



Washington Guide to Sustainable Viticulture

VITICULTURE

WHAT DO I NEED TO KNOW ABOUT VINEYARD MAINTENANCE AND HARVEST IN WASHINGTON STATE?

CHECKLIST OF QUESTIONS TO ANSWER

Though many of the viticulture practices employed in Washington State are common to other grape growing regions, some practices have been specifically developed through research and experience to help sustain grape vines periodically subjected to temperatures cold enough to reduce grape yields and kill vines. The Pacific Northwest is considered a cool climate grape growing region, although some locations are warm enough to ripen varieties typically produced in warm regions. For information about vineyard development issues, see *VineWise* sections *Vineyard Site Selection and Establishment*.

MAINTENANCE/MANAGEMENT OF ESTABLISHED VINEYARDS

Proper management of vegetative growth of established vineyards will help the grower produce high quality grapes and lead to his or her continued economic stability and sustainability. Depending on the vineyard location, growers in western Washington may be interested in controlling vegetative growth to increase fruit exposure, whereas those in eastern Washington may need to adjust canopy management to optimize or balance fruit exposure.

1. Canopy

- a. Have I assessed the potential vine vigor of my site and variety?
 - Soil characteristics (depth, texture, fertility, water holding capacity)
 - Annual precipitation (amount and distribution)
 - Vigor of selected varieties and phenology (bud break, ripening time)
 - Temperature profile of vineyard location (heat accumulation, frost risk)

- b. Have I established goals for my vineyard canopy, considering the following?
 - Canopy shape that results in uniform vines
 - Potential to use mechanical pruners, hedgers, harvesters
 - Control of crop load
 - Support of optimal fruit quality
 - Promote productive and fruitful buds
 - Promote uniform spray coverage and penetration

- c. Do I understand how fruit exposure affects cluster quality and what can happen to grape clusters if there is very high or low light within the canopy; low or very high temperatures within the canopy?
- d. Have I assessed the canopy density within my established vineyard?
Methods available to assess density include estimating the surface volume or height and width of the canopy, using the point quadrat method (www.youtube.com/watch?v=MtRdcZPZLMQ), or sunfleck analysis. (Methods described in Key Knowledge Area at end of chapter)

2. Canopy Manipulation

What is my plan to manipulate the canopy and achieve my desired goals? Techniques include:

- Training or trellis system
- Pruning
- Shoot thinning/suckering
- Shoot positioning
- Irrigation
- Other means (leaf removal, hedging, mechanical)

3. Crop load Management

- a. Do I have a plan for crop load management, beginning with pruning, shoot thinning, irrigation management, and using cluster thinning as a last resort?
- b. Do I annually estimate my crop, keeping data for historical review?
- c. Do I revisit my irrigation and nutrient management strategies if I am not achieving desired crop size, berry size or fruit set?
- d. Do I understand the need to balance the intended vine size with crop load (yield per vine or per unit pruning weight) and the costs of increasing or decreasing canopy density?

4. Harvest

- a. Do I understand the minimum and desired maturity parameters used by the winery to determine harvest?
- b. Although most wineries will assess crop maturity and determine harvest dates, do I understand what methods are used to assess maturity?
Assessment methods include:
- Grape seed color and hardness
 - Laboratory analysis of berries
 - Refractometer to determine berry sugar or Brix
 - Flavor
- c. Do I know the harvest preference (hand or machine) of the winery(ies) purchasing my grapes?
- d. Have I planned for the harvest of my crop?
- If hand harvest is to be used, do I have labor available?
 - If mechanical harvesters are used, have I made arrangements with a custom harvester or will I use my own machine?



e. Do I need to deliver the crop to the winery? If so, have I made delivery arrangements?

4. Vineyard Health and Productivity

a. Have I considered maintaining the long-term productivity of the vineyard (retraining, replanting, winter kill)?

b. Am I annually reviewing productivity records and visually observing the vineyard to learn if canopy adjustments are needed?

c. Have I developed a productivity plan that addresses issues like changing pruning levels or nutrition to increase yields/quality, dealing with winter injury issues (timing and steps to assess damage and evaluate yields or quality issues)?

KEY KNOWLEDGE AREAS

Manipulating canopy through shoot thinning

Shoot thinning –

Shoot thinning increases light penetration into the canopy, reduces disease incidence by increasing air movement within the canopy, improves spray coverage into the canopy, and facilitates bud development. Thinning fruitful shoots can also help adjust the crop load by reducing clusters; thinning nonfruitful shoots will increase the leaf area to crop ratio.

Thinning shoots too early can encourage more buds to break, but thinning too late is difficult for workers and can waste vine reserves.

Shoot Positioning-

Positioning the shoots with movable catch wires is another way to manipulate the canopy and help expose fruit to light for better color development, improve air circulation within the canopy, and direct shoot growth where you want it to go. Some trellis designs utilize several catch wires to direct shoot growth upwards or downwards. It is best to expose fruit to sunlight early in the season to avoid sunburn problems.

Hedging, removing leaves-

Hedging and leaf removal are other ways to improve fruit exposure of vigorous and overly vegetative canopies. Timing is important. Hedging removes the top portion of the canopy (about 10 to 20 percent) and is best done during the middle stage of fruit development (but may be done at bloom where poor fruit set is a problem). Early leaf removal after fruit set is best and maximizes benefit of increased light exposure without risking increased sunburn, an issue in late leaf removal. Extreme leafing puts fruit at risk for sunburn and can delay ripening. Leafing should focus on the east side of vine rows oriented north-south to avoid overexposure on the west side of the vine. Leafing can be done by hand or with several types of specialized implements.

