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Thank you to everyone who has already taken part in our [end-of-season survey](#)! These results will help us tailor the newsletter to your preferences for next season.

If you have not yet completed the brief (5-10 minutes) anonymous survey, please click the link above to access it online.

You can also print, complete, and return the paper copy found on page 13 of this document.

Viticulture

Growing season summary: West Madison Agricultural Research Station training systems trial *By: Madeline Wimmer and Amaya Atucha*

Every good vintner knows that each growing season has unique weather condition, pest pressure, and other factors that cumulatively produce a distinctive vintage. This season was no exception at West Madison Agricultural Research Station. It was the second fruiting season for our vineyard and the second year of taking data on our trial: testing out four different grape cultivars ('Brianna', 'Frontenac', 'La Crescent', and 'Marquette') on three different training systems (Vertical Shoot Positioning, High Cordon, and Scott Henry). Our vineyard was subject to the late spring frost on May 14th, experienced large amounts of rainfall throughout the season, and a seemingly unstoppable infestation of Japanese Beetles. By the end of the season, we harvested a total of 4115 pounds of fruit from 180 grapevines within and ¼ acre vineyard. In retrospect, we had a fairly productive year for our grapes, despite seeing poor fruit set on 'Brianna', diluted sugar levels from consistent rainfall, and a late cane maturation (shoots were still green in early November).

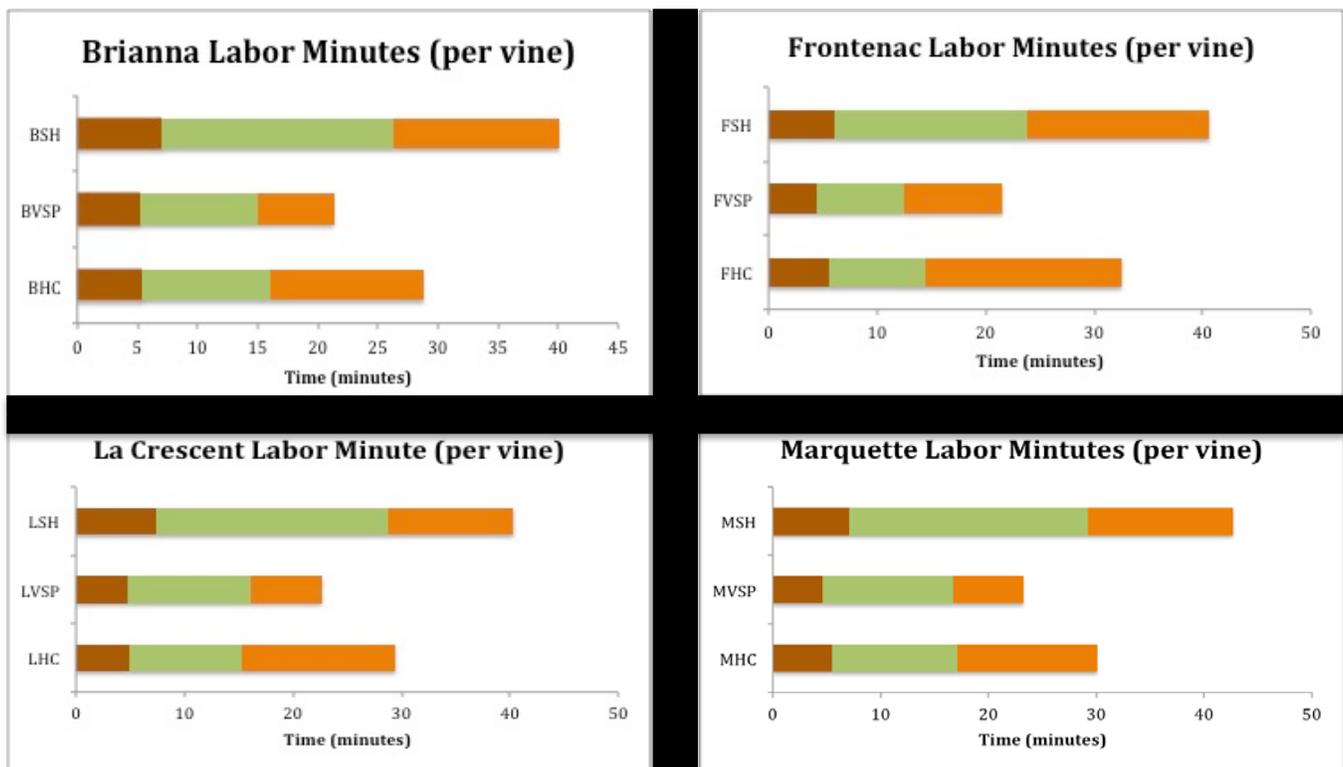


Below you'll find a summary of the 2016 data on yield, fruit quality, and labor requirements from our research vineyards at West Madison Agricultural Research Station.

