

Integrated Pest Management Program Highlights – 2019



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OHIO STATE UNIVERSITY EXTENSION

Greetings!



Another year of IPM programming for the 2019-20 fiscal year has come and gone, but not without leaving some unimaginable changes to our “business as normal” delivery model. Of course I’m speaking about the novel Covid-19 virus pandemic that emerged in January 2020 and is still impacting every aspect of life in this country and around the world.

Although a handful of IPM programs were conducted normally prior to the pandemic, once the scope and severity of the virus was fully recognized, our face to face meetings were completely shut down through August. We were forced to either cancel our programs or conduct them in a virtual or online capacity, via video conferencing software or through pre-recorded clips, challenging to both presenters and attendees.

We are slowly adapting to the new normal of non-face to face interactions and are still striving to find a program delivery formulas that work for presenters and participants.

Amidst all the challenges and restrictions, we maintained our pest monitoring networks, increased our newsletter article output, created online courses and animated videos to fill certain program gaps, experimented with constructing 3D field environments to teach from, and added extensively to our YouTube video library as a means to stay connected with end users. As we move forward from the pandemic, we will continue to adapt to meet the educational needs of our stakeholders.

Until next time, stay safe, stay healthy, stay engaged.

Respectfully,

James R. Jasinski

Professor, Department of Extension
IPM Program Coordinator
The Ohio State University

Cover: Honey bee on mustard cover crop

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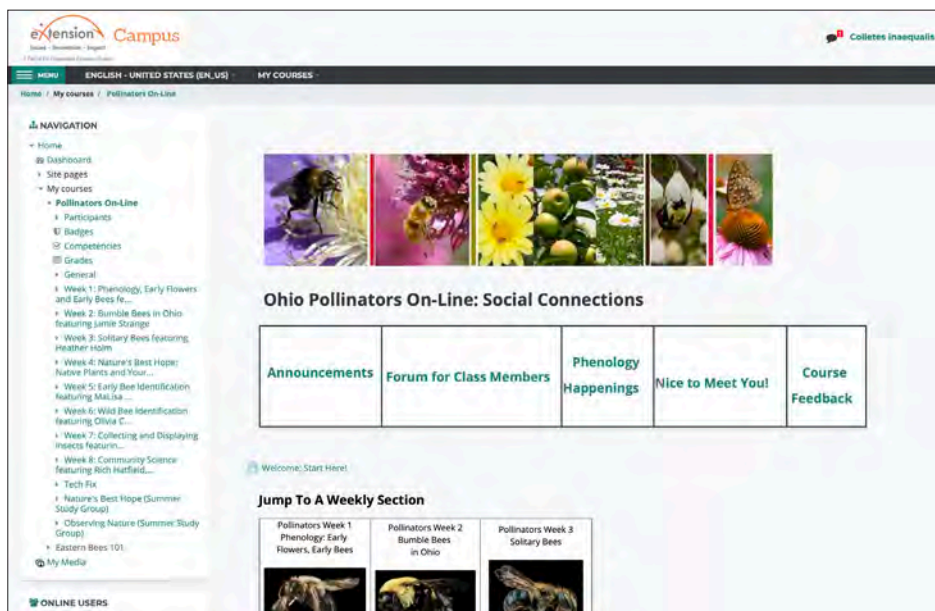
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Ohio Pollinators On-Line Course

Denise Ellsworth – Department of Entomology

Because of the Covid-19 pandemic and the need to cancel all in-person outreach programs and workshops, the “regularly scheduled” pollinator education program morphed into an 8-week on-line course developed in March and April on the national eXtension on-line campus. The “Ohio Pollinators On-Line” course drew 140 participants from the Volunteer Pollinator Specialist program, the OSU Pollinator Short Course and the Bee Survey Team representing three cohorts that would have otherwise met monthly in person. Participants completed activities, forums and assignments to continue learning and networking about pollinators.

