Beginner Grapes

Introduction and the Grape Plant
Teryl Roper, USU Extension

Potential and Challenges of Table Grapes Production in the Intermountain West
Essie Fallahi, University of Idaho Extension

Grape Varieties for Northern Utah
Mike Pace, USU Extension

Suitable Table Grape Varieties for the Inland Pacific Northwest
Essie Fallahi, Univ. of Idaho Extension

Managing Primary Grape Pests
Marion Murray, USU Extension

Introduction and the Grape Plant

Introduction to grapes, including site selection, plant anatomy, basics of cultivation.

Teryl Roper

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Dr. Roper teaches the fruit production course at USU. He was Extension Fruit Crops Specialist at the University of Wisconsin-Madison for 20 years. He earned BS and MS degrees in Botany from Brigham Young University and a PhD in Horticulture from Washington State University. Teryl's academic career focused on the production of fruits in the upper Midwest, including cranberries, apples, and tart cherries. Much of his research included mineral nutrition of perennial fruit crops.

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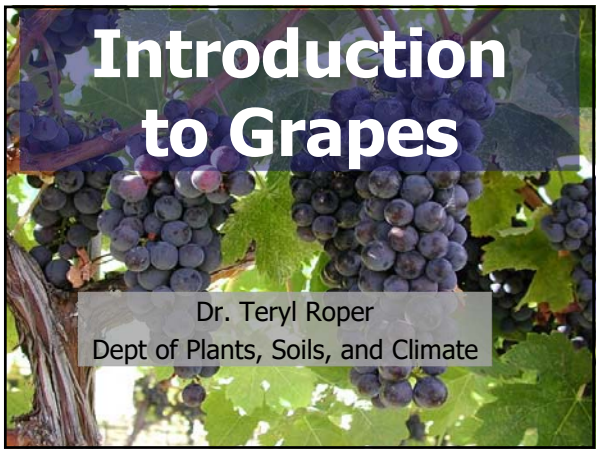


Objectives

- Know the origins of grapes
- Know the commercial species
- Understand the basics of grapevine structure
- Site Selection
- Introduction to culture

Grape Origins

- One of earliest cultivated crops
- Native to:
  - Europe
  - Asia
  - Middle east
  - North America
- Propagated without grafting
- Selected hermaphroditic vines
  - Flowers with both male & female parts (perfect)
- More grapes than any other fruit crop

Grape Family

- Vitaceae
- Latin *Viere* = to attach
  - Structure is a Liana = woody vine, 'clingy'
- About 1000 species
- 17 genera
  - Mostly tropical/subtropical
- 30 species native to North America

Genus: Vitis: 60-80 species

- Euvitis (2n=38 chromosomes)
  - *Vitis vinifera* European wine grapes
  - *Vitis labrusca* American grapes, fox grape
  - French-American hybrids
- Muscadinia (2n = 40 chromosomes)
  - *Muscadinia rotundifolia* Muscadine grapes
- 30 species native to North America

Comparison

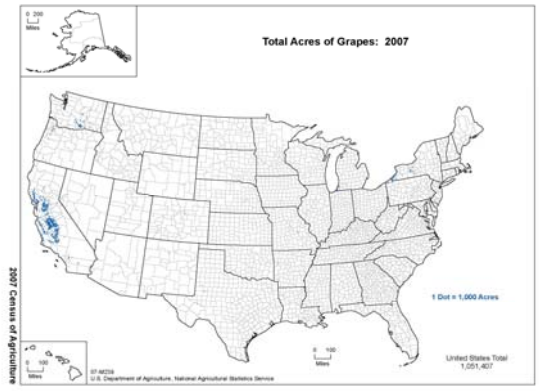
Trait	*Vinifera*	*Labrusca*
Cold hardiness	Tender	More cold hardy
Growth habit	Upright	Trailing
Bark	Light colored	Dark Colored
Slip skin	No	Yes
Fruitfulness	Good	Poor or variable
Fruit quality	Good	Poor
Propagation ease	Good	Variable
Lime tolerance	Good	Variable
Phylloxera resistant	Poor	Good or variable
Disease resistance	Poor	Good or variable

US Production 2015

State	Acres	Production
California	856,000	6,847,000 tons
Washington	70,000	419,000 tons
New York	37,000	145,000 tons
Michigan	13,000	80,600 tons
Pennsylvania	13,000	77,000 tons
Oregon	19,000	65,000 tons

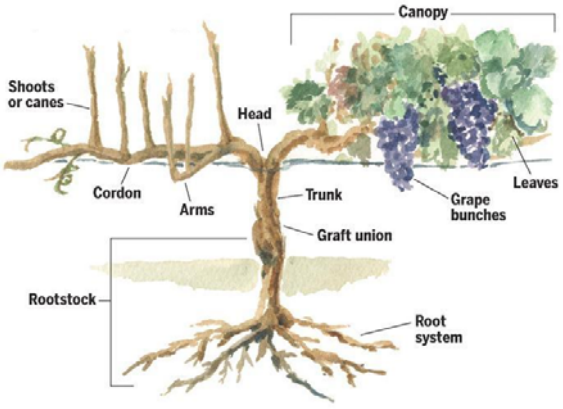
California Grape Industry

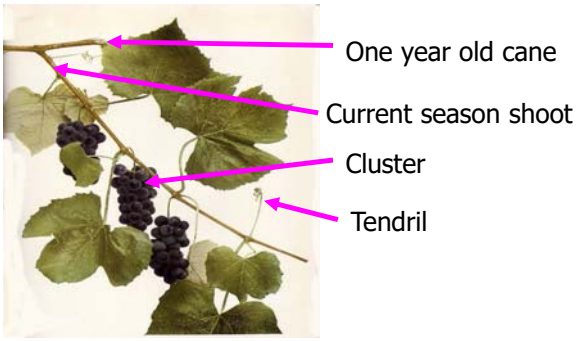
Purpose	Acres	Value (x1000)
Raisin grapes	189,480	701,445
Table grapes	122,973	2,514,076
Unspecified	17,202	99,385
Wine grapes	615,592	3,627,134
Total	945,247	6,942,040



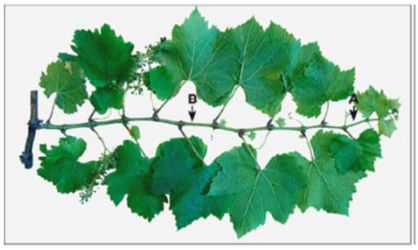
Grape Glossary

Term	Definition
Trunk	The main vertical stem (permanent)
Head	Top of the trunk & short upper arms
Cordon	Horizontal extensions of the trunk, perennial
Cane	A mature woody shoot after leaf-fall
Shoot	Green growth from a bud on a cane, spur, cordon, or trunk. Always has leaves, may have fruit.
Tendril	Long, slender, curly structure to attach the vine to supports
Spur	Cane pruned to four or fewer nodes
Cluster	Group of flowers
Bud	Compound bud. Contains both vegetative and reproductive structures





Grape Shoot



Fruit possible only at nodes 1-8

One bud = one shoot
30-40 shoots per plant
1 to 2 clusters per shoot

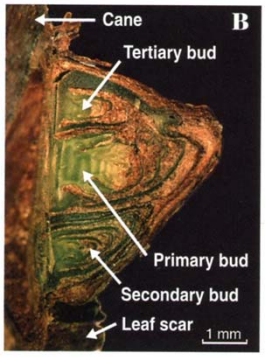
Grape Cane

- May have many nodes (buds)
- Nodes may be fruitful, or not
- Generally basal nodes are most likely to produce fruiting shoots

- Fruitful cane nodes determine
  - Cane pruning (*labrusca*)
  - Spur pruning (*vinifera*)

Buds

- Mixed bud
  - Vegetative
  - Reproductive
- Compound bud
  - Primary
  - Secondary
  - Tertiary

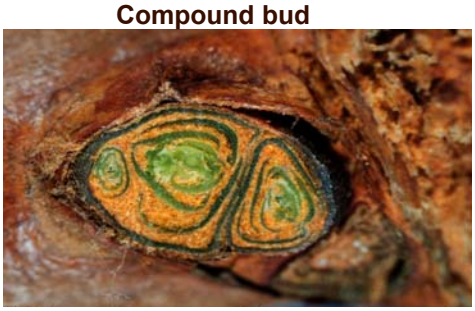


Compound **bud**
and leaf scar where leaf had been attached.

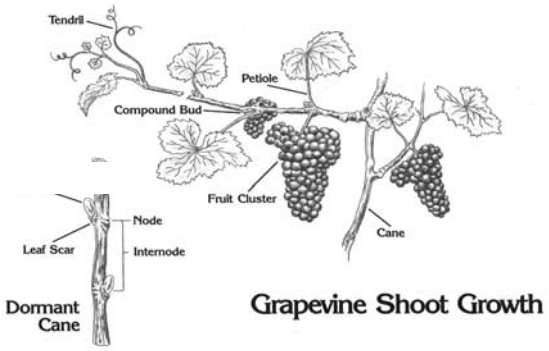
"One-year-old wood"
"dormant current season's growth"

Primary Bud

Compound bud

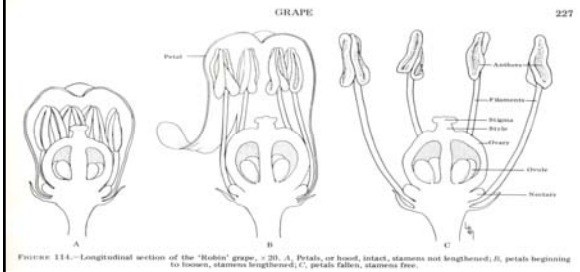


Primary **bud** death (low winter temp.)



Flowers

- Small 1/8 inch, nondescript
- 5 sepals, petals, stamens
- Superior ovary
- 2 locules/2 ovules per locule
- Cultivated grapes have perfect flowers
- Wind pollinated



Fused petals = calyptra

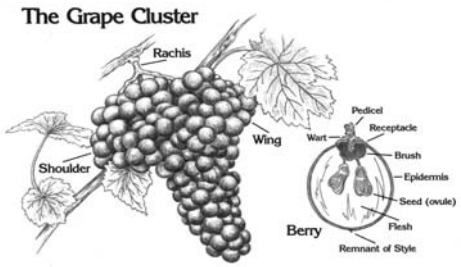
Pollination

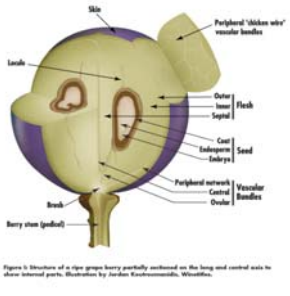
- Grapes with perfect flowers are self fruitful
- Some wild types have male and female plants. Male plants produce flowers, but **never** produce fruit.

Fruit

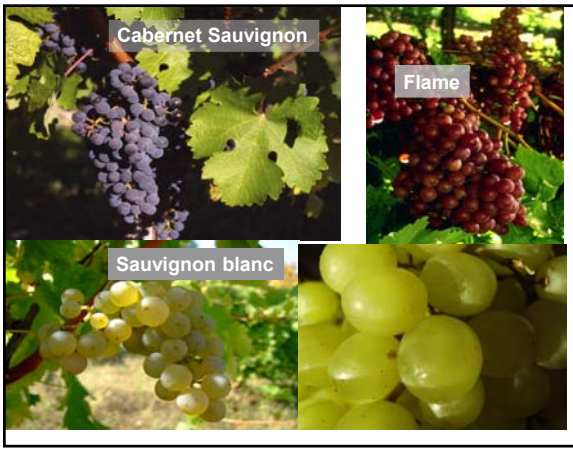
- Grapes are true berries
- Colors range from green to yellow to red to blue to purple to black

Fruit = Berry





Berry



Vineyard Establishment

- Site selection absolutely critical
  - Air drainage
  - Minimum winter temperatures
  - Length of season
  - Soils
  - Water

Hardiness

- **Vinifera**
  - 0 to -10°F bud injury
  - <-10°F trunk injury
- **French hybrids**
  - -10°F bud and trunk injury
  - -20°F kill buds and trunks
- **American types**
  - -20°F would cause crop reduction

Suitable Sites--Length

- <150 frost free days labrusca only
- 150-160, most American, some hybrids
- 160-170, early European, most hybrids
- 170-180, many European, all hybrids
- >180, Best grape environment
- >200, Late European, muscadines

Frost free days

Site	Shortest	Mean	Longest
Logan (USU)	95	158	203
Brigham City	111	159	206
Ogden Pioneer Park	116	164	221
Farmington	127	165	220
SLC Airport	125	175	237
Provo (BYU)	116	165	228
Vernal	99	122	166
Nephi	93	138	204
Fillmore	63	140	193
Cedar City	75	133	173
St George	135	205	268

Soils

- Widely adapted to varying soils
- Well drained critical
  - Heavy clay soils not suitable
- May show iron chlorosis
  - *Labrusca* more than *vinifera*

Water

- Grapes deep rooted
- Irrigation critical
- Less frequent DEEP irrigation
- Well drained soils
- pH isn't critical

Site Preparation

- Control perennial weeds
- Deep rip to 12+ inches
- Soil test to 12 inches
- Broadcast apply P & K per report results
- Add organic matter & incorporate

Vineyard Layout

- Row spacing 9-15 feet
  - Dictated by equipment
  - Row usually <1,000 feet long
  - Access, wire tension
- Vine spacing 6-8 feet
  - Narrower for hybrids
  - Wider for labrusca

Propagation

- Cuttings root easily
- Cut canes with three nodes (buds)
- Put two buds below ground one above
- Vines will readily root and grow
- Can also tip layer

Intellectual Property

- Many newer cultivars are patented
- Must have license and pay royalty prior to propagation
- Old types such as Concord and Himrod can be freely propagated

Obtaining Vines

- Pre-contract with a reputable nursery
  - True-to-name
  - Disease free
  - Established root system
- Self-propagate

Handling stock

- Check vines upon receipt
  - Moist, not moldy
  - Boxes/bundles intact
- Keep moist and cool prior to planting
- Don't prune roots

Planting

- Lay out vineyard
- Plant small quantities with shovel
- Planter for larger quantities
- No fertilizer in planting furrow/hole

Planting year

- Grow root system
- Post or trellis not essential
- Irrigation is critical
- Fertilizer is critical
- After bud break, prune to best single cane
- Rub out other shoots
- Remove any flower clusters
- Control weeds!!

