It's All in the Vine

Growing wine grapes

VEN 3

Fall 2014

Fine Wine begins on the Vine

- You can make bad wine from good grapes
- BUT you can't make great wine from bad grapes
- AND only great grapes make great wine

- However, today it is possible (but not totally simple) to use damaged grapes and make acceptable wine

Annual Cycle

Typical Dates in California

- Spring
  - Bud break, April 1
  - Flowering, May 15
- Summer ripening
  - Veraison, July 15
- Fall Harvest, September 15
- Winter Dormancy, Nov-March

http://oregonwinepress.com/pub/photo/thumb/ VineSpeak_6_11_fitbox_350x350.jpg

A Dormant Vine after pruning

Late Winter

Flickr: northbaywanderer

Flickr: matthew.lavelle; Ryan Opaz

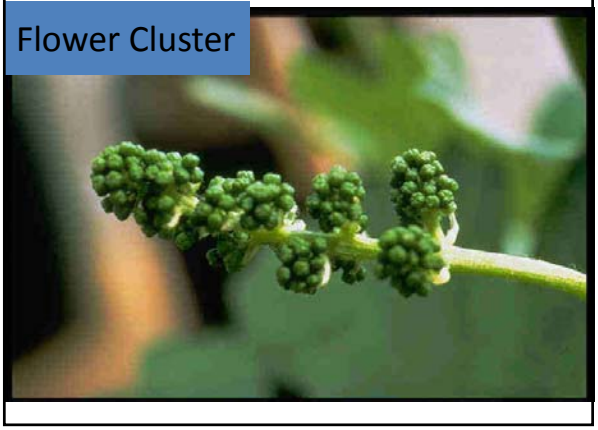
Early Spring in the Vineyard

http://www.made-in-italy.com/files/imagecache/lg/pictures/italian-wine/learning/grape-vines-in-early-spring.jpg

Right before flowering

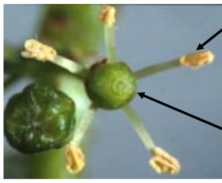
http://www.wineanorak.com/wineblog/wp-content/uploads/2010/06/IMGP0530-1.jpg

Flower Cluster



Start of bloom

http://www.hort.cornell.edu/reisch/grapegenetics/breeding/FewOpen1.jpg



Grape Flower

http://[illegible]%20dreamweaver/virtual%20grape%20images/flower%20CH2.jpg

Fruit Set

http://altoslashormigas.files.wordpress.com/2011/11/fruitset_grapes.jpg?w=800

Pea Size Berries

- Hard and green
- Seed development

http://tabletograve.com/wp-content/uploads/2012/06/peas.jpg

Veraison

- Softening and Color change

http://landvinewine.files.wordpress.com/2012/02/img_0381.jpg

Hand Harvesting

http://www.stonehillwinery.com/images/hand-harvest.jpg

http://us.123rf.com/10536031-woman-hands-harvesting-grapes-in-a-fields.jpg

Mechanical Harvesting

http://www.extension.org/sKorvan%20rotary%20pulsator_0.jpg

http://3.bp.blogspot.com/_night-harvest.jpg

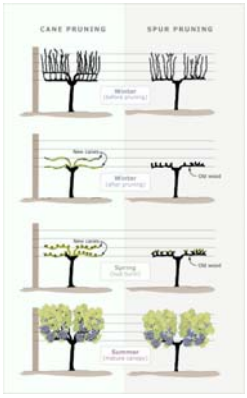
Clusters after mechanical harvesting

http://upload.wikimedia.org/wikipedia/commons/b/b2/Rachis_and_stems_after_mechanical_grape_harvest.jpg

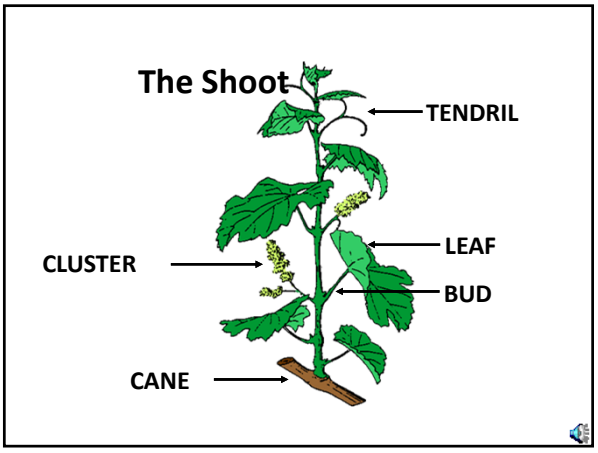
http://cdn.c.photoshelter.com/img-get/I0000VV_6nDhFbO8/s/880/880/Wine-Vineyard-D3022.jpg

