Supporting Fruit Production

OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

FEBRUARY 2021

An Overview of Fruit Disease Diagnostics in 2020

By Melanie Lewis Ivey- Assistant Professor, Extension Fruit Pathologist Department of Plant Pathology

This year the fruit diagnostic program ran differently because of the Covid-19 pandemic. The state of emergency declared by the university in early March reduced the activities allowed on campus. However, the diagnostic program was recognized as an essential service to commercial growers and was exempted in early April. To accommodate the many restrictions put in place by the university we took a digital first approach to diagnostics. We requested that clients send digital images first and if we were unable to diagnose the problem, we arranged for a contactless sample drop-off.

From April to December, we received 62 (41 physical and 21 electronic) samples. This represented a 24% reduction in the number of samples processed during the same period in 2019. Including grape, 29% of the samples were small fruit, 53% tree fruit, and 18% hop or nut (Figure 1). Samples were received from 28 counties in Ohio (Figure 2). Samples from Oregon and Indiana were also processed.

Among all the samples (Table 1), 20% had abiotic injuries such as chemical damage, winter stress, or root asphyxiation, 8% were insect related injuries, and 11% of the samples had injuries or symptoms that could not be identified. Two samples (3%) were healthy and exhibited typical phenotypic traits for the variety.

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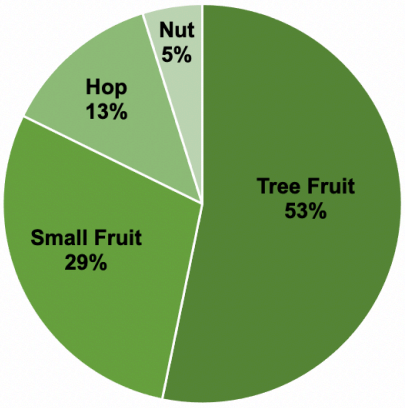

Figure 1. Percent of samples submitted to the Fruit Pathology Program in 2020 that were small fruit, tree, fruit, hop and nut.

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Does Investing in the Intelligent Sprayer Make Economic Sense?

By Nieyan Cheng and Wendong Zhang- Iowa State University

** This article was first published as a blog on the Smart Apple Spray website.*

Conventional airblast sprayers operate in continuous spray mode, so they can't adjust sprayer flow rate in real time to match canopy conditions. For apple growers, this familiar type of sprayer can do a good job of controlling diseases and insect pests, but it wastes pesticide because much of what goes out the nozzles never hits the target.

The Smarter Spraying for Apples project is testing a new type of airblast sprayer called the Intelligent Sprayer. It uses lasers to help it "see" where the trees are and how dense the canopy is, then adjusts the spray nozzles to aim the spray accurately. Field trials have shown savings of 30 to 80% on the volume of pesticide applied – without compromising on pest and disease control. Another plus for Intelligent Sprayers is that they are commercially available; in fact, you can have your standard airblast sprayer converted to use Intelligent Sprayer technology. But this makeover doesn't come cheaply. To figure out when, where, and how Intelligent Sprayers can be profitable, we're taking a close look at the money side.

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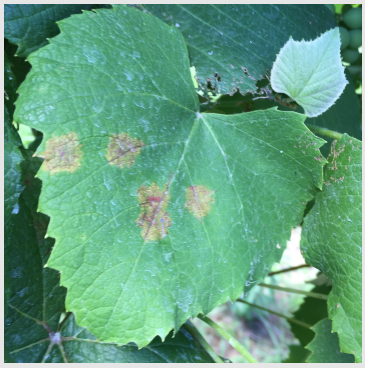
Grower's Corner

Is it ok to mow grapevine cuttings in the vineyard?

Rarely will a plant pathologist encourage a producer to leave plant cuttings (debris) in a commercial planting. Many plant pathogens can overwinter on plant debris and overtime pathogen population levels can reach a point where even the best chemical spray program won't be effective. This is especially true for grape anthracnose and downy mildew. By removing the plant debris, the risk of an in-season or next-season outbreak is reduced.

