Hello Northeast Ohio Counties!

Punxsutawney Phil must have been right in predicting six more weeks of winter, as the deep freeze continues here in Northeast Ohio. Be sure to provide livestock with extra feed and make sure water is available and not frozen.

For those who want to learn about 2021 Farm Bill selections, sign up for the NE Ohio Farm Bill Zoom Webinar on February 11th at 1:00 PM. You can register today at: https://go.osu.edu/neofb21
Check out the flyer for more details!

Stay safe and healthy!
Waterhemp populations across the Midwest continue to develop more complex variations of herbicide resistance. Multiple resistance to an increasing number of herbicide sites of action is the norm in many populations in states west of Ohio. Waterhemp has on the whole developed resistance to seven sites of action, including the following:

Group 2 – ALS inhibitors – chlorimuron, imazethapyr, etc
Group 4 – Synthetic auxins – 2,4-D, dicamba, etc
Group 5 – Photosystem II inhibitors – atrazine, metribuzin, etc
Group 9 – EPSP synthase inhibitor – glyphosate
Group 14 – PPO inhibitors – fomesafen, flumioxazin, sulfentrazone, etc
Group 15 – long chain fatty acid inhibitors – metolachlor, pyroxasulfone, etc
Group 27 – HPPD inhibitors – mesotrione, isoxaflutole, topramezone, etc

Individual populations with resistance to three or more sites of action are common. Mutations are occurring that confer resistance to several of these sites of action simultaneously, through a resistance mechanism that enhances the metabolism and inactivation of the herbicides by the plant. For example, there appears to be a linkage in the resistance to mesotrione and atrazine, where resistance to one means it’s likely that resistance to the other occurs also. Weed scientists have concluded that this weed is capable of developing resistance to any herbicide site of action used against it. We aren’t actually sure what the correct recommendation is for stewardship of herbicides once a single mutation can confer resistance to multiple sites of action. Which is the reason we stress the need to take steps in mid to late season to prevent seed from plants that survive management strategies.

Since 2016, OSU weed scientists have been taking steps to maintain a rough assessment of the herbicide resistance characteristics of Ohio waterhemp populations. Some of these populations were randomly collected during our surveys and some provided to us by OSU Extension Educators or clientele. For the first several years we focused on the possible resistance to glyphosate and group 14 herbicides. Essentially all waterhemp populations are resistant to group 2 herbicides so there isn’t any point in looking for it – it’s assumed.

2016 – 18 populations
Glyphosate – 100% resistant, group 14 (fomesafen) – 28% resistant
Glyphosate + group 14 – 28% resistant

Some populations resistant to low rate of atrazine (but not metribuzin)
2017 – 13 populations collected in fields from plants surviving group 14 herbicides
77% of the populations were resistant to group 14 herbicides (did not test for glyphosate)

2018 – 8 populations
Glyphosate – 87% resistant, group 14 (fomesafen) – 25 to 50% (rate-dependent)
Glyphosate + group 14 – 25 to 50% resistant (rate-dependent for group 14)
Starting with 2019 populations, we have expanded to assess response of waterhemp populations to foliar applications of 2,4-D, and groups 5 (atrazine), 14 (fomesafen), and 27 (mesotrione). Our assumption at this point is that most waterhemp populations are glyphosate-resistant so there’s point in looking for it. We assessed response of 19 populations collected in 2019, and the results below show assessment of % mortality from each herbicide/rate combination. (1X and 4X indicate a use rate and four times that rate).

<table>
<thead>
<tr>
<th>Herbicide/rate</th>
<th>Sensitive &gt;80% dead</th>
<th>Partial resistance 50 to 80% dead</th>
<th>Resistant &lt;50% dead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrazine - 1.5 lb ai</td>
<td>53</td>
<td>31</td>
<td>16</td>
</tr>
<tr>
<td>Atrazine - 4 lb ai</td>
<td>84</td>
<td>16</td>
<td>--</td>
</tr>
<tr>
<td>Mesotrione – 0.09 lb ai</td>
<td>47</td>
<td>47</td>
<td>6</td>
</tr>
<tr>
<td>Mesotrione – 0.37 lb ai</td>
<td>94</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>2,4-D - 1 lb ai</td>
<td>16</td>
<td>63</td>
<td>21</td>
</tr>
<tr>
<td>2,4-D – 4 lb ai</td>
<td>94</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td>Fomesafen – 0.3 lb ai</td>
<td>42</td>
<td>42</td>
<td>16</td>
</tr>
<tr>
<td>Fomesafen – 1.2 lb ai</td>
<td>68</td>
<td>26</td>
<td>6</td>
</tr>
</tbody>
</table>

We are also conducting soil-applied screens for group 15 herbicides (s-metolachlor). In the table below, assessment at 14 and 28 days after preemergence treatment was based on % control compared with a nontreated for each population.