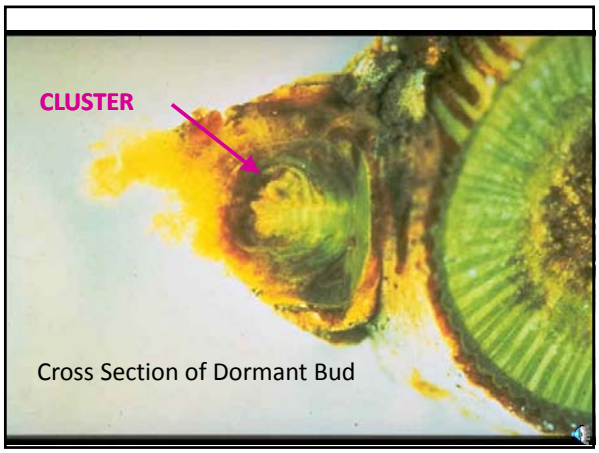
After Leaf Drop

http://quadywinery.typepad.com/photos/uncategorized/a_row_of_vines_before_pruning.jpg



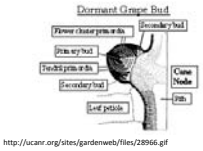
http://www.teara.govt.nz/files/di18314enz.gif





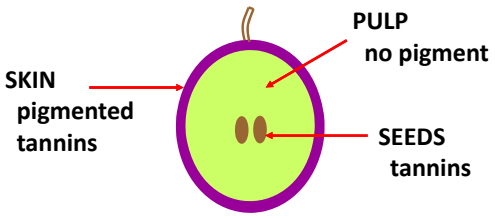
The Significance of Dormant Buds

- The number of buds left after pruning determines the number of fruit clusters
  - Affects the amount of crop!
- This year's events affect next year's crop



http://ucanr.org/sites/gardenweb/files/28966.gif

Berry Structure



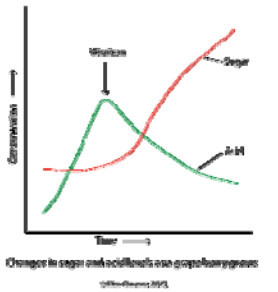
Tannins ➔ bitterness, astringency

Grape Berry Components

- Water
- Sugar
  - Glucose & Fructose, 20-25%
- Acids
  - Malic, tartaric, 0.5-1%
  - Essential to taste of wine
- Pigments
- Tannins
- Aroma compounds
  - Trace quantities, but key to high quality

Ripening:

Sugar Increases,
Acid Decreases



http://knowyourwine.net/wp-content/uploads/2013/03/Grape-berry.gif

The Decision To Harvest

- Sugar must be high enough
- Acid must not be too low
- Varietal flavor optimal
  - Taste the fruit!
- Many berries must be sampled so that the analysis represents the whole vineyard
  - Each berry ripens at a slightly different rate

Importance Of The Environment

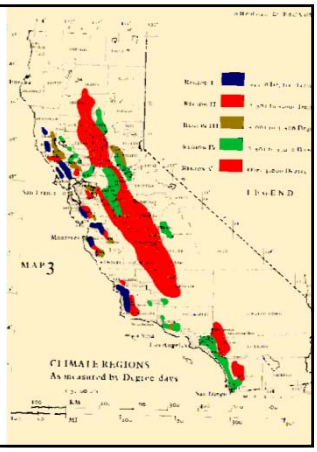
- Temperature
- Water
- Soil

Vineyard Heat Index

- Degree days
  - Developed in 1940's at UCD
  - Cumulative measure of heat
- Uses daily average temp (min/max)
  - Add up each day during season >50F
  - i.e. max 90, min 60 , Average 75→ add 25
  - i.e. max 110, min 80, Average 95 →add 45
  - i.e. max 60, min 40, Average 50 → add zero
- I<2,500, V>4000 degree days F
- Useful in new plantings
  - Varieties are adapted to particular heat levels

Heat Index Regions in California

Amerine & Winkler, Hilgardia, 1944



Varieties Have Different Heat Requirements

- Some need more heat to ripen
  - e.g. Cabernet Sauvignon, Zinfandel (warmer origins)
- Some need less heat to ripen
  - e.g. Chardonnay, Pinot noir, Riesling (cooler origins)