Sixty percent of participants completed at least six of eight course sessions. Beyond the initial course offerings, specials summer study groups were developed that focused on habitat enhancement, nature observation and bee identification. A monthly pollinator webinar series drew approximately 90 participants to each session. The webinar offerings will continue through spring of 2021. In 2021, the on-line course will transition to a certificate program -- a serendipitous product of the pandemic that would've taken much longer without the crisis as motivation.



One Day Insect University Outreach

Denise Ellsworth – Department of Entomology

The need for continuous science and insect outreach for all ages was the inspiration for the “One Day Insect University” held on October 30th at the 4-H Center on Ohio State University’s Columbus campus. This inaugural event attracted over 200 participants for a day-long workshop focused on pollinator health, citizen/community science and garden pest management. Dr. Gretchen LeBuhn from San Francisco State

University gave the keynote address on The Great Sunflower Project, a nationwide pollinator citizen science project. In addition, OSU faculty, staff and graduate students presented a total of twelve educational sessions.

The day also included a field trip to the OSU Museum of Biological Diversity and an interactive display by the OSU Bug Zoo. Attendees

included conservationists, researchers, graduate students, agency employees, naturalists, gardeners, Extension employees, volunteer pollinator specialists and others. In an end-of-session evaluation, 72% of participants rated the program as excellent, with 70% indicating they learned a lot and 65% indicating they intended to take action based on what they learned.



Dandelion Detectives – A Youth Community Science Program

Sarah Scott, Kayla Perry, Denisha Parker and Mary Gardiner – Department of Entomology

Dandelion Detectives is a STEM activity targeting 3-7 graders where participants work together to measure the distribution of weeds in turf lawns and their attractiveness to insects across Ohio residential landscapes. Dandelion Detectives launched in the summer of 2020 and families could choose to participate by ordering a toolkit of materials though the mail, or constructing their own by following videos posted to our website (<https://u.osu.edu/dandeliondetectives>). Dandelion Detectives selected one day of their choice (June-August) to complete the study, which involved: taking a pre and post questionnaire about insects; observing insects at an “Observation Dandelion” created using simple provided materials and sugar water mixture; and conducting a lawn weed survey. Participating Dandelion Detectives were then able to upload their findings to a project website.

We distributed 115 Dandelion Detectives toolkits in 2020. By catching ants, bees, beetles and flies within their Observation Dandelion, our Detectives deduced that all of these insects consume nectar from flowers. They also found that lawns contained several species of weeds that provide food for insects, with dandelions, white clover and narrow-leaf plantain being the most common. Dandelion

Detectives interviewed their parent or guardian about their lawn care practices. Participating Ohio families mowed their yard an average of 3.9 times per month and 33% applied both fertilizer and broad-leaf herbicides. Most participating families take care of their lawn themselves, while 10% hire a professional company. After completing our study (and potentially being pressured by a Dandelion Detective) we were thrilled to see that 100% of parents and guardians are willing to leave a patch of flowering weeds in their lawn for bees and other insects. When we asked our Detectives what they learned from participating in this community science program and responses included “weeds are important”, “insects other than bees feed on nectar”, “random sampling is important”, and “kids can contribute to real science experiments”.



Assisting Ohio's Hop Industry

Brad Bergefurd, Thom Harker, Charissa Gardner and Anna Adams – Department of Extension

Experienced Ohio Hop growers are aware of the importance of developing long-term strategies to address pest management needs and to increase farm profits and understand the need to be educated and outfitted with the newest IPM tools and knowledge to properly develop their hop pest management program. To help growers accomplish that, in 2019 three hop field nights were conducted at OSU hop research yards in Piketon, Wooster and Bowling Green to teach and demonstrate growers hop pest scouting and management strategies. Hops IPM programs highlighting insect and disease management strategies were also taught at the Ohio Hop Growers Annual Conference in Springfield in February 2020. These programs included current pest-management approaches with an emphasis on economically viable pest management solutions and adoption of new pest-management tactics.

100% of those who attended the summer field days reported increased confidence in identifying spider mite injury, downy mildew, and their ability to manage these pests (n=26) and an increased confidence in using IPM strategies to



reduce hop insect and disease injury. Likewise conference participants reported their knowledge about managing diseases in hops increased 100% from the beginning to the end of the three day conference (n=30) and that it was likely they would adopt at least one of the new pest management practices learned at the conference (n=27).