Trellis Construction

- Vines can be staked singly first year
- Various trellis configurations
  - 2 wire, no arms
  - 2 wire, arms
  - 3 wire, arms
- Much information about trellis construction available in Extension publications

Second Year

- Develop strong straight cane → trunk
- Choose cordons, train to wire

Third Year

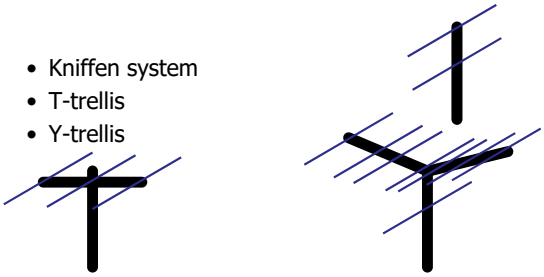
- Develop head and/or Cordons
- Grow canes for next year's crop
- May develop fruit
  - Crop lightly

Training Objectives

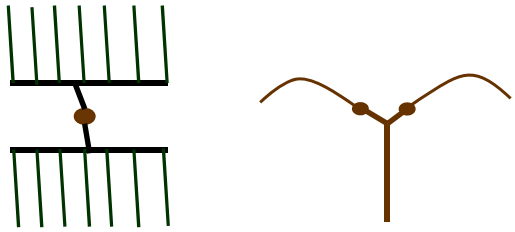
- Light capture
- Cane support

Training Systems

- Kniffen system
- T-trellis
- Y-trellis



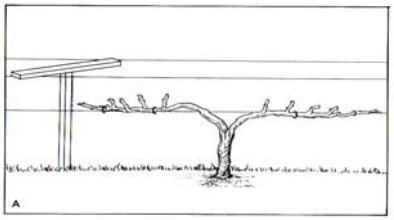
California quadrilateral



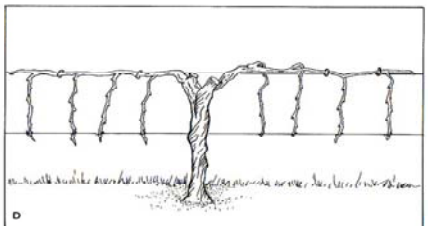
Grape Systems

		Pruning	
		Spur	Cane
Training	Cordon	Cordon trained, spur pruned	Cordon trained, cane pruned
	Head	Head trained spur pruned	Head trained cane pruned

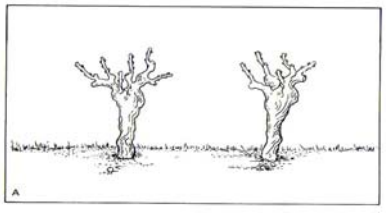
Cordon/Spur



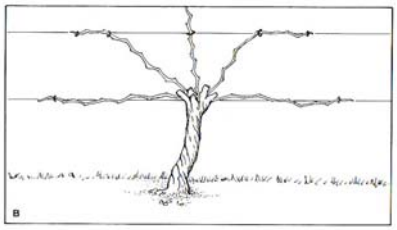
Cordon/Cane

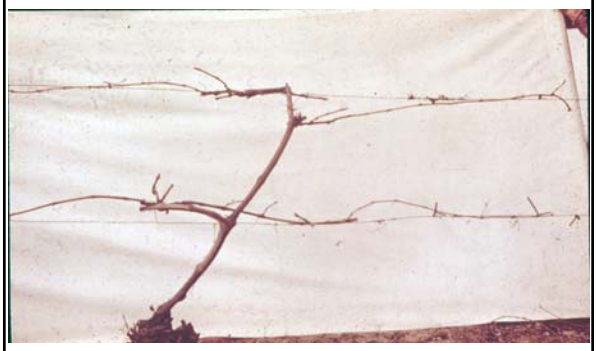


Head/Spur

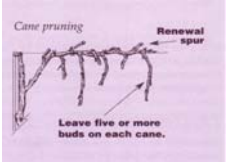


Head/Cane

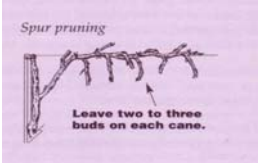




Cane *vs.* Spur

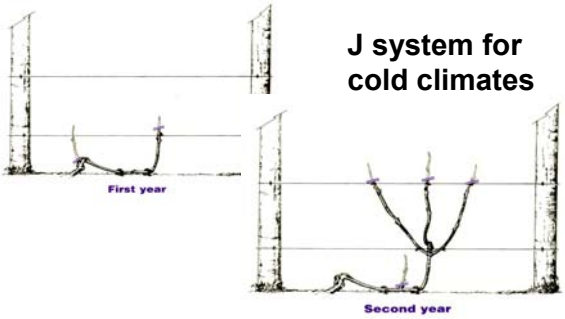


Labrusca types bear fruit at the second to fifth cane nodes

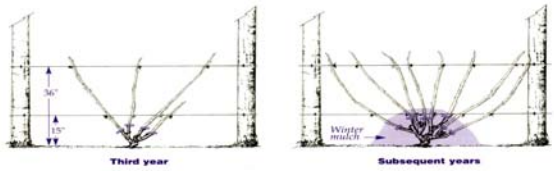


Most vinifera types bear fruit at the second and third cane nodes

J system for cold climates



Spur pruned rose



Balanced pruning

- American types
  - 30 plus 10 system
    - 30 buds for first pound of prunings
    - 10 buds for each additional pound
- French hybrids
  - 20 plus 10 system
- Don't exceed 40-50 buds/vine

"Weighing" one-year-old canes when pruning

Fertility

- Annual nitrogen application in spring
- May need additional potassium
- Micronutrients rarely needed
- Tissue testing based on petioles

Table Grapes

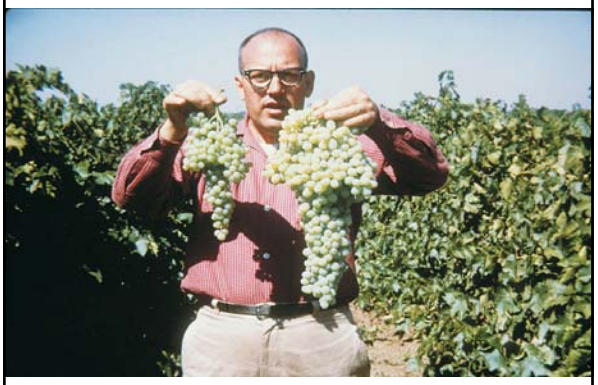
- Mostly seedless *vinifera* cultivars
- Large berry size desirable
  - Girdling
  - GA
- Hand harvested

Girdling for table grape production

Girdling consists of cutting out a ring of bark from the vine trunk, *left*. The fresh girdle, *center*, temporarily interrupts the flow of assimilates produced in the leaves to the roots. Vines girdled at fruit set produced larger grapes. At right is a healed girdle.

TABLE 1. Influence of trunk girdle timing and ethephon on the berry weight, length and diameter of 'Crimson Seedless' table grapes at harvest, 1991–1992*

Variable	Berry weight	Berry length	Berry diameter
	g	mm	mm
Trunk girdle timing			
Fruit set	5.1 a†	14.3 a	9.7 a
Berry softening	3.5 c	12.6 b	8.6 c
Ungirdled control	3.7 b	12.8 b	8.8 b



Pests

- **Insects**
- Grape phylloxera
- Grape leafhopper
- Grape skeletonizer
- Grape root borer
- Grape berry moth

- **Diseases**
- Powdery mildew
- Downey mildew
- Botrytis bunch rot
- Phomopsis
- Pierce's disease

Birds

Grapes in Utah?

- Some appropriate sites
- Consider both minimum winter temps AND # frost free days
- Market?
- Herbicide drift

Potential and Challenges of Table Grape Production in the Intermountain West

Cover the basics of the production of table grapes, from soil preparation, cuttings, and planting through storage will be discussed.

Esmaeil Fallahi

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Professor Esmaeil Fallahi received his BS degree in Horticulture from Joundishapour University, MS from Washington State University, USA, and Ph.D. and post-doctoral fellowship from Oregon State University, USA. All Dr. Fallahi's degrees are in fruit physiology. Prof. Fallahi served as assistant professor at the University of Arizona, USA. As an associate and full professor and Director of fruit physiology program, Prof. Fallahi has conducted and published numerous research projects at the University of Idaho since late 1989.

In the last 35 years, Professor Fallahi has been a member and one of the leaders in the ISHS and ASHS. Professor Fallahi served as Vice-President of the American Society for Horticultural Science for 6 years, President of the American Pomological Society, editor of ASHS and several other journals. Prof. Fallahi has received the most prestigious Fellow Award of the American Society for Horticultural Science for his like time contributions to horticulture.

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Potential and Challenges of Table Grape Production in the Intermountain West

Dr. Esmaeil "Essie" Fallahi
Professor and Director of Pomology and Viticulture

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University of Idaho
USA

Steps Taken in Research in a New Table Grape Industry

1) Evaluation of Cultivars and Adaptability:

What cultivars can successfully be grown in the region
If Growers grow, that may be a costly operation

2) Fine-Tuning Viticulture Practices on Selected Varieties and Impact on Yield and Quality:

Planting Spaces, Training, Irrigation, Nutrition, Crop or Cluster Management, Harvest, Canopy Management, Disease Management, Postharvest Storage, Growth Regulator Applications, Weed Control

3) Pilot Plan, Educational Classes and Tours and gradually establishing in growers block

Willingness of growers
Close cooperation between University & Growers

U of I Research Part 1

Physiology

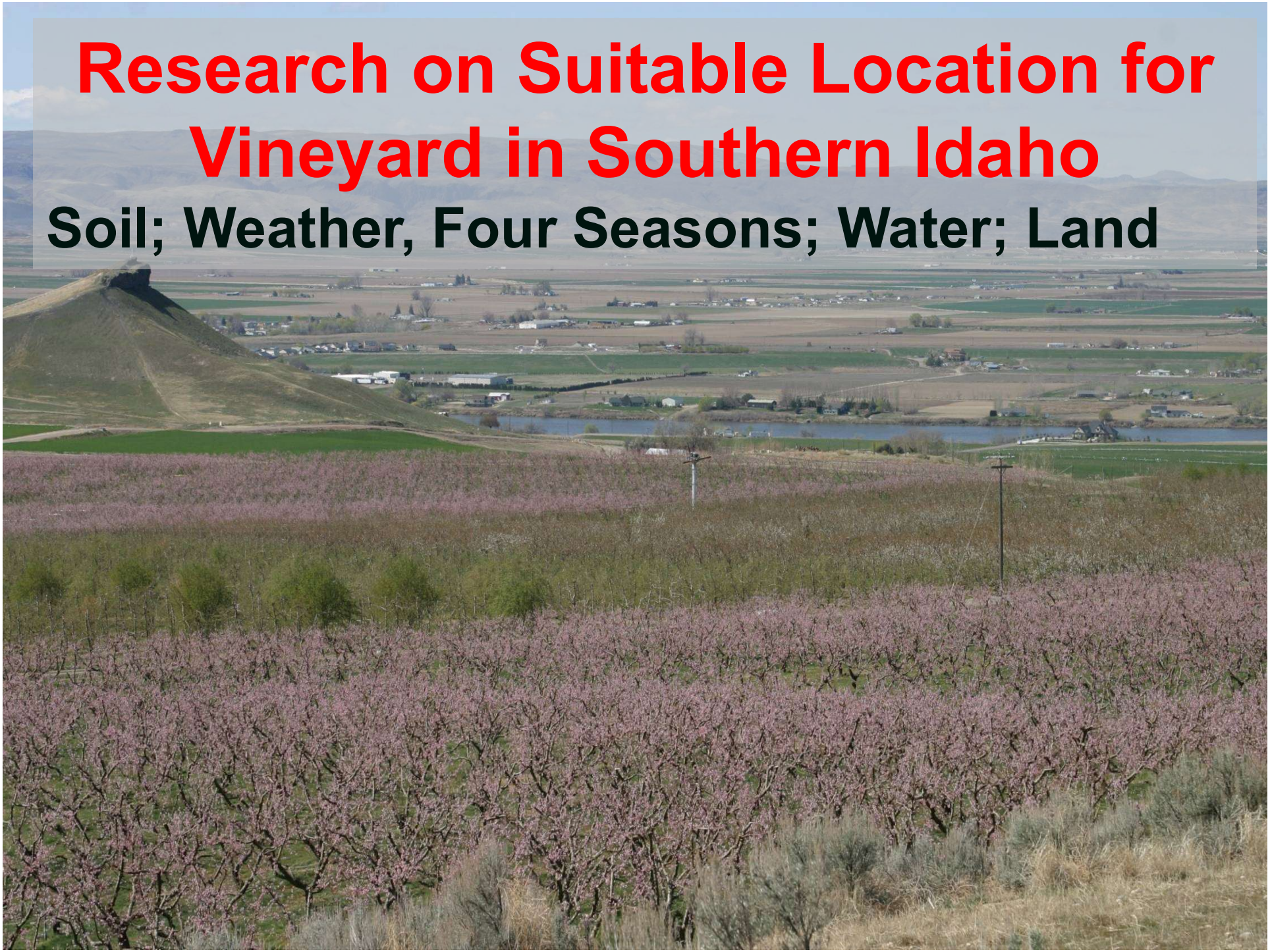
- Berry Growth
- Uptake of Water and Mineral Nutrients

Cultural Practices

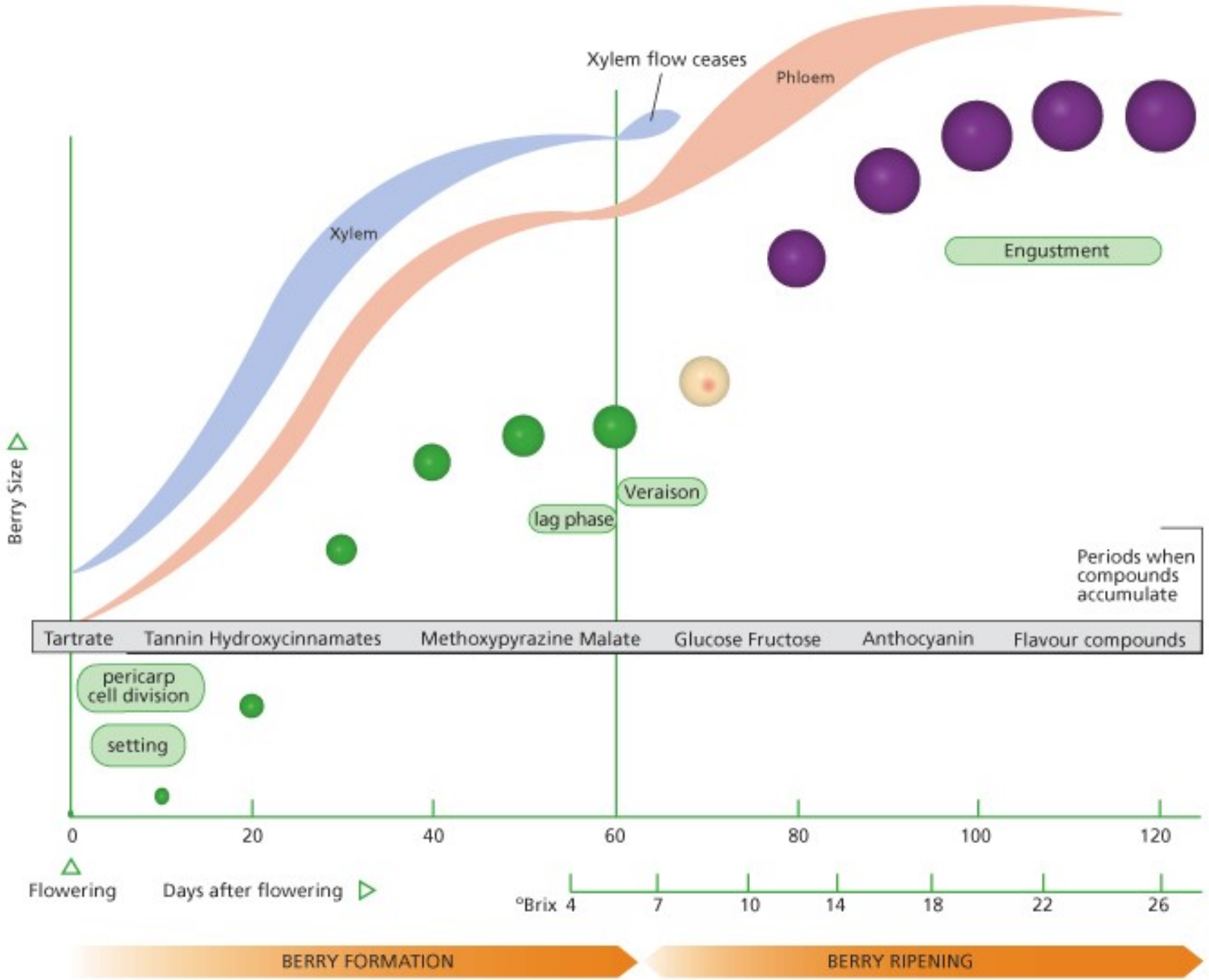
- Ground Preparation
- Propagation
- Planting
- Training and Pruning/ Canopy Management
- Crop Management
- Growth Regulators

