

Trellis Construction for the Long Haul

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Grapes are one of the oldest cultivated crops, and breeding over the millennia has resulted in a variety of growth habits for various species and cultivars. A grape vineyard consists of a population of vines, which grow very quickly during the first part of the growing season and slow down as fruit matures. Early viticulture sometimes attempted to simulate the natural ecosystem by planting grapes among trees. This can still be seen in some areas of Europe, where grapevines coexist with olive, plum, or other fruit trees. Vines grown in this way do not yield what are now considered commercially acceptable quantities of high quality fruit. However, it is useful to consider this artificial ecosystem when designing a trellising system.

Although the mechanisms of plant growth were not known until fairly recently, and are still not completely understood, early viticulturists learned empirically that well-exposed leaves and fruit yielded the best quality and quantity of fruit. Wooden stakes began to be substituted for nearby trees, so grapevines did not have to compete for nutrients, water, or sunlight. With the introduction of relatively low cost wire trellising materials, grapevine management has dramatically changed in the last century and a half. Today, trellis design and management is one of the most important components of successful vineyard operations.

General Considerations

With the possible exception of mechanical equipment, the trellis system typically represents the single greatest cost when establishing a commercial vineyard. Trellises designed for the long haul should be made so that, if one is fortunate, little or no maintenance will be required for many years. Like other early decisions, such as cultivar or clonal selections, care should be taken to ensure that the trellis system will accommodate the needs of the grower, and if later training or trellising modifications are desired, that they can be made with a minimum input of material cost and labor. Try to choose components that will allow for maximum flexibility during the life of the vineyard. There are few growers who, after a few years of experience, say “If I had to do it all over again, I’d do it exactly the same way as I did it originally”. Building flexibility into the system from the beginning usually results in savings of time, money, and frustration over the long haul, even though initial material costs may be increased slightly.

Besides providing needed support, well-designed trellis systems improve operating efficiency. Especially with vertically shoot positioned systems, several passes are made through the vineyard during the growing season for operations such as shoot positioning, leaf removal, fruit thinning, and hedging. Compared to the cost of labor, the cost of slightly altering the trellising system usually more than pays for itself the first season that

the foliage fills the trellis. For instance, using pairs of catch wires almost doubles the amount of wire required, but it is much more efficient to go through the vineyard tucking shoots in between the wires as opposed to tying or clipping shoots to single wires.

Components of a Trellis System

Trellis systems consist of 1) end posts with some type of stabilization; 2) line posts; and 3) wires with some type of anchors. Training systems that divide the canopy horizontally, such as Lyre or Geneva Double Curtain, also require some type of additional support structures at each line post. The end posts with their anchors are the most structurally important component of any trellis system. Failure of other elements of the trellis system, such as rusted or rotted line posts or broken wires, are of course undesirable, and every effort should be made to prevent them. However, some failure is practically inevitable, and repair, while inconvenient, should be considered part of standard vineyard operations. End post failure is much more difficult and expensive to repair, and every effort should be made to avoid this when the trellising system is designed and installed.

The height of the posts is largely determined by the training system being used. Instead of thinking in terms of absolute heights, one should choose dimensions that will ensure that shoots can be at least about 42 inches long. Posts which are seven feet tall when installed will accommodate most all training systems. Most commonly used training systems will work well with posts six feet tall. Unless you already know that you will be using a vertically divided canopy such as Scott Henry, a six foot high trellis is usually sufficient. Post extenders are available and fairly easily installed if you decide to change training systems in the future.

End posts

End posts, unlike line posts, are subject to a lateral breaking force. Every effort should be made to ensure that end posts are resistant to shifting due to the stresses on the trellis system. End posts and their anchoring systems are the most expensive component of the system. The strength of an end post is proportional to its cross-sectional area (Zabadal 2004). Ideally, end posts should be as thick as possible; six inch diameter posts are typical for stable systems, although four or five inch diameter posts have sometimes been used successfully. Posts of lesser diameter are frequently used, but they are more likely to fail. Iron metal posts, such as those used for traffic signs, are available for use as end posts, and are offered by many dealers specializing in vineyard trellis materials. Their longevity over years under the stress of the trellis system is unknown in relatively humid climate of New England, but they have been successfully used in many areas of the west coast for many years with no more problems than wooden posts.

There are several methods of anchoring end posts, and each of them involves tradeoffs with regard to cost, ease of installation, and facilitation of future vineyard operations. Rocks in the soil can present considerable problems both for driving posts and installing anchors, so materials suitable for some sites may not be suitable for others. Post pounders are expensive to purchase, but can frequently be rented. The substantial cost of renting can frequently be justified by the knowledge that the posts were installed to the appropriate depth.

Line posts

Wooden line posts have been the standard for trellis supports in New England until relatively recently. Poor quality metal line posts were marketed in the 1990's, and the reputation of metal posts predictably suffered. The metal line posts currently offered by most specialists in vineyard trellis construction have a good track record, but their long-term durability in the humid northeast cannot be determined for several years. Based on the data available, they have a failure rate which is the same or slightly less than traditional wooden posts. Metal posts are easier to install and, for most people, easier to manage with regard to wire installation and adjustment. Metal line posts are being used for all new grape plantings at the Connecticut Agricultural Experiment Station, so I have considerable confidence in their long-term performance.

Trellis wire

Wire used for trellis construction should be high tensile wire adapted to vineyard operations. The difference in the cost of high tensile wire compared to less expensive types is relatively small. By the time that replacement costs in terms of time, labor, and convenience are factored in, the cost of high tensile wire is more than justified.

The amount of wire required can add up quickly. A standard vertically shoot positioned system with one lower fruiting wire and three pairs of catch wires will require slightly more than seven times more wire than the actual row length. So, for an acre of vineyard, approximately 30,000 feet of wire will be required. This is seven and a half standard 4,000 foot coils.

Standard trellis wire is 12.5 gauge. This size is well adapted to most vineyard operations. Some growers prefer to use lighter gauge wire for catch wires, as they do not have as much of a load placed on them. Lighter wire, such as 14 gauge, is suitable for this use, but the cost savings realized need to be balanced with the reduced flexibility should a change in trellising system, such as vertical canopy division, be desired in future years. If all initially installed wire is appropriate for any eventual modification is used at the outset, a conversion is easy. If it is not, new fruiting wires will need to be installed. Usually, growers who convert lighter wires to fruiting wires struggle for two or three years before realizing that the fruiting wires need to be replaced with heavier wire. Such circumstances could be avoided at the outset for relatively little additional cost at initial installation.

Other materials

There are several different types of wire anchors and joiners on the market. Most perform well, but none are failure-proof. If available, use anchors or joiners that will allow you to loosen as well as tighten wires. Some growers who use vertical shoot positioning prefer to drop the catch wires down below the fruiting wire prior to pruning. The pairs of wires are raised one at a time during the growing season as shoot growth dictates. This results in much less time spent shoot tucking and positioning, although additional time is spent dropping the catch wires after harvest and raising them during periods of rapid shoot growth.

Zabada, T.J. 2004. Vineyard establishment II: Planting and early care of vineyards. Michigan State University Extension Bulletin E-2645.