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Viticulture

Sustainable Viticulture

Mark L. Chien, Penn State Cooperative Extension

Sustainable, organic, biodynamic… these are all relatively new words in the popular agricultural lexicon. While they certainly have their own meanings, they share an idea that agriculture has to be about more than just producing food for consumers. Anyone who reads the news knows that the planet is under some stress from man made pollutants. Our local concern about field run off that affects the Chesapeake Bay is a classic example of how everything we do in farming has implications "down stream.". Wine growers are well aware of this. The truth is that most of the people who are starting vineyards do not come from agricultural backgrounds. They are successful professionals who have developed a love of wine and want to grow it, but at the same time have a healthy respect for the land and environment. They come into the business wanting to be good stewards of the land they farm. So, often, one of the first questions they will ask me is if they can grow grape organically. My answer often disappoints them. Because of our humid and rainy climate during the growing season and the need for clean and ripe fruit to make good wine, it is difficult to grow grapes without the help of synthetic pesticides. Currently, I do not have a set of extension recommendations for even a sustainable viticulture program. However, that is not to say that every grower, no matter what the crop, can impose a sustainable philosophy on his farm. The goals of sustainability in farming are universal and include:

- Viewing the farm as a whole system and encouraging biological diversity
- Minimizing off farm inputs, especially synthetic pesticides
- Using IPM, scouting and cultural practices to solve pest problems
- Encourage responsible stewardship of the soil, its health, fertility and stability
- Growing a high quality product in an economically sustainable business
- Being a responsible part of the larger community

In my opinion, only the best growers can succeed in doing these things. Synthetic pesticides make farming easier, perhaps cheaper, but are also a bit of a crutch for the less skilled grower. If a grower takes the time to learn integrated pest management practices by learning his weeds, diseases and insects, it is much easier to control them using minimal inputs. For example, in vineyards disease can be a terrible problem in a wet year like 2004. As the season developed, experienced growers

realized we were in a rainy vintage and they managed their canopies more diligently, pulling leaves to expose fruit clusters to wind so they would dry off faster and better spray coverage. They lowered their crop loads so the remaining fruit would have a better chance to fully ripen. These decisions are easy to make if the grower is intimately familiar with the affects of climate on the crop and how to respond to changes during the season. Cover crops are very important to erosion control, attracting beneficial insects, water penetration, soil aggregation and reducing soil compaction. Many of these choices are easy to make because they are both sustainable and viticultural best practices. The bottom line is that we do not live or work in a vacuum. Our choices in life, what car we drive or what pesticide we spray not only affect our own lives but those around us, loved ones and people we do not know. We have only one planet to live on and it is our moral, ethical and humanitarian obligation to do everything we can to protect and preserve it - if for no other reason than for our children's sake.

Plant Pathology

Grape Diseases: Pre-bloom through Post-bloom
Dr. Jim Travis, Department of Plant Pathology

You need not have been growing grapes for very long to know that the pre-bloom to post-bloom period is one of the most critical in grape disease prevention and harvesting a quality crop. Most of the significant diseases of grapes in southern PA and the Mid-Atlantic region can be a problem during this time period. These include, Phomopsis, black rot, down mildew, Botrytis and powdery mildew.

Except for powdery mildew the diseases mentioned above all require wet weather conditions for infection and spread. So you may be thinking that since it has been relatively dry there is no threat from these diseases this season. However, the key word in the previous statement is 'relatively'. There have been some significant wetting periods in late April through mid May. The length of time the leaves and canopy remained wet is the critical factor not how much rain was received. Late afternoon and evening showers can result in long over-night wetting periods with very little precipitation. Additionally, depending on temperatures, wetting periods need only be 6 to 7 hours long to initiate infection of some diseases. Given the high disease carry-over from last season and adequate wetting events this spring, there is a significant threat of early season disease development in PA vineyards.