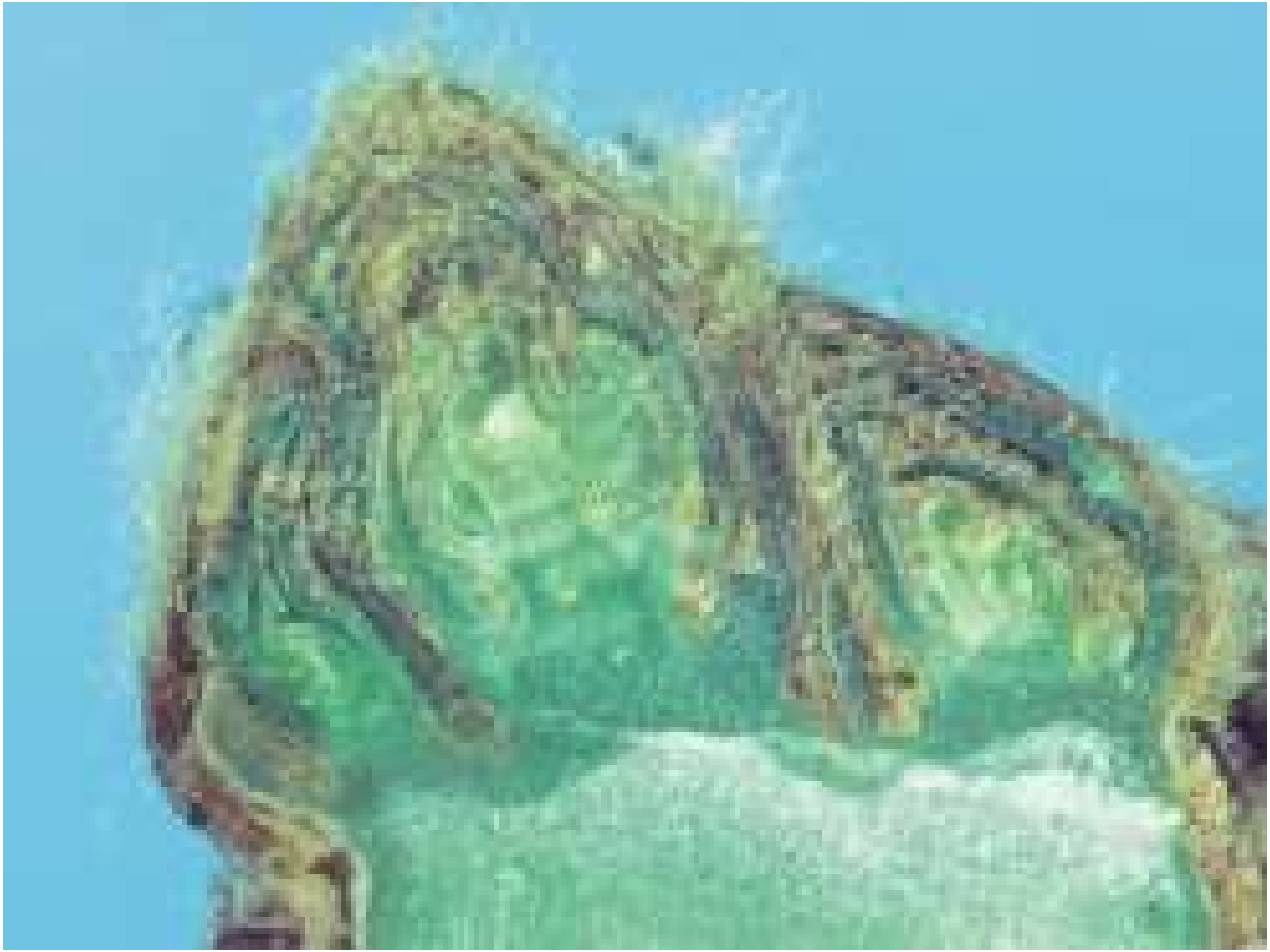
Research on Suitable Location for Vineyard in Southern Idaho

Soil; Weather, Four Seasons; Water; Land



Research on Developmental Physiology, Morphology


Xylem flow ceases
Phloem
Xylem
Engustment
Berry Size
Veraison
lag phase
Periods when compounds accumulate
Tartrate
Tannin Hydroxycinnamates
Methoxypyrazine Malate
Glucose Fructose
Anthocyanin
Flavour compounds
pericarp cell division
setting
0
20
40
60
80
100
120
Flowering
Days after flowering
°Brix 4
7
10
14
18
22
26
BERRY FORMATION
BERRY RIPENING



Research on Cultural Practices

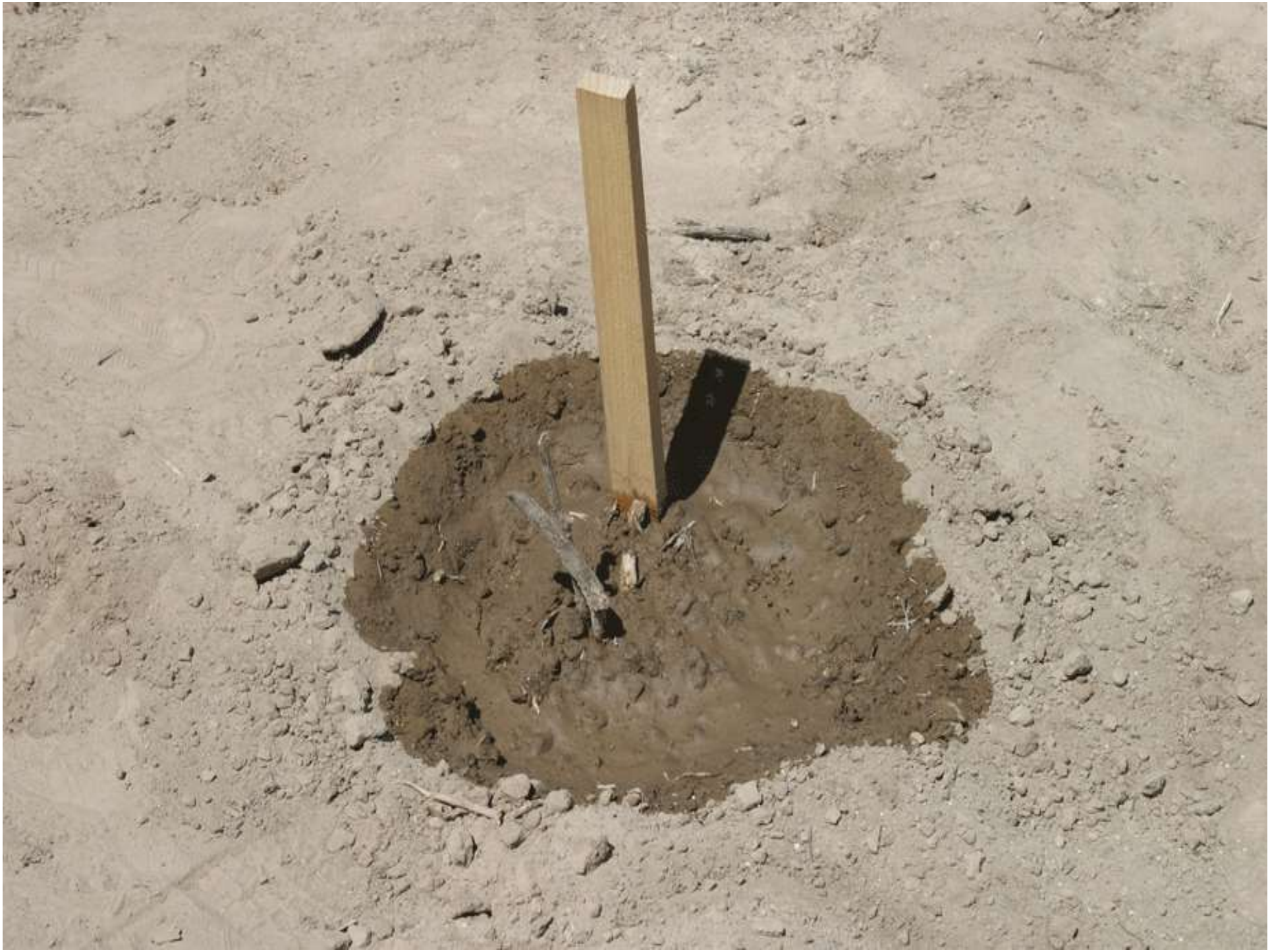
Ground Preparation


7


Research on
Propagation

Growing in the Paper Containers

Research on Planting, Training and Pruning




REAL VANILLA
ICE CREAM MIX
KEEP IT COLD!

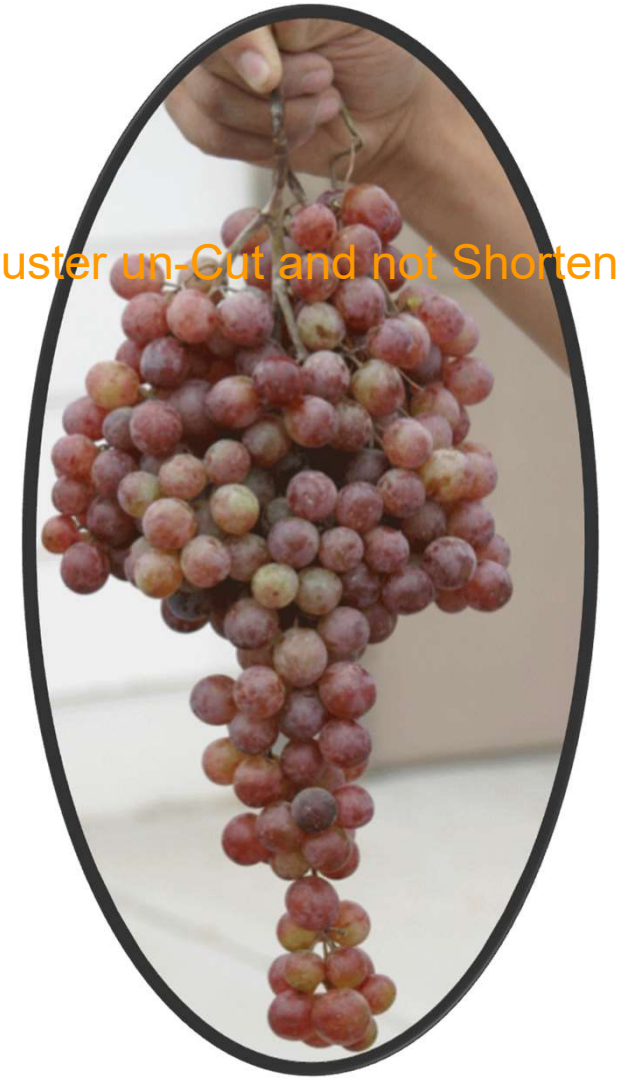

University of Idaho
Pomology Program,
Parma

Crop Management to Improve Table Grape Berry Quality

Shoot and Cluster Thinning Experiment

Alborz, 2008

Alborz, Clusters Reduced & Shortened



Alborz, Cluster un-Cut and not Shortened

Cluster Removal and Shortening in Alborz

Control

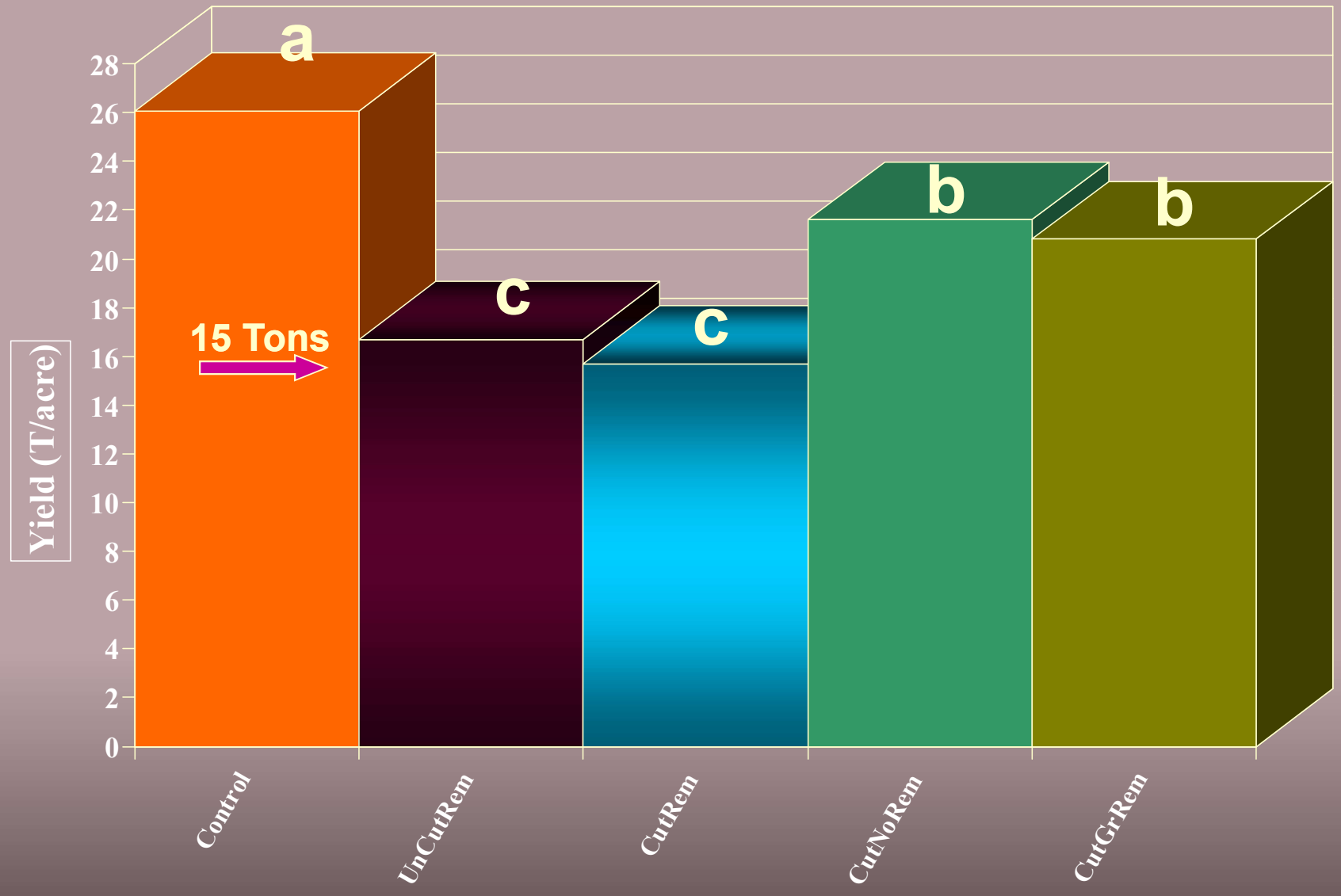
Fewer Clusters & Shortened

Too Short?

