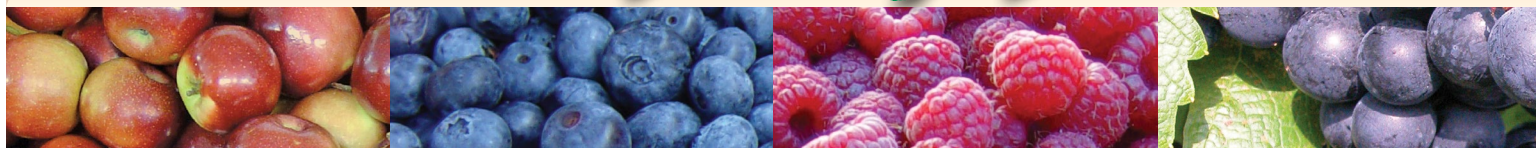


# FACTS FOR

# Fancy Fruit



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## Crop conditions

Apple harvest is in full swing, with Gala being harvested in central and southern areas. Generally fruit size is a little on the small side this year but crops are heavy and color looks good. Grape harvest is underway, red raspberry harvest continues. SWD are a major concern.

## Apple ripening

Apples are ripening well and ripening times seem to be in the same ballpark as previous years. Red color development is looking very good and probably benefitted from cool nights earlier in August, although the recent hot weather hasn't helped. Generally we expect the best red color when warm days are followed by cool nights. Many growers are enjoying a somewhat normal year after spring freezes and drought last year. Gala harvest is underway in central parts of the state. Fruit size is medium at best, and is being held back by heavy crops we are seeing around the state. Both color and quality look good. (Hirst)

## Grape ripening

Grapes have reached veraison and begun the ripening process. Harvest of early wine grape varieties has begun in the southern part of the state. As harvest nears, it is very important to monitor grape chemistry. Growers should sample weekly leading up to harvest with a protocol to collect a representative sample of fruit from the entire vineyard.

Fruit quality is comprised of several factors, the most important of which are sugars, organic acids, and pH.

Other factors such as phenolics and anthocyanins, terpenes and other aroma and flavor compounds can be very important to wine quality as well. And of course, freedom from rots is an important consideration. Unlike some other fruits, grapes do not continue to ripen after harvest. Consequently, it is important to harvest grapes at the peak of quality and with the desired parameters for the intended use.

Wine grape growers should have the ability to measure sugars (with a refractometer), titratable acidity and pH (with a pH meter and burette). Equipment and supplies to measure these parameters can be purchased for about \$500. Each of these factors is important for determining proper harvest time, but none alone can accurately estimate overall fruit quality. It is the balance of sugars, acids and juice pH that is important to the wine maker. And of course, there are the subjective qualities of seed and skin maturity, tannins, anthocyanins, flavors, aromas, etc. The Berry Sensory Analysis method addresses evaluation of these more subjective factors such as skin, pulp and seed maturity. More needs to be done to adapt the method for use with our Midwest varieties, but as a descriptive tool, it can be an excellent way for growers to go beyond the basics of sugar, acid and pH.

With wine grapes, all fruit of a given cultivar is typically harvested from the vineyard or block at a single time to coordinate winery activity and to reduce costs. It is important to plan carefully so that the harvest date coincides with the optimum fruit quality. Most vineyards have some degree of variability in soil type and drainage, sunlight exposure, wind, insect and disease pest, nutritional



status, etc. These variations can result in large differences in fruit ripeness and quality. Fruit from adjacent vines as well as from different parts of the same vine can vary. Differences are caused by variation in crop load (pounds of fruit/vine size), cluster position, shoot vigor, degree of sun exposure, and so on. Much of the variability can be reduced with proper vineyard management. A pre-harvest walk through the vineyard block should identify any clusters lagging in ripeness. In most cases, those clusters will never catch up to the rest and will only reduce the overall quality of the crop at harvest. Now is a good time to drop any undesirable fruit. Don't expect your harvest crew to sort as they pick. Go through beforehand and eliminate the guesswork. (Bordelon)

## Spotted Wing Drosophila (SWD) in grape and berry crops

One of the most recent invasive pests affecting fruit producers is the spotted wing drosophila (SWD), *Drosophila suzukii* Matsumura (Diptera: Drosophilidae). This insect is a serious pest of soft fruits such as blackberries, raspberries, blueberries, grapes, strawberries, cherries, and peaches. It can also infest apples, apricots, and tomatoes that are damaged.

