What's Cropping Up?

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Nitrogen Management of Brown Midrib Forage Sorghum in New York

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Introduction

Forage sorghum is a drought and heat tolerant warm-season grass that can be used for silage on dairy farms. It can be a good alternative to corn silage in New York particularly during drought years or in the case of delayed planting in the spring. Forage sorghum requires soil temperatures of at least 60°F for planting, which normally occurs in early June in New York. Forage sorghum could also be a good fit for double cropping rotations because its later planting date gives time for an early May harvest of a forage winter cereal. Between 2013 and 2017, we conducted 13 N-rate trials across three regions of New York to evaluate nitrogen (N) needs for a brown midrib (BMR) forage sorghum variety (Alta Seeds AF7102).

Trial Set-Up

The trials were planted between early June and early July in central New York (eight trials) and northern New York (five trials). Of the northern New York trials, three were on commercial farms. The other trials were on Cornell research farms. Two of the three trials on commercial farms were conducted on fields with recent manure or legume histories. For eleven of the trials, sorghum was planted at a 1-inch seeding depth and 15-inch row spacing (15 lbs/acre seeding rate). The remaining two trials were planted either with a 30-inch or 7.5-inch row spacing. Five N-rates as Agrotain®-treated urea (Koch Agronomic Services, LLC, Wichita, KS) were broadcasted at planting (0, 50, 100, 150, and 200 lbs N/acre) with two additional N rates (250 and 300 lbs N/acre) for one of the central New York locations. The forage sorghum was harvested at the soft dough stage, which occurred between September 20 and October 14. Harvest was done using a 4-inch cutting height and dry matter (DM) yield was measured. This allowed for determination of the most economic rate of N (MERN), the N use efficiency (NUE), and the apparent N recovery (ANR). The NUE and ANR are measures of N efficiency. The NUE is the amount of N taken up in relation to yield, and is calculated by subtracting the yield when no N was applied in the spring from the yield when N was applied, and dividing that value by the N rate applied (NUE [lbs DM/lbs N] = [Triticale $\text{yield}_{\text{N rate}}$ – Triticale $\text{yield}_{\text{0 N}}$]/N rate). A higher

NUE means that more of the N that was applied was taken up by the sorghum. The ANR is the amount of fertilizer N recovered, calculated by subtracting the N in the forage when no N was applied from the N in the forage when N was applied, and dividing that value by the N rate applied (ANR [%] = [Forage N of N_{rate} – Forage N of N_0]/N rate).

Results

The crop yield response to N could be separated into three yield response groups: (1) no response to N addition (MERN = 0; two trials), (2) no yield plateau (MERN > 200 kg N ha^{-1}; four trials), and (3) a yield plateau between the lowest and highest N rates (seven trials) (Figure 1). The two trials on fields at commercial farms with a recent manure or legume history did not respond to N addition (group 1 trials, panel A). The trial in group 1 with the lowest yield (5.3 tons DM/ac) was planted with a 30-inch row spacing, which resulted in weed issues that likely impacted crop performance. Trials in group 2 (panel B) were either very responsive to N addition or had N uptake limitations, most likely reflecting weather or soil drainage issues. The trials in group 3 (panel C) had MERNs ranging from 134 to

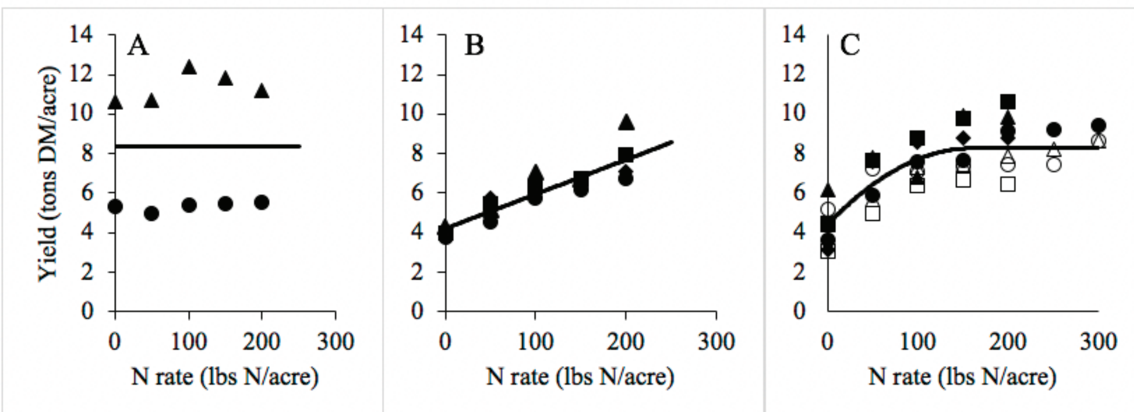

Fig 1. Impact of N application on forage sorghum yield for 13 trials from 2013 to 2017. Sorghum was harvested at the soft dough stage. Two trials did not respond to N (A), four trials did not have a yield plateau (B), and seven trials had a yield plateau between the lowest and highest N rates (C). Differences are likely due to sites native N supply, weather conditions, agronomic practices, and/or soil properties (see text for further details). Different symbols represent different sites within each group.