We Can Produce this

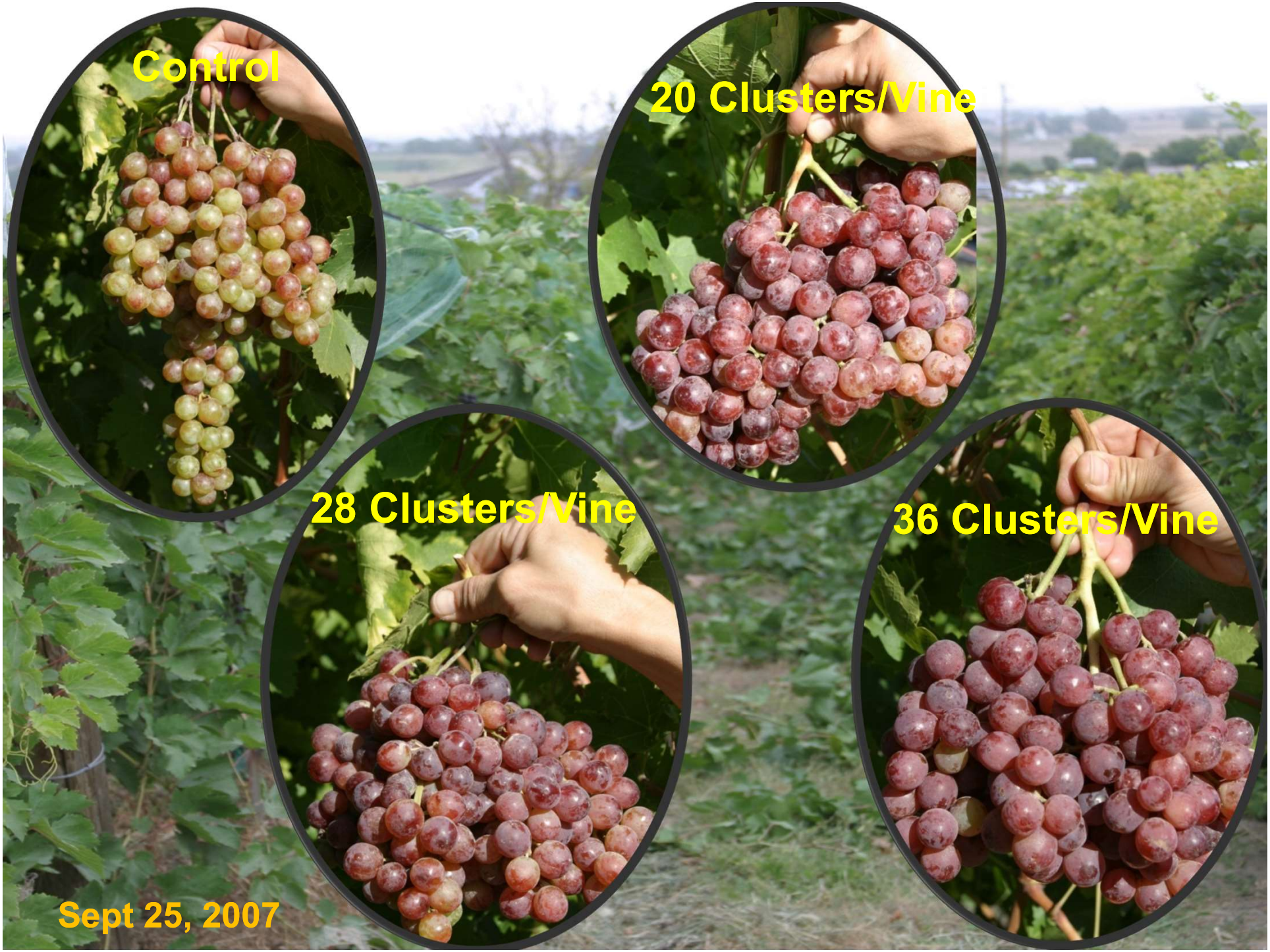
If We do it right

Yield (T/acre @ 6 x9 ft spacing) with Different Cluster Removal and Cutting Regimes in ‘Alborz’ Grape



Effects of Cluster Number on Cluster Characteristics and on Yield of ‘Alborz’ Table Grape (U of I Research)

Treat	Cluster No	Cluster Length (cm)	Cluster wt (g)	Yield (kg/vine)	Yield T/acre
Control	71 a	29.26 a	684.0 b	29.44 a	23.74 a
20 Clusters	19 c	19.73 b	870.1 ab	14.57 c	11.75 c
28 Clusters	28 bc	19.85 b	1003.0 a	20.02 ab	16.15 ab
36 Clusters	34 b	20.59 b	820.3 ab	25.77 a	20.79 a


Control
20 Clusters/Vine
28 Clusters/Vine
36 Clusters/Vine
Sept 25, 2007


Idaho Table Grapes


Idaho Grown
Table Grapes
Idaho's warm days and crisp nights during the growing period, make Idaho Grapes the finest, sweetest, richest and most flavorful grapes possible.
Produce of U.S.A.
IDAHO
Idaho Grown
Table Grapes

Alborz Table Grapes, New Canopy Design, 2009


10
11


2 ft

Emerald (cut cluster)

“Kashishi”; From A New Canopy Design, Pomology Program

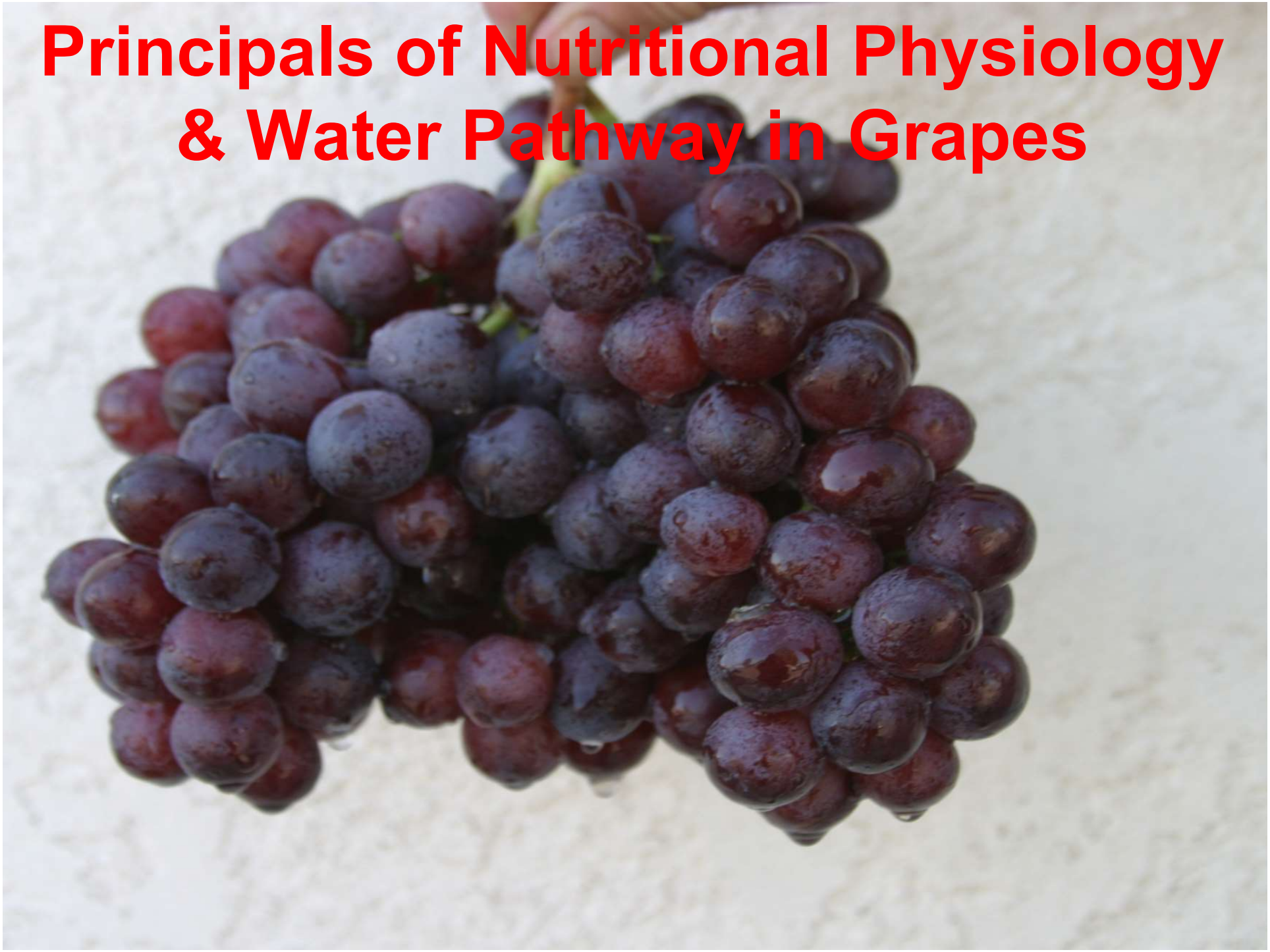
Research on Nutrition and Water Applications in Table Grapes

How much Nitrogen should we apply:

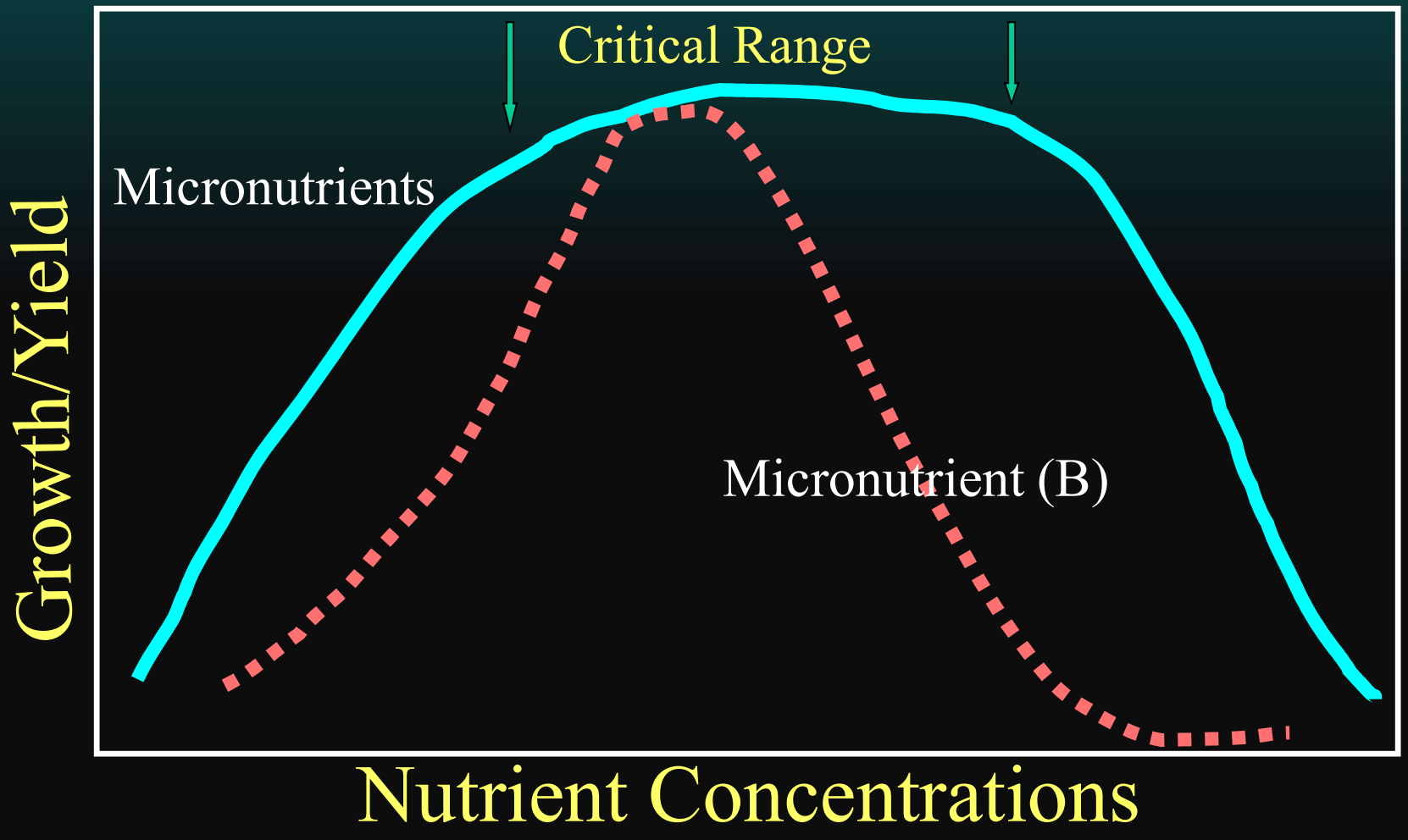
25 to 50 kg/ha in California (22.5 to 45 pounds/acre)
31.5 lb/acre is N removal per year

In Idaho 28.5 pounds/acre or 15 g/vine Max
Start with 5 to 10 g/vine

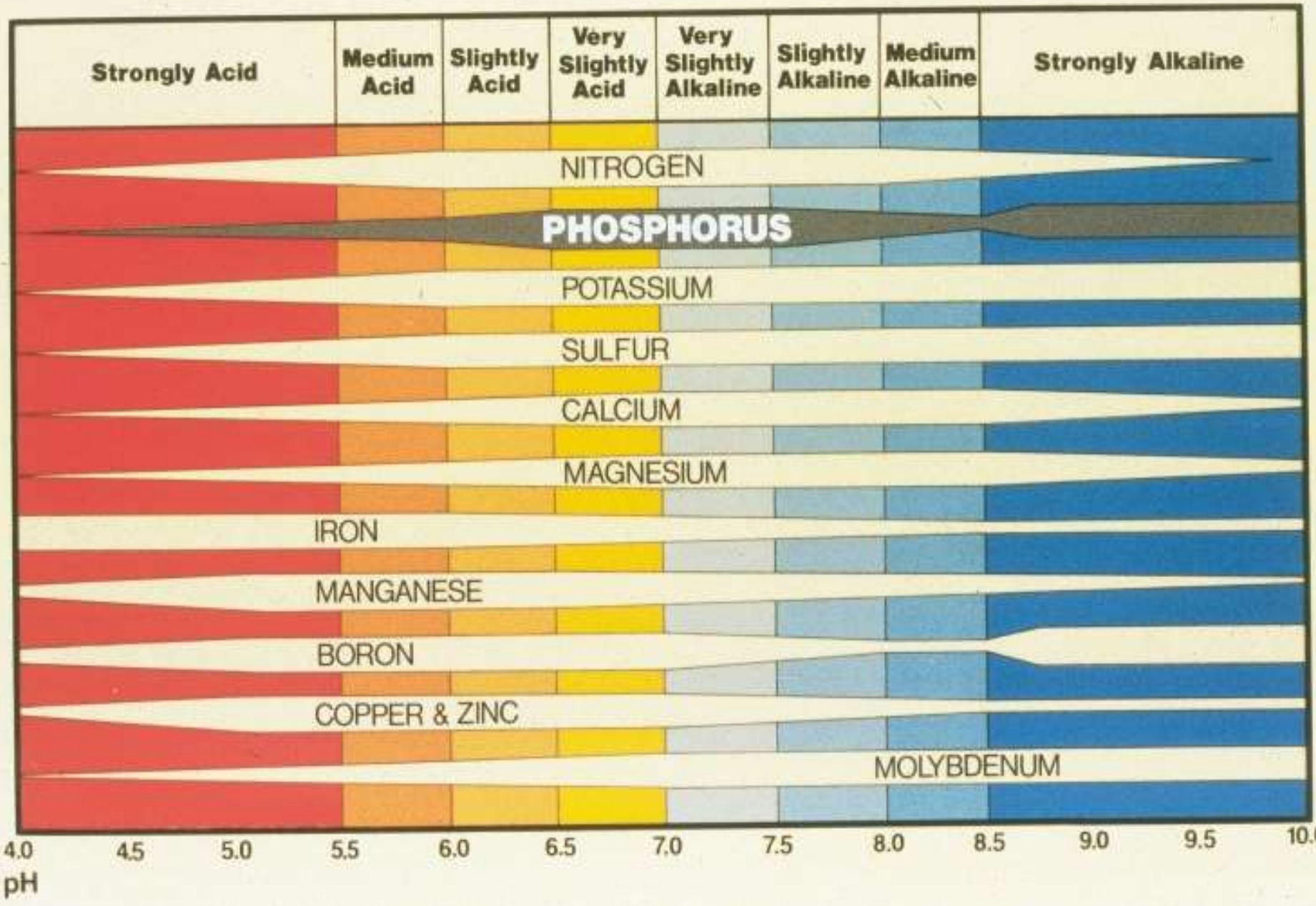
Principals of Nutritional Physiology & Water Pathway in Grapes