Figure 1.1 Fruit quality and yield data from different cultivars and training systems at harvest.

Grape Cultivar	Training System	Total yield (lbs)	Total cluster count	Avg sugar content (Brix)	Avg TA (grams NaOH/L)
Brianna	HC	242.88	1112	16.5	7.2
Brianna	VSP	97.35	560	16.6	7.25
Brianna	SH	333.18	1379	16.03	6.91
Frontenac	HC	468.34	1380	21.15	12.98
Frontenac	VSP	361.18	1091	21.83	12.22
Frontenac	SH	511.12	1706	22.13	11.94
La Crescent	HC	472.09	1086	19.3	14.2
La Crescent	VSP	178.05	750	19.1	13.06
La Crescent	SH	392.71	1265	18.78	12.26
Marquette	HC	313.55	1389	23.23	10.97
Marquette	VSP	283.89	1068	24.13	10.42
Marquette	SH	462.51	1921	22.7	9.93

Figure 1.2 Labor requirements represented as average number of minutes per vine throughout the growing season based on pruning (brown), canopy management (green), and harvest (orange).





Harvesting 'Frontenac' from lower Scott Henry Canopy (left) and post-harvest picture of 'Frontenac' and some of the harvest crew.

2016 Growing Season Timeline

March

11th

- Dormant pruning, canes pruned to 2-3 bud spurs.
- Cordons with significant cold damage or blind wood, were renewed by replacing the old cordon with a new healthy cane.



April

20th

- Bud break.

May

- 14th • The late spring frost damaged some new shoots in early varieties, but very few shoot were lost in our research blocks. Overall, the damage from the spring frost was variable across the state, with some vineyards suffering substantial losses while other had minimal damage.
- 23rd • Shoot Thinning- Vines were thinned to 6 shoots per linear foot of cordon to control crop load and help with canopy management.

June

- 1st-13th • Shoots in the VSP and Scott Henry training systems were tucked into trellis catch wires in order to train shoots upward.
- 6th • Early bloom.
- 13th • Lateral shoots located near the cluster zone were removed to open the canopy and expose fruit to the sun.
- 20th • Shoots in the Scott Henry and High Cordon training systems were combed to grow downward by hooping shoots into a lower catch wire.
- 21st • Fruit had completely set at this point and reached pea size. Brianna has noticeably poor fruit set this year.
- 22nd • Leaf pulling done near the cluster zone to expose clusters and improve fruit quality (i.e. increase sugar levels, improve color, and decrease acid levels).



24th

- We reduced the Scott Henry crop by 25% to avoid the cropping our young vines.

30th

- VSP and Scott Henry upper canopies were hedged for the 1st time in the season.

July

15th

- High cordon vines hedged to 6-inches off the ground.
- Extremely high pressure of Japanese beetle.

28th-31st

- Early veraison.



August

8th- 14th

- VSP and Scott Henry hedged for 2nd time to control shoot growth.

23rd

- Brianna harvested. (16 lbs per vines)

29th

- La Crescent harvested. (25 lbs per vines)



September

12th

- Marquette harvested. (22 lbs per vines)

19th

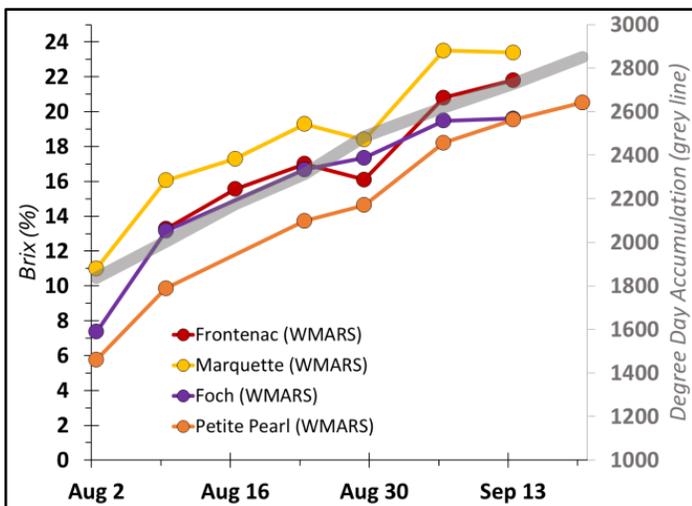
- Frontenac harvested. (28 lbs per vines)
- Harvest season finished.

