The Grape Communicator

A Newsletter for the Illinois Grape & Wine Industry

Volume 2, Number 3 **May/June 2006**

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VENOM
New Insecticide

Get out your spray guides and add Venom Insecticide for control of grape berry moth (1st generation only) and multi-colored Asian lady beetles.

Venom is a neonicotinoid compound (IRAC code 4A) that was developed to control chewing and sucking insects on various crops. The active ingredient in Venom is dinotefuron—a related compound to acetamiprid, which is the active ingredient in Assail. There are currently two labels through Valent for Venom, a national label and a 2(ee) label. The national label lists glassy-winged sharpshooter, grape mealybug, leafhoppers, and thrips. The 2(ee) label lists the grape berry moth and the multi-colored Asian lady beetle. The national label will come with the

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MALOLACTIC FERMENTATION

Barry H. Gump, Ph.D.
Department of Viticulture & Enology
California State University, Fresno

The occurrence of malolactic fermentation (MLF) is common to all wine-producing areas of the world. It involves a catabolic pathway in which bacteria enzymatically de-carboxylate (loss of CO_2) L-malic acid to form L-lactic acid. Depending on the strain(s) of lactic acid bacteria (LAB) involved, several byproducts may be produced that can impact the sensory properties of the wine. As a result, there are a number of processing, tracking, and analyzing concerns that are of importance to a winemaker. In the following I have summarized some of the material from our textbook ("Wine Analysis and Production" by B. Zoecklein, K. Fugelsang, and B. Gump) currently being revised. One can find citations from original literature there, if they wish to follow up on some point in more depth. I have also attached our current version of the paper chromatographic method of analysis for following the progress of a malolactic fermentation.

The most significant chemical changes observed during the course of MLF are increases in pH and corresponding decreases in titratable acidity (increases in pH of 0.3 units along with decreases in TA on the order of 1 to 3 g/L can be observed). As a result, successful induction of MLF in low pH, high acid wines can be a useful technique for acid and pH adjustment. However, with high pH wine, a MLF may negatively impact the sensory properties of the wine. In addition both chemical and microbial instability are known to result from increased pH. In cases where MLF may occur in low acid wines, follow-up adjustments in acidity may be desirable.

In addition to its importance in acid balance, byproducts of MLF may play important sensory roles, potentially contributing to complexity. These byproducts include principally diacetyl, and secondarily acetoin and 2,3-butanediol, in addition to acetic acid and its esters.

Diacetyl is perceived as buttery in character and is normally produced by yeasts during alcoholic fermentation at low concentrations (<4 mg/L). Bacterial production during MLF represents the primary source for diacetyl. Its formation varies with the strain of LAB involved. At concentrations less than 5 mg/L, and in combination with other components, diacetyl may add to wine complexity, and thus may be used as a stylistic tool.

Ethyl lactate may play a sensory role in wines having undergone MLF. Post-MLF ethyl lactate levels ranging up to 110 mg/L are thought to contribute to enhanced "mouth feel." It is generally accepted that MLF

Malolactic Fermentation

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significantly affects the fruity aromas of Chardonnay wines. In cases of wines not undergoing MLF, sensory descriptors from taste panels tend towards "green apple, citrus, fruity, and melon rind." By comparison, wines having undergone MLF are frequently described as "apple, nutty, smokey, fruity, buttery, melon and sweaty." Grape variety and vinification techniques also influence the sensory properties of wines having undergone MLF. In aromatic varieties, the contribution of MLF to flavor may be overshadowed. Sur lie contributes to wine-enhanced complexity in the form of yeasty and nutty aromas, whereas barrel fermentation and aging imparts smoky and spicy odor notes.

Parameters Affecting Growth of LAB

The lactics are micro-aerophilic to facultatively anaerobic and, thus, require reducing (low oxygen) conditions for normal growth. Further, the group is nutritionally fastidious, requiring complex organic media for growth. LAV have lost their ability to synthesize many specific compounds required for activity, and therefore require preformed compounds such as vitamins and amino acids in addition to other organic compounds for growth. Table wines contain sufficient carbohydrates to serve as energy sources for growth of LAB, they have been found to use seemingly minute concentrations of sugars in "dry wines" at less than 0.1% .

Variation in the susceptibility of wines to LAB is partly due to differences in available nutrients and metabolic intermediates, as well as, bacterial strain. If other factors are not limiting, the addition of small amounts of yeast autolysate may stimulate their growth in wine (B-complex vitamins, produced by yeasts, are especially important to the growth of lactic bacteria). Thus, one advantage of adding LAB starter cultures during the course of alcoholic fermentation is to take advantage of the increased supply of nutrients provided by the yeast.