Growing in Elevated Raised Beds

Jim Jasinski – Department of Extension

Gardening is a favorite past time for many Ohioan's, and whether it's done at the backyard scale for pleasure or larger scale for profit, it's nice to incorporate bits of IPM along the way. Two workshops were scheduled in the spring of 2020 to show gardeners how to reap the combined ergonomic, production and pest management benefits of growing in elevated raised beds but were cancelled because of the Covid-19 pandemic.

In a quick pivot to provide this information to clientele, instead of face to face workshops, a three part video series was created to introduce growers

to elevated raised beds (part I), demonstrate how these beds could be designed and constructed (part II) and finally how to add season extension and a bit of pest exclusion to the finished bed (part III). These beds were designed to be aesthetically pleasing and complement the existing landscape or could be stacked together to create a highly productive area for raising vegetables, fruits or flowers. These videos have a combined 63 views to date and can be found on the OSU IPM YouTube channel (<https://go.osu.edu/osuipm>) under the Home and Garden Playlist.



Pumpkin Field Day Goes Virtual

Jim Jasinski – Department of Extension

Celeste Welty – Department of Entomology

Tony Dobbels – Department of Horticulture and Crop Science

The pumpkin field day rolled into its 21st year with a new twist being held virtually due to the Covid-19 pandemic. Instead of inviting growers, consultants and industry representatives onto the research station, a series of five videos were shot and stitched together into one 70 minute long movie that premiered on the OSU IPM YouTube channel August 27 at 6PM. The topics were an update on the mustard cover crop biofumigation project, herbicide and weed screen trial, powdery

mildew fungicide trial, insect management update and the pumpkin and squash hybrid trial. The full pumpkin field day video and all other related material including two 3D field models of the hybrid and weed trial can be found here: <https://u.osu.edu/jasinski.4/pumpkins/>

There were 61 people registered for the virtual field day and the video has received 127 views to date. Twenty-six of the virtual field day participants growing ca. 112 acres of pumpkins responded

to a follow up survey. Thirty-two percent found the herbicide and weed screen extremely useful for future seasons, 56% found the powdery mildew trial extremely helpful for selecting effective fungicides and 52% found the insect management segment extremely useful for their farm. Nearly 80% of the virtual field day participants had a positive experience with the non-traditional format and commented that “no drive time barrier” and being able to “see pests better” were noted.



Re-Distribution of Biocontrol on Farms

Celeste Welty – Department of Entomology



The brown marmorated stink bug (BMSB) is continuing its steady invasion into Ohio from the eastern USA. This new pest is causing injury to many crops including peaches, apples, raspberries, grapes, sweet corn, peppers, and tomatoes. We are supporting a network of pheromone traps for stink bug in multiple counties. Most of the traps are serviced weekly by the local Extension Educator, who then shares the resulting trends with other growers in their local area. Last year we expanded the number of sites to include counties that had not been sampled before. BMSB was found at all

33 trapping sites in 2019, with peak density in September and October. The network in 2020 is focused at a smaller number of sites but at different farms than previously used, so that we can see if recent trends continue to be found at new sites.

On farms where the brown marmorated stink bug is causing injury to crops, the most common short-term management tactic is to spray insecticide. A longer-term, more sustainable tactic is biological control. A known natural enemy of BMSB is the samurai wasp, an egg parasitoid that attacks and kills the eggs of BMSB. The samurai wasp is native to Asia but has found its way to several States within the USA. In Ohio, it was first detected in 2017, and was used to start a lab colony. After

initial surveys of egg parasitoids at 20 fruit farms in Ohio in 2018 and 2019 did not detect the samurai wasp, we made controlled releases of this natural enemy at ten farms, in comparison with 10 farms where no release was made. Follow-up surveys have not yet detected the samurai wasp at any of the ten release sites, but we are hopeful that it is becoming established and will contribute to biocontrol in the near future. This biocontrol topic was discussed in eight extension presentations in 2019/2020 and generated much interest from fruit and vegetable growers.