Grape fruit quality assessments

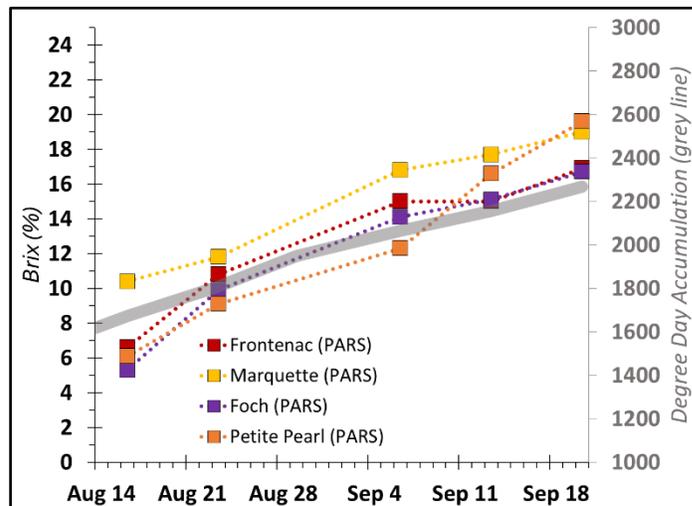
By: Janet van Zoeren, Annie Deutsch, Madeline Wimmer, and Amaya Atucha – UW-Extension

Harvest day is perhaps the most important day of the year for grape grower. It is the last major task of the growing season, but it also defines the quality of the wine that will be made out of the grapes. Every year growers have to face the dilemma of either delaying harvest until the fruit has achieved the desired quality standards or harvest in a hurry before fruit is overripe and berries may shatter off the clusters. Fortunately, we do have some parameters that can help us define ripeness levels, such as soluble sugar concentration (°Brix), titratable acidity (TA), and pH. In addition, color, flavor, and aroma of the fruit are important characteristics to evaluate fruit ripeness.

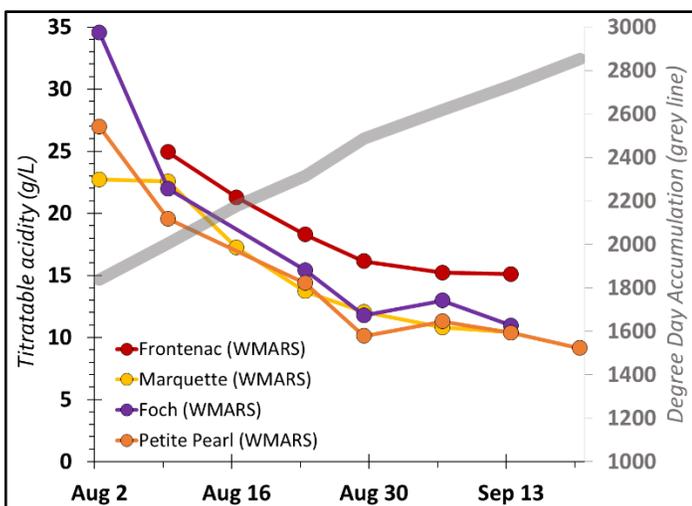
Although no single factor or equation can provide an answer of when to harvest for every grower, the routine standards mentioned above can provide a general rubric for establishing potential harvest dates. Here in Wisconsin this past summer, we tracked °Brix and TA for four red wine and two white wine cultivars, at the West Madison Agricultural Station (WMARS), near Madison, and at the Peninsular Agricultural Station (PARS), in Door County. The graphs on the left side present data for WMARS, and the ones to the right side for PARS. Each graph also illustrates, in a grey line, growing degree day accumulation during the growing season for each station.



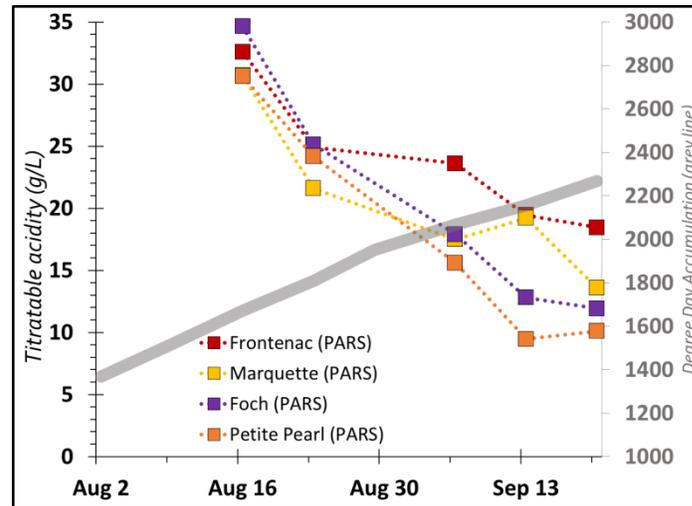
Sugar (brix) accumulation for four red wine varieties at the West Madison Agricultural Research Station (colored lines), compared degree day accumulation (grey line).



