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Vineyard Mothballing

Strategies for Successfully Taking Vineyards Out of Production

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Mothballing

- Term coined in early 2000s by Australian winegrape producers
- Formally defined as:
Maintaining a non-producing vineyard with minimal, critical inputs to allow for a rapid return to production in the future
- In contrast to “Abandonment” which suggests no maintenance, inputs, or plans to return to production



Potential Approaches to Mothballing

Type I = No Harvest + Minimum Management

- Managed only to mitigate pest and disease pressure
- No consideration to recovery of vines during future return to production
- Little to no cultural practices, inputs, or chemical intervention
- No harvest of fruit

Type II = No Harvest + Management for Recovery

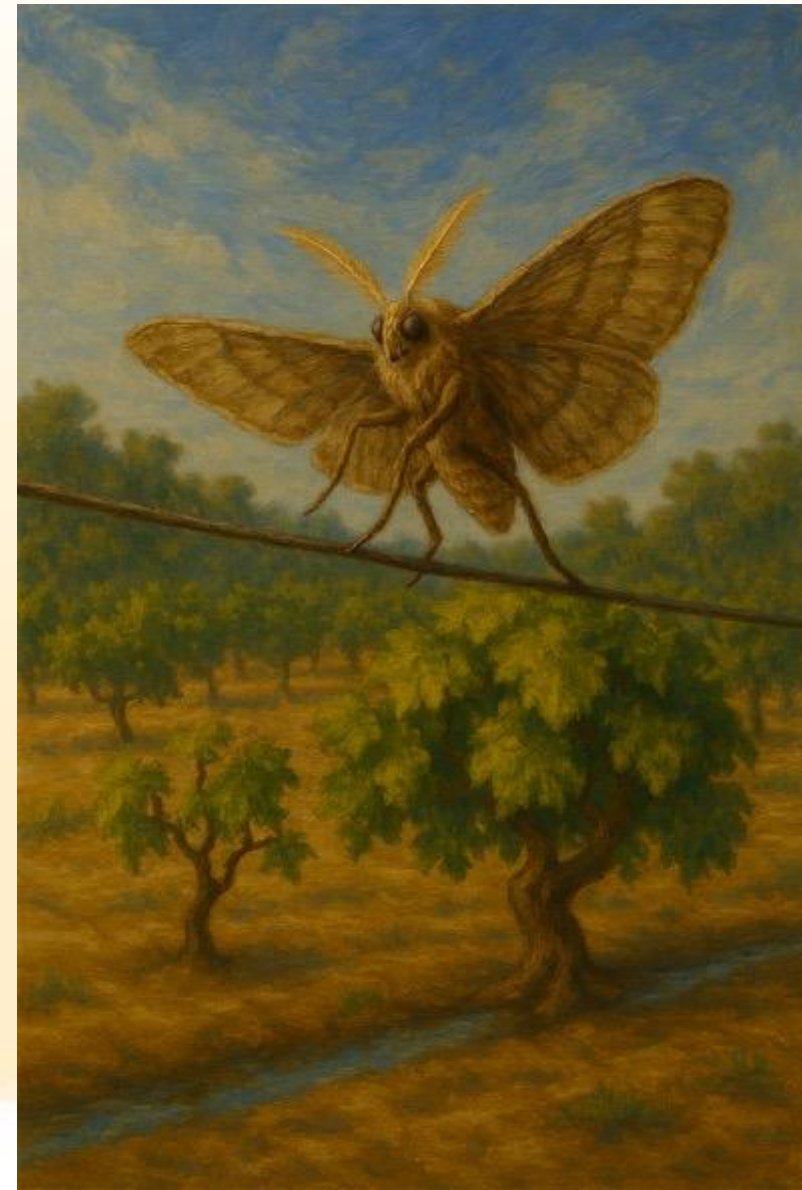
- Management is reduced but still addresses pests, diseases, and vine health
- Vines managed to be quickly brought back into production with minimal effort
- Cultural practices like pruning may continue; inputs may be reduced or eliminated
- No plans for harvest

Type III = Minimal Harvest + Reduced Management

- Management reduced as needed; extraneous practices eliminated first
- Vineyard is not managed for high yields but surviving fruit may be harvested

Risks of Mothballing

- Vine Health and Longevity
 - Significant stress on vines over multiple years
 - Can cause long-term damage to vines
 - May reduce the lifespan of the vineyard
- High Pest and Disease Pressure
 - Pests and diseases can proliferate beyond expectations
 - Can increase long term pest pressure going forward
- Nuisance vineyard and Abatement
 - Vineyard may become a “nuisance” to nearby farms
 - High pest pressure; reservoir for uncommon pests
 - Visual eyesore in highly-trafficked areas
- Poor Recovery
 - Vines may never recover to peak production
 - May take longer than expected to recover to acceptable cropping levels