Ideally the plant debris would be removed and either burned or put in the trash. While the debris can be composted the composting process must be done precisely so that adequate temperatures are reached to kill the pathogens. Chopping plant debris into small pieces using a flail mower speeds up the rate of decomposition, but decomposition can take several weeks to a couple of months, depending on the weather and how fine the debris is chopped. During the growing season this may not be fast enough! I've always wondered if flailing followed by an application of urea would be effective in the fall, like what apple growers do to manage scab outbreaks in the spring, but the viticulturalists I have talked with think that it would be too much nitrogen input for the vines. Perhaps this is a future research study?



The pathogen that causes grape downy mildew, *Plasmopara viticola*, overwinters as specialized structures (oospores) in leaves.

This question was from a grape producer in Minnesota (Courtesy of Annie Klodd Extension Educator - Fruit and Vegetable Production, University of Minnesota Extension).

Fruit disease diagnostics continued from page 1

Undetermined hop and peach samples exhibited virus-like symptoms but tested negative for common viruses associated with these crops.

Most fruit tree samples were from apple. Like 2019, fruit rots, including black rot, white rot and bitter rot were frequently diagnosed. Marssonina leaf blotch (MLB) of apple, caused by *Marssonina caronaria*, was identified for the first time in Ohio. The disease is a minor problem of apple as it is easily controlled using fungicides. However, in wet years, fungicides can be washed off, resulting in an outbreak (See December OFN for more information on MLB).

Among the small fruit samples, blackberry and grape samples represented over half the samples. Diseases caused by fungi were the most diagnosed among the small fruit samples.

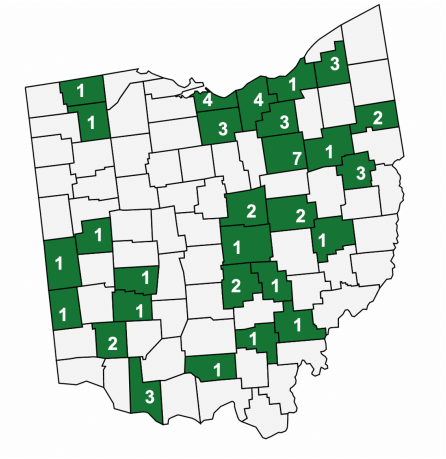


Figure 2. Number of samples for disease diagnoses processed by The Ohio State University-Wooster Campus, Fruit Pathology Program in 2020, by Ohio county.

Table 1. Diseases, abiotic disorders, and insect pests diagnosed on fruit, hop and nut samples submitted to the Fruit Pathology Program in 2020

Crop (number of samples)	Diagnoses
Fruit Tree	
Apple (27)	• Normal plant physiology (leaf yellowing on HoneyCrisp) • Abiotic-SAD or root asphyxiation • Abiotic-chemical injury • Crown gall • Bitter rot • Abiotic-drought stress • Black stem borer • Apple scab • Cedar apple rust • Sooty blotch and flyspeck • Black rot • Frogeye leaf spot • Marssonina leaf blotch • Abiotic- possibly winter stress or drought • White rot
Cherry (2)	• Abiotic-root asphyxiation • Brown rot
Peach (2)	• Peach leaf curl • Undetermined (virus-like symptoms)
Plum (2)	• Bacterial spot • Black stem borer

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Fruit disease diagnostics continued from page 3

While we received eight hop samples, we were only able to provide a confirmed diagnosis for three of the samples and only one sample was diseased (Fusarium canker). For the three nut crops Glomerella twig blight of chestnut and bacterial spot of black walnut were diagnosed.