<table>
<thead>
<tr>
<th>S-metolachlor</th>
<th>&gt;80% control</th>
<th>50 to 80% control</th>
<th>&lt;50% control</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 days</td>
<td>% of populations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 lb ai</td>
<td>6</td>
<td>84</td>
<td>10</td>
</tr>
<tr>
<td>4 lb ai</td>
<td>63</td>
<td>37</td>
<td>--</td>
</tr>
</tbody>
</table>
Some observations on these data:

- Herbicides do not necessarily work the same in the field versus the greenhouse, so results can vary between them for a given rate. It’s evident here that the 1X rate of the 2,4-D and S-metolachlor were possibly not truly a use rate in the greenhouse. This doesn’t change the fact that there was variable response among populations.

- Overall, the data show that Ohio waterhemp populations vary in their sensitivity to these herbicides. For all of the herbicides, at least some populations were resistant to the 1X rate and partially resistant to the 4X rate. We assume this is an evolved lack of response that is developing over time in some fields in response to the use of these herbicides, and also movement of seed from field to field. We expect this to happen, based on the history of resistance in areas west of us with a longer history of waterhemp resistance problems.

- There could not really have been much selection by 2,4-D in these fields prior to 2019, based on the Enlist soybean adoption timeline. So the lack of response of some populations to this herbicide may be due to a mechanism that confers resistance to multiple sites of action. A population from Illinois was identified several years ago where on mutation conferred resistance to atrazine, mesotrione and 2,4-D.

- Some populations were completely sensitive to all of these herbicides, and other populations had a reduced response to all. In one Darke County population, mortality from foliar applied herbicides did not exceed 60% at the 1X rate, and ranged from 77 to 96% at a 4X rate. Control from S-metolachlor did not exceed 60%. Darke County is one of the counties with the longest history of waterhemp issues, so selection for resistance has occurred for a while. But – another Darke County population was still sensitive to all herbicides.

- The populations tested are a composite sample from several plants at a field site, so we assume that where some degree of resistance occurs, there are individual plants that may be mostly resistant and others that are still susceptible.

We are in the process of screening populations collected in 2020. We are also part of a regional project that screens waterhemp populations from various states for resistance to glufosinate and dicamba. So far, that project has not identified resistance to either herbicide in the populations sampled from any state, although dicamba resistance has independently been confirmed in other non-Ohio waterhemp populations.

<table>
<thead>
<tr>
<th></th>
<th>1 lb ai</th>
<th>4 lb ai</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 days</td>
<td>--</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>68</td>
<td>32</td>
</tr>
</tbody>
</table>
Pesticide and Fertilizer Recertification Update

Happy New Year! I’m sure some of you have received your private pesticide license renewal from the ODA, and are wondering how to get recertified. Admittedly, we are behind this year as we try to navigate changing guidelines from the state, county, and OSU on holding meetings. Hitting a moving target is a little challenging! We will make sure that everyone will get recertified one way or another.

While we prefer in-person programs, that is not possible in the near future. We have been granted permission by the ODA to hold virtual live meetings for pesticide recertification, and we have four sessions scheduled for the upcoming months. You can find those dates below, and registration links as well. These are live events and not recorded. We realize that not everyone has a computer, or reliable internet so we are working on some in-person events later this spring. We will provide updates on those in-person events when those are available.

Thankfully, the deadline for applicators with an expiration in 2020 and 2021 has been extended to July 1, 2020. We hope with the option of having recertification in warmer weather, we can move outside and get together in person. If you have any questions please give us a call and we will answer any questions you have.

