



Vineyard Floor Management

I began to consider the matter of cover crops this spring while visiting many vineyards and seeing every manner of floor management possible, I wondered if there is a standard recommendation for how to best manage the vineyard floor and the precious resources below it.

The variety is as wide as the number of vineyards I have time to visit, from clean cultivation to cover crops over most of the vineyard surface. In general we are taught the benefits of a cover crop system in vineyards, but there can be associated problems as well. Most of the vineyards I see have a somewhat “natural” appearance, meaning the grower has left it up to Mother Nature to decide what will comprise the cover crop. This usually includes a diverse and substantial broadleaf population which can be viewed from two perspectives – as weeds that are a host for Tomato Ringspot virus or as part of a diverse plant population that promotes beneficial insects. As we drift towards more sustainable practices I believe we will come to accept the latter and learn how to deal with the former.

A cover crop is a non-economic crop that grows in vineyard row middles and sometimes in the vine rows.¹ Cover crops basically come in two types – winter or summer annuals that grow and die within the span of a year or perennial plants that live for more than three years. While we most often think of and use grasses as cover crops they also include legumes like clovers and vetches that might be planted as green manures to add organic matter and nutrients to a soil.

Potential benefits of cover crops include reduced soil erosion, dust and soil compaction, increased N and organic matter, reduced nematode populations, improved soil structure and water penetration, enhanced vineyard access in wet conditions, weed suppression, controlled vine vigor, improved plant diversity and pest management, and the aesthetic appearance. The last benefit is not to be underestimated. I remember from my years as a grower that the vineyard never looks better than right after the grass has been cut. This is a cultural implant that we cannot escape.

The possible problems with cover crops include increased water and nutrient use that may compete with vines, potential host plants for disease, virus and pests, frost hazard, and increased establishment, management, and equipment costs and fossil fuel use.

¹ *Cover Cropping in Vineyards*. C. Ingels, et. al. 1998. pg 3

As in all aspects of vineyard management, there are trade offs involved. It is a classic conundrum on a south slope – should rows go up and down N-S which may increase erosion or E-W, not an ideal vine orientation but less prone to erosion. In Virginia and North Carolina (and probably also in Pennsylvania) an acre of cultivated land loses an average of about eight tons of top soil.² This alone may be sufficient justification for using cover crops.

The use of cover crops has been implicated in studies in Germany as a potential contributor to atypical aging of aromatic white wines due to reduced nutrient levels in grape musts and competition for water.

We are only beginning to understand the potential for using cover crops as a viticultural tool to control excess vine vigor. Most vineyard sites in Pennsylvania suffer from too much potential growth from soils that are both very fertile and hold a lot of water, and these conditions combined with frequent summer rains exacerbate vine growth. Cover crops compete for water and nutrients with the vines and in combination with careful rootstock selection may help to control overly exuberant growth. At Linden Vineyards the cover crop is fine tuned to the point that weed-free circles of various radii are maintained around mature vines depending on their size. Special mowers are used to make sure “weeds” do not grow high and up into the vine canopy making it difficult for workers to do canopy work and creating a more humid canopy microclimate. Cover crops’ influence on vine performance can be regulated (I use this term loosely) by varying the width of the cover crop (and inversely the vine row strip) or using different plant types that have certain performance characteristics. It was suggested to me that C-4 grasses (corn is a C-4 plant), in particular those used to hold soil on slopes by roads, have incredible evapotranspiration capacity and move water out of the soil at enormous rates, thereby helping to reduce vine vigor³. Kentucky-31, a tall fescue, is a popular cover crop in Eastern vineyards that grows prolifically in cool, wet weather requiring frequent mowing passes. Since one of my pet projects is to reduce fossil fuel use in vineyards, grasses that require less mowing are more desirable. Common winter annuals for temporary cover crops include annual rye grasses, oats, and barley.

