PURDUE UNIVERSITY
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FACTS FOR Fancy Fruit
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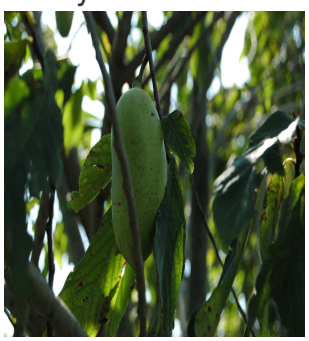
In This Issue

Crop Conditions

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

Blackberry- harvest continues



PawPaw- harvest continues

Raspberry- harvest continues

Grape- harvest underway

Apple- harvest underway

Indiana Climate and Weather Report

(Beth Hall, hall556@purdue.edu)

The initial cool wave of September is likely over as we welcome warmer temperatures for the next several weeks. The Climate Prediction

Center is showing strong confidence for above-normal temperatures through September 24rd, which should help accumulate growing degree days and move agricultural production further along.

Outlooks are showing significant probabilities for above-normal precipitation over the next few weeks, but it is uncertain how much and when that precipitation will occur. The 3-month (September-November) climate outlook is indicating significant probabilities for above-normal temperatures.

This will hopefully discourage any cold waves passing through from causing an earlier-than-desired hard freeze event. However, keep in mind that predictions are still too far in the future to provide any certainty and climate outlooks are unable to account for a brief (1-to-3-day) event from passing through with temperatures low enough to cause a frost. Primary message: still too soon to predict when the first fall frost will occur.

Beth Hall, PhD
Director, Indiana State Climate Office

Rootstocks, Replant, and Reconsiderations

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

Rootstocks, Replant, and Reconsiderations

Replant disease is a term that describes reduced productivity and 'failure to thrive' of new plantings of trees back into orchards of the same or closely related tree fruit (or nut) crops. Historically, it has been referred to as 'soil sickness, soil exhaustion, replant disorder, and replant problem'. Regardless of name, replant disease is a complex interaction of abiotic factors (loss of soil fertility, residual herbicides, other residual pesticides), fungal pathogens like *Rhizoctonia* and *Cylindrocarpon*, along with the oomycetes *Pythium spp*. and *Phytophthora spp*. along with the nematodes like *Pratylenchus penetrans* (Fig. 1).

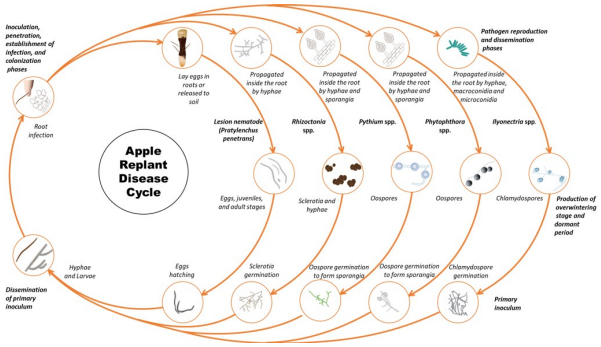


Figure 1 Apple replant disease cycle. Illustration credit: Indika Ratnayake from http://treefruit.wsu.edu/crop-protection/disease-management/apple-replant-disease

Rootstock selection literally and figuratively sets the foundation for grower viability and success, and is just as important as the choice of fruiting cultivar. Rootstocks impact disease resistance (and pesticide inputs), fruit size and yield, tree vigor (including precocity and productivity), and winter hardiness. This is the type of long-term research that both the Land Grant University and USDA-ARS were created for, to improve the health of orchard systems, and the sustainability of tree fruit production.

From this collaboration, several new rootstocks were selected, bred, and developed. Of these, G. 935 is considered to be "a very reliable, replant-tolerant rootstock." Although lacking in woolly aphid resistance, it's posited as a heavy cropper with good winter hardiness in a tree with size and vigor somewhere between M.26 and M.9. There are replicated trials and data to support these contentions (Russo et al. 2007), and 'results demonstrate the ability of new rootstock clones to perform better than current commercial standards, reducing financial risk to producers while promoting orchard health with enhanced

disease resistance.'

