

# Dormant Pruning of Wine Grapes in Kentucky

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Pruning is the removal of plant parts for horticultural objectives. The purposes of pruning grapevines are to:

- 1) Control the size and the form of the grapevine
- 2) Optimize the production potential of the grapevine
- 3) Maintain the balance between shoot and fruit growth.

## Grapevine Fruiting Characteristics:

In grapevines, fruiting shoots are borne on one-year old dormant buds (Figure 1). Because of this character trait, we prune to replace the fruiting wood in each year. Pruning results in removal of 80 to 90% of the canes per year.



Figure 1. Dormant one-year old buds on a one-year old cane. Photograph courtesy of Dr. Joseph Masabni.

## Effects of Dormant Pruning on the Grapevine:

- 1) A grapevine can only ripen a certain number of clusters in a given season.
- 2) Dormant pruning has a depressing effect on the grapevine.
- 3) The capacity of the grapevine is directly related to the number of shoots retained by dormant pruning.
- 4) The production of crop depresses vine capacity.
- 5) Shoot vigor is indirectly related to the cluster number.
- 6) Bud fruitfulness is indirectly related to shoot vigor.
- 7) Old growth (large diameter cordon or arm) can carry more fruit versus a newly established cordon.

## Time of Pruning

Grapevines can be pruned throughout the dormant season. However, growers in Kentucky should wait until early spring to prune so uninjured canes can be selected by dormant pruning for fruiting. Delaying pruning until early spring tends to hold back spring growth flush that may be affected by late spring frosts in the region. However, dormant pruning should be completed before bud swell. Sap bleeding is seen with delayed pruning of grapevines up to 5 gallons per day, but this does not harm the grapevine.

## Types of Pruning

The length of the one-year old dormant fruiting wood retained during dormant pruning determines the type of pruning. Cane pruning has 10 to 20 node fruiting canes (Figure 2) retained during dormant pruning, while spur pruning has 2 to 5 node fruiting canes (Figure 3).



Figure 2. Cane-pruned dormant grapevine



Figure 3. Spur-pruned dormant grapevine

Generally, most cultivars perform well with either type of pruning. However, some shy-bearing cultivars either with American or European heritage such as ‘Norton,’ ‘Concord,’ or ‘Thompson seedless’ perform better when cane pruned because the buds that are four to 12 nodes from the base of the cane are more fruitful than the basal nodes.

## Quality of Wood to Retain at Pruning

Since grapevines produce fruit from only one-year-old wood called canes, the following criteria must be followed to choose the canes or nodes to retain during pruning.

- 1) Wood should be healthy and free from disease or insect damage
- 2) Wood should be at least ¼” in diameter (about pencil size) at the 5<sup>th</sup> and the 6<sup>th</sup> buds and nearly the same thickness at the 10<sup>th</sup> bud (Figure 4).
- 3) Large diameter wood (> ½” diameter) should be removed as they are less fruitful and more susceptible to cold injury.
- 4) The bark color should be tan to brown with bright hue (Figure 5).
- 5) The distance between the nodes should be about 4 to 8 inches for hybrids and American type varieties.



Figure 4. 1/4" diameter wood to retain



Figure 5. Tan to brown color wood with optimum diameter to retain in foreground

### Balanced Pruning

The practice of balanced pruning aims to maintain the balance between shoot growth and fruit growth. In this practice, the weight of one-year old dormant prunings determines vine size and thus determines how many buds to retain for the upcoming year. The weight of one-year old dormant prunings essentially is an estimate of the leaf area on the vine. The manipulation of the number of buds to retain essentially adjusts the ratio of clusters per vine to leaf area per vine. The two possible scenarios for not practicing balanced pruning will be:

- 1) Too many cluster per unit leaf area = **OVERCROPPING**
- 2) Too few clusters per unit leaf area = **UNDERCROPPING**

*Steps in Balanced Pruning are as follows:*

- 1) Rough prune the grapevine to three-bud spurs to an upper limit of 65 buds (Figure 6).
- 2) Measure the weight of the prunings to estimate the vine size (Figure 7).
- 3) Adjust the number of buds to retain for fruiting on the grapevine according to the Balanced Pruning Formula (Table 1) for the specific cultivar.



