

M I C H I G A N  
**GRAPE & WINE NEWSLETTER**

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CALENDAR



Niagara shoot tip in Berrien County

## News you can use

**GDD Table update.** The growing degree table (at right) has been modified for the SW. The SWMREC data station has been reporting incorrect GDD accumulations, and so we changed our report to include a nearby station in Scottdale (Dongvillo Farm). Please be aware of this if you are using the SWMREC station for your weather data reporting. The Enviroweather team has indicated that the SWMREC weather station will be fixed soon.

**Disease management.** Protect clusters from

major grape diseases at this time. See disease articles in this edition for recommendations.

**Insect management.** The post-bloom period is an important time for growers to protect clusters from insects that can cause economic damage. See this issue for control options.

### GROWING DEGREE DAYS

		<i>Base 50 from April 1</i>					<b>5-yr Avg*</b>
		<b>2011</b>	<b>2010</b>	<b>2009</b>	<b>2007</b>		
<u>Lawton</u>	6/8	616	728	560	700	<b>616</b>	
	6/15	706	866	646	848	<b>739</b>	
	<i>forecast</i> 6/22	848	1019	789	1007	<b>881</b>	
<u>Scottdale</u>	6/8	614	717	550	706	<b>609</b>	
	6/15	694	856	639	855	<b>731</b>	
	<i>forecast</i> 6/22	827	1019	788	1022	<b>878</b>	
<u>Leelanau</u>	6/8	410	574	295	520	<b>420</b>	
	6/15	463	672	368	668	<b>514</b>	
	<i>forecast</i> 6/22	586	799	512	802	<b>635</b>	
<u>Old Mission</u>	6/8	359	524	265	455	<b>382</b>	
	6/15	409	621	327	584	<b>469</b>	
	<i>forecast</i> 6/22	532	747	459	707	<b>585</b>	

\*5-yr Avg = 2006 to 2010

See [enviroweather.msu.edu](http://enviroweather.msu.edu) for more information.

## NORTHWEST

**Duke Elsner**  
*Grand Traverse County MSU Extension*

Recent weather conditions favored rapid shoot growth. Suckering needs to be finished soon or it will get quite difficult to break off shoots and pull them from the canopy. The crop looks good overall, with many three cluster shoots in Riesling vines at the Northwest Station.

There have been reports of significant grape berry moth trap catches on Old Mission Peninsula. Potato leafhopper, although present in the area for some time, has not been much of a concern in vineyards up to this point, although you should be checking your own sites to determine if control is warranted. Rose chafer adults appeared in the area over the weekend and will likely be found in all vineyards soon. It is too soon to speculate on the level of rose chafer populations; they can often be tolerated at low to medium numbers. A sample of grape plume moth larvae was brought in last week. These are small bright green caterpillars (Fig. 1) with a few long hairs. They fold leaves slightly



Fig 1. Grape plume moth at NWMHRS; Photo: E. Lizotte.



with silk and feed in irregular patterns on the leaf surface. In every case of this insect I have personally seen the level of injury is very minor. A small number of foliar galls, which I believe are caused by gall midges in the family Cecidomyiidae, have turned up in the area.

There was still no signs of powdery mildew on sprayed vines at the NW Station as of June 10. Even if vineyards look clean at this point, care should be taken to protect from infection during the critical pre-bloom and bloom stages ahead.

## Southwest

**Diane Brown**  
*Berrien County MSU Extension*

**Steve Van Timmeren**  
*MSU Department of Entomology*

Concord and Niagara grapes began blooming last week. Full bloom for Concord was recorded

as June 8. June 6 is the 5 year average for Concord bloom, June 8, is the 10 year average and June 10 is the average of the last 41 years that National Grape has recorded Concord bloom date. Some wine grapes have begun to bloom- Riesling and Chardonnay were at 5-10% bloom at the beginning of the week. Crop load adjustment was discussed at last Wednesday's grape meeting. Predictions for growing degree day accumulations are at best for this to be an average year. Crop load potential is quite heavy in many vineyards. Growers need to get out in their vineyards to count clusters and evaluate the need for thinning based on their current crop estimations and what they have historically been able to ripen .

The amount of Phomopsis on leaves was the same as it was last week. However, black rot infections (Fig. 2) on leaves at the Van Buren Concord site increased significantly from last week and symptoms have begun to show up elsewhere. This shows a black rot infection event took place and emphasizes the need to keep your clusters protected from diseases. According to the new black rot model, we had



Fig 2. Black rot leaf infection on Concord; Photo: D. Brown.

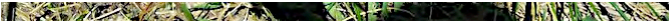


infection periods for black rot at all Enviroweather locations in the Southwest sometime between June 9th and June 11th. The first Downy mildew symptoms were observed on wild grape in Berrien County on Monday (Fig. 3), but so far, none has been observed at the commercial vineyards we monitor. Thus far, powdery mildew symptoms have not been observed.

