Publication by the Program of Viticulture and Enology, Department of Horticulture, Michigan State University. 2003.

Developing a Greater Awareness of Your Vineyard's Condition

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Long-term sustainable production of grapes for processing into either juice or wine is increasingly tied to a clear, accurate knowledge of conditions in the grower's vineyard. We are awash in change as alternatives to traditional cultural approaches are presented with increasing frequency. While evaluation of these new approaches can be done in a general way for the region of culture, ***only the vineyard owner/manager can assess the applicability for his/her own vineyard.***

The main reason for the need of individual assessment is tied to variability. We say, "if you don't like the weather, just wait a minute." We could say with equal accuracy, "if you don't like the soil, just take a step in any direction." In Michigan we live with variable weather as has been so clearly been shown in the period from 1990 to date. We can recall the great growing years of 1991 (the best in 100 years), 1998 and 1999. We can also too readily recall the terrible 1992 growing season (the worst in 100 years), the killer freezes in January, 1994, the very lucky, late ripening season of 1997, the terrible fruit-set conditions in the spring of 2001, and finally, the severe spring frost damage of 2002. We are familiar with variability. If we are to believe the forecasters, one impact of "global warming" will be increased weather variability. The future economic survival and success of Michigan's grape and wine industries will be strongly tied to our capacity to accommodate such variability and still maintain consistent economical levels of production.

This brief article presents a suggestion that would seem simple at face value, but it has the potential to give growers a tool to enhance production levels over time in our increasingly variable situation.

A Modest Proposal.

No person can have better knowledge about the vineyard or greater incentive to achieve maximal sustainable production of ripe grapes than does the vineyard owner and manager. That person knows that her/his vineyard is not uniform, and

knows that different portions could be categorized as ‘high’, ‘moderate’, or ‘low’ producing. This modest proposal suggests that vineyard managers select a few vines that are characteristic of these type areas, and use them as indicators for that location’s production potential for a given season.

What Do We Know?

2-3 weeks post bloom has historically been very close to the 1200 GDD timing for Concord. Dr. Bob Pool of Cornell University has good data suggesting that the weight of berries at 1200 GDD is 50% of final berry weight. That window of time is the time to estimate crop potential. The hitch is the specific date we reach that 1200 GDD.

In 1991 we reached it on 27 June in SW Michigan; we reached it on 21 July in 1992 and 28 July in 1997. It is easy to see how the delay in timing of these events will reduce the season left to ripen the crop and thus the crop must be adjusted accordingly if ripeness is to be achieved and vine stresses associated with chronic over-cropping are to be avoided.

Recent Concord research in Michigan has suggested that for years like 1991 and 1998 it was possible to ripen an estimated upper limit of 11.0 tons/acre on heavier soils and 7 tons/acre on sandy soils without “stealing” either vine size or cropping potential for the next year. By contrast, the same vineyards could not ripen the crop and the vine with balance in 1992 or 1997 at levels above 7 or 5 tons/acre respectively. Could larger crops be ripened in those years? Possibly, but processor acceptance would have been open to doubt and the over-cropped vines would be seriously depleted for the coming season. ***The goal being suggested here is for highest, sustainable, LONG-TERM production.***

Specifics.

Selection of a 3-vine (1-post-length) panel that accurately represents the area is the first, critical step. Indeed, as there are differences across all Michigan vineyards, selection of representative, 3-vine plots for “high”, “moderate”, and “low” production areas will be most useful. If you can, 6-vine plots are even more useful. Such vines can serve effectively over the vineyard’s life and be the basis for long-term understanding of that location/vine relationship. The utility of the vineyard data grows as the information collected grows over years. Understand that ***this is not a direct prediction*** of crop, it is an ***estimate, but the estimate now is superior to that made during dormant pruning based on nodes retained.***

Data Collection Work Sheet.

Attached is a work sheet devised to help determine the kind of inputs to collect, when to collect them and how the information can be used. This suggestion calls for selection of a few predictive areas within your vineyard. It is better to get complete information on a few locations than to select too many locations and become too overloaded and ultimately the abandonment of the effort.

