

# Seasonal cultural and canopy management in vineyards

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# Why is viticulture management important?

- Makes vine cultivation possible in our already challenging climate!
  - More critical than in arid/dry regions
- Sets crop yield
- Dictates quality
- Optimizes pest management
  - Integrated approach
- Ensures vineyard health and sustainability
  - Nutrition
  - Diseases
  - Vine capacity





# *Timely* implementation of management

- Management needs to be *timely*
  - Pruning
  - Fertilization
  - Shoot thinning
  - Leaf pulling
  - Shoot positioning
  - Hedging
  - Crop thinning
  - Harvesting
- Often **not** calendar-based
- Often optimized when phenology-based



If you *miss* the implementation of a practice at a given stage/time...

- The *work load can INCREASE*
  - Ex: late shoot thinning
- AND...
- The *practice is less effective*
  - Ex: late crop thinning and leaf removal





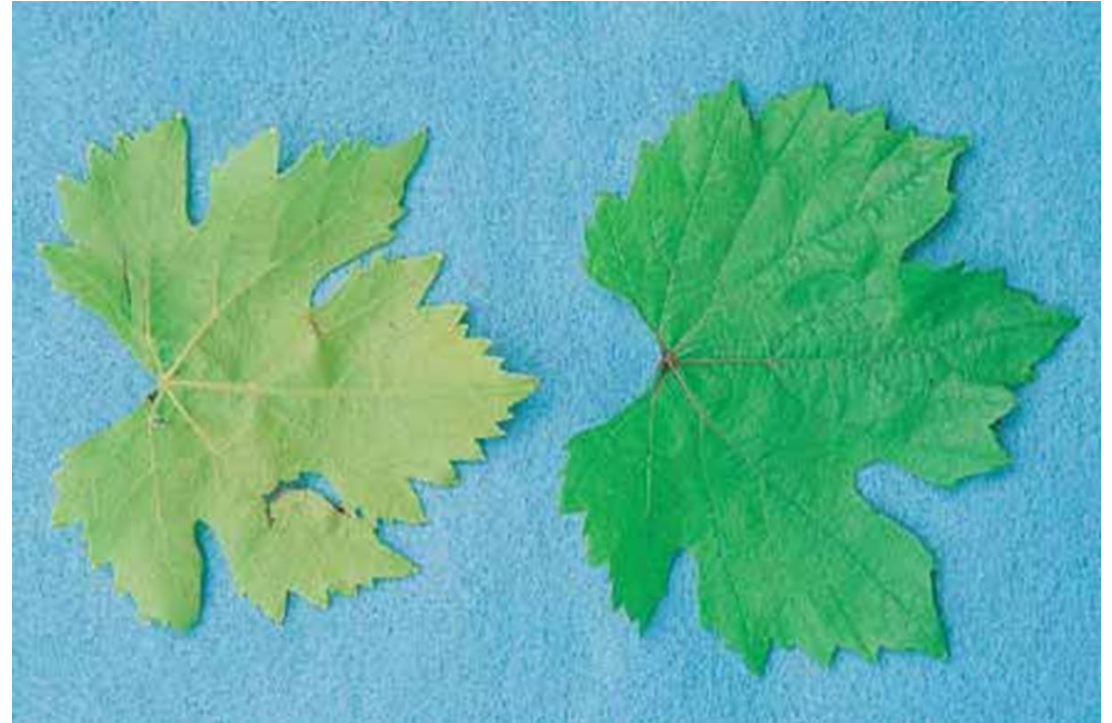
If you *miss and don't finish* the implementation of a practice at a given stage/time...

- There are carryover effects
  - Ex: if you save buds and don't come back to shoot / crop thin:
    - You will have lots more pruning to do next year...
      - All of the extra one year-old wood
    - You COULD be overcropped
      - Less ripe fruit (current season)
      - Compromised vineyard sustainability (long term)



If you *miss and don't finish* the implementation of a practice at a given stage/time...

- There are carryover effects
  - Ex: if you don't fertilize at the proper time...
    - Could have deficiency (N)
      - Reduced fruit set
      - Chlorotic leaves
      - Less sugar accumulation
      - Less ripe fruit
      - Less overwintering carbohydrate reserves?
    - Lower YAN?
      - Sluggish fermentatiton
      - Increased yeast nutrient requirements to maintain fermentation



<http://www.winetitles.com.au/diagnosis/details.asp?view=231>



If you *miss and don't finish* the implementation of a practice at a given stage/time...

