COLLEGE OF AGRICULTURE & NATURAL RESOURCES

MAES | MARYLAND AGRICULTURAL EXPERIMENT STATION

CMREC Headquarters Clarksville Facility

ROOTS IN RESEARCH

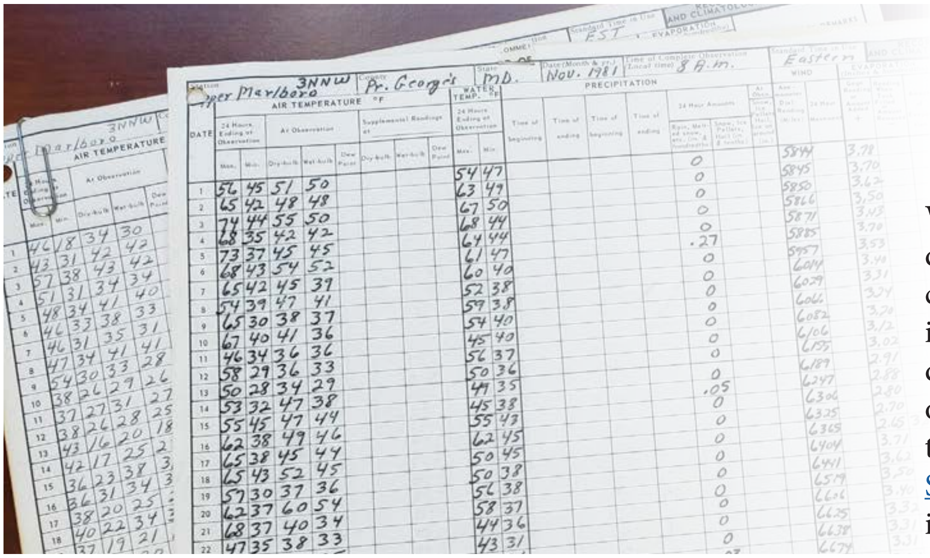
Yield of 2023

The 2023 growing season can be summed up in a single word: “dry.” Changes in rainfall patterns and hot, dry summers are just one of the stresses that MD farmers can expect to face under a changing climate. Many of the research projects carried out at the UMD RECs are helping to find solutions to help farmers cope with drought stress and other climate change factors. From genetic improvements to crops and alternative crop rotations, to cover crop management and climate monitoring, the studies carried out at our RECs are designed to ensure the success of MD agriculture through adaptive and resilient cropping strategies. Enjoy this summary highlighting the hard work that UMD researchers are doing in pursuit of solutions to agriculture’s most pressing problems.

Alan Leslie
MAES Center Director
WMREC | CMREC | LESREC

To view this newsletter electronically, scan the QR code!

In This Issue:



Clarksville Weather Station

Weather data for Poplar Hill and Salisbury are displayed on our website. The information can be displayed by month, or by the year in a printable format. To compare weather data averages by the month or year, check out our website! If your research requires this data in a different format, please contact Sheila Oscar and she will help to get the information you are requesting.

Roots in Research
CMREC Beltsville, Clarksville, Turfgrass and Upper Marlboro, LESREC Poplar Hill and Salisbury, and WMREC Keedysville are published by the University of Maryland Extension

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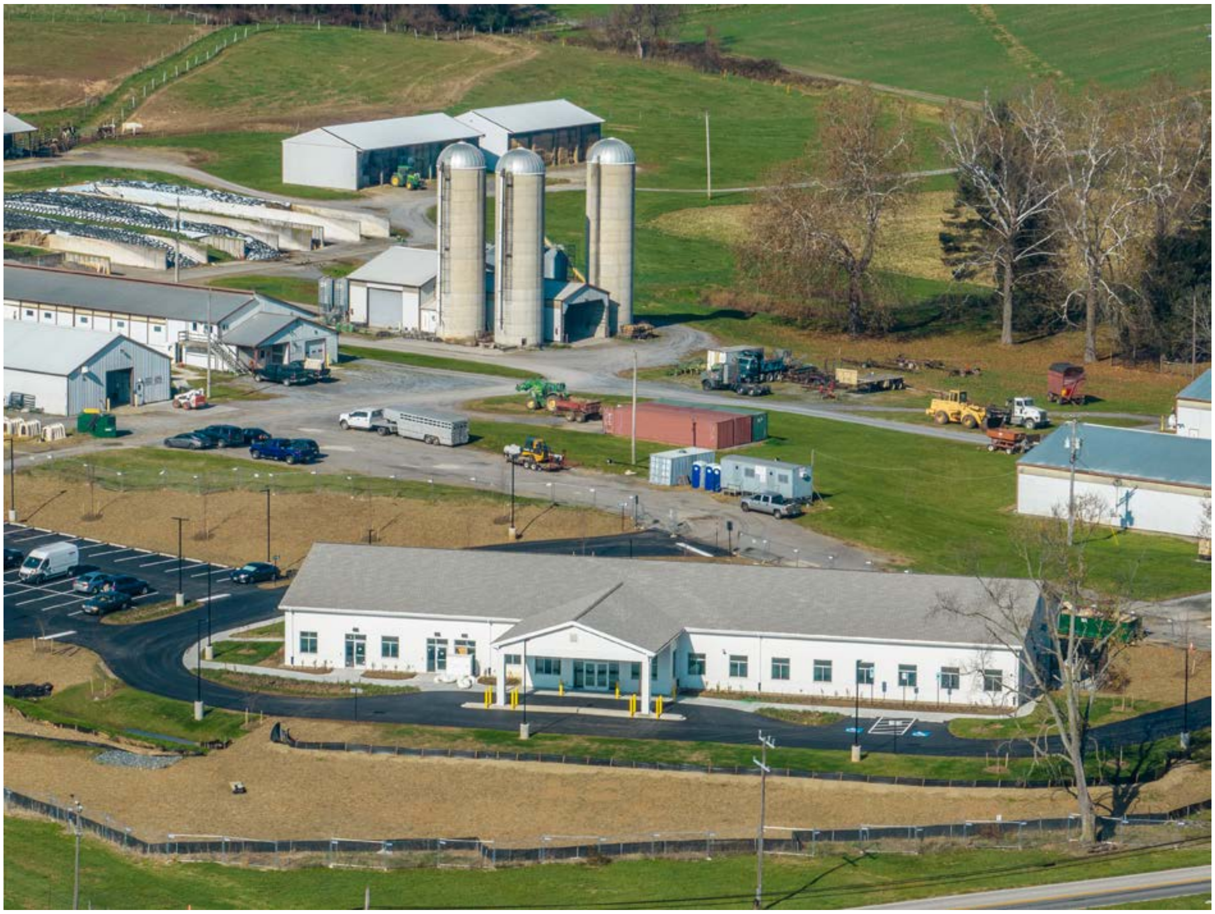
New Building at Clarksville CMREC



This year we are all eager to see the doors finally open on the new building that will serve as CMREC headquarters. This 13,000 ft 2 building will provide us modern office spaces to replace the aging facilities off Homewood Drive and bring together the faculty and staff from MAES and the UME Home and Garden Information Center and Commercial Horticulture Program. We also look forward to welcoming new faces, with new specialists in Urban Agriculture, Entomology and IPM, Residential Landscaping, and Native Plants. In addition to the greatly improved office space, the new building will facilitate holding workshops, classes, and seminars with its new classroom space and teaching laboratory. The classroom holds nearly 100 participants or being divided into 3 smaller rooms and is fully equipped with screens, cameras, and microphones to enable virtual or hybrid workshops. The teaching laboratory is a unique workspace within MAES and will function both as a diagnostic laboratory to support commercial horticulture clientele and as a space for hands-on workshops in disease diagnosis, microbiology, and other lab-based lessons. We look forward to hosting a diverse array of educational programming here at CMREC-Clarksville as these new teaching resources become available.

