Introduction

After a vineyard has been planted, the goal is to establish the permanent vine structures: roots, trunks, and fruiting wood (cordon, canes). The rate of new vine growth depends on several factors, including but not limited to soil properties, weed competition, disease pressure, pest pressure, water status, and cold injury events. When management results in little pest pressure and optimal water and nutrient status, vines establishment is efficient. General goals should be to establish trunks in year one or two, and then establish fruiting wood in year two or three. From year three or four on, vines should be trained to the trellis system, setting the stage for successful crop production for the lifespan of the vineyard.

This short guide reviews dormant pruning and training in young grapevines. In most cases here, “pruning” refers to cutting one-year-old wood, which is also known as a “cane.” Canes are the name given to green vegetative shoots that have become fully woody after leaf fall; canes were green, vegetative shoots during the previous growing season. Many of the principles that apply to dormant pruning and training mature grapevines also apply to young grapevines, regardless of training system. The purpose of this fact sheet is to provide the basic steps to dormant pruning and training young grapevines in the first few years after planting. We present steps that document objective and qualitative assessments for making pruning decisions in young vineyards. For a more comprehensive review of dormant grapevine pruning in commercially mature vineyards, please review Dormant Cane and Spur Pruning in Bunch Grape Vineyards (https://extension.psu.edu/dormant-cane-and-spur-pruning-in-bunch-grape-vineyards) and Grapevine Cane and Spur Pruning Fundamentals (https://extension.psu.edu/grapevine-cane-and-spur-pruning-fundamentals).

Stepwise Approach to Evaluating and Pruning

Step 1. Evaluate cane health: size, color, bud tissues.

Evaluate the health of the dormant wood by visual assessment of external and internal cane color, cane thickness, and bud tissue status. In general, it is good to retain strong canes that are approximately 3/8 inch in diameter, with cinnamon/brown external color and green internal color and green (internal) buds. Use traits listed in the brown box on page two to guide choice of retaining or removing dormant grapevine wood (Figures 1–4).
a. Wood thickness (Figure 1)
   i. If between pencil and permanent marker, can likely retain
   ii. If thinner than a pencil, should likely discard
b. Wood color–external (Figure 2)
   i. If brown/cinnamon, can likely retain
   ii. If light tan/pale, should likely discard
c. Wood color–internal (Figure 3)
   i. If green, can likely retain
   ii. If light brown/tan, should likely discard
d. Primary, secondary, and tertiary bud health (Figure 4)
   i. If some are green, can likely retain
   ii. If all are necrotic/brown, should likely discard

Figure 1. General thickness of wood to retain (top photos) and thickness of wood to discard (bottom photos).

Figure 2. External color of wood to retain (right cane in left photo; bottom of same cane in right photo) and external color of wood to discard (left cane in left photo; top of same cane in right photo). Note that these colors approximate healthy vs. unhealthy wood; the color of healthy and unhealthy wood may vary between cultivars and should be calibrated accordingly.

Figure 3. Internal color of wood to retain (top cane) and internal color of wood to discard (bottom cane). Note: The green (top) and tan (bottom) canes correspond to the brown/cinnamon (right) cane and light tan/pale (left) cane in the right photo in Figure 2, respectively.

Figure 4. A cross section of a grapevine bud. Grapevine buds are compound in nature; primary (largest), secondary (medium-sized), and tertiary (smallest) buds are contained within. Note that in this case the primary bud is dead but the secondary and tertiary buds appear alive. Healthy secondary or tertiary buds will often produce shoots and the subsequent opportunity to train young vines. Although primary buds bear the largest crop potential in mature vineyards, some cultivars do produce healthy crops on secondary buds.

Step 2. Prune and retain or discard.
Prune back to where wood thickness is ample, external wood color is brown/cinnamon-colored, internal wood color is green, and/or buds are alive. Prune away and discard any wood that is not observed to be healthy. Refrain from tying small and weak lateral canes (see horizontal, thin canes growing from vertical primary canes in Figure 5) as permanent vine parts; it is best to retain a strong and straight primary cane. See the "Case Studies" section below for examples of pruning application.

