PURDUE EXTENSION

FACTS FOR

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Crop Conditions

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

Grape harvest continues across the state. Overall fruit quality has been excellent, but maintaining that quality with all the rain recently is challenging. Thin skinned varieties have fruit cracking and rot problems. Primocane fruiting blackberry harvest continues into its fourth week on Black magic, with APF-45 just getting started. Heritage and Caroline primocane fruiting raspberries are struggling through the heat and rain. Gray mold, spotted wing Drosophila and Japanese beetles are major concerns in brambles and growers should continue control measures. Apple harvest continues. Summer varieties are done and early fall varieties are being harvested.



Foch grapes almost ready to pick.



Noiret grapes are in good shape.



Vidal grapes, with their tough skin, are in good shape.



Steuben grapes are in good shape.



Honeycrisp apple near harvest.



Red Delicious apples near harvest.



APF-45 primocane fruiting blackberries. First harvest.

Grapes: The Sour Rot Situation

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

Grape harvest is underway in the southern part of the state, and early varieties have been harvested in central Indiana. The recent storms and heavy rains could not have come at a worse time, especially for varieties near harvest, and tight clustered varieties such as Vignoles, Seyval Valvin muscat, etc. Excess rain causes fruit to expand as water enters the berry. Unfortunately, in many cases, the berry cannot hold all the water and something has to give. That something is usually the berry skin, which cracks under the pressure. In tight clustered varieties, the berries may squeeze each other until they burst or separate from the pedicel. Once split, the berries are open to insect pests, and various spoilage organisms such as bacteria, fungi and yeasts.

The resulting "sour rot" can be a major concern for fruit and wine quality. The most obvious symptom of sour rot is a pre-harvest decay accompanied by the smell of vinegar (aka acetic acid, or what winemakers call volatile acidity or VA). The berries usually turn a tan color, soften, and eventually break down and disintegrate. The decayed berries seldom have any noticeable fungal growth or fruiting bodies on the surface like we see with *Phomopsis*, *Botrytis* or black rot. We see sour rot almost every year, but especially in years where heavy rains occur near harvest. There has been some excellent research done in recent years by Dr. Wendy McFadden-Smith at OMAFRA in Ontario, and Dr. Wayne Wilcox, fruit pathologist at Cornell University. Here are some details on sour rot from the annual "Grape Disease Control" document by Dr. Wilcox. Real "sour rot" is caused by a combination of yeasts and bacteria. While filamentous fungi, such as Botrytis, may be associated with the rotting berries, they don't appear to be the cause. The vinegar in rotted berries is produced by acetic acid forming bacteria, mostly species of Acetobacter and Gluconobacter. Yeasts are also involved including various wild types as well as the good Saccharomyces types. Apparently the yeasts convert the sugar to ethanol then the bacteria convert the ethanol to acetic acid in a microorganismal "tag team effort." Both the yeasts and bacteria need some type of physical injury or wound to infect the plant, so birds, rain cracking, compression in tight clusters, etc. is all involved in the process.

Some interesting findings from Dr. McFadden-Smith's group is that sour rot does not become a problem until berries reach about 15 Brix. Additionally they found, not surprising, that temperature has a major effect on the rate of development, with rot developing rapidly at higher temperatures (68-77°F in their case), much more moderately at cooler temperatures (59-68°F) and hardly at all when temperatures remained in the 50s. Tough luck for those of us in Indiana. We are unlikely to see temperatures in the 50s over the next few weeks as we progress through harvest.

What is most interesting is that another group of organisms has been shown to be a key part of the sour rot equation. Research done by Megan Hall, a student in the Wilcox lab has shown that fruit flies of the Drosophila genus are a key component of the disease cycle. These can be both the normal D. melanogaster species, or the new Spotted wing variety, D. suzukii. Megan ran a few experiments where she inoculated berries in petri dishes with standard wine yeast and acetic acid bacteria, both with and without fruit flies being introduced into the dishes. Each day for five days she measured ethanol and acetic acid accumulation. What she found was that after day 4 ethanol concentration increased rapidly in the dishes without flies, but there was little additional accumulation where flies were present. Acetic acid, on the other hand, was very low in inoculated berries without flies, but ten times greater in treatments with flies. Apparently the ethanol is not being converted to acetic acid unless the flies are present, even though the bacteria are present. There is obviously more to figure out, and I'm sure Megan is working hard on the project again this year. In the meantime, we'll just have to be content in knowing that fruit flies are definitely a cause of sour rot development, not just being attracted to the rotting fruit.