We caught about the same number of grape berry moth adults in traps this week as we did last week at most locations. Trap catches peaked last week. There are a few grape berry moth larvae that have begun to show up in clusters at the borders of the Van Buren Concord and Berrien Niagara sites this week. We also found larvae in clusters in a Niagara vineyard in Allegan County. Most of these larvae are very tiny. Your best bet in finding them is to



**Fig 3. Downy mildew on wild grape in SW; Photo: D. Brown.**



**Fig 4. Flower buds webbed together by a GBM larva in Concord; Photo: S. Van Timmeren.**

look for a few grape flowers and/or berries webbed together (Fig. 4). When you see some flowers/berries webbed together gently tease them apart to look for the small pale yellow larva with a black head capsule (see picture).

Rose chafers were still present at the Van Buren Concord site, but populations haven't increased to economically damaging levels. Leafhopper adults and nymphs are still present but haven't had a great increase in population yet. We should see them start to increase once this current generation of nymphs reaches adulthood and starts laying eggs.

The grape flea beetle feeding along the woods border of the Berrien Vignoles site have now mostly made it through their life cycle, with only a few larvae left on the leaves. While the larvae did do some minor damage to the clusters it was isolated to the border row and didn't result any real economic damage. A few grape tumid galls have begun to appear on shoots and leaves. These are caused by a tiny wasp and are more of a curiosity than a concern, as damage is cosmetic. The galls are round, red and about the size of a small pea.

Grape cane girdlers have become a problem in young unsprayed potted grapes at the Trevor Nichols Research Complex in Fennville. If you have young vines that haven't had any insecticide applications yet, make sure their growth isn't being stunted by cane girdlers or one of the other minor pests.



**Fig 5. Healthy Concord cluster in Van Buren; Photo: S. Van Timmeren.**



**Fig 6. Healthy Vignoles cluster in Berrien; Photo: S. Van Timmeren.**



## Post-bloom vineyard insect control options

There are a range of different insecticide options available for use in vineyards. Many of these require certification to apply restricted use pesticides, but there are also a few that can be used without certification. As growers plan the management of insects in vineyards for the rest of the summer, the chart associated with this article can help in the planning for what to do if insects reach economic thresholds. Grape berry moth larvae are starting to be visible in clusters in some high pressure vineyards in SW Michigan this week, but the level of damage potential is low and the infestation at this time of the season is a very poor predictor of the infestation at harvest. As the season progresses, how vineyards are managed for berry moth in July and August is much more important for the level of infestation at harvest. Looking at the table, the GBM column indicates high efficacy of the newer insecticides Altacor, Delegate, Intrepid, and Belt. Using these in your IPM program can help delay resistance development, plus they provide long-lasting GBM control due to their good residual activity. The pyrethroids are also ranked high in activity

on GBM, but these suffer from more rapid breakdown during hot sunny weather. The organophosphate Imidan is also effective on GBM, but only if buffered to pH 5.5 or 6, and the high 2.125 lb/acre rate. For all sprays targeting GBM, use enough water and the right sprayer setup to cover the clusters. The table also provides pre-harvest restrictions, re-entry intervals, and can help you see what other insect pests might be controlled based on the activity spectrum of the product. The column titled 'Hopper Activity gives a guide of relative activity on leafhoppers, with the neonicotinoid insecticides as the standout class active against this type of insect. The 'Beetle Activity' column provides rankings that would be appropriate for rosechafer and Japanese beetle control. The right-most column provides an indication of the general level of activity of the insecticides on natural enemies.

Table 1. **Insecticides for vineyard pest management, 2011**

Insecticide	Chemical class	Mode of cont.	Longevity	PHI (d)	REI	Beetle activity	'Hopper activity	GBM activity	Nat. Enem. Tox
Sevin	Carb	C	**	7	12 h	***	***	**	Toxic
Imidan	OP	C	***	14	14 d	***	**	***	Moderate
Danitol	Pyrethroid	C	***	21	24 h	***	****	***	T
Brigade/Capture	Pyrethroid	C	***	30	12 h	***	****	***	T
Mustang Max	Pyrethroid	C	***	1	12 h	***	****	***	T
Baythroid	Pyrethroid	C	***	3	12 h	***	****	***	T
Intrepid	Growth Reg.	I	****	30	4 h	-	-	***	Safe
Delegate	Naturalyte	C, I	**	7	4 h	*	*	***	M
SpinTor/Entrust <sup>▲</sup>	Naturalyte	C, I	**	7	4 h	-	*	**	M
Avaunt	Oxadiazine	C, I	**	7	12 h	**	*	**	M
Altacor	Diamide	C, I	***	14	4 h	***	*	***	M
Belt	Diamide	C, I	***	7	12 h	-	-	***	M
Provado	Neonicotinoid	S, C, I	****	0	12 h	***	****	-	M
Admire Pro (soil)	Neonicotinoid	S, I	****	30	12 h	**	***	-	S
Venom, Scorpion	Neonicotinoid	S, C, I	****	1	12 h	***	****	**	M
Assail	Neonicotinoid	S, C, I	***	7	12 h	***	***	-	M
Actara	Neonicotinoid	S, C, I	****	5	12 h	***	***	**	M
Belay	Neonicotinoid	S, C, I	****	0	12 h	***	****	**	M
B.t. <sup>▲</sup>	Biological	I	*	0	4 h	-	-	**	S
Neem <sup>▲</sup>	Biological	C, I	*	0	12 h	**	**	**	M
Pyganic <sup>▲</sup>	Pyrethrum	C	*	0	12 h	**	*	*	M
Evergreen	Pyrethrum	C	*	0	12 h	***	*	*	M
Leverage	Neonic+Pyreth	S, C, I	****	3	12 h	***	***	***	M
Voliam Flexi	Neonic+Diamide	S, C, I	****	14	12 h	***	***	***	M
Brigadier	Neonic+Pyreth	S, C, I	****	30	12 h	***	***	***	T
Tourismo	Diamide + IGR	C, I	****	7	12 h	-	-	***	M
Movento	Tetramic acid	S, C, I	***	7	24 h	<i>phylloxera control</i>			M