The new headquarters building will be sure to bring some big changes to the CMREC- Clarksville facility as people move into their new offices, workshops and classes are finally held, and more field day events are planned and hosted. There is bound to be a period of adjustment for the farm crew getting used to the increase in traffic and the UME faculty and staff learning the sites, sounds, and smells of the dairy facility, but these changes are bound to result in a net positive for the facility. Already there are plans and discussions about adding additional trials and demonstrations in the “organic field” adjacent to the building, planning new training opportunities, and bringing additional programming to this location. I am grateful for the investment that AGNR has made in the CMREC-Clarksville location, and I look forward to future investment by MAES and UME faculty and staff.

Hybrid Hazelnuts for Maryland Growers as an Alternative Crop for Maryland Growers

Submitting grant:

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Stanton Gill, Extension Specialist in Entomology and IPM, CMREC, University of Maryland Extension, CMREC

Andrew Ristvey, Extension Specialist, Nutrition and Water Management Specialist, Commercial Horticulture, University of Maryland Extension WYEREC.

Situation: Maryland growers are in a unique position to produce and market a new crop for local markets. The crop we are are proposing can be sold at farm markets, pick your own, local restaurant and caterer sales and would be new to Maryland is Hybrid hazelnut trees. Disease resistant hazelnuts can be trees that Maryland nurseries can grow and sell to landscapers for installing into landscapes as an edible nut tree.

European hazelnuts , *Corylus avellane*, produce a high quality nut that can be eaten fresh or use in baked goods. Demand for these nuts are strong and Oregon has been the lead state to produce these nuts for sale in the United States. What has inhibited growth of European type hazelnuts on the East coast has been a devastating disease called filbert blight (Hazelnut=filbert) caused by Eastern Filbert Blight, also known as EFB, a fungal disease that is native to a wide area in eastern North America. Here it is found naturally associated with its host, native American hazelnut (*C. americana*), on which it causes only limited damage. However, EFB causes severe cankering, branch die-back and death of susceptible European hazelnuts (*C. avellana*). The primary limiting factor for growth of commercial European hazelnuts is EFB susceptibility.

American filberts, *C. americana*, are smaller than commercially produced European hazelnuts. That's why the native American species are not usually grown commercially – people prefer the larger European nuts. Wild American hazelnuts are slightly sweeter and milder in flavor but extremely small.

Plant Breeder, Dr. Thomas Molnar, Rutgers University, has released several hybrid cultivars (cross of *C. avellane* and *C. americana)* that have the size and shape of European hazelnuts and the filbert blight resistance that American filbert exhibit. He has made these cultivars available through a nursery, Foggy

Bottom Plant Nursery, in southern New Jersey. We have contacted both Tom Molnar and the owner of Foggy Bottom Tree Farm, and they have agreed to supply us with filbert blight resistant hybrid hazelnuts to plant at the University of Maryland CMREC facility to evaluate for a new crop for Maryland growers. They will supply two cultivars to evaluate 'Somerset' and 'The Beast' hazelnut trees, followed by additional cultivars that will available in the fall of 2023.

These plants will be tissue-culture produced plants which will be purchased in May of 2023 and grow in containers until September of

2023. They will then be planted at the Central Maryland Research and Education Center in fall of 2023. In the fall of 2023, Foggy Bottom Nursery agrees to sell us three additional hybrid , disease resistant hazelnuts from the Rutgers breeding program. These will include 'Hunterdon', 'Grand Transverse' and

What has been done so far in 2023:
We purchased two cultivars of hybrid hazelnuts, 'Somerset' and 'The Beast' from Foggy Bottom Tree Farm in May of 2023. These were planted transplanted field research plots at CMREC and WYEREC in June of 2023. In the fall additional hybrid filbert plants, 'Hunterdon', 'Grand Transverse, and 'Raritan' will be purchased from Foggy Bottom Tree Nursery. These will be planted in September of 2023.
David Clement, Stanton Gill, Andrew Ristvey, Suzanne Klick and Sheena O'Donnell, will evaluate growth, disease resistance and insect tolerance. Field days will be held for Maryland Growers, on a yearly basis, to see the test plots at CMREC and demonstrate to them the most viable cultivars.

Efficacy of Turf Organic Herbicides

Kelly Nichols | kellyn@umd.edu | University of Maryland Extension, Montgomery County

Background
In some areas of Maryland, synthetic pesticides are restricted or banned for use in home lawns. This study was conducted in order to research the efficacy of some turf organic herbicides. These trials included both pre- and post-emergent control.

Pre-Emergent Trial
This trial focused on pre-emergence control of crabgrass (Digitaria sanguinalis [L.] Scop) using a corn gluten product with a nitrogen percent that complies with the Maryland Fertilizer Law. (This law limits the amount of nitrogen that can be applied to turf.)

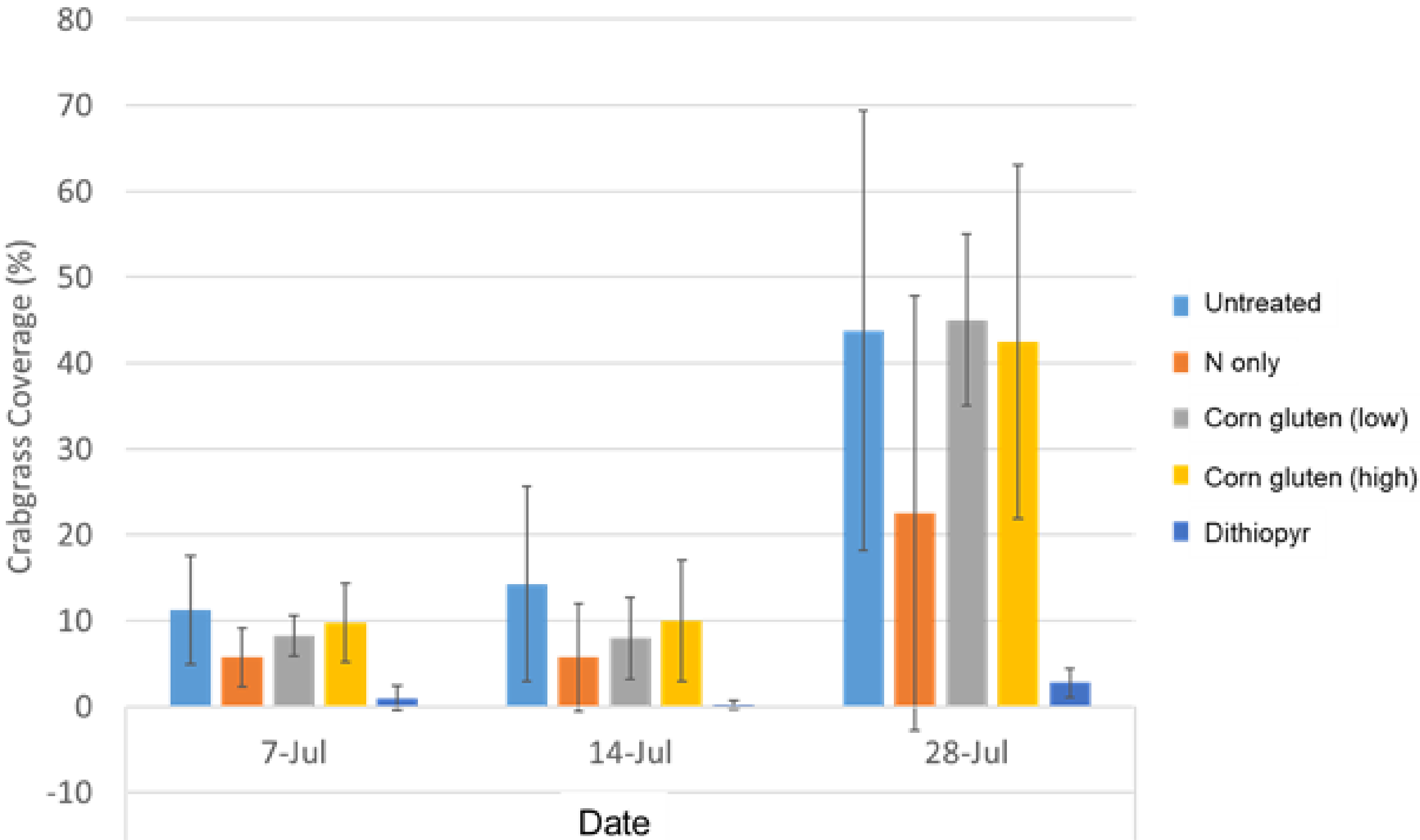
Methods
Two rates of the corn gluten product were included, along with a nitrogen fertilizer only and standard treatments for comparison (Table 1). Treatments were placed in a randomized complete block design with three replications. Individual plots measured five feet by five feet. The first application was made on April 4, prior to crabgrass emergence. A second application of all treatments was applied on May 16.

