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FACTS FOR Fancy Fruit
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In This Issue

Crop Conditions

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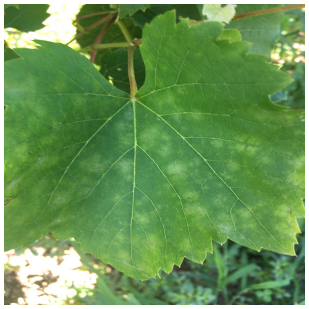
Grape harvest is underway for early and mid-season varieties. Downy and powdery mildew are showing up in vineyards. Table grapes have been especially nice this year. Primocane bramble harvest is also underway. Surprising low number of spotted wing Drosophila have been found in grapes or brambles. Frequent rains are very unwelcome as they generally have a negative effect on fruit quality in both grapes and brambles. Gala and Honey Crisp apples are being harvested. Weeds and row middle covers are growing excessively with all the recent rains.

Grape harvest is underway



Downy mildew oil spots on the upper surface of a grape leaf

Powdery mildew on the upper surface of a grape leaf

Mars seedless table grapes

Primocane fruiting blackberry harvest continues

Honey Crisp apples are being harvested

Yellows and Bitter Pit

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

Susan Brown of Cornell probably said it best: “The performance and attributes of Honeycrisp are varied and can be grouped under the heading, ‘The good, the bad, and the ugly.’ The ‘good’ refers to a great name for marketing and excellent texture, crispness, and juiciness. The ‘bad’ refers to coloring problems, appearance defects, and susceptibility to an undiagnosed leaf dis- order. The ‘ugly’ refers to bitter pit, scald, soft scald, and a tendency to ferment due to skin permeability problems.” More than 25 years after the release of Honeycrisp, we still don’t have definitive answers.

We are already experiencing numerous reports of Honeycrisp (and other apple) yellows this year (Fig. 1a,b,c). This disorder is a genetic peculiarity of Honeycrisp (and apparently a few other varieties) and is believed to be caused by excessive buildup of carbohydrates in the leaves (Snyder-Leiby and Wang, 2008). Yellowing is often most severe on trees with light crop loads (although the included pictures makes one wonder about that!). The excess carbohydrates that build-up in fruitless limbs are correlated to declining photosynthesis and leaf chlorophyll levels, turning the leaves yellow. Although disconcerting, this yellowing seems to have no detrimental effect on the trees. The occurrence is common and does not seem to impact tree health or performance.

Fig 1a. Honeycrisp yellows compared with other varieties

Figure 1b Photo by Janna Beckerman

Figure 1c Photo by Janna Beckerman

Now, let’s talk briefly about correlation and causality. Relax–It’s not that scary. Correlation between two variables indicates that changes in one variable are associated with changes in the other variable. For us, this means variable 1= crop load and variable 2= yellowing. When we have light crop loads, we associate it with ‘more’ yellowing. Keep in mind that this correlation of light crop loads DOESN’T cause the yellowing, just that they MAY be related. Sometimes these relationships are clear: For example, small dogs(variable 1) usually weigh less(variable 2) than big dogs; more torque and horsepower is associated with a more powerful engine than one with less torque and horsepower.

However, sometimes a correlation is just a correlation. For example, the rooster crows and the sun rises are positively correlated. Does the rooster cause the sun to rise? (Hint: Do not ask the

rooster—he's cocky that way.). Going back to yellowing and crop loads, to actually figure out this and other correlations, you'll need to perform more experimentation to determine that a relationship is causal instead of correlated.

Also, don't just assume that you have yellows just because it is Honeycrisp–Be sure! As always, pull out that hand lens to confirm the absence of leafhoppers. No one wants to apply any insecticide unnecessarily—at the same time, no one wants to enable an outbreak of leafhoppers from a misdiagnosis!

But what about bitter pit?
Bitter pit is a physiological disorder characterized by dark sunken lesions at or beneath the fruit surface (Fig. 2). Pits may be observed before harvest (Fig. 3), be present at harvest or, more frequently, become evident after the fruits have been placed in storage. Pits usually appear first at the blossom end of the fruit, but can be observed throughout the fruit. Conditions that favor excessive fruit size make bitter pit worse. Bitter pit has been correlated (there's that word again!) with drought, nutrient excess (magnesium, nitrogen and potassium), and nutrient deficiency (boron, calcium).

Fig. 2. Bitter pit after storage. Photo by Janna Beckerman

Fig. 3. Bitter pit developing about 2 weeks before harvest. Photo by Janna Beckerman.

