Evaluating Impacts of Neonicotinoid Seed Treatments on Pests, Beneficial Arthropods, and Yield in Grain Crop Rotations
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Overview:

Background: Neonicotinoid seed treatments (NSTs) are a popular and economical way of protecting many crops from insect pests. Neonicotinoids have low mammalian toxicity and seed treatments are considered low-risk for applicators and the environment. However, neonicotinoids may have negative impacts on beneficial insects such as predators and parasitoids. Additionally, they may only provide yield benefits in areas with high early season pest pressure.

Methods: In this study, we examined the impact of two NSTs, Cruiser® and Gaucho®, in a three-year crop rotation of full-season soybean, winter wheat, double cropped soybean and corn. We evaluated the effects of seed treatments on pest and beneficial insects, as well as effects on plant growth parameters and yield.

Results & Conclusions: Pest pressure was very low throughout the 3-year study. While Cruiser® and Gaucho® did reduce the abundance of some early season pests, beneficial insects were also reduced. Cruiser® and Gaucho® use in soybean, wheat, and corn did not significantly impact yield. NSTs are useful in fields with high early season pest pressure. However, where pest levels are often low, such as much of the mid-Atlantic, they may not be economically beneficial.

Background: NSTs are one of the most widely used methods for protecting various crops from insect pests. Neonicotinoids have low mammalian toxicity, and applying insecticides as seed treatments reduces applicator exposure and off-site drift of the active ingredient. NSTs are used to control soil and seedling pests and play an important role in grain crop production, as they are used on the majority of corn and about half the soybean grown in the U.S. Their usage is also increasing in wheat. In the Mid-Atlantic, these grain crops are typically grown in a crop rotation.

Previous studies have shown that NSTs may improve yield under high pest pressure; however, they only provide protection against early season pests for the first 4-6 weeks after planting. If insect pest pressure is low, using NSTs may not improve yield compared to seeds that have not been treated with an insecticide. Because treatment decisions are made before target pest populations are known, NSTs provide the highest economic benefit in fields with a history of early season insect pest problems.

In addition to providing inconsistent benefits, NSTs can have negative impacts on beneficial insects, primarily pollinators and natural enemies. Repeated use of neonicotinoids could also lead to the development of insecticide resistance. Therefore, we conducted a three-year study to better understand both the benefits and risks of using two neonicotinoid seed treatments, Cruiser® 5FS (thiamethoxam, Syngenta) and Gaucho® 600 Flowable (imidacloprid, Bayer) in a 3-year grain crop rotation of full-season soybean, winter wheat, double-cropped soybean and corn.

Objectives: To determine the impact of NSTs on 1) arthropod pests, 2) beneficial arthropods, and 3) plant growth and yield. By looking at a 3-year rotation, we are also evaluating potential cumulative effects of the
repeated use of NSTs over multiple years in the same location.

**Methods:** The study was conducted at two sites in Maryland (Beltsville and Queenstown). At each site, we planted four replicate plots of each of the following treatments using standard Mid-Atlantic production practices:

1. Control (bare seed)
2. Fungicide (fungicide seed treatment)
3. Cruiser + Fungicide (insecticide + fungicide seed treatment)
4. Gaucho + Fungicide (insecticide + fungicide seed treatment)

**Figure 1:** Insect sampling through visual counts (top left), sticky cards (top right), pitfall traps (bottom left), and litter sampling (bottom right).

At each site, the abundance and diversity of invertebrate communities were measured throughout the season. Insects on the plants were measured through visual scouting, sweep-net samples and sticky cards, while soil-dwelling insects were sampled with pitfall traps and litter samples (Figure 1). This allowed us to measure both the pest and beneficial arthropods present in the field. To determine whether seed treatments increase yield, either by reducing pest damage or increasing plant growth and establishment, we measured yield and growth parameters such as stand density and plant height.

**Results: 2015 & 2016**

**Insect abundance:**

It is important to note that overall pest pressure was low during this study. All the pests mentioned for soybean, corn and wheat were present at numbers well below treatment thresholds.

In full-season soybeans, the most abundant arthropod pests observed during early season (V5 stage) visual scouting were plant thrips and leafhoppers, while the most abundant beneficial insects were predatory thrips and minute pirate bugs. Both Cruiser® and Gaucho® reduced the abundance of these pests and beneficials.

Double cropped soybean was visually scouted twice, at the V2-V3 and R1 stages. Plant thrips and predatory thrips were the most abundant insects. Cruiser® reduced plant thrips on both dates, and predatory thrips on the first date. Gaucho® did not impact the abundance of pest or beneficial thrips.

In winter wheat, we conducted visual counts twice in the winter and three times in the spring (Feekes stages 1, 2, 6, 10 and 11). Aphids were the most abundant pest; cereal leaf beetle was also present in the spring, but in very low numbers. Natural enemies were not prevalent in wheat. In the winter, both Cruiser® and Gaucho® significantly decreased the numbers of aphids. However, by the spring there were no significant treatment effects on either aphid or cereal leaf beetle populations.

