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## *New England Grape Notes - May 18, 2017*

### Spring and Early Summer Update

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Cool temperatures this spring have held grapevine growth at early shoot expansion for an extended time. Now, with the onset of warmer temperatures, shoot expansion has accelerated and the window for shoot thinning is getting smaller. Below is an excellent and very thorough description of the whys and hows of shoot thinning. A brief discussion follows from Dr. Terence Bradshaw from UVM.

And, disease management programs begin with the onset of shoot growth. Below, Dr. Terence Bradshaw also provides a great review of early season decisions.

Then, a brief discussion of 'Don'ts' from Alice Wise from Cornell Coop Extension in Suffolk County (Long Island). These are just as important as the 'Do's'.

Finally, the 2017-18 New England Small Fruit Management Guide is available online at <http://ag.umass.edu/fruit/ne-small-fruit-management-guide> and in print for \$16 by going to <https://www.umassextensionbookstore.com/products/108>.

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## Early season grapevine canopy management, Part I: Shoot thinning

*By: Maria Smith and Dr. Michela Centinari, Dept. of Plant Science*

This is the first of two posts on grapevine canopy management in the early growing season from bud burst to bloom. The second in the series will be post in two weeks and will focus on pre- or trace-bloom leaf removal for crop level and disease pressure control.

This week, our blog post will focus on shoot thinning, the first canopy management practice of the growing season. As seen in the pictures below, we spent last week shoot thinning Grüner Veltliner (*V. vinifera*) vines in a central Pennsylvania vineyard (Figure 1).



**Figure 1.** (A) Andrew Harner, graduate student at Penn State in the Centinari lab, is shoot thinning Grüner Veltliner (*V. vinifera*) vines, May 10, 2017, Lewisburg, PA. (B) Grüner Veltliner shoot length at the time of thinning (pencil as a reference for shoot length).

In the following sections, we will highlight the benefits and costs associated with shoot thinning while providing a few general shoot thinning guidelines for both *V. vinifera* and hybrid cultivars in the Mid-Atlantic region.

### Benefits of Shoot Thinning Grapevines

While dormant pruning (<https://psuwineandgrapes.wordpress.com/tag/dormant-pruning/>) is the primary tool used by grape growers to maintain vine structure, canopy architecture and regulate crop level, shoot thinning provides an additional canopy management tool to bring vines into vegetative and fruiting balance by reducing shoot density and the number of clusters per vine. Cluster thinning later in the season may be needed in order to balance highly-fruitful vines.

In addition to improving balance between vegetative growth and fruit biomass, other benefits of shoot thinning include:

- Reduction of canopy density and fruit shading: through removal of selected shoots, shoot thinning reduces overcrowding of shoots in the canopy thus reducing the number of leaf layers and improving sunlight exposure to fruit (1).
- Reduction of disease pressure: reducing canopy density improves air circulation and sunlight penetration that promotes quicker drying of leaves and fruit, as well as increases spray penetration.

### Timing of Shoot Thinning

Shoot thinning should be done early in the growing season, when shoots are approximately 5–6 inches long and not more than 10–12 inches long. Shoot thinning should be timed after the date of last 'expected' frost, such that secondary or non-damaged primary shoots can be retained in the event of a late spring frost.

When shoot thinning is performed before inflorescences are visible (shoots 0.8 inch to 4 inches), increased vigor of the remaining shoots and lateral shoot growth may occur as a response, negating the benefits of

shade reduction (1). When performed too late (shoot longer than 10 inches), shoots become lignified at the base and difficult to remove. If performing late thinning, pruning shears should be used if there is risk of damaging the arm of the vine. It also takes longer to thin longer shoots, potentially decreasing the cost-effectiveness of this practice.

### Shoot Spacing and Density Recommendations

Generally, shoot thinning on cane-pruned vines is easier, faster, and more straight-forward than spur-pruned vines, which require substantially more decisions regarding what shoots to retain or remove, and where shoots should be spaced along the cordon (2; Figure 2).



**Figure 2.** Before shoot thinning: spur-pruned (left) vs. cane pruned (right) in Grüner Veltliner, May 26, 2016, Lewisburg, PA.

Plant genotype, soil, and climate are all factors influencing vine vigor potential and capacity to fully ripen a crop. Therefore, these factors indirectly affect the appropriate number of shoots to retain at thinning. Many Cooperative Extension websites provide recommendations on range of optimal shoot density based on cultivars grown in their region. [*Author's note: for the eastern US see the additional resources section at the bottom of the post.*]

Shoot density targets for Pennsylvania regions:

- For *vinifera* cultivars it is recommended to leave 3 to 5 shoots per linear foot of canopy (3, 4; Figure 3). The general rule of thumb is to retain fewer shoots in red varieties and more in white varieties. However, other factors (*i.e.*, cultivar disease susceptibility) must be taken into consideration.