- Normal/Agronomy
  - Date: February 16, 2021, Time: Evening 5PM – 9PM
  - All categories, CORE and Fertilizer
- Normal/Agronomy
  - Date: March 10, 2021, Time: Daytime 10AM – 2PM
  - All categories, CORE and Fertilizer
- Normal/Agronomy
  - Date: April 7, 2021, Time: Daytime 10AM – 2PM
  - All categories, CORE and Fertilizer

You can register now at https://go.osu.edu/NEOPAT21

MAKING WHEAT AND PEANUTS LESS ALLERGENIC

By Adityarup "Rup" Chakravorty

The United States Department of Agriculture identifies a group of “big eight” foods that causes 90% of food allergies. Among these foods are wheat and peanuts.
Sachin Rustgi, a member of the Crop Science Society of America, studies how we can use breeding to develop less allergenic varieties of these foods. Rustgi recently presented his research at the virtual 2020 ASA-CSSA-SSSA Annual Meeting. Allergic reactions caused by wheat and peanuts can be prevented by avoiding these foods, of course. “While that sounds simple, it is difficult in practice,” says Rustgi.

Avoiding wheat and peanuts means losing out on healthy food options. These two foods are nutritional powerhouses. Wheat is a great source of energy, fiber, and vitamins. Peanuts provide proteins, good fats, vitamins and minerals.

“People with food allergies can try hard to avoid the foods, but accidental exposure to an allergen is also possible,” says Rustgi. Allergen exposure can lead to hospitalization, especially for people with peanut allergies. “For others, avoiding wheat and peanuts is not easy due to geographical, cultural, or economic reasons,” explains Rustgi.

Rustgi and his colleagues are using plant breeding and genetic engineering to develop less allergenic varieties of wheat and peanuts. Their goal is to increase food options for people with allergies.

For wheat, researchers focus on a group of proteins, called gluten. The gluten in bread flour makes dough elastic. Gluten also contributes to the chewy texture of bread.

But gluten can cause an immune reaction for individuals with Celiac disease. In addition, others experience non-celiac gluten sensitivity, leading to a variety of adverse symptoms.
Researchers have been trying to breed varieties of wheat with lower gluten content. The challenge, in part, lies in the complicated nature of gluten genetics.

The information needed to make gluten is embedded in the DNA in wheat cells.

But gluten isn’t a single protein – it’s a group of many different proteins. The instructions cells needed to make the individual gluten proteins are contained within different genes.

In wheat, these gluten genes are distributed all over a cell’s DNA. Since so many portions of the DNA play a role in creating gluten, it is difficult for plant breeders to breed wheat varieties with lower gluten levels.

“When we started this research, a major question was whether it would be possible to work on a characteristic controlled by so many genes,” says Rustgi.

For peanuts, the situation is similar. Peanuts contain 16 different proteins recognized as allergens.

“Not all peanut proteins are equally allergenic,” says Rustgi. Four proteins trigger an allergic reaction in more than half of peanut sensitive individuals.

Like the gluten genes in wheat, the peanut allergen genes are spread throughout the peanut DNA.

“Affecting this many targets is not an easy task, even with current technology,” says Rustgi.

Rustgi and the research team are testing many varieties of wheat and peanuts to find ones that are naturally less allergenic than others.

These low-allergenic varieties can be bred with crop varieties that have desirable traits, such as high yields or pest resistance. The goal is to develop low-allergenic wheat that can be grown commercially.

Northeast Ohio Agriculture

Ohio State University Extension
Ashtabula, Portage and Trumbull Counties
In addition to traditional breeding efforts, Rustgi is also using genetic engineering to reduce allergenic proteins in wheat and peanuts.

For example, a technology called CRISPR allows scientists to make very precise changes to a cell’s DNA.

Rustgi is using CRISPR to target gluten genes in wheat. Recent improvements in CRISPR technology allow researchers to target many genes at once.

Genes targeted by CRISPR are changed or mutated. This means that cells can no longer ‘read’ these genes to make the specific proteins.

“Disrupting the gluten genes in wheat could yield wheat with significantly lower levels of gluten. A similar approach would work in peanuts,” says Rustgi.

Other approaches include understanding how gluten production is regulated in wheat cells. As it turns out, one protein serves as a ‘master regulator’ for many gluten genes. That’s important because disrupting this master regulator could lead to reduced amounts of gluten in wheat.Targeting a single gene is much easier than trying to disrupt the several gluten genes.

“Wheat and peanuts are the major sources of proteins to many, especially those living in resource-deprived conditions,” says Rustgi. “Finding affordable ways to make wheat and peanuts available for all is very important.”

Developing wheat and peanuts with reduced allergen levels is a key step toward this goal.

Bacteria growing in this petri dish can help create copies of genetic material. This method in biotechnology is called recombinant DNA technology. Credit: Jonathan Windham
“These crops will also reduce accidental exposure to allergens,” says Rustgi. “Also, they would limit the severity of reactions if exposure did happen.”