Critical Ranges of Nutrients in Grapes

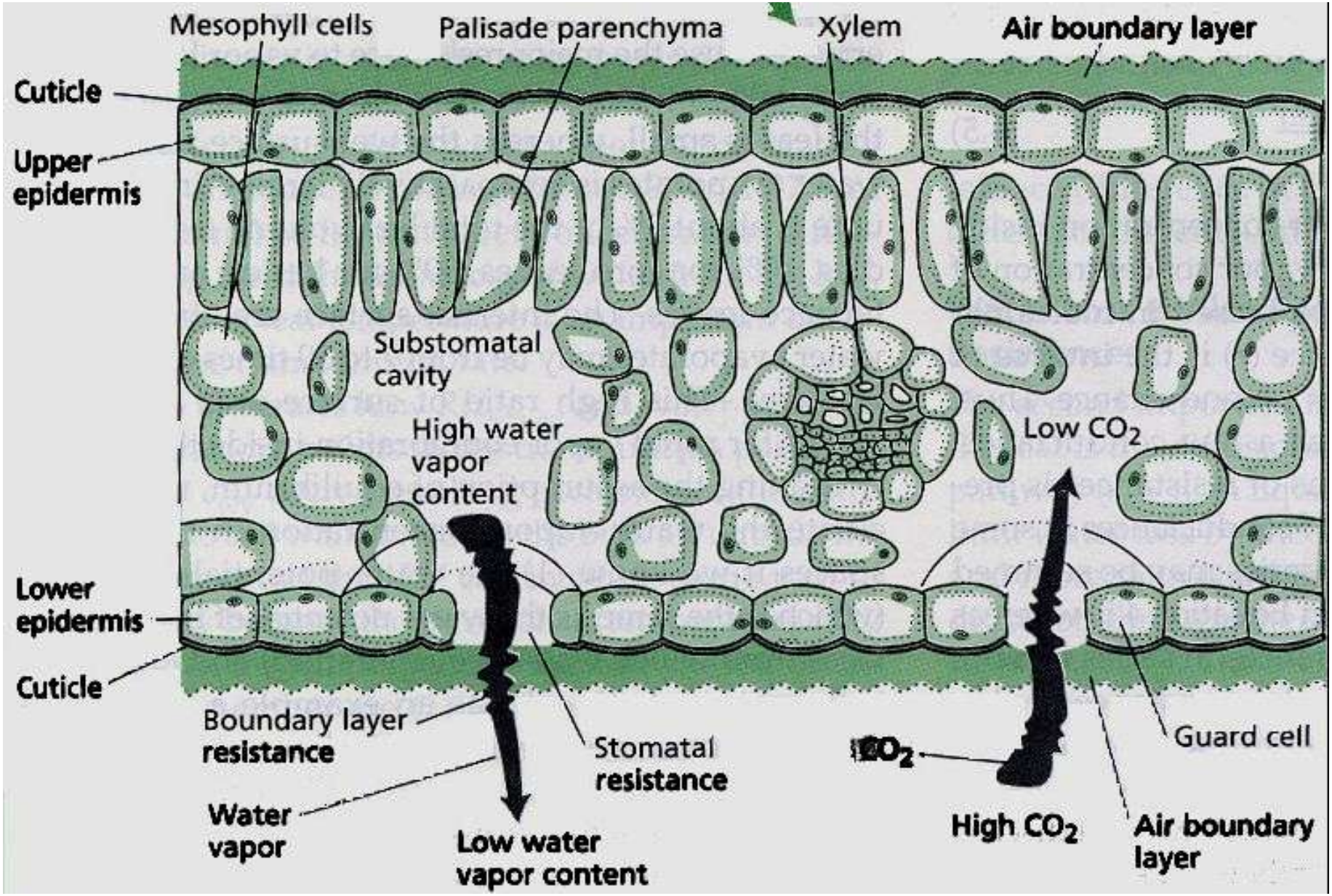


Soil pH Effect on Phosphorus Availability



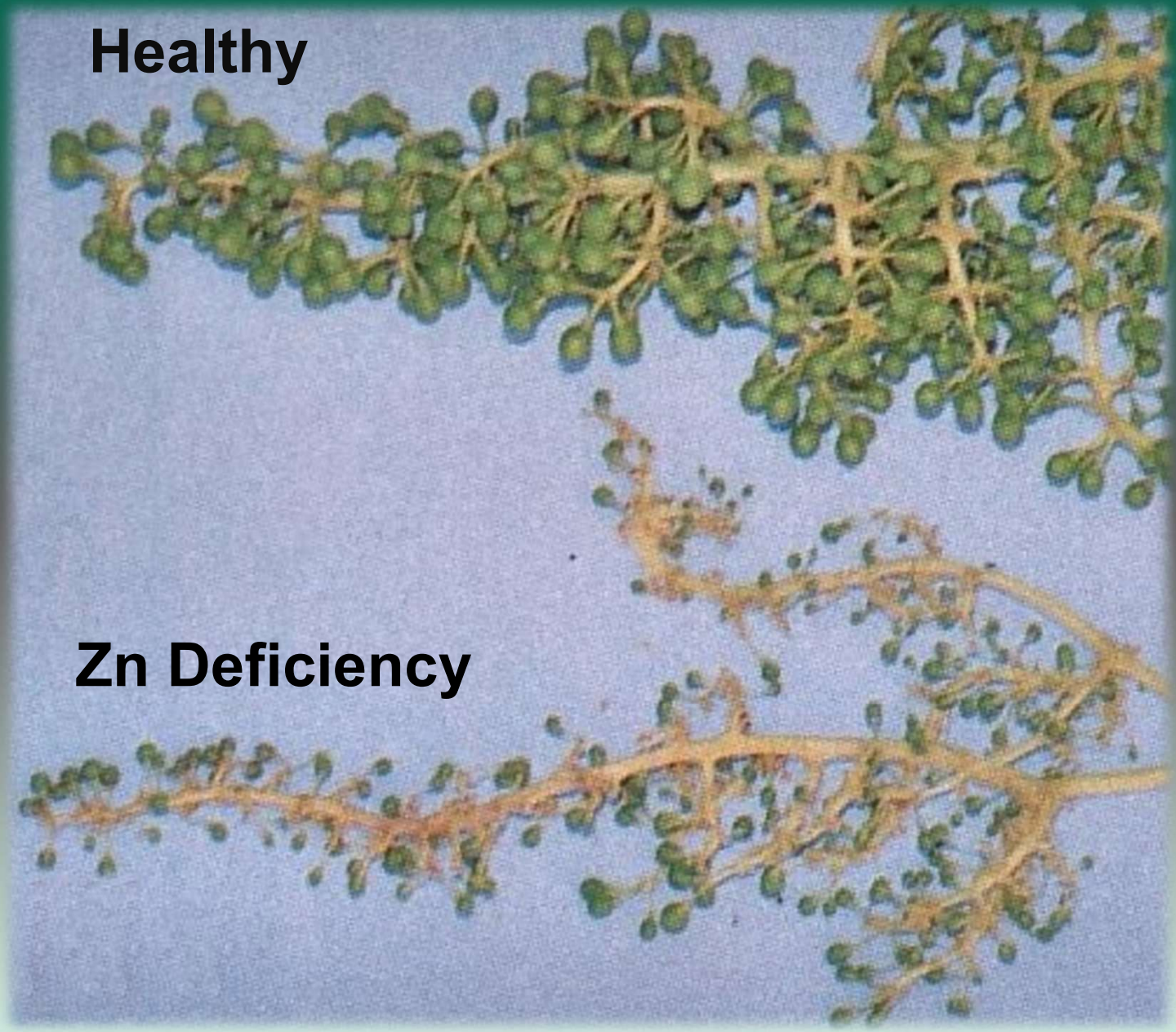
Physiology of Foliar Nutrition

Anatomical Structure of Leaves



N Deficiency

K Deficiency in ‘Princes’ grape


Healthy
Zn Deficiency

Fe Deficiency

B Deficiency

Mg Deficiency

Mn Deficiency


B Deficiency

Irrigation Research

Check it by hand

By Sensors

By ET

About 5gal/day till 5 years old

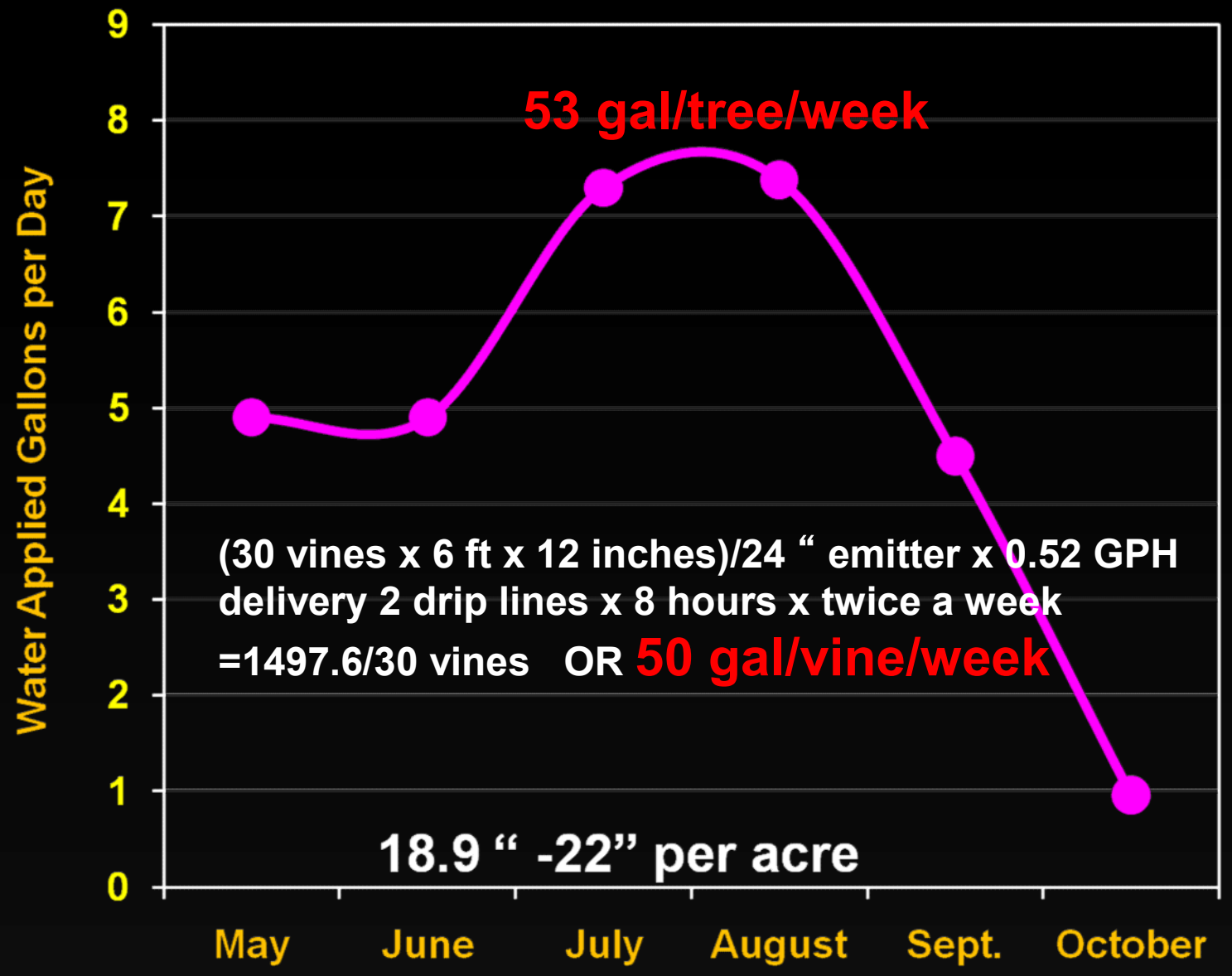

Commercial
Alborz
Production,
2007

0-25% water available

50-75% water available

75-100% water available

How Much Did We Apply to Alborz in July 2007 at the University of Idaho?



Research on Harvest, Postharvest & Storage


Snake River
TABLE GRAPES
Snake River
TABLE GRAPES
Snake River
TABLE GRAPES
Snake River
TABLE GRAPES


Idaho Grown Table Grapes
Snake River
TABLE GRAPES
SELECT FRUIT


EVOLUTION ONE


Harvest


Avenue Pack
Field Pickers
• Selecting
• Harvesting

Shed Pack

- Lidding
- Staking
- Unitizatio n
- Cooling

Snake River Table Grapes from Packed and Shipped from Idaho, Oregon, and Washington


• PROEM DUAL RELEASE GRAPE GUARD • GENERADOR DE SO2 •
KEEP OUT OF REACH OF CHILDREN
CAUTION

Problems

Research on Frost/Freeze Injury

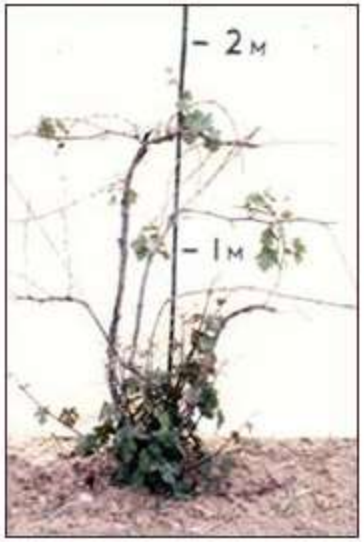
Age:	**Vineyards less than 5 years old sustain more damage, possibly due to less protective bark.**
Site:	**Cold pockets, low-lying areas, latitude, and elevation can all affect the local temperatures.**
Yield:	**Reasonable crop loads do not appear to affect bud survival.**
Fluctuating Weather:	**Brief periods of warm weather during mid-winter can decrease a vine's cold-hardiness.**
Grow Tubes:	**Vines in grow tubes seem to fair worse, possibly due to greater temperature fluctuations inside the tubes.**
Harvest Date:	**Grower observations indicate that cold hardiness is NOT influenced by an early or late harvest.**
Viruses:	**Vines infected with at least 2 strains of the leaf roll virus may suffer greater damage.**
Disease:	**Severe late-season infections of powdery mildew, especially on young vines, may put vines at higher risk.**

External, dried bud

Internal, live bud

Internal, primary bud dead

Entire bud dead



Suckers

Aerial Roots

Crown Gall

Split Trunk

Research on Bird Control

Thank You

Grape Varieties for Northern Utah

The vineyard was planted in the spring of 2012. The site contains early, mid and late season grape varieties in red, green and blue colored grapes. A majority of the grapes at the demonstration site are table grapes (30 varieties) but we do have some juice and wine varieties at the gardens. The presentation will be spent discussing the varieties and what we have learned about growing them in Northern Utah.

Mike Pace

Extension Agent

USU Extension

Mike.Pace@usu.edu

Mike developed a 1.5 acre demonstration orchard and vineyard at the Utah State University Botanical Center (USU BC) in Kaysville, UT that has heirloom and modern apple varieties, peaches, rootstock demonstrations, grapes and misc. fruits. The site contains early, mid and late season grape varieties in red, green and blue colored grapes. A majority of the grapes at the demonstration site are table grapes (30 varieties). In 2017 he purchase a small mist sprayer that can be towed behind an ATV to spray the orchard to provide insect control. In his spare time, he enjoys teaching fruit tree grafting classes along the Wasatch Front.