**Yield:** Cruiser® and Gaucho® seed treatments did not impact yield in full-season soybean, double cropped soybean or winter wheat.

**2017**

**Insect abundance:**

In field corn at the V4 stage, we counted the number of plants that showed evidence below-ground pest pressure (white grubs and wireworms were present at both sites). At Beltsville seedling damage due to cutworms was also present and measured. The Cruiser® and Gaucho® treatments did not have an impact on the number of plants affected by soil/seedling pests.

The most abundant foliar insects early in the growing season (V7) were plant thrips (Figure 2). These were not significantly impacted by the neonicotinoid seed treatments (Figure 3). No beneficial insects were present in high numbers at this time.

**Figure 2:** Insects seen in V7 and R1 stages of corn. The primary pest insect was plant thrips (top left and right) and the primary beneficial insects were lacewing eggs (bottom left) and minute pirate bugs (bottom right).

Visual counts were repeated at the R1 stage. No pest insects were found in high numbers. The most numerous beneficial insects were minute pirate bugs and lacewing eggs (Figure 2); these were not impacted by the Cruiser® or Gaucho® treatments.
Figure 3: Mean number of plant thrips per four corn plants at V7 growth stage. Error bars represent standard error and N.S. = Not Significant.

**Yield:** Gauch® and Cruiser® did not significantly impact corn yield (Figure 4).

**Conclusions:** These results indicate that NSTs provide limited pest protection, as they are only effective early in the growing season. When pest pressure is low, the use of NSTs may not increase yield relative to seeds not treated with insecticides (fungicide seed treatment only or bare seed (control)). NSTs play an important role in grain crop production and can be a useful tool for insect pest management. When pest pressure is high, they provide a convenient and economical way to protect crops. However, our work demonstrates that the use of NSTs may not always be economically beneficial in the mid-Atlantic region. Producers can make the best use of NSTs where they regularly have high early season insect pest pressure.

Figure 4: Corn yield in 2017. Corrected to 15.5% moisture. Error bars show standard error. N.S. = Not Significant.

**Acknowledgements:** Funding for this research was provided by the Maryland Grain Producers Utilization Board, the Maryland Soybean Board and by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-38640-23777 through the North East SARE program under sub-award number GNE16-11B-29994. We would like to thank Maggie Lewis, Terry Patton and all the technicians who worked on this project.

**References:**
where it has been found the disease incidence is often spotty within a field, and within an area. Oftentimes fields adjacent to the infected field will show no symptoms. At times the disease is completely absent in some years or could cause widespread symptoms in cucurbit fields in other years.

Fig. 3 Cross-section of the stem of an oddly yellow plant showing the honey-colored phloem (arrows) characteristic of Cucurbit yellow vine disease.

*Serratia marcescens* is vectored by the squash bug *Anasa tristis* (fig. 4). The squash bug feeds with its needle-like mouth parts in the phloem, where carbohydrates (sugars) are transported throughout the plant. Once the bacteria get into the phloem they begin to multiply and eventually clog this tissue. The bacteria survive the winter in squash bugs and can be spread to young plants in the spring when the bugs colonize and feed on cucurbit crops. Young seedlings with the first true leaf are more susceptible to disease transmission than older plants. There is probably very little secondary spread of the disease within a field because the progression of symptoms is usually very slow.

Fig. 4 Squash bug adult-vector of CYVD.

Characteristically, leaves change from green to greenish-yellow to bright yellow as the disease progresses (fig. 2). These foliar symptoms usually occur about 2 weeks prior to fruit maturity and is the same for cantaloupe, pumpkin, watermelon and squash. Affected plants gradually decline and exhibit a blighted appearance in about 1-2 weeks. Older leaves develop scorched margins and usually die. As stated earlier the phloem in the crown and lower stem of the plant turns honey-colored (fig. 3) rather than a healthy translucent green. Fruit and flowers on affected plants are not

distorted, but watermelon fruit lose their chlorophyll very quickly and become pale green and then yellow. However, other fruit such as pumpkins usually fail to show much if any symptoms. Young plants that are infected can be symptomatic or asymptomatic and may collapse suddenly in the middle of the season or just after fruit set. Older infected plants usually turn yellow with their terminal leaves dying and become weakened and susceptible to secondary infections. This is often what causes problems in the diagnosis of CYVD in that the roots begin to decay and the plant begins to decline and is more susceptible to infections from disease organisms such as *Fusarium* crown and fruit rot, *Phytophthora* and *Sclerotinia* white mold. Most of the cucurbits (cantaloupe, pumpkin, squash, and watermelon) are susceptible to the disease. Surprisingly cucumbers are thought to be resistant. Pumpkin and squash are the most preferred cucurbits of squash bugs and therefore have the best chance of becoming infected.