Olmstead, M., Willemsen, K., Keller, M. 2006. Canopy Management for Pacific Northwest Vineyards, WSU Extension Bulletin 2010.



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General rules for Cluster Thinning

Clusters may be thinned for a variety of reasons—from adjusting crop load to achieve timely maturity or reach targeted levels to removing non-uniform berries or reducing potential for Botrytis or bunch rot.

1. Estimate your crop load.
2. Work with your winemaker in determining if adjustment is needed.
3. Reason for thinning dictates timing.
 - Thin clusters at bloom to fruit set to advance maturity.
 - Clusters lagging behind at veraison can be thinned by removing wings or entire cluster.
 - The earlier clusters are thinned, the more the vine tries to compensate, which in red varieties can increase berry size and have the opposite effect of what the grower was trying to accomplish. Some growers combine thinning with regulated deficit irrigation to keep berry size small.
 - The later the thinning, the smaller are the effects, both in terms of improving fruit quality and advancing maturity. Done too late, the only effect is reducing yields.

Tips for estimating crop

Number actual vines/acre x number of clusters/vine x cluster weight.

Use the same vines each year to sample clusters or berries and conduct crop estimation at same time each year. Avoid sampling from outside rows and row-end vines.

If using berry weights to determine average cluster weights, sample berries from all sides, top and bottom of cluster.

HOW MANY SAMPLES NEEDED TO BE REPRESENTATIVE?

May wish to return to same vines during dormancy to collect pruning weight data.

How to assess canopy density

There are three methods to assess canopy density.

Shoots per linear foot of cordon - An easy method done by counting the number of shoots per linear foot of cordon. Shoots from randomly chosen sections of a specified length are counted. Comparison of shoot density from year to year is made and the grower may use this method to assist in shoot thinning decision making.

Point quadrant-

This method uses a thin metal rod (about 40 inches or so) randomly inserted into the canopy, recording each leaf, cluster and canopy gap (when the rod touches nothing) as it is inserted from one side of the canopy to the other. Use a uniform random method when inserting the rod throughout the vineyard row or block to avoid bias. Measuring between 50 to 100 data points will help obtain a representative sample.

Sun fleck analysis-

This method estimates the proportion of gaps in the canopy, particularly around the fruiting zone, and is relatively easy and can be done throughout the growing season. Adequate light should reach the fruiting zone from the top or exterior portion of canopy to the cordon or cane. Place a sheet or tarp underneath the canopy under the fruiting zone and assess canopy gaps within a defined area. (You can draw this defined area, such as one square foot or one square meter on the sheet or tarp). Calculate the percentage of sun that shines on the tarp or sheet. The percentage of sun reaching the ground for vertical canopies should be in the range of 2 to 10 percent, according to Dr. Richard Smart. Watch a demonstration video here. (<http://www.youtube.com/watch?v=MtRdcZPZLMQ>)



Balanced Pruning

Balanced pruning- a concept describing a canopy with enough leaf area to support crop and reach fruit maturity without requiring excessive canopy manipulations. To determine if pruning levels are "balanced," ratios have been developed to compare pruning weights to yield.

To determine balanced ratio:

Weigh dormant prunings from a vine. Weigh clusters from the same vine later in year, dividing vine yield (clusters) by pruning weight.

Understanding ratio:

Low number (less than five) indicates the vine may be undercropped and could support more fruit.

Number higher than ten indicates overcropping and may benefit from reducing crop or bud numbers per vine.

A yield to pruning weight ratio of five to eight is considered to be in the optimum range. Vigorous vines are typically pruned lighter to leave more buds, while weaker vines are pruned heavier. Pruning guidelines for wine grape varieties suggest leaving 15 buds per pound of pruning weight, according to Canopy Management for Pacific Northwest Vineyards.

How to collect fruit sample?

Berries or whole clusters can be sampled, but they must be representative of the vineyard if the data is to be meaningful. Berries or clusters should be collected from different heights within the canopy, shady locations, and both sides of the row. Avoid outside rows and row-end vines. Significant changes in the weather may require more frequent sampling.

Grape maturity assessments

Several methods are used to assess grape maturity:

- Measuring the sugar or Brix with a calibrated refractometer
- Observing the color of the grape seeds and berry color
- Seed color indicates extractable seed tannins, color changes from green to brown to dark brown as berries mature.
- Berry color also an indicator- red varieties progress from blush to medium red to black-red to dark blue; white grapes change from dark green to light green to gold.
- Measuring the aroma and phenolic compounds.

Factors delaying optimum maturity-

Factors that can delay the sensory development of the grapes and lead to herbaceous flavors and grapes that lack varietal flavor and intensity include:

- Improper site selection (late maturing variety in a site that is too cool)
- Crop load (over cropping or under cropping)
- High soil moisture (over irrigated or over fertilized vines)
- Canopy management (overly shaded clusters or excessive vigor)



RESOURCES:

Ahmedullah, M. Training and Trellising Grapes for Production in Washington. Extension Bulletin 0637. 1996. Washington State University Cooperative Extension, Pullman, Washington. Available as a PDF file on the Web at: www.cru.cahe.wsu.edu/CEPublications/eb0637/eb0637.pdf

Olmstead, M., Williams, K., Keller, M. Canopy Management for Pacific Northwest Vineyards. Extension Bulletin 2010. www.cru.cahe.wsu.edu/CEPublications/eb2018e/eb2018e.pdf

Watson, J. Growing Grapes in Eastern Washington. Proceedings from a Washington State University short course for establishing and producing grapes. 1999. Good Fruit Grower, Yakima, Washington.