Processing Considerations

Processing operations are known to play a role in predisposing a wine to MLF. Prefermentation processing, such as cold clarification and fining, may not only reduce native populations of lactic bacteria but, additionally, reduce nutrient levels to a point where subsequent bacterial growth may be impeded. Skin contact enhances the growth of lactics but it is unclear whether this is due to increases in pH through extraction of alkali salts into the must, and/or extraction of nutrients.

Certain yeast strains may inhibit successful growth of LAB when grown in co-culture. This antagonism may result from competition for nutrients and/or from production of soluble antimicrobial agents. Demand for and accumulation of amino acids by yeast could deplete available pools needed for bacterial growth; certain yeast strains are also

Malolactic Fermentation

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reported to produce SO_2 at levels sufficient to inhibit lactic bacteria. Most of this SO_2 will be bound rather than in the free molecular form suggesting that bound SO_2 may be inhibitory to lactic acid bacteria. Medium-chained fatty acids can also be inhibitory to LAB.

LAB Starters and Inoculation

Most winemakers choose to inoculate fermenting must or wine with high density bacterial starter cultures to improve the success of MLF. Starters may be purchased as lyophilizates, frozen concentrates or in liquid culture. An alternate procedure is to raise starters from pure culture stock, which is expanded in sterile juice or wine before use. Lactic starter selection is usually limited to strains of L. oenos, and several commercially available strains, such as ML-34 and PSU-1, have been used. The advantage of commercially available high titer lyophilizates and cultures is that the lag time needed to prepare sufficient volume of active starter is reduced significantly from that needed to bring up cultures stored on laboratory media. Propagation of starters may be carried out in co-culture with Saccharomyces cerevisiae, or as a pure LAB culture. The former has the advantage that the yeast provides essential growth factors and intermediates for the lactics.

Timing of LAB Inoculation

There is no unanimous opinion as to timing the addition of LAB starters. They may be added along with the yeast at the crush/clarification stage or during the course, or upon completion of, alcoholic fermentation. The main concern regarding addition of LAB starters at the beginning of fermentation is the potential for growth of heterolactic LAB species and subsequent production of acetic acid from fermentable sugars.

Many winemakers use high titer ($>10^6$ CFU/mL) bacterial starter additions during the course of or shortly after completion of alcoholic fermentation. At this point, potentially inhibitory levels of pre-fermentation SO_2 have been reduced and yeast growth has proceeded to the point where bacteria have little impact on their activity. Furthermore, yeast autolysate provides important B-complex vitamins to stimulate bacterial growth and activity.

In the case of red wine fermentations, many vintners prefer to add lactic cultures after pressing but before the fermentation has finished. Still others add starters to freshly fermented wines or rely on endogenous populations present in barrels to bring about the conversion. However, successful completion of the MLF at this stage may be difficult because of alcohol levels and nutrient depletion. To overcome the problem of nutritional deficiency, one can use a period of

Malolactic Fermentation

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lees contact to make available the necessary nutrients for growth of the bacteria. Due to the sensitivity of LAB to SO_2, its use post-fermentation is usually delayed until completion of MLF.

Timing of inoculation may also play an important role in levels of diacetyl present in wine. In that yeast are capable of using the compound, inoculation towards the end or at the completion of alcoholic fermentation and before first racking may result in lower concentration. Conversely, inoculation after first racking (when yeast titer is low) results in higher levels of diacetyl remaining in the wine.

Spoilage Resulting from LAB Growth

Refermentation: Post-bottling fermentation is probably the most frequently encountered type of spoilage associated with wine yeasts and LAB. In both cases, utilizable levels of carbohydrate can stimulate growth in a wine that is otherwise at risk (low alcohol and SO_2). In the case of LAB, continued growth of Oenococcus or Pediococcus in wines determined to be "stable," based upon paper chromatography, has been reported. Paper chromatography, while expeditious for tracking progress, has detection thresholds for malic acid of 100-200 mg/L, well above the 15-30 mg/L level that many winemakers consider to be stable for a wine.

To minimize the potential for secondary growth, winemakers should consider racking, SO_2 addition, and acidulation where the pH has increased above 3.5. In this case, acid adjustment should be made with tartaric acid rather than malic or citric acids in that the latter provides a source of carbon for bacteria. Despite its relative low cost, citric acid should not be used for wines except immediately prior to sterile bottling due to the possibility of excessive diacetyl production.