Harder Than it Sounds

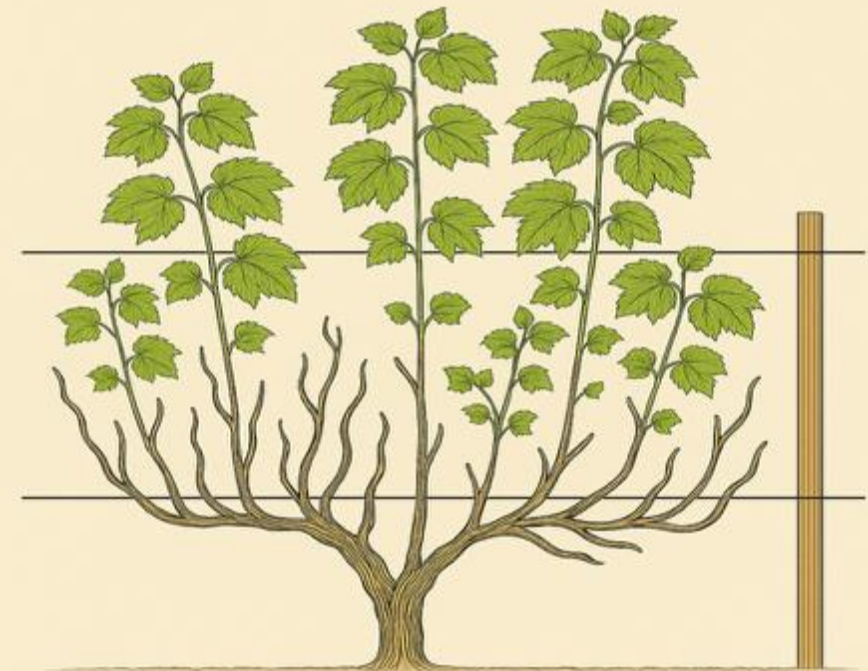
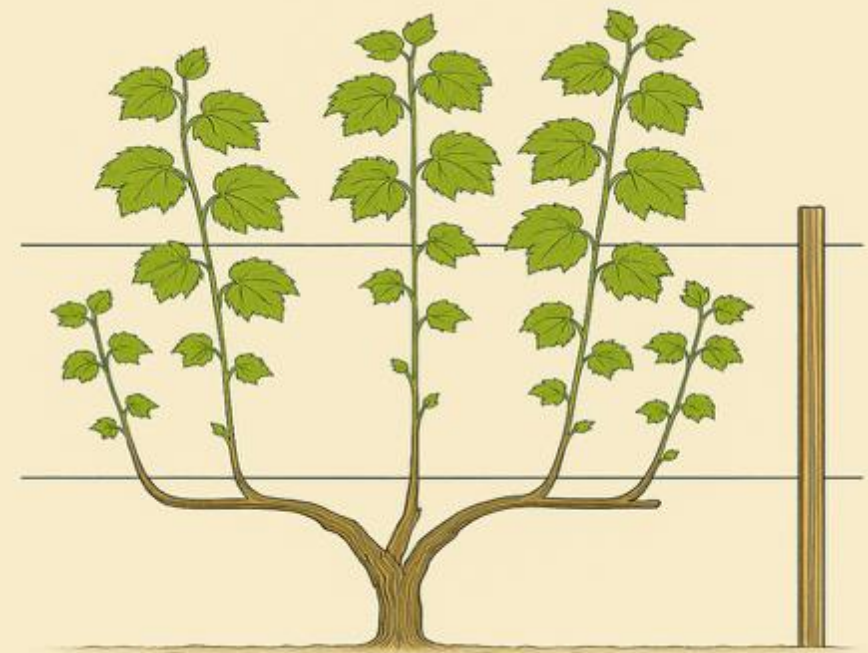
- We can't expect to return to production when we wish to without a long-term, low-input strategy
- Considerations when planning to mothball:
 - Vine physiology
 - Resource use efficiency
 - Pests and diseases
 - Site conditions
 - Target training and management when returning to production
 - Expected length of time vines will be mothballed
 - Minimum labor hours needed
 - Whether or not to still use some chemical controls



Mothballing Methods & Considerations

Vine Physiology

- To successfully mothball a vineyard, we should develop a plan around grapevine physiology and phenology
- Major considerations
 - Assume no harvest planned
 - Yield and quality will decline severely
 - To prune or not to prune?
 - Labor costs ~ Vine health
 - New buds vs. Latent buds when return to production occurs
 - Water use efficiency
 - Less water = less leaves
 - Less transpiration and photosynthesis
 - Plan for recovery



Pruned Vine

New Dormant Buds

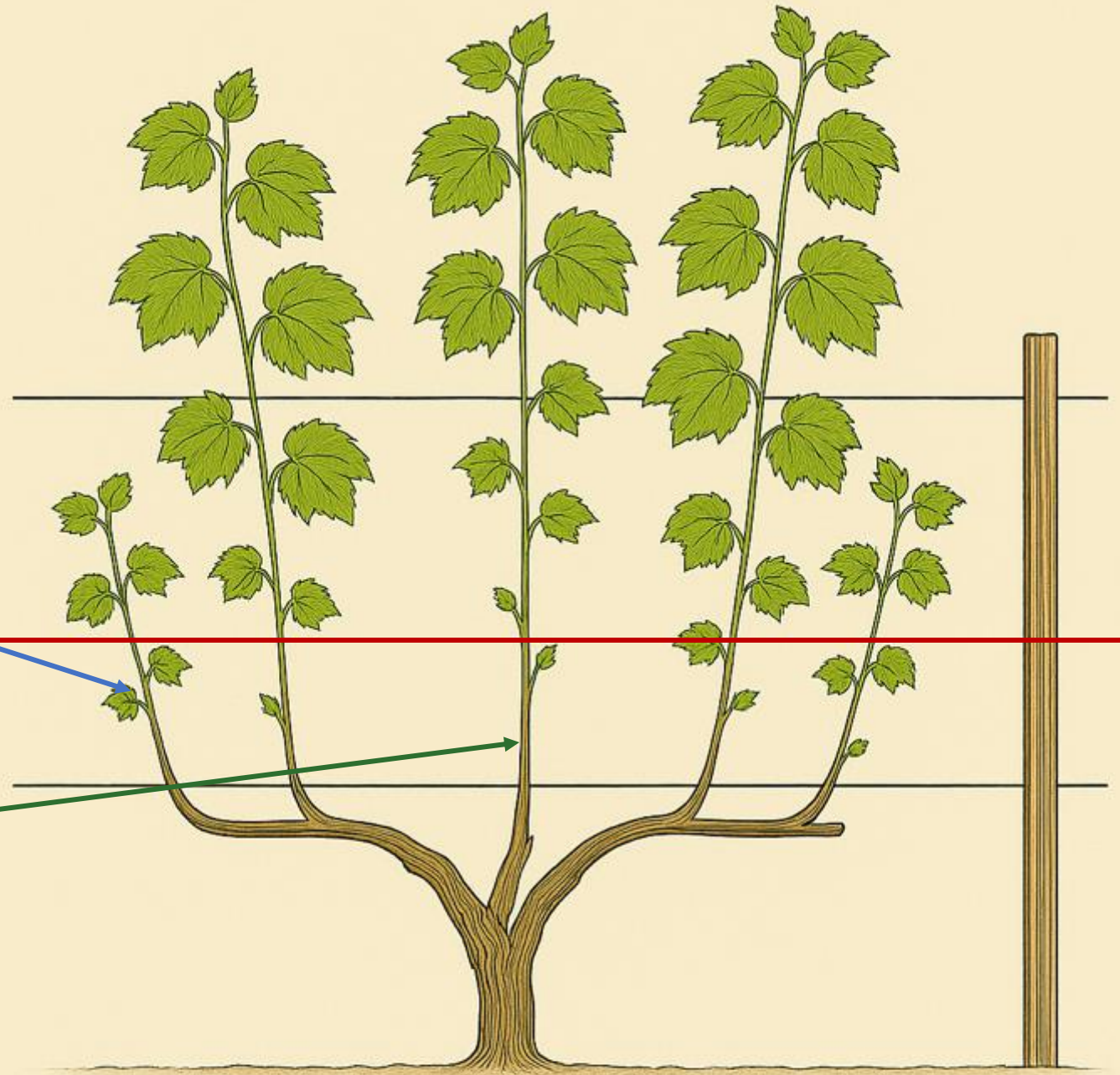
- Has primary bud
- More fruitful and healthy
- Most useful the year after they form