At this point in time I do not think growers need to do anything differently than what they have been doing to control squash bugs in their pumpkin or squash fields other than watching for any suspicious looking plants that they think might have CYVD. This is because this disease is rather unpredictable and generally has not been a consistent problem in the Northeastern states where it previously has been found. If you have any questions or concerns about what you may find in your field please contact me or Kate Everts.

Current Management Strategies for Managing Ear Invading Caterpillars of Sweet Corn

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Corn earworm is the primary ear invader of sweet corn, followed by European corn borer, sap beetles and fall armyworm. Infestation levels in Maryland vary with the year, time of season, and farm location. For instance, corn earworm successfully overwinters in the warmer counties of the state, allowing population built up to start earlier in the season. However, a major source of late season infestations of earworms and fall armyworms (does not overwinter in Maryland) results from migrant moths carried northward on storm fronts
into the region during mid to late summer. Population pressure is generally higher on farms on the Eastern shore and in Southern Maryland, and lower and more variable in central and western counties. Historically, corn borer pressure varies depending on the number of generations (1, 2 and possibly 3 depending on the length of the growing season) and environmental factors. However, the corn borer population in Maryland has been significantly reduced due to regional suppression in areas of high Bt field corn adoption. Consequently, field infestations are inversely influenced by the extent of Bt acreage around any given farm. Despite changes in the population dynamics of these ear invading insects, sweet corn producers still rely on timely pest monitoring and insecticide sprays for effective control. However, insecticide control programs are costly, potentially pose exposure risks to the applicator and farm workers, and require considerable time and management to successfully implement.

The cheaper pyrethroid (Group 3A) products have been the popular choice but their control efficacy has declined in certain areas due to resistance in corn earworm populations. Resistance monitoring in the South has shown near 50% reduction in control efficacy against this pest compared to when pyrethroids first came on the market. Spray mixtures of Lannate® (Group 1A) plus a pyrethroid are often used to circumvent the resistance problem and improve control of fall armyworms, cutworms, and sap beetles. Rotations and mixtures with different active ingredients, such as Coragen (Group 28), Radiant (Group 5), Entrust and Blackhawk (Group 5), as well as premix products (i.e. Besiege (Group 3A + 28) are also increasingly used and can provide good control. However, the reality is that pyrethroids no longer provide enough ear protection on many farms, so it is becoming necessary to switch or rotate to alternative products. For all insecticide products, timing the first spray at early silking, applying subsequent sprays on a schedule based on moth activity, and achieving adequate spray coverage of the ear zone are prerequisites for effective insect control.

Most corn earworm eggs are laid directly on the silks; once larvae hatch, they quickly move down the silk channel and begin feeding on the ear tip, where they are protected from insecticidal sprays. Thus, it is absolutely necessary to target larvae before they enter the ear by treating silk tissue when moth pressure is high. Timing sprays for corn borers and fall armyworms is less critical because their eggs are laid on corn leaves, thus the period of larval exposure to sprays is much wider. Still, effective control depends on getting enough insecticide to the target larvae at the right time, with the proper spray coverage, and without interference from weather events.

The problems and challenges with foliar insecticide applications can essentially be eliminated with Bt sweet corn, which expresses insect-active toxins from the bacterium, Bacillus thuringiensis (Bt) in tissues of the entire plant. This technology has revolutionized the way many corn insect pests are managed, especially European corn borer, which is virtually 100% controlled by Bt sweet corn. However, the expressed toxins alone do not always provide 100% control of corn earworm or fall armyworm, and thus supplemental insecticide sprays are often needed to ensure quality ears during periods of high moth activity. Currently, there are three types of Bt sweet corn commercially available: Attribute® hybrids (expressing Cry1Ab toxin), Attribute® II hybrids (expressing Cry1Ab and Vip3A), both from Syngenta Seeds, and Performance Series™ hybrids (expressing the Cry1A.105 and Cry2Ab2 toxins) from Seminis Seeds.

Attribute® hybrids have been commercially available since 1996, and acreage has increased significantly with the introduction of fresh market hybrids (i.e. BSS0977, BC0805, WSS0987, GSS0966) and availability of 25K seed units for smaller producers. However, efficacy of these Cry1Ab expressing hybrids has been variable for controlling corn earworm since 2008. Research findings from 22 years of monitoring changes in field efficacy in 89 untreated Attribute® sweet corn plots in Maryland provide strong evidence of resistance development in corn earworm populations to the Cry1Ab toxin. When first introduced, expression of Cry1Ab toxin provided greater than 95% control of all worms, with very minor injury to a few kernels at the ear tip and only small larvae if present. The ear protection allowed producers to eliminate pre-silk treatments and reduce insecticide applications during silking by 70 to 90%. However, ear damage and larval survival have progressively increased since 2000. The percentage of Attribute® ears damaged increased from less than 10% in 1996 to an average of 79%, based on 18 trials of untreated plots conducted in 2017 (Table 1). This reduction in control efficacy is unrelated to corn earworm pressure, because moth activity has actually declined over the past decade. Many sweet corn producers have stopped growing Attribute® hybrids or are applying insecticide sprays to compensate for the reduced efficacy.