- There are carryover effects
  - Ex: if you don't pull fruit zone leaves
    - Could have increased fungal disease and bunch rots
      - Increased inoculum buildup
      - Increased overwintering of diseases
      - Increased disease pressure
      - Less quality fruit
      - Less wine
      - Less revenue....



Many practices give you more than one benefit (usually fruit quality and disease control)... **they are important!**

- ***Leaf removal:***

- Improved sensory compound development
- Improved spray penetration
- Reduced rots

- ***Hedging:***

- Less vine self-shading
- Better radiation penetration and net photosynthesis (better carbon gain, sugar accumulation)
- Better spray penetration





# Overall: there are penalties associated with mismanagement

- When management is implemented:
  - At the wrong time
  - Improperly
- Effects can (and will!) compound over time...
- Results in greater challenges to production
  - **WE ARE “GOOD” ON CHALLENGES (we don’t need more)**



# So.... we need to make sure we implement practices – no exceptions

- There are no free lunches in eastern US viticulture
- *Common* vineyard management practices have become *common* for a reason...
  - They are ***not*** an option in order to be successful





# Canopy scouting

- Nelson Shaulis, viticulture professor at Cornell back in the 60's:
- “The best fertilizer is the owner's / manager's footprints in the vineyard”
- “If I had only one time to step in the vineyard, I could glean the most information at veraison”



# Canopy scouting

- Those that get out in the vineyard daily are much better-informed than those who do not.
- What to look for?
  - Insects (Brett)
  - Diseases (Phil)
  - Chlorotic canopy leaves
  - Nutritional deficiencies





# Practical applications: if it was my vineyard....



- CONSIDER YOUR SITE AND GOALS
- Apply management based on science rather than what “seems to make sense”
  - Don’t consider as “optional”
- Match management to:
  - Variety
  - Site
  - Budget
  - Production goals
    - quality and quantity

# VITICULTURE MANAGEMENT

## CULTURAL PRACTICES

Detailed practice guides  
 are available for each  
 month of the growing  
 season. These guides  
 provide detailed  
 information on the  
 timing and sequence  
 of cultural practices  
 for each month of  
 the growing season.

## DISEASES

Detailed practice guides  
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## INSECTS

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1	2	3	4	5	6	7	8	9	10	11	12	13
SUMMARY	OLD GROWTH	OLD GROWTH	PRUNING	BLOSSOM	FRUIT SET	NO-GROWTH	PEA-GROWTH	SEMI-THICK	BUNCH CLIPPING	VERMILION	PREHARVEST	HARVEST



START PHENOLOGY PART HERE



# Dormant bud

- Prune (are you done?)
- Frost protection:
  - Wind machine
  - Heaters
- Apply oils and/or cryoprotectants?
  - Mixed results
  - I wouldn't recommend





# Dormant bud

- Late winter / early spring
  - NOW
- Order vines for spring 2020 planting



# Bud break



- Bud swell
- Implement delayed pruning?
- *Do not delay* delayed pruning too much...
  - Basal buds (those retained) produce less crop when pruning is delayed to the point where apical growth is more than a few inches





# 4 inch growth stage -



- ***Inflorescences are clear***
  - As such, one can make out fruitful vs. non-fruitful shoots
- **Shoot thinning needs to occur between now and 6 inch stage**
  - **4-5 shoots / linear foot of row**
  - Ways to mitigate shoot thinning need:
    - Cane prune
    - Prune aggressively down to 4-5 buds per linear foot of row



Too late (...and this is only 7-10 days week later!)





# 6-8 leaves separated



- **Flowers still in compact groups**
- Last of shoot thinning needs done?
- Soil sampling required?
  - Take before first fertilization
- *Prepare* to fertilize
  - Have you ordered fertilizer?