▲ Organic insecticide  
**Alternate chemical classes to minimize resistance**

S = systemic locally or through vine  
 C = contact activity, usually nerve poison  
 I = ingestion needed for best activity

Longevity ratings  
 \* = 3-5 days \*\* = 7 days  
 \*\*\* = 7-10 days \*\*\*\* = 10-14 days

Prepared by Rufus Isaacs  
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 March 2011



## Protect grape clusters from all major grape diseases at this time

Young fruit clusters are highly susceptible to all major diseases, including downy mildew, powdery mildew, black rot, Phomopsis, and anthracnose. Prolonged wet conditions during bloom can also allow Botrytis to get a foothold in clusters of susceptible varieties by promoting fungal growth on senescent flower parts. Black rot and Phomopsis lesions have been seen for several weeks and indicate that the pathogens are active. Grape anthracnose symptoms are also visible on shoots, leaves and cluster stems of susceptible varieties. No signs of powdery mildew and downy mildew have been seen yet and scouting is advised on at least a weekly basis. However, it is possible to have powdery mildew fruit infection without seeing any foliar infections, either because the colonies are too sparse to be easily detected or because fruit infections are the result of ascospores released from overwintering inoculum (i.e., primary infections of the fruit and leaves are occurring simultaneously). Often, downy mildew infections of flower clusters in cv. Chancellor are seen before leaf infections as well. In 2009, we first observed downy mildew in Chancellor in Fennville during the first week of June and in 2010 during the second week of June. Growers are strongly advised to protect flower and fruit clusters from infection by all these pathogens using effective fungicides as soon as possible if the vines are not already protected. The risk of infection is especially high if we have multiple rain events and moderate to high temperatures.

In general, aim to protect the clusters from the major diseases from immediate pre-bloom until 4 to 5 weeks after bloom. As the berries develop, they become naturally resistant to black rot, downy mildew, and powdery mildew and the need for protection diminishes after the susceptible period ends. This happens quite rapidly for downy mildew (2-3 weeks after bloom), whereas for powdery mildew it is about 4 weeks after bloom. Concord grapes become resistant to black rot 4-5 weeks after bloom, but some wine grape varieties may remain susceptible to black rot for up to 8 weeks postbloom. However, be aware that the cluster stem (rachis) and berry stems can remain susceptible longer than the berries in most cases. The only disease to which berries remain susceptible throughout their development is Phomopsis, but the risk of infection diminishes after bunch closure because inoculum levels

drop off then. Botrytis is just the opposite in that berries actually become more susceptible as they get closer to harvest, especially in tight-clustered varieties.

**Powdery mildew.** It will be especially critical to protect clusters of susceptible varieties from powdery mildew at this time. Sterol inhibitor (e.g., Elite, Rally, Vintage) and strobilurin (e.g., Sovran, Flint, Pristine) fungicides have the ability to cure early infections but will not eliminate colonies that are already established. JMS Stylet Oil and potassium bicarbonate fungicides (Kaligreen, Armicarb, MilStop) can be used to eradicate visible powdery mildew colonies. If you use eradicators, make sure that coverage is thorough (use sufficient spray volume), as only those colonies contacted by the fungicide will be killed. Since strobilurin-resistant powdery mildew isolates have been found in Michigan vineyards (mostly MSU experimental vineyards and wine grape vineyards with a history of strobilurin use) and we have circumstantial evidence for sterol inhibitor resistance, we recommend adding a protectant fungicide like Sulfur or Ziram to the tankmix when using either type of fungicide. Sulfur is the most cost-effective option for non-sulfur sensitive grape cultivars. Over the past two years, we have noticed that Ziram as a tank-mix partner did improve control of powdery mildew in a spray program on the research stations where we have strobilurin resistance. Also, alternate with fungicides with different modes of action, for example Sulfur, Quintec, Vivando, Endura, Serenade, Sonata or Regalia. Revus Top is a new fungicide for powdery and downy mildew and black rot control in grapes. However, the ingredient that is active against powdery mildew is difenoconazole which belongs to the sterol inhibitor class. This fungicide may be phytotoxic on Concord grapes, so do not use on Concoords. Inspire Super also contains difenoconazole.