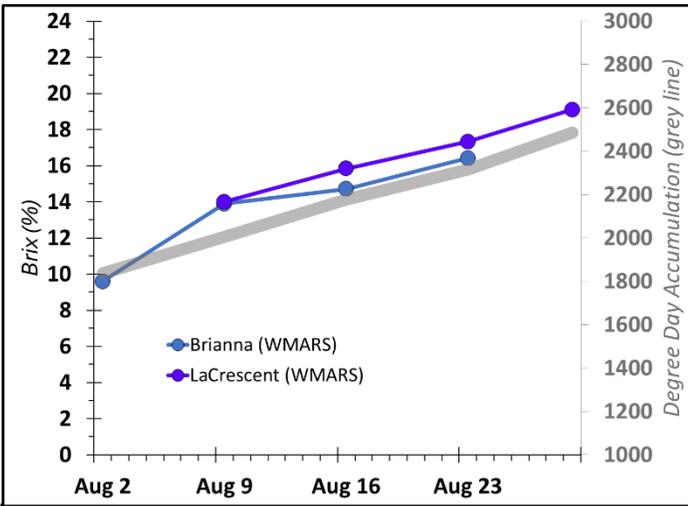
Sugar (brix) accumulation for four red wine varieties at the Peninsular Agricultural Research Station (dotted colored lines), compared degree day accumulation (grey line).



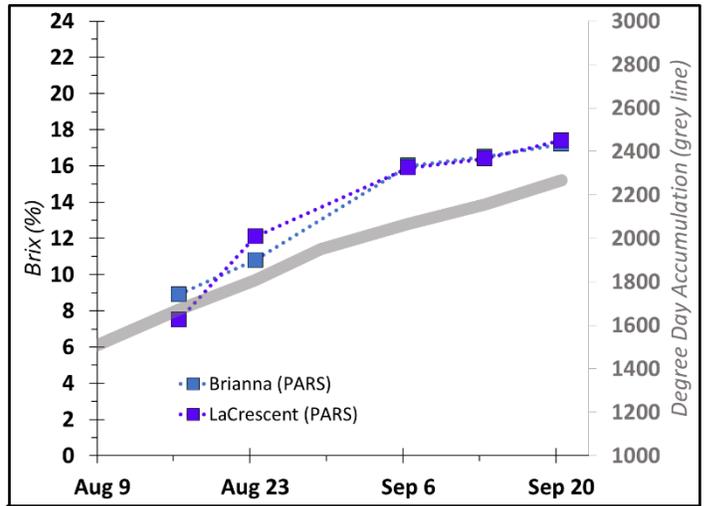
Acidity (TA) accumulation for four red wine varieties at the West Madison Agricultural Research Station (colored lines), compared degree day accumulation (grey line).



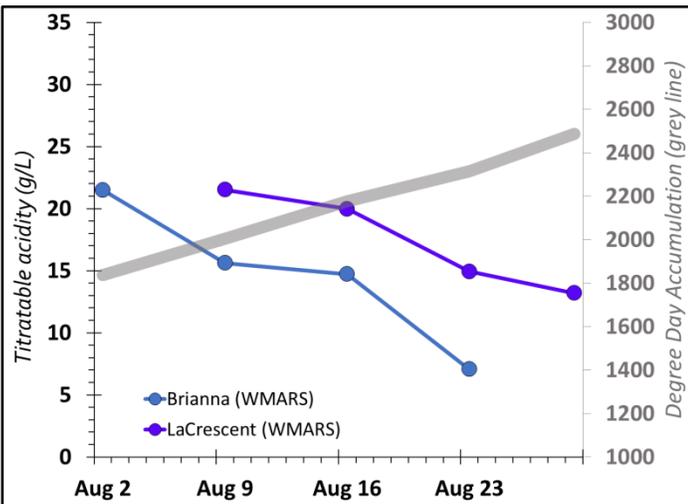
Acidity (TA) accumulation for four red wine varieties at the Peninsular Agricultural Research Station (colored lines), compared degree day accumulation (grey line).



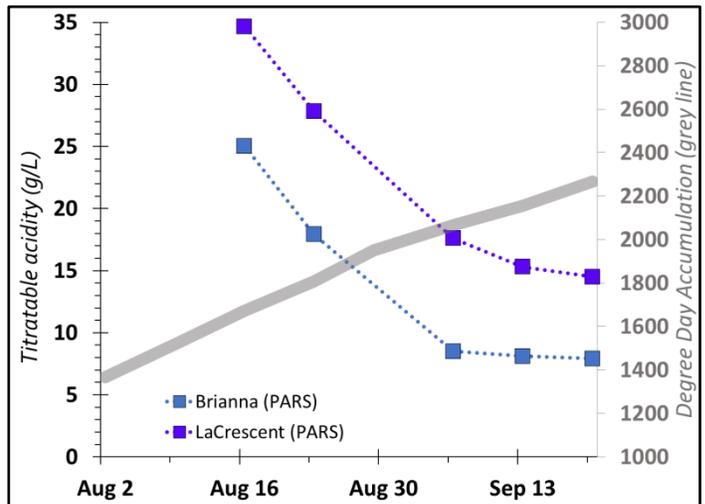
Sugar (Brix) accumulation for two white wine varieties at the West Madison Agricultural Research Station (colored lines), compared degree day accumulation (grey line).