**JOIN US FOR FARM OFFICE LIVE’S FEBRUARY WEBINAR**

By: Peggy Kirk Hall, Tuesday, February 02nd, 2021

Source: [https://farmoffice.osu.edu/blog/tue-02022021-800am/join-us-farm-office-lives-february-webinar](https://farmoffice.osu.edu/blog/tue-02022021-800am/join-us-farm-office-lives-february-webinar)

Wondering what’s happening with CFAP, the Paycheck Protection Program, and Executive Orders? So is the Farm Office team, and we’re ready to provide you with updates. Join us this month for Farm Office Live on Wednesday, February 10 from 7–8:30 p.m. and again on Friday, February 12 from 10–11:30 a.m., when we’ll cover economic and legal issues affecting Ohio agriculture, including:

- Status of the Coronavirus Food Assistance Program (CFAP)
- Update on the Paycheck Protection Program (PPP)
- Tax credits information
- Executive Orders that may impact agriculture
- Legal update on small refinery exemptions
- Farm Business Analysis program results
- Legislative update
- Your questions

To register for the free event, visit this link: go.osu.edu/farmofficelive.

**Sponsors for 2021 AG Day Sought**

Every spring around 1,000 first graders from all Ashtabula County Schools descend on the Ashtabula County Fairgrounds to participate in Ashtabula County’s “Ag Day.” Coordinated by OSU Extension and the Ashtabula County Farm Bureau, the primary goal of Ag Day is to educate first graders on where their food comes from and to showcase the different types of agricultural commodities which are being produced in Ashtabula County. Due to the pandemic, last years Ag Day was postponed, with the plan of offering this years Ag Day to two classes. As the pandemic continues into 2021
there are still decisions that will be made to ensure both safety and great agricultural education is provided.

What will Ag Day 2021 look like? Currently there are some unknowns, but we are excited to be serving both Ashtabula County’s first and second graders. Due to the unknowns when it comes to in person gatherings, we are working hard to be prepared for any situation. Our first choice would be to have all schools attend the event in person at the fairgrounds. This would be accomplished over two days (May 13 & 14, 2021).

While we are preparing for in person, we know that for many reasons this may not be possible. That is why we are creating an Ag Day- classroom edition that can be done in classrooms or virtually online. This will include videos we are making from stations we would normally have and supplies that will be sent to the schools to provide the hands-on activities. Regardless of if we hold Ag Day online or in person, the online content and activities will enhance the Ag Day experience for years to come and offer the ability to educate students about agriculture beyond our one-day event. We plan on making a final decision in March and will continue to prepare for any situation.

Ashtabula County’s Ag Day program has become a community supported effort as over 300 volunteers and donors help to make this day a reality for the students. The cost of hosting this event is nearly $22,000 (both monetary and in-kind) and without the support of many this program would not be possible.

We are asking you to considering becoming a donor for the 2020 Ag Day and are offering 5 levels of sponsorship:

- **Platinum Sponsorship** - $1,000 and over
- **Gold Sponsorship** - $500 to $999
- **Silver Sponsorship** - $250 to $499
- **Bronze Sponsorship** - $100 to $249
- **Friends of Ag Day** - $1 to $99

For 2020, we are asking all Ashtabula County farms, agribusinesses, and supporters of Ashtabula County Agriculture to consider donating to help us educate our youth about agriculture. Your gift to this program is 100% tax deductible. Donors are recognized in a variety of manners.

A sponsorship letter can be obtained by calling the Ashtabula office at 440-576-9008 or emailing Andrew Holden at Holde.155@osu.edu. If you are interested in volunteering at this year’s program or would like to be a sponsor, please contact Abbey Averill at 440-576-9008.

**If you have never experienced Ag Day, please check out this short video from Ag Day 2019:** [https://youtu.be/3Aw_P2-fi8k](https://youtu.be/3Aw_P2-fi8k)
Lee’s Monthly News Column

Hello Trumbull County! It looks like we are going to have a prolonged period of exceptionally cold weather coming up next week. Some overnight lows may approach 0F. Freezing weather is always challenging on a farm or in your landscape, but temperatures that low pose a higher level of risk for plants and animals.