Low Fruiting Zone

- Uniform height for cluster management
- Easy to expose fruit and apply pesticides

Minimal Permanent Wood

- Pruning removes extra tissue
- Limits habitat for pathogens
- Allows for smaller pruning cuts rather than removal of large portions



Unpruned Vine

Latent Buds Needed for Return to Production

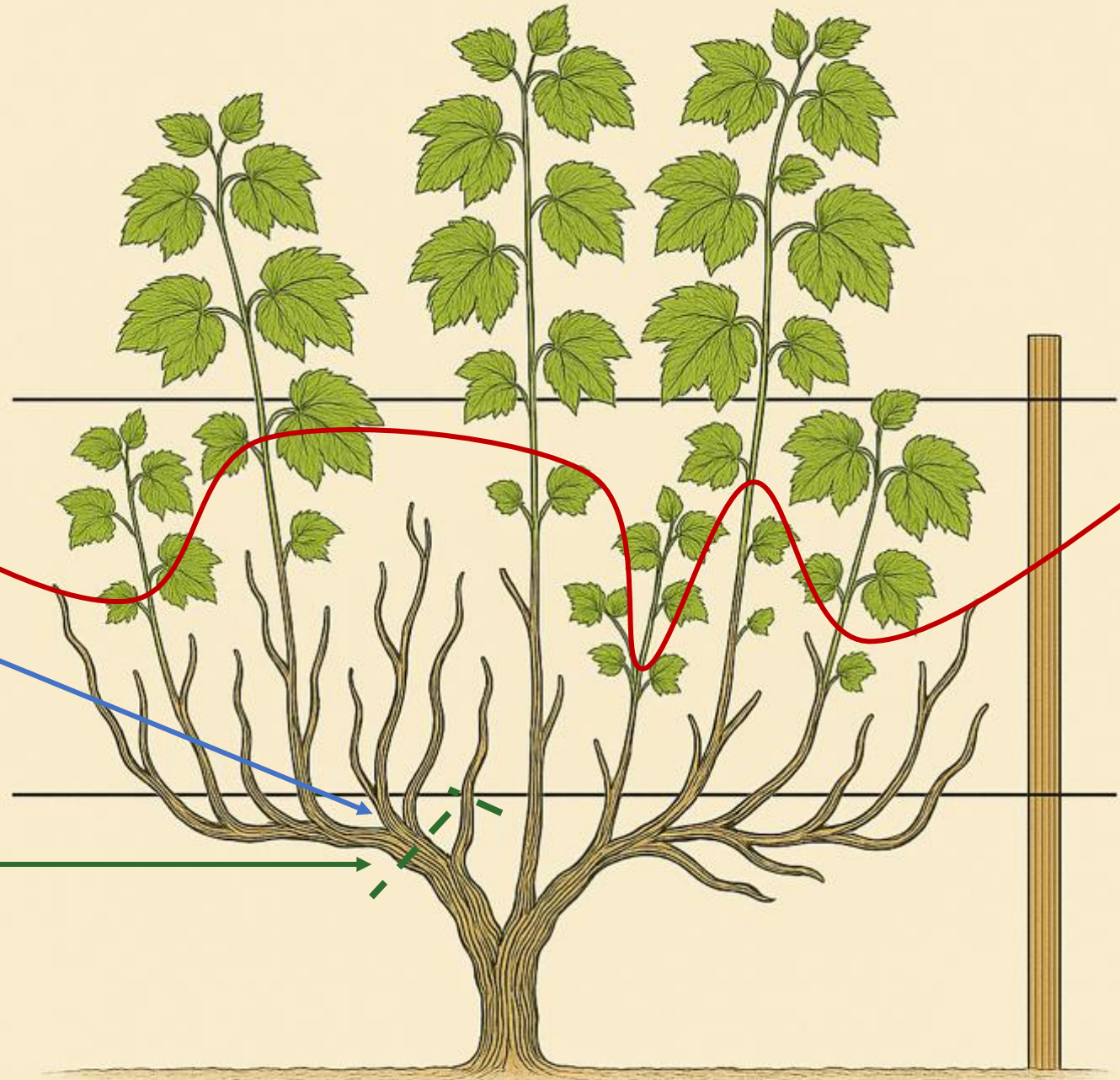
- Likely lacking primary bud
- Often has no cluster primordia
- Less strongly attached to permanent wood

High Fruiting Zone

- Fruit occurs at non-uniform heights
- Even if not harvesting, allows for variation in exposure and temperatures for pests/diseases

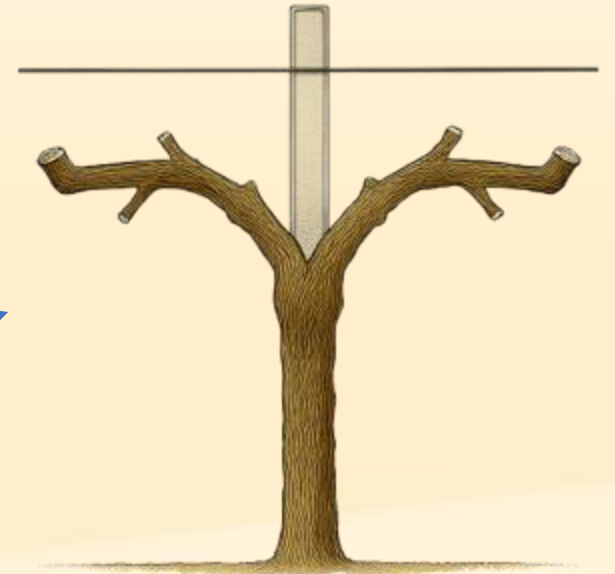
More Permanent Wood

- Unpruned shoots become lignified
- Provides excess habitat for pathogens
- Requires larger pruning cuts when bringing vines back into production



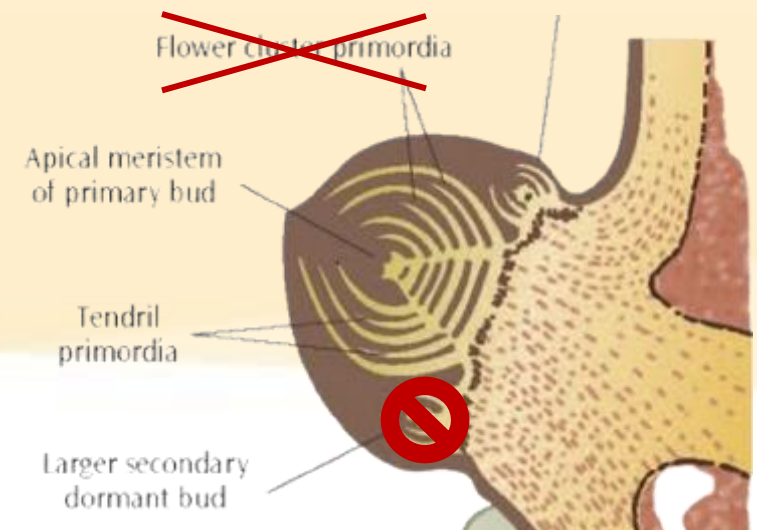
What about Converting to Cane Pruned?