Managing this problem is more complicated than just spraying x, y or z (Baugher et al. 2017). However, complicated is difficult to implement in the orchard. With that in mind, bitter pit in 'Honeycrisp' is best managed by applying high rates of CaCl2 throughout summer. Keep in mind that $CaCl_2$ sprays cannot completely control bitter pit if other factors are less than idea (e.g., crop load, thinning, fruit size, other nutritional issues). As an added bonus, hgher levels of exogenous $CaCl_2$ was found to reduce bitter rot in storage, too (Biggs and Peck, 2015).

Baugher, TA, Marini, R., Schupp, JR, and Watkins, CB. Prediction of Bitter Pit in 'Honeycrisp'

Apples and Best Management Implications. HortScience 52(10):1368–1374. 2017 https://fruit.wisc.edu/wp-content/uploads/sites/36/2017/11/Prediction-of-Bitter-Pit-in-Honeycrisp.pdf

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Atlantic United States with Foliar-applied Calcium Chloride and Some Alternatives. HortScience 25:385-91. http://horttech.ashspublications.org/content/25/3/385.full.pdf

Brown, S. Fargione, M., Merwin, I., and Rosenberger, D. 1999. What we have learned about

new apple varieties. N. Y. Fruit Quarterly 7(1): 7-11.

Snyder-Leiby and Wang, 2008. Role of Crop Load in Chloroplast Ultra-structure and Zonal

Chlorosis, a Physiological Disorder in 'Honeycrisp' Apple Trees. HORTSCIENCE 43(6):1819–1822. 2008.

For more info on Honeycrsip: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.656.5282&rep=rep1&type=pdf

Grape Harvest and Rain

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

2018 is looking a bit like 2016 with all this late summer rain. We've had statewide rainfall each of the past 5 weeks. Most unwelcome! Sour rot and Ripe rot are becoming common in our research trials

and vineyards around the state. Early ripening thin-skinned varieties are especially prone to skin splitting and cracking due to rain. Once opened, the berries are quickly invaded by yeasts, bacterial and fruit flies. Sour rot with its characteristic vinegar odor is the end result. There is nothing a grower can do to stop the rain, but there are some approaches to reducing sour rot. Canopy management is an important aspect for many varieties. Sprays of insecticide to control fruit flies plus an antimicrobial such as Oxidate or Fracture have shown some success. Best results occurred when sprays were started at 15 Brix. Sour rot is mainly a concern on the thin-skinned, tight cluster varieties such as Vignoles, Chardonel, Seyval, etc. We've also seen it this year on La Crescent, Itasca, Prairie Star and others. Tough skinned varieties like Vidal, Chambourcin, Noiret, etc. seldom experience skin splitting and thus are not prone to sour rot.

Ripe rot is a relatively new disease in our region and is most likely to occur on Marquette or Frontenac. Verona and Crimson Pearl are also showing heavy infection. I have a trial underway this year on Marquette and Frontenac. Preliminary data suggest that Abound (a.i. azoxystrobin, a FRAC 11 strobilurin) applied at veraison and again 14 days later provided excellent control. Rally and Captan applied on the same schedule have provided about 50% control, which is not commercially acceptable. Untreated control plots of Marquette have essentially 100% infected clusters so this is a real concern for growers of that variety. We'll be collecting data on Frontenac later this week and will have an update at the Fall Wine Grape Workshop in September.

Severe ripe rot and sour rot on Marquette

Ripe Rot on Marquette (untreated control)

Clean Marquette fruit (Abound treatment)

Close up of ripe rot infected berry: note sunken tan circular area with numerous fruiting bodies (acervuli) on skin surface

Harvest from control treatment: Infected clusters top, healthy clusters bottom

Harvest from Captan treatment: infected clusters top, healthy clusters bottom

Harvest from Abound treatment: infected clusters top, healthy clusters bottom

Upcoming Events

(Lori K Jolly-Brown, ljollybr@purdue.edu)

September 5, 2018 Greenhouse & Indoor Hydroponics Workshop
Purdue University, PFEN 1159 & Purdue Horticulture Greenhouse
Contact Lori Jolly-Brown ljollybr@purdue.edu
Register here: https://tinyurl.com/yaxd4k2z

September 24, 2018 Purdue Fall Winegrape Workshop
From Vineyard to Winery. Registration info and itinerary coming soon! Save the date!
Contact Jill Blume blume@purdue.edu

October 17, 2018 Indiana Flower Growers Conference
Daniel Turf Center
Contact Lori Jolly-Brown ljollybr@purdue.edu

January 8, 2019 Illiana Vegetable Growers Symposium
Teibel's Family Restaurant, Schererville, IN
Contact Liz Maynard **emaynard@purdue.edu**
https://ag.purdue.edu/hla/Extension/Pages/IVGS.aspx

February 12-14, 2019 Indiana Hort Congress Indianapolis Marriott East Indianapolis, IN
Contact Lori Jolly-Brown, **ljollybr@purdue.edu** or 765-494-1296
http://www.inhortcongress.org

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