Acetic Acid Production:
Compared with acetic acid levels from other sources, those attributed to MLF are not excessive, being on the order of 0.1 to 0.2 g/L. Acetic acid is well known to be inhibitory to yeasts, influencing both their growth and fermentative abilities. In this regard, rapid proliferation of certain hetero-fermentative lactobacilli before the onset, or during the early stages of alcoholic fermentation has been reported to result in sluggish or stuck fermentations.

Mousiness: Reminiscent of rodent-cage litter, mousy defect or mousiness is associated with the growth of some strains of hetero-fermentative lactobacilli. The defect is characterized by development of offensive odor and lingering aftertaste. In that the aroma threshold in wine has been reported

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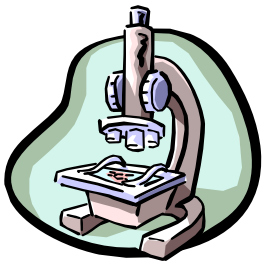
to be 1.6 µg/L, even limited bacterial activity may result in defect.



MALOLACTIC FERMENTATION: MONITORING BY PAPER CHROMATOGRAPHY (SEMIQUANTITATIVE MEASUREMENT)

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Department of Viticulture & Enology
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Wine acids partition themselves in a chromatographic system according to their relative affinities for the mobile solvent and stationary phase. Usually the system is operated in an ascending manner; however, descending chromatography is possible, although the procedure involves purchase of additional components.

With the paper chromatographic method presented below, the solvent used has the added advantage of not requiring subsequent development; it already contains an indicator for acid spots. Thus, after drying, results can be directly evaluated. Fresh solvent should be prepared on a weekly basis, in that old solvent may cause excessive trailing of spots, making interpretation of the chromatogram difficult. When not in use, the solvent may be stored in a separatory funnel away from exposure to direct sunlight. Storage in a separatory funnel has the advantage that any separating aqueous phase can be discarded before use.

The solvent mixture used contains the pH indicator bromocresol green, which undergoes a color change from yellow to blue in the pH range 3.8-5.4. The presence of an acid is indicated as a yellow spot on a blue-green background. To identify the acid, analysts should run standard acid(s) as reference(s), to make spot identification easier. Standard acids are prepared at concentrations of 0.3%.

I. Equipment

- Whatman No.1 chromatography paper
- Chromatography developing tank
- Separatory funnel
- Micropipettes (20 µL)

II. Reagents

- Wine acid standards (0.3%)

Chromatography solvent: In an appropriate sized separatory funnel, add the following reagents:

Malolactic Fermentation Monitoring By Paper Chromatography (Semiquantitative Measurement)
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- 100 mL n-butanol
- 100 mL deionized water
- 10.7 mL stock formic acid
- 15 mL indicator solution

prepared by dissolving 1 g of water-soluble bromocresol green in 100 mL of deionized water.

Shake solvent mixture thoroughly by repeated inversion of separatory funnel. Allow for phase separation, and discard lower phase.

NOTE!! Solvent should be prepared fresh on a weekly basis.

III. Procedure

1. Taking care to handle chromatography paper only by the edges, cut a piece of appropriate size to fit into developing tank.

2. Using a pencil, draw a line parallel to, and approximately 2.5 cm from the bottom edge of the paper.

3. Using micropipettes or hematocrit tubes, spot standard acids and wine samples at equal intervals along baseline. Spots should be of as small a diameter as possible (less than 1 cm). It is recommended to re-spot at least twice in order to achieve this goal. Each spot should be at least 2.5-3.0 cm apart. A hair dryer can be used to assist in drying the spots between applications.

4. Transfer solvent to developing tank, allowing at least 30 min for vapor saturation to occur. A minimum depth of 0.75 cm of solvent is required for adequate development.

5. Immerse baseline side of paper into tank, taking care that solvent moves uniformly up the paper.

6. When the solvent has ascended to near the upper edge of paper, chromatogram may be removed and allowed to dry.

7. When dry, results may be interpreted by noting the positions of yellow spots (acids) on blue background. Identification of various wine acids may be made by comparison to standard acids or by calculation of R_f values. Sensitivity of the method for individual acids is about 100 mg/L.

IV. Supplemental Notes

1. The time required for migration of solvent front is not critical. To facilitate maximum separation of wine acids, the solvent front should be allowed to move near the top edge.

2. In solvent preparation, formic acid is added to suppress ionization of acids, which would otherwise prevent their separation.