Unfortunately, around 2015 (Auvil,201X) growers were warned that "high yields from these rootstocks can cause the scion to slide off the rootstock, especially when the trellis fails." In 2018, we planted Rosalee with a vertical, 3-wire trellis. To date, we've lost…, and continue to lose despite increasing the trellis lines to 4. Obviously, slipping from the rootstock doesn't reduce grower financial risk! It also doesn't explain our experience with this rootstock and the cultivar 'Rosalee', which is sliding off the rootstock even without fruit on the tree. So, what is going on? Why is the published data so different from our reality? And what is a grower to do?

To begin with, I think we need to recognize that it's much easier to get a ***result*** than an ***answer.*** The results published in 2007 were just one of many temporary truths, which is why agricultural scientists repeat experiments in different locations, and with different combinations (in this case, site, scion, rootstock, time). These different situations result in outcomes that are subject to change when the new data is added to previous information. In this way, I think we can identify and acknowledge a problem with science: In the beginning of any study, there is a lot of uncertainty. It takes very little data to yield a large reduction in that uncertainty. In this case, the 2007 article reported experiments that involved three rootstocks and scion combinations in two sites and yielded a data that suggested that these rootstocks were better than B.9 and M. 26. There have been other rootstock trials across the country (you can read about the NC-140 Regional Rootstock Research Project at http://www.nc140.org/plantings.html). Many but not all of these studies showed improved outcomes with the new rootstocks. However, as studies continued, not everyone saw the same results. Unfortunately, these subsequent studies never get the coverage of the first studies (which is true about everything!).

Worse still, many growers are getting results that conflict with previous answers, and losing money in the process. So, the choice facing growers regarding which rootstock to use comes down to **risk**. Risk is simply defined as the uncertainty about the outcome, in this case, using a new rootstock **on their site.** Although an increasing amount of data is available (with noisy, conflicting results!), it isn't available for your specific site, nor was it available for our scion-rootstock combination. For this reason, I recommend caution when using choosing new rootstocks, as your mileage may vary, and the more uncertainty (risk) you have about the outcome. Start small before investing in hundreds of rootstock scion combinations you haven't tested at your site so you don't lose thousands of trees (Courtney, 2017).

As for our block of Rosalee/G.935, the reasons for our rootstock failures are not clear, although everyone seems to have hypotheses regarding why. Few people (including me!) have data to support their claims. At this point, I feel safe in saying the incredibly obvious: Certain combinations of scion and G.935 (or G. 41) are prone to failure, and these include Rosalee and Royal Red Honeycrisp. Until more is known, growers should only use known combinations (like Gala and Fuji) with G. 935, and implement and maintain a trellis system when planting them. When considering new combinations, do a small-scale test to see how the combination performs at your location.

Hopefully, no one is swearing at the scientists and their statistics. It's important to remember that it's easier to lie without statistics than it is to lie with them. Data and the appropriate statistics provide and enforce boundaries. Unfortunately, people (including scientists) like to extrapolate

from the data they have, despite the boundaries that data provides. What we've learned is that "It is better to take many small steps in the right direction than to make a great leap forward only to stumble backward."

All trees showed a similar pattern of breakage between the G. 935 rootstock and Rosalee scion.

Losses continue in year 2 and increasing trellis lines from three to four.

Auvil, T. 2017. Geneva Rootstock Performance: 2016 Rootstock Trial Update. Available online at: http://treefruit.wsu.edu/article/geneva-rootstock-performance-2016-rootstock-trial-update/ Last accessed 9/3/2019.

Courtney, R. 2017. Problematic pairings with Geneva 935. The Good Fruit Grower. January 1st 2017 Issue. Available at: https://www.goodfruit.com/problematic-pairings-with-geneva-935/

Hewavitharana, S. et al. 201X. Apple Replant Disease. Available online at: http://treefruit.wsu.edu/crop-protection/disease-management/apple-replant-disease/. Last accessed 9/3/2019.

Mazzola, M. 1997. Identification and pathogenicity of Rhizoctonia spp. isolated from apple roots and orchard soils. Phytopathology 87:582-587.