Table 1. Diseases, abiotic disorders, and insect pests diagnosed on fruit, hop and nut samples submitted to the Fruit Pathology Program in 2020

Crop (number of samples)	Diagnoses
Small Fruit	
Grape (6)	• Normal plant physiology (leaf hairs on Concord) • Abiotic-Chemical (Captan) and ozone injury • Anthracnose (foliar and berries) • Powdery mildew on berries • Grape leaf roll associated virus
Blackberry (4)	• Botrytis grey mold • Leaf rust (out-of-state) • Abiotic-sunscald • Red-necked cane borer • Undetermined (virus-like symptoms)
Raspberry (3)	• Abiotic-chemical injury • Undetermined • Phytophthora root rot
Blueberry (2)	• Phytophthora root rot • Anthracnose (ripe) fruit rot
Elderberry (1)	• Elder shoot borer
Strawberry (2)	• Botrytis grey mold • Leaf blight, scorch and spot
Other crops	
Hop (8)	• Undetermined (decayed samples) • Fusarium stem canker
Nut (3)	• Bacterial spot (black walnut) • Glomerella twig blight (chestnut)

The Fruit Pathology Laboratory will diagnose small fruit, tree fruit, tree nuts, and hop samples at no cost to **commercial** growers. Physical or digital samples are accepted. This free service is supported by the Ohio Vegetable and Small Fruit Research Development Program and the Department of Plant Pathology, The Ohio State University.

Ready for Cicadas in Southwestern Ohio?

By Celeste Welty – Associate Professor, Extension Entomologist, Department of Entomology

Fruit growers in the southwestern quadrant of Ohio, especially around Cincinnati, should expect to see and hear the periodical cicada in 2021, and need to be prepared to prevent damage to fruit crops by this pest. Last seen and heard in 2004, this brood has spent 17 years developing underground, with emergence expected mostly in the last 2 weeks of May but likely to linger through early July.

The adult cicadas (Figure 1) injure woody stems of fruit crops by egg laying. The adult female cicada makes a series of slits in woody stems then inserts an egg into each slit. They prefer to lay eggs in woody They prefer to lay eggs in woody stems that are ¼ to ½ inch in diameter, which is a commonly found in young apple and peach trees and in blueberry, grape, and raspberry plants. Terminal leaf clusters usually wilt and die on stems that are injured, leading to a tree with 'flagging' symptoms of drooping dead branch tips.

Figure 1. An adult of the periodical cicada.

The adults live for 2 to 4 weeks. Eggs take 6 to 10 weeks to hatch. The eggs hatch into nymphs that are about the size and shape of a grain of rice. The nymphs drop to the ground and burrow into the soil in late summer.

Fruit growers in affected areas should avoid planting new nursery stock this spring; wait until autumn or next spring. Mechanical control in existing plantings can be done by ¼ to ½-inch netting to exclude the cicadas (sample product: www.industrialnetting.com/applications/lawn-garden/cicada-netting.html). Injured stems can be pruned and destroyed before eggs hatch.

Orchards should be scouted frequently to look for the start of egg-laying injury, starting one week after the cicada calling begins. Chemical control can be used by applying insecticide, starting when egg laying begins and, if needed, repeated 7 to 10 days later. Insecticides that are effective and have cicadas listed as a target pest on the label are Asana (esfenvalerate), Warrior (lambda-cyhalothrin), Proaxis (gamma-cyhalothrin), Baythroid (cyfluthrin), Danitol (fenpropathrin), and Delta Gold (deltamethrin), which are all restricted-use products. Beware that these products are in the pyrethroid group of insecticides, which are known to be harsh on some natural enemies, and thus the use of pyrethroids for cicada control can lead to flare-ups of spider mites, San Jose scale, and woolly apple aphid. Also effective for cicada control is Sevin (carbaryl), which is not restricted use, but it should be used with caution during 30 days after bloom due to fruit thinning effects. Insecticides known to be effective for cicada control, but which do not have cicadas listed as a target pest on the label are Mustang Maxx, Brigade, Lannate, and Vydate, as well as the pre-mixes Hero and Gladiator; these are all restricted use products. Assail is not restricted use and is known to have some activity on cicadas. Danitol, Brigade, and Hero have broader activity than other pyrethroids and can kill spider mites but only if used at the maximum labeled rate.

