March

- Fix trellis
- Tighten cordon/cane wires to 250-300 lbs.
- Remove crown gall infested trunks, or flag for later removal
- Pruning... if absolutely necessary!
  - Check bud viability first!
  - 20+10 or 30+10 balanced pruning, or rough first pass if double pruning
- Soil analysis (every 2-3 years)
Determining Bud Mortality
## Compensating for Bud Injury

<table>
<thead>
<tr>
<th>% Dead Primary Buds</th>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 20%</td>
<td>Do not change normal pruning practice.</td>
</tr>
<tr>
<td>20 - 80 %</td>
<td>Increase the number of buds retained in proportion to the injury.</td>
</tr>
<tr>
<td>&gt; 80 %</td>
<td>Prune away only those nodes which will intrude into the space for adjacent vines or which will produce fruit so low that it hangs to the ground.</td>
</tr>
</tbody>
</table>
April

- Vine row weed control
  - Pre-emergent herbicide?
- Pruning – in earnest
  - As late as possible best to delay budbreak
- Dormant fungicide application
- Electrify deer fence
- Remove pruning debris
- Replace missing vines
- Flea beetle/climbing cutworm control
- Lower movable foliage wires
May

- Nitrogen application
- Disease control – phomopsis, powdery mildew, black rot, downy mildew (2-3X+)
- Insect pest management – twig/cane borer, phylloxera (foliar), grape cane gallmaker, grape cane girdler
- Vine row weed management
Sucker removal

- **UNLESS** you expect/identify winter trunk injury, or need a second trunk!

Water sprout removal on trunks, from the ground into the yoke

Shoot thinning to $\leq 6$ shoots/ft. of cordon

- Removal order:
  - Undesirable base shoots, or other “non-count” shoots (watch renewal positions carefully!)
  - Unfruitful shoots from “count nodes”
  - Fruitful shoots only as necessary

Pay special attention to “bull canes” forming in the yoke
May, Cont’d

- **Cluster thinning**
  - **Vines in their first bearing year:**
    - Easy does it - don’t overcrop!
    - $\leq \frac{1}{2}$ length cordons: remove all crop
    - $\frac{1}{2}$–$\frac{3}{4}$ length cordons: 1 cluster on alternating shoots
    - $\frac{3}{4}$-full length cordons: 1 cluster per shoot
  - **Trying to increase cluster size in table grapes?**
    - Thin to 1-2 clusters per shoot, dependent upon normal cluster size
  - Delaying until after fruit set may be wise in mature vines to counteract a poor set
May, Cont’d

- **Shoot positioning**
  - **Low/Mid-wire Cordon/Cane Systems**
    - Elevate movable catchwires as needed to maintain narrow canopy
    - Tuck shoots as necessary in fixed catchwire systems
  - **High Cordon/Cane Systems**
    - High vigor vines: separate shoots as needed to facilitate later positioning; perform before the tendrils become attached
June

- Disease control: powdery mildew, downy mildew, black rot, botrytis (2-3X)
  - Critical period for successful control
- Insect pest management: grape berry moth, eight spotted forester, phylloxera (foliar), rose chafer, Japanese beetle, leafhoppers, leafroller, sphinx moth, grasshoppers
- Weed control
- Water sprout removal on trunks
- Cold injury assessment on trunks where damage is suspected (4)
June, Cont’d

- **Yield estimate post-set**
  - Avg. cluster count per vine $\times$ avg. cluster weight = avg. yield/vine

- **Crop load adjustment post-set**
  - Cluster thin as needed to adjust the crop load : pruning weight ratio
  - Suggested crop load ratios vary from 5-15:1\(^{(1,2)}\). Advisable to begin cropping in lower ½ of this range ($\approx$7-10), and increase if vines prove capable of supporting higher yields.

- **Contact buyers with yield estimates after adjustment**
June, Cont’d

- Shoot positioning
  - Low/Mid-wire Cordon/Cane Systems
    - Elevate movable catchwires as needed to maintain narrow canopy
    - Tuck shoots as necessary in fixed catchwire systems
    - Maintain upright shoot orientation!
  - High Cordon/Cane Systems
    - “Comb” shoots downward as soon as possible once shoots are sufficiently developed to resist breakage and heavy enough to remain in position
    - Strive to position ≥80% of the foliage below the cordon/cane
“Combing” – Before

Photo Courtesy Dr. Paul Domoto; Iowa State University
“Combing” - After

Photo Courtesy Dr. Paul Domoto; Iowa State University
Nicely Positioned “VSP”

Photo Courtesy Dr. Paul Domoto; Iowa State University
Why Bother With Shoot Positioning?