Acidity (TA) accumulation for two white wine varieties at the West Madison Agricultural Research Station (colored lines), compared degree day accumulation (grey line).



Sugar (Brix) accumulation for two white wine varieties at the Peninsular Agricultural Research Station (colored lines), compared degree day accumulation (grey line).



Acidity (TA) accumulation for two white wine varieties at the Peninsular Agricultural Research Station (colored lines), compared degree day accumulation (grey line).

The graphs clearly illustrate the correlation between growing degree days and grape maturity, with °Brix and TA tending to level out around 2600-2700 degree days at WMARS (at PARS grapes were harvested before we reached 2500 degree days).

Disease Management

Susceptibility to downy mildew, powdery mildew, and black rot: New management applications for cold-climate wine grape growers

By: David S. Jones and Dr. Patty McManus, University of Wisconsin -Madison

In field trials conducted in Wisconsin over two years at three vineyards (WMARS, PARS 1, and PARS 2), we found that both severe susceptibility and relative resistance to powdery mildew, downy mildew, and black rot are present in several popular cold-climate cultivars, and that several disease susceptibility ratings published in extension literature need to be updated. Additionally, we found that for most cultivars a difference between foliar and fruit susceptibility to diseases, a distinction that is not usually made in extension resources, and that may have management implications.

Based on these data, we have created susceptibility charts displaying the relative susceptibility of both the fruit and foliage of all eight cold-climate grape cultivars included in this work. A wide spectrum of disease susceptibility is displayed within these cultivars. Future work will focus on using this information to develop spray management strategies to optimize the profitability and sustainability of grape production in the Midwest based on host plant resistance to disease. It is important to note that among the cultivars that we studied there is no “silver bullet” cultivar that provides protection from downy mildew, powdery mildew, and black rot all at once. As a result, future trials will test reduced-spray programs that focus only on those diseases that are a known threat to a specific cultivar. Such tailored spray programs should reduce costs substantially for growers compared to the “one-size-fits-all” programs currently recommended. These tables also provide valuable information for growers looking to establish new plantings, as well as for providing increased insight on the risks associated with growing each one of these eight cultivars.

Downy Mildew: While susceptibility of foliage was variable among the eight cultivars, susceptibility to the fruit was less so. Only ‘Valiant’ was susceptible to damage on fruits, suffering over 90% loss in all of our trials, while fruits on all seven other cultivars were not damaged by the disease. This suggests that downy mildew may not pose a significant threat to yield when growing cultivars with minimal foliar susceptibility to the disease; fruits are not in danger of being damaged directly by the disease, and if foliar injury is minor, then fruits would not be indirectly affected by loss of photosynthesis.

Figure 1: Relative foliar and fruit susceptibility of cold-climate cultivars to downy mildew.

Downy Mildew	
Risk of Foliar Damage	Cultivar
Severe	Valiant* = LaCrosse
High	La Crescent
High to Moderate	St. Croix
Moderate to Low	Brianna
Low	Frontenac = Frontenac gris
Very Low	Marquette

*Fruits are also susceptible to downy mildew

Powdery Mildew: Unlike downy mildew, none of the eight cultivars in our trials had fruits that were fully resistant to powdery mildew. This indicates that this disease must be managed carefully, particularly on susceptible cultivars in order to avoid damage to fruits. Only La Crescent and Valiant escaped severe damage in hot, dry weather at PARS 1 in 2015, indicating that conducive weather may put nearly all of these cultivars at risk for economic damage. However, severe damage was not typical across other trials.

Figure 2: Relative susceptibility of cold-climate cultivars to powdery mildew.

Powdery Mildew	
Risk of Foliar Damage	Cultivar
Severe	Brianna** = Frontenac** = Frontenac gris**
High	Marquette*
Moderate	LaCrosse*
Low	St. Croix*
Very Low	La Crescent* = Valiant*

**Fruits are severely susceptible to powdery mildew

*Fruits are slightly susceptible to powdery mildew

Black Rot: None of the eight cultivars were resistant to black rot damage to the fruit. However, when producing relatively less susceptible cultivars such as La Crescent and St. Croix, it might be possible to forego some early sprays but focus on sprays bloom (the peak window of susceptibility to black rot) Black rot poses a minimal threat to the foliage of many cultivars, but the fruit of severely susceptible cultivars such as Marquette and highly susceptible cultivars such as Frontenac and Frontenac gris can be extensively damaged by black rot if proper management is not practiced.