The Performance Series™ pyramided Bt sweet corn expresses three insecticidal toxins: Cry1A.105 and Cry2Ab2 to control worms, and Cry3Bb1 to control rootworms, as well as herbicide tolerant traits. Common hybrids are Temptation II, Obsession II, Passion II, and SV9010SA. Field trials of Obsession II compared to nonBt Obsession I were conducted in Maryland from 2010 to 2017, alongside Attribute® sweet corn at the same locations. When this Bt sweet corn was first evaluated, control efficacy was similar to the level of ear protection by Attribute® hybrids in the late 90’s, providing 100% control of fall armyworms and more than 95% control of corn earworns, with very few surviving larvae and only minor injury on the ear tip.
However, control efficacy of earworms rapidly declined during the last four years, showing average unacceptable levels of 74% damaged ears in six late plantings in 2017 (Table 1).

Table 1. Summary of insect control efficacy of different Bt hybrids compared to non-expressing isolines. Data compiled from individual field trials of untreated plots conducted at 15 locations across seven states (NC, VA, WVA, MD, DE, NJ, and NY) in 2017.

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Bt traits expressed</th>
<th>Number of trials</th>
<th>% of clean ears</th>
<th>% of ears damaged by corn earworm</th>
<th>% of ears damaged by corn borer</th>
<th>% of ears damaged by fall armyworm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remedy</td>
<td>Cry1Ab+Vip3A</td>
<td>17</td>
<td>98.7</td>
<td>0.6</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Milky Way</td>
<td>Cry1Ab+Vip3A</td>
<td>6</td>
<td>96.8</td>
<td>0.2</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Obsession II</td>
<td>Cry1A.105+Cry2Ab2</td>
<td>7</td>
<td>25.7</td>
<td>73.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>BC8085</td>
<td>Cry1Ab</td>
<td>18</td>
<td>23.8</td>
<td>79.0</td>
<td>0.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Obsession I</td>
<td>Non-Bt isolate</td>
<td>6</td>
<td>4.3</td>
<td>95.7</td>
<td>0.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Providence</td>
<td>Non-Bt isolate</td>
<td>18</td>
<td>12.6</td>
<td>84.4</td>
<td>3.6</td>
<td>6.1</td>
</tr>
</tbody>
</table>

 Attribute® II sweet corn expresses a new Bt gene combination to broaden the spectrum of activity and reduce resistance development. Hybrids available are Remedy, Aspire, Milky Way and Protector. Introduced commercially in 2013, this sweet corn expresses a novel vegetative insecticidal toxin, Vip3A, from B. thuringiensis, pyramided with the Cry1Ab toxin, along with herbicide tolerant traits. The Vip3A toxin is highly effective against a range of important pests including black cutworm, fall armyworm, corn earworm, and western bean cutworm. Of 22 field trials in 2017 comparing Attribute® II hybrids with non-Bt hybrids in seven states, less than 1% of the ears were damaged, indicating near 100% control efficacy of all ear-invading worms (Table 1). In comparison, the percentage of ears damaged by older larvae in non-Bt sweet corn, planted side-by-side without insecticide protection, averaged 90%. The expressed toxins in Attribute II have no effect on sap beetles; however, the absence of worm damage that attracts beetles significantly reduces the infestation risk of this pest.

Current field performance of Bt sweet corn is summarized as follows. First, all Bt sweet hybrids provide excellent control of corn borers, eliminating all whorl, tassel and silk sprays directed solely for this pest. Furthermore, there is no evidence of any change in corn borer susceptibility to the Cry or Vip toxins. Secondly, the herbicide tolerance traits in these hybrids offer a weed control advantage over non-Bt hybrids. Attribute® sweet corn still provides good control of fall armyworm during pre-silk growth stages but only moderate ear protection; no effective control of western bean cutworm; and variable but generally poor to fair control of corn earworm. Performance Series™ sweet corn provides very good control of fall armyworm during the vegetative and ear development stages but no effective control of western bean cutworm and only poor to fair control of corn earworm. Timing of supplemental sprays in Attribute® and Performance Series™ sweet corn is less critical and wider spray intervals are generally allowed compared to non-Bt sweet corn under the same insect pressure. In both types, fresh silk tissue is consistently more toxic to newly hatched larvae, causing intoxication and delayed growth; so those larvae that survive are exposed longer before entering the ear. Pyrethroids and other insecticides may actually work better because larvae are weakened by the Bt intoxication. The first spray can be applied at full silk, usually three or four days later than the first application in non-Bt sweet corn. A second spray 3 to 4 days later may be necessary if heavy moth activity continues, and sometimes three applications are needed. Attribute® II sweet corn provides excellent control of all foliage feeding and ear invading worms, thus no insecticidal sprays are required, except for secondary pests such as sap beetles, rootworm adults and Japenese beetles.