Malolactic Fermentation Monitoring By Paper Chromatography (Semiquantitative Measurement)

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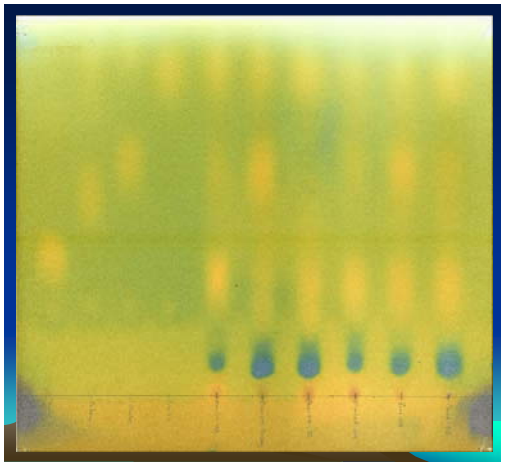
3. Homofermentative LAB produce lactic acid as a normal product of metabolism when growing on sugars. Therefore, the presence of a lactic acid spot on the chromatogram is not necessarily confirmation of an ongoing MLF.

4. In the following sample paper chromatogram, the spots from left to right represent tartaric acid standard, citric acid standard, malic acid standard, lactic acid standard, Merlot #1, Cabernet Sauvignon #1, Cabernet Sauvignon #2, Merlot #2, Zinfandel #1, and Chardonnay #1.

5. The malic acid spot intensities for the wines are: M#1 – slight, Cab#1 – moderate, Cab#2 – negative, M#2 – slight, Zin#1 – moderate, and Char#1 – slight.



Venom: New Insecticde

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product, but you will have to acquire the 2(ee) label to legally use Venom for the control of grape berry moth and the multi-colored Asian lady beetle. The Venom 2(ee) label can be viewed and printed from the CDMS website http://www.cdms.net/

Venom has a 1 day PHI and has is restricted to a total of 6 oz. per acre per season by foliar application. To reduce resistance development, more than three applications of Venom per growing season are not allowed.

Heads up on powdery mildew. Powdery mildew is heavy across the board on susceptible crops, including grapes. I have already received one report on failure of Nova to control powdery mildew. For growers who have not developed resistance to Nova, continue to use it in a proper rotation, but be diligent in your scouting for signs of control failure. Where Nova is no longer effective, move to another powdery mildew compound like Topsin-M.

There are several additional fungicides that can be used in an effective resistance management rotation—see the 2006 Midwest Small Fruit and Grape Spray Guide for a complete listing.

- Elizabeth Wahle-
University of Illinois Extension

Illinois Vineyards & Regions Update

SOUTHERN UPDATE

Allan Dillard, Limestone Creek

April 23- Most of the vineyards in the area have been rough pruned and many of them have had secondary, fine pruning done as well. Hopefully everyone has also sprayed for fungal control at least once, since bud break has occurred on some of the early varieties like Chancellor and is imminent in several other varieties, depending on site location and aspect. If you consider planting vines on a site, one thing to remember is that a southern exposure or aspect to the site slope will usually mean an earlier bud break than on a similar site with a northern aspect. In the case of early varieties like Chancellor, this can mean the difference between frost damage/no damage to primary buds in the spring.

Another way to lower the chance of frost damage in early varieties is to avoid pruning them until very late, since this will retard bud break. Especially important in late pruning is to use extra care when removing canes, since the buds will be more susceptible to damage and you want the ones on the spurs you leave to be in good condition.

I have been watching several vineyards with vinifera plantings(Cabernet Franc, Chardonnay,etc.) and some of the New York varieties, NY 70, 73, that have been established in the area in the past few years and so far all seems well. Some of the older Chardonnay has had winter injury and has developed crown gall in the scion trunk/graft union area, but most of them have not. However, we have not had a "real" winter with very cold temperatures (below -10) since these vines were planted in the late 90's, so the winter injury incidence is not nearly as prevalent as it could be. One bad cold snap, even to near zero, early in the winter and any unprotected viniferas will likely have serious damage.