# Pre-bloom



- **12 leaves separated**
- **Single flowers separated**
- Pre-bloom leaf removal?
  - Will reduce fruit set and potentially loosen clusters
  - CROP YIELD – can reduce by > 30%
    - (Annie Vogel's work)
  - Tight clustered cultivars?
  - Start now, finish... after fruit set
    - Depends on labor and acreage





# Bloom



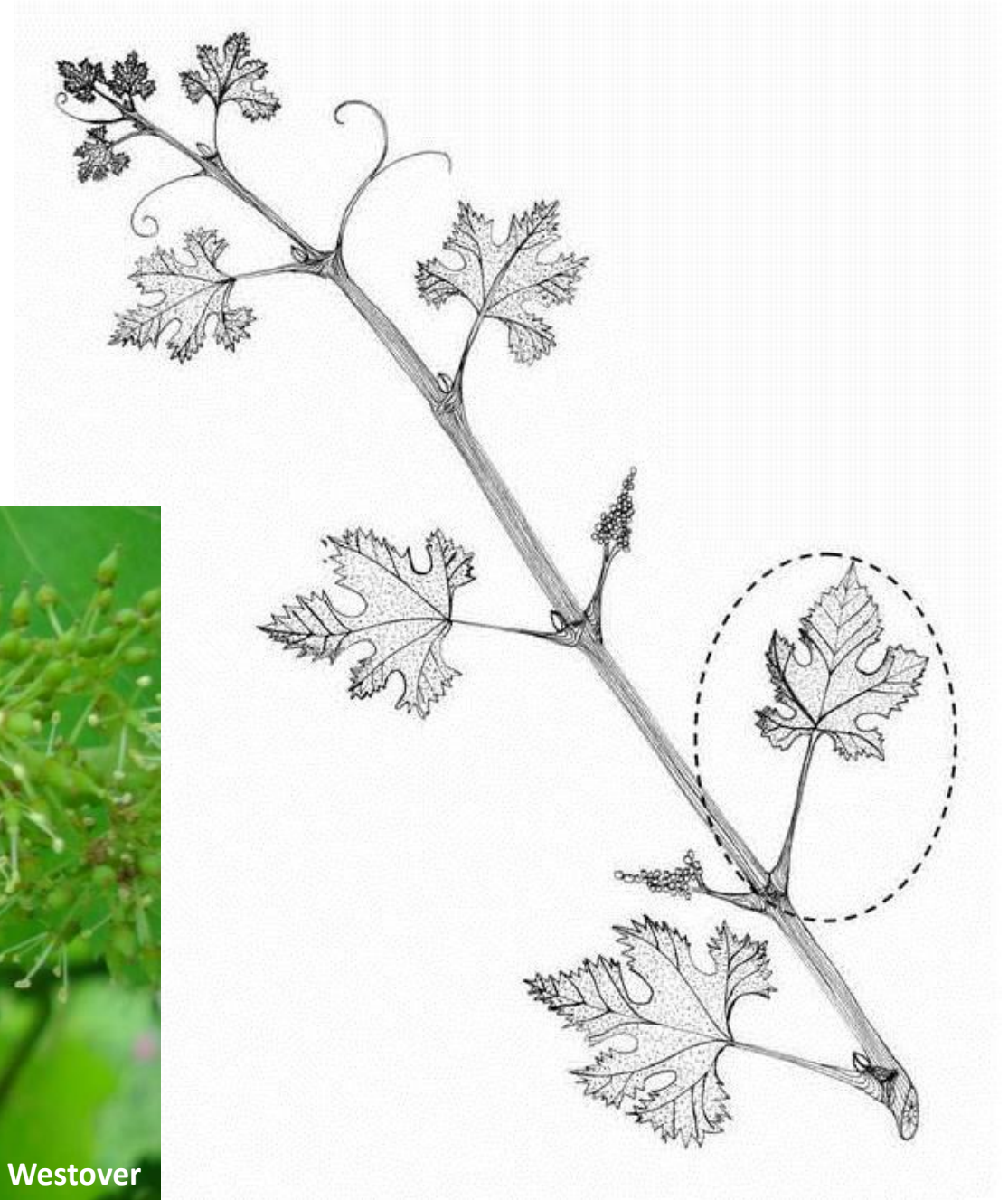
- 50% caps off
- Petiole sampling
  - Leaves opposite clusters (at bloom)
  - Roughly 50-80 petioles
    - Rinsed and dried in oven
    - Depends on cultivar
- Fertilization – see next slide