**Figure 3.** Suzanne Fleishman, graduate student at Penn State in the Centinari lab, is shoot thinning spur-pruned Grüner Veltliner vines (May 26, 2016). Note the differences shoot density between the cordons on the right (thinned) and on the left (unthinned) cordons.

- For most of the hybrid cultivars it is recommended to leave 4 to 6 shoots per linear foot of canopy (5).
- For Concord and other native cultivars, as many as 15 shoots per linear foot of canopy can be retained (4).
- In divided canopies trellis systems, the same shoot density along each cordon should be retained (Figure 4).

In addition to the number, the position of the shoots along the cordon is important. Ideally, the shoots retained should be equally spaced to promote a uniform, balanced canopy.



**Figure 4.** Proper shoot density at harvest on Gewurtztraminer vines trained on divided Scott-Henry system in Andreas, PA.

#### **What types of shoots should you remove?**

- Weak, non-fruitful shoots especially if they grow in crowded areas of the canopy.
- Secondary and tertiary shoots, if a primary healthy shoot has emerged.
- Shoots arising from the trunk that are not retained for renewal wood (e., new trunks and canes or cordons).

#### **Does shoot thinning improve fruit composition and wine sensory perception?**

The associated costs with manual labor and labor shortages are reasonable considerations before implementing vineyard management practices. This is also true for implementing shoot thinning techniques into a vineyard. Nonetheless, it is also important to consider the potential benefits from implementing a new practice.

The effects of shoot thinning practices on hybrid varieties are a bit unclear. A previous study on shoot thinning found that shoot thinned Marechal Foch (red interspecific hybrid of *Vitis*) vines exhibited higher total soluble solids (°Brix) and berry anthocyanin concentrations as compared to un-thinned vines (6). The increase in berry anthocyanin, however, did not translate into higher anthocyanin concentration in the final wine, and furthermore, shoot thinning did not impact the sensory perception of “fruitiness” of the wines (6). In contrast, a study focusing on Corot noir (red interspecific hybrid of *Vitis*) implementation of shoot thinning provided

inconsistent results in grape and wine quality across a two-year (2008–2009) evaluation, which was determined by °Brix, pH, titratable acidity (TA), wine anthocyanin, berry and wine tannin content (7). Shoot thinning increased berry °Brix, wine alcohol concentration and anthocyanin content only in second year of this study. While berry TA at harvest was lower (*e.g.*, 2008, un-thinned = 8.6 g/L, shoot thinned = 7.6 g/L), there were no differences in the TA of wine in either year (7). Shoot thinning also decreased berry seed tannin in 2008 and berry skin and wine tannin in 2009, which could have negative implications for final wine, considering generally low tannin concentrations in hybrid red wines (7). In an effort to compensate for costs associated with shoot thinning and yield loss, this study on Corot Noir suggested growers increase the price of grapes by 11 to 20% per ton, depending on the average annual market price and yield loss (7).

A study in Fayetteville (Arkansas) on three highly-fruitful French-American hybrid cultivars (Aurore, Chancellor, and Villard noir) found that shoot thinning increased fruit sugar accumulation (°Brix) only in Chancellor and without changes in pH or TA, while a more intense juice color was associated with shoot thinned vines of both red cultivars (Chancellor and Villard noir; 8). In addition, shoot thinning favorably decreased the Ravaz index (yield to pruning weight ratio) for all three cultivars, improving vine balance (8).

The results of these studies suggest that in some situations the costs of shoot thinning may not outweigh the benefits, especially for hybrids that do not command a high market value ([Finger Lakes Grape Prices 2016](#)). However, none of these studies account for potential reduction in disease infections, which may help justify the implementation of shoot thinning in a given vineyard. For example, it has been found that higher shoot density may contribute to the increased incidence of *Botrytis* rot infections in susceptible cultivars such as Seyval Blanc (9) and Vignoles (4).

In other cases, shoot thinning improved fruit composition in Pinot Noir and Cabernet Franc for two consecutive vintages (1), and also increased color intensity, phenolic content, and total anthocyanins of Cabernet Franc berries (1). Benefits of shoot thinning on fruit quality and wine sensory perception have been reported for other *vinifera* cultivars, such as Barbera (10) and Sauvignon blanc (11).

Unless your vineyard is located in a low or moderate vigor site, shoot thinning is strongly recommended for *vinifera* cultivars growing in the Mid-Atlantic region.