Most of our plants will survive those low temperatures without too much concern, but some plants may be injured. Woody perennials with developing flower buds are the most likely to be damaged, and unfortunately you will likely not see any damage until bloom later this spring. Covering these plants may provide some protection from a drying wind but will likely not protect them from the cold temperatures. Among our commercial crops, pears, apples, and especially peaches are prone to damage.

When temperatures get as low as predicted next week, the biggest threat to the plants is actually dehydration. Temperatures below freezing cause the humidity to drop, which leads to dry air. Coupling dry air with wind exacerbates this issue. Plant cells contain a variety of compounds (like sugars) that act much like antifreeze in your car – these compounds lower the freezing temperature of the fluid in the cell. This helps prevent the formation of ice crystals that would puncture the plant cells and cause all the contents to leak out. If the cells are punctured and do leak, the leaking then causes dehydration of the cells and ultimately will lead to the death of a portion of the plant.

If the snow that blanketed much of southern Ohio earlier this week made its way up here, that would have been beneficial. A 4” to 6” layer of snow would provide a layer of insulation to low lying plants. Although the air temperature may approach 0F, under a layer of snow the soil surface will likely hover around 30F to 32F. Most plants are taller than 6” so it would seem this snow would not help them. However, freeze damage can still occur to the root crown (especially in grapes) and most of our winter cereal crops (wheat and barley) would be completely covered. A snow blanket may not completely stop freeze damage, but it will certainly help.

I’ve been talking about plants, but the real concern with farms will be livestock, water lines, and keeping animals healthy with access to food and water. If you’ve ever had to chip ice out of a frozen waterer or fix a frozen pipe out in cold weather you know what I am talking about. We know what is coming, so if you have been putting off any last minute pipe insulating projects you may want to tackle that soon.

Wind shelters, access to a barn, or some other relief from wind is recommended for all animals. You want to block the majority of the wind, but don’t forget that animals will still need fresh air, as stale air in a barn can lead to sickness. In cold temperatures cattle energy requirements can increase by 30%, so you should also be prepared to feed more during these cold temperatures to help keep your livestock warm. Special
attention will need to be given to older, sick, and especially young animals. Blankets for horses, heat lamps for baby pigs, and other measures may be necessary to help your livestock survive.

Good luck staying warm out there! As always, OSU Extension Trumbull County is still here to serve you during the pandemic. If you have questions about soil testing, plant disease, farm bill, or generally anything about agriculture give us a call. Our office is open on Monday and Thursday from 8:30-4:30, but you can reach us anytime at 330-638-6783 or send me an email at beers.66@osu.edu. We hope you all stay safe and healthy!
Agricultural Risk Coverage (ARC)/Price Loss Coverage (PLC) Covering Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit

Enrollment for the Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) programs for the 2021 crop year is currently open. The deadline to enroll and make amendments to program elections is March 15, 2021. Producers have the option to enroll covered commodities in either ARC-County, ARC-Individual, or PLC. These are the same program options that were available to producers during the 2019 and 2020 crop years, but in some cases, producers may want to amend program elections to better manage the potential risks facing their farms during the 2021 crop year. There is no cost to attend these meetings, but registration is required:

https://go.osu.edu/neofb21

Location: Online via Zoom Cost: Free Time: 1:00 PM

Contact information: Any questions can be directed to Andrew Holden at 440-576-9008 or email Holden.155@osu.edu

To view the recorded video of this presentation contact Andrew Holden

https://go.osu.edu/neofb21
HAVE YOU TRIED GROWING COVER CROPS?

◊ PLEASE JOIN US FOR A VIRTUAL, INTERACTIVE ROUND-TABLE DISCUSSION ON MARCH 4TH @ 6:30PM.

◊ A PANEL OF FARMERS THAT ARE UTILIZING COVER CROPS WILL BE ON HAND TO SHARE THEIR EXPERIENCE.

◊ TO REGISTER EMAIL ANTHONY AT: ALECH@PORTAGESWCD.ORG OR CALL (330)235-6815
Woodland Management Tips that Pay

Woodland owners are encouraged to participate in this virtual presentation to learn about resources and recommendations to help you better manage your woodlot to achieve the goals you have for your property.

Join John Kehn, ODNR Division of Forestry and Dave Apsley, OSU-Extension Natural Resource Specialist to learn about some key economic and environmental benefits that forests provide.

The Portage County Farm Bureau will be hosting this VIRTUAL event on:

Thursday, February 25th at 6:30 PM

To register for this virtual presentation visit:  go.osu.edu/portageswcd

Or email: alerch@portageswcd.org