The NY varieties seem to be very hardy and quite happy in their locations so far, but we still don't know what the quality of the fruit/wine will be like. The Cabernet Franc is about as hardy as Chambourcin, BUT will suffer winter damage, especially low on the trunk and at the graft union, if not protected by mulching or hilling dirt each winter and removing it each spring. Another issue with viniferas in our soil is that they grow too quickly and have excessive vigor in the canopy. For that matter, so do

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many of the hybrid vines. For now, unless you have a very good site (elevation above 650-700 ft., low organic matter, below .8-1.0) and have been growing for quite a while, I would not try planting viniferas, even Cabernet Franc. Come to the SIU Horticulture Research Center when they have there summer program, probably in late July or early August, and see the viniferas we planted there in 1999/2000. There are several clones of Chardonnay, Cabernet Sauvignon, Cabernet Franc, Syrah, etc. You can see the vigor, the extra effort needed to maintain and control disease in these vines and get an idea of how difficult it can be to establish and continue with even a small number of them.

This is the time of the year when there isn't enough daylight each day, nor enough days in the week to keep up! If you haven't already suckered, it is time, and within a week to ten days, you will have to be well on the way to completing the first shoot thinning. For those of you who came to the shoot positioning/thinning workshop at Kite Hill vineyards yesterday, hope you learned enough to feel more confident about how to select the right stuff to leave in the right places and at the right spacing. All of that, of course, on the perfectly pruned vine you did in February! We had decent weather and a good group. For those of you who missed it, I will be doing another on May 4 at Genkota Winery in Mt. Vernon beginning at 9 a.m. Come on out and meet some people and hopefully learn something to make your life easier and your vineyard better.

May 17- I have never seen a May as cool and wet at this one has been. If you have not sprayed at least weekly for the past few weeks, you can probably expect problems with Anthracnose, Black Rot, etc. Good Grief! This weather has also meant slowing of vineyard progress, both for the vines and for the work, but shoots are in many cases beginning to attach more firmly to the cordons (and trunks, for those who need to sucker more or again). It is much easier and faster to shoot thin now than to have to use pruning to remove them later, so put on the rain gear and keep thinning!

I have seen early disease in Chardonel, Chambourcin, Traminette; mostly anthracnose is showing up, with a few leaves having signs of black rot, and also phomopsis on some leaves and shoots in chardonel, so keep an eye open and keep your spray schedule tight(use a good spreader/sticker when spraying) until this pattern changes for the better.
You should be watching near the base of the shoots for either Anthracnose or Phomopsis signs -- look at the pix in the Midwest Grape Production Guide, ppg. 64-80 for good identification of what you are seeing. If you still don't have a copy

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of this book, you need to get one. Bill Shoemaker, Elizabeth Wahle or I have copies available.

I can't stress enough that, even in a drier spring in this part of the state, it is imperative to be very precise about your early season sprays, in dose, timing and coverage of all newly developing material. The sprays from now through the next three to four weeks can make or break your entire season and crop. DO NOT miss a spray because you want to wait until after the next rain threat! Spend a little extra on disease control or lose more to poor fruit condition later. I remember fifteen years or so ago having a conversation with a guest speaker from California at the Midwest Conference in Missouri. He thought anyone trying to grow grapes in our macroclimate in the Midwest deserved a great deal of respect -- or psychiatric help.

I will be doing a couple more workshops next month on summer canopy management (cluster thinning, shoot combing and leaf removal, etc) and crop assessment, as well as looking in general at vine condition/disease, signs of viral problems (we have lots of them, too), vineyard floor management, and anything else you want to discuss. Current plans are for the first one at Alto Vineyards on June 17 and Genkota Winery in Mt. Vernon on June 22, both beginning at 9 am.

Watch your email for final notice from Bill McCartney, since these dates could change, based on vineyard development.

NORTHERN UPDATE

Denise Cimmarrusti
U of I, St Charles Research Center

Mid April - All vines at the St. Charles Horticulture Research Center have been pruned and secured to their stakes and trellis wire. Now with this spring chore behind us, we can focus our attention to other aspects of vineyard management.

Bud break began with the varieties Valiant and MN1197 and as the season progressed, all other varieties followed pursuit. Shortly thereafter scouting began for grape flea beetle. As populations began to rise, an insecticide was applied (April 27th.) to bring this insect under control.

MAY - In the early part of May temperatures ranged in the upper

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60's to low 70's with scattered rainfall occurring weekly. A fungicide spray application program began on May 8 when shoots were nearing 2" shoot length, with the application of Pristine. By the end of May, temperatures were up into the 90's. With these unseasonably warm temperatures, vines made rapid progress from bud break to shoot elongation. It was a welcome sign to see the greenery of spring once again. When shoots were between 3 and 5 inches long, cold temperatures descended upon the region. On May 22nd the low temperature reached 32° overnight and the Northern Region experience a spring frost. While there was no visible frost damage observed to the vines at the Research Center, growers in other locations in the Northern Region reported frost damage to primary bud shoots. Depending on their vineyard site locations, growers in the area of Rockford over to Galena and out toward the Quad cities reported moderate damage. Other growers outside of this area but still within the Northern Region reported only sporadic pockets of minor frost damage. .