Searching for Spotted Lanternfly

Jim Jasinski, Amy Stone – Department of Extension
Celeste Welty – Department of Entomology

In this era of global commerce, most states including Ohio have observed an uptick in the number of invasive insect pests that growers must manage such as the Brown Marmorated Stink Bug, Soybean Aphid and Spotted-Wing Drosophila. The latest insect pest of concern which has not been detected in Ohio yet but in several nearby states is the Spotted Lanternfly (SLF). This large planthopper is native to China, India and Vietnam but was discovered in Pennsylvania in 2014, where it has spread to eight states by 2020. This bug feeds on many wild hosts and is known to attack many valuable cultivated crops such as hops, apples, blueberries and peaches, but one of its preferred hosts is grape vines. Ohio currently has a \$1.3 billion wine industry which could be threatened if this pest becomes established in the state.

To raise awareness, create a sense of vigilance and educate growers of the threat SLF poses to various crops, Ohio State University specialists and Extension Educators have formed a task force to work with members of the Ohio Department of Agriculture and the Ohio Department of Natural Resources in monitoring and surveying for this pest. In addition to giving educational presentations to growers, Master Gardeners and the general public at various in-person and online meetings, there has been creation of factsheets and identification cards which have been circulated to all Extension offices and most wineries, tree fruit and hops growers in the state. A website has been developed to house all of the OSU generated information about this pest at go.osu.edu/slf.

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ADULT
1" long
½" wide at rest

Feeding: Sucks sap from woody tissue of host plants such as *tree-of-heaven*, *hops & grape*. Also fruit trees and other hardwoods.

Report SLF to the Ohio Department of Agriculture (ODA) by calling 614-728-6400



Bed Bug Video for Children

Benjamin Philip – Department of Entomology

One of the many challenges associated with curbing the spread of bed bugs is the stigma related to an infestation. Although anyone can fall victim to these widely spread pests, there remains an incorrectly held perception that infestations are correlated to socioeconomic status, personal hygiene and/or household cleanliness. The shame that some people feel when discovering bed bugs in their homes can lead to secrecy while attempting to address the issue on their own, often at the detriment to their health and wellbeing. Additionally, they can exacerbate the problem, making it more difficult to control the infestation.

To reduce the stigma surrounding bed bugs, Dr. Benjamin Philip developed a video geared towards school-aged children, titled “Junior Bed Bug Detectives” (JBBD). As impressionable and naturally inquisitive, children were picked as a target population to focus efforts to destigmatize bed bugs and to recruit as “detectives” to assist in curbing spread. The video begins with an introduction to the basic biology of bed bugs, as many children may have heard the name, but know little else about this insect. Bed bugs are adept at hitchhiking, so the video alerts kids to common modes of spread, such as luggage or hiding on clothing. To encourage kids to be vigilant, Dr. Philip describes some of the common hiding spots for bed bugs, and signs to look for, such as shed exoskeletons and fecal spotting. The end of the video reminds children that in their role as a JBBD,

they should tell an adult if they have concerns or have seen signs suggesting the presence of bed bugs. The two main goals of this video are to 1) recruit young, curious and observant kids to be alert to signs of bed bugs and 2) “normalize” the dialogue around bed bugs to reduce the societal stigma associated with this pest. This video is in the final editing stages and will be posted on the OSU IPM YouTube channel when completed.



Diagnostic Clinic Gets Answers to Clients

Joy Pierzynski – Department of Plant Pathology

The C. Wayne Ellett Plant & Pest Diagnostic Clinic processed 632 samples for clientele during the 2019 growing season. The Diagnostic Clinic received both homeowner and commercial samples from 59 of 88 Ohio counties, plus samples from Pennsylvania, Kentucky, Tennessee, Indiana, Michigan, and Nevada. The types of samples processed through the clinic included ornamentals and turf (78%), soybean cyst nematode and field crops (17%), insect identification (9%), fruit and vegetables (5%). Additionally, the Clinic handled over 200 digital diagnostic requests just from March to July 2020, which is much higher than normal and likely attributed to the COVID pandemic.