Table 1. Pre-emergent trial treatment list.

Treatment	Product Rate (lbs per 1000 sq ft)
untreated	--
nitrogen fertilizer only (ammonium sulfate)	2.4
corn gluten	3
	5
dithiopyr	3.6

Results
Crabgrass germinated after the first application. However, due to cooler spring weather, crabgrass did not grow much beyond seedling stage for a few months. Through April and May, presence and absence or relative severity ratings were taken. It was not until July that the crabgrass was tall enough to collect percent coverage of the plots (Figure 1). The amount of crabgrass across the plots was highly variable. Therefore, the efficacy of the corn gluten product in this trial was inconclusive.

Figure 1. Crabgrass coverage in pre-emergent trial.



Standard deviation bars are included, which measure how dispersed the data is in relation to the mean for each treatment and date.

Post-Emergent Trial

This trial focused on broadleaf control using various application rates and intervals of two organic herbicides.

Methods

Twelve organic treatments were included, along with one synthetic treatment for comparison (Table 2). Treatments were placed in a randomized complete block design with three replications. Individual plots measured five feet by five feet. Applications were made on June 30, July 21, July 28, and August 11. These timings were later than anticipated due to logistics of obtaining herbicides. Visual control ratings were taken throughout the study.

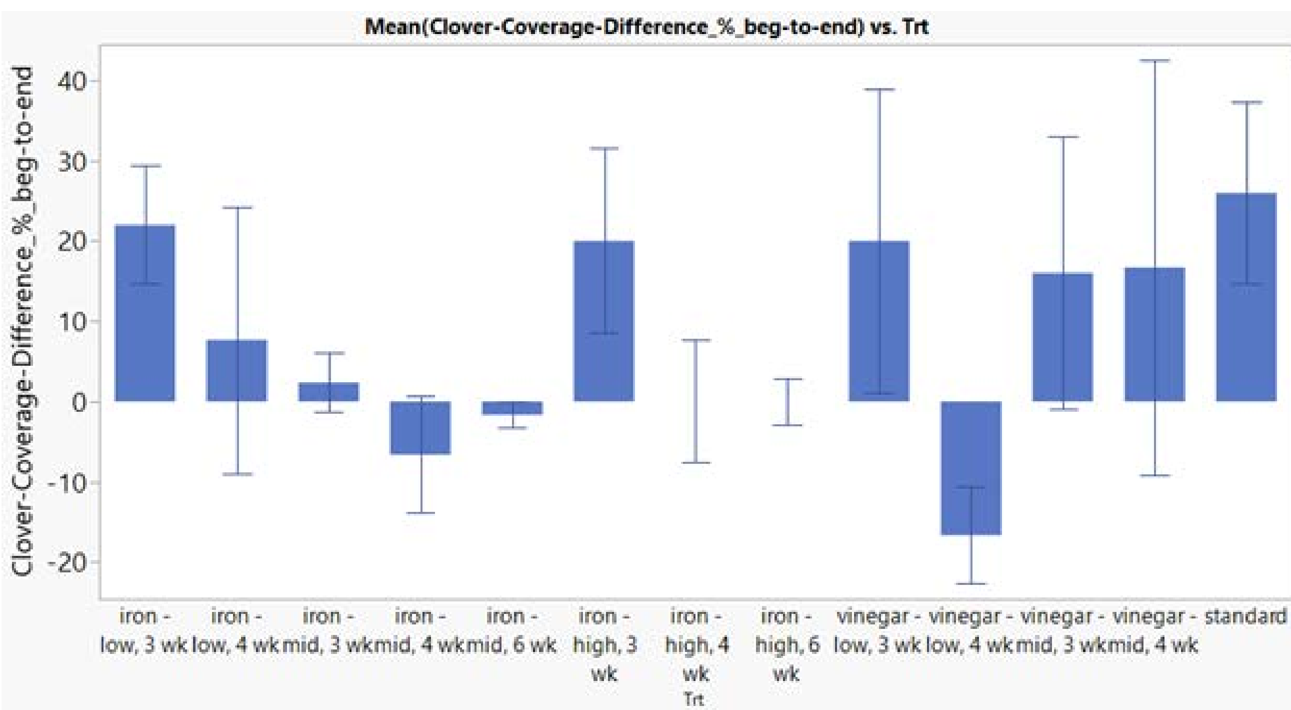
Results

White clover (Trifolium repens L.) was the predominant broadleaf weed present across all plots. The amount of clover present at the end of the study was compared to the amount present at the beginning of the study (Figure 2). While an initial burn and dieback was seen, and the amount of clover may have been reduced in some plots, the overall variability resulted in no significant differences. Application timing may have played a role in the variability of control, since by mid-summer, the clover would have been larger and harder to control compared to spring, the more common time for POST applications in turf. Future research is planned with spring POST applications to better reflect control when weeds are smaller.

Table 2. Post-emergent trial treatment list.

Treatment	Rate (fl oz/1000 sq ft)	Solution (gal/1000 sq ft)	Application Interval (wks)
Untreated	--	--	--
Iron (low)	12.6	2.5	3 & 4
Iron (mid)	25.2	4.9	3, 4, & 6
Iron (high)	50	10	3, 4, & 6
Vinegar (low)	44 fl oz/1000 sq ft (20% solution RTU)		3 & 4
Vinegar (mid)	66 fl oz/1000 sq ft (20% solution RTU)		3 & 4
Standard (2,4-D + dicamba + MCPP + carfentrazone)	2	1	--

Figure 2. The difference in clover coverage from the beginning to the end of the study.



Positive numbers indicate a reduction of clover by the end of the study. Negative numbers indicate an increase in clover by the end of the study.

Research Update: Effect of Soil Fertility on Triticale Yield and Quality

Amanda Grev PhD, Forage and Pasture Specialist, University of Maryland Extension
Jeff Semler, Principal Agent, University of Maryland Extension

It is well known that cover crops can provide many benefits in terms of soil health and nutrient retention, but in addition to this, winter forages can also serve as a high yielding and high quality forage crop for feeding livestock. Winter forages like triticale have been found to yield 2 to 6 tons of dry matter per acre and can produce forage with 180+ RFQ (relative forage quality) and 17 to 20% CP (crude protein). As a result, triticale silage has become a popular forage choice for many dairy producers to increase forage supply.

Given this, triticale has the potential to be not only a high quality forage but also a good source of protein for livestock, potentially even a more economical alternative compared to other feed ingredients such as soybean meal for meeting ration protein needs.

Figure 1. Harvesting triticale forage plots in Keedysville, MD on April 21, 2021

To produce this high yielding, high quality forage, good management is essential. The yield potential for winter forages is largely based on planting date and fall nitrogen availability; these two critical factors determine the number of fall tillers, which sets the yield potential for the following spring. To support these higher yields while maintaining high forage protein concentrations, winter forages require adequate nitrogen and sulfur fertility. Previous research evaluating nitrogen fertility rates for triticale found that providing additional spring nitrogen was not only successful, but economically advantageous as a means to increase forage protein content and offset soybean meal costs.

Treatment	Nitrogen	Sulfur
	—— lb/A ——	
CON	0	0
SUL	0	15
NLOW	50	0
NSLOW	50	15
NMED	100	0
NSMED	100	15
NHIGH	150	0
NSHIGH	150	15

Table 1. Fertility treatments applied to replicated triticale plots

With that, the objectives of this study were 1) to investigate the effect of increasing nitrogen (N) fertility rates with and without sulfur (S) on triticale yield and quality, 2) to evaluate production implications when incorporating the forage into dairy cow diets, and 3) to assess the economics of this strategy as a means to meet ration protein needs. This was accomplished via an initial field trial to assess soil nutrient status, forage quality, and forage yield of triticale under varying nitrogen and sulfur fertility treatments, followed by a feeding study to assess dairy cow milk production and performance when fed the resulting forage, and finally an economic analysis to assess the effectiveness of the system.