Field-evolved resistance and associated reduction in control efficacy reported here confirm findings from studies in the South showing evidence of developing resistance to Cry toxins in Bt field corn and cotton. However, corn earworm resistance may be localized in Maryland because Attribute® and Performance Series™ hybrids may still provide fair to good control of corn earworm in some areas, depending on where the migrant moths originated from southern sources. Clearly, the high adoption rate of Bt field corn and cotton, with the Cry1Ab toxin being used since 1996, has contributed to the selection pressure on earworm populations. Additionally, moderate dose expression of Cry1Ab and related Cry1Ac toxins in these crops, decreasing refuge compliance, and potential cross resistance between Cry toxins, altogether have contributed significantly to the evolution of resistance. Unfortunately, corn earworm resistance to the Cry toxins is likely to increase, and spread, with the shift to ‘refuge in bag’ field corn hybrids that contain only 5% non-Bt seeds, and reduced refuge size (from 50% to 20%) in the South where Bt cotton is grown. Due to northward influxes of potentially resistant moths from southern source regions, the risk of further evolution of resistance in the entire Northeast will likely increase and may compromise the efficacy and durability of the Bt sweet corn technology, particular at risk is the Vip trait.
Manure Management Technologies

Request for Proposals: Proposals due December 29

The Maryland Department of Agriculture has issued a grant solicitation for demonstration projects from vendors, businesses, and individuals offering technologies, equipment, infrastructure, or services that can improve the management and utilization of manure and other nutrient-rich, on-farm generated waste products.

Protecting the Chesapeake Bay and its tributaries from excess nutrients—primarily nitrogen and phosphorus—is a top priority for Maryland and the other Bay states. Maryland farmers are required by state law to follow nutrient management plans when fertilizing crops and managing animal manure. In 2015, the department implemented new Phosphorus Management Tool regulations to further protect waterways from phosphorus runoff. The regulations mainly impact livestock and poultry producers that use manure and poultry litter as a crop fertilizer. To help these producers comply with the new regulations, Maryland supports and invests in alternative uses for manure such as fertilizer manufacturing, composting and manure-to-energy projects that add value to the farm business model.

Maryland’s Animal Waste Technology Fund is a grant program that provides seed funding to companies that demonstrate innovative technologies to manage or repurpose manure resources. The program is a key component of Governor Larry Hogan’s broader Agriculture Phosphorus Initiative to improve water quality, strengthen agriculture and bolster rural economies.

The fund has $3.5 million available to invest in innovative technologies during State Fiscal Year 2018, which ends June 30, 2018. Approximately $2 million will be directed at projects with a renewable energy component. There is no maximum or minimum request. Vendors, businesses, and individuals are invited to respond to this grant solicitation which may be downloaded here.

Proposals should be submitted by 4 p.m. local time on December 29, 2017 to:

Ms. Louise Lawrence
Maryland Department of Agriculture
Office of Resource Conservation
50 Harry S. Truman Pkwy
Annapolis, Maryland 21401
Email: louise.lawrence@maryland.gov
Fax: 410-841-5734

EPA Pesticide Program Updates

September 12, 2017

Cooperative Agreement on Pesticide Safety Education

EPA is awarding the eXtension Foundation with a cooperative agreement to establish a system to distribute EPA funds to Pesticide Safety Education Programs (PSEPs) in State Cooperative Extension Services at Land Grant Universities.

PSEPs will use the funds to provide pesticide applicator training on the safe use of restricted use pesticides by applicators in agricultural, commercial and residential settings.

The cooperative agreement is funded at $1,500,000 for the first year, with up to $1,000,000 for each of the four remaining years. We expect to award up to $5,500,000 over the five years. EPA solicited proposals from eligible applicants and applications were due last December.

More information:
- The eXtension Foundation.
- Pesticide applicator training.

To learn more about Pesticide Worker Safety Cooperative Agreements, see:

Registration of Dicamba for Use on Genetically Engineered Crops

More Information
- Read the Press Release
- Understanding the Science behind EPA’s Pesticide Decisions

In 2016, EPA registered new dicamba formulations, approved for “over-the-top” use (i.e., use on growing plants), to control weeds in cotton and soybean plants genetically engineered (GE) to resist dicamba.