The Clinic has been involved in presenting Plant Disease Diagnostic Updates to groups of experienced and new OSU County Educators and Master Gardener Volunteers. In addition, plant-disease diagnostics programs with relevant case studies that promote Integrated Pest Management (IPM) strategies were provided to industry professionals such as horticulture, commercial arborists, nursery and landscape groups, and natural resource professionals and land managers. Currently the Clinic incorporates traditional plant diagnostics and molecular analysis for a faster turn-around time and the best results for our clientele base. Deoxyribose nucleic acid sequencing has been fully incorporated into our operation when complete pathogen identification is needed. The principles of IPM are considered a top priority in all recommendations to all clientele.



Small Grains Management Workshop

Laura Lindsey – Department of Horticulture and Crop Science



A hands-on, intensive small grains management workshop was held in Auglaize County in January 2020. As a fall-planted crop, winter malting barley and winter wheat have many environmental benefits within traditional corn-soybean rotations. The goal of the workshop was

to help farmers become more profitable small grain producers. Topics included: on-farm grain storage, wheat and barley seeding rate, nitrogen management, insect management, and disease management. Ten small grain producers attended the meeting, representing 1185 acres of winter wheat production and 686 acres of winter malting barley production.

Participants indicated that they were “very likely” to use at least one of the IPM tactics presented during the workshop in their farming operation. Most participants also indicated that the IPM tactics presented at the workshop would “very likely” save their farming operation money. As a result of this

workshop, participants had a better understanding of selecting barley seeding rate and nitrogen application rate, insect pests and management practices, and management of Fusarium head blight. This should result in the production of high yielding and high quality small grain crops.

Tracking Stink Bugs in Ohio Soybean

Andy Michel, Kelley Tilmon and Amy Raudenbush – Department of Entomology

Stink bugs in soybean have emerged as an important contributor to yield loss in Ohio soybean. Losses can be extreme in some cases, impacting not only overall yield, but also seed quality. Damaged seed becomes wrinkled or shriveled, and turns brown or black as stink bugs feed with straw-like mouthparts. Since stink bugs are a relatively new problem in Ohio soybean, the OSU Agronomic Crop Entomology team focused on determining what species infest soybean, and provided tools such as a stink bug guide and stink bug pocket card to Ohio soybean growers for identification, scouting and management.


Identifying the correct species of stink bugs can sometimes be difficult; since stink bugs have nymphal stages and most do not resemble the coloring adults. For example, the green stink bug nymphs are black, orange, with green stripes, the adults are completely green. Often growers mistake these as two different species. Nonetheless, treatment thresholds are based on the total number of stink bugs, and informing growers of scouting techniques is important for successful management.

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STINK BUGS OF OHIO SOYBEAN

EGGS



Stink bug eggs are barrel-shaped with a ring of hairs on the top. The eggs can be a variety of colors including clear, pale green, tan and metallic gray.

NYMPHS



Stink bug nymphs (immatures) are smaller and rounder than adults.


ADULTS




Stink bug adults have a classic shield-shaped body.

COMMON SPECIES


BROWN MARMORATED STINK BUG



GREEN STINK BUG



REDSHOULDERED STINK BUG



Adults have two color variations, green with red shoulders or brown (common in late summer).


BROWN STINK BUG



SPINED SOLDIER BUG (PREDATORY)



The straw-like mouthpart on a predatory stink bug is twice as thick as an antennae segment.



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STINK BUGS SCOUTING & MANAGEMENT

WHO: Growers, crop consultants, IPM scouts and university specialists

WHAT: To monitor stink bug populations in soybean fields using a sweep net take **10 sweeps** and count the **total** (adults and nymphs) number of stink bugs in the sweep net. Check 5 - 10 locations in the field this way.

WHEN: Scouting should **begin at full bloom (R2)** and continue **weekly** throughout the season.

WHY: Management based on scouting helps ensure stink bug levels stay below threshold. Consider treating if the average per 10-sweep set is 2 for food grade/seed or 4 for grain.