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Suitable Table Grape Varieties of the Inland Pacific Northwest

Characteristics, growth, quality, cold tolerance of numerous varieties of table grapes based on three decades of research at the University of Idaho will be discussed.

Esmaeil Fallahi

Professor and Director of Pomology and Viticulture

University of Idaho

efallahi@uidaho.edu

Professor Esmaeil Fallahi received his BS degree in Horticulture from Joundishapour University, MS from Washington State University, USA, and Ph.D. and post-doctoral fellowship from Oregon State University, USA. All Dr. Fallahi's degrees are in fruit physiology. Prof. Fallahi served as assistant professor at the University of Arizona, USA. As an associate and full professor and Director of fruit physiology program, Prof. Fallahi has conducted and published numerous research projects at the University of Idaho since late 1989.

In the last 35 years, Professor Fallahi has been a member and one of the leaders in the ISHS and ASHS. Professor Fallahi served as Vice-President of the American Society for Horticultural Science for 6 years, President of the American Pomological Society, editor of ASHS and several other journals. Prof. Fallahi has received the most prestigious Fellow Award of the American Society for Horticultural Science for his like time contributions to horticulture.

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Suitable Table Grape Varieties for the Inland Pacific Northwest

Dr. Esmaeil "Essie" Fallahi
Professor and Director of Pomology and Viticulture

www.efallahi.org

University of Idaho

Part 2

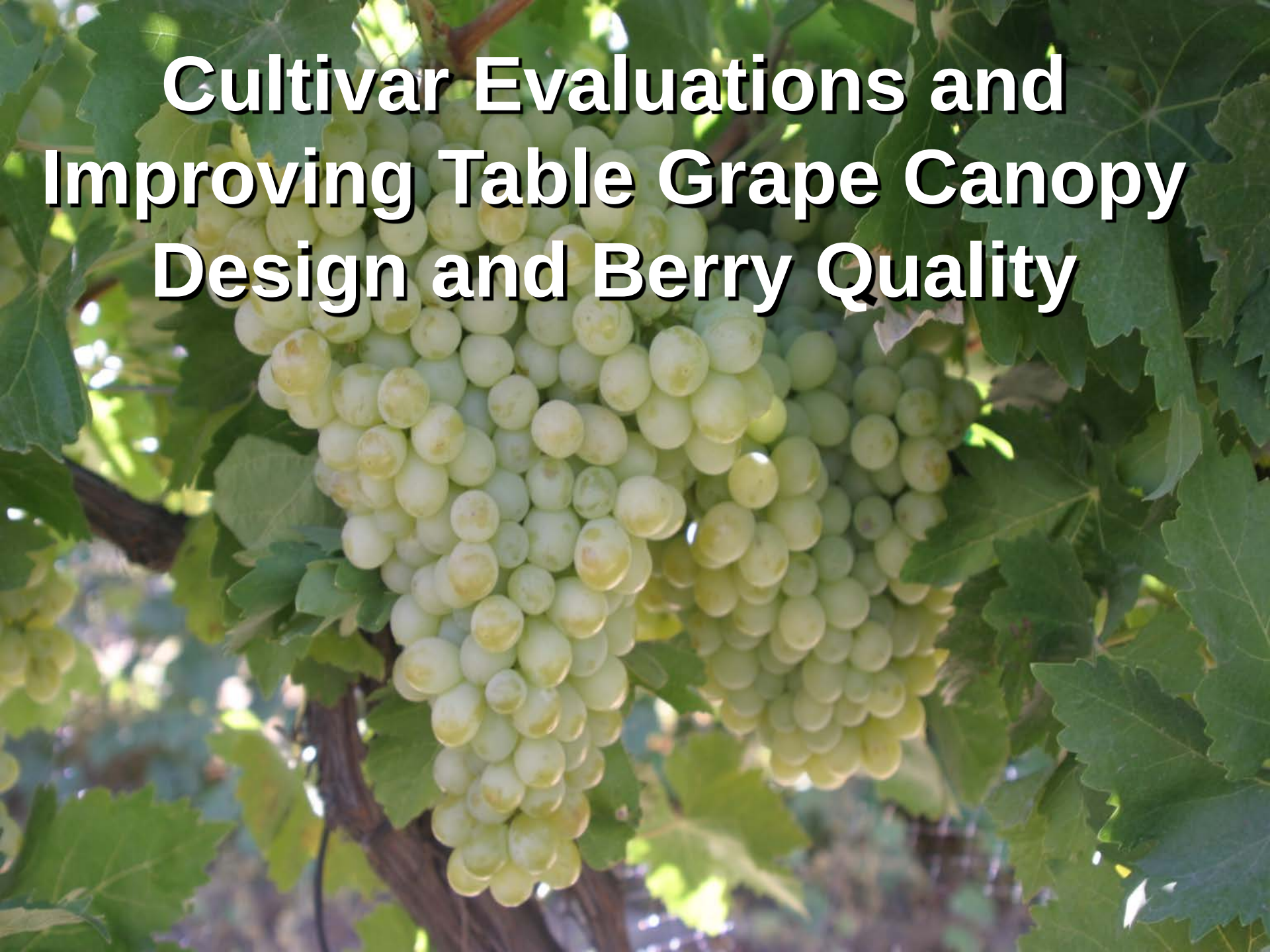
Cultivars/ Varieties

- California
- Idaho

Harvest, Handling, Postharvest and Marketing

- Harvest and Packing
- Storage and Sulfur Pad
- Marketing

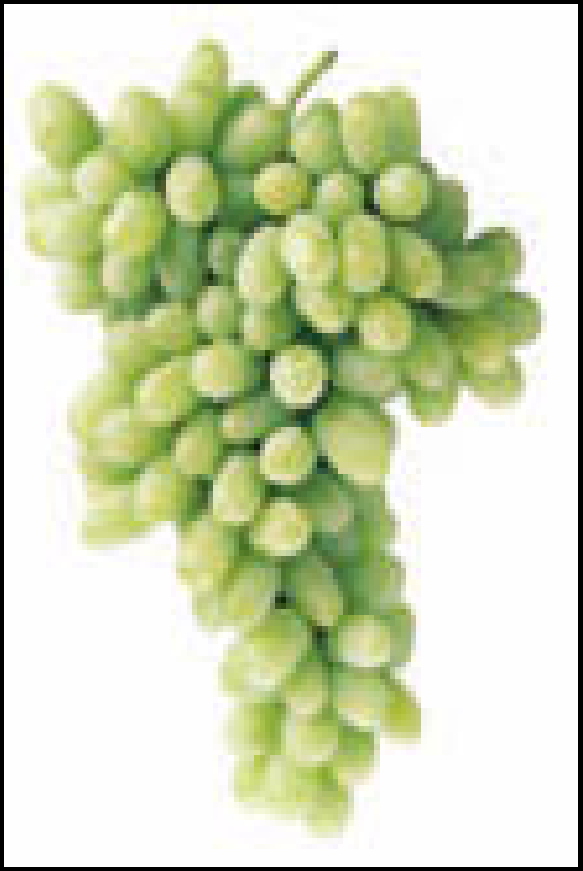

Idaho Table Grape: The Ultimate Flav


Cultivar Evaluations and
Improving Table Grape Canopy
Design and Berry Quality

California Table Grape Cultivars

- Autumn Royal
- Fantasy Seedless
- Beauty Seedless
- Marroo Seedless

- Flame Seedless
- Crimson Seedless
- Ruby Seedless
- Red Globe

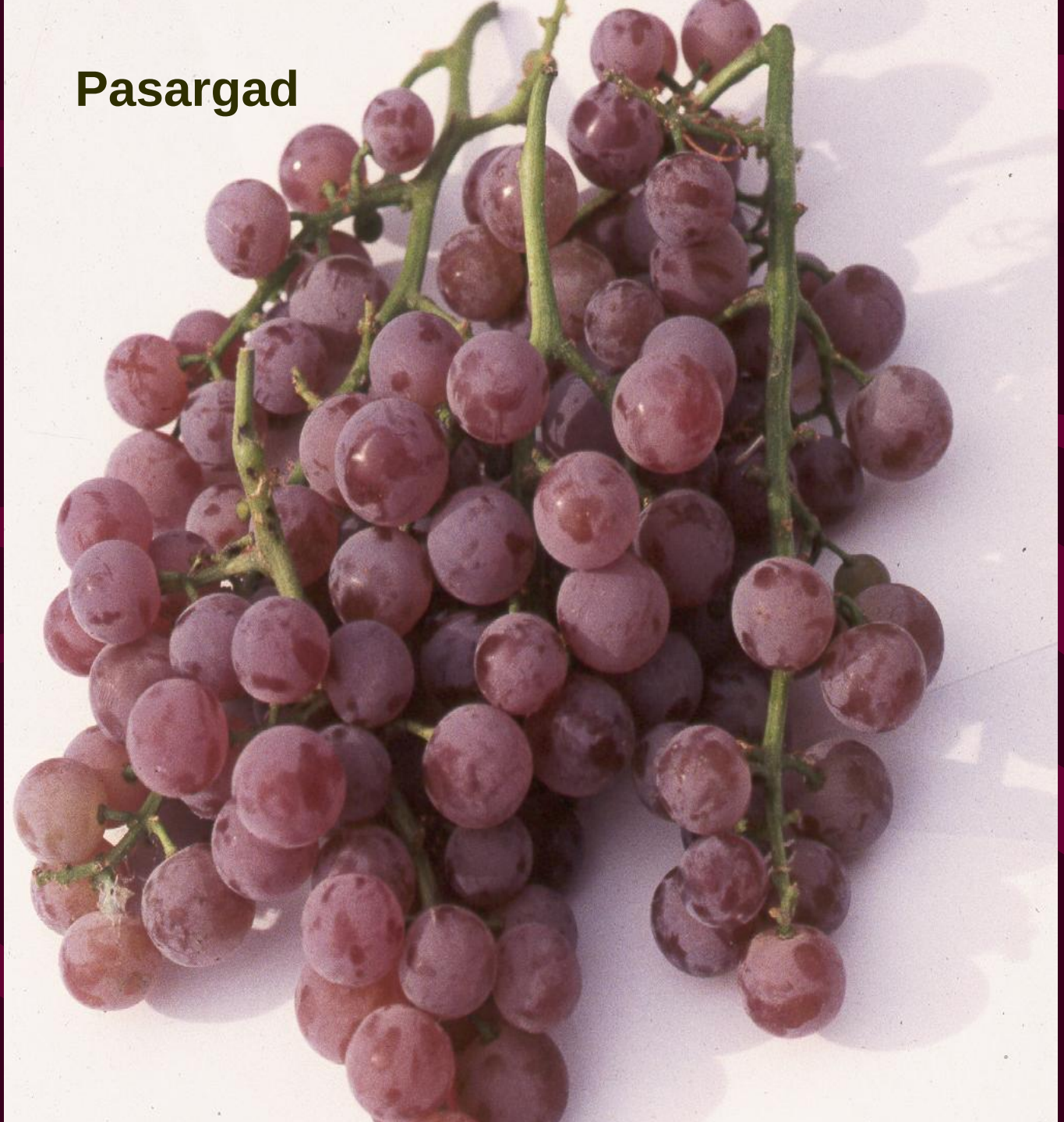


- Thompson Seedless
- Perlette
- Sugraone
- Calmeria

Idaho Table Grape Varieties (First Phase)

Alborz

Pasargad




Vanessa

Fresno


Sweet Shelly
NY
14716


Glenora

Idaho Table Grape Varieties (Second Phase)


Italia


Jupiter


Emerald, Exposed to the Light

Emerald, Commercially Desirable

Idaho Table Grape Varieties (Third Phase)


Autumn Royal, 2007


Kashishi, 2007

Anahita (AUG. 20-Sep.30)


Idaho Table Grape Association
Idaho Table Grapes; What a Treat...!!


Anahita, 2007

Fantasy

Katie K


Red Globe,
October 2007


Fantasy, 2007


Fourth Phase
U of Idaho and U of Arkansas Cooperation

Arkansas-U of I; A-2494

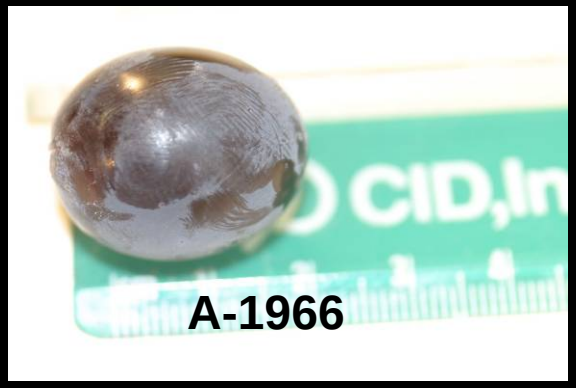
University of Arkansas and University of Idaho Cooperative Research

University of Arkansas and University of Idaho Cooperative Research

A-2480

A-2486

A-2485



A-1966

A-2494

A-2653

A-2412

A-2034

A-2640

Fifth Phase

Persian and Afghan Cultivars, Cutting Edge Selections with Arkansas and California

A-2494, Under Divided Canopy, 2009

A 2494, U of I Pomology, 2009

A-2494, Cooperative Grape Selection U of I and U of Arkansas

Persian Gulf Bidaneh, 2009

Persian Gulf Bidaneh, 2009

Scarlett Royal, U of I Pomology, 2009

Thomcord, 2009

Ghandahar, U of I Pomology, 2009

Scarlett Royal, U of I Pomology, 2009

Alborz, The Major Table Grape of PNW, from U of I Pomology Program

Anahita, from U of I Idaho


Golden Idaho Grapes

Alborz Table Grapes, New Canopy Design, 2009


10
11

Effects of Canopy Design on Quality and Yield of ‘Alborz’ Table Grape, 2011

Treat	No Cluster/Vine	Color	Cluster wt (g)	Yield (kg/vine)	Sugar
6 ft Arbor	50.4 a	4.26 bc	576.4 a	30.59 a	19.97 bc
6 ft one side	21.2 c	4.63 a	555.4 a	12.65 c	21.48 a
3 ft one side	20.8 c	4.45 ab	555.6 a	13.04 bc	20.35 b
6 ft Low T	27.9bc	4.03 cd	453.0 b	15.06 bc	19.43 c
6ft High T	31.8 b	4.16 cd	489.3 ab	17.45 b	19.85 bc

Effects of Canopy Design on Quality and Yield of ‘Alborz’ Table Grape, 2011

Treat	Berry size mm	Berry wt (g)
6 ft Arbor	19.45 a	5.50 a
6 ft one side	19.19a	5.10 ab
3 ft one side	18.95 a	5.07 ab
6 ft Low T	19.09a	5.05 b
6ft High T	19.22a	5.17 ab


“Kashishi”; From A New Canopy Design, Pomology Program

Current Commercial Cultivars in Idaho

Alborz, Red Seedless, Flame type, extremely crunchy, September 1-20

Alborz, The Major Table Grape of PNW,
from U of I Pomology Program

Anahita (Rally), Red Seedless, extremely crunchy, Harvest: August 25-September 20


Anahita, 2007

Anahita (Rally), Red Seedless, extremely crunchy, Harvest: August 25-September 20

Autumn Royal, Deep Purple, Seedless, extremely crunchy, Harvest: October 1-15

Emerald, Green-yellow, Seedless, Flavorful, Large Clusters, Harvest: Sept 25-Octber 15

Golden Idaho, Seedless, Flavorful, Very Sweet, October 1-15

Alborz, Red Seedless, Flame type, extremely crunchy, September 1-20

Kashishi, Seeded, Dark Red, Crunchy, Flavorful, Harvest: September 25-October 10


Red Globe, U of I
Pomology,
October 2009

Sweet Shelly


Jupiter, Fresh and
Raisins Grape


Idaho Table Grapes
Jupiter, 2007
Idaho Grown Table Grapes
Idaho's warm days and crisp nights during the growing period, make Idaho Grapes
the finest, sweetest, richest and most flavorful grapes possible.