In 2017, EPA reached an agreement with manufacturers on measures to further minimize the potential for drift to damage neighboring crops from the use of dicamba formulations used to control weeds in genetically modified cotton and soybeans. The registrants voluntarily agreed to registration and labeling changes including making these products restricted-use, record keeping requirements, and certain additional spray drift mitigation measures. New requirements for the use of dicamba “over the top” (application to growing plants) will allow farmers to make informed choices for seed purchases for the 2018 growing season.

In a series of discussions, EPA sought extensive input from States and USDA cooperative extension agents from across the country, as well as the pesticide manufacturers, on the underlying causes of damage. EPA reviewed all available information carefully and developed tangible regulatory changes for the 2018
growing season. This is an example of cooperative federalism leading to workable national level solutions. Learn more about dicamba for use on genetically-engineered crops:

1. What is dicamba?
2. What additional steps is EPA taking to reduce damage to non-target crops from dicamba used on GE crops?
3. What are EPA’s next steps?
4. Is dicamba safe?
5. How will the use of dicamba on GE cotton and soybeans affect pollinators/bees?
6. In what states will dicamba be registered for use on GE crops?

1. What is dicamba?
Dicamba is a selective herbicide in the benzoic acid family of chemicals. It is already registered for use in agriculture on corn, wheat and other crops. Dicamba is also registered for non-agricultural uses in residential areas, and other sites such as golf courses, mainly to control broadleaf weeds such as dandelions, chickweed, clover and ground ivy.

Only dicamba products registered for use on GE cotton and soybean can be applied “over the top” (to growing plants). It is a violation of FIFRA to use any other dicamba product that is not registered for use on GE crops “over the top” on crops.

2. What additional steps is EPA taking to reduce damage to non-target crops from dicamba used on GE crops (applications “over the top,” to growing plants?)
EPA worked with States, USDA cooperative extension agents and the pesticide manufacturers to develop tangible solutions to address the underlying causes leading to dicamba-related crop damage incidents in 2017. The manufacturers voluntarily agreed to label changes that impose additional requirements for "over the top" use of these products next year including:

- Classifying products as "restricted use," permitting only certified applicators with special training and those under their supervision to apply them; dicamba-specific training for all certified applicators to reinforce proper use;
- Requiring farmers to maintain specific records regarding the use of these products to improve compliance with label restrictions;
- Limiting applications to when maximum wind speeds are below 10 mph (from 15 mph) to reduce potential spray drift;
- Reducing the times during the day when applications can occur;
- Including tank clean-out language to prevent cross contamination; and
- Enhancing susceptible crop language and record keeping with sensitive crop registries to increase awareness of risk to especially sensitive crops nearby.

2018 Maryland Crop Production Meetings Announced

University of Maryland Extension has announced dates for this year’s crop production meetings that will be conducted around the state between December and March. The most recent research, information and data will be shared at these meetings and will help make 2018 growing decisions for agricultural crops. The meetings are open to all interested in agronomy, forage, vegetables and fruit. Private pesticide applicator and nutrient management credits will be offered. Be sure to call your local Extension office for further details and to get registered. If you need special accommodations please call one week prior to the event.

Raising Sheep and Goats for Quality Meat Production “Nutrition and More” Workshop
Saturday, November 11th, 2017 from 10:00 a.m to 2:00 p.m. at Montpelier Farms, Upper Marlboro
Contact: Shelby Watson-Hampton, Director, Southern Maryland Agricultural Development Commission (SMADC) swatsonhampton@smadc.com (301) 274 - 1922, Ex. 1

Annual Agriculture and Environmental Law Conference
November 17, 2017 from 8:00 am to 3:00 pm. Doubletree Hotel, Annapolis, MD.
Register online at https://go.umd.edu/ALEIconf or by calling Erin Mosley at 301-314-0324

Southern Maryland Crops Conference
November 28, 2017. 4:30 p.m. - 9:00 p.m. Baden Fire Hall, Baden, Maryland.
Register by calling the Charles County UME Office at 301-934-5403.
Washington County Crops Conference  
November 29, 2017.  9:00 a.m. - 2:30 p.m.  
Washington County Agricultural Service Center, 7313 Sharpsburg Pike, Boonsboro, MD 21713  
Register by calling the Washington County UME Office at 301-791-1304 or jsemler@umd.edu.

Baltimore County Agronomy Meeting  
December 7, 2017.  9:00 a.m. - 3:00 p.m.  
Friendly Farms, Foreston Road in Upperco, Maryland.  
Register by calling Baltimore County UME Office at 410-887-8090.

Cecil County Winter Agronomy Meeting  
January 24, 2018.  9:00 a.m. to 3:00 p.m.  
Calvert Grange, Rising Sun, Maryland.  
Register by calling the Cecil County UME Office at 410-996-5280 or dbehnke@umd.edu.