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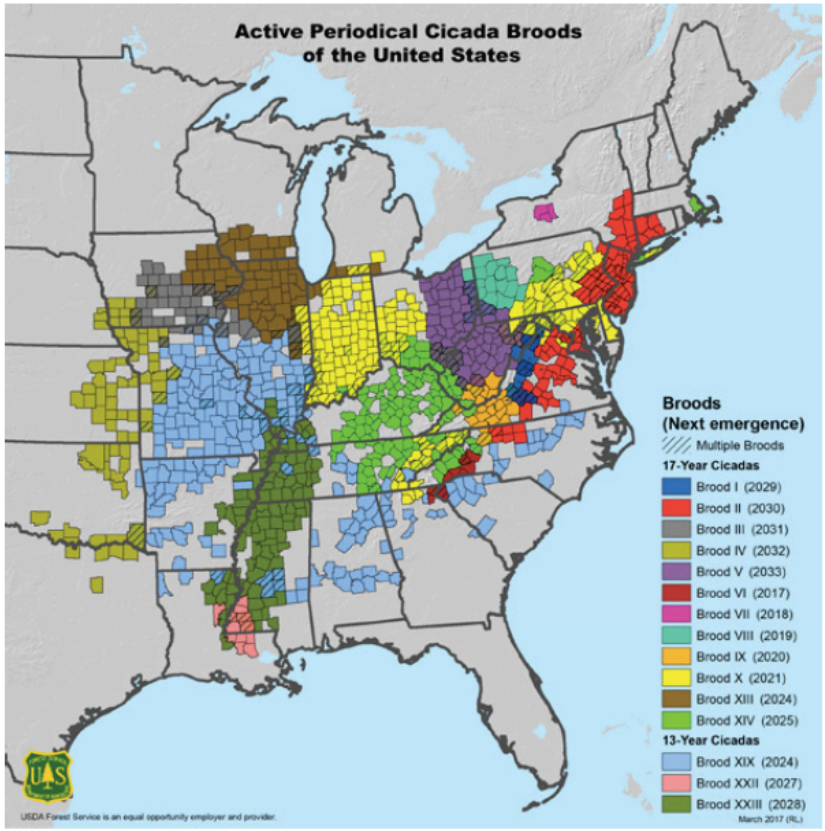
Cicadas continued from page 5

An alternative chemical approach is to use imidacloprid as a soil drench. The label for Admire Pro, which has imidacloprid as the active ingredient, does include treatment to the soil around apple and peach trees, for control of aphids and leafhoppers, applied by chemigation into the root zone by drip irrigation or similar methods, with a 21-day pre-harvest interval. The label does not include periodical cicada on the list of target pests, however it has been shown that this chemical is effective for control of periodical cicada on ornamental trees, so it is likely to be effective on fruit trees. Keep in mind that when imidacloprid is applied to the soil, it acts as a true systemic and it taken up by the roots to the stems and leaves of the canopy, where it is active for anywhere from two to four weeks. When imidacloprid is applied as a spray to the leaves, it does not act as a true systemic, but it has translaminar movement, which means it can move from the top of the leaf to the bottom of the leaf and inside the leaf, but it will not move down the stem to other branches or to the roots. When applied as a spray, imidacloprid is active for a shorter time, for about 10-14 days, than when applied to soil.

In addition to the physical injury to fruit plants, this insect is a nuisance pest to humans due to its large size, its presence in extremely large numbers, and the loud mating call of the male cicadas.



(Forest Service map by A. M. Liebhold, M. J. Bohne, R. L. Lilja)

Figure 2. Area shaded in yellow is where brood X of the periodical cicada is expected to emerge in 2021 (from USDA Forest Service, Pest Alert: Periodical Cicadas, https://www.fs.usda.gov/naspf/sites/default/files/publications/cicada.pdf).