- Common question:
 - What if I convert my vines to a head-trained, cane-pruned system to reduce the pruning demands for my vineyard?
- Viable if applied well
 - Must still prune vines back to the head each year
 - Likely wouldn't retain fruiting canes
 - Only retain renewal spurs to preserve growing positions
 - Similar to making a head-trained, spur-pruned vine
- Labor
 - Still requires labor hours for pruning
 - May require **more** labor hours than spur-pruning does



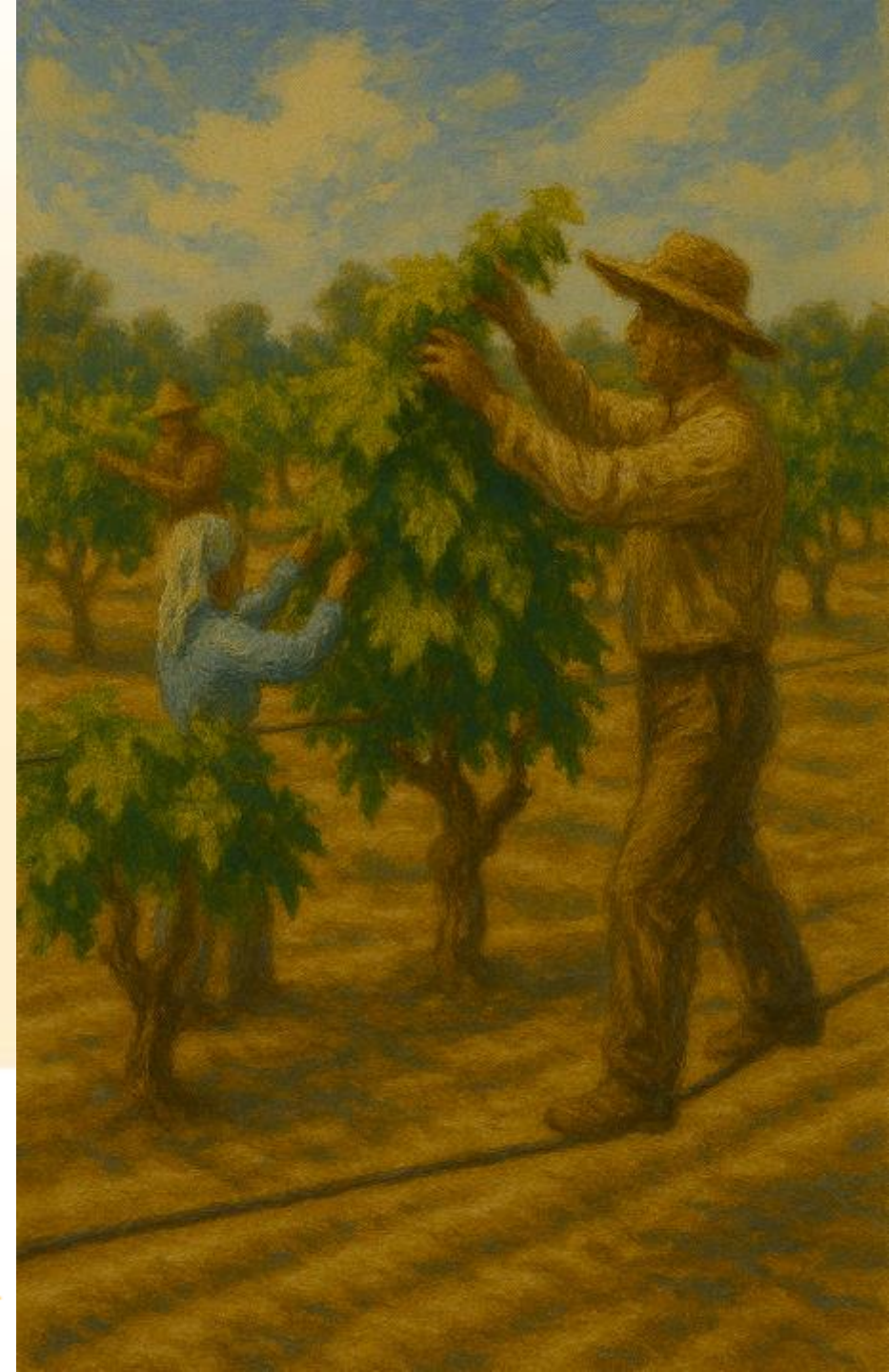
Resource Use Efficiency

- Most mothballed vineyards will receive little to no water or nutrient inputs
- In response, vines will reduce vigor
- Vine vigor \sim resource availability
 - Smaller canopy = less water demand
 - Changes root proliferation over time
 - Seeking resources at first
 - Less root growth in long-term
 - Cluster size decreases
- An already-healthy vine will be able to reduce its growth and reproductive output to match resource availability
 - It will be able to survive low resource availability by reducing vigor significantly



Labor Requirements

- Labor is often the most costly aspect of managing a vineyard
- Labor costs change between the mothballing approaches
 - Type I = Least labor needed
 - Type II = Moderate labor requirements
 - Type III = Fewer hours but still high
- Each approach has variation in how the objectives are achieved



Labor Requirements Examples

- Type I: no harvest; minimal management \$
 - Pest and disease control and/or
 - Livestock management

- Type II: no harvest; manage for recovery \$\$
 - Pest and disease control and/or livestock management
 - Standard pruning for training/trellising style

- Type III: minimal harvest; reduced management \$\$\$
 - Pest and disease control
 - Livestock management
 - Standard pruning for training/trellising style
 - Canopy management
 - Irrigation management

Type I: No harvest – Minimal Management

- Only objectives are:
 - Limit pest and disease pressure
 - Keep the vines alive
 - Really “Storing the vines for later” strategy
- Eliminates the need for nearly all cultural practices
 - Pruning is not conducted
 - Canopy management practices are not applied
 - Inputs are reduced severely or eliminated totally
 - Reduces costs the most out of the various mothballing approaches
- Makes return to production very challenging
 - Requires a year of vegetative tissue recovery before vines can be cropped
 - Relies on older, latent buds for recovery