Estimating This Season's Crop in Your Vineyard.

1. Get total berry weight for all vines in-group and divide by total number of berries. Result is average berry weight. If this has been collected at 1200 GDD the result can be doubled with producing an ***estimate*** of final berry weight (based on 7-years of Pool data in NY and 1-year by us in MI).

2. We now know the berry weight and the average berry number per cluster. We can now calculate the estimated yield per primary shoot and secondary shoot. Since we used primary shoots for our estimate, we keep the value and multiply by number of primary shoots on the 3-vines. Use the same number for secondary shoots, except multiply the value by 0.33. Add the values for primary and secondary shoots, divide by 3, and the result is estimated final yield/vine.

3. If the row X vine spacing is 9 X 8 vines/acre = 605. If 10 X 8 vines/acre = 570. Multiply your single vine estimate by the appropriate number and get lbs/acre. Divide by 2000lbs and get tons/acre.

4. Now, determine the exact date that 1200 GDD occurred. This gives a basis to assess the current season with regard to the excellent and terrible years of the 1990's. If the 1200GDD occurred at or prior to 27 June, do nothing. If it occurs at or later than July 21, reduce crop to about 7tons/acre on heavy soils and 5 tons/acre on sandy soils. The challenge is to determine crop reduction when 1200 GDD comes between these dates (See attachment).

For vines on heavy soils we adjust the crop down 0.5 tons/acre for every 3-days that the 1200 GDD is later than 27 June. For sandy soils, crop is reduced less because the starting maximum is lower (11 vs. 7 T/A) and the crop is reduced 0.5 T/A for every 5-days that 1200 GDD is later than 27 June.

This effort is ***in-progress*** and the information must still be considered experimental. We have had only 1-year's experience and that was the 2002 season where we had to adjust crop down in only one plot. Incidentally, one side benefit of this approach is the impact on other stress situations. We did not have to crop

adjust in Berrien, Co. nor on the MSU campus where there was significant spring frost damage. Vines set to produce 11 tons/acre were cropped at 6.0+ tons/acre in 2002 at all three locations.

Is this "FOOL PROOF"? No, it is a work in progress. Does it have a sound basis in our understanding of vine growth and production in Michigan? Yes, but anyone employing this at this time should be aware that the effort is experimental even if the concepts are clear. The crop adjustment methods presently available are necessarily mechanical for Concord vines. This worked well in 2002 in Lawton. The key is care by the operator, an estimate of the amount of crop in the vineyard, and a sound basis for estimating appropriate crop level based on the current season.

Is there a risk if tonnage exceeds 11/acre on heavy soils or 7 T/A on sandy soils? Yes. The risk is on several levels: 1) the crop might not meet ripeness standards and be rejected; 2) the crop could meet sugar limits, but lack sufficient varietal character to make anything other than inferior juice or wine; and 3) the crop could mature, the processed product be acceptable but the vine be weakened so as to lower next season's potential to produce 11 T/A if that year was excellent.

There are growers of Concord grapes who will consider this too much trouble, too time consuming and lacking in guarantees. 5-years research data have suggested an approach to accommodate such considerations. Prune vines to 80-nodes/vine and avoid crop adjustment.

Estimating crop is filled with pitfalls as growing conditions can have impact right up to harvest. The value of this approach is that it has the potential to allow growers to achieve highest yields of ripe fruit possible each season in our highly variable climate. We will continue to refine the methods and the effort, but the 2003 season is a special one given the economic trauma of the 2001 and 2002 seasons and the dangerous potential for a huge, fine crop, finally, that we might not be able to ripen. That would be too terrible to contemplate.

So, this is our challenge.

Vineyard Data Collection Worksheet Date_____

I. Pre bud break

A. Count nodes/vine

Vine 1_____ Vine 2_____ Vine3_____

II. Shoots at 3 inch stage

A. # blind nodes

Vine 1_____ Vine 2_____ Vine 3 _____

B. # frosted primary buds

Vine 1_____ Vine 2_____ Vine 3 _____

C. # frosted secondary buds

Vine 1_____ Vine 2 _____ Vine 3 _____

III. Near Bloom: Count the # Clusters/Vine

Vine 1._____ Vine 2_____ Vine 3_____

IV. 2-Weeks Post-Bloom Select 3 Shoots/Vine *that are like the most common type on the vine.* Pick the clusters, count and weigh the berries/shoot on all clusters.