Figure 3: Relative susceptibility of cold-climate cultivars to black rot.

Black Rot	
Risk of Foliar Damage	Cultivar
Severe	Valiant***, Marquette***
High	Frontenac**, Frontenac gris**
Moderate	Brianna*, LaCrosse*
Low	St. Croix*
Very Low	La Crescent*

***Fruits are severely susceptible to black rot

**Fruits are moderately susceptible to black rot

*Fruits are slightly susceptible to black rot

Insect Pest Management

Grape insect report – 2016 summer summary

By: Janet van Zoeren, Annie Deutsch and Christelle Guédot, UW-Extension

Throughout the past summer we have been scouting weekly at the West Madison Agricultural Research Station (WMARS) and the Peninsular Agricultural Research Station (PARS). Here is a brief summary of our findings, along with links to previous published articles from this newsletter, where you can read more about the key pests from this past summer.

Calendar of occurrence of insects observed at WMRS in 2016

	May	June	July	August	Sept.
Flea Beetle					
Grape Tumid Gallmaker					
Grape Phylloxera					
Grape Plume Moth					
Japanese Beetle					
Yellow Jackets					
Multicolored Asian Ladybug					

Grape Flea Beetle is first seen in early spring (late April through May) as buds begin to swell. This year grape flea beetle did not cause much damage at the vineyards where we were scouting. The lower numbers of this pest may have been due to the relatively quick bud development due to warm temperatures this spring – grape flea beetle does best when buds develop slowly during a prolonged, cool spring. Although we did not focus on grape flea beetle in the Wisconsin fruit newsletter this summer, you can find information about this pest in the [2013 Grape IPM Scouting Report, issue 1](#) (page 1).

Grape Phylloxera populations were especially high this past summer in the WMARS vineyard where we were monitoring. Infestations begin in late May, although we didn't begin to see significant damage until mid-June. Unfortunately, by then, it was too late to control phylloxera with an insecticide spray, because the nymphs were already safely enclosed in the leaf galls.

If you similarly saw high numbers over this past summer, it would be a good idea to be especially careful about monitoring early next spring, to catch and control for the phylloxera as soon as the first galls begin to form in May or you may consider applying a prophylactic treatment around bud swell. For more information about early spring control of grape phylloxera, please see the [Wisconsin Fruit News, issue 6](#) (page 18).

Grape Plume Moth is a sporadic pest, but was seen in higher number this summer than most, although it still was not numerous enough to cause economic damage at either PARS or WMARS. In fact, research at Cornell University has shown that up to 20% of shoots on a vine can be infested with grape plume moth without any effect on yield. If you would like more information about grape plume moth identification, monitoring or control, please see the [Wisconsin Fruit News, issue 5](#) (page 14).



Larval grape plume moth. Photo by D.S. Jones

Grape Tumid Gallmaker is another pest that was seen in unusually high number in Wisconsin this summer. Similar to the grape plume moth, grape tumid gallmaker populations, in most vineyards, have not reached high enough levels to cause economic damage. However, as populations have continued to increase in both Michigan and Wisconsin over the past few years, it will become increasingly important to recognize and watch for this pest in your vineyards.

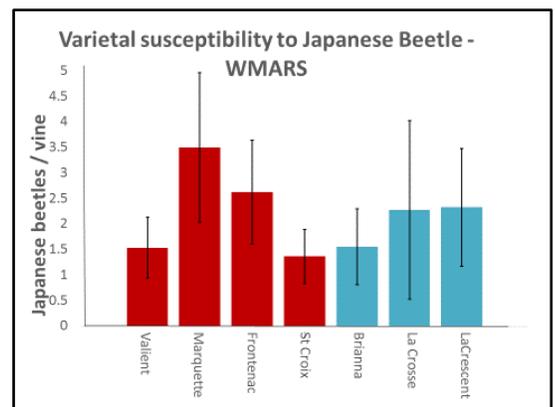
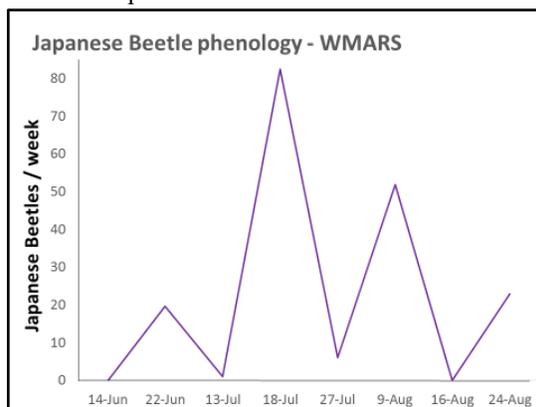
Grape tumid gallmaker has 2-3 generations in Wisconsin, with the first appearing in mid-May and continuing throughout most of the summer. Compared to grape phylloxera galls, which are green and fuzzy/rough, grape tumid gallmaker galls are shiny, smooth and often iridescent red (see photos at right). For more information about the grape tumid gallmaker, please see the [Wisconsin Fruit News, issue 7](#) (page 11).