Pest and Disease Mitigation

- Fine line between a mothballed vineyard and an abandoned one
- Limiting pest and disease pressure to within expected ranges for a managed vineyard is key
- Approaches:
 - Only early season pesticide applications
 - Reduce pest pressure at the start of the season
 - Limit or eliminate inputs
 - Fewer inputs lead to less vigorous vines for pests/diseases (doesn't always apply, e.g., PD)
 - Livestock integration
 - Heavy grazing on cover and the vines can reduce habitat and food for pests/diseases



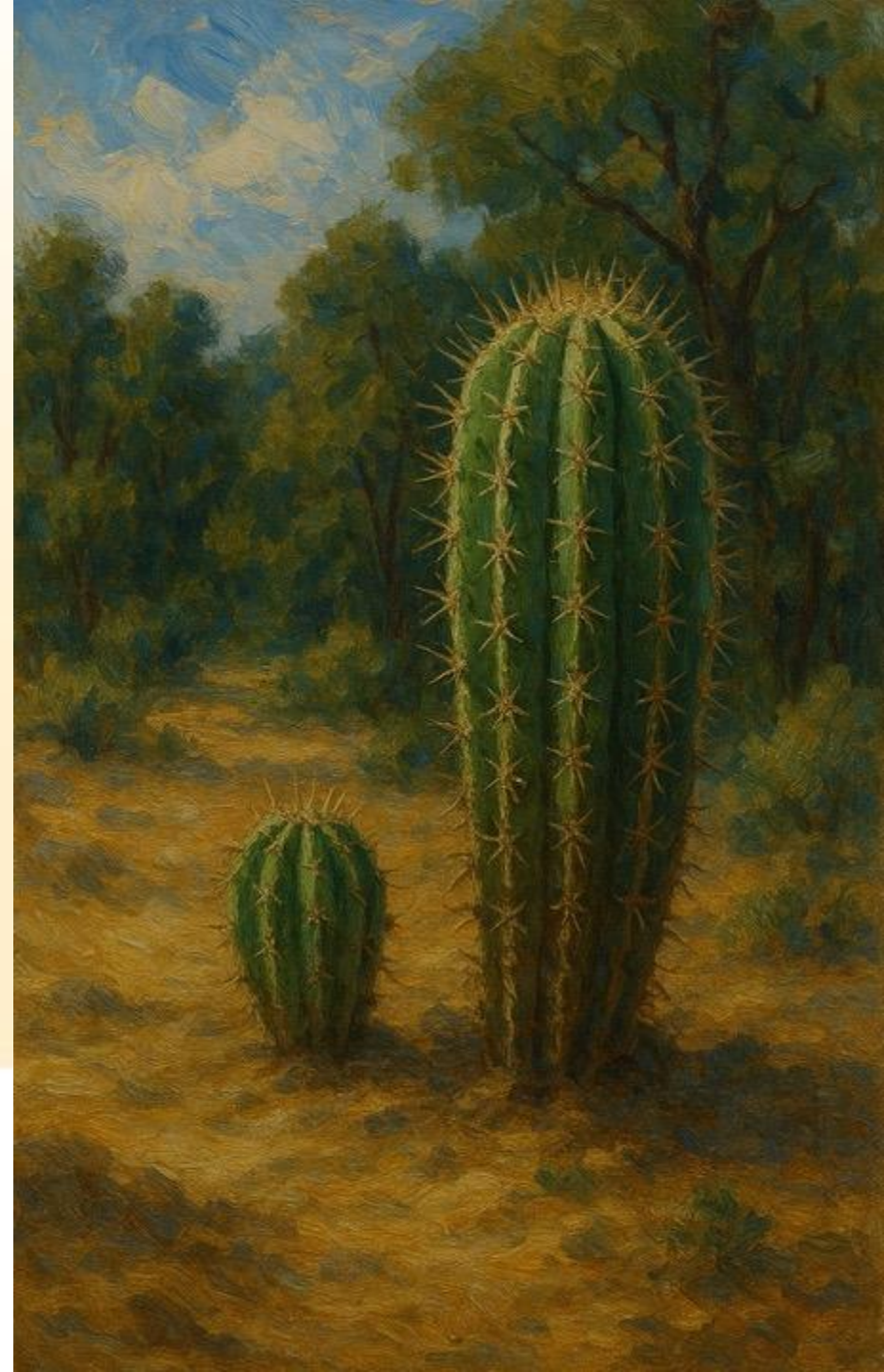
Pest and Disease Mitigation

- Many pesticides are expensive
 - The most costly should be eliminated first
- Some pesticides can still be applied
 - Sulfur and oils are still viable components of pest and disease management
 - Apply early and in fewer overall applications
- Alternative Options (Livestock canopy grazing)
 - Livestock ~ canopy grazing eliminates pockets in the canopy prone to fungal growth
 - Increases airflow and light penetration
 - Can achieve acceptable pest control without chemical applications



Inputs

- Reducing inputs not only saves on costs, but it can also decrease the suitability of the vine to pests and diseases
- Fewer inputs often leads to lower vine vigor and decreased reproductive success
 - This vine response decreases the habitat and resources for pests and diseases that rely on the vine for food or to complete their lifecycles
- Desert plants
 - Most desert plants grow slowly in their natural habitat because resources are scarce
 - In a greenhouse setting they grow much more rapidly and can be subject to higher fungal pressure



Inputs

- When mothballing fertilization of vines is likely not necessary unless you still plan to harvest some of the fruit
- Irrigation should be reduced on a per-site basis and should account for soil ~ water interactions
 - Soils that dry down quickly in spring may still require some water inputs
 - Soils that retain water late into summer may not require irrigation at all
 - Some irrigation may be required to avoid vine embolism and permanent tissue damage



Cultural Practices

- In a Type I mothballed vineyard without plans for harvest, no cultural practices should be applied
- If planning to maintain vine health and structure, pruning would be the most necessary cultural practice in a Type II mothballed vineyard
- In Type III mothballed vineyards (salvageable harvest), pruning and minimal canopy management should be applied
 - e.g., leaf removal, raking, and suckering

Cultural Practices – Floor & Soil Management

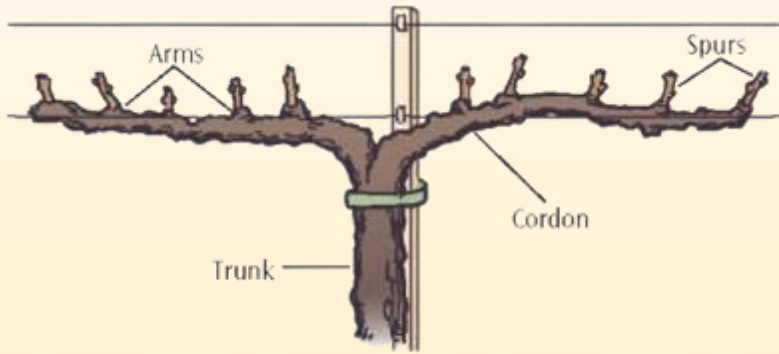
- In any form of mothballing, some floor management will be beneficial
- There's still a need for cover to limit erosion
- Planting self, re-seeding crops during last year of full management will help maintain cover of preferred species rather than weeds
- Mowing, tilling, and/or crimping becomes optional
 - Good to manage cover to limit overwintering habitat for pests that overwinter in leaf litter
 - Maybe a good time to switch to no till