It is important to protect early season foliage to prevent spread of diseases like black rot and downy mildew from the leaves onto newly developing fruit. Apply recommended fungicides being careful to utilize several different modes of action as discussed in grower educational meetings and the NY & PA Grape Recommendations. Don't make some common mistakes in applying fungicides. At this time of year spray intervals should not be more than 10 days between sprays. Apply enough water to completely cover foliage, shoots and fruit clusters. Whatever is missed will not be protected and may become diseased. It is difficult to spray less than 50 gallons of water per acre and adequately cover the grape canopy. Many growers begin the season by spraying every other row. When doing this remember you are only applying ½ the recommended fungicide per acre to control disease. Once fruit clusters are present, each row should be sprayed on both sides on a 10 day schedule or less if rain fall amounts of 1 inch or greater occur. Do not count on the redistribution of

fungicides after application with dew or light rain showers. New tissue that develops after you spray is unprotected until your next application, keep intervals short during the pre-bloom to pea size fruit period.

About powdery mildew, it is true that powdery mildew favors warm humid conditions, not wet conditions. However, it takes only a small rain event to drive up humidity. More grape crops are lost or quality reduced from powdery mildew than any other single grape disease. The powdery mildew infections that most affect the crop occur during the pre-bloom to pea size fruit period.

Don't expect to see disease on the foliage or fruit until it is too late. If your plan is to respond to black rot, downy mildew or powdery mildew once you have seen it, you have already lost the crop. It is impossible to stop a disease epidemic once it has begun. It will cost you a lot of money and time for little gain and the disease will carry over to next season. This is also the best strategy to develop fungicide resistance in your vineyard. The more fungal disease you spray in your vineyard the better the chance of selecting for a resistant strain in the population. Once this happens there will be a loss in effectiveness of the 'best' disease control materials.

This season the wine grape extension team (Mark Chien, Steve Menke and Jim Travis) will focus on the cultural and disease management strategies that can be used by growers to most effectively grow quality grapes and produce quality wine in the vineyard. Plan on attending the May 24 educational meeting in Lancaster for a more thorough discussion of the early season strategies for quality crop production.

There is also a field day planned at the Penn State University Fruit Research and Extension Center on July 14 (Adams County, 9 miles north of Gettysburg). There will be an opportunity to visit in-field research trials on Botrytis (12 treatments including cultural, alternative materials and best fungicides), canopy management systems and compost application in vineyards. Research trials are being conducted on vinifera varieties; Chardonnay, Pinot noir, Cabernet franc, and Riesling. Hybrid varieties in the trials include; Chambourcin, Vidal, Traminette and Chancellor. A new cooperative research trial was begun this year in cooperation with Michigan State University on crown gall management. Although you can read about many research projects occurring in the east and across the United States and Canada, this work is being conducted in the region you grow grapes and with the varieties you grow. Please plan to attend, more information is provided below. The field day agenda will be expanded to include the grape topics listed above. Please indicate that you are interested in grapes when you register.

http://frec.cas.psu.edu/FieldDay05/FieldDay.html

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Enology

AVOIDING *BRETTANOMYCES/DEKKERA* IN YOUR WINE

By Stephen Menke, PSU Extension Enology Educator

As wines move from winter storage to spring and summer cellaring and bottling, microbiological problems can often become manifest as malodorous or foul-flavored wine taints. Many wineries have significant seasonal temperature changes, with warmer spring and summer temperatures that encourage microbial growth in already contaminated wines. Wines are also being transferred more often, thus markedly increasing chances for new contamination and/or activation of organisms from static to growing forms.

One especially troublesome source of odor and flavor changes is the *Brettanomyces*/*Dekkera* (asexually-reproducing/sexual-spore-producing) yeast (a single celled fungus without multi-cellular hyphae chains). Only the *Brettanomyces* asexual form is found in wine. *Brettanomyces* yeast produce a complex set of chemicals that can either be perceived as odor or flavor taints or can also suppress positive aromas and flavors. *Brettanomyces* can grow in either aerobic (oxygen rich) or facultative-aerobic (minimal oxygen) conditions, so opening and transferring barrels and tanks can activate an existing population of *Brettanomyces.* *Brettanomyces* grows slowly, so it is often not noticed until it has been present for a long time or activated by changing conditions. Unfortunately, most wineries notice *Brettanomyces* only when their older wines are removed from barrels or tanks, or even after it has sat in the bottle for a while. For that reason, prevention of contamination is the optimal goal for *Brettanomyces*, not mitigation of contamination.