As spring continued, temperatures once again stabilized and vines resumed their normal growth and work at the Research Center vineyards continued. Trunks were de-budded as well as numerous additional buds on cordons as final spur counts were decided upon. On April 21st, a nitrogen fertilizer application was applied to the Cold Hardiness Variety Trial as well as to the vines in the GDC & SHW Trellis Comparison Trial. Rainfall shortly afterwards, proved to be an efficient means for providing quick incorporation of the nitrogen into the vines rooting zone for uptake. Weed control measures were also initiated during this period to control any perennials and to keep annuals under control. In consideration of temperature and rainfall, disease pressure should be light to moderate if growers have adhered to fungicide spray schedule.

New Grape-Grower Workshops Popular

Bill Shoemaker, University of Illinois

Workshops for new or potential commercial grape-growers were held during May in the northern Illinois communities of Colona, near Rock Island, and in Woodstock, about 45

New Grape-Grower Workshop Popular

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miles northwest of Chicago. Both attracted almost 30 people who were interested in or had just begun planting a commercial vineyard.

Bill Shoemaker organized these workshops, which were hosted by Lavender Crest Winery and the McHenry County Farm Bureau and McHenry County Extension. The workshops were designed to help people plan a vineyard enterprise as a commercial business. Topics included an overview of the Illinois grape and wine industry, highlighting its rapid growth and its challenges. Another presentation covered the topic of developing a vineyard business plan. The Vineyard Business Plan Workbook, published by SIU in 2000, served as a model for participants, who were given a copy of the workbook on a cd to take home.

Workshop at McHenry County Farm Bureau

Bill then spent time going over the horticultural challenges of grape growing, from site selection through harvest parameters. He focused on the unique challenges of growing grapes in the north, including proper selection of varieties.

After lunch, participants learned about the challenges of controlling pests in the vineyard. Insect pests, wildlife and diseases were the primary focus, though weeds were also discussed.

Another feature of the workshops really gave them a local flavor and a dose of reality. A commercial grower and a winemaker were both on hand at each workshop. Gina Backes of Lavender Crest and Bob Hall of Arbor Hill Vineyards shared their experiences and concerns for new grape growers at Colona. They emphasized the importance of communicating with others in the trade, especially winemakers who will become potential buyers.

Rick Mamoser of Prairie State Winery and Terry Tuntland of Steingtunt Vineyards and Winery talked about the challenges they've faced in establishing their businesses, including some of the mistakes they've made. All gave great advice that helped participants put their plans in greater perspective.

New Grape-Grower Workshop Popular

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Rick Mamoser, Prairie State Winery

Participants at Lavender Crest Workshop

Terry Tuntland, Steingtunt Winery

A sign of success with the workshops was the enthusiastic response of participants, who thanked the presenters for their input. One was even enthusiastic and thankful for helping him realize this was not an enterprise he was prepared for. Based on responses, there may be need for more in the future. In fact, plans are currently being made for a similar workshop in Will County sometime next Spring.

Thanks need to be offered to the IGGVA, the IL Dept of Ag and the University of Illinois for their support of these events.

UPCOMING WORKSHOPS & EVENTS

► **Viticulture Field Day**
State Fruit Experiment Station
Mountain Grove, Missouri
Thursday, June 8, 2006
Registration $15 includes lunch

Dr. Laszlo Kovacs is presenting information on crown gall. Dr. Martin Kaps is presenting information on cultivars, and Dr. Wenping Qui is presenting information on the grapevine virus indexing program.

We will have tours of the USDA quarantine greenhouses, the distillation facility, and the field and research area. (A barbeque lunch is served and is included in the registration fee.)

For more info - http://mtngrv.missouristate.edu/vfd.htm

► **Northern Region:**
NIWIG
Saturday, June 17, 2006

Canopy Management Workshop led by Bill Shoemaker, UI, at Galena Cellars Winery, Galena, IL.

For further information and in order to plan space for the meeting, please contact Ken Rosmann at 815/563-4665.

► **Northern Region**
IGGVA Northern Region
St Charles Research Center
Saturday, August 17, 2006

Sampling and Harvest Parameter Measurements.