# Sampling at bloom

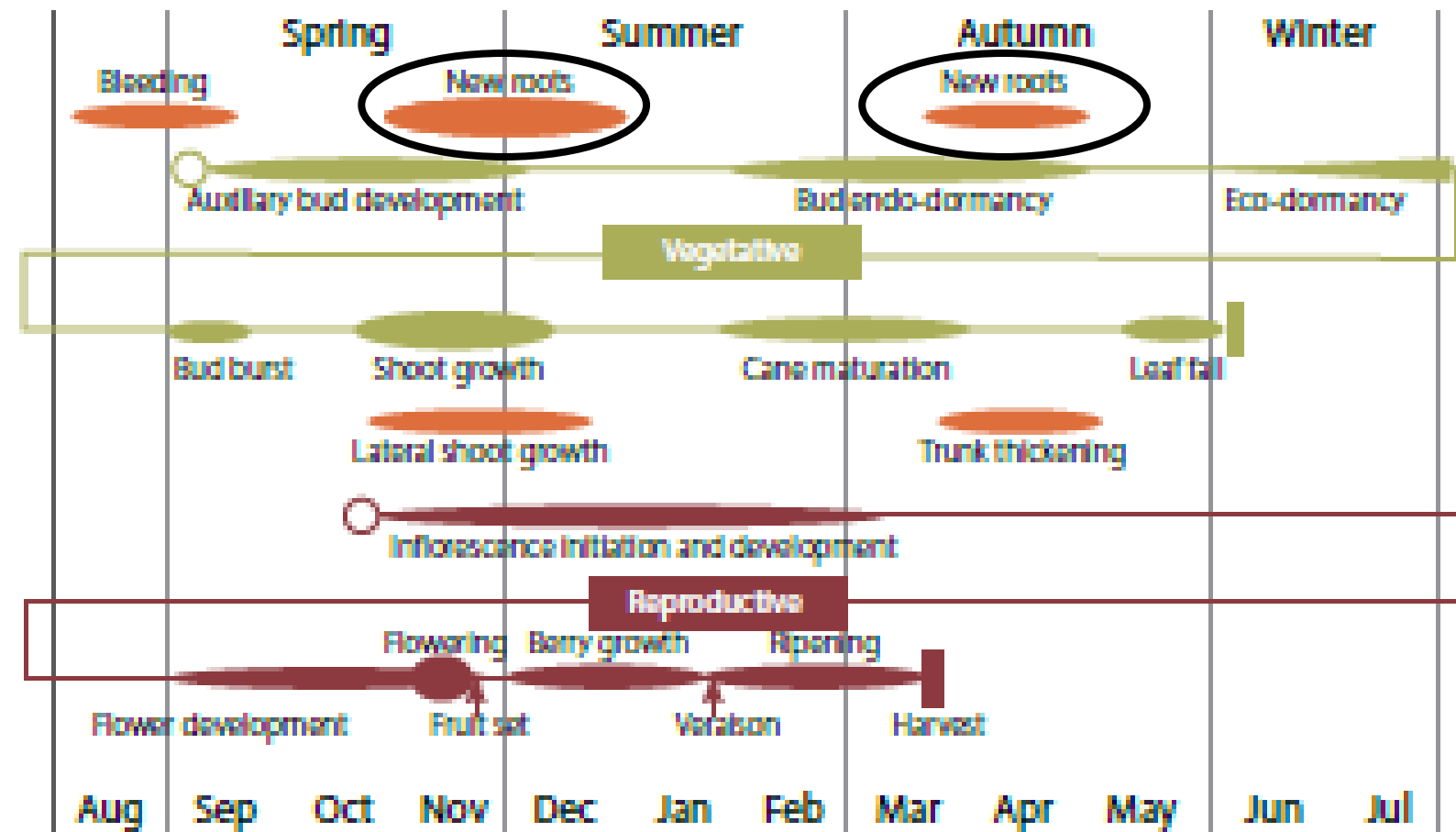
- Petioles (most common) or petioles + leaf blades
- **Opposite flowering cluster**





# Bloom

Figure 4 Seasonal growth phases of the grapevine (adapted from Pearce and Coombe 2004)



# From fruit set through bunch closure – canopy management





# Fruit set



- Shoots above top catch wires (VSP)
- Bunches at right angles to stems
- Tuck / position canopy shoots
- First hedge?
- **This is the best stage at which to remove fruit-zone leaves:**
  - Maintain crop yield
    - (bloom is over)
  - Open up fruit-zone
    - (good air flow and spray penetration)
  - Acclimate grapes to radiation and temperature
    - (prevent sunburn)





# Peppercorn-size berries



- Continue to “set” canopy
  - Shoot tucking and positioning
  - Hedging and lateral shoot trimming
- Any leaf removal left to do?