When it comes to the issue of excess vine vigor, I like the use of cover crop and tile drainage with drip irrigation for drought years, particularly for young vineyards. Since fruit quality is tied to vine physiology and all of those functions are directly related to water and nutrient availability, management of these resources is key to controlling the vine and, hence, fruit quality. Short of covering the vineyard after veraison, cover crops may offer the best means to control water and nutrients. I have seen this work in the other direction, too. In Oregon a neighbor had a very weak section of the vineyard with persistently short shoots and yellow leaves. He disced out the cover crop in every other row and it was like magic the way those vines sprang back to life.

Young vineyards and cover crops may be at cross purposes. Young vines need a lot of TLC and that means removing all possible sources of stress. Cover crops (and weeds) can

² *Mid-Atlantic Winegrape Grower's Guide*. T. Wolf and B. Poling. 1995. pp. 40, 41.

³ Malcolm Sumner. 2003. Personal communication.

compete with new vines for water and nutrients. If growth is restricted a vine will suffer, root development will be reduced, and vines may suffer long-term ill consequences, manifested by lack of productivity and quality. I have seen new vines in vineyards this spring in exactly this predicament. A dry spring and no irrigation can be a recipe for trouble. This is the reason why new vineyards often clean cultivate for the first year or two before the establishment of a permanent cover crop. New vineyards with drip irrigation should apply water in two sets per week at 3 gallons per vine per set throughout the growing season.⁴ In the fall, a winter cover is planted and disced out in the spring.

If you are going to use a cover crop, I recommend a commercial orchard/vineyard blend of a fescue grass such as creeping red fescue. While difficult and expensive to establish, once it is in place it will offer all the benefits of a cover crop, and its dense root system will help to keep broad leaf weeds from spreading. During dry periods in the summer its growth is very limited, saving valuable mowing passes through the vineyard.

What about the “natural” or resident vegetation? In general, it just doesn’t look as good as a cultivated cover crop. If vineyard aesthetics are important around the winery entrance where visitors roam, then a grass cover is probably the best choice. But as we consider a sustainable vineyard, plant diversity becomes important, and local, non-obnoxious weed species are encouraged. In the Oregon Low Input Viticulture and Enology program, a baseline threshold for number of plant species present in the vineyard is set and penalties assessed if this threshold is not met. In this case, a cover crop may become more of a matter of semantics than aesthetics, referred to as “bio-diversity” instead of weeds. Plant diversity can also be introduced in and around the vineyard to encourage diverse insect populations. This is a common practice in organic vineyards in California where “habitat strips or corridors” are established with a careful selection of plants that attract beneficial insects. These areas are as labor intensive and expensive to maintain as the vineyards they help to protect.

A friend and vineyard consultant in the North Coast told me that nematodes are among the top three considerations in site selection and amelioration in his area (the others are soil pH and total water availability). Plant parasitic nematodes can not only weaken vines through their feeding habits (primarily on young roots) but also transmit viruses like Tomato Ringspot and Fanleaf. Cover crops, used either in a bioremediation program or as part of a more sustainable system, can help to suppress parasitic nematode populations.

Cover crops are an important part of an overall sustainable vineyard management system. They are ever present in vineyards but not always well considered for both their positive and negative effects. It is a good idea for every grower to approach vineyard floor management in a thoughtful way that will give the best balance to the overall performance of the vines. As with almost every aspect of viticulture, changing one part has downstream effects on a dozen others. It is very important to weigh the pros and cons of cover crops and to use them effectively to achieve your viticultural goals.

⁴ Jeff Newton, Coastal Vineyard Care. 2006. Personal communication.

Cover Crop Resources:

1. *Cover Cropping in Vineyards: A Grower's Handbook*. Chuck Ingels, et. al. 1998. DANR Publication 3338. Univ of California
2. *Growing Organic Winegrapes: An Introductory Handbook for Growers*. Ann Thrupp. 2003. Fetzer Vineyards

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