Methods

Field trials were completed during the winters of 2020-2021, 2021-2022, and 2022-2023. In September of each year, triticale was established in replicated fields at both the Central (Clarksville) and Western (Keedysville) Maryland Research and Education Centers. Fertility treatments included increasing levels of nitrogen with and without the addition of sulfur and are depicted in Table 1. Fertility treatments were applied in March of each year, and soil nitrate samples were collected before and after fertilizer application to test for potential losses due to nitrate leaching. Triticale plots were harvested when forage reached the boot stage in late April. At both locations, plots were harvested mechanically using a forage harvester (Figure 1). Harvested forage was weighed for yield determination and subsamples were taken for forage quality analysis.

In the fall of 2020 and 2021, triticale was also established in three 5-acre fields at the Clarksville location to provide forage for two feeding studies. The NLOW, NMED, and NHIGH fertility treatments were applied to these fields in March of 2021 and 2022 and the resulting forage was chopped and ensiled using ag bags in late April of each year. With this forage, two feeding studies were completed using Holstein dairy cows at the University of Maryland dairy in Clarksville. Each feeding study was set up as a replicated study design with 28 lactating cows and 4 dietary treatments. Cows were housed in a freestall barn equipped with a Calan door system to allow for individual animal feeding and intake measurements (Figure 2). The standard (ALF) diet contained 60% forage (48% corn silage, 22% alfalfa silage) and 40% concentrate (DM-basis). The LOW, MED, and HIGH diets were formulated by replacing alfalfa silage with NLOW, NMED, or NHIGH triticale silage at a rate of 18-20% of diet DM (Table 2). Cows were randomly assigned to treatments and were fed their respective diet for 21 days before rotating to another treatment; this rotation continued until all cows consumed each dietary treatment. Feed intake, bodyweight, milk production, and milk components were measured throughout each feeding study.

Figure 2. Cows consuming TMR from Calan door system at UMD dairy in Clarksville, MD

Treatment	Corn Silage	Alfalfa Silage	Triticale Silage	Ground Corn	Soybean Meal	Mineral Meal
	% DM					
ALF	48.1	21.9	—	16.4	2.2	11.4
LOW	47.2	—	17.5	16.1	8.0	11.2
MED	47.2	—	18.0	16.1	7.6	11.2
HIGH	47.2	—	19.9	16.1	5.6	11.2

Table 2. Dietary treatments used for dairy feeding studies

Results

Analysis of the results for this study are in progress, but some preliminary results from the first field season (2020-2021) and first feeding study (2021) are presented here. Forage yields for the fertility treatments that included nitrogen were similar but were increased compared to the CON and SUL control treatments (Figure 3). This pattern held true at each location, with yields averaging 2.0 T/A at Clarksville and 2.7 T/A at Keedysville.

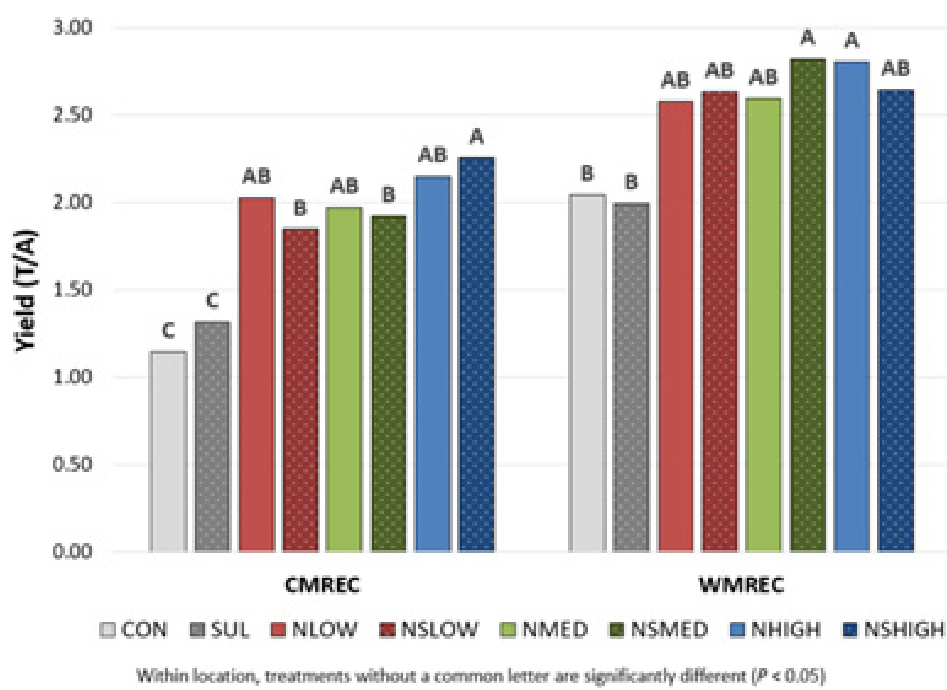


Figure 3. Forage yield for triticale forage plots in Clarksville (CMREC) and Keedysville (WMREC) harvested April 2021

At both locations, forage crude protein (CP) concentrations were lowest for the CON and SUL treatments (average 8.7% CP) and increased with increasing fertility, with the NHIGH and NSHIGH treatments containing the greatest amount of protein (average 18% CP; Figure 4). Across all fertility treatments, the addition of sulfur did not further increase forage CP concentrations, likely because fields were not limiting in sulfur prior to this experiment.