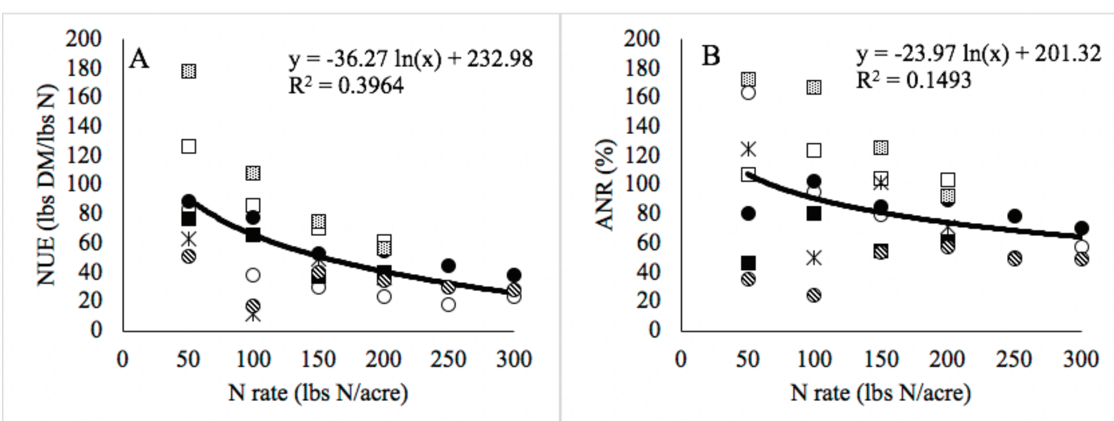

Fig 2. Forage sorghum nitrogen use efficiency (NUE, panel A) and apparent N recovery (ANR, panel B) as impacted by N application rate for seven trials with a most economic rate of N between the highest and lowest N rates. Different symbols represent different sites.

234 lbs N/acre, averaging 181 lbs N/acre. Yields at the MERN for group 3 trials ranged from 6.7 to 10.4 tons DM/acre and averaged 8.9 tons DM/acre. On average, for responsive sites (so excluding group 1 trials), forage sorghum required approximately 20 lbs N/acre per ton DM. On average, for each ton of DM, 25 lbs of N was taken up by the sorghum. For group 3, higher N rates led to lower ANR and NUE (Figure 2). For these trials, NUE at the MERN averaged 56 lbs DM/lbs N and ANR at the MERN averaged 83%.

Conclusions and Implications

Forage sorghum can be a good alternative to corn silage in years of drought, delayed corn planting, or as part of a double crop rotation with forage winter cereals. The BMR forage sorghum in this study, grown on N-limited sites, needed around 180 lbs N/acre, or around 20 lbs N per ton of DM, and yielded between 7 and 10 tons DM per acre. Fields with recent manure or legume histories supplied sufficient N, resulting in no crop response to additional N for the forage sorghum. Applying N beyond the N needs of the crop will result in reduced N use efficiencies. In addition, stands with row spacing greater than the recommended 15 inches may result in weed or other stand issues that could impact performance.

Acknowledgements

This work was supported by Federal Formula Funds, and grants from the Northern New York Agricultural Development Program (NNYADP), New York Farm Viability Institute (NYFVI), and Northeast Sustainable Agriculture Research and Education (NESARE). For questions about these results, contact Quirine M. Ketterings at 607-255-3061 or qmk2@cornell.edu, and/or visit the Cornell Nutrient Management Spear Program website at: http://nmsp.cals.cornell.edu/.

Nutrient Management

Stalk Nitrate Test Results for New York Corn Fields from 2010 through 2018

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Introduction

The corn stalk nitrate test (CSNT) is an end-of-season evaluation tool for N management for 2nd or higher year corn fields that allows for identification of situations where more N was available during the growing season than the crop needed. Where CSNT results exceed 3000 ppm for two or more years, it is highly likely that N management changes can be made without impacting yield.

Findings 2010-2018

The summary of CSNT results for the past nine years is shown in Table 1. For 2018, 54% of all tested fields had CSNTs greater than 2000 ppm, while 44% were over 3000 ppm and 26% exceeded 5000 ppm. In contrast, 15% of the 2017 samples were low in CSNT-N. The percentage of samples testing excessive in CSNT-N was most correlated with the precipitation in May-June with droughts in those months translating to a greater percentage of fields testing excessive. As crop history, manure history, other N inputs, soil type, and growing conditions all impact CSNT results, conclusions about future N management should take into account the events of the growing season. In addition, weed pressure, disease pressure, lack of moisture in the root zone in drought years, lack of oxygen in the root zone due to excessive rain, and other stress factors can impact the N status of the crop.