There are many species of native vinegar flies that are attracted to ripe, over-ripe, or decaying fruit. SWD, on the other hand, is capable of infesting healthy fruit in the field because of the presence of a serrated ovipositor that allows the female fly to cut through the skin of many soft fruit to lay her

eggs inside. Most fruits become attractive for oviposition as they begin to turn color during ripening and sugar levels increase.



Figure 1. Spotted wing drosophila larvae inside blackberry.

This pest is apparently a native of Japan and was discovered causing serious crop injury in California in 2008. Since that time, the spotted wing drosophila has spread throughout many of the continental states. The detection in Michigan in the fall of 2010 was the first confirmation that this insect had reached the North Central region. SWD has since been found in a number of North Central states. The first confirmed record of SWD in Indiana was on October 16, 2012 in a home garden in Blackford County in east-central Indiana although we have undocumented reports of infestations earlier in 2012.

We have been monitoring the population across the state with traps this season. Throughout June and early July only a few adults were captured in traps. Over the past few weeks, however, the numbers of adults and incidence of damage to fruit has increased dramatically. SWD has been found attacking grapes and berry crops at Purdue research farms in Vincennes and Lafayette and in

commercial plantings elsewhere. SWD is attacking any berry or grape that has softened and begun to ripen.



Figure 2. Spotted wing drosophila larvae inside raspberry.

## Detection

On grape berries, look for small puncture wounds that may or may not be leaking juice. Cut open, peel, or smash the berry and look for larvae. The larvae are white and small, about the diameter of mechanical pencil lead (0.5 mm) and about 2 mm long. There may be several in each berry. In addition, look for small white larvae on the surface of berries. We have observed an abundance of larvae on the outside of berries after an insecticide was applied in research plots recently.

On raspberry and blackberry, tease open or smash the fruit carefully and look for larvae. Any overripe or soft fruit is likely to be infested. As with grapes, there can be several larvae in each berry.

## Control

Even though this is a new pest in our region, there are recommended control measures in the 2013 Midwest Small Fruit and Grape Spray Guide (<https://ag.purdue.edu/hla/Hort/Pages/>

Facts for Fancy Fruit is a newsletter for commercial and advanced amateur fruit growers. It provides timely information on pest control, production practices, and other topics likely to be of interest to fruit growers. All growers and interested persons are welcome to subscribe.

Subscriptions are \$15 per year. Subscribers will receive 12-15 issues biweekly during the growing season and monthly otherwise.

To subscribe, send your name, mailing address, and check for \$15 (payable to Purdue University) to:

Facts for Fancy Fruit  
Attn: Tammy Goodale  
Purdue University  
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This newsletter can be accessed free at [www.hort.purdue.edu/fff/](http://www.hort.purdue.edu/fff/).

[sfg\\_sprayguide.aspx](http://www.sfg.sprayguide.aspx)). Since the Spray Guide was published we have learned more about insecticide efficacy against this pest thanks to work by Rufus Isaacs at Michigan State University. ([http://www.ipm.msu.edu/invasive\\_species/spotted\\_wing\\_drosophila](http://www.ipm.msu.edu/invasive_species/spotted_wing_drosophila))

Several insecticides are registered for use on berry crops and many are effective against SWD. The table to the right lists the recommended products. It is important to consider the pre-harvest interval (PHI) when applying any pesticide close to harvest.

In our opinion, Mustang Max is the insecticide of choice due to excellent efficacy and short (1 day) PHI. It is limited to six applications per season so growers may need to rotate with another product. Delegate/Radiant would be a good alternative as it also has good efficacy and a 1-day PHI and is a different mode of action from Mustang Max.

If growers find any damage or evidence of infestation, we suggest you spray immediately to try to knock down the population. You will likely need to make a second application a few days later to kill the new adults that emerge after the initial application. For more info about SWD (See Facts for Fancy Fruit Vol 13 Issue 6, July 3, 2013 at

<http://www.hort.purdue.edu/fff/FFF13/FFF13-06.pdf> )

or view the SWD video on YouTube at <http://youtu.be/DLNDnMMfWfs> (Bordelon and Foster)

## Disease update: Preparing for harvest and postharvest

General management techniques for reducing postharvest fruit rots are important considerations as we approach harvest season. Growers are encouraged to use the infection periods posted as a tool to understand disease issues encountered in the orchard during this season.