A map of the area where cicada emergence is expected in 2021 is shown in Figure 2. A map of all known broods of periodical cicada in Ohio is shown in Figure 3. Although many counties in southwestern Ohio are in the known zone of brood X, cicadas are not known to be abundant in areas other than the Cincinnati area. For anyone with interest in reporting locations of emergence, there is an app called 'Cicada Safari' that is available for iOS and Android devices. It is interesting that most of the cicada broods do emerge as expected 17 years after the previous emergence, but if they are off-schedule, it is usually by 4 years, usually 4 years early. Excellent information about the biology and behavior of cicadas can be found at the cicada mania website: https://www.cicadamania.com/ .

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Cicadas Continued from page 6

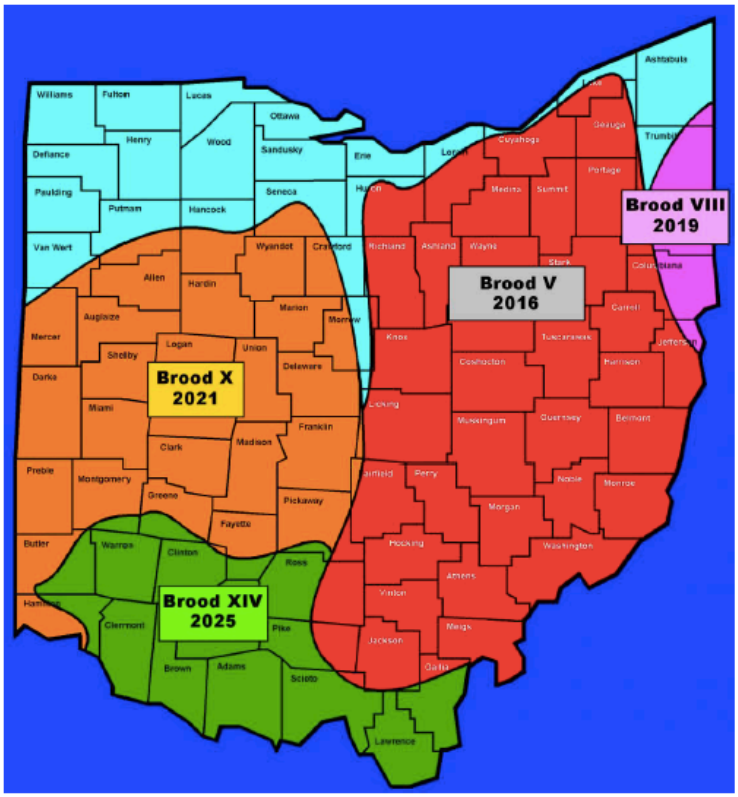
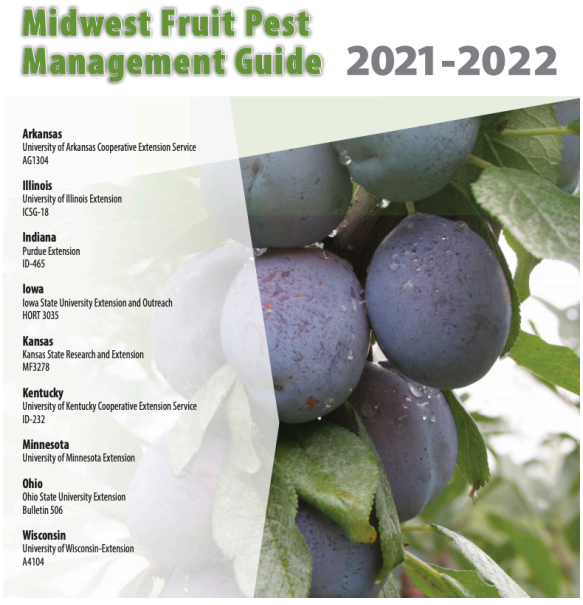


Figure 3. Area shaded in orange is where brood X of the periodical cicada is expected to emerge in 2021 (from Periodical and "Dog-Day" Cicadas, OSU extension Fact Sheet ENT-58, by David J. Shetlar and Jennifer E. Andon, 2015; https://ohioline.osu.edu/factsheet/ENT-58).