**Downy mildew.** For most varieties, foliar infections are the main phase to be concerned about. However, the downy mildew pathogen can also infect clusters. Cultivar Chancellor is the poster child for downy mildew cluster infection. Both the rachis and berries can be destroyed. If active infections are found, use fungicides with post-infection activity at the highest labeled rate. For downy mildew, Ridomil Gold (MZ or Copper) are the strongest fungicides, followed by phosphorous acid fungicides like Phostrol and ProPhyt. When using phosphorous acids, applying a "booster spray" 5 days after the first spray will enhance the curative effect. Strobilurin fungicides have

limited post-infection activity and should preferentially be used in a preventive mode. New(er) fungicides for downy mildew control are: Presidio, Revus and Revus Top (don't apply Revus Top to Concord or Noiret vines due to risk of phytotoxicity), Gavel (contains mancozeb), Forum, Reason, and Tanos. While some of these new fungicides have post-infection (curative) activity, they are best applied on a preventative basis. They are excellent for integration into a fungicide resistance management program as many of them represent new and different chemistries.

**Black rot.** Black rot lesions (Fig. 7) have been seen on grape leaves in various locations and range from 1 to 5 mm in size. They can be recognized by the tiny black pimples (pycnidia) in a ring along the inner edge of the lesion. Temperatures in the high 70's and low 80's are perfect for black rot. At these temperatures, only 6 to 7



Fig 7. Black rot lesions on grape leaf. Note pycnidia (small black dimples) along inside of rim; Photo: A. Schilder.

hours of wetness are needed for infection, so a nightly dew period may be sufficient for infection. Black rot is a tricky disease because infections can remain latent (invisible) for a long period of time, so you won't know the berries are infected until it is too late to do anything about it. However, one can scout for the small, roundish leaf spots – a lot of black rot leaf lesions indicate high disease pressure from ascospore inoculum and will also contribute spores for fruit infections. In a field with a history of black rot, old fruit cluster remnants left hanging in the trellis are major contributors to infection. Fruit infections can take place anytime from bloom onwards, but only become apparent between bunch closure and veraison. The period from immediate pre-bloom through early fruit development is crucial to protect grapes against black rot infection.

The approach to black rot control now focuses primarily on protecting the clusters from infection. EBDC sprays applied earlier in the season for Phomopsis will also control black rot leaf infections, and therefore no sprays are recommended specifically for black rot on the foliage early in the season. In five years of trials in New York, good black rot control was achieved with one immediate pre-bloom and 1 to 2 post-bloom fungicide sprays. A second post-bloom application is strongly advised if black rot has been a problem in the vineyard the previous year, and should be considered prudent if

wet weather is anticipated. During three years of fungicide trials in a 'Concord' vineyard in Fennville, MI, just two post-bloom applications of SI fungicides (Rally, Elite) provided very good control under high black rot pressure.

Sterol-inhibitor fungicides (e.g., Rally, Elite) continue to provide outstanding control of black rot, and provide several days of post-infection activity. Currently there are various "generic" tebuconazole products on the market, e.g., Orius and Tebuzol that may be more cost-effective. The difenoconazole ingredient in Revus Top and Inspire Super is similar to Rally and Elite when it comes to black rot control. When using SI fungicides on a post-infection schedule, use the highest label rates, because post-infection activity is strongly rate dependent, particularly when extended "kickback" activity is required. The strobilurin fungicides (Abound,



Fig 8. Phomopsis lesions are tiny brown specks with yellow halos; Photo: A. Schilder.

Flint, Sovran, Pristine) are also excellent against black rot but provide only limited post-infection activity. Flint, Pristine, and Revus Top should not be used on Concord grapes because of potential phytotoxicity.

**Phomopsis.** Cane and leaf lesions (Fig. 8) have been showing up in high numbers in susceptible varieties. Each rainfall event will lead to spore dispersal and can also lead to successful infection if the tissue remains wet for a sufficient amount of time. The optimum temperature for infection is 59-68°F, at which time about 6-10 hours of wetness are needed for infection. The longer the tissue stays wet, the more severe the symptoms will be. At this time we should be concerned with preventing Phomopsis infection of the rachis and fruit, especially in mechanically pruned vineyards and vineyards with a history of the disease. Rachis infections are most closely correlated with yield losses due to berry drop at harvest in Niagara vines, whereas fruit infections are more of a problem in wine grapes.

If at this time you find a lot of lesions on the leaves and canes, infection pressure will be high for the fruit also. It is not too late to apply fungicides for cluster protection from Phomopsis. The best fungicide options for control of Phomopsis during and after bloom are Abound, Sovran, Flint, or Pristine (do not use Pristine on Concord grapes). Sterol inhibitors do not have good efficacy against Phomopsis. Phosphorous acid fungicides such

as ProPhyt and Phostrol are also good and cost-effective alternatives. These are systemic and will likely provide some kick-back activity. In trials done in Michigan, ProPhyt provided very good control of Phomopsis when sprayed on a 14-day schedule. Tighten the schedule and increase the rate if disease pressure is high. Ziram is a moderate to good protectant against Phomopsis and can be a tank-mix partner with any of the phosphorous acid fungicides. EBDC fungicides and Captan are good protectants but cannot be applied after bloom has started in grapes grown for the National Grape Cooperative (these fungicides are suspected carcinogens). EBDC's have a 66-day pre-harvest interval.