Apples are still susceptible to disease even after they leave the orchard. This is especially

## Efficacy of insecticides for control of Spotted Wing Drosophila

Insecticide	Efficacy <sup>3</sup>	Class	PHI			
			Grape	Caneberries	Blueberry	Strawberry
Imidan	****	Organo-phosphate	7-14	---	3	---
Malathion	***	Organo-phosphate	3	1	1	---
Lannate <sup>1</sup>	***	Carbamate	---	---	3	---
Asana <sup>1</sup>	****	Pyrethroid	---	7	14	---
Brigade <sup>1</sup>	****	Pyrethroid	30	3	1	0
Mustang Max <sup>1</sup>	****	Pyrethroid	1	1	1	---
Hero <sup>1</sup>	****	Pyrethroid	30	3	1	---
Danitol <sup>1</sup>	****	Pyrethroid	21	3	3	2
Delegate/ Radiant	****	Spinosad	7	1	3	1
Entrust <sup>2</sup>	***	Spinosad	7	1	3	1
Pyganic <sup>2</sup>	**	Botanical	0	0	0	0

<sup>1</sup> Restricted Use Pesticide

<sup>2</sup> OMRI approved insecticides

<sup>3</sup> Efficacy data courtesy of Dr. Rufus Isaacs, Michigan State University

<sup>4</sup> --- = not registered on that crop



Figure 3. Left to right: Blue mold on apple; gray mold on apple; diseased fruit with debris in the bin - what not to do.

significant if your apples are headed for a packinghouse or even fresh market.

Blue mold (left photo in figure) caused by *Penicillium expansum* is the most important postharvest disease on pome fruit occurring during storage. Gray mold (center photo in figure) caused by *Botrytis cinerea* is the second most important postharvest disease on pome fruit. Blue and gray molds require a wound to cause disease and are typically not a problem during preharvest. Additional problematic

diseases popping up in storage are white rot, black rot, and bitter rot. Unlike blue and gray molds, these diseases can be a preharvest issue, and appear during storage when fungal spores land on unsuspecting fruit while still on the tree. Asymptomatic fruit appear clean when put into storage; however, a different story when they come out. Resistant tree options are not available and all apple cultivars are susceptible to these diseases.

Preharvest chemical controls are available that will help reduce storage diseases (blue mold and gray mold), as well as preharvest diseases that can also manifest in storage (bitter rot, white rot, black rot). To make sure your apples don't succumb to these diseases while in storage, Pristine and Merivon are chemical options that are labeled for diseases occurring during postharvest, in addition to the summer diseases. If possible, include one of these chemicals during your last cover spray.



## Minimizing postharvest fruit rots this season

As you're getting your orchards ready for harvest, some general management techniques to keep in mind to reduce postharvest fruit rots:

- Bruised or wounded fruit are susceptible to blue mold and gray mold. While harvesting, handle fruit carefully when picking and transferring fruit from bag to bin to avoid bruising or wounding.
- The more mature a fruit, the more susceptible it is to storage diseases. Harvest fruit at proper maturity.
- Inoculum sources for rot pathogens causing disease in storage (if already not hitching a ride on the fruit), come from plant and soil debris (right photo in figure). Use clean bins and minimize the amount of soil and plant debris brought in on bins.
- Warm temperatures encourage pathogens to grow. Keep fruit cool after harvest, i.e. keep bins in shade.
- If delivering to a packinghouse, minimize time between harvest and delivery of fruit.

## Minimizing postharvest fruit rots for next season

Although the season isn't over yet, it's good to be thinking ahead:

- Practice orchard sanitation
- Prune out cankers, dead branches, twigs, etc. which serve as inoculum sources
- Improve fruit quality through nutrient programs, such as applying calcium sprays
- Control insects that may act as vectors of diseases
- Prune for increased air flow to promote faster drying and better spray

penetration

- Ensure good spray coverage  
(Kari Peter, Penn. State University)

## Strawberry fruit bud development

Late summer is the time to fertilize strawberries fields to stimulate flower bud initiation during the fall months. Applications of 20 to 50 pounds of nitrogen per acre in mid August to September are recommended. Nitrogen rates depend upon amount supplied at renovation and plant vigor. New fields with high vigor may not need additional nitrogen now, but most older fields should benefit. Irrigation during this time is also extremely important, if rainfall has not been sufficient. We suggest about 1 inch per week. Continue to irrigate strawberries at this time to assure a good crop next year. (Bordelon)