Within-field spatial variability can be considerable in New York, requiring (1) high density sampling (equivalent of 1 stalk per acre at a minimum) for accurate assessment of whole fields, or (2) targeted sampling based on yield zones, elevations, or soil management units. The 2018 expansion of adaptive management options for nutrient management now includes targeted CSNT sampling. Work is ongoing to evaluate use of yield to CSNT-N ratios to identify situations where yield was limited by factors other than N supply. Two years of CSNT data are recommended before making any management changes unless CSNT's exceed 5000 ppm (in which case one year of data is sufficient).

Relevant References

- Instructions for CSNT Sampling; Cornell Nutrient Management Spear Program: http://nmsp.cals.

Table 1. Distribution of CSNT values (low, marginal, excess) for New York State (NYS) corn fields sampled in 2010-2018. Also presented are state average yield for corn (bu/acre at 85% dry matter and tons/acre at 35% dry matter). In grey are wet years and in orange are drought years based on May-June rainfall (less than 7.5 inches in drought years, 10 or more inches in wet years).

	2010	2011	2012	2013	2014	2015	2016	2017	2018
NYS corn grain (bu/acre)	149	133	134	137	148	143	129	161	166
NYS corn silage (tons/acre)	19	16	17	17	18	17	16	18	?
April-June rainfall (inches)	10.0	16.5	10.2	14.6	12.8	12.8	7.6	15.3	9.7
April-July rainfall (inches)	14.0	18.6	13.2	19.1	18.1	16.5	10.7	20.6	14.6
May-June rainfall (inches)	**7.9**	**10.0**	**7.4**	**11.4**	**9.3**	**9.9**	**5.1**	**10.4**	**6.0**
May-July rainfall (inches)	11.8	12.2	10.3	16.1	14.6	13.5	8.3	15.6	10.9
May-August rainfall (inches)	15.9	20.0	13.6	20.0	18.3	16.7	12.4	19.2	16.4
Low (<250 ppm) (%)	24	21	20	35	29	37	13	34	15
Marginal (250-750 ppm) (%)	17	19	17	16	16	18	12	18	11
Optimal (>750-2000 ppm) (%)	19	24	22	20	19	21	24	20	20
Excess (>2000 ppm) (%)	40	36	41	29	36	24	51	28	54
Excess (>3000 ppm) (%)	28	24	29	20	27	16	37	19	44
Excess (>5000 ppm) (%)	14	12	14	9	14	6	19	9	26
Total number of samples	509	765	923	1473	1175	1039	859	1180	873
Maximum value (ppm)	13966	16687	15671	13147	14659	13947	14959	14517	14936

Note: Data prior to 2013 reflect submissions to the NMSP only. 2013 and 2014 data include results from NMSP and DairyOne; 2015-2016 includes samples from NMSP, DairyOne, and CNAL; 2017 and 2018 include results from NMSP and DairyOne.