## Anthracnose: How to recognize and control this fungal disease of grapevines

Anthracnose is most common in southern grape-growing areas but also sporadically occurs in Michigan. Symptoms are visible at this time in susceptible varieties. Some table grape varieties are particularly susceptible, including Marquis and Mars. In addition, wine grapes like Frontenac, Vidal and Marquette can be

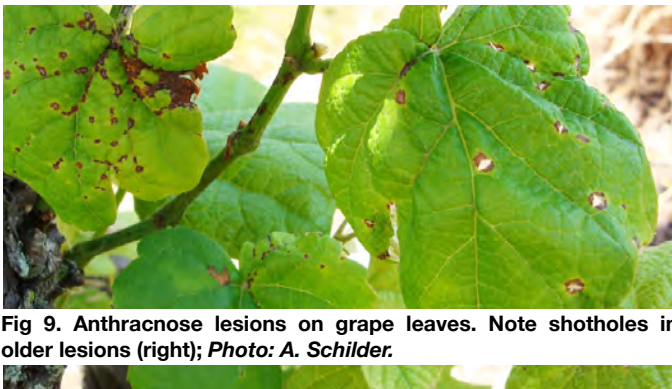


Fig 9. Anthracnose lesions on grape leaves. Note shotholes in older lesions (right); Photo: A. Schilder.

affected. The disease has also been seen occasionally on Concord and Niagara vines. The disease is caused by a fungus called *Elsinoe ampelina*. Anthracnose reduces the quality and quantity of the fruit and weakens the vine.

**Symptoms.** On leaves, more or less circular, chocolate brown spots (1-5 mm in diameter) develop. The centers eventually become bleached and fall out, giving a “shot hole” appearance (Fig. 9). Lesions are often found along the major veins and may cause curling and distortion of the leaves as they expand. On shoots, spots are roughly oval, sunken, and purplish-brown with gray centers and raised edges (Fig. 10). Shoot tips may be killed and look burned. On older canes, lesions may extend into the pith and have thick raised edges and may be confused with hail injury. On clusters, lesions may damage the rachis and cause curled or corkscrew-shaped clusters. On berries, spots (2-7 mm in diameter) are purplish brown with a lightbrown or bleached-gray center, giving

them a “bird’s-eye” appearance. Lesions may cause cracking of berries and render grapes unmarketable. Berries eventually shrivel up and mummify.

**Biology of the pathogen.** The fungus survives the winter in infected canes and berries in the vine and on the vineyard floor. In the spring, two types of spores (conidia and ascospores) are released which are spread by rain splash and by wind. Both can cause new infections on green plant parts. Spores produced in these lesions are spread by rainsplash. Young leaves, shoots, and fruit are most susceptible to infection. Anthracnose is especially severe during wet seasons. The optimum temperature for infection is 75-79°F, although the fungus is active from 36-90°F. Symptoms appear 4-13 days after infection.

**Management.** Purchase disease-free planting material from a reputable nursery. This is especially important when obtaining plants from southern states where the disease is endemic. Avoid highly susceptible cultivars. Prune out diseased canes and fruit mummies. Remove infected plant material from the vineyard and destroy it. Dormant applications of lime sulfur or Bordeaux mixture are effective against the fungus as are foliar applications of registered fungicides (on 2-week intervals) during the growing season. The fungicides we have found most

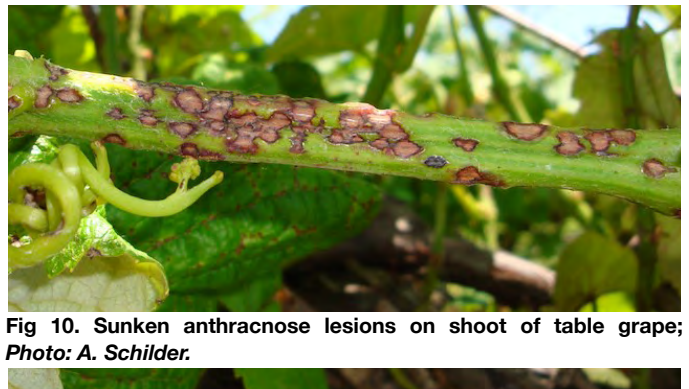


Fig 10. Sunken anthracnose lesions on shoot of table grape; Photo: A. Schilder.

effective are Sovran, Abound, Endura, Pristine, and Topsin M. Good activity is also provided by Elite, Rubigan/Vintage, Penncozeb, and Dithane. For organic growers, sulfur and Serenade (+ spreader-sticker) are moderately effective options. Resistant varieties, dormant lime sulfur and sanitation should be cornerstones of control in organic vineyards.

## How to get a grip on the 2011 grape growing season

After a winter and a spring that brought an abundance of moisture to the state, Michigan juice grape vineyards are facing a cool spring as they progress to the early stages of crop development. Concord vines are at bloom and fruit set, depending on locations, while Niagara vines are already in fruit set.

