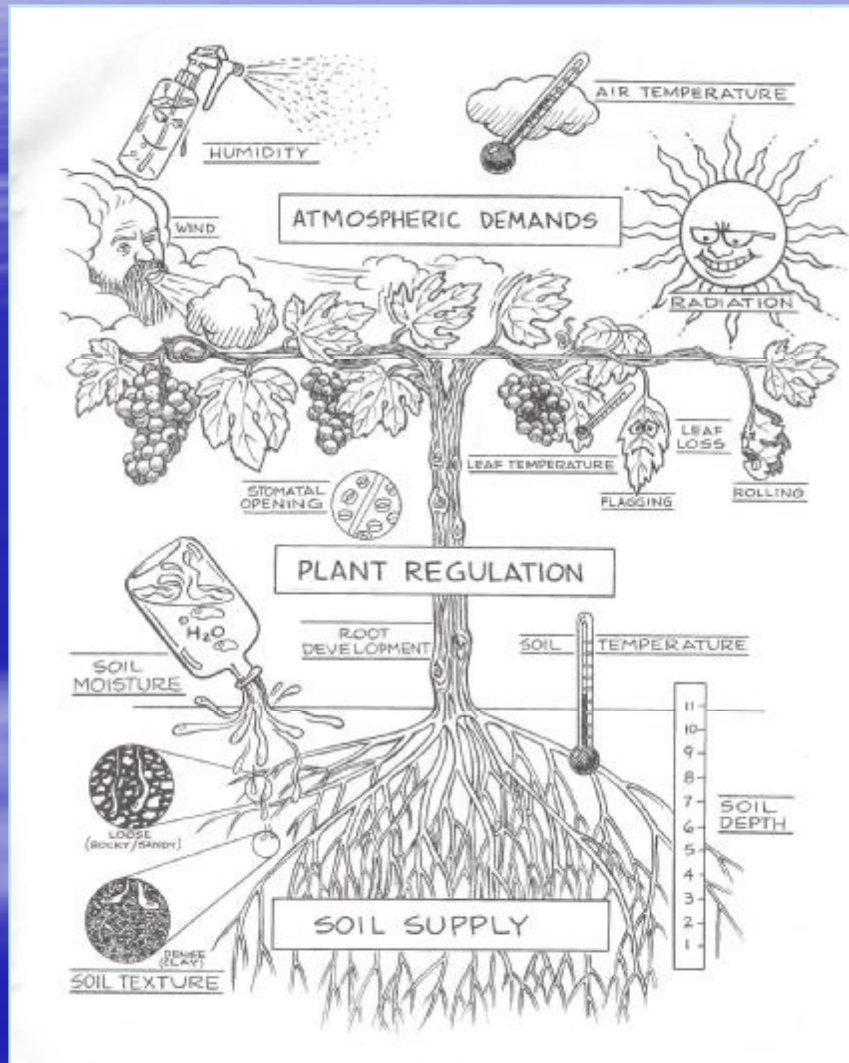
Websites for: Tilth, OMRI, and IOBC

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

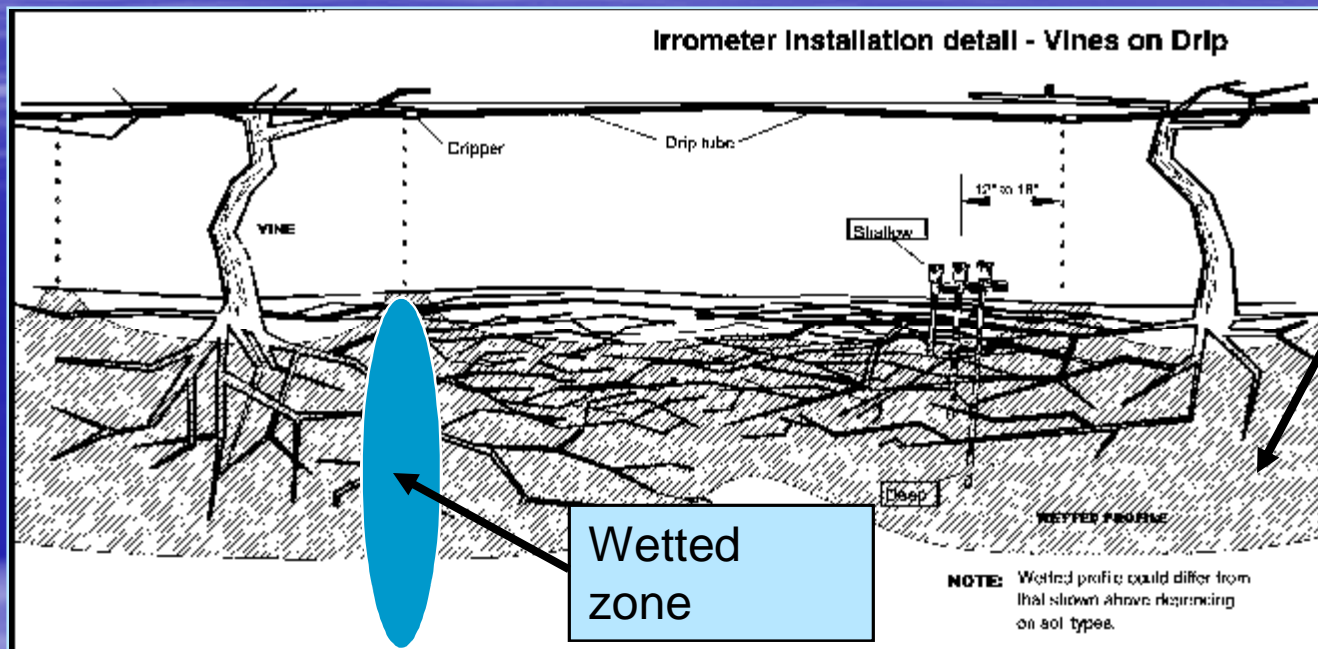
Scion / Rootstock

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 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 (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 (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 (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)