For more information, contact Bill Shoemaker at shoemak@inil.com or 630/584-7254.

► **Southern Region:**
IGGVA
Saturday, June 17, 2006
Saturday, July 8, 2006

Summer Canopy Management & Crop Assessment.

If you are interested in attending either of these sessions, please contact Allan Dillard via e-mail at: limestonecreek@msn.com or call him at (618) 534-9049, cell, or (618) 833-4683.

CANOPY MANAGEMENT FOR QUALITY WINE GRAPES

Bill Shoemaker, University of Illinois

Many issues in growing grapes are cited as influences on the quality of the fruit produced in a vineyard. Some people cite variety, soil type, climate, lay of the land, soil minerals and a host of other reasons why a vineyard produces, or fails to produce quality fruit. While these reasons may or may not contribute to quality, most practicing viticulturists agree that the primary influence on quality comes from management. More specifically, the canopy management practices used in the vineyard are probably more critical to producing quality fruit than any factor other than variety. And even great varieties can produce bad fruit through poor canopy management.

What is canopy management? It may seem obvious at first glance that it consists of grower practices which influence the state of the vegetative canopy during the growing season. But the whole story, and the heart of it, is much more complicated, and much more critical than simply influencing the canopies of grapevines. Canopy management in the vineyard optimizes the relationship between leaf material, fruit and sunlight, improving the amount and quality of light exposure to fruit. Canopy management maintains a balance between vegetation and fruit for the plants health, which suggests the role of limited cropping. Light drives the physiology of plants and with grapes, it directly and indirectly influences the development of flavor compounds in the fruit. It also influences the development of fundamental winemaking characteristics such as acid levels and sugar content. For a grower, canopy management is the most powerful tool available to optimize quality in the wine grape crop.

In Illinois, canopy management practices may be more critical than in other areas of the world where grapes are grown. Two issues that almost all Illinois grape growers face are fertile soils and plentiful rainfall during most growing seasons. Both contribute to aggressive growth in grapevines and the subsequent prolific development of generous canopies. This represents one of the constant challenges then for Illinois viticulture, how to accommodate this environmental constant and consistently produce high quality grapes. Canopy management, executed properly and in a timely manner, can meet this challenge for Illinois wine grape growers.

Before discussing the practices that constitute canopy management, it's important to recognize that for canopy management practices to work, the vines must be grown in an appropriate trellis system for the variety and vigor expected. Trellis system designs are developed to display the plant, particularly the

Canopy Management for Quality Wine Grapes

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canopy, properly to the environment to support the plant's health and productivity. They are frameworks for proper grapevine management. They are also designed with consideration of sites that promote more or less vigor. Certain trellis systems are appropriate for grape-growing sites that contribute to low plant vigor, such as dry regions or sandy soils. Others are meant to provide an appropriate frame for high vigor in grapes, such as can be found in most Midwest sites. If the trellis system creates an appropriate frame for plant growth in a specific site, the grower will be able to manage growth and direct it properly through canopy management practices. If the trellis system is inadequate or inappropriate for the plant type or vigor expected on a site, then it will be a tremendous struggle for the grower to manage the vine growth properly. If trellis systems are not matched to sites, variety and climate properly, it may not be possible to optimize quality and productivity through canopy management practices. The grower must know how to choose wisely.

Because Illinois has a climate and soils that contribute to high vigor in grapes, and because most grapes in Illinois are hybrids with a procumbent (downward) growth habit, systems such as Single Hi-Wire or Geneva Double Curtain are popular. In some cases, other systems may be appropriate but these two systems generally work well for Illinois grape growers. They are designed to accommodate vigorous and generous vegetative growth. An added benefit for Geneva Double Curtain is the doubling of cordon length per acre, potentially allowing for increased yield without sacrificing canopy management potential.

Canopy management should begin prior to the growing season with proper planning. Every variety has a unique growing habit. Every crop has a previous growing season which has an impact on potential for the upcoming season. As growers consider yield goals for the upcoming season, they will need to reflect on those influences to prepare their expectations for the new season. Some considerations by variety include growing habits, relationship between yield and quality, buyers expectations and special problems, such as high total acid content. Previous season considerations may include fertility management, disease problems, croploads, winter damage or fall hardening issues. These, and other issues, may play a role in determining what are fair expectations for yields and appropriate management practices for quality.