Returning to Production

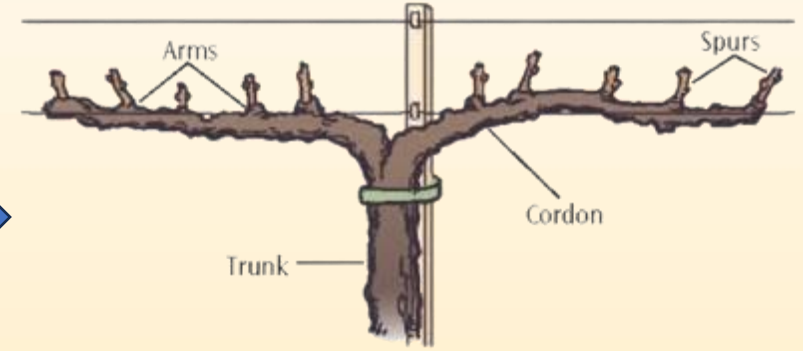
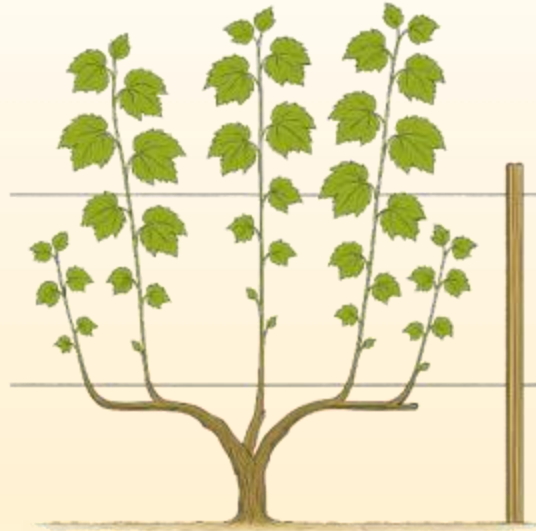
- You should consider your plans for returning the vines to production before designing a mothballing strategy
- Primary objectives upon return:
 1. Fruit production as soon as possible
 2. Healthy shoot growth in year 1
 3. Reestablishment of growing positions
 4. Limiting pest and disease risk
 5. Reintroduce inputs without vine vigor overcompensation



Normal vine pruning & regrowth

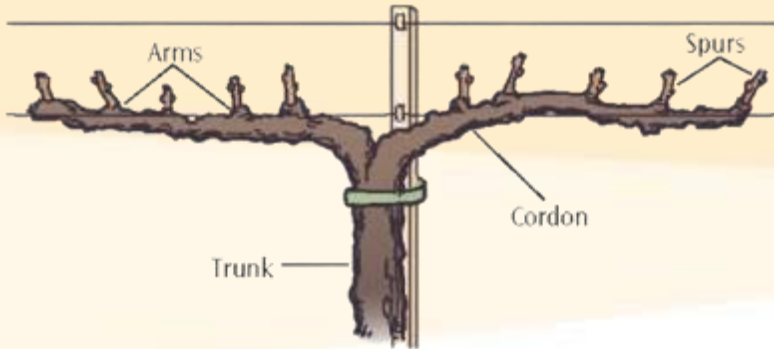


Bi-lateral cordon training with spur pruning

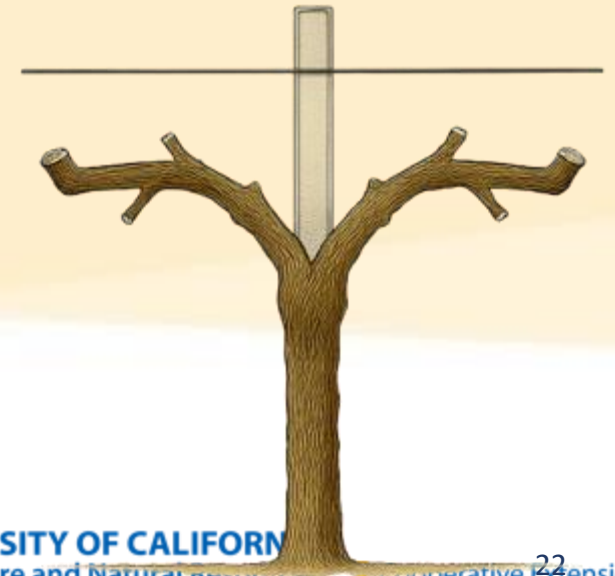
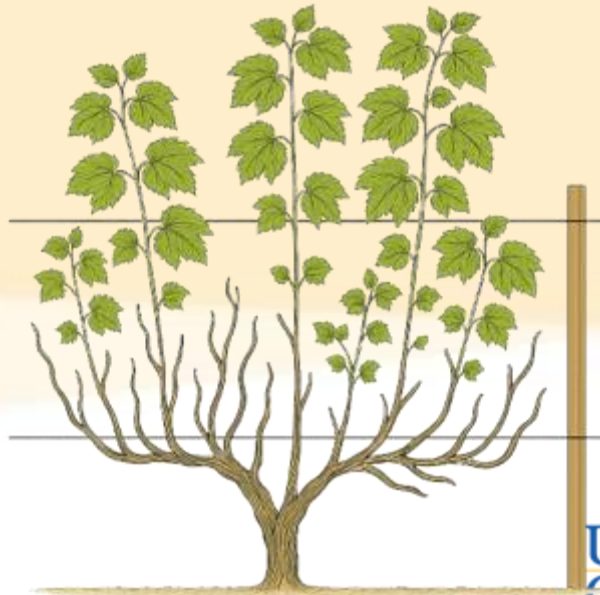