For Concord juice grape growers the challenge in Michigan is economic production consistency in a region with a considerable year-to-year climate variability (growing season length and quality measured as heat units in Growing Degree Days, Base 50F). Weather historical data from 2000-2010 show a series of climatically variable growing seasons: 2002, 2007 and 2010 were the 3 good growing seasons and 2003 and 2009 were 2 poor growing seasons (Table 1). Good or poor are relative to the amount of heat (as measured by growing degree days @ base 50F) that accumulated during vine growth and fruit ripening. 2005 with 3275 GDD was the warmest growing season and 2009 with 2547 GDD was the coolest one: a difference of 728 GDD. What 728 GDD does really mean? Considering that in a great sunny summer day in Michigan we can accumulate up to 20 GDD, 728 GDD divided by 20 is 36 days; the difference between 2005 and 2010 is more than a month, meaning that vines in 2009 skipped probably August, going from July straight to September!

Table 2 reports the GDD accumulated at the end of the seasons (October 31<sup>st</sup>) and on June 3<sup>rd</sup> at the SWMREC (calculated from April 1<sup>st</sup>, with base 50F), over the last 10 years. Unfortunately 2011 is the year that shows the lowest value (350 GDD). Good years as 2005 or

2010 had 483 and 628 GDD already accumulated the first week of June, +30% and +45% heat accumulation than 2011. A correlation analysis (Fig. 12) between GDD accumulated the first week of June and at the end of the season, shows a positive trend ( $r^2=0.4$ ), projecting 2011 (the white dot in the graph) to 2650 GDD (10-yr mean 2920 GDD). It is probably too early to trust this analysis, and better correlations will be found the more the season is advancing. However, the indications are projecting 2011 to be probably cool as 2003 and 2009.

The litany of weather conditions (winter damages, spring frost, season length) inducing crop reductions and inadequate fruit maturity for Michigan's juice grape growers is too long to recite here. However, the future of juice grape production in Michigan will be closely tied with the challenge of increasing fruit quality, as demanded by Welch's and National Grape Cooperative to maintain market competitiveness. In fact, there is an increasing interest by Welch's in higher quality grapes and in particular in higher antioxidant capacity of the fruit. Achieving ripe fruit of Concord in Michigan is mainly related to reduce the crop to acceptable levels so that acceptable fruit and subsequent juice quality can be achieved also in 'poor' years (low GDD accumulation).

The severe spring frost losses in 2010 increased the potential of huge crop in 2011 for the excellent bud differentiation during last summer.

Therefore, a potential excess crop in 2011, potentially coupled with a poor growing season could make a considerable amount of this year's crop un-salable. Under these conditions will be crucial to achieve a physiological balance between vine growth and reproduction



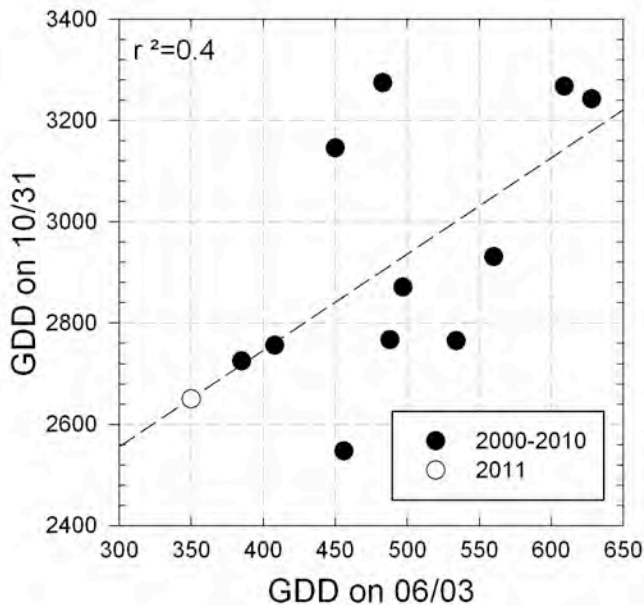
Fig 11. MSU Viticulture team working at the South West Michigan Research and Extension Center (Benton Harbor) in the Pinot noir clonal trial on 06/15/11. Vines could use a "break" of good weather as well the team working under the rain! From left to right: Pat Murad (research technician), Sofia Murad (undergraduate), Jake Emling (undergraduate), Shijian Zhuang (graduate student), Dr Paolo Sabbatini (Assistant Professor), Letizia Tozzini (graduate student) and Dana Acimovic (graduate student).

**Table 2. GDD (Growing Degree Days at SWMREC) accumulated on June 3rd and at the end of the season (October 31st).**

YEAR	GDD on 06/03	GDD on 10/31
2000	497	2871
2001	560	2931
2002	450	3146
2003	385	2725
2004	534	2765
2005	483	3275
2006	488	2767
2007	609	3268
2008	408	2756
2009	456	2547
2010	628	3243
2011	350	<u>2650</u>

to obtain maximum fruit maturity and quality at 2011 harvest. In order to achieve such balance, estimation of yield potential plays a central role. Considerable research has been done and continues today, to provide growers with crop estimation protocols that are accurate and easy to use.