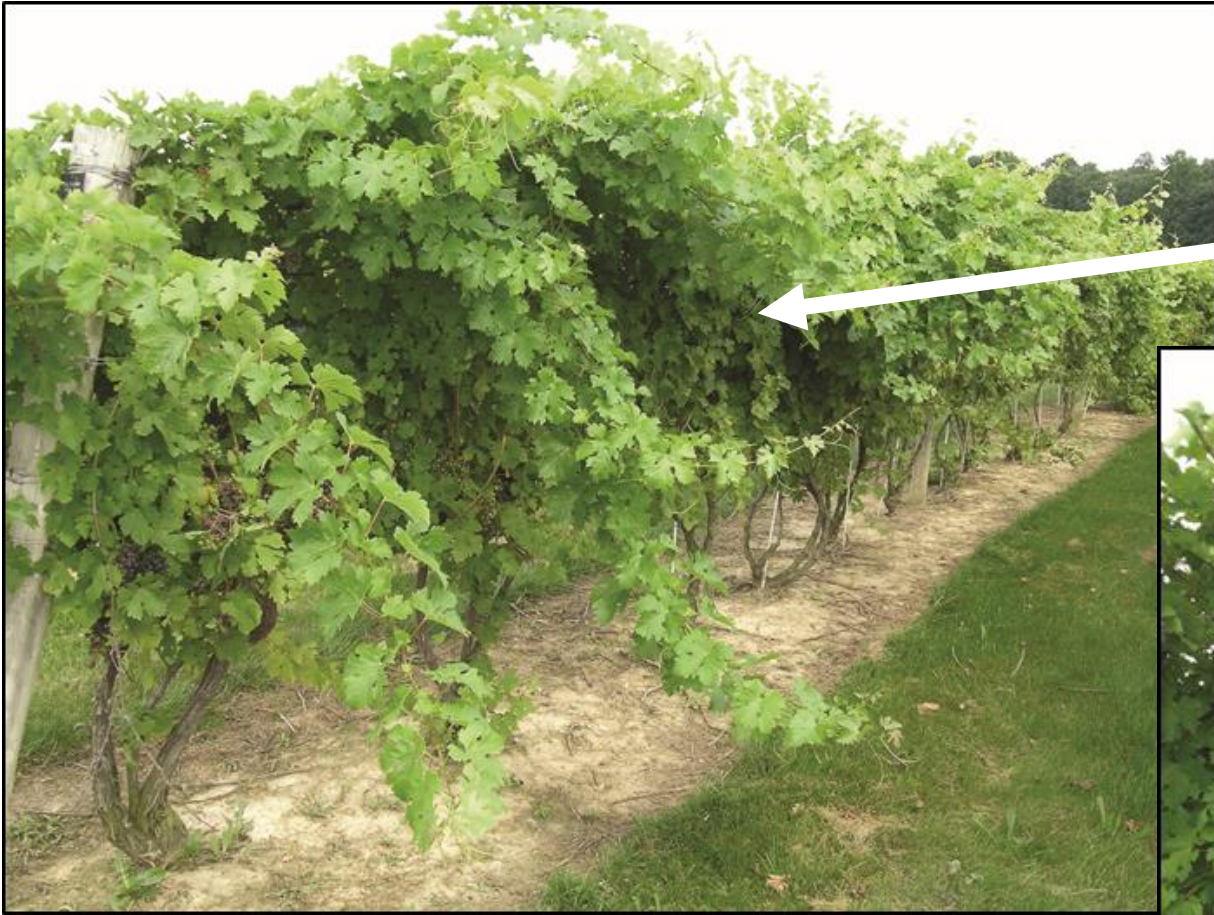




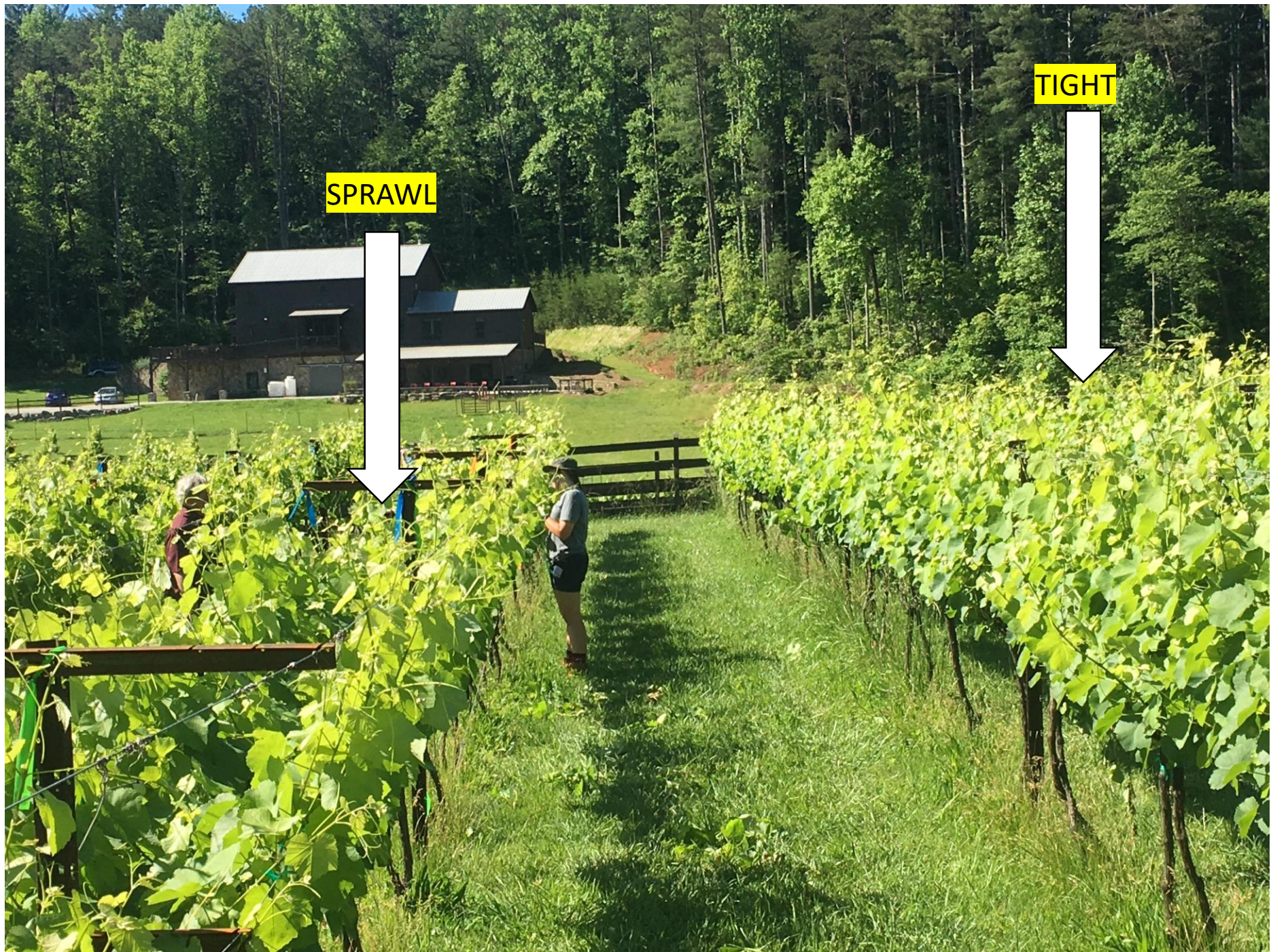














# Pea-size berries



- Last chance to get good spray penetration into cluster centers
- Do not remove leaves intensively if you haven't already
  - sunburn





# Bunch closure



- Read the paper?
- Just kidding...
- Catch up on what you haven't done before this stage
- Prepare for what'

# Pre-veraison



- Brix starts increasing
- Berries soften
- Is your canopy set? Trimmed
- Last chance to thin clusters and potentially affect fruit quality
  - If cluster thinning is conducted before this stage, berries *may* compensate and increase in size as a response
    - Skin: volume ratio





# Veraison

- Plant tissue nutrient analysis?
  - Most recent fully developed primary shoot leaves
    - Pay attention to where you hedged
- Nutrient deficiencies and virus symptoms will be revealed
- Fine tune leaf removal
- Hedge tops and laterals once more?