2021 - 2022 Fruit Pest Management Guide-What is New?

By Melanie Lewis Ivey- Assistant Professor, Extension Fruit Pathologist Department of Plant Pathology

You probably noticed that in 2020 we did not publish an updated Midwest Fruit Pest Management Guide (although updates were added to the on-line version). This was because the Midwest Fruit IPM Working Group spent 2020 working on a new format for the guide. The new format is driven by a database and will allow the group to develop a mobile-friendly version of the guide. The printed copy of the guide will continue to be revised every other year, with critical updates/corrections made in real-time to the on-line version of the guide.



For the 2021-2022 publication changes were made to the apple and grape sections only. The new format provides users with same information as previous guides but is more concise and in our opinion easier to understand. Over the next two years we will transition the other crops in the guide to this format.

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The grape and apple sections now include charts displaying pest emergence by stage and tables that incorporate product efficacy, REI, and PHI into the spray charts. **The new charts (Figure 1) allow users to make side by side comparisons of products for efficacy and target pests throughout the crop season!** Instructions on how to make the most of the new charts are also included.

We welcome your comments, criticisms and suggestions on the newly formatted apple and grape sections. A short on-line survey has been set-up to collect your feedback. Even if you don't grow apples or grapes, we appreciate your feedback to improve the new layout design and its usefulness and effectiveness. The new layout for apple and grape will be applied to the remaining crops in the 2022 guide.

You can access the survey by scanning the QR Code on the right or you can click here. If you don't have access to the internet and want to give us your feedback you can call an OSU Extension Specialist or your county Extension office. We will record and submit your feedback.

SCAN ME

Effectiveness of Fungicides for Control of Apple Diseases – Green Tip through Half-Inch Green[1]

Product and formulation Active ingredient	FRAC[2]	Powdery mildew	Scab	REI[3] PHI[4]	Max amt[5] Max app[6]
Captan 80 WDG	M3	x	G	24h	40 lb
captan				0d	NA
Cuprofix Ultra 40 Disperss	M	x	G-F	12h	NA
copper hydroxide				NA	NA
Ferbam Granulfo (76WDG)	M	x	F	24h	NA
ferbam				NA	3
Kocide 3000	M	x	G-F	48h	53.3 lb.
copper hydroxide				0d	NA
Microthiol Disperss	M	G	i-F	24h	NA
sulfur				0d	NA
Polyram 80 DF	M3	x	G	24h	21 lb.
metiran				77d	7
Roper DF rainshield	M	i	G	24h	21 lb.
mancozeb				77d	6
Scala SC	9	x	E-G	12h	40 fl. oz.
pyrimethanil				72d	NA
Vangard WG	9	x	G	12h	30 oz.
cyprodinil				0d	2
Ziram 76DF	M3	x	G	48h	42.4 lb.
ziram				14d	7

E = excellent control **G** = good control **F** = fair control **[r]** = fungicide/Insecticide resistance possible **s** = suppression only **i** = ineffective **u** = unknown efficacy
x = pest not on the label

Figure 1. Example of the new chart format in the Midwest Fruit Pest management Guide that allow users to make side by side comparisons of products for efficacy and target pests. Table layout and database development was supported by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center (2018-70006-28883).

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As with all pesticide spray guides, the recommendations for product usage (i.e., rate, PHI, REI, number of applications) are based on information provided in the product label. Remember, **the label is the law!**

How to get a copy of the 2021 – 2022 Midwest Fruit Pest Management Guide?