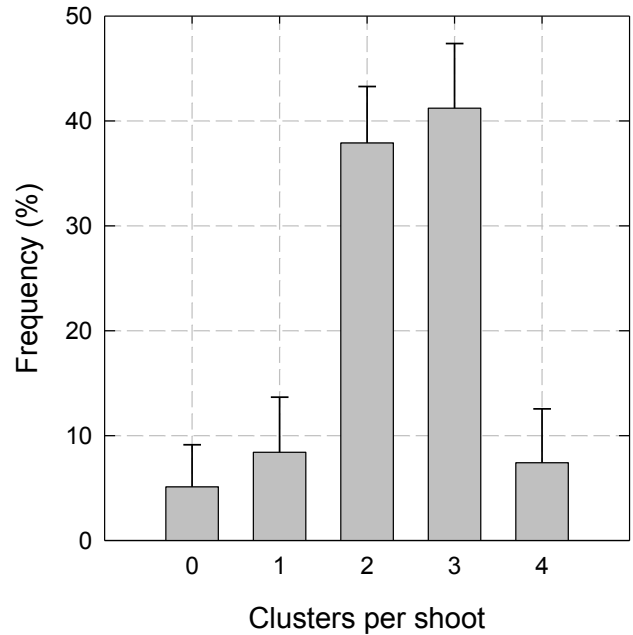
There are a variety of methods available to growers and each should choose the one that is accurate and manageable in consideration to their particular management techniques. Researchers in viticulture have developed different systems for estimating crop load that can be divided in two groups: 1) based on cluster weights during “lag phase” which is the time during the growing season when the berry’s growth slows momentarily (around 50-60 days after bloom) and 2) the traditional method based on historical records of cluster weights (specific for location, cultivar blocks...)



**Figure 12. Correlation between GDD on 06/03 and GDD at 10/31. The white dot is 2011. The value for 2011 at 10/31 is calculated from the regression equation.**

with the application of the following formula to calculate the Predicted Yield, PY, where  $PY = (ANV \times NC \times CW)$ , ANV = Actual Number of vines per acre, NC = Number of Cluster per vine and CW = Cluster Weight.

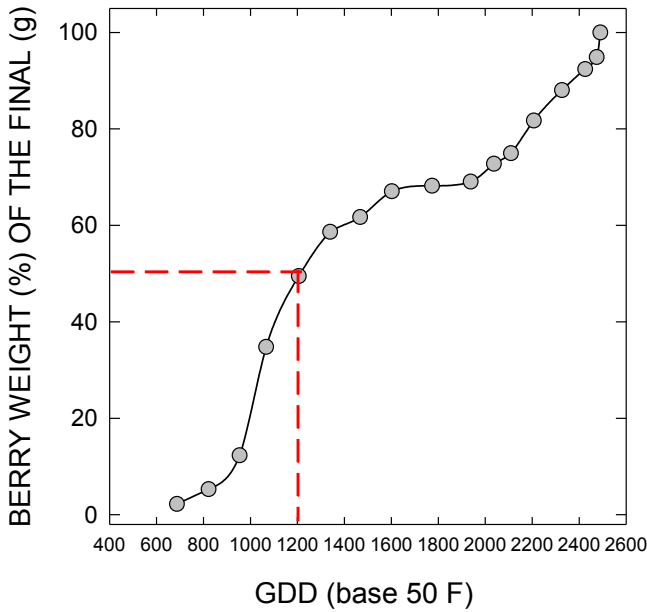
The “Lag Phase Technique” (developed by Price in 1992) presupposes the prediction of final yield on the basis that at Stage II of berry development (lag phase) berries are approximately half their final fresh weight. Price uses seed hardness as the primary indicator that berries have entered lag phase. The other traditional method is based on a running of historical record of cluster weights for a single cultivar in different locations. Multiplying cluster number by expected final cluster weight produces a harvest fruit weight per vine value. The problem of this approach is consistency. When



**Figure 13. Frequency distribution of shoots with 0,1,2,3 and 4 clusters on Concord vines pruned at 80 nodes during the winter (Dongvillo’s Farm, Scottsdale). Vines are carrying 150±25 clusters and planted 6 x 11 ft within and between rows, respectively. Yield estimation is 9.8±1.2 t/acre, an amount of crop difficult to ripe in Michigan also in a good season.**

grapes are grown in regions with plenty of heat, sunlight, irrigation, and no winter injury, then the year to year variation in the components of yield (cluster number, berry number and berry size) are very low. Expected variation year to year in Michigan is very high, both within and between cultivars. Nevertheless, both systems could provide good results, but they rely largely on the grower’s ability to provide accurate cluster/vine and vine/acre information.