University of Arkansas and University of Idaho Cooperative Research

Thank You

Managing Primary Grape Pests

For the most part, grapes are fairly easy to grow, but there are a few pests in Utah that stand in the way, including powdery mildew, leafhoppers, spider mites, and others. Learn about these primary pests and the best tools to manage them.

Marion Murray

IPM Project Leader

Utah State University Extension, Logan

marion.murray@usu.edu

Marion has been the IPM Project Leader at Utah State University Extension, Logan, since 2006. She conducts outreach and research in IPM, with a focus on fruits and landscape ornamentals. She received her MS in plant pathology from Oregon State University and is originally from North Carolina.

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Managing Common Grape Pests

MARION MURRAY
UTAH STATE UNIVERSITY IPM PROGRAM

EXTENSION
UtahStateUniversity

Powdery mildew
Downy mildew
Crown Gall
Herbicide
Scorch

Leafhoppers
Spider Mites

IPM Pest Monitoring Toolkit

EXTENSION
UtahStateUniversity

- Pocket knife
- Spade or small shovel
- Pruners, pruning saw
- Hand Lens (16x-30x)
- Vials, plastic baggies, Tupperware containers, pens, tweezers

monitor for pests and practice good preventive habits

Powdery Mildew

EXTENSION
UtahStateUniversity

Erysiphe necator: specific to grapes

Overwinters in dormant buds or on wood

Thrives in humid grape canopy with no rain

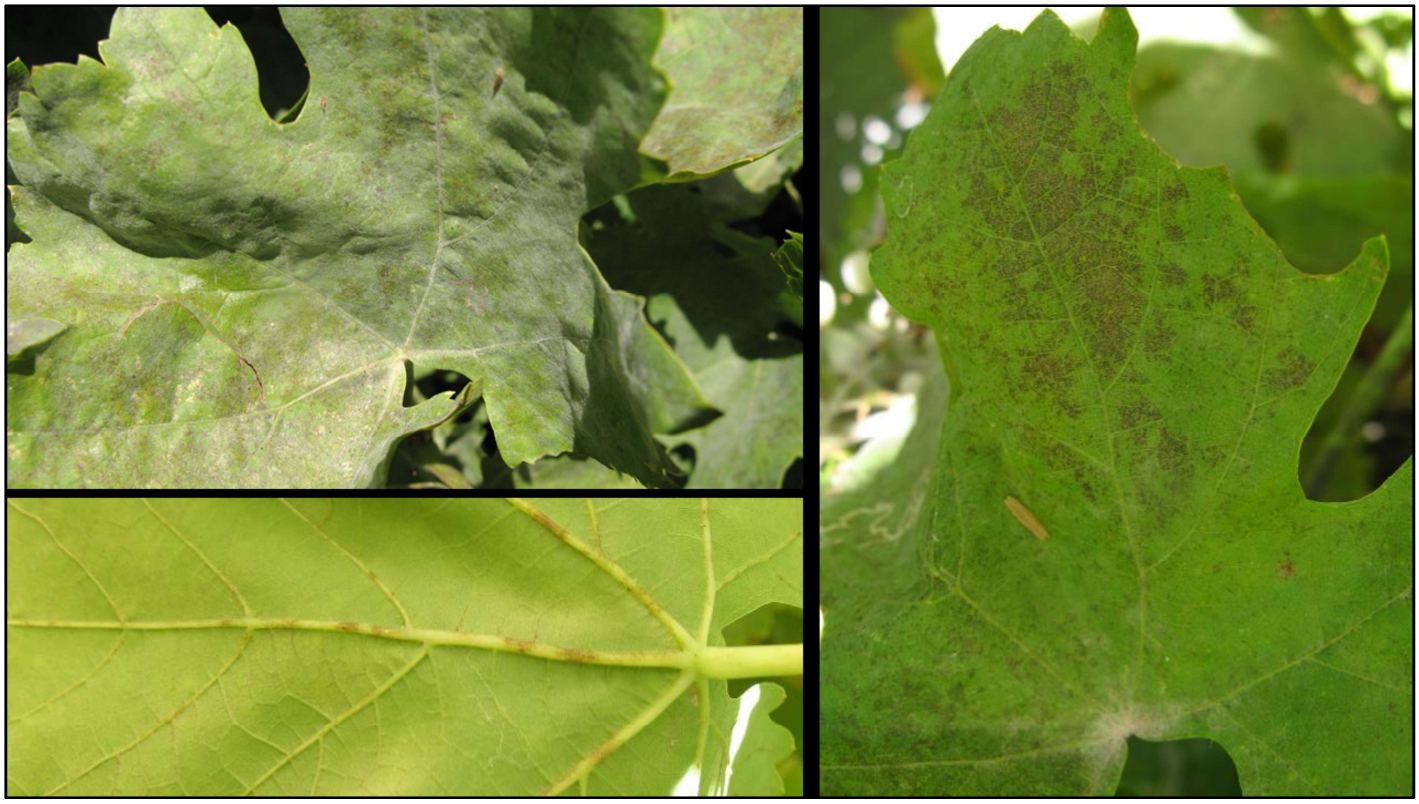
Infections are greatest at temperatures 70 – 80F, and least above 90F

most common and most destructive single grape disease in Utah

specific to grapes

start as yellowish, almost clear lesions

new infections on young foliage or stems



Severely infected leaves may turn brown and fall off.

can cause plants to be less winter hardy

greatest concern is infections on berries

Infected berries appear rusty or scaly.

They may fail to mature properly or split open.

Scarring of berries where growth of powdery mildew has occurred on the skin surface

powdery mildew can infect immature berries between flowering and up to four weeks later (around the time of onset of ripening (veraison veer AYE zon)

Severe infection can scar the berry surface. As the berry ripens, the scar cracks and splits,

Managing Powdery Mildew

EXTENSION
UtahStateUniversity

Plant grapes in full sun with good air circulation

Fungicides

- Wettable sulfur starting at budbreak and continuing on a 10-14 day pattern (7 days for dust) until 10" shoot growth.

- Curative fungicides every 18 days starting at bloom and repeated around 3 times
  - Torino
  - Quintec
  - Vivando
  - Spectracide Immunox (residential)

assume it is always present; prevention so that it does not develop to epidemic levels

with sulfur, temps over 85 can cause plant damage; it is preventive fungicide and is only effective immediately in the vicinity of the particle. Excellent coverage is necessary

When using sulfur for mildew control, the basic goal is to keep a coating of relatively fresh sulfur on the entire vine as consistently as possible.

sulfur burn

torino and Vivando are in different groups and quintec is group 13; all excellent

Downy Mildew

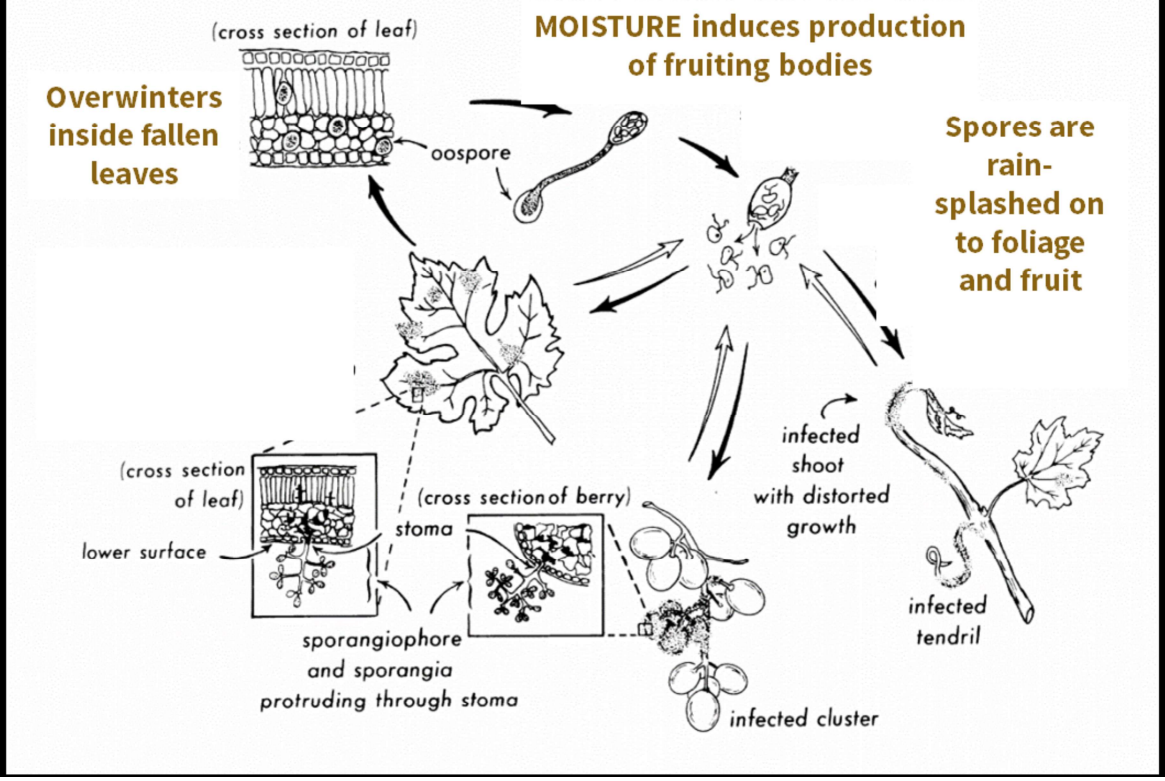
EXTENSION
UtahStateUniversity

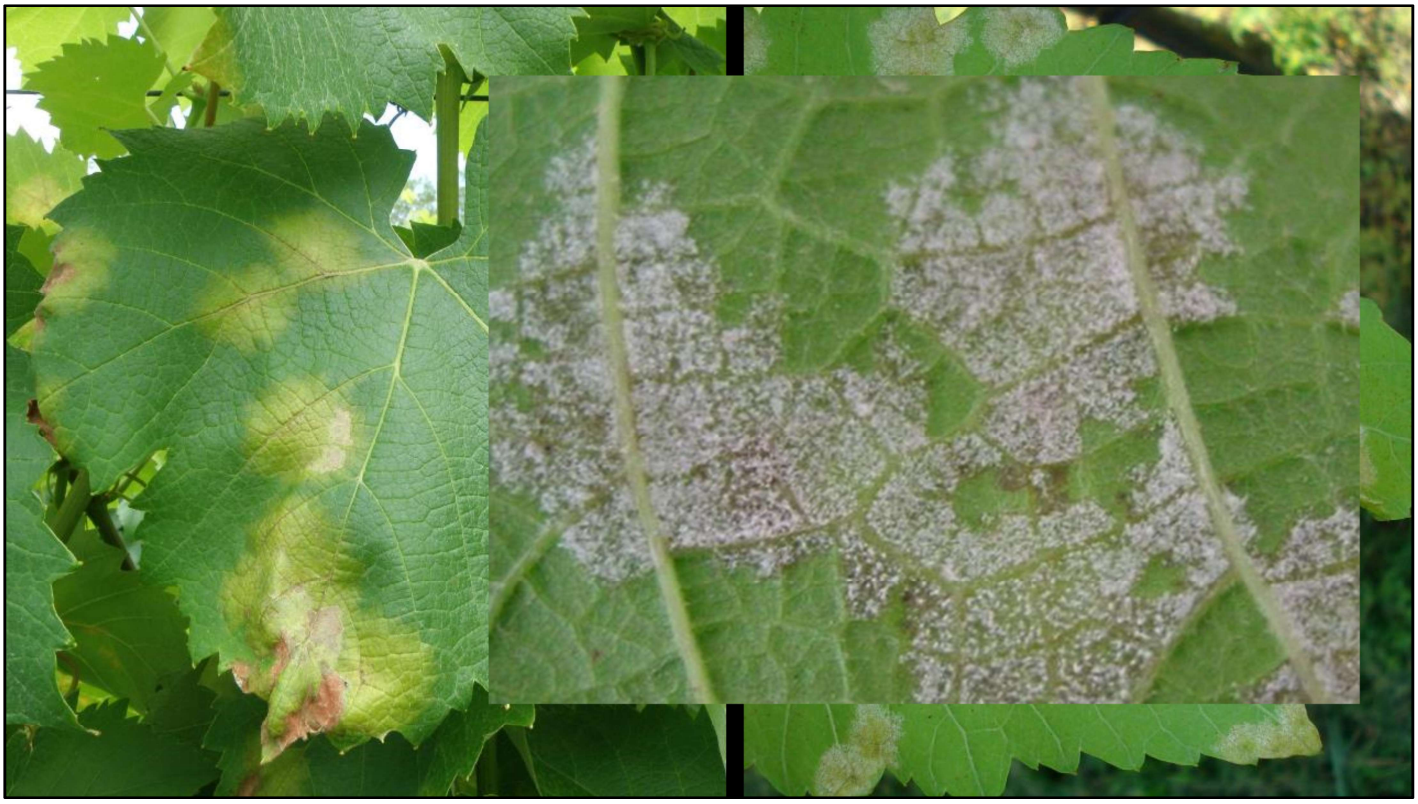
Occurrence is highly unlikely except in very wet springs

Cache and Beaver counties

Affects foliage and fruit

in 2006 in cache county and beaver county

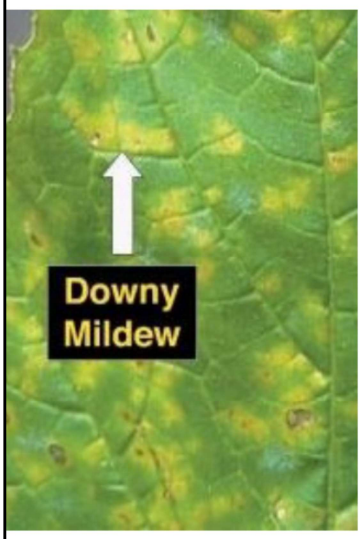

(cross section of leaf)
MOISTURE induces production of fruiting bodies
Overwinters inside fallen leaves
oospore
Spores are rain-splashed on to foliage and fruit
infected shoot with distorted growth
(cross section of leaf)
lower surface
(cross section of berry)
stoma
sporangiophore and sporangia protruding through stoma
infected tendril
infected cluster

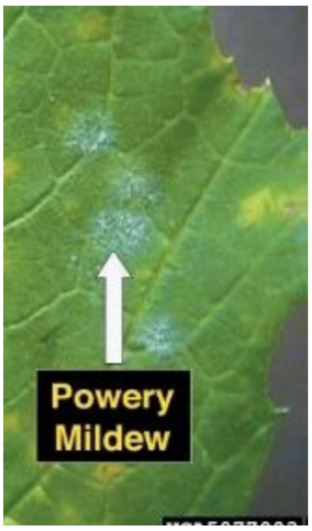


“downy” fungal masses on underside of leaf

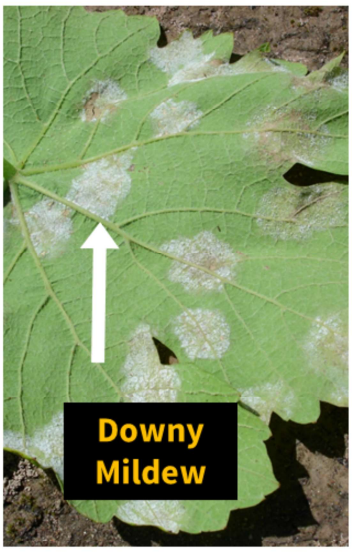
Downy Mildew vs Powdery Mildew

TOP of leaf





BOTTOM of leaf



Crown Gall

EXTENSION
UtahStateUniversity

Agrobacterium tumefaciens

Overwinters inside the plant in galls, or in the soil

Infections occur through wounds

This bacterium has the widest host range of any plant pathogen. It is capable of causing tumors, or "galls," on virtually all plant species, except the monocots.