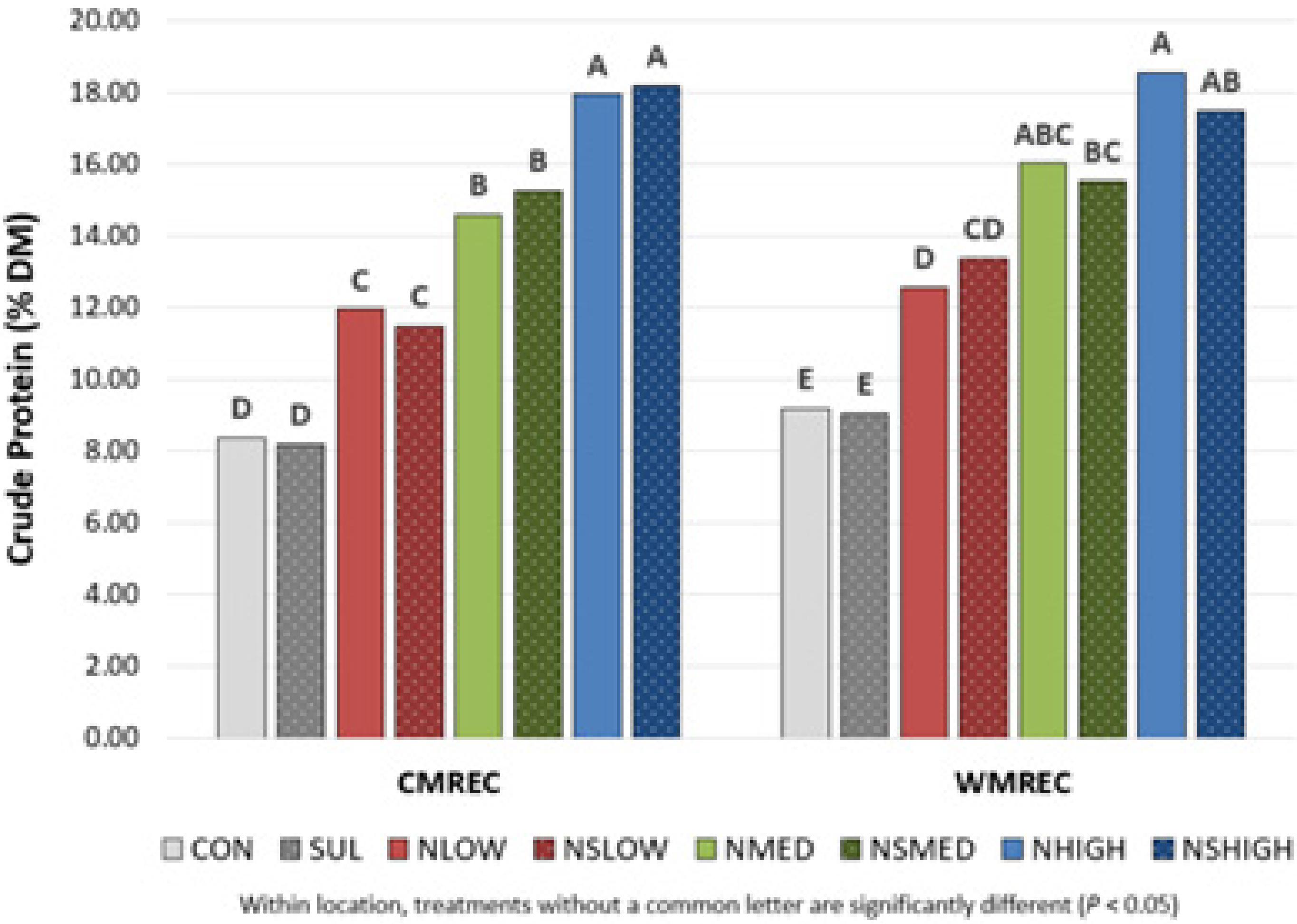


Figure 4. Forage crude protein content for triticale forage plots in Clarksville (CMREC) and Keedysville (WMREC) harvested April 2021

Neutral detergent fiber concentrations did not differ between fertility treatments at either location, averaging 51% across all locations and treatments. Similarly, total digestible nutrients did not differ between fertility treatments at either location, averaging 65% across all locations and treatments. At both locations, nitrate concentrations in soil samples taken both pre- and post-fertilizer application remained minimal, indicating no additional nitrogen losses due to leaching.

Feeding study results found no difference in feed intake or milk production across any of the dietary treatments (Figure 5). Across all treatments, feed intake averaged 51 lb DM/d and milk yields averaged 73 lb/d. Milk components were also similar across dietary treatments, with no differences in milk fat or milk protein concentrations.

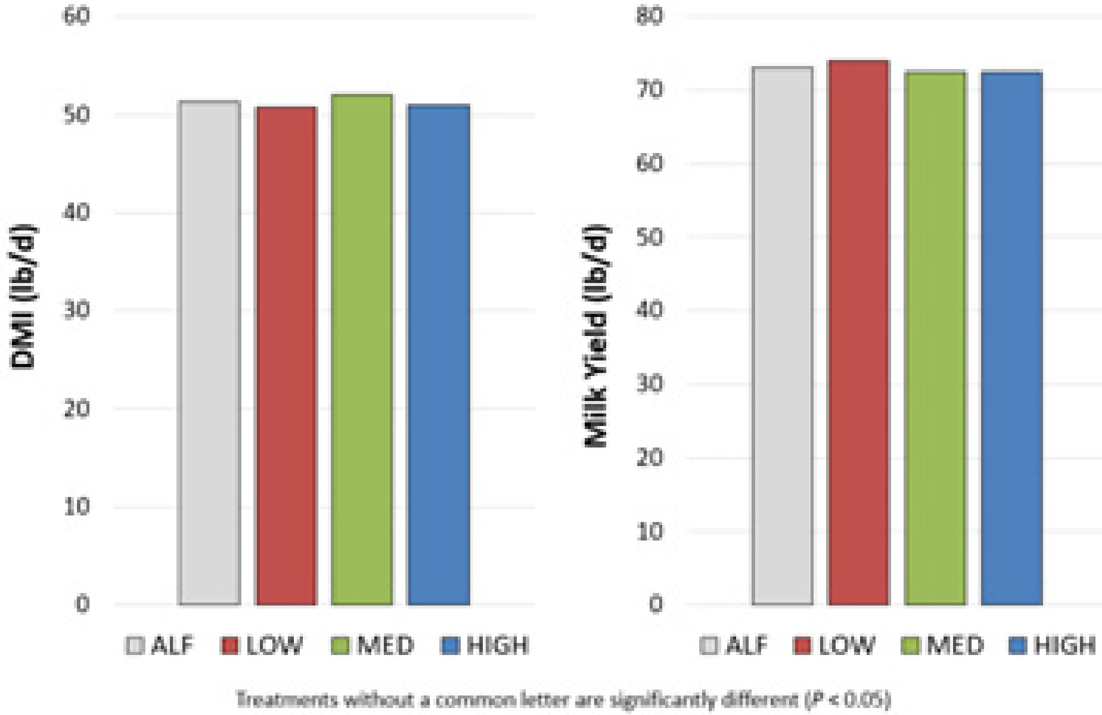


Figure 5. Dry matter intake (left) and milk yield (right) for dairy cows consuming the control (ALF) or triticale (LOW, MED, HIGH) dietary treatments.

Take Home & Conclusions

Overall, these preliminary results indicate that additional nitrogen fertility in the spring does not produce a consistent yield gain for triticale forage. This was not unexpected; as mentioned earlier, it has been shown that spring yield potential is largely set based on planting date and fertility management in the fall. However, results did show that additional spring nitrogen fertility can influence forage protein, with forage protein concentrations increasing from 9 to 18% as additional nitrogen fertilizer was applied. Additionally, low soil nitrate-N concentrations both pre- and post-fertilizer application indicate that there were no leaching losses and that this additional nitrogen was taken up by the triticale forage.

Results from this study also indicate that triticale forage can be used as an alternative to alfalfa silage without affecting milk production or components. Increasing the protein content of triticale silage through nitrogen fertilization did reduce the amount of soybean meal required to maintain dietary crude protein concentrations.

Future Plans

Moving forward, a full analysis of all three years of this study will be completed. Along with this, an economic analysis comparing the cost of meeting ration protein needs through increased soil fertility (i.e. increased triticale protein concentrations) versus through traditional sources such as soybean meal or alfalfa will also be completed. Future studies may compare these triticale fertility treatments against a triticale-annual rye-grass and/or triticale-legume combination.

Acknowledgements

We are grateful for the assistance provided by the staff at both the Clarksville Dairy Farm and the Western Maryland Research and Education Center in support of this study. This study was partially funded by the Maryland Agricultural Experiment Station Competitive Grants Program.

2023 Maryland Soybean Fungicide Efficacy Trials

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JUSTIFICATION

Fungicides are becoming increasingly popular in full season soybean production. These trials provide data that soybean producers can benefit from, such as: fungicide efficacy for managing common fungal diseases of soybean, monitor fungicide resistant pest populations, and track the economic impact of foliar fungicide applications over multiple years and environments unique to Maryland.

RESEARCH OBJECTIVES

1. Evaluate the efficacy of select foliar fungicides on full season soybeans grown on two research farms in Maryland by measuring foliar disease incidence and severity.
2. Determine any greening or green stem effects of the fungicides.
3. Monitor fungicide active ingredient efficacy over time and identify any fungicide insensitive foliar fungal pathogens.
4. Determine the yield impact of foliar fungicides and their economic impact.

METHODS

Plot Design
Field trials were established at three University of Maryland Research farms: Western Maryland Research & Education Center in Keedysville, MD (WMREC), Wye Research and Education Center in Queenstown, MD (WYE), and Central Maryland Research & Education Center (CMREC). Plots were 11’x30’ arranged in a randomize complete block design with five replicates. Planting details are outlined in Table 1. Plots were planted behind soybeans in order to create conditions conducive for developing foliar diseases on soybean.

Project supported by the Maryland Soybean Board

Table 1. Planting and harvest specifications.