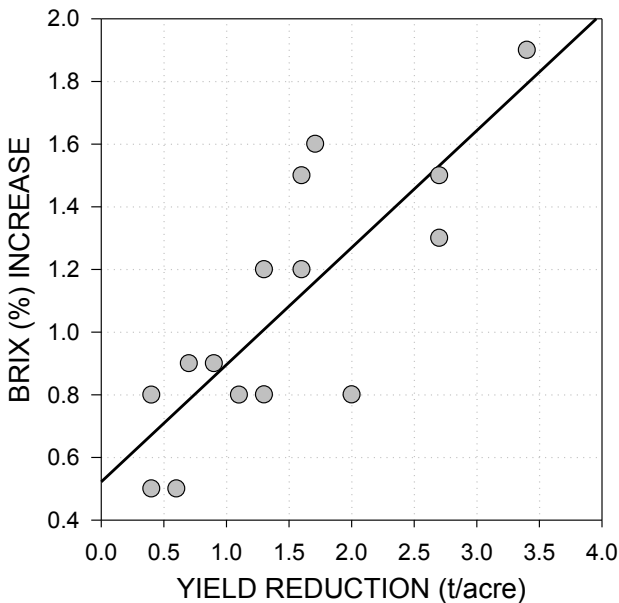
Another method developed by Dr. Pool and Dr Bates in NY and generally accepted for use in juice grapes is based on GDD (Growing Degree Days) accumulation. Concord berries accumulate 50% of their final weight at harvest by 1200 GDD (5-6 weeks after bloom). Research



**Figure 14 - Size increase of Concord berries (mean of 2008 , 2009 and 2010), expressed as berry weight (g) percentage of final berry weight vs. seasonal Growing Degree Days (GDD) accumulation. The curve shows that 50% of final berry weight is reached at 1200 GDD. The berry development consists of 2 successive sigmoidal curves (from 600 to 1500 GDD and from 2000 to 2500 GDD) separated by a lag phase (from 1500 to 2000 GDD). The first period is characterized by cell division and the second is the fruit ripening phase**

done in Michigan in 2008, 2009 and 2010 (Fig. 14) showed that Concord berries, in a wide range of cropping potential (from 4 to 12 t/acre) reached 50% of their final berry weight at 1200 GDD, with few degree days of difference between the 3 years, and with no differences related to the cropping levels of the vines. Whether cropped at 4, 8, or 12 t/acre they reached 50% at 1200 GDD.

Therefore, for the data available, it appears that crop estimation done at 1200 GDD is a good tool in predicting final crop size in Michigan. However, crop estimation is not a perfect science, and do not be discouraged if some of your attempts are inaccurate. With experience and data collection on your specific vineyard, the estimation will become more accurate and precise. Using crop estimation techniques you may discover that you are hanging too much fruit per vine, and the estimation will help you to achieve the target yield and quality through thinning (Fig. 15).



**Figure 15 - Relationship between yield reduction (t/ acre) and sugar accumulation increase (Brix %). Project funded by MSU-GREEN in 2009 and 2010. on "Improving fruit quality in Concord vineyards in Michigan". Yield reduction was performed at 1200. 1.0- 1.5 t/acre reduction increased harvest berry sugar accumulation of about 1% brix.**

## 2011 NW Wine Grape 'First Friday' Meetings

Sponsored by Parallel 45 Vines & Wines  
Info: Jay Briggs, 231-499-0763; Duke Elsner, 231-357-8353

*Please note that all meetings do not fall on a Friday this year due to holidays.*

**June 30 (Thursday)**

**3-5PM**

**Leorie Vineyard - Old Mission**

Topics: Crop estimation

**August 5**

**3-5PM**

**2 Lads - Old Mission**

Topics: MSU cover crop trials

## NW Michigan Horticultural Research Station Annual Open House

**August 25**

**NWMHRS - Traverse City**

## 36th Annual ASEV-Eastern Section Conference

**July 11-14**

**Sheraton Baltimore North Hotel - Baltimore, Maryland**

*(Symposium on July 12, Pest management: Impacts in the vineyard and winery)*

Registration and information: <http://www.asev-es.org/>

## Viticulture Field Day

**July 27**

**9AM-5:15PM**

**SWMREC - Benton Harbor**

Sponsored by Michigan Grape Society

More information: Tom Zabadal, 269-944-1477

## 2011 SW Grape Grower Meetings

Sponsored by MSU Extension  
Info: Diane Brown, 269-605-6305

**August 10**

**6-9PM**

**Dongvillo Vineyards - Berrien Springs**

Topics: Insect management, sprayer coverage comparisons using UV dye.

Registration includes lunch, and is 15.00 per person/meeting, paid in advance, 20.00 paid the day of the meeting. Please register in advance with Linda Gustafson at the Berrien County MSUE office (269-944-4126). Checks should be made out to Berrien County MSUE and mailed to 1737 Hillandale Rd, Benton Harbor, MI 49022.

## Great Lakes Fruit, Vegetable, and Farm Market EXPO

**December 6-8**

**DeVos Place Convention Center & Amway Grand Plaza Hotel - Grand Rapids**

More information: <http://www.glexpo.com/>

## Midwest Grape & Wine Conference

**February 9-12, 2012**

**St. Charles, MO**

More information: <http://www.midwestgrapeandwineconference.com/>

## Michigan Grape & Wine Conference

**February 22-24, 2012**

**Amway Grand Plaza Hotel - Grand Rapids**

More information: [MGWIC website](http://www.mgwic.org/)