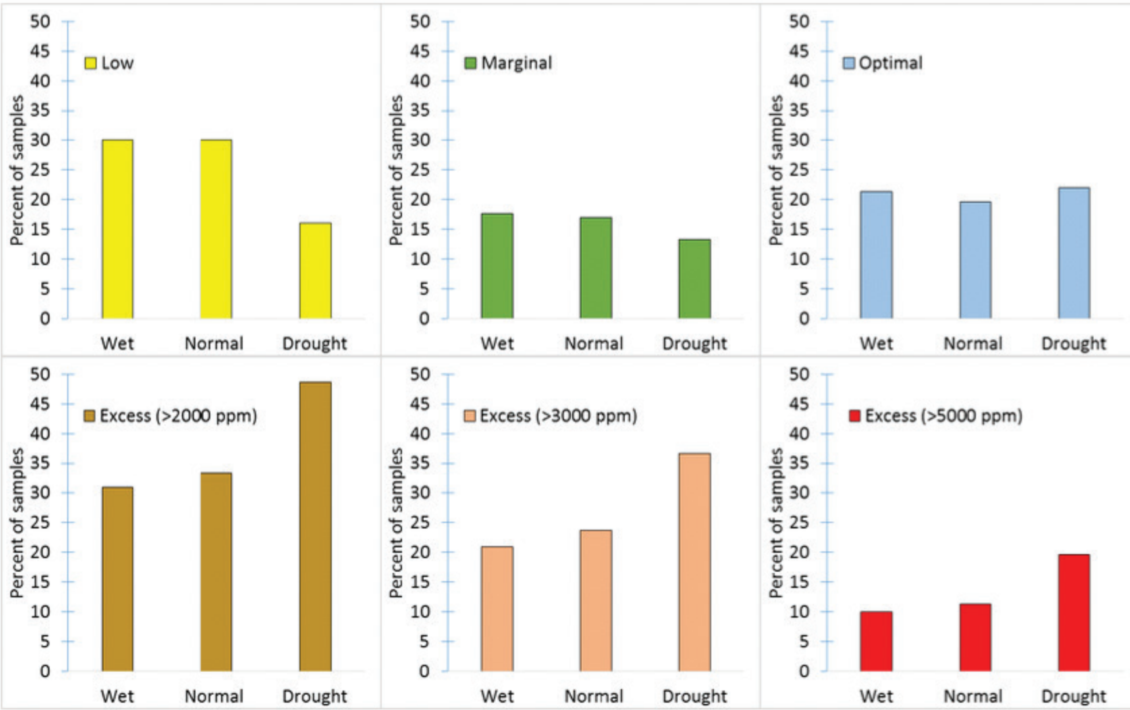

Fig 1. In drought years (determined in this analysis by May-June rainfall below 7.5 inches; which occurred in 2012, 2016, and 2018), more samples test excessive in CSNT-N while fewer test low or marginal.

cornell.edu/publications/StalkNtest2016.pdf.

- Agronomy Factsheets #31: Corn Stalk Nitrate Test (CSNT); #63: Fine-Tuning Nitrogen Management for Corn; and #72: Taking a Corn Stalk Nitrate Test Sample after Corn Silage Harvest. http://nmsp.cals.cornell.edu/guidelines/factsheets.html.

Acknowledgments

We thank the many farmers and farm consultants that sampled their fields for CSNT. For questions about these results contact Quirine M. Ketterings at 607-255-3061 or qmk2@cornell.edu, and/or visit the Cornell Nutrient Management Spear Program website at: http://nmsp.cals.cornell.edu/.

Precision Agriculture

Increase Yield Monitor Data Accuracy and Reduce Time Involved in Data Cleaning

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Introduction

Reliable yield maps allow farmers and farm consultants to analyze yields per field, within fields, across fields and across years. Yield maps can be used to develop yield stability zones, or to identify reason(s) for low/high yielding areas by overlaying them with other geospatially tagged data such as elevation maps, soil series maps, etc. For reliable data, pre-harvest calibration of yield monitors and sensors should be followed up by careful operation in the field and proper post-harvest data cleaning in the office (Figure 1). This article presents best practices (pre-harvest, in-field, and post-harvest) that minimize yield monitor data errors and noise, reduce loss of data, and speed up data cleaning.

Pre-Harvest

1. *Field naming*. Develop a simple and consistent set of field IDs or names for each farm. Make sure all operators know and use the correct field identification. Using numbers eliminates spelling errors. Inconsistency in a field's name from year to year results in extra, time consuming, post-harvest data clean-up.
2. *Field boundaries*. Establish and load geo-spatially fixed/frozen field boundary files into the Yield Monitor prior to harvesting. This will assist in maintaining the accuracy of field IDs. Preloading fixed field boundaries facilitates assignment of harvest data to the correct fields as the harvester moves from field to field. Follow the procedures in your Yield Monitor manual to load boundary files before harvest begins.

In-Field

1. *Calibrate*. Calibration using accurate scale weights or a grain cart with load sensors will increase accuracy. When calibrating, harvest as you would normally do in average crop areas in the field (include variability in the field, not just the best part). Re-calibrate the yield monitor often – for each crop or even variety that is being harvested, and for significant changes in crop conditions (very dry to very wet). Check and zero the mass flow sensor every morning so that the sensor identifies crop flow accurately. Clean the lens of the moisture sensor and inspect for damage daily.
2. *Field name/ID*. Check to be sure correct field name/ID is entered or displayed before harvester enters a new field. Avoid inventing field names "on the fly." Carefully check spelling if manually entering a field ID while harvesting. Misspelled or variations in field names from season to season make it difficult