Mazzola, M., and Brown, J. 2010. Efficacy of brassicaceous seed meal formulations for the control of apple replant disease in conventional and organic production systems. Plant Dis. 94:835-842.

Russo, N., Robinson, T., Fazio, G. and Aldwinckle, H. 2007. Field evaluation of 64 apple rootstocks for orchard performance and fire blight resistance. HortScience 42:1517- 1525.

Sixth annual Great Lakes Great Apple Crunch

(Peter M Hirst, hirst@purdue.edu, (765) 494-1323)

Join participants across Indiana, and the greater-Midwest on Thursday, October 10, 2019, for the sixth annual Great Lakes Great Apple Crunch! Or, host your Crunch ***any day and time*** *in October that works for you. Register below to receive the 2019 Apple Crunch Guide and stickers! The Great Lakes Great Apple Crunch is a great way for schools, early care sites, business campuses, hospitals, farmers and others to celebrate local farmers and purchase Indiana-grown apples! Participants of all ages and at all organizations are invited to help us reach our goal of 1.7 MILLION CRUNCHES this year!*
https://www.cias.wisc.edu/applecrunch/

Lafayette-area corn maze themed for Purdue's 'Giant Leaps' wins USA Today contest

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Get the story here!

Lafayette-area corn maze themed for Purdue's 'Giant Leaps' wins USA Today contest

HLA Extension Events

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

September 5, 2019 Hydroponics & Greenhouse workshop
Purdue University, Deans auditorium, HLA greenhouse
Contact Lori Jolly-Brown, ljollybr@purdue.edu
Participants learned about optimal conditions for growing hydroponic lettuce, including nutrient recipes, production systems, artificial lighting practices and optimal temperatures for lettuce. Workshop attendees had the opportunity to tour the department's greenhouse and hydroponic facilities where several hands-on activities took place. Krishna Nemali, professor of controlled environment agriculture, lead the workshop. Event comprised of both classroom style presentations by Drs. Petrus Langenhoven, Laura Ingwell and Krishna Nemali and hands-on training sessions organized by Alex Miller, Juliana Brustolin, Yuyao Kong, Alex Rodriguez, and Ranjeta Adhikari (students and postdoc). A big thanks to Lori Jolly-Brown for organizing the event and working behind the scenes to make it a grand success! The event was attended by nearly 80 people.

October 17, 2019 Indiana Flower Growers association conference
Registration now open!
Purdue University, Daniel Turf Center
Contact Lori Jolly-Brown, ljollybr@purdue.edu
Horticulturists and greenhouse operators will have an opportunity to network with industry experts and Purdue Extension specialists. Educational sessions to include technology and automation, electrical conductivity sensors, marketplace opportunities, greenhouse production, worker production standards, as well as networking with other flower growers across the state.

January 7, 2020 Illiana Vegetable Growers Symposium
Teibel's Family Restaurant, 1775 US 41, US 30 & US 41, Schererville, IN
https://ag.purdue.edu/hla/Extension/Pages/IVGS.aspx

February 11-13, 2020 Indiana Horticultural Conference & Expo
Indianapolis Marriott East Hotel:
Contact Lori Jolly-Brown, ljollybr@purdue.edu
https://www.inhortcongress.org/
The Indiana Horticultural Conference & Expo, presented by Purdue University, is an educational meeting designed to meet the needs of fruit, vegetable, wine, organics, greenhouse, high tunnel, specialty crop growers and marketers in Indiana and surrounding states. Over 500 registrants and more than 70 vendors attend each year.

February 11-13, 2020 Indiana Green Expo
Indiana Convention Center, Indianapolis, IN
Indiana's largest, most comprehensive green industry event of the year!
Offering over 75 educational seminars plus a Spanish track, certification opportunities, in-depth workshops, numerous CEUs and CCHs to be earned, and a two-day trade show!

July 30, 2020 Small Farm Education Field Day
Daniel Turf Center, Purdue Student Farm
Contact Lori Jolly-Brown, ljollybr@purdue.edu

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