Serious problem, freeze injury locations are worse.

The disease is particularly destructive on brambles (raspberries and blackberries) and grapes.

These galls interfere with water and nutrient flow in the plants. Seriously infected plants may become weakened, stunted and unproductive.

typically think of crown gall around base of plants or on roots

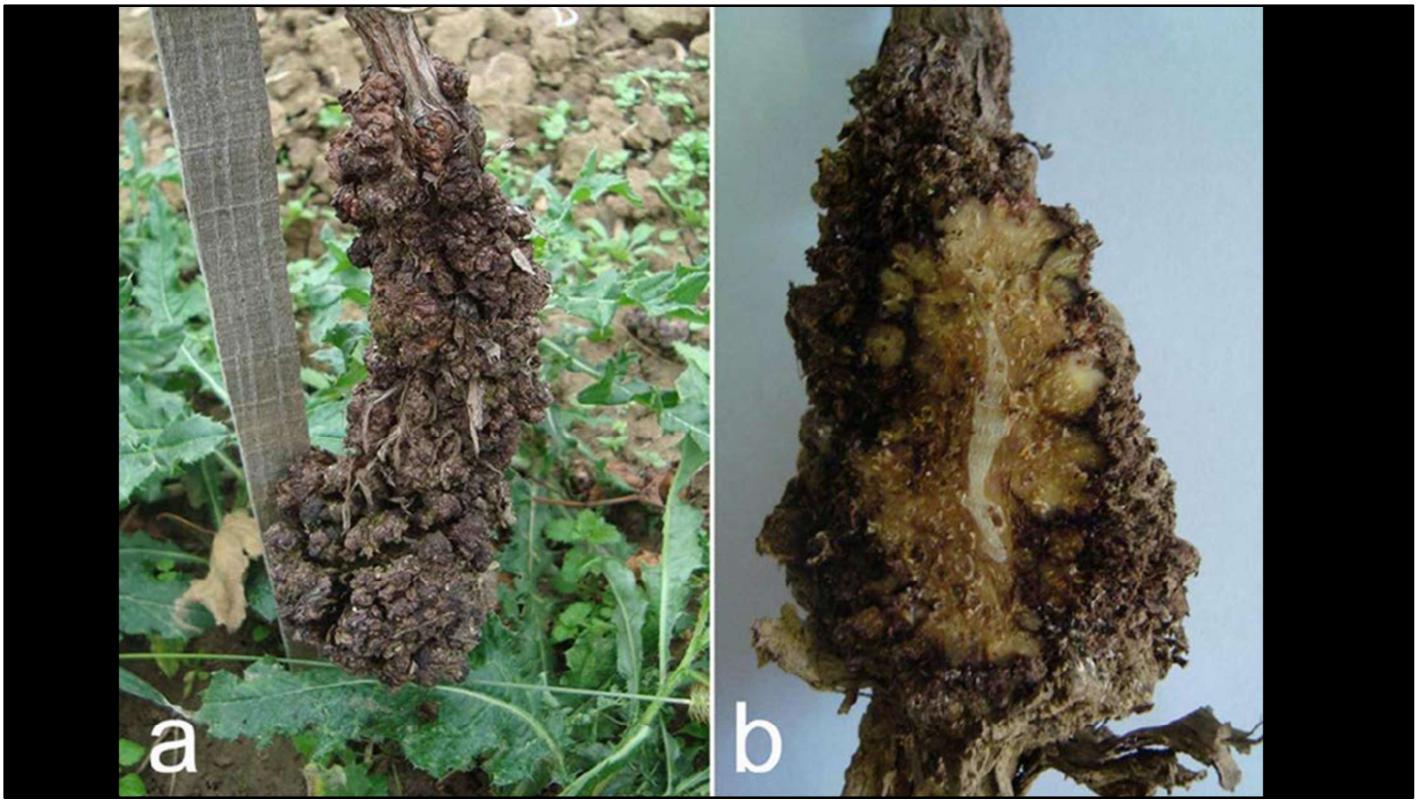
Gall formation on the aerial part of the vines

Young galls are soft, creamy to greenish in color, with no bark or covering.

They usually form in late spring or early summer and can be formed each season.

As galls age they become dark brown to black, hard, rough, and woody. Some disintegrate with time and others may remain for the life of the plant.

As they age, the tissue darkens to brown.



cross section of gall showing inhibition of xylem and phloem activity

If infection is severe, plants may be stunted, produce dry, poorly-developed fruit, or show various deficiency symptoms due to impaired uptake and transport of nutrients and water.

early vine collapse from crown gall

red foliar discoloration due to inhibited water flow

can increase chances of winter injury

Managing Crown Gall

EXTENSION
UtahStateUniversity

Select sites with good air and water drainage

Avoid vine stress due to poor nutrition or low pH

Do not propagate wood taken from galled vines

Obtain clean (disease free) nursery stock, and avoid planting clean material in sites previously infested with the bacteria.

Any practice that reduces wounding is highly beneficial. Preventing winter injury (especially on grapes) is also beneficial.

Galls on the upper parts of the trunk or on canes can be removed by pruning.

Sour Rot

Caused by a combination of yeasts and bacteria

A secondary effect of berry wounding

Characterized by vinegar odor

Ideal condition: hot August weather accompanied by rains

Both the yeasts and bacteria need some type of physical injury or wound to infect the plant, so birds, rain cracking, compression in tight clusters, etc. is all involved in the process.

Apparently the yeasts convert the sugar to ethanol then the bacteria convert the ethanol to acetic acid in a “tag team effort.”

Drosophila. melanogaster may be key component

Fruit flies are known to make problem worse

Controlling them has been shown to reduce sour rot

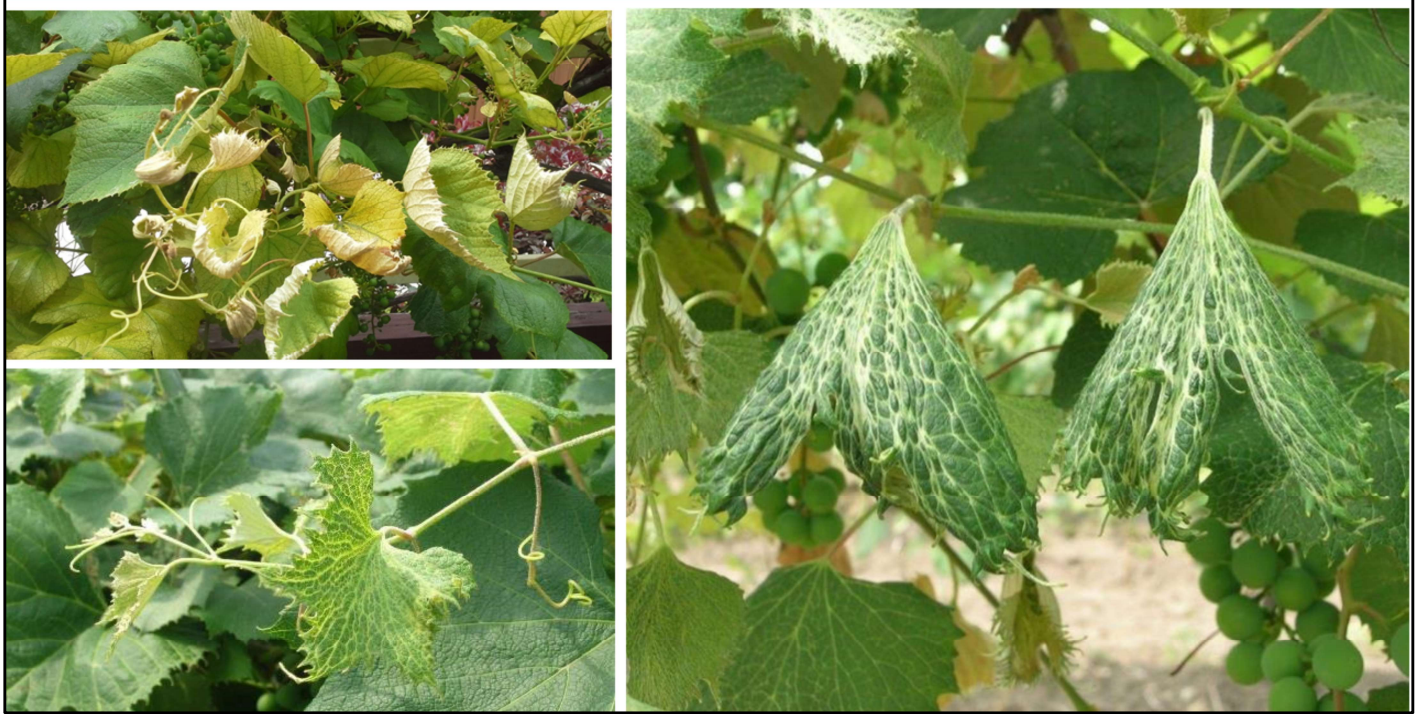
No fungicides, but at point of fruit ripening (veraison; skin color changes, degree Brix increases to 15, softening), control fruit flies with insecticide

If there are only a few berries split and rotting, and the fruit maturity still a week or two away from optimal, can I just wait and let them dry out as the rest of the fruit ripen

or pick off those berries

Scorch

Injury from 2,4-D Herbicide



very sensitive to herbicide injury from 2,4-d

vines can show injury from 2.4 d (growth regulator) for several years after application

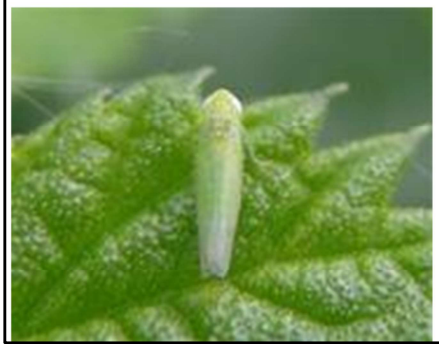
Clusters – injury to clusters can include: flower abortion; fruit set reduction; reduction of fruit size (shot berries intermingled with normal size berries); delayed ripening; and reduction in fruit quality.

Insects

Leafhoppers

Western grape leafhopper: *Erythroneura elegantula*

Potato leafhopper: *Empoasca fabae*



always present in grape vineyards, but seldom reach sufficient populations to damage the vines

Adult grape leafhoppers overwinter beneath leaves and trash near vineyards

potato leafhopper overwinters in southern locales and is blown north

May the adults migrate to the grapes, feed, and lay eggs just under the lower leaf surface

Nymphs feed on the leaf undersurface and cause the typical leafhopper damage. There can be a partial second generation late in the summer.

potato leafhopper does not cause stippling; instead it causes leaf curling, and hopper burn

Leafhopper Management

EXTENSION
UtahStateUniversity

Monitor for nymphal stages

When present, apply:

- insecticidal soap
- horticultural oil
- Sevin (carbaryl)
- Lannate

Two-spotted Spider Mite

EXTENSION
UtahStateUniversity

Overwinter in ground cover and feed on weeds and cover-crop vegetation in spring

Migrate to vines for additional food when groundcovers dry

Each adult female produces 40 to 100 eggs, and the average adult life span is 15 to 30 days but may be up to two months

In heavy infestations, the spots coalesce and the leaf turns yellow or reddish-bronze.

When infestations are heavy, the mite populations retard fruit color development to such an extent that fruit quality may be downgraded.

High mite populations also can affect bud formation.

Spider Mite Management

EXTENSION
UtahStateUniversity

Good irrigation and fertilizer practices help offset damage to foliage

Manage dust from roads

Insecticide application when needed

- Organic
  - Neem oil, insecticidal soap, pyrethrin
- Conventional
  - Agri-Mek, Acramite, Vendex, Envidor, Nexter

An extensive community of natural enemies successfully regulates spider mite populations when undisturbed by pesticides

predatory mites and lacewing and ladybird beetle larva

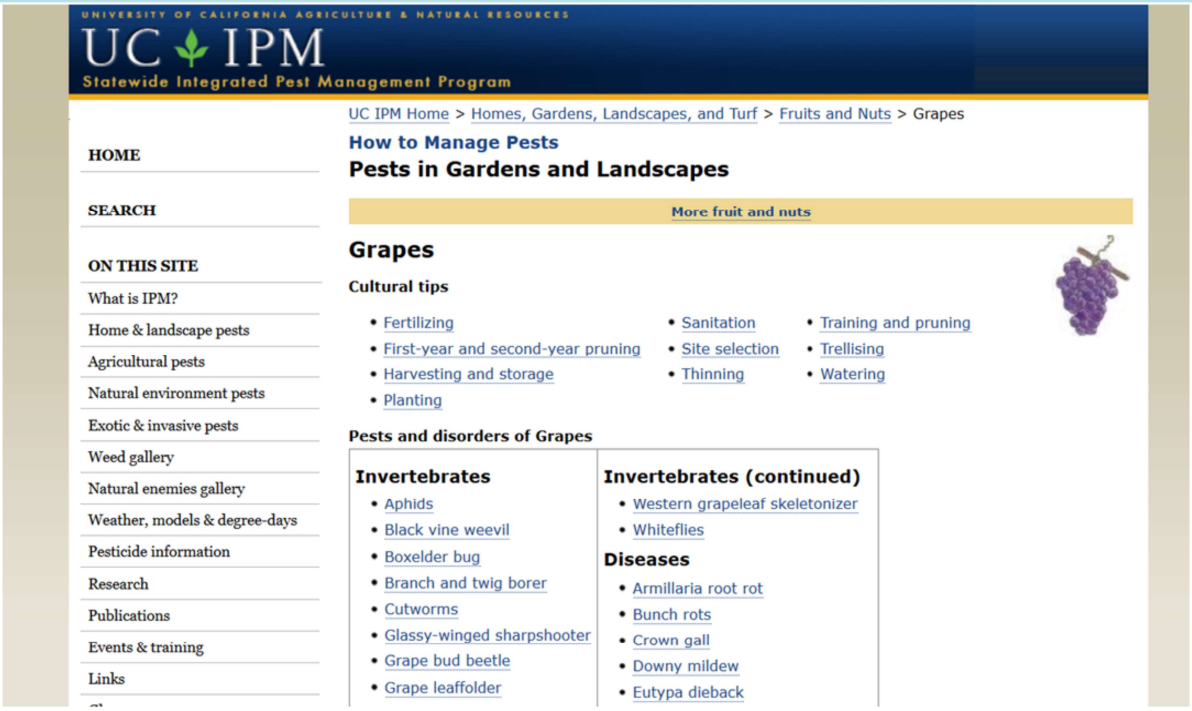
Recent results show that multiple applications of sulfur for disease management (more than five per season) tend to increase incidence and severity of spider mite problems by inhibiting the function of predators, particularly predatory mites

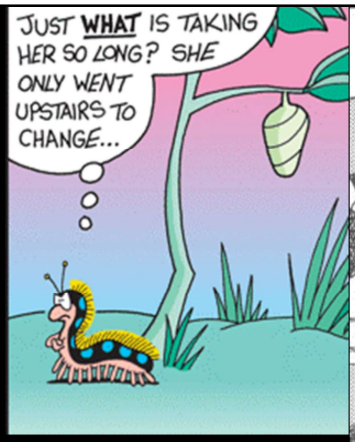
manage dust with water or vineyard floor vegetation

Sulfur is only organic option for PM

Where to Get More Information

Google: “grape pests UC Davis”





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