Having considered the previous season and varietal characteristics, growers can begin to plan. The first step is to set the yield goals and determine balanced pruning goals

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for each variety. Balanced pruning looks at the amount of vegetation the plant produced in the previous season by weighing the dormant prunings from the vine. Then a formula is used to determine the number of producing buds to leave on the plant for the coming season. Over time, growers may adjust the formulas to adapt them to the performance of varieties in their site and system. Adjustments may be made to allow for site/system/variety relationships and improve yield/quality relationships.

Canopy management really begins with the active growth of the canopy. As shoots emerge and elongate, flower clusters are revealed and some shoot thinning can be done, eliminating shoots which may prove unfruitful or which crowd the canopy. Before long growers can begin combing the shoots downward, creating the curtain effect. This can be a frustrating process because it can result in broken shoots that were promising or in important positions. But it's important to get an early start on training the shoots down into their curtain form. As they grow through this training the shoots respond by adapting to the downward pattern. After flowering, the shoots develop long tendrils that will soon become active, looking to lock onto something to hold the shoot in place. If the shoots are combed down, the tendrils will lock the shoots onto each other, "knitting" the shoots together and forming a uniform curtain down the trellis row. This will lead to less movement of shoots back up into the canopy, which can crowd and shade the fruit.
During this same period, flower and/or fruit thinning can take place. If a grower knows the average weight of a cluster of a variety of grape, the grower can predict how many clusters a plant it will take to reach a yield goal. The grower can use the number of plants per acre and weight per cluster to determine number of clusters per plant needed to reach the yield goal. For example, if a cluster averages 0.15 lb and the yield goal is 5 tons/acre, and the grower knows there are 600 plants per acre, 5 tons equals 10,000 lb, divided by 600 plants equals 16.7 lb/plant, which can be divided by average cluster weight to equal 111 clusters per plant. This might be a realistic number of clusters for varieties like Marechal Foch.

If there are too many flower clusters, some can be removed prior to flowering. This can lead to increased berry size. But it can also lead to tighter clusters and bunch rot in certain varieties, which may lead a grower to prefer to wait until after fruit set to cluster thin. While avoiding tight clusters and bunch rot, it also means conducting this practice in a much denser canopy, which makes it harder work and takes longer. Knowing the variety is an important consideration for deciding when to cluster thin.

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Growers may also want to consider limiting remaining clusters to those which set within a shorter time frame, leading to more uniform ripening. For example, many varieties, particularly with small clusters, set 3-4 clusters per shoot. These flower at different times, in descending order down the shoot. If the third and fourth clusters are removed, the crop will ripen more uniformly than with the third and fourth clusters remaining. Their timing of maturity will be within a shorter time frame.

The shoots will continue to grow after fruit set and thinning, leading to more canopy management decisions. Secondary, or lateral shoots, which are prolific on some varieties, particularly hybrid varieties, will begin to form between the shoot and the base of the leaf petiole. This can lead to crowding of vegetation in the fruit zone and shading of fruit. Removing these can preserve an open canopy for light penetration and air movement through the canopy. This is best done while the secondary shoots are still small (2-5"). They can be snapped out quickly by moving them side-to-side at their base. They usually just snap out of their base and can be discarded. This practice is useful in the fruit zone but isn't necessary further down the shoot.

As the shoots gain length they may need to be hedged, particularly in upright trellis patterns. This simply means terminating the tip growth of the shoots at some pre-determined length. Generally once a shoot reaches 15-16 nodes in length they can be hedged with no loss of photosynthetic potential for the crop. In systems which have shoots growing downward, hedging isn't necessary but may make the vineyard cleaner and safer to work in.

Another canopy management practice which can contribute to better light exposure to fruit is leaf pulling. This can be overdone or done improperly, leading to overexposure of fruit to light and scalding of the fruit. Leaves can be removed from the east or north sides of rows at or just after fruit set, limiting direct exposure of fruit to light. The first three leaves can potentially be removed, though decisions about which and how many are made subjectively by the grower.

The goal of canopy management is to optimize the balance of productivity and quality in a vineyard. There are many considerations when making canopy management decisions so growers should educate themselves thoroughly on the subject. A great source of further information can be found in "Sunlight Into Wine" by Dr. Richard Smart or in the Midwest Grape Production Guide by Dr. Imed Dami of Ohio State University. The latter is available for $15 from the 3 IGGVA viticulturists; Elizabeth Wahle, Alan Dillard and Bill Shoemaker.

This newsletter welcomes new contributors. If you would like to make a newsletter contribution, please contact Denise Cimmarrusti at cimmarru@uiuc.edu or Bill Shoemaker at wshoemak@inil.com .

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As always, we welcome your feedback