We are moving towards a veraison sampling  
of vineyards for “routine” sampling

Veraison is more “revealing” of current nutrient status

**Veraison 40-60% color change**



(Tony Wolf)



# Post-veraison



- Scouting
  - Pests
  - Mineral nutrient deficiencies
- Monitoring ripeness
  - How to sample
  - How often
  - What to measure





# Scouting in the post-veraison period

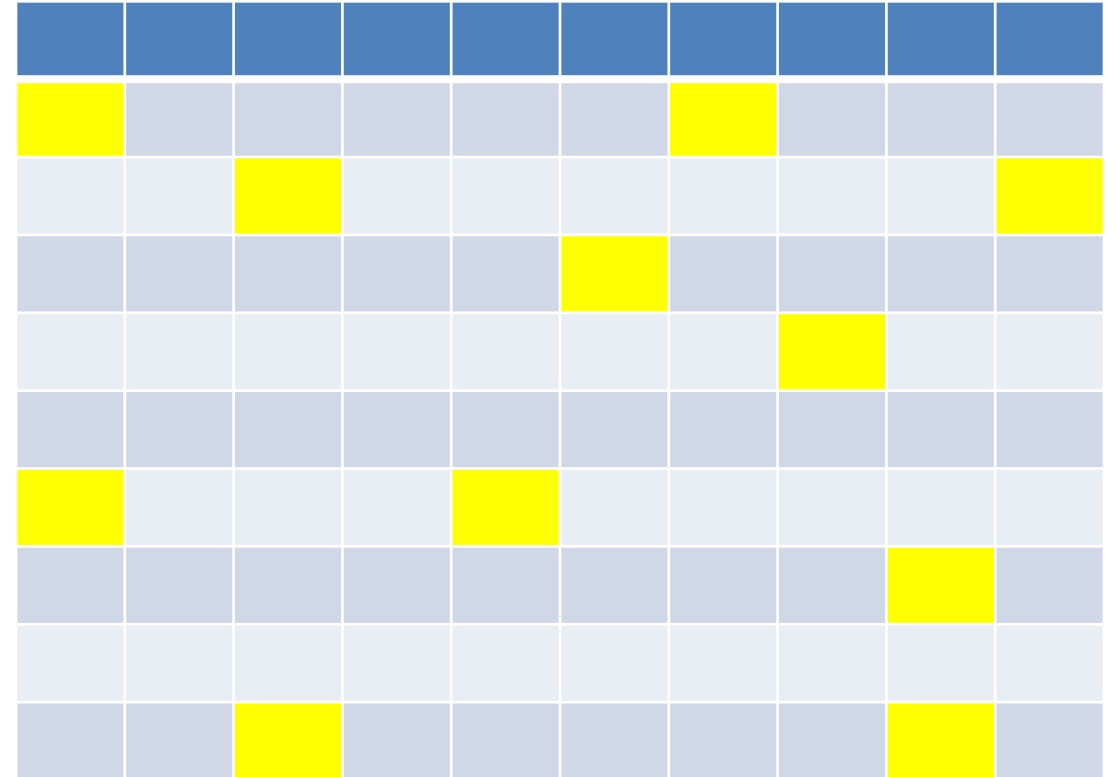






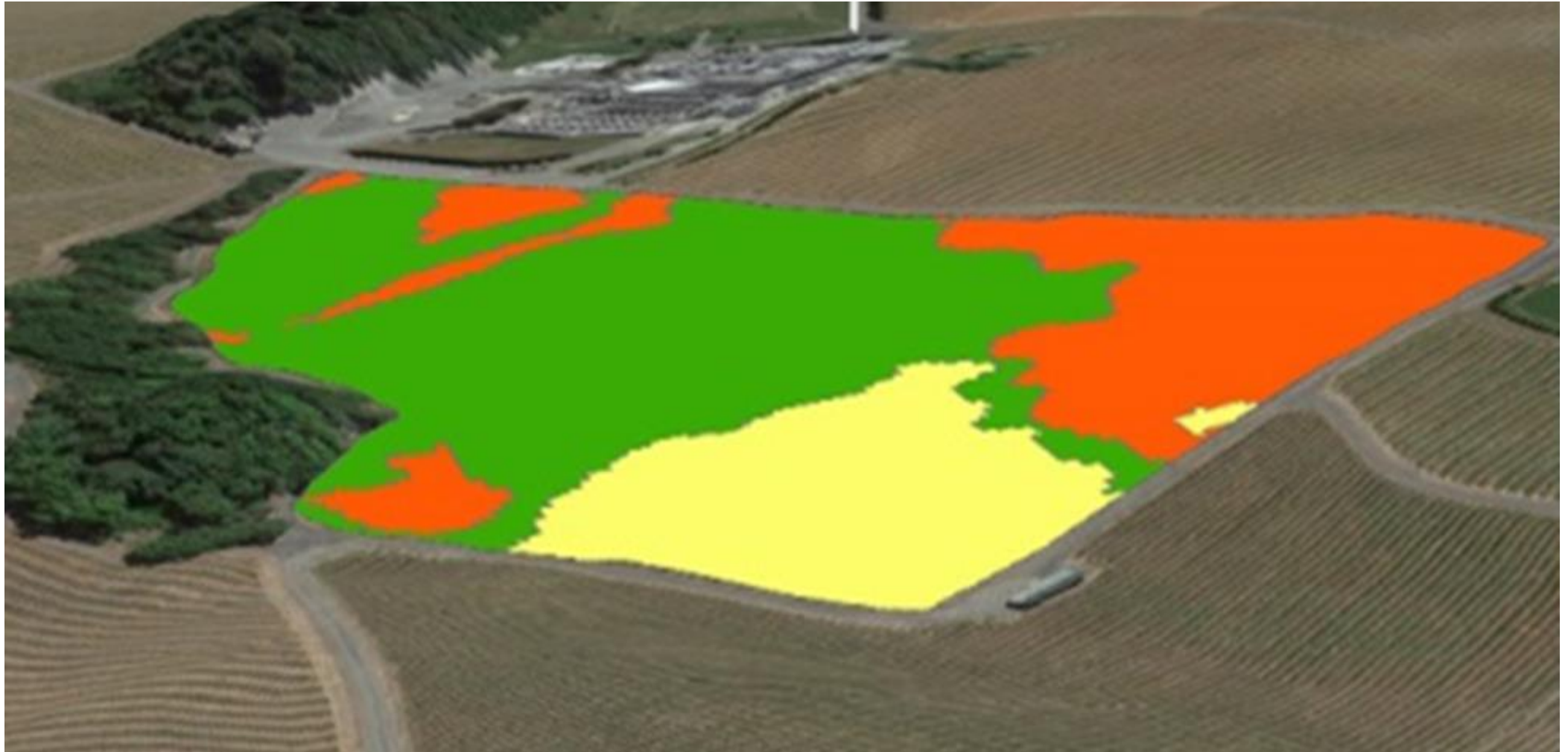
# Monitoring ripeness

- Sample separately:
  - all fruit that will be vinified together
  - Variety - for sure
  - Block of variety
    - (blend vs. premium?)
  - Be sure to sample entire block to characterize the influence of changes in topography, canopy growth, crop load, etc.





**Who cares? I'm just going to vinify it all together anyways....**



# Sampling berries from a cluster

- Should be unbiased and represent the whole cluster....
- ... unless you plan on harvesting different parts of the cluster separately....
- (I wouldn't recommend)





# When / how often?

- Start roughly two weeks post-color change / softening.
- Sample bi-weekly at ~13-14 °Brix
- Sample every few days at about ~ 18-19 °Brix
- Use current-season weather patterns to guide....
- Compare to previous year's weather...