1. At the minimum, during winter pruning, you get this...
Instead of This...
Not to Mention…

2. Improved shoot periderm formation
3. Bud fruitfulness
4. Decreased incidence of cluster rots; esp. Botrytis
5. Reduced numbers of fungal infection periods in leaf canopy
6. Increased spray penetration, and improved coverage
7. Improved fruit, and resulting wine quality
8. More efficient hand harvest
June, Cont’d

- **Shoot positioning not giving enough exposure?**
  - **Leaf thinning**
    - Performed to adjust cluster exposure, particularly in low/mid-wire cordon/cane systems
    - Complete shortly after fruit set to minimize incidence of sunburn
    - Remove 1-2 basal leaves from bearing shoots, typically from east side of canopy on N/S rows, and north side of canopy on E/W rows
  - **Lateral removal**
    - Similar to above; typically only those laterals shading the fruit/renewal zone are removed
    - May be beneficial in all training systems; particularly for vines suffering from herbicide drift injury
July

- Disease control: powdery mildew, downy mildew, black rot (1-2X+); Botrytis (veraison)
- Insect pest management: leafhoppers, Japanese beetle, rose chafer, grape berry moth (late)
- Shoot positioning
- Topping – upward positioned systems; ≈12” above top catchwires
July, Cont’d

- **Skirting** – downward positioned systems; ≈12” above ground
- **Hedging** – traditionally employed in upward positioned systems; cutting to ≈10-12” canopy width common
  - Remember – 12-15 mature leaves/shoot must be retained to ripen the crop! Hedging non-positioned canopies can be counterproductive\(^{(3)}\).
  - Delay shoot tip removal to minimize lateral growth\(^{(1)}\).
Skirting a High Cordon System

Photo Courtesy Dr. Paul Domoto; Iowa State University

Trimming Plane: ≈12" Above Ground
July, Cont’d

- Employ bird/raccoon control measures before veraison
  - Bird netting:
    - Apply after vines cease growth, but before veraison, if possible
    - Mow cover crop before applying!

- Early cultivars: make harvest arrangements with buyer

- Begin monitoring fruit maturation (°Brix, pH, titratable acidity) at veraison

- Allow vine row vegetation to re-establish to slow vine growth if needed
August

- Early cultivars: test fruit maturation every 3 days until within ± 3 ° Brix of target, then daily
  - Maintain close contact with buyer!
  - Make arrangements for transport &/or refrigeration
  - Sanitize harvest lugs/bins
  - Harvest!
  - Collect cluster/ berry weights!

- Insect pest management: grape berry moth, multicolored Asian lady beetle
August, Cont’d

- Mid/late season cultivars: continue monitoring fruit maturation
- Tissue analysis
  - Petiole (leaf stem) sampling presently the most common in the Midwest
  - Early/mid August sampling is common
  - Establish a consistent sampling time for your vineyard (XX days after bloom annually)
  - Sample areas of different soil composition separately
September

- Multicolored Asian lady beetle control
- Harvest mid/late season cultivars
  - Ideal: harvest ≥ 14 days prior to average date of the first killing frost
- Remove bird netting from vineyard
- Disease control: powdery mildew post-harvest
- Perennial weed control in vine rows with post-emergent herbicide as needed
September, Cont’d

- Post-harvest irrigation, where possible, if soil is dry
- Post-harvest manure application where used as a nitrogen source
October

- Not done yet!
- Reduce wire tension
- Repair trellis
- Shut down deer/raccoon fencing
- Drain irrigation system
- Order replacement vines
- Internal season review
  - Fruit quality discussion with buyer
  - Operational efficiency review
- Planning for following season


   [http://www.nysaes.cornell.edu/hort/faculty/pool/trunkinjury/tihtml/tru.html](http://www.nysaes.cornell.edu/hort/faculty/pool/trunkinjury/tihtml/tru.html)

   [http://www.nysaes.cornell.edu/hort/faculty/pool/budcoldinjury/Assessingbudcoldinjury.html](http://www.nysaes.cornell.edu/hort/faculty/pool/budcoldinjury/Assessingbudcoldinjury.html)