Lower Shore Agronomy Day  
January 25, 2018.  10:00 a.m. - 3:00 p.m.  
Somerset Civic Center, Princess Anne, MD  
Register at the Wicomico County UME Office at 410-749-6141.

Carroll County Mid-Winter Farm Meeting  
February 6, 2018.  10:00 a.m. - 3:00 p.m.  
Carroll County Ag Center, Westminster, Md.  
Register by calling the Carroll County UME Office at 410-386-2760.

Harford County Agronomy Day  
February 13, 2018.  10:00 a.m. - 3:00 p.m.  
Deer Creek Overlook at Harford 4-H Camp  
8 Cherry Hill Road, Street MD 21154  
Register by calling the Harford County UME Office at 410-638-3255 or emailing akness@umd.edu with your name and phone number.

Caroline County Agronomy Day  
February 21, 2018.  4:30 p.m.  
Caroline County 4-H Park  
8230 Detour Rd, Denton, MD 21629  
Register by calling the Caroline County UME Office at 410-479-4030.

Montgomery-Howard-Frederick Agronomy Day  
February 28, 2018.  9 a.m. - 2:30p.m.  
Urbana Fire Hall  
3602 Urbana Pike, Frederick, MD 21704  
Register by calling the Montgomery County UME Office at 301-590-2809.

Queen Anne’s Agronomy Day  
March 2, 2018.  9:00 a.m. - 2:30 p.m.  
Queen Anne’s County 4-H Park  
101 Dulin Clark Road, Centreville, MD 21617  
Register by calling the Queen Anne’s County UME Office at 410-758-0166.

Delmarva Hay and Pasture Conference  
January 9, 2018.  9:00 a.m. - 3:30 p.m.  
Delaware Ag Week. Harrington Delaware

Southern Maryland Forage Conference  
January 10, 2018.  8:00 a.m. - 3:30 p.m.  
Baden Fire Hall, Baden, Maryland.  
Register by calling the St Mary’s UME Office at 301 475-4484.

TriState Hay and Pasture Conference  
January 11, 2018.  9:00 a.m. - 3:30 p.m.  
Location TBA  
Register by calling the Garrett County UME office at 301-334-6960.

Food for Profit Training  
November 16, 2017 from 9:00 a.m. to 4:30 p.m.  
Prince George's Soil Conservation District, 5301 Marlboro Race Track Rd, Upper Marlboro, MD 20772  
For more information, click here

On Farm Food Safety and Recall Readiness Trainings Series:  
1) On-farm Food Safety and Recall Readiness Training for CSA operators  
January 10, 2018 @ 8:00 am - 3:00 pm*  
Priapi Gardens, 5996 Augustine Herman Hwy, Cecilton, Maryland 21913 United States  
Registration: https://csa-foodsafety-workshop.eventbrite.com  
* Snow date is 1/17/2018.

2) On-farm Food Safety and Recall Readiness Training for an On-farm market  
January 19, 2018 @ 8:00 am - 3:00 pm*  
Where: Butler’s Orchard, 22222 Davis Mill Rd., Germantown, MD 20876 United States  
Registration: https://onfarmmarket-foodsafety-workshop.eventbrite.com  
*Snow date 1/26/18.

3) On-farm Food Safety and Recall Readiness Training for Agritourism Operators  
January 25, 2018 @ 8:00 am - 3:00 pm*  
Forrest Hall Farm, 39136 Avie Ln., Mechanicsville, MD 20659 United States  
Registration: https://agritourism-foodsafety-workshop.eventbrite.com  
*Snow date is 2/1/2018.
First Annual Urban Farmers of Maryland Winter Meeting
January 21, from noon to 5 PM (Sunday)
Cylburn Arboretum
Cost: $10, lunch will be provided, registration will open in November.

Starting a Small, Intensive, Commercial Farm for Local Markets
January 24 through March 28, with April 4 saved as a snow date. Wednesday nights, 6:30 to 9:00 PM, Baltimore County Extension Office, 1114 Shawan Road, Cockeysville, MD
Cost: $10 per session, or $60 for all ten sessions. Registration will open in November.

Central Maryland Vegetable Growers Meeting
Friday, January 26, 2018
Friendly Farms, Foreston Road in Upperco, Maryland
Register by calling UM Extension Baltimore County Office at 410-887-8090 or visit our webpage: http://extension.umd.edu/baltimore-county

Eastern Shore Vegetable and Fruit Meeting
Tuesday, February 13, 2018
Eastern Shore Hospital Center, Cambridge MD
Register at: https://www.eventbrite.com/e/eastern-shore-vegetable-growers-meeting-2018-tickets-38584279619 or by calling the Dorchester County UME office at 410-222-8800.

Southern Maryland Vegetable and Fruit Meeting
Thursday, February 8, 2018
Bowie Lodge, Defense Highway Gambrills, MD
Register on-line for this event at: http://extension.umd.edu/anne-arundel-county or contact the Anne Arundel County Extension Office at 410-222-3906.