So what can you do? As with most diseases there are several approaches. First and most obvious is to minimize berry injury such as cracking. Unfortunately we can't stop the rain, but other injuries such as bird pecking, berry moth, etc can be managed. Another strategy is to provide a canopy microclimate that is not conducive to disease development. Shoot thinning and positioning, leaf removal, nutrient management, and training system can all play a role. Lastly, are more directly at this stage of the season is minimizing the populations of yeasts, bacteria, and fruit flies. So let's focus on that approach.

A number of fungicides and antimicrobial sprays were tested in Ontario. Most did not have any effect on sour rot development. This is not too surprising since fungicides are designed to control filamentous fungi, not yeasts and certainly not bacteria. More recently work in New York has shown some benefit from Oxidate (hydrogen dioxide and peroxyetic acid) and Fracture (a naturally occurring seed protein from lupines, Banda de Lupinus albus doce BLAD). Both of these products are labeled for grapes and have short PHIs (0 and 1 day respectively).

What has worked best in New York is controlling fruit flies. In New York trials, they applied insecticides and antimicrobials weekly starting at 15 Brix, or as a rescue treatment at the start of symptoms. In just a single year of study so far, they got pretty good results with Oxidate, and reasonably good control with Fracture when applied with an insecticide weekly beginning at 15 Brix. The results were less impressive when applied at the beginning of symptoms, with little additional control over the insecticide alone. A key finding was that the insecticide alone had a significant effect. Severity of rot was 43% lower when insecticides were included across all their treatments, and they saw a 50% reduction in disease severity from the insecticide alone, without antimicrobials.

So what should you do? We really don't have a solid recommendation yet, but I think at the very least we should be applying insecticides to manage fruit flies. Based on the findings in New York, that should at least slow the spread. And because we have a significant threat from SWD in our region, these applications make sense. Addition of an antimicrobial such as Oxidate may be effective, but we really don't have enough data to make a recommendation. But that is an option that growers can try.

We have gained quite a bit of experience over the past two years since SWD showed up, especially with trials in red raspberries. We've found that SWD are not easy to control in berries. But grapes are much less attractive hosts, so I think we have had reasonably good success with Mustang Maxx, Delegate, and malathion in rotation. (See articles on SWD by Rick Foster in recent issues.).

I've heard from several growers since I first posted this article last week. Thanks for the updates. I've gotten some good guestions. One is, "If there are only a few berries split and rotting, and the fruit maturity still a week or two away from optimal, can I just wait and let them dry out as the rest of the fruit ripen?" The answer is "yes" that is a good strategy. I walked my plots this weekend and, despite recent insecticide applications, there was a plethora of bees, wasps, flies, and beetles happily feeding on the damaged clusters. So, with a little luck from the weather, the "wait and see" approach is certainly a viable option. On the other hand, if more rain causes additional splitting, all that insect activity is sure to spread the pathogens around, leading to more rot. So, it's a judgement call. Let's hope for a significant break from this tropical moisture pattern we've been in.

split skins and sour rot.



Seyval with split skin and sour rot.



Close up of Seyval berries showing typical skin splitting from excess rain.



Seyval cluster with bumblebee feeding on split berry.



Chardonel has thin skins and is rot prone.



Traminette grapes with

The Final Spray

(Janna L Beckerman, jbeckerm@purdue.edu, (765) 494-4628)



Harvest



Spot the rot: One rotten apple can spoil an entire bushel



Scab developed in storage

Hopefully, everyone somehow managed to obtain effective fungicide coverage during the wet summer of 2016, and the torrential rains of the last few days. Unfortunately, many of the diseases you thought you successfully battled all summer long might still show up now at harvest, and even in a few weeks post-harvest. It is important to recall that these infections happened all the way back in late June through July.