## Brown Marmorated Stink bug

We first discovered the brown marmorated stink bug in Elkhart County in late 2010. Since that time we have been anticipating its emergence as an important pest. As most of you know, it can be a devastating pest to lots of crops including tree fruits (particularly peaches), vegetables, ornamentals, and agronomic crops. Last week, thanks to Dave Hynes, Extension Educator, we confirmed BMSB causing damage to sweet corn in a home garden. The bugs fed right through the husks on the nearly ripe kernels.



Figure 4. Corn damage from brown marmorated stink bug in Clark County.



Figure 5. Brown marmorated stink bug life stages.



Figure 6. Brown marmorated stink bug life stages.







Figure 7. Insect top.



Figure 8. Insect bottom.

I believe that this is really just the beginning of serious problems from this pest in the future. Right now, I suggest that fruit growers be on the lookout for BMSB attacking their crops this fall. It's unlikely to be a serious problem this year, but I've been surprised before. (Foster)

<b>Current bud stages West Lafayette, IN</b>	
<b>Apple</b>	<b>Blackberry</b>
	
<i>Harvest of Buckeye Gala starting</i>	<i>at harvest</i>
<b>Grape</b>	<b>Raspberry</b>
	
<i>at harvest</i>	<i>at harvest</i>

## Apples available from Purdue

At the Purdue Meigs farm, we have over 2000 apple trees in the ground. Most of the fruit produced is used in some way by our research programs but from time to time we have excess fruit. We like to make this available to growers where this is feasible. Generally growers would need to come and harvest the fruit and transport it. We gratefully receive donations to help support our programs. If you would like to be on the email list to be notified when we have fruit available, please email me ([hirst@purdue.edu](mailto:hirst@purdue.edu)) and I'll add you to the list. (Hirst)

## Purdue agriculture ranked sixth in the world

A British company that specializes in information about higher education and careers has ranked the Purdue College of

Agriculture sixth among agricultural institutions worldwide.

Quacquarelli Symonds ranks learning institutions across the globe in 31 categories based on several metrics.

"This ranking is testimony to the hard work of College of Agriculture faculty, staff and students and the support we receive from the University, stakeholders, partners, and alumni," said Jay Akridge, Glenn W. Sample Dean of Purdue Agriculture. "We are committed to providing an exceptional education for our students and to high-impact discovery and engagement that addresses society's most important challenges. Recognitions such as this QS ranking illustrate the impact our people have."

Universities are ranked based on four main criteria: the number of times research publications from the institution were cited by

other researchers in professional journals; the opinions of other academics in the field; the opinions of employers in the field; and the "H-index," a quantitative and qualitative measurement of research paper output.

The group selected the University of California—Davis as the top school in the agriculture and forestry category for 2013. Rounding out the top five places were, in order, Wageningen University in the Netherlands, Cornell University, the University of Wisconsin—Madison and Texas A&M University.

Other U.S. universities that made the top 25 include Oregon State (8), Penn State (9), Iowa State (10), North Carolina State (14), Michigan State (16), Illinois (17), Florida (23) and Colorado State (24).

(Source: Purdue Connections, <http://www.agriculture.purdue.edu/connections>)

## Upcoming events

September 18, 2013.

Viticulture, Enology and Wine Marketing for Tasting Room Managers. Purdue Meigs Farm. 9:00am - 5:00pm EST. This one day workshop is designed for tasting room staff and managers in the commercial wine industry or those in the initial steps of planning a tasting room. Due to limited class size, advance registration is required! To register or for more information contact Jill Blume, [blume@purdue.edu](mailto:blume@purdue.edu) or 765-494-1749.

January 7, 2014.

Illiana Vegetable Growers Symposium. The meeting will be held from 8:00 - 4:00 Central time at Teibel's Restaurant in Schererville, IN. Registration and additional info will be available in early December at <https://www2.ag.purdue.edu/hla/fruitveg> under "Events" or by phoning, 219-531-4200 x4201.

January, 21-23, 2014.

Indiana Horticultural Congress and Trade Show, Wyndham Indianapolis West, Indianapolis, IN.  
<http://www.inhortcongress.org>





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