Comparison of grape phylloxera (at left) and grape tumid gallmaker (at right, photo by Dean Volenberg).

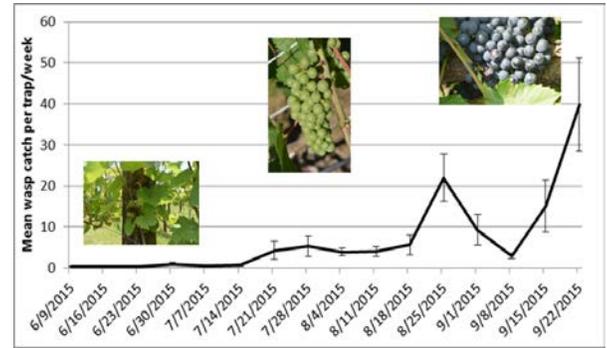
Japanese Beetles began to appear this past summer in mid-June at WMARS, and caused significant foliar defoliation through the end of August. Populations were higher than normal at WMARS, possibly because the mild winter allowed unusually high numbers of larvae to survive the winter. The graph below to the left shows Japanese beetle phenology throughout the summer at WMARS. Insecticide applications targeting Japanese beetle began at the station in early July, and appear to have prevented populations from continuing to increase throughout the late summer. Japanese beetles were an insignificant pest of grapes at PARS this past summer.

At WMARS we counted the average number of beetles per vine for seven wine grape varieties. Although this is preliminary data from a single location, there is a trend toward Japanese beetles feeding most frequently on Marquette, and feeding least on St.



Croix. Future work would be necessary to determine if this trend is consistent across years and locations (see graph above at right – red bars are red wine grapes and blue bars are white wine grapes). To read more about Japanese beetle life cycle, monitoring, and control, please see the [Wisconsin Fruit News, issue 8](#) (pages 6-7 and 17-18).

Yellow Jackets represent a potential economic pest in the vineyard, as they do feed on fruit in the fall; however, they also are a nuisance and potential danger to employees harvesting or working in the vineyards in fall. In the past years, increased numbers of yellow jackets have been observed in several states and fruit crops, possibly due to the increased use of softer pesticide chemistries. This past summer at WMARS, yellow jackets began to be seen in low numbers in mid-June, were seen more consistently by mid-July, and reached high enough densities to be a nuisance in August and September. This very closely matches with the phenology data we collected in 2015 (see figure at right). At PARS, wasp populations built up more slowly, but were also at nuisance levels by September.



In 2015 we determined the four most common species of yellow jacket in our vineyards, and found that in order to effectively bait and trap all four of those species you will need different baits, such as an acetic acid/isobutanol mix and heptyl butyrate. Future work will look at determining the ability of these species to directly damage grape and to identify best attractants for these species. For more information about removing yellow jackets and their nests from vineyards, please see the [Wisconsin Fruit News, issue 8](#) (page 17).

Multicolored Asian Lady Beetle can be both a pest (during the fall, as an adult) and a beneficial (during the summer, as a predacious larva). For this reason, and because there are many species of beneficial, native lady beetles, it is especially important to monitor in fall and to avoid spraying unless lady beetles reach an economic threshold. At both WMARS and PARS this past summer, lady beetle populations stayed at low densities, and no cultural or chemical controls were necessary to control them. For more information about multicolored Asian Lady Beetle life cycle, monitoring, and control, please see the [Wisconsin Fruit News, issue 11](#) (pages 8-9).

New invasive pests in Wisconsin include the Spotted Wing Drosophila (SWD) and the Brown Marmorated Stink Bug (BMSB). These both have the potential to be present in Wisconsin vineyards and are able to feed on grapes.

There have been many reports of spotted wing drosophila in vineyards in Wisconsin. Despite their prevalence, research from the Guédot lab has shown that it is unlikely that SWD can use their ovipositor to puncture the thick skin of our wine and table grapes. Therefore, it is expected that SWD in vineyards are feeding and ovipositing on previously damaged grapes, and are unlikely to cause further significant damage. More research needs to be conducted on table grapes to assess different varieties.