There are two keys to controlling *Brettanomyces*. The first key is the proper use of SO_2 and good sanitation. The second key is to regularly monitor the wine for the presence of *Brettanomyces* by either chemical, DNA, or biological tests.

Brettanomyces (as well as many other yeasts and bacteria) can enter the winery with the fruit from the vineyard. Thus, the addition of at least 50-100 ppm SO_2 to the must as it is crushed or to the grapes before maceration is your first line of defense against *Brettanomyces*. This kills the yeast before it can enter the winemaking process. Regular and through cleaning and sanitation of all winery surfaces and of tanks and barrels after emptying and before filling is the second line of defense. Maintaining wine during cellaring at low pH, low oxygen, and free SO_2 of 35+ ppm will usually be sufficient to inhibit *Brettanomyces*. Note that once a barrel is infected, only very long treatment with very hot water has a chance to kill *Brettanomyces* that is hidden within the microscopic surface architecture of the barrel. Even then, it is best to remove and destroy the barrel.

Monitoring wines is the next best tool to killing the *Brettanomyces* before it enters your wine. Biological tests (culture growth on agar medium) are the best proof that the organism is in the wine, but *Brettanomyces* is difficult to culture. Chemical and DNA tests are very reliable, but only tell you that these by-products of the organism are in the wine sample, not whether the organism is still living in the wine. Perhaps a fluorescent tag, that is specific to the living cell of *Brettanomyces*, will be developed to provide a quick and accurate test.

Though monitoring may be a little difficult and expensive, the alternative is throwing away a lot of wine and/or constantly fighting the battle against contamination from unknown sources. **Remember**

to take monitoring samples with good sterile technique, or you will just increase your chances of spreading any infection. When taking samples from barrels or tanks, always use a sterile pipet or wine thief for each tank or barrel sampled. Proven sources of *Brettanomyces* should be removed to an isolated area for treatment and/or disposal. Do not dump infected wine onto a common floor or into a common drain or clean the container near other wine. A contaminated stainless, glass, plastic, or even smooth metal pump surfaces can be successfully sterilized, but decontaminating a wooden surface, or any roughened surface is very risky. To be safe, remove and destroy any contaminated barrel, and any equipment used to remove contaminated wine should be capable of sterilization or should be dedicated only to contaminated wines and kept isolated from the rest of the winery.

As with sampling, anything put into a tank or barrel could be infected, if it has not been monitored. The quickest and easiest way to contaminate many containers is to use contaminated wine to "top off" barrels or tanks. Often small remainders of older wine are used for this purpose. Not only are topping wines often old, but they are often among the most likely wines to have been opened or transferred many times, thus increasing chances of contamination. If you monitor no other wine, at least monitor any topping wine.

As a final note, I would like to discourage a practice in some Pennsylvania wineries that may exacerbate *Brettanomyces* infections. I have found that many Pennsylvania wineries do a "natural" malolactic fermentation. That is, the winery is poorly insulated and/or kept very cold in the winter, and conditions are too cold to allow for malolactic fermentation to occur. In spring as the tanks warm up, seeding of malolactic bacteria is done or natural malolactic populations start growing. Since malolactic bacteria are sensitive to SO_2, wineries that practice this seasonal malolactic fermentation do not maintain tanks in the winter with SO_2 at levels sufficient to inhibit other organisms, including the other lactic acid bacteria and *Brettanomyces*, which have similar temperature and SO_2 responses. I would strongly encourage malolactic fermentation immediately in the fall, followed by 35+ ppm SO_2 maintenance, even if it takes heating the winery, rather than waiting until spring and allowing the malolactic bacteria and the other lactic bacteria and Brettanomyces organisms to all maintain infections in the winter that can then speed up in the spring and summer and cause significant odor and flavor problems.

[The article following this one is a reprint of an excellent comprehensive review, by Arvik and Henick-Kling, that appeared as "*Brettanomyces bruxellensis* occurrence, growth, and effect on wine flavor", in *Practical Winery and Vineyard, May/June 2002*].

ed note: please see attachment

Brett_Review.doc