LEVELS OF SEED INJURY



No injury
round and tan seeds



Moderate injury
seeds slightly shriveled, discolored and deformed



Severe injury
small shriveled and discolored seeds



OHIO SOYBEAN

Support provided by:



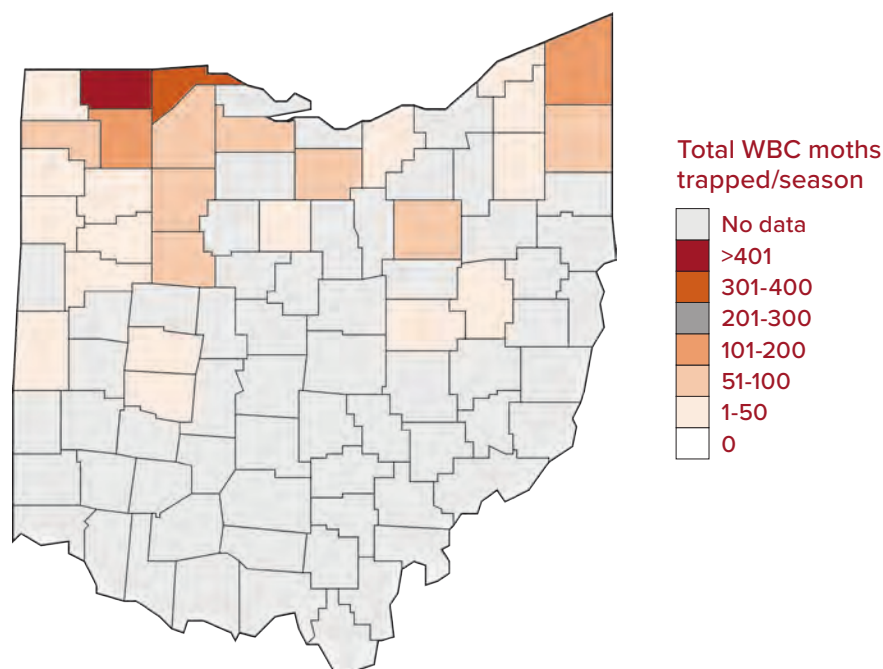
United States Department of Agriculture
National Institute of Food and Agriculture

Western Bean Cutworm Monitoring Network

Amy Raudenbush, Kelley Tilmon – Department of Entomology

The Western bean cutworm (WBC) is a pest of field corn in Ohio that has recently become resistant to Cry1F Bt hybrids. WBC eggs are laid on the upper leaves of corn plants from late June to early August. Soon after hatching the larvae (caterpillars) quickly take shelter in the corn silks and feed on developing corn, making the timing of treatment, before caterpillars take shelter, very important. An effective way to monitor WBC is to trap adult moths to indicate when scouting for egg masses should occur (Figure 1).

To monitor, lure and bucket traps are placed on the edges of corn fields and checked weekly (Figure 2). Monitoring WBC adults is an important tool that helps us understand population trends and allows growers to make the best management decisions. In 2019 we utilized a network of 27 cooperators to monitor 27 counties across the state for WBC moths, and published the results weekly from July 2 to August 13 in the Crop Observation and Recommendation Network newsletter. This information warns crop professionals when WBC numbers are increasing in their area, which helps inform their scouting programs.