Regarding BMSB, however, research from the East Coast has shown that they are able and highly likely to damage not only grape berries, but the grape vines as well. To date, BMSB has not been a pest of grapes in Wisconsin, as populations are, just in the past year, increasing to pestiferous levels. In fact, this summer was the first year BMSB was trapped in Wisconsin in agricultural crops (apples and pumpkins in Dane County). It is likely that in future years the prevalence and damage potential of BMSB in grapes and other Wisconsin crops will only increase, so it will be important to be on the lookout for this pest in the future. For more information about Brown Marmorated Stink Bug, please see the [Wisconsin Fruit News, supplemental issue](#) or visit stopbmsb.org.

We hope you enjoyed our scouting reports this past season. Thank you to WGGA for providing support to scout at PARS!

Edited by: Christelle Guédot, Entomology Specialist, UW-Madison and Amaya Atucha, Horticulture Specialist, UW-Madison. *Formatting by:* Janet van Zoeren, Fruit Crops Extension Associate, UW-Extension. Articles provided by other sources as attributed. Funding provided by the University of Wisconsin-Extension. *Email Questions to:* vanzoeren@wisc.edu.

The Wisconsin Fruit News is a publication of the University of Wisconsin-Extension Program, which provides statewide access to university resources and research so the people of Wisconsin can learn, grow and succeed at all stages of life. UW-Extension carries out this tradition of the Wisconsin Idea – extending the boundaries of the university to the boundaries of the state. No endorsement of products mentioned in this newsletter is intended or implied. The University of Wisconsin is an equal opportunity provider and employer.

If you have any questions or comments about the Wisconsin Fruit News issues, please contact Janet van Zoeren: vanzoeren@wisc.edu.

Wisconsin Fruit News 2016 feedback form

We hope you found the newsletter informative and useful last summer. To better provide you with informative and applicable articles next year, we would like your feedback on which sections you found most interesting, what you would like to see different or added in the newsletter next summer, and whether you made any changes in management practices this summer on account of the information in the newsletter.

Survey created by Janet Van Zoeren (vanzoeren@wisc.edu), Christelle Guédot (guedot@wisc.edu), and Amaya Atucha (atucha@wisc.edu) – UW-Fruit Crop Extension

Please return to:

Janet van Zoeren, 536 Russell Labs, 1630 Linden Drive, Madison, WI 53706

1. Which fruit crops do you grow, either commercially or on a home-gardener scale? (check all that apply)

- Berry crops
- Cranberries
- Grapes
- Tree Fruits

2. Where are you located?

- a. In Wisconsin (what county? _____)
- b. Another state (what state? _____)
- c. Outside the US (what country? _____)

3. Did you find the Wisconsin fruit **website** useful (www.fruit.wisc.edu)?

- Yes, always
- Yes, frequently
- Sometimes
- Almost never
- Not at all
- Never heard of it

4. How do you receive the Wisconsin Fruit Newsletter? (check all that apply)

- Subscribed through the website
- Receive it by email (from a grower association or through the University)
- Search it out and view it on the website
- Other (please specify) _____

5. Did the newsletter increase your overall knowledge of fruit crop production and pest management?

- Not at all A little Some Quite a bit A lot

6. Did the newsletter encourage you to adopt new management practices in 2016?

- Not at all A little Some Quite a bit A lot

7. Based on the information in the newsletter, do you plan to make any changes to your management practices in 2017?

- Not at all A little Some Quite a bit A lot

8. How useful are the following article topics to you?

Plant disease and insect diagnostic lab updates:

- Not useful Moderately useful Extremely Useful Did not read

Monitoring for diseases (i.e. Grape disease updates):

- Not useful Moderately useful Extremely Useful Did not read

Insect pest alerts (i.e. spotted wing monitoring and management articles):

- Not useful Moderately useful Extremely Useful Did not read

Grape development and fruit quality assessment:

- Not useful Moderately useful Extremely Useful Did not read

Horticultural management updates (i.e. pruning, fruit thinning, nutrient management, harvest):

- Not useful Moderately useful Extremely Useful Did not read

Insecticide profiles:

- Not useful Moderately useful Extremely Useful Does not apply/
did not read

Alternative Crops for Wisconsin (i.e. hazelnut, elderberry, currants, etc):

- Not useful
- Moderately useful
- Extremely Useful
- Does not apply/
did not read

9. What new information or articles would you like to see included next year (that has not been included in the newsletter yet)?

10. How often would you prefer to get the newsletter?

- Every week (more frequently than 2016)
- Every other week (same as 2016)
- Every month (less frequently than 2016)

11. Would you be willing to pay \$5-10 annually for this newsletter?

- Yes
- No

12. Any additional comments???

Thank you for your time! We appreciate your feedback.