	WMREC	CMREC	WYE
Seed:	**-------------------------Soybean, Mid-Atlantic Seed 3220E3-------------------------**		
Previous Crop:	**--Soybean--**		
Tillage	**--No till--**		
Plant Date: **Planter:** **Row Spacing:** **Population:**	**5/16/2023** **John Deere 1750** **30"** **150,000 seeds/acre**	**5/22/2023** **John Deere 1590** **7.5"** **150,000 seeds/acre**	**5/18/2023** **Great Plains EWNT-10** **7.5"** **150,000 seeds/acre**
Harvest Date:	**11/9/2023**	**11/7/2023**	**10/24/2023**
Harvester:	-------------------------------Almaco R1 research combine--------------------------------		
Harvest Area:	---------------------------------30' from Center 5' of plot------------------------------------		

Fungicide Applications

Fungicides (Table 2) were applied at the R3 growth stage (August 9 at WMREC and CMREC and August 2 at WYE) using a CO2 powered backpack sprayer equipped with TeeJet 8003 nozzles calibrated to deliver 20 GPA at 35 psi to the center 80 inches of each plot. Some plots had two fungicide treatments, the first at R3 and the second 14 days later with (R3+14 days). These applications were made on August 16 at WYE and August 23 at WMREC and CMREC.

Table 2. Fungicide treatments.

Treatment	Product Name Active Ingredient(s)	Application Rate (& Timing)
Non-treated Control	None	N/A
Headline	Headline 2.09 EC/SC *Pyraclostrobin*	12.0 fl oz/A (R3)
Veltyma	Veltyma *Mefentrifluconazole + Pyraclostrobin*	10.0 fl oz/A (R3)
Priaxor	Priaxor 4.7 SC *Pyraclostrobin + Fluxapyroxad*	8.0 fl oz/A (R3)
Lucento	Lucento 4.17 CS *Bixafen + Flutriafol*	5.5 fl oz/A (R3)
Topguard EQ	*Topguard EQ 4.29 EC* *Azoxystrobin + Flutriafol*	8.0 fl oz/A (R3)
Revytek	Revytek *Fluxapyroxad + Pyraclostrobin + Mefentrifluconazole*	15.0 fl oz/A (R3)
Revytek @ R3+14 days	Revytek *Fluxapyroxad + Pyraclostrobin + Mefentrifluconazole*	5.0 fl oz/A (R3 and R3+14 days)
Adastrio	Adastrio 4 SC *Azoxystrobin + Fluindapyr + Flutriafol*	5.5 fl oz/A (R3)
Adastrio @ R3+14 days	Adastrio 4 SC *Azoxystrobin + Fluindapyr + Flutriafol*	5.5 fl oz/A (R3 and R3+14 days)

Disease Rating

Foliar diseases were rated prior to fungicide application at R3 and approximately every two weeks following until approximately R6. Disease severity from frogeye leaf spot (FLS; Cercospora sojina) was visually rated as the percent leaf area infected in the upper canopy from the center rows of each plot (four rows for 15-inch row spacing plots and two rows of the 30-inch row spacing plots). Frogeye leaf spot is typically the most prevalent foliar fungal disease in Maryland soybean production..

Harvest and Statistics

Yield data were collected by harvesting the center 5 feet of each plot using an Almaco R1 research combine. All yields reported are adjusted to 13% moisture. Harvest dates are shown in Table 1. Statistics related to profitability and economics were calculated using the local cash market price for soybean of $13.05 per bushel at the time of analysis. Data were analyzed using ANOVA and significant differences between treatments were separated using Fisher's Least Significant Difference (LSD; α=0.10).

RESULTS & DISCUSSION

Disease Rating

Growing conditions were generally not favorable for disease development and we did not observe any ratable fungal diseases at any of the three trial locations. This is likely due to the weather conditions around pod fill, as well as the resistance package in the soybean variety; Mid-Atlantic Seed '3220E3' has a frogeye leafspot resistance rating of 6 on a 10-point scale (10 being the most resistant). This is now the third year in a row where no ratable foliar diseases were present in these plots.

Yield

Yields (Figure 1 and Table 2) varied greatly between locations. Yield average at WMREC was 45.5, 61.2 at CMREC, and 74.7 bushels per acre at WYE. Yields at WMREC were suppressed due to the drought in western Maryland. Statistically, there were no significant differences between fungicide treatments and the non-treated control at any of the trial locations (P=0.4331 at WMREC, P=0.6580 at CMREC, and P=0.4056 at WYE). There were also no significant differences in grain moisture or test weight.

	WMREC			CMREC			WYE		
Treatment	Yield (bu/A)	Moisture (%)	Test Wt. (lbs)	Yield (bu/A)	Moisture (%)	Test Wt. (lbs)	Yield (bu/A)	Moisture (%)	Test Wt. (lbs)
Control	42.4	11.6	55.5	60.6	14.7	57.5	73.0	12.4	57.7
Headline	46.6	11.8	56.9.	63.8	14.3	57.1	76.0	12.3	57.8
Veltyma	49.8	11.7	59.1	60.8	14.4	56.5	77.2	12.2	57.6
Priaxor	47.4	11.8	55.3	63.1	14.3	58.2	74.7	12.3	56.8
Lucento	46.7	11.9	58.5	58.8	14.6	58.0	78.0	12.2	57.4
Topguard EQ	42.2	11.9	58.3	57.6	14.7	57.1	72.4	12.5	57.1
Revytek	45.7	11.9	58.7	66.8	14.1	57.9	74.5	12.3	57.6
Revytek @ R3+14 days	43.4	11.9	59.0	58.8	14.7	57.5	77.6	12.2	57.6
Adastrio	47.8	11.9	58.8	63.6	14.3	57.8	72.0	12.4	57.4
Adastrio @ R3+14 days	43.3	11.8	56.3	56.9	14.7	58.2	72.0	12.4	57.5
P Value	0.4331	0.8806	0.7567	0.6580	0.3267	0.6191	0.4046	0.2030	0.7071

Table 2. 2023 Harvest Data.