If you want to assess the effects of shoot thinning on fruit composition, plan to leave half of a row of vines un-thinned and thin the remaining half to a consistent number of shoots per foot (*e.g.*, 4 shoots per foot). Alternatively, use two rows (of the same variety and cultivar) to assess the impact of shoot thinning in your vineyard: one row thinned and the adjacent row un-thinned. These two methods should help evaluate the effect of shoot thinning on berry composition at harvest and if possible, on wine chemistry and sensory perception assuming that the lots of berries can stay separated through wine production.

### **Effects of shoot thinning on vine physiology**

Impacts of shoot thinning on vine physiology and performance are complex. A study conducted in Italy evaluated the whole-canopy photosynthetic response to shoot thinning using spur-pruned Barbera vines (*V. vinifera*; 10). Vines were thinned to 5 shoots per foot, reducing the total shoot number by 50% as compared to un-thinned control. In this study (10) shoot thinning significantly improved grape sugar content, color, and phenolics. Despite the benefits provided by shoot thinning on fruit composition, which has been already reported by other studies, what makes this study unique and interesting is that they investigated the mechanisms behind the improvement in grape quality through the measurement of whole-canopy net carbon assimilation. Although the shoot-thinned vines had initially lower photosynthesis (carbon assimilation) than un-thinned vines due to the removal of photosynthetic source (leaf), they had regained photosynthetic capacity to levels similar to the un-thinned vines within 17 days of treatment. This occurred as a result of a substantial increase in both main leaf size and amount of lateral leaves as a result of shoot thinning (10). Therefore, individual shoots of thinned-vines had a higher supply of assimilates (*e.g.*, sugar) per unit of crop, which can increase sugar accumulation during ripening. This may explain why shoot thinning improved grape

composition in Barbera under these growing conditions.

### Additional Shoot Thinning Resources

- Cornell Cooperative Extension (CCE) video tutorial on shoot thinning: <https://www.youtube.com/watch?v=5wyFolawc-s>
- Fiola, J. 2017. Canopy Management – Shoot thinning and positioning. “Timely Vit” from UMD Extension. [https://extension.umd.edu/sites/extension.umd.edu/files/\\_docs/programs/viticulture/TVCanopyMgmtShootThinPos.pdf](https://extension.umd.edu/sites/extension.umd.edu/files/_docs/programs/viticulture/TVCanopyMgmtShootThinPos.pdf)
- Martinson, T and Vanden Heuvel, J. Shoot density and canopy management for hybrids. <http://www.fruit.cornell.edu/grape/pdfs/Canopy%20Management%20for%20Hybrids%20-2007.pdf>

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7. Sun Q., *et al.* 2012. Impact of shoot and cluster thinning on yield, fruit composition, and wine quality of Corot noir. AJEV. 63:1, 49–56.
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11. Naor *et al.* 2002. Shoot and cluster thinning influence vegetative growth, fruit yield, and wine quality of ‘Sauvignon blanc’ grapevines. J. Amer. Soc. Hort. Sci. 127(4), 628–634.

(Source: Penn State Wine Grapes U., May 19, 2017)

### Shoot Thinning Update from the Vermont – Terence Bradshaw, Univ. of Vermont

Grapes are moving fast in Vermont vineyards, with most cultivars in the UVM vineyard at about 2" shoot growth. Shoot thinning now will give best results before the vines waste energy on growth that you won't keep. We typically aim for 4–6 well-spaced shoots per foot of canopy, selecting for the most healthy/vigorous and those with appropriate orientation for our downward training system (high-wire cordon).



**Figure 1** Before shoot thinning



**Figure 2** After shoot thinning

(Source: UVM Grape Newsletter, May 19, 2017)

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### **Early Season Disease Management in Cold Climate Wine Grapes - Terence Bradshaw, Univ. of Vermont**

This is a typical time to start thinking about a spray program to manage disease. The primary disease of concern at this point is phomopsis, as rachis infection at this point in the season is may cause significant fruit loss at harvest. Anthracnose may also be active at this point , given the warm/hot weather we recently had. Vineyards that have had recent problems with those diseases or organic growers using copper or other less-effective materials may consider treating this week; if you haven't had major problems with those diseases, treatment can wait until the 5-8" growth stage as long as you are using a highly effective contact fungicide like mancozeb or captan.

As a reminder, a refreshed version of the Initial IPM Strategy for New Cold Climate Winegrape Growers is available at: [http://www.uvm.edu/~fruit/grapes/gr\\_ipm/InitialIPMStrategyGrape2017.pdf](http://www.uvm.edu/~fruit/grapes/gr_ipm/InitialIPMStrategyGrape2017.pdf)

Organic growers are in for a bit more work. The standard fungicides, copper and sulfur, have only fair efficacy against this disease at best, and in a couple of weeks when black rot becomes the next disease of concern, those materials will have even less efficacy against that disease. The first line of defense in an organic vineyard is a strict sanitation program. This includes removing all mummies still in the canopy (not dropping on the ground, but actually removing them from the vineyard) as well as any obviously diseased wood. Phomopsis and anthracnose both overwinter largely on infected wood in the canopy, and removing this wood during dormant pruning or now is essential to reducing disease pressure. Stubs left at the ends of spurs should now be removed since you can see where this year's shoot growth will resume (at the developing shoot)- these stubs will die and may become



infected with phomopsis this season (or were last season) .



*Figure 3 Removing stubs at end of retained spurs.*

It is worth noting that both copper and sulfur (including lime sulfur) can cause phytotoxicity on certain cultivars. Dr. Patty McManus summarized her research on copper and sulfur sensitivity in cold-hardy grapes in the 2/8/16 Northern Grapes newsletter <http://northerngrapesproject.org/wp-content/uploads/2016/02/NG-News-Vol5-I14-Feb2016.pdf>, and I'll summarize it to say that Brianna should receive no copper; and Frontenac (all types), La Crescent, Leon Millot, Marechal Foch, Marquette, and St. Croix should receive no more than 2-3 copper sprays per season. Save those for later when black rot and downy mildew become bigger concerns. Sulfur sensitivity was observed on several cultivars, and its use (including lime sulfur) is discouraged on Foch, Millot, Brianna, and Louise Swenson; with limited (2-3) applications suggested on LaCrescent and St. Croix. So, if you have removed all diseased wood and are ready to cover your vineyard for protection against phomopsis and anthracnose, the best choice is likely lime sulfur applied at two quarts per acre in sufficient water (25-30 gallons should do it) to wet the canopy. Lime sulfur is hot stuff: caustic, corrosive, and noxious. Use appropriate personal protective equipment and spray in cooler weather to reduce phytotoxicity. Powdered sulfur may also be a good choice, I would suggest 3-5 pounds per acre at this stage.

*Where trade names or commercial products are used for identification, no discrimination is intended and no endorsement is implied. Always read the label before using any pesticide. The label is the legal document for the product use. Disregard any information in this message if it is in conflict with the label.*

*(Source: UVM Grape Newsletter, May 19, 2017)*

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## Update from Long Island *Alice Wise, Cornell Coop. Extension Suffolk County*

Week of May 15: Warm weather pushed shoot growth this week. The research vineyard is at about the same stage as in 2016. Chardonnay shoots were mostly in the 3-6" range with a few longer shoots. Minor amounts of phomopsis can be seen on the base of shoots. This is not unusual for this time of year. **Caution ahead:** We hear lots of recommendations for what we should be doing in the vineyard. What about things we should avoid?

- Stylet oil in hot weather – Application of oil in temps >90F or to plants under heat/water stress can lead to phytotoxicity. For vines that have endured prolonged periods of drought stress, one rainstorm may not alleviate that stress. Be especially cautious in late summer, in blocks without irrigation and in blocks with green growth under vines (mowed weeds or cover crops).
- Phos acid products – High concentrations in the spray tank can lead to phytotoxicity. See labels for specifics.
- Oil + sulfur, Captan, copper, other products – Read the Stylet Oil label for specifics on tank mixes to avoid and for intervals that must be observed to minimize the risk of phytotoxicity. Oil acts as a carrier and can facilitate absorption of materials not meant to be absorbed.
- Excessive use of copper – Copper is a heavy metal and does not degrade once introduced into the environment. In many areas of Europe, copper is severely limited or even prohibited. The US EPA is also

considering stricter limits in many commodities, including grapes. Unfortunately, it is one of the only effective organically approved fungicides for downy mildew. There are a few other organic biological fungicides new to the market, hopefully one of those will be an effective rotational partner.

- Sulfur close to harvest – Results indicate sulfur within ~ 4 weeks of harvest can result in residues on harvested grapes and may increase levels of H<sub>2</sub>S production. Sulfur residues are primarily a concern with skin-fermented wines (i.e. reds). For standard white winemaking conditions, if the must is well clarified, >95% of sulfur residues will be removed. A more complete article on this topic will be published in a later newsletter.
  - Over use of resistance prone materials – For resistance prone materials, using >2 consecutive sprays, exceeding allowable limits, spraying on existing infections are all practices that further the development of resistant fungal strains. With few new materials being labeled, especially for Long Island, these practices are unwise and unfair to fellow growers.
  - Materials that affect bees – Read pesticide labels to understand the risk to bees. Caution is especially important during periods of high bee activity such as grape bloom and when weeds such as clover and dandelion are in bloom. (*Source: Long Island Fruit & Vegetable Update, No. 7, May 18, 2017*)
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