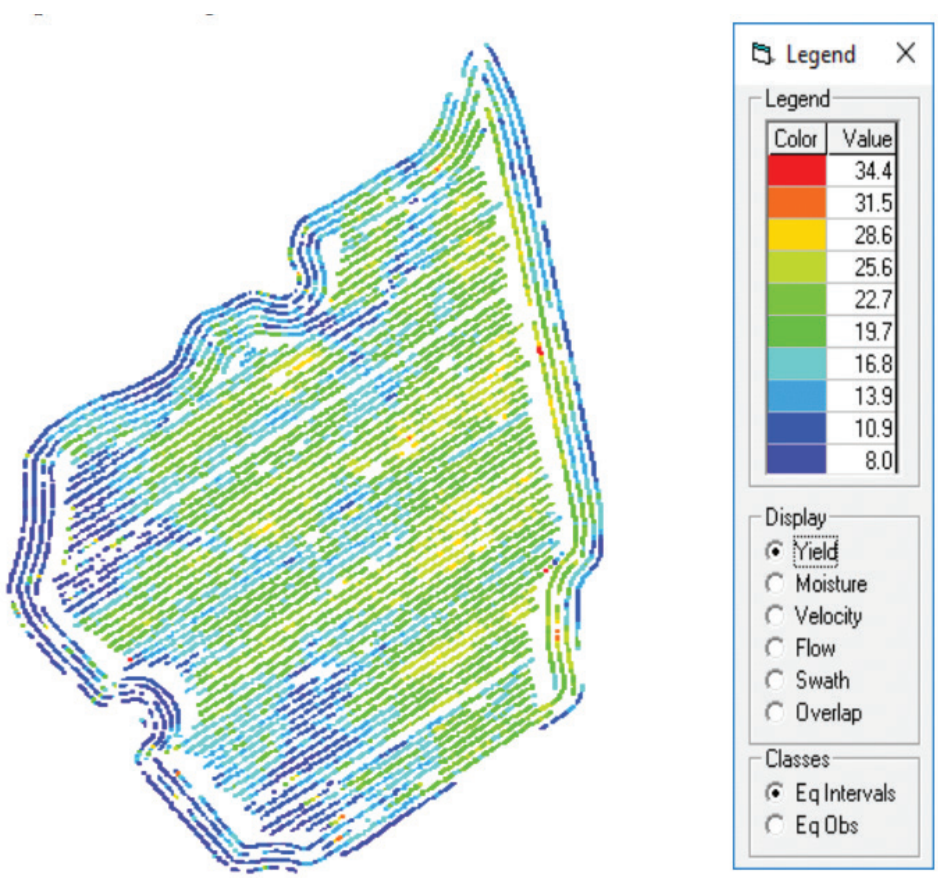

Fig 1. Valuable data can be obtained when yield monitors are calibrated and yield data are properly cleaned. For instructions on corn silage and grain yield monitor data cleaning, see: http://nmsp.cals.cornell.edu/publications/extension/ProtocolYieldMonitorDataProcessing2_8_2018.pdf.

to match field data files across years for yield comparisons and within-field variability analysis. Proper field naming will ensure that yield data are assigned to correct field files.

3. *Harvest speed*. Maintain a steady harvest speed within the calibration range for your system. Yield data recorded outside of the calibration range will be less accurate (irregular and/or very slow or high velocities over parts of the field result in yield calculations errors).
4. *Header height*. Be sure the monitor logs a start and stop for each directional pass across the field to ensure data and yield area are logged properly. In most cases, the operator must lift the header beyond a set height to trigger the "stop logging" signal when exiting a pass or turning in the field. For some equipment, material flow can also be used to log the end of passes when the header is not raised for turning or for driving in the field without harvesting. Correctly logged field passes expedite trimming of unrepresentative start and end pass data points (ramping effect) during the cleaning process and proper shifting of data when correcting for flow and/or moisture delays relative to GPS location.
5. *Swath width*. Be sure the recorded swath width is the actual width harvested. If swath width is not recorded properly, the harvested area calculated is wrong and so is the yield value. If the GPS system of the yield monitor has a large positional error (e.g. WAAS), turn off the auto swath adjustment and manually enter the default swath/chopper width. When harvesting less than the default chopper width without auto-swath, manually adjust swath width of the pass in the yield monitor to avoid erroneous yield calculations.
6. *Short rows*. For long, narrow fields, plant and harvest rows the length of the field rather than the width if practical and consistent with soil conservation and other farm objectives. Short harvest passes distort yield data due to ramping velocity and flow impacts at the beginning and end of a pass, leaving few or no accurate data points in very short passes.
7. *Multiple combines/choppers in the field*. If using more than one combine or chopper on a field, harvest a discrete section of the field with each one rather than mixing their passes across the whole field. Differences between operators, equipment and sensors result in different flow and moisture delays. These factors, if interlaced across the field, make it difficult to properly clean data.

Post-Harvest

Do not risk losing the season's data by just leaving it on your monitor or relying on the cloud to save it. Download the raw yield monitor data files periodically during the season. The data cleaning protocol requires raw data to be transferred into Ag Leader format. Save the original files, backing them up on thumb drives and on your computer.

In Summary

Reliable data are essential for making the right decisions in field management. Mitigating errors at the source reduces the amount of data loss when filtering out noise during the post-harvest data cleaning process. The accuracy of yield data depends not only on proper calibration of yield monitoring equipment prior to and during harvest, but also on operation in the field and post-harvest data cleaning. Data become more reliable and the data cleaning process can be accelerated with implementation of the pre-harvest, in-field, and post-harvest practices described in this article.