Download for free. To download a free digital copy of the 2021-2022 guide, click here (go.osu.edu/2021fruitpestguide).

Purchase from Purdue Website. A Print copy can be purchased directly from Purdue University at a cost of $15 (plus shipping) per copy.

Purchase from OSU. Print copies can be purchased directly from OSU at a cost of $15 per copy. There is no charge for shipping. Due to state mandated COVID-19 restrictions in-person pick-ups are not permitted at this time.

You can request a print copy of the guide by contacting your county OSU Extension office or Dr. Melanie Lewis Ivey (ivey.14@osu.edu; 330-263-3849). Cheques should be made out to "The Ohio State University" and mailed to Melanie Ivey, Department of Plant Pathology, 1680 Madison Avenue, Wooster, OH 44691. *Please do not send cash through the mail.*

Bines to Steins Webinar Series to be Held in 2021

By Brad Bergefurd - Extension Educator, Horticulture Specialist

The Ohio Hop Growers Guild (OHGG) is excited to announce, ***Bines to Steins - ONLINE***, a new 6-part series of timely educational webinars to get Ohio Hop Growers Guild members and growers ready for the 2021 hop season. Webinars will feature monthly topics and answer grower questions in real-time. Everything will be covered- from preparing the hop yard through post-harvest, and everything in between! This series is free to all current OHGG Members. To learn about becoming a guild member click here or email ohiohopgrowersguild@gmail.com.

This educational webinar series is organized by the board of directors of the Ohio Hop Growers Guild, a not-for-profit organization, whose mission it is to unify, grow, educate and protect the Ohio hops growing community, to increase sales of Ohio grown hops through promotions, marketing, public and industry awareness, and to monitor and assure a sustainable hops industry within the state of Ohio.

OHIO HOP GROWERS GUILD

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2021 Midwest Fruit Pest Management Guide Continued from page 8

The series will be kicked-off with our OHGG Annual Meeting with keynote speakers James Altwies and Gregg Baimel, from the popular Hopnology podcast! The remaining webinars will be held on the last Thursday of each month from 7-8 pm.

Bines to Steins – ONLINE Schedule

February 21, 4pm:	James Altwies and Gregg Baimel, Hopnology podcasters
February 25, 7pm:	Phenology and Record Keeping, Denise Ellsworth- OSU
March 25, 7pm:	Pruning and Training and Weed Management (TBD)
April 29, 7pm:	Disease Management and Pesticide Labels- Brad Bergefurd- OSU
May 27, 7pm:	Insect Management (Jim Jasinkski-OSU) and Fertilization (TBD)
June 24, 7pm:	Harvest Timing and Drying (TBD)

Intelligent Sprayer-Does it make economic sense? Continued from page 2

As the economists on this project, we'll total up the costs and benefits of converting to an Intelligent Sprayer, using both **partial budget analysis** and a **techno-economic model**. We already have experience figuring out cost-efficiency of disease-warning systems for Midwest apple production. This time, we'll use the Intelligent Sprayer with and without disease-warning systems so we can see the financial projections from using each technology alone as well as together. The kind of savings we think we'll see from using an Intelligent Sprayer differ from savings using a disease-warning system. The Intelligent Sprayer saves volume on every spray, so you use less volume and less pesticide per acre. In addition, this could mean less trips to refill the tank, especially when you have a large orchard. In contrast, warning systems can reduce the number of sprays against certain diseases.

To figure out **the payback period** – how many years it will take for the investment in the Intelligent Sprayer to pay for itself - we need to account for several factors including pesticide application frequency; costs of pesticides, tractor and sprayer; and logistics for pesticide application, which include tractor and sprayer speed, and time required for pesticide mixing, sprayer tank filling, and pesticide application. We'll compare the costs of Intelligent and standard airblast sprayers in field trials under the same orchard conditions. Intelligent Sprayer technology offers some potential labor and fuel savings in refilling the sprayer, thanks to less spray volume applied per acre (and thus fewer tank refills). We'll also figure in the finances of using warning systems for the diseases fire blight and sooty blotch and flyspeck – with and without the Intelligent Sprayer technology.