Figure 5. An example of several canes that approximate the minimum thickness for retention consideration. Retain only one or two trunks. Pruning cuts would be made below the fruiting wire to retain the young trunks.
Step 3. Train and tie to trellis.
If wood looks healthy (see traits in Step 1) only below the fruiting wire, trim back and tie to fruiting wire with (1) a vertical string connecting the top of the cane and the fruiting wire or (2) using a fastener to tie the cane to a training aid (e.g., bamboo stake or pencil rod). If wood looks healthy (again, see traits in Step 1) above the fruiting wire, it may make sense in some circumstances (e.g., high vigor, second-year or older vines) to tie down a portion of the cane to the fruiting wire; this portion of cane tied to the fruiting wire does not necessarily need to be permanent (Figure 6).

Figure 6. An example where a cane could be retained as a future trunk as well as trained down the fruiting wire as a semi-permanent/permanent portion of the future fruiting wood.

Case Studies of Pruning in Young Vines in Various Stages of Establishment
What follows are some visual case studies of pruning scenarios in young vineyards. Note that these few scenarios are not exhaustive, and do not represent all possibilities for pruning and training young vineyards. A common anecdote is to cut vines back to a few buds after the first season's growth; there may be some logic to this in some cases. However, several factors affect young vine growth and establishment. Often, several vines in the same cultivar block will display varied growth patterns relative to many of the other vines. It is therefore often necessary to view each vine as a unique situation and prune each vine based on its growth patterns, as opposed to trying to use a blanket approach to pruning all vines. The goal of these case studies is to review situations that might exemplify common circumstances seen when pruning and training young vines in commercial vineyards.

One- and two-year-old vines
In general, portions of trunks and fruiting wood can often be established in the first one or two growing seasons after planting. For example, Figures 7 and 8 could represent vines that were planted in May of calendar year one and photographed in December of calendar year one or two.

Figure 7. Due to the weak growth of the grapevine wood (left photo), sometimes canes need to be cut back down to approximately two to four buds (right photo). New green shoots that emerge in the following growing season will be an opportunity to establish aboveground vine structures (e.g. trunk, small portions of fruiting wood).

Figure 8. Sometimes canes are healthy enough to either retain as a trunk, or as a trunk and a semi-permanent/permanent portion of the future fruiting wood (before pruning in left photo; after pruning and training in right photo). New, green growth that emerges in the following growing season will emerge along the length of the vertically and horizontally trained portions of the cane (right photo).
Two- and three-year-old vines

In general, whole trunks and at least a portion of fruiting wood can often be established in the first two or three growing seasons after planting. For example, Figure 9 could represent vines that were planted in May of calendar year one, and photographed in December of calendar year two or (or more likely in this case) three.

Figure 9. Two- or three-year-old vines will often have a trunk that is a year or two older than the canes that can be trained horizontally down the fruiting wire. In this case, the dark brown wood that forms on the trunk is older than the cinnamon-colored, one-year-old wood (“canes”) that are trained along the fruiting wire. The outer bark will exfoliate on grapevine wood that is two years and older, while the outer tissue is smooth on one-year-old grapevine wood.

Three- and four-year-old vines and beyond

In general, whole trunks and large/entire portions of fruiting wood can often be established in the first three to four growing seasons after planting. For example, Figure 10 could represent vines that were planted in May of calendar year one and photographed in December of calendar year three or four. By the fourth or fifth growing season after planting, vines can bear crop yields that are approaching similar crop yields of the subsequent 10–20 years, provided the young vineyard represents a good “cultivar-site match,” is effectively managed, and hasn’t suffered severe cold injury or systemic viruses. After the trunk and permanent fruiting cords/cane training system has been established, the vineyard could be considered “mature,” or at least no longer “new” or “young.” From this point forward, young vine pruning and training are less relevant, and dormant pruning in mature vineyards will be the focus.

Figure 10. Three- or four-year-old vines will often have a trunk and a large portion of the horizontally trained fruiting wood established. In this case, the fruiting wood (cords) had a vertically trained canopy in the previous growing season. One of the vertically trained canes (top photo) was retained (middle photo) and trained out to the left of the trunk (bottom photo). Such a decision can be made when poor shoot growth in the previous season has precluded establishment of ample fruiting positions (spurs), which can be seen on the left relative to the right side of the trunk.