Although the weather has been hot, it has also been EXTREMELY wet, which means apple scab, the summer rots (black, white and bitter), and sooty blotch/flyspeck can still appear at harvest, or later appear in storage in what was thought as clean fruit. Depletion of fungicide residues (due to heavy rains, or waiting too long between applications, or simply trying to save a spray) and/or fungicide resistance provides allows latent infections to occur; you may not have seen it at harvest, but it can develop when fruit is stored,

and surprise you in a bad way, like a scary clown. Using a pre-harvest spray prior to the planned harvest date should provide sufficient residue to prevent pinpoint scab, summer rots and flyspeck/sooty blotch from growing after harvest. You may wish to target high value cultivars (e.g., Honeycrisp) to receive a final application of Pristine+ Captan or Merivon+Captan before harvest. These tank-mix combinations of fungicides have a 0-day PHI. Other strobilurins like Flint or Sovran, or the premix Luna Sensation have longer PHIs, and will not provide the necessary protection in storage with their longer (14d)PHI. If using captan or Merivon as that final spray, be careful if also applying Harvista or Retain, which may be applied with a 1% summer oil or 0.05% Silwet. Combinations with captan+Oil, merivon+captan+oil, and Silwet+Captan have been reported to be phytotoxic to fruit.

Harvesting fruit at the right maturity with little bruising is important in the management of postharvest rots. Cool fruit as rapidly as possible. After harvest, minimize the risk of condensation (also called 'sweat') that sometimes occurs in cold storage, as it provides both surface moisture and humidity that allows pathogens to grow by keeping apples at the optimal temperatures (30-32 degrees F). Remember: Apples respire (sweat!) and soften twice as fast at 40 degrees F than at 32 degrees F. Sweaty apples are favored by the pathogens that were present going into storage. Remember your disease triangle and recognize that you have a host with a pathogen-don't give them a favorable environment, too! There is little that can be done at this stage to latently infected apples, but symptoms can be delayed by proper storage.

Codling Moth

(Ricky E Foster, fosterre@purdue.edu)

I am still catching significant numbers of codling moths in my pheromone traps. That means that they are still mating and laying eggs on fruit. Even though you may be well into the harvest period, don't forget that those later varieties still need to be protected from codling moth. Don't forget to pay close attention to the pre-harvest intervals on whatever insecticide you choose to use.

New Pollinator Publication

(Ricky E Foster, fosterre@purdue.edu)

We just completed a new publication that will assist fruit and vegetable growers in protecting pollinators while still managing their insect pests. The title is "Protecting Pollinators in Fruit and Vegetable Production." It can be found at https://extension.entm.purdue.edu/publications/P OL-2/POL-2.html. There are two companion publications in this series, "Protecting Pollinators in Home Lawns and Landscapes" and "Protecting Pollinators: Tips for Commercial Agricultural Pesticide Applicators." Additional publications in this series will target agronomic crop producers, folks who want to plant a pollinator garden, and how youth can help to protect pollinators.

Upcoming events

(Peter M Hirst, hirst@purdue.edu, (765) 494-1323) & (Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

Northern Pecan Growers seminar: September 17th, 2016 Pecans for the Back Yard or back 40 Commercial Grove.

Scottsburg High School, (Commons room) Registration deadline August 30th 2016 Cost \$20.00 includes catered lunch, seminar and tour of USDA cooperator test grove of named and experimental cultivars in production. More information and registration:

www.vaughnfamilypecanfarm.com

Pay online or send to Vaughn Family Pecan Farm 1208 W. Craig rd, Scottsburg, In. 46170 (812)752-4929

This seminar is the first to be held in Indiana and is being advertised by a number of groups and organizations that promote planting of nut trees as an alternative crop with emphasis on Northern United States

Purdue Wine Grape Team Fall Workshop: October 6, 2016 9 am to 4 pm

Meet at the Purdue Meigs Horticulture Research Farm for registration, coffee and networking. Board bus for transfer to Purdue West Lafayette campus, Nelson Hall of Food Science for program. Lunch provided (Bring a bottle of your wine to share). Return to Meigs Farm for vineyard tour at 2:30 pm.

For more details contact Jill Blume <blume@purdue.edu> 765-494-1749 and watch for announcements in the Grape to Glass newsletter.

Indiana Horticultural Congress at the NEW LOCATION January 10-12, 2017

Indianapolis Marriott East Hotel, 7202 East 21st Street, Indianapolis, IN 46219.

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