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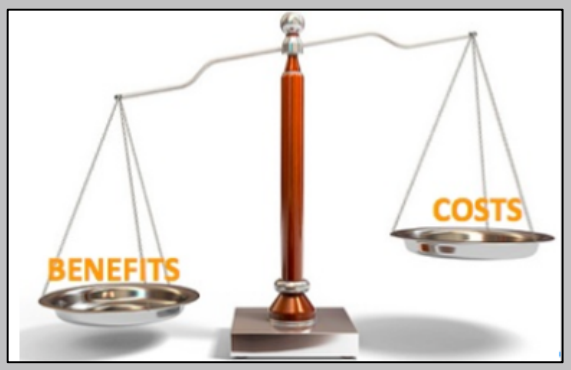
Major Benefits:

Intelligent Sprayer:
- Less mixing time
- Fewer refills
- Less fuel

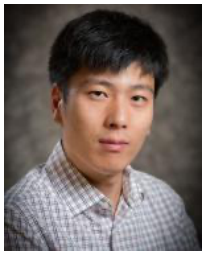
Warning systems:
- Fewer sprays
- Less fuel
- Shorter hired labor time



Major Cost Items:

- Weather sensors
- Data loggers
- Sprayer retrofit fee

How long will it take to recover your investment if you adopt the Intelligent Sprayer? Orchard size is likely to be an important factor, with quicker payback for larger orchards, along with orchard layout, sprayer capacity, refill station location, and so forth. It's likely to take several years to repay the cost of the Intelligent Sprayer (which is much more expensive than adopting warning systems). Despite the investment and payback questions, these technologies offer new options when deciding how to manage insect pests and diseases.



For more information on the economic study associated with the Smart Spraying of Apples Project contact Dr. Wendong Zhang, Iowa State University, dept. of Economics. wdzhang@iastate.edu or 515-294-2536

Black knot of plum and cherry trees is a common disease in Ohio. The disease also occurs on other *Prunus* species. Black knot is caused by the fungus *Apiosporina morbosa.* The fungus overwinters in black knots on twigs and branches as shown in these images. In the spring, spores are produced and blown onto new green tissue. The easiest time of the year to see the knots is when the tree has dropped its leaves. If disease is not too severe the knots can be cut-out of the tree and burned or put in the trash. The best time to do this is during the dormant season. Fungicides can also be applied beginning at bud break. Fungicide recommendations begin on page 105 of the 2021 – 2022 Midwest Fruit Pest Management Guide.

Grower Resources:

- 2021 Midwest Fruit Pest Management Guide (go.osu.edu/2021fruitpestguide)
- OSU Fruit Pathology website (u.osu.edu/fruitpathology)
- OSU Fruit and Vegetable Safety website (https://producesafety.osu.edu)
- OSU Fruit and Vegetable Pest Management website (entomology.osu.edu)
- OSU Fruit and Vegetable Diagnostic Laboratory (u.osu.edu/vegetablediseasefacts/)
- OSU Bramble: Production Management and Marketing Guide (Bulletin 782) (extensionpubs.osu.edu)

OSU Upcoming Events-2021

February 15-17 – Ohio Wine and Grape Conference (Virtual); Link here
February 18 – Good Agricultural Practices Training Webinar; Link here
March 4 – Winter Grape School (Virtual); Link here
March 10 – 2021 Grapevine Pruning Workshop (Virtual); Link here
March 18 – Good Agricultural Practices Training Webinar; Link here
March 26 – Soilless Strawberry School-Greenhouse Focused Track; Link here
April 17 – 2021 Ohio Paw Paw Conference (Virtual); Link here

For a list of all CFAES events and schedule changes go to the CFAE Events Page

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