Bi-lateral cordon training with spur pruning

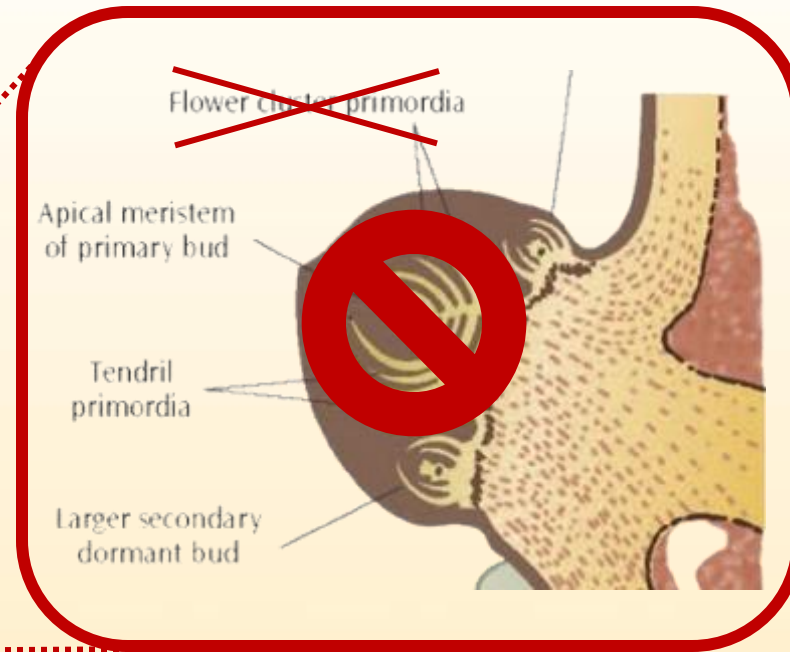
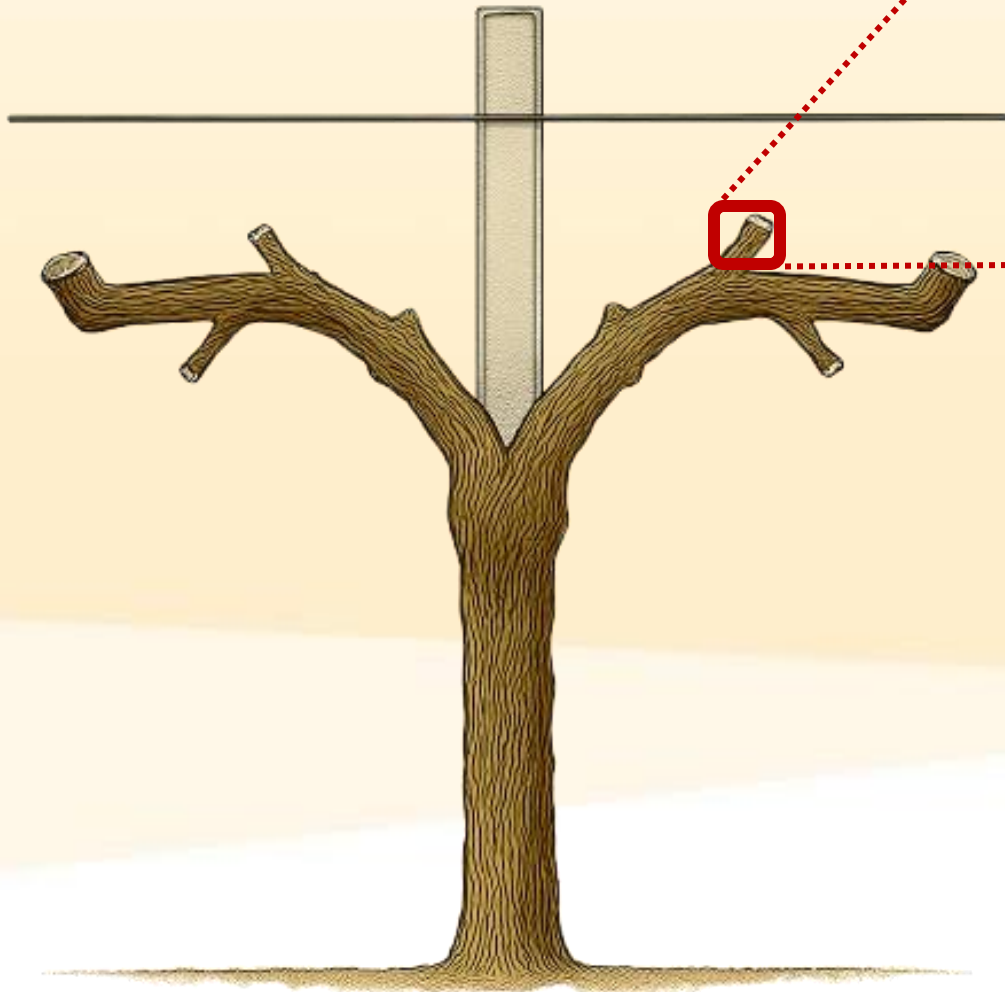
Recovery from Mothballing



Bi-lateral cordon training with spur pruning



Vine Recovery

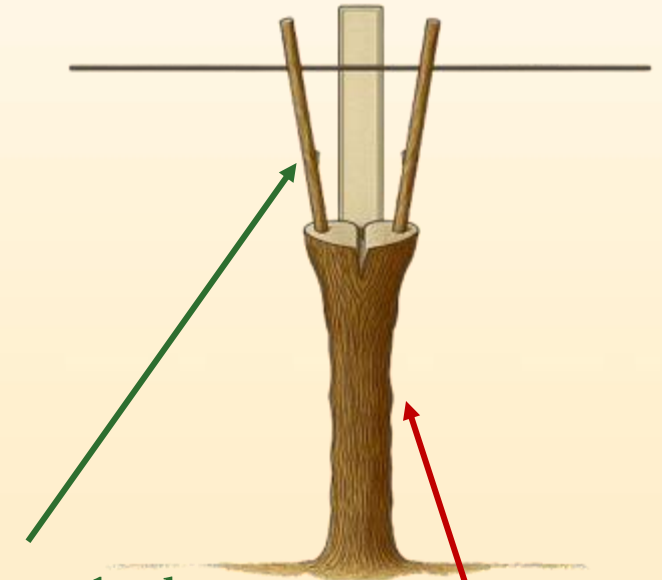


Latent Buds

- We will rely on latent buds to restore the fruiting positions
- These were formed > 1 year ago
- They are often less fruitful and less well attached than 1 year old buds
- We need these to grow to replace pruning wood in the first year of recovery

Top working for vine recovery

- You can also retrain the vine from the head by top-working the scion
- This can reduce the need for relying on latent buds that may or may not provide quality pruning wood
- Also allows for a new scion variety to be grafted onto the vine if market demands change when the vineyard is being brought back into production
- This will still take 2+ years to reach full cropping production



Young dormant buds

- 1 year old
- More fruitful than latent buds

Previously mothballed trunk

Challenges with Return to Production

- Relying on latent buds to replenish pruning wood means the resulting shoots may be weakly connected to the cordon/trunk
- Latent buds may not be fully developed prior to budbreak; This could lead to shoots with fewer leaves & clusters, poor bud development, etc.
- Latent buds may not grow at all when needed for return to production
- Return to full-potential yields may not be possible or take several years
- The likelihood of running into these challenges will likely be affected by variety and possibly rootstock