Western Maryland Fruit Meeting
February 2018, date TBA. 8:00 a.m. to 4:00 p.m.
Western Maryland Research and Education Center, Keedysville MD
Register email sbarnes6@umd.edu or call 301 432-2767 ext.301.

Bay Area Fruit Meeting
February 2018, date TBA. 8:30 a.m. to 3:30 p.m.
Wye Research and Education Center, Queenstown MD
Register call phone: 410-827-8056

See the Attachments!
1) CMREC Cover Crops Field Day
2) BARC Weed Control Field Day
3) NM Farmer Certification Program

Agronomy News
A timely publication for the commercial field crops and livestock industry available electronically in 2017 from April through October on the following dates: April 20, May 18, June 29, July 20, August 17, September 7 and October 26 (Special Research & Meeting Edition).

Published by the University of Maryland Extension Focus Teams 1) Agriculture and Food Systems; and 2) Environment and Natural Resources.

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Field-day: Getting the most from your cover crops

Nov 1, 2017 11am-1pm

Central Maryland Research & Educ. Center
12000 Beaver Dam Road
Laurel, MD 20708

Lunch will be provided

Planting cover crops by early September and letting them grow through April can provide a host of potential benefits, including capturing hundreds of pounds of nitrogen and other nutrients, suppressing weeds, building soil organic matter and even increasing crop yields. But, getting a cover crop in that early is a challenge.

Come see our research on timing of cover crop planting and spring termination, efficacy of various cover crop species and mixtures, and innovative approaches to getting plant cover crops planted early. There will be a tour of field-plots showing various planting dates and field-plots showing mixed species cover crops that were inter-seeded into a standing soybeans.

So we can order lunch, please RSVP Hirsh@umd.edu by October 26 with the number attending.

www.enst.umd.edu
Integrated Weed Management Field Day

November 2, 2017
10 am – 2 pm
USDA-ARS Beltsville Agricultural Research Center
10300 Baltimore Ave, Beltsville, MD

Watch a field demonstration of the Harrington Seed Destructor (HSD), a new machine to destroy weed seeds during harvest, and learn the latest about herbicide resistant weeds and integrated weed management innovations. The field tour will be led by Dr. Steven Mirsky of USDA ARS with participation from Delaware, Penn State, NC State, and Virginia Tech Weed Specialists. This is a free event. CCA credits available. Lunch is included!

TOPICS INCLUDE:
• Update on herbicide resistance in the Mid-Atlantic
• Harrington Seed Destructor Demonstration
• Field tour of exciting weed and cover crop management research
• And learn about other herbicide resistant weed management tactics

TO RSVP: Contact Karen Adams, UD Carvel Bldg (adams@udel.edu or 302-856-2585). Additional information will follow registration.
The Farmer Training and Certification workshops provide opportunities for producers with cropland and pastures who use commercial fertilizer and/or manure to learn how to write nutrient management plans for their operation that meet Maryland Department of Agriculture’s regulations. Individuals with fields or pastures high in soil test phosphorus may require additional training and a greater time commitment.

**Required Skills:**
Competency in high school math, familiarity with using a keyboard, and the ability to save and retrieve files on a computer are essential for completion of the course and nutrient management plan development.

**You will receive:**
- **A comprehensive training binder** – the training binder will be used during the class, serve as a reference during the open-book exam, and be a valuable resource when you write future plans for your operation.
- **Certification** – producers who pass the exam will be certified by MDA to write their own nutrient management plans.
- **Voucher training credits** – this class will fulfill the nutrient applicator voucher training requirements.

**Registration Information**
- Space is limited and registrations are accepted on a first-come basis; therefore, **register early**.
- Paid registrations must be received 10 days before the first class. For more information, please call 410-841-5959. Classes will be cancelled if there is insufficient enrollment.

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<tr>
<th>#</th>
<th>Location</th>
<th>Dates</th>
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<td>University of Maryland Wye Research and Education</td>
<td>January 16 (snow date January 19) and January 30 (exam and plan writing) (snow date February 2)</td>
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<tr>
<td>#2</td>
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<td>February 5 (snow date February 9) and February 19 (exam and plan writing) (snow date February 21)</td>
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<td>University of Maryland Extension – Howard County Office</td>
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6 – 9 PM each evening ($20 is the certification fee)

**Please register me for class # __________. Enclosed find my payment for the class.**

Name

Mailing Address

County ______________________ City ______________________ State _____ Zip Code ___________

Telephone ______________________ E-mail ______________________

Special accommodations needed?

Submit a separate form for each person. Make check payable to *Maryland Department of Agriculture*. Mail completed form and payment to: Nutrient Management Program, Maryland Department of Agriculture, and 50 Harry S Truman Pkwy, Annapolis, Maryland 21401