Acknowledgements

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Weed Management

Herbicide Resistance Management: Get to know herbicide sites of action

Mike Hunter, Cornell Cooperative Extension-North Country Regional Ag Team

Glyphosate resistant marestail in soybean field in Western New York

According to the International Survey of Herbicide Resistant Weeds, there are 497 unique cases (site of action x species) of herbicide resistant weeds globally. This organization also has reported that weeds have evolved resistance to 23 of the 26 known herbicide sites of action.

Herbicide resistance management strategies must be included in all weed control recommendations. Herbicide resistant weeds are not new for growers in New York State. In fact, we have four officially confirmed herbicide resistant weeds which include common lambsquarter, smooth pigweed, common groundsel and common ragweed all of these cases are resistant to triazine herbicides. Common ragweed was the last herbicide resistant weed case reported back in 1993.

This list will soon grow to include at least two, if not, three new herbicide resistant weed cases in NYS. Added to the list will be horseweed (marestail) and tall waterhemp. Many growers in Central and Western New York are now dealing with herbicide resistant marestail and a much smaller number of growers are now finding resistant populations of tall waterhemp in their fields. The third suspected herbicide resistant case is the recent discovery of palmer amaranth on a NY farm in October. This is the first report of this weed growing in NYS. For those unfamiliar with palmer amaranth, the Weed Science Society of America ranks it as the most troublesome or difficult to control weed in the United States.

Remembering back to pesticide applicator training classes, you may remember the term Mode of Action when herbicides were discussed. The mode of action can be used to describe the process or how the herbicide controls the targeted weed. When we talk about herbicide resistance management we need to think about Site of Action (SOA). The SOA is the location in the plant where the herbicide acts or has its effect on the plant. The SOA is sometimes referred to as the Mechanism of Action.

When selecting herbicides to include in the tank mix we must now pay close attention to not only the mode of action, but also the site of action. Resistance management strategies include using herbicides with different sites of action. It is challenging enough to come up with an effective herbicide weed control program and now we are being asked to include herbicide sites of action in the decision making process. Fortunately, there has been a numbering system developed to make this an easier task. There are now herbicide group numbers assigned to each different SOA. The group numbers are found on the first page of almost all herbicide labels that we currently use in field crop production. Multiple numbers in the box indicate the herbicide or herbicide premix has more than one SOA (see example below).

It has been said many times before that there is an app for just about everything. This is true about an app used to look up the specific SOA(s) for herbicides. Take Action on Weeds has a very handy herbicide lookup tool app that can be used on Android and Apple smartphones, tablets, as well as, desktops. It can be found at www.IWillTakeAction.com/app.

When we use herbicides with the same SOA over and over again it fosters the development of herbicide resistant weed populations. To prevent or delay the

Example of Roundup PowerMax label (Group 9)

GROUP	9	HERBICIDE

Example of Flexstar GT (Group 9 + 14), a Flexstar (fomesafen) + Glyphosate premix

GROUP	9 + 14	HERBICIDE

development of herbicide resistant weeds we must include herbicides with different sites of action in the tank mix. In order for this resistance management strategy to work you must have at least two different SOAs that are effective on the targeted weed.

Here are some scenarios that demonstrate how we can best use the herbicide group numbering system when making herbicide application recommendations.

Let's examine a no-till soybean burndown program for control of multiple resistant marestail (glyphosate and ALS resistant (or Group 9 and 2)) using a tank mix of glyphosate (group 9) + Valor XLT (a premix of Classic (group 2) + Valor (group 14)) + 2, 4-D LVE (group 4). This herbicide program contains herbicides with 4 different SOAs, a group 9, 14, 2, 4. The marestail in our example is resistant to both group 9 and 2 so these products will do nothing to control the marestail; however, the Valor (group 14) component in Valor XLT and 2,4-D LVE (group 4) will provide two different effective SOAs on our targeted weed, multiple resistant marestail.

Here is another example using glyphosate resistant (GR) tall waterhemp in Roundup Ready soybeans. A Flexstar GT (a premix of Flexstar (group 14) + glyphosate (group 9)) application applied postemergence to soybeans for the control of emerged GR tall waterhemp will provide control. It will provide control of GR resistant waterhemp because the Flexstar (group 14) in the Flexstar GT is providing the control. However, from a resistance management strategy this may not be the best program because the only effective SOA in this program is from the Flexstar component. This will put greater selection pressure on our population of tall waterhemp and it could eventually become resistant to the Group 14 herbicides. To improve this program you could elect to apply a soil applied herbicide preemergence such as Dual II Magnum, Outlook or Warrant (all group 15 herbicides) followed by a postemergent application of Flexstar GT. This will provide two different SOAs (Group 15 and 14) that are effective on our targeted weed, GR tall waterhemp.