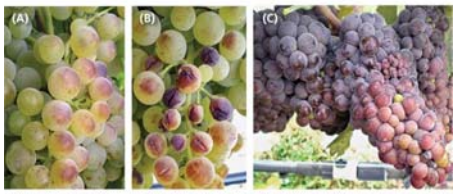
Hotter Places

- More sugar
  - More tons per acre
  - Ripe earlier
- Lower acid
  - Malic acid is respired
- Less color
- Less flavor

http://mavensphotoblog.com/central-valley-grapevines-apr-2010-smaller.jpg

Very Hot

- Shriveled fruit
- Sunburn
- Sugar accumulation stops



A Burger grape cluster exhibits (A) slight browning due to sunburn and (B) more severe sunburn and cracking. (C) *Left*, A healthy Barbera cluster and, *right*, a sunburned cluster with poor coloration and raisining.

http://ucce.ucdavis.edu/files/repository/calag/img6403p155.jpg

Cooler Places

- Less sugar
  - Sugar addition may be necessary
- More acid
  - Wine will be more tart or sour tasting
- More color and more flavor
- Overall, better quality areas (CA)

http://www.russianhillestate.com/assets/client/image/Russian_river_valley.jpg

Very Cold

- Winter kill
- Spring frost
  - Important in California
- Poor fruit set
- Fruit won't ripen

http://cahnrsnews.wsu.edu/files/2011/11/vineyard-snow.jpg

Easter 2007 Freeze: Missouri

Three successive nights of 20 F

http://wine.appellationamerica.com/wine-review/410/Missouri-Freeze.html

Freeze damaged Chardonel from Missouri

Smudge Pots

http://www.cephas.com/smudgepots_in_vineyard_Waipara_New_Zealand.jpg

Wind Machines

http://www.napanow.com/graphics/wind.jpg

http://lasmadresvineyards.com

Preparing for frost, John tunes up the wind machine.

Ice encased vines due to spring frost protection

Paul Kenney, Estancia Estates, Paso Robles – Thanks to Maria Cecilia

Paul Kenney, Estancia Estates, Paso Robles – Thanks to Maria Cecilia

October 11 2008

Paso Robles area 3 nights of HARD Freeze (below 25 degrees F

Effects of Different Climates
(California)

	WARMER	COOLER
SUGAR	higher	lower
ACID	lower	higher
COLOR	lower	higher
FLAVOR	lower	higher
YIELD	higher	lower
VALUE	LOWER	HIGHER

Effects of Water Availability

- When?
  - Winter rain ideal (deep roots)
  - Summer rain ➔ rot
- How much?
  - Too little ➔ low production
  - Too much ➔ poor quality

Irrigation Practices

- Europe
  - NOT permitted in cooler wetter places
- New world
  - widely used

Flood Irrigation

http://www.cephas.com/Flood_irrigation_in_Parral_trained_vineyardMendoza_province_.jpg

Drip Irrigation

http://www.kobrandwineandspirits.com/irrigation.jpg

Function of Soil

- Supports the vine
- Holds water and nutrients

- Imparts flavor??? NOT directly

Soil Effects on Wine

- Wine differences that are attributed to soil are probably due more to differences in the water holding capacity of the soil than to any other factor

http://www.thewanderingpalate.com/highbank-vineyard-terra-rossa-soil.jpg

Terra Rossa soils of Coonawarra, South Australia

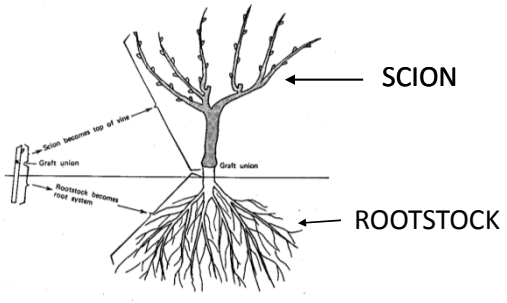
A New Vineyard

- Not from seeds
- Plant a piece of cane
  - a piece of wood cut off in pruning
- Field budding

  OR
- Bench grafts

http://theromanticvineyard.com/carlton-hills-new-vineyard-planting.jpg

Grafting



Jose Sanchez Gavito

How wine became modern (SFMOMA)