Example Timeline to Return to Production

Year 1 – Return to Production

- Winter – Heavy pruning back to ideal latent buds
- Spring – Intensive shoot thinning to 2-4 shoots per side
- Spring – Fertilize and irrigate to increase vine vegetative vigor
- Summer – Allow selected latent shoots to grow without fruit (remove crop)
- Summer/Fall – Dormant preparatory fertilization

Year 2 – Replace Permanent Growing Positions

- Winter – Prune remaining shoots to two-bud spurs
- Spring – Fertilize/irrigate and train new shoots as cordons
- Summer – New shoots can be allowed to crop ($\approx 50\%$ cropping capacity)
- Fall – Proceed as normal for pre-mothballed vineyard management

Year 3 – Return to Full and Regular Production

What We Don't Know

- Long-term impact on vine health and productivity
- Differences in successful methodology by cultivar/rootstock
- Is it economically viable in the long run?

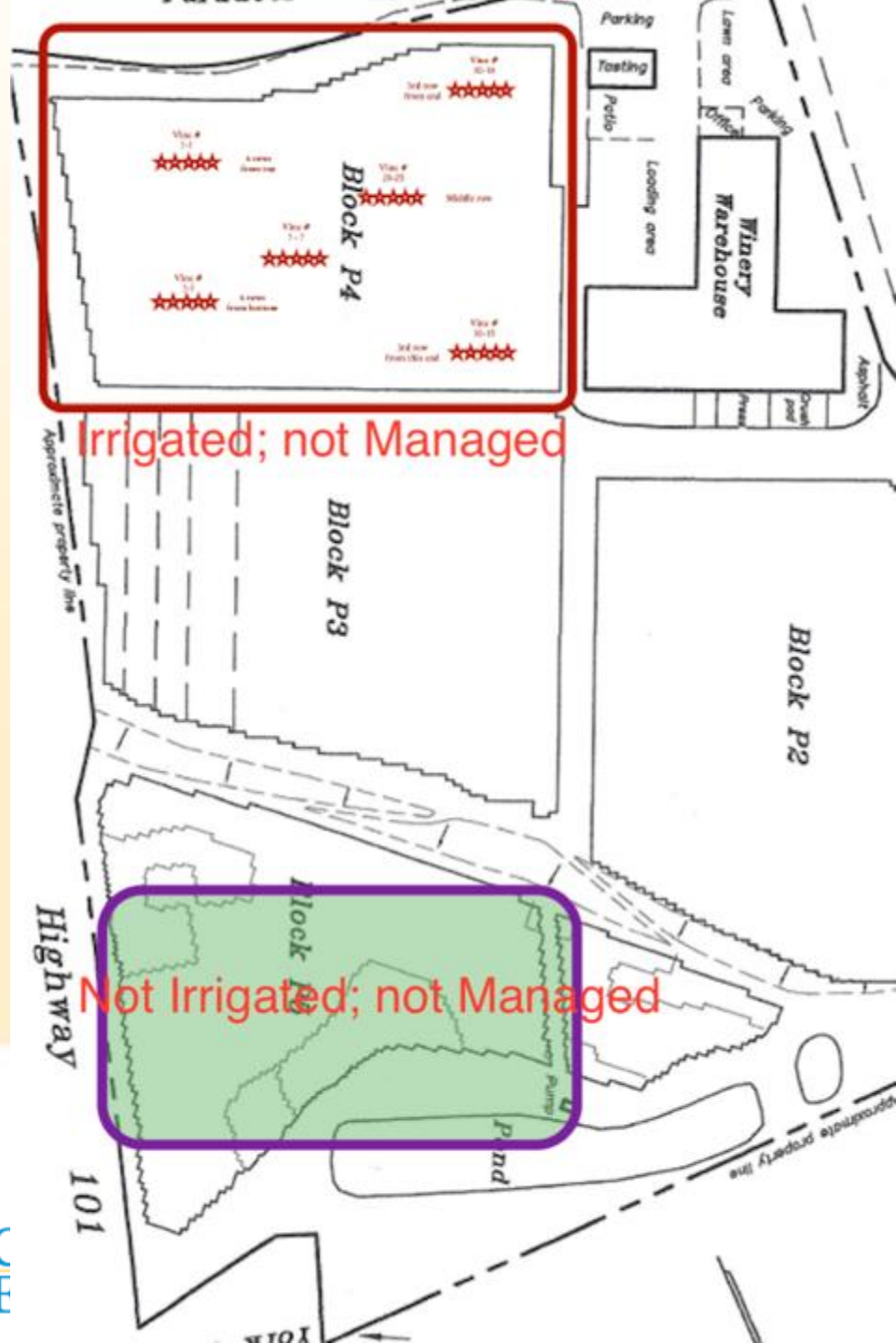


Some Other Good Tips

- If you plan to move your vineyard into mothball management, talk to your neighbors
 - Some county Agriculture Commissioners have the authority and responsibility to abate vineyards considered abandoned and a risk to nearby agriculture
 - Talking to your neighbors can reduce the risk of your vineyard being reported as abandoned
- Plan out your return to production before you mothball
 - Try to decide how thoroughly you want to mothball the vineyard based on your plans to return it to production
 - Don't expect to return to full production in one year if you applied the most minimum management during the mothballing

Preliminary Research

- Small, unfunded study in conjunction with:
 - Mendocino Wine Co.
 - Mendocino College
- Experimental Design
 - Three blocks (all Cabernet Sauvignon)
 - One control (managed)
 - Remains in production
 - One irrigated but no canopy or floor management
 - Planned to return to production
 - One not irrigated and no management
 - Not planned to return to production



Preliminary Findings (ongoing)

- Unirrigated vines have smaller canopies
- Unirrigated vines also have a lower water demand and less water stress than irrigated counterparts
- Unpruned and non-managed vines have many more clusters with uneven fruiting zones
 - Up to 10x more individual clusters
- Suspected differences in berry sugar loading and pest pressure (ongoing)



Summary

- Mothballing vineyards should be applied with a clear goal and return to production timeframe in mind
- There can be numerous approaches to mothballing vineyards; a mothball plan should be developed to match your site conditions.
- Recovery of vines is not guaranteed and may have long-term impacts
- Some level of management is necessary to avoid vineyard abandonment risks (e.g., pest proliferation)
- Communicate your plans with neighbors and growers nearby that may be impacted or at risk if mothball management doesn't go as planned

Sources

You can find this presentation at:

1. <https://ucanr.edu/sites/chenlab>
2. Speaker Presentations



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