Utilizing effective herbicide resistant management strategies goes beyond just using herbicides with different effective sites of action. This is just one part of the resistance management puzzle that we need to piece together so that we can delay the development of resistant weeds from showing up on our farms. Herbicide names used in this article are for illustrative purposes only and do not constitute and endorsement of the product.

Pest Management

Avipel Shield Seed Treatment Repels Birds and Improves Corn Establishment

Ken Wise and Jaime Cummings
New York State IPM Program, Cornell University

Many species of birds, including crows, ravens, black birds, starlings, grackles, Canada geese and wild turkeys, are a pest problem annually for corn growers in several areas in New York State. Many growers have issues with birds picking corn seed and seedlings out of the ground after planting.

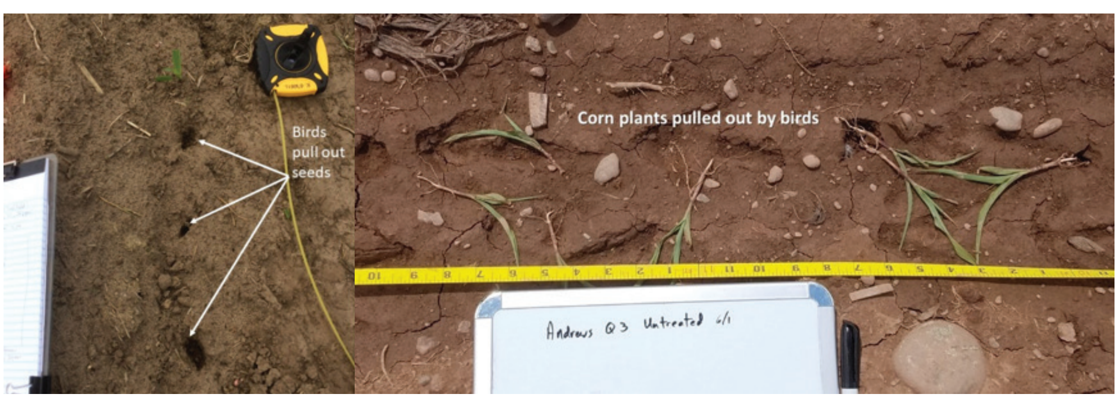
Birds can greatly reduce corn plant populations in fields. Many farmers indicate that they do not achieve high yields in fields with high bird pressure. Bird damage is not easily predictable. But small fields surrounded by roosting areas with soils that are compacted or gravelly, and where seed is planted shallow tend to be most susceptible. However, damage can be observed in any corn field where a random flock of birds decides to feast. Many farmers have this problem annually, and struggled to find effective options to keep birds out of the fields.

A biological seed treatment, called Avipel Shield, developed by Arkion Life Sciences, is marketed to repel birds from feeding on newly planted corn seed and seedlings. The active ingredient is “anthraquinone”, which is a plant extract found in aloe, rhubarb, buckthorn and more. The corn seed is coated with Avipel Shield, which is also compatible with other conventional seed treatments. As it states on the product’s website, “Avipel Shield (AQ) creates a powerful negative intestinal reaction in all birds”. This product does not harm the birds, but causes them to forage elsewhere. The product can come pretreated on seed, or the farmer can apply it themselves.

Corn growers in NY were interested to know if this product really worked. Therefore, NYS IPM and CCE collaborators around the state conducted 3 years of research to determine the efficacy of this product for deterring birds from feeding on newly planted corn fields.

Methods and Procedures:
We worked cooperatively with nine CCE educators/ specialists who organized 11 farms in eight counties (Schenectady, Delaware, Jefferson, Ulster, Green, Lewis, Oneida and Franklin) to implement this on-farm research project. Trials were established in fields that traditionally had a history of excessive bird damage to newly seeded field corn. Each trial involved a split-field design on 5 acres. Half of each trial (2.5 acres) was treated with Avipel Shield and the other half was not. A 97-day, multi-purpose triple-stacked hybrid was selected with a typical insecticide and fungicide seed treatment package from Dairyland (HiDF 3197RA) in order to minimize other possible variables from interfering with the research. Any remaining acreage of each field was planted to a hybrid of the farmer’s choice. Data was collected at each trial from each treatment at the V3 growth stage from two random samples in four quadrants of each treatment area. Plant populations were measured in each of the quadrants in 100 ft lengths of two consecutive rows. Observations on crop damage from birds were recorded at this time. Yields were recorded, when possible, for both silage and grain trials. For silage trials, scales and wagons/trucks were used to measure the wet plant weight of the entire treatment area (2.5 acres), or were hand harvested at five random locations in each treatment block, cut a 20’ row length at 10” above the soil surface. For grain trials, yield monitors were used to determine bushels/acre.