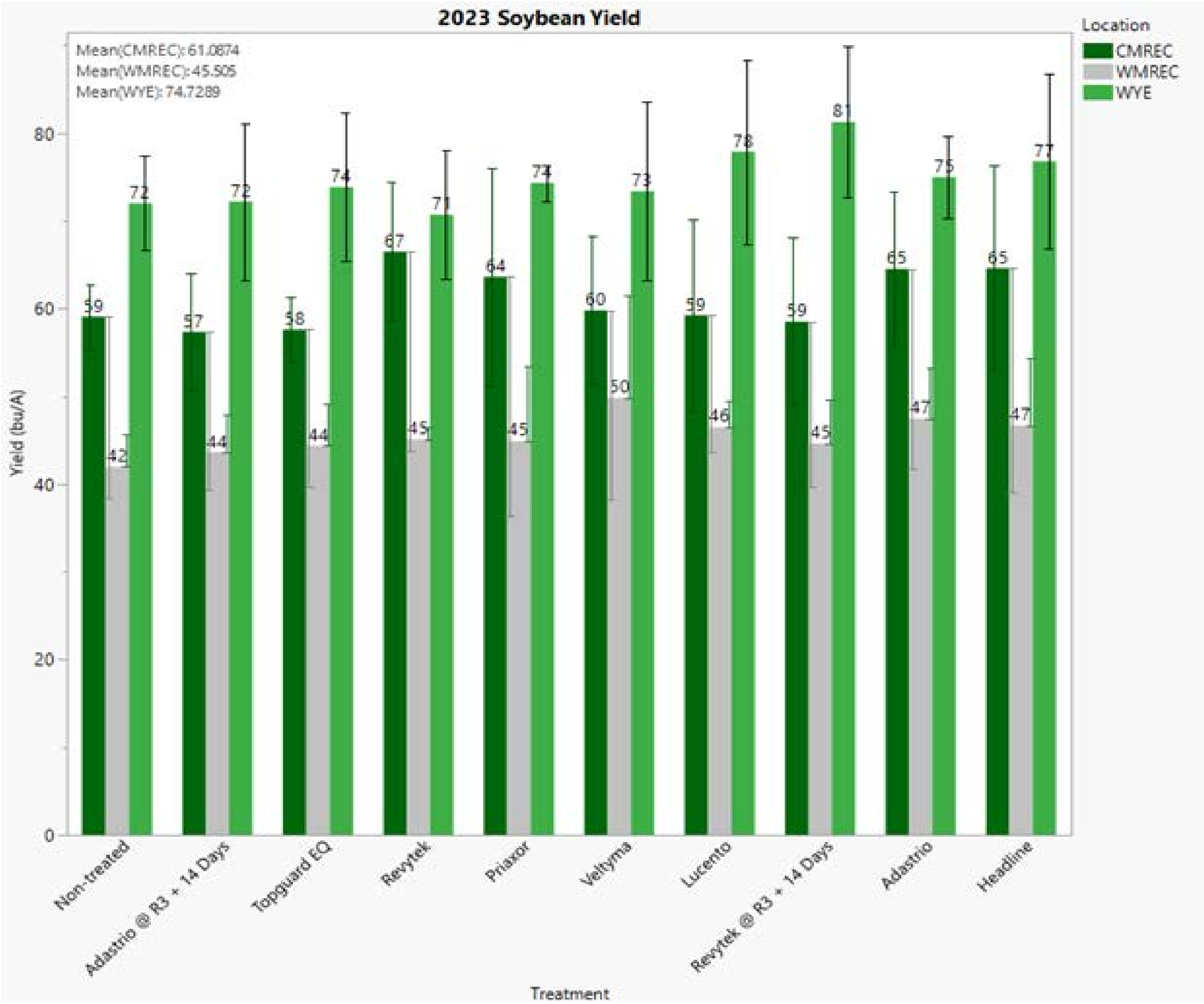

Figure 1. Soybean grain yield by location. Each error bar is constructed using 1 standard deviation from the mean. No significant differences between treatments at each location (α=0.10).

Since there was a significant difference in yield between locations (P<0.0001), relative yield was calculated and used to compare yields across locations. Relative yield was calculated by dividing the plot yield by the non-treated control plot yield and reported as a percentage. Values greater than 100 represent a yield greater than the control and values less than 100 represent a yield less than the control. When data were combined this way, no significant differences were observed between treatments (P=0.6901, Figure 2).

Green Stem

It is common for fungicides to keep plants greener for longer, and we observed a significant difference in plant greenness prior to harvest in plots that received a fungicide application. Both the single application at R3 and the double application at R3 and R3+14 days significantly increased green stem compared to the non-treated control (p=0.0221).

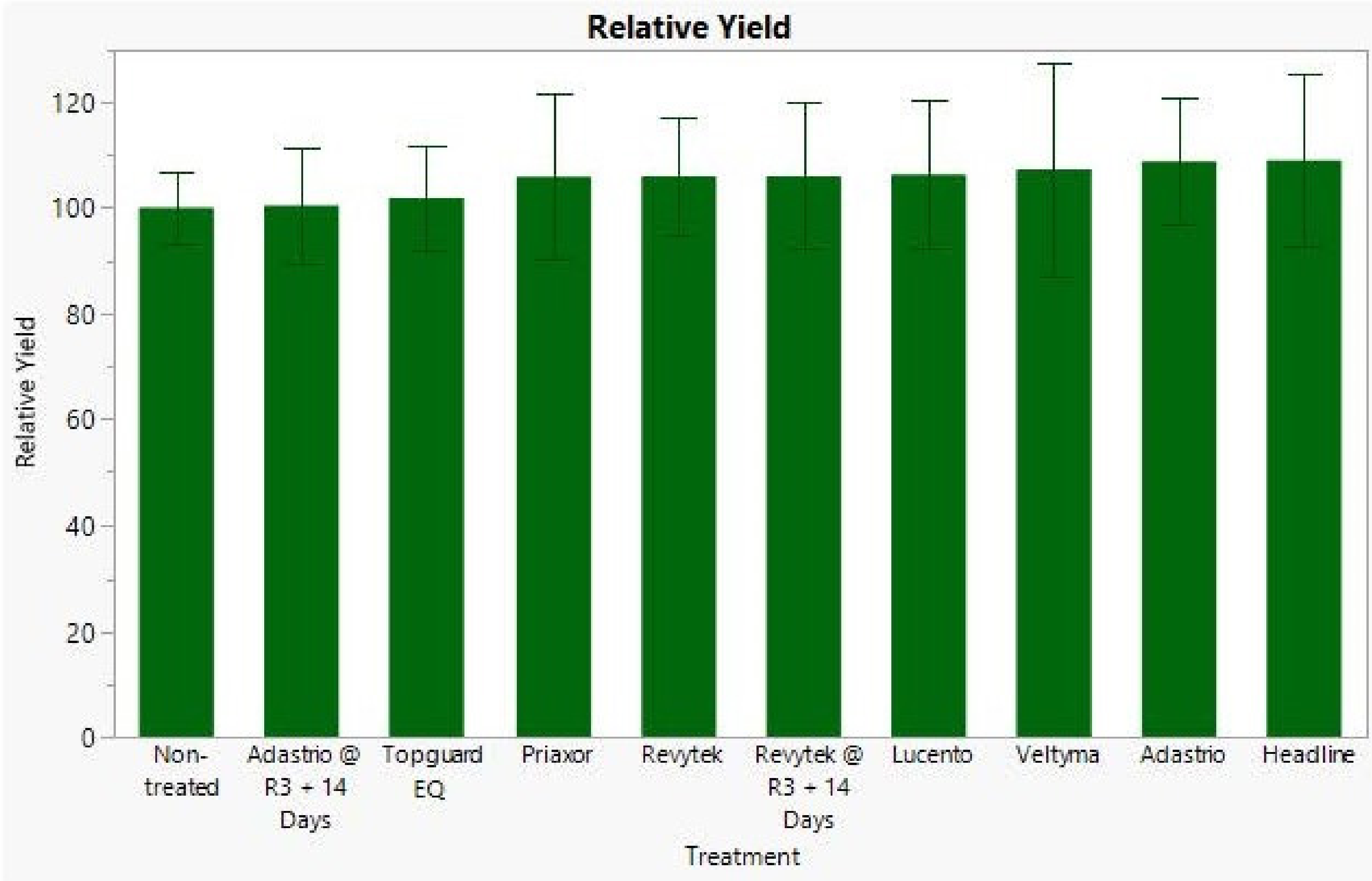

Figure 2. Relative grain yield of all site locations combined. Each error bar is constructed using 1 standard deviation from the mean. No significant differences between treatments (α=0.10).

CONCLUSIONS, IMPLICATIONS, AND FUTURE WORK

In previous years of this study, foliar fungicide applications with the selected products tested provided some benefit related to improved seed quality and yield in situations where FLS disease pressure was present at measurable levels (2018-2019). Fungicides also significantly increased plant greenness and delayed senescence.

During the 2023 growing season, however, none of the treatments tested yielded significantly different than the non-treated control. This is likely due to the fact that no ratable foliar fungal diseases were present in the plots this year. Without the presence of a pathogen, fungicides have reduced odds of improving yields over non-treated plots.

Relative net profit was calculated by multiplying the bushel increase over the non-treated control by the cash market price for soybean at the time of analysis (13.05/bu for December 2023) and subtracting the cost of application. A flat rate of $26.00 per acre was used for 2023 data; for plot with two applications, $52.00 was used. This metric, net profit, was used to compare the economics of the fungicides while accounting for yield, market prices, and the cost of application. Figure 3 shows net profit for each treatment; there are no significant differences (P=0.6838).

When net profit was analyzed by treatment timing (R3, R3 + 14, and none) across all years (2021-2023), the single R3 application was provided a significantly greater profit margin ($29/acre) than two treatment program (-$26/acre) and the non-treated control (P=0.0231; Figure 4). These data indicate that a single fungicide application at R3 provides the greatest yield increase and profit margin compared to a two-pass program.

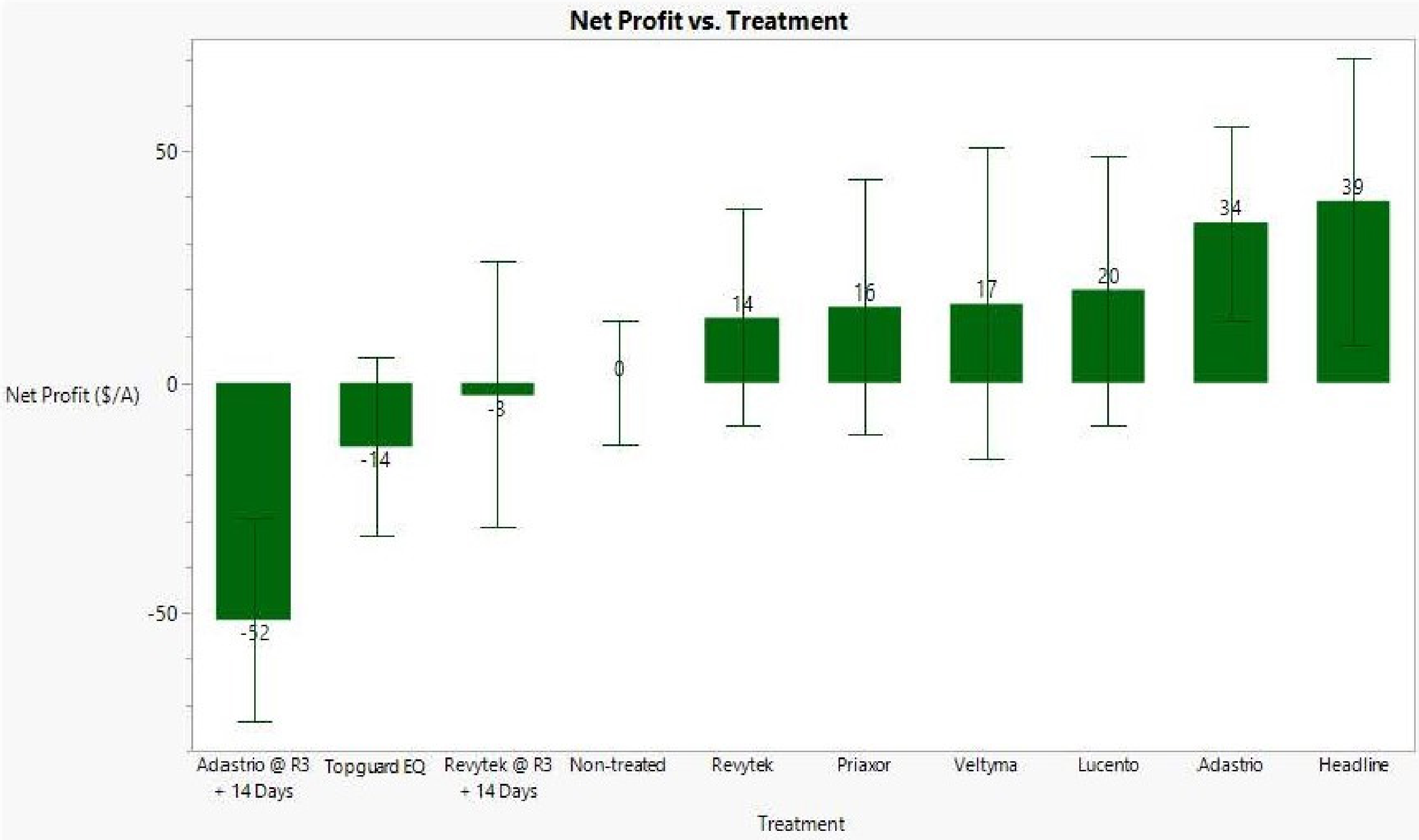

Figure 3. Net profit of 2023 fungicide treatments. Each error bar is constructed using 1 standard deviation from the mean. No significant differences between treatments (α=0.10).

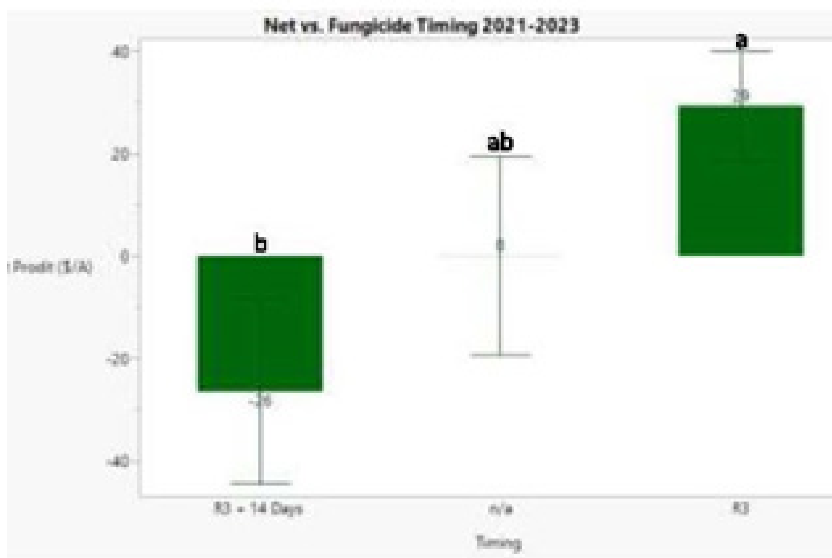

Figure 4. Net profit by fungicide timing of 2021-2023 treatments combined. Each error bar is constructed using 1 standard error from the mean. Treatment timings connected by the same letter are not significantly different (α=0.10).

Future work will be focused on replicating similar experiments over more plot-years to gather more data for Maryland's unique growing conditions and to track pathogen resistance and fungicide profitability over time.

ACKNOWLEDGEMENTS
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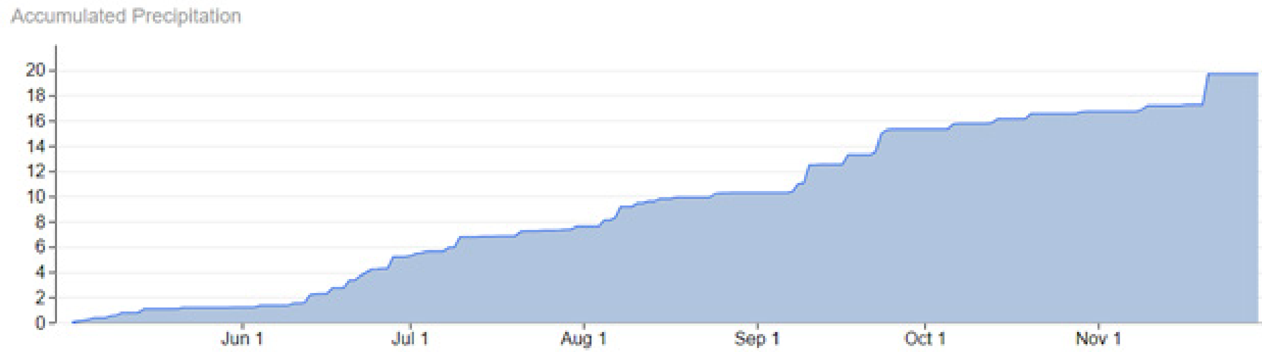
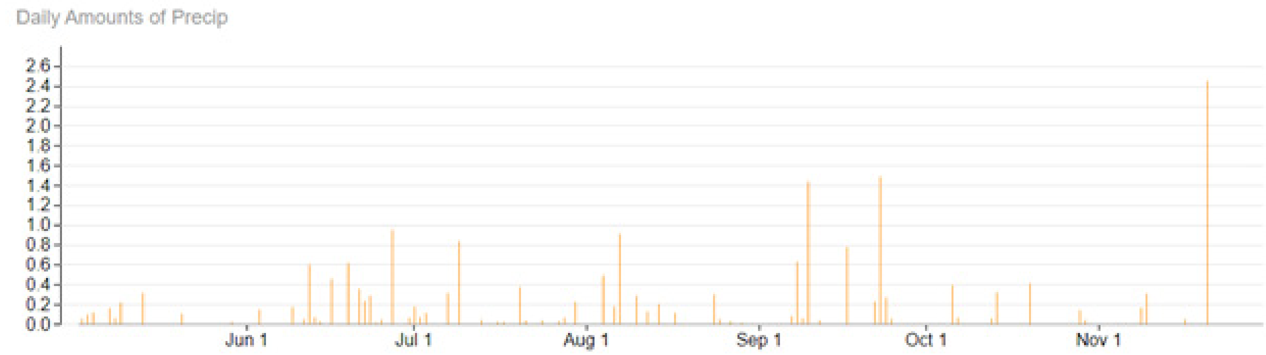