Figure 6. Rough-pruned, three-node spurs



Figure 7. Measuring vine size using a top-load scale

**Table 1. Suggested Balanced Pruning Formulae for various grapevine cultivars**

Cultivar	Number of buds for 1 <sup>st</sup> Pound of prunings	Number of buds for each additional pound	Maximum number of buds per 8 f of canopy
<u>American cultivars</u>			
Concord	30	10	60
Catawba	20	20	40
Delaware	20	20	40
Niagara	30	10	60
Norton◇	60	10	80
<u>French-American hybrids</u>			
Baco noir	20	10	40
Chambourcin*	20	20	40
Chancellor*	20	20	40
Chardonel	20	20	45
Leon Millot	30	10	60
Marechal Foch	30	10	60
Seyval blanc*	20	20	40
Traminette	20	20	45
Vidal blanc*	20	20	40
Vignoles	20	10	60
Villard blanc	20	10	40
Villard noir	20	10	40
<u>Vinifera</u>			
	20	20*	40
<u>Seedless table grapes</u>			
Canadice	30	10	45
Jupiter	20	20	45
Mars	30	10	60
Reliance	20	20	45
◇	Trained to GDC		
*	Requires cluster thinning		

*Adjusting the number of buds*

For example, if a ‘Vidal blanc’ vine has a vine size of 2.0 pounds, then prune so that  $20 + 20 = 40$  buds on the vine. Using a spur-pruned training system such as the bi-lateral cordon (Figure 8), the grower would leave 20 fruiting spurs with 2 buds on each of them with the spurs spaced about a hand’s width apart on the cordon (Figure 9).



Figure 8. Balance pruned dormant grapevine



Figure 9. Correct spacing of fruiting spurs on cordon

### *Pruning and shoot thinning*

Generally, if more than 60 buds are left on a vine with vines spaced 8 feet apart, considerable mutual shading occurs within the grapevine canopy. A general rule of thumb is to retain five to six shoots per foot of canopy run to achieve optimum sunlight interception and spray penetration within the grapevine canopy. For example, ‘Vidal blanc’ vines spaced 8 feet apart within the row can have between 40 to 50 shoots per vine. Growers should shoot thin during the pre-bloom period.

### **Vine Balance**

The grapevine has a finite capacity for the number of clusters it can ripen in a given season. Therefore, each vine must be pruned according to its capacity. Vine balance is assessed by *vine size* in the dormant season by measuring pruning weight per vine and the *crop size* that is assessed by fruit weight per vine measured at harvest. The ratio of fruit weight (in pounds) to vine size is *cropload*. Growers can refer to Table 2 to determine if their mature vines are balanced. Optimum cropload ranges between 5 to 14. The lower end of the range is for low-yielding vinifera vines (‘Chardonnay,’ ‘Cabernet Sauvignon’) and the higher-end of the range is for varieties with the propensity to overcrop (‘Chambourcin,’ ‘Vidal blanc’). The interpretation of this range is that for every pound of prunings measured, 5 to 14 pounds of commercially acceptable fruit can be produced by that vine. For example, if a ‘Chambourcin’ grapevine has a vine size of 2.2 pounds (pruning weight), then in order to achieve vine balance, the optimum crop size (fruit weight) should range between  $5 \times 2.2 = 11.0$  pounds and  $14 \times 2.2 = 30.8$  pounds of fruit.

**Table 2. Assessing grapevine balanced based on vine size, crop size and cropload**

<u>Vine class</u>	<u>Vine size (lbs/ ft of canopy)</u>	<u>Vine size (lbs/vine)</u>	<u>Cropload (crop size/vine size)</u>
Small	<0.25	<2.0	>15
Optimum	0.3 to 0.4	2.4 to 3.2	5 to 14
Large	>0.4	>3.2	<3