Results:
The results of the five replicated trials in 2016 showed that



Photos by Joe Lawrence (PRO-DAIRY, Cornell University)

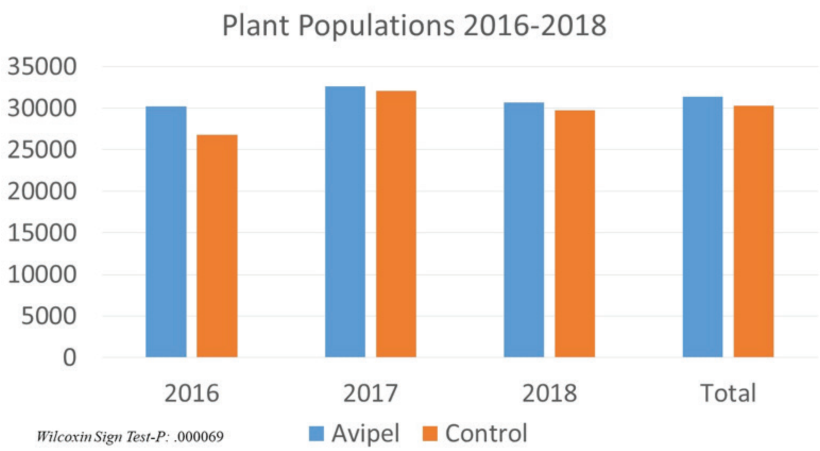


Fig 1. Combined overall plant populations of the Avipel treated and non-treated seed.

the seed treatment significantly reduced feeding by birds. On average, the plant population in the Avipel treated plots was 30,237 plants/acre, compared to 27,604 plants/acre in the non-treated plots, resulting in 2,632 more plants/acre in the Avipel treated plots. In 2017, there were 16 replicated trials, and the Avipel treatment resulted in significantly higher plant populations overall when compared to the non-treated control, with an average of 612 more plants per acre. In 2018, there were 20 replicated trials. Once again, the Avipel treatment resulted in significantly higher plant populations overall when compared to the non-treated control, with an average of 962 more plants per acre. With plant population data pooled from all three years of the study, the difference between the Avipel treatment and the control was highly significant (Figure 1). Despite the significant increase in plant populations in the Avipel treated plots, there was no significant difference in yield between the treatments. However, many factors account for end of season yields in field corn, including weather and other environmental factors.

Impacts and Observations:
In this study, crows were the main pest observed in the fields, but there were also turkeys, seagulls and red winged black birds observed. It is thought that the birds learn the effect of the product, and likely do not return to those fields in subsequent years, though this was not specifically measured in this study. The main impact of this research revealed that Avipel Shield helps maintain plant populations, especially in fields with high bird pressure. But, birds, like crows, are complicated in how they select where they want to roost and feed from year to year, making it difficult to predict bird damage.

One observation from this study is that there may have been an effect within the same field where Avipel-treated seed is planted next to the non-treated seed. The birds may have left and avoided the entire field after experiencing the Avipel, rather than seeking to feed on the non-treated half of the field. A second observation is that once the birds learned the taste of Avipel in certain fields, they did not return, and many of the fields used in this study were planted to the same trial each year. This may explain the low bird pressure in some fields.

Avipel Shield has since been registered for use in New York, and some of the growers involved with this project have decided to treat all of their corn with Avipel based on the results of participating in these trials.

This research was made possible with funding from the NYS Corn Growers Association and the NYS Farm Viability Institute, and with extensive assistance from CCE collaborators Aaron Gabriel, Kevin Ganoe, Jeff Miller, Mike Hunter, Dr. Kitty O'Neil, Joe Lawrence, Paul Cerosaletti, Dale Dewing and Dr. Paul Curtis.

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Calendar of Events

FEB 12	2019 Corn Day - Cooperstown, NY
FEB 12	New York Certified Organic 2019 Winter Meeting - Geneva, NY
FEB 14	Winter Shop Meeting - CCE Cayuga County - Conquest, NY
FEB 27 & 28	Forage Quality Conference - Hamilton & Johnstown, NY, respectively
MAR 1	Musgrave Winter Shop Meeting: Utilizing corn silage trial results - Aurora, NY
MAR 12	New York Certified Organic 2019 Winter Meeting - Geneva, NY
MAR 15	Winter Shop Meeting - CCE Cayuga County - Cato, NY

Have an event to share? Submit it to jnt3@cornell.edu!

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What's Cropping Up? is a bimonthly electronic newsletter distributed by the Soil and Crop Sciences Section at Cornell University. The purpose of the newsletter is to provide timely information on field crop production and environmental issues as it relates to New York agriculture. Articles are regularly contributed by the following Departments/Sections at Cornell University: Soil and Crop Sciences, Plant Breeding, Plant Pathology, Animal Science and Entomology. **To get on the email list, send your name and address to Jenn Thomas-Murphy, 237 Emerson Hall, Cornell University, Ithaca, NY 14853**

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