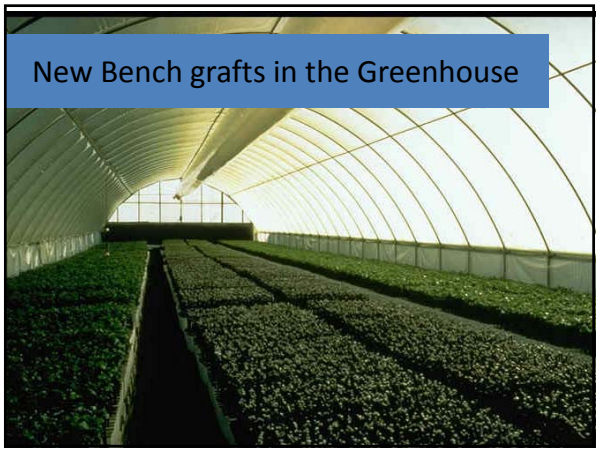
Making Bench grafts at a Commercial Nursery

http://www.academyofwine.com/storage/Bench%20Graft.gif

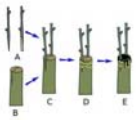
http://www.edenwines.co.uk/images/Omega_cut.jpg

http://www.extension.org/sites/default/files/w/9/9b/omega_grafting.jpg

New Bench grafts in the Greenhouse



Field grafting



http://www.extension.org/Cleft_graft.jpg

http://www.goodfruit.com

Field grafts a few months to more than a year later

http://www.goodfruit.com

A New Vineyard

- 3 to 4 years to get first crop
- Very expensive
  - Vines, trellising and training, irrigation system
- Typical life: 20 - 25 years
- Cost: $10,000-50,000+ per acre

A Newly Planted Vineyard

http://www.winebusiness.com/content/image/vineyard_Panorama1.jpg

Vineyard Yield

- Range in California
  - 2-20 tons per acre
- Typical high quality area
  - 4-7 tons per acre
- Typical moderate quality
  - 8-12 tons per acre
- Typical low quality
  - 15+ tons per acre

Wine Yield

- 160 gallons per ton (80% of weight)
- 5 bottles per gallon (750 mL)

- 20 acre vineyard, 7 tons per acre
  - 20 x 7 x 160 x 5 = 112,000 bottles
    = 9133.33 cases

Vine Management

- Training
- Trellising
- Pruning

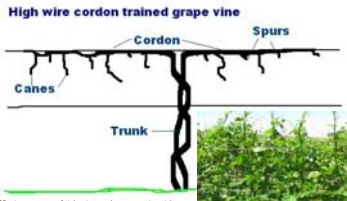
➔Control size and shape of vine
➔Influence wine flavor

Head Trained Vine

http://reignofterroir.com

http://www-plb.ucdavis.edu/head-trained.jpg

Cordon Trained Vine: Bilateral Cordon



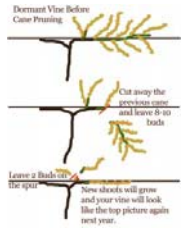
http://lovingrapes.com/High-wire-cordon-grape-vine.JPG

https://go.dmacc.edu/programs/viticulture/MidWireCordonVSP.jpg

Thanks to Greg Hirson

Pruning

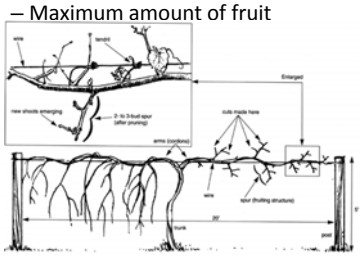
- Removes most of last year's shoot
- Determines number of dormant buds



http://www.growbettergrapes.com/grape-pruning-21-231x300.jpg

Pruning Controls Amount of Crop

- Number of buds
  - Number of clusters
- Number of clusters
  - Maximum amount of fruit



http://www.aces.edu/fig.4.gif

Pruning

- Too few buds → excessive vegetation
  → poor flavor
- Too many buds → over cropped
  → won't ripen

http://www.extension.org/Vine_balance_3.jpg

Excessive vigor

Balanced vine growth

http://www.avalonwine.com/ciel-du-cheval-rows-400p.jpg

Canopy Management

- Optimizing
  - Ratio of fruit to foliage
  - Amount of light reaching fruit
- By → trellising
  → training
  → pruning

Fruit zone leaf removal

http://asiancorrespondent.com

Summer topping

Topped and 'green harvested'

Another “green’ Harvest