Vine 1
Berry Count

Shoot 1 _____ Shoot 2_____ Shoot 3_____

Weight

Shoot 1_____Shoot 2_____ Shoot 3_____

Vine 2
Berry Count

Shoot 1_____ Shoot 2_____ Shoot 3 _____

Weight
Shoot 1 _____ Shoot 2_____ Shoot 3_____

Vine 3
Berry Count

Shoot 1_____ Shoot 2_____ Shoot 3_____

Weight
Shoot 1_____ Shoot 2_____ Shoot 3_____

Now we can take these data and estimate crop level.

Sample calculations:

1. We retained 120 buds/vine at pruning = 120(3)=360 buds
2. At 3-inch stage here were 9+ 11+ 13= 33 total blind nodes on the 3-vines
3. There had been a slight frost, and the total for the 3-vines was 25 dead primary buds (how do you tell it's a primary? It's the angle of the shoot).
4. At pre bloom there were 756 clusters on the 3-vines.
5. 2-weeks post set, three primary shoots per vine were harvested and the berries on each shoot were counted and weighed. The average berry weight was 1.6g and average berries per shoot was 63.

Calculating potential yield per vine. Based on average per vine

120 nodes/vine
11 blind nodes
8 dead primary buds by frost
101 live primary shoots
8 live secondary shoots

63 berries/primary shoot (1.6g/berry at 1200 GDD)(2—final berry Wt @ harvest)= 201.6g/shoot

(201.6) (101 primary shoots)= 20361.6 g on primaries/vine
(201.6) (8 secondary shoots)(0.33 for reduced productivity of secondary) = 532.26/vine

20361.6 + 532.3 = 20883.8g/vine

20883.8 =20.9 kg/vine = 46.04 lbs/vine
1000g/kilo
(46.04)(605)=13.93 T/A (46.04)(570)=13.1 T/A

That is true if there are not missing vines. Assume there are 25 missing vines, then this becomes 13.3 and 12.6T/A respectively.

<u>Applying the Concepts.</u>

So, when did 1200 GDD occur in this imaginary year? Let's pick a good average date like July 4th.

Based on our sliding scale this is not too bad. Even though we have exceeded our 11 ton upper limit at 13 tons, the timing of the 4th puts us at 9-9.5 tons/ acre and we need to adjust the crop down by 1.5 to 2.0 tons per acre.

If our date was 8 July the crop range would drop to 8.5 to 9.0. This is based on the heavier soils that can bear the 11 ton crop. What about the sandy very well drained soils? At 13 T/A this crop is far too great to achieve balance without considerable crop adjustment down.

For the July 4th date the crop would be suggested at 6.5 T/A< requiring a reduction of half the crop (6.5 T/A) and the 8th date would suggest a reduction of the 13 T/A to 6 T/A. Such large reductions are problematic as it is both difficult to accomplish and the emotional impact on the producer is severe.

Sliding Scale for Crop Adjustment to Concord Grapes in Michigan. A Preleminary Assessment. ***This Will Be Further Refined, But Is Presently a Basis for Discussion and a Considered Basis for Producer Decisions.***

Date of 1200 GDD	**Proposed Upper Crop Limit Tons/Acre**	
	Heavy soil	**Sandy Soil**
June 27 or before	11.0	7.0
28-30	10.5	7.0
July 1-4	10.0	6.5
5-7	9.5	6.5
8-11	9.0	6.0
12-14	8.5	5.5
15-16	8.0	5.5
17-19	7.5	5.0
20-22	7.0	5.0

There are likely situations where 1200 GDD can occur either earlier or later. This is based on the NOAA data describing the 1991 and 1992 growing seasons, respectively, as the best and worst in 100 years