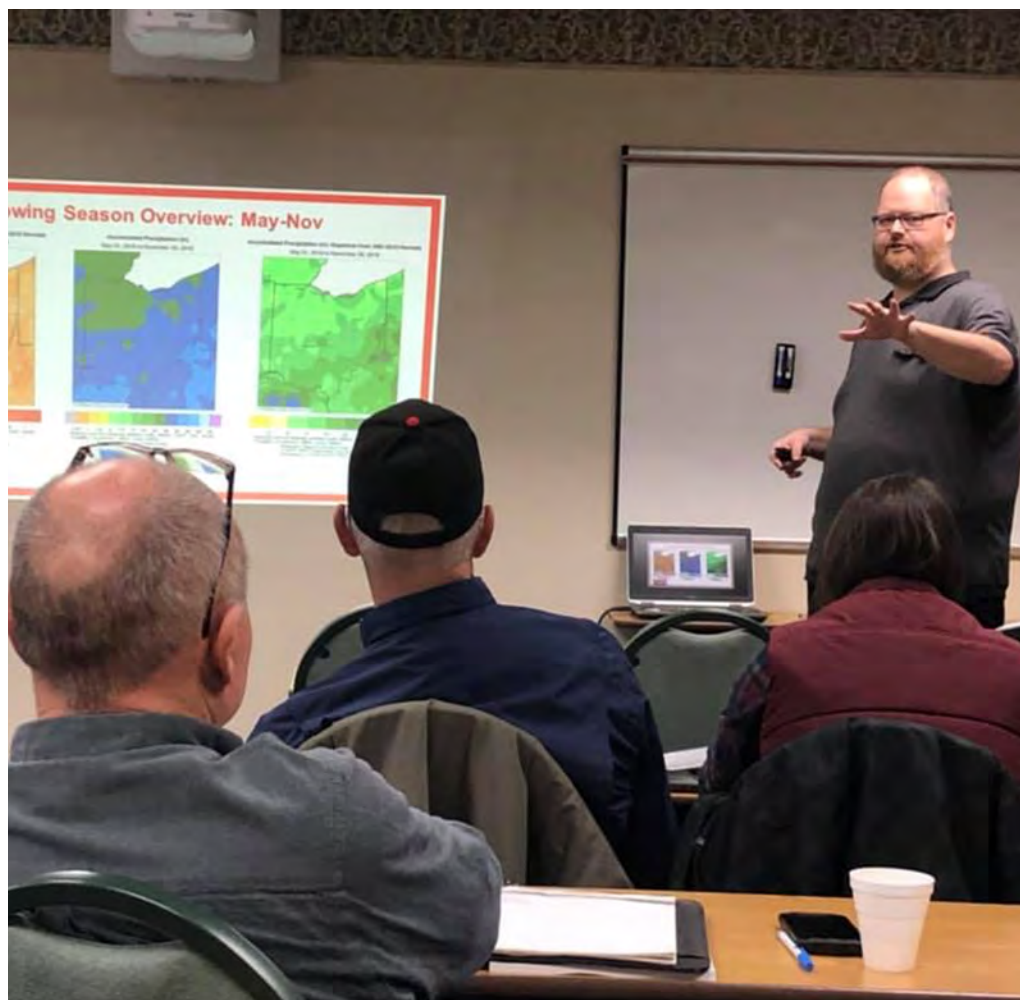
Climate Change and Pest Management

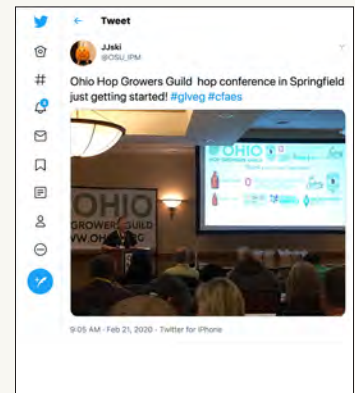
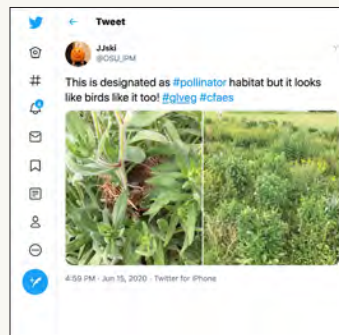
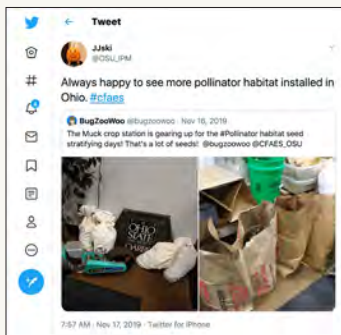
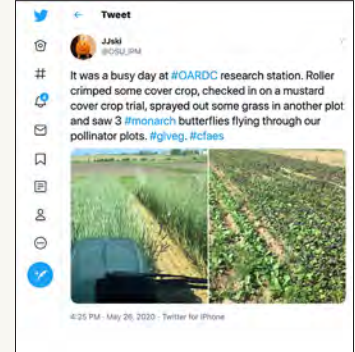
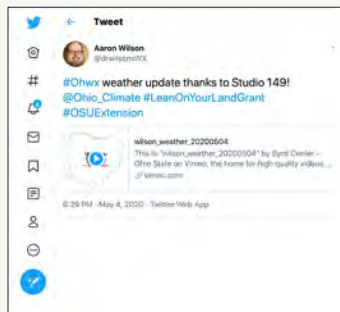
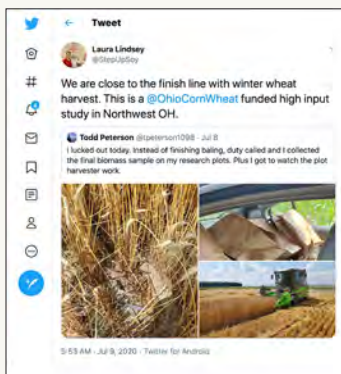
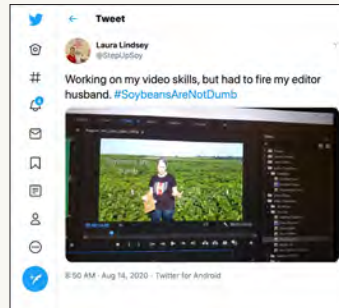
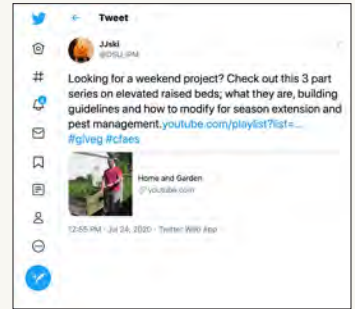
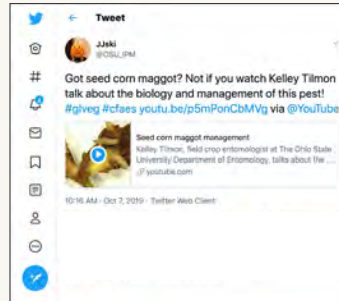
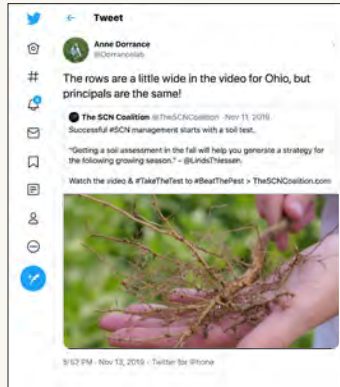
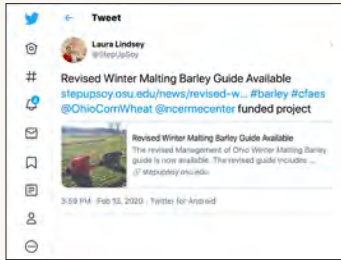
Aaron B. Wilson – Department of Extension | Byrd Polar and Climate Research Center

Several presentations and invited talks on climate change impacts on growers were conducted throughout the year, engaging educators, specialists, and agricultural clientele throughout the state and region. Climate change is a threat multiplier to the profitability and sustainability of the agricultural production systems across the U.S. Here in the Midwest, temperatures are warming, precipitation is increasing and becoming more variable and intense, and these trends are expected to continue through the 21st century.

Grower surveys suggest that weather extremes and climate change pose serious risks to farming across the region, as we look to mitigate these threats with new technologies and management strategies. This includes discussions on how changes in weather may impact pest migration due to milder winters and

increase susceptibility to certain species that may find the environment increasingly suitable for overwintering. Discussions on changing climate conditions and how they may impact certain species and migration patterns continue, with future consideration being given to improving pest models, monitoring capability, and enhancing visualization of data to allow users to better interpret how climate change impacts pest management.





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