2010 – 2011 Cabernet sauvignon in Winchester, VA		
	Harvest date	Harvest Brix
2010	September 9	26.0
2011	October 19	22.0

# What should I monitor?

- Brix – tells of alcohol potential and relative “heat” and sweetness
  - 19-26 °Brix
- pH – tells of microbial stability
  - > 3.8 is “playing with fire”
- TA – tells of relative astringency
  - 4-10 g/L
- Seed
  - green/soft vs. brown/crispy
- Taste
  - Muscat ottonel and aromatic whites





# Harvest



# When to pick?

- It depends
- *Variety:*
  - Sauvignon blanc (19-20 °Brix)
  - Chardonnay (21 °Brix)
  - Petit manseng (25-29 °Brix)
- *Winemaking goal:*
  - Cabernet Sauvignon from 2016 vs. Cabernet Sauvignon in most years
  - Petit manseng at 25 °Brix vs. Petit Manseng at 29 °Brix









# Leaf fall

- Rest?
  - Not if you make wines as well...
- Evaluate wines and decide on barrels / blends
- Reflect on season's triumphs and failures
- Start to prepare for pruning and next season





# Dormant bud



# VITICULTURE MANAGEMENT

	1	2	3	4	5	6	7	8	9	10	11	12	13
	BURNING	OLD UNITS	OLD BIRCH	PEACHES	BLISS	FRUIT SET	OLD-SIZED FRUIT	PEA-SIZED FRUIT	BERRY TRUCK	BUNCH CLIPPING	VERMION	PREHARVEST	HARVEST
<b>CULTURAL PRACTICES</b>													
<b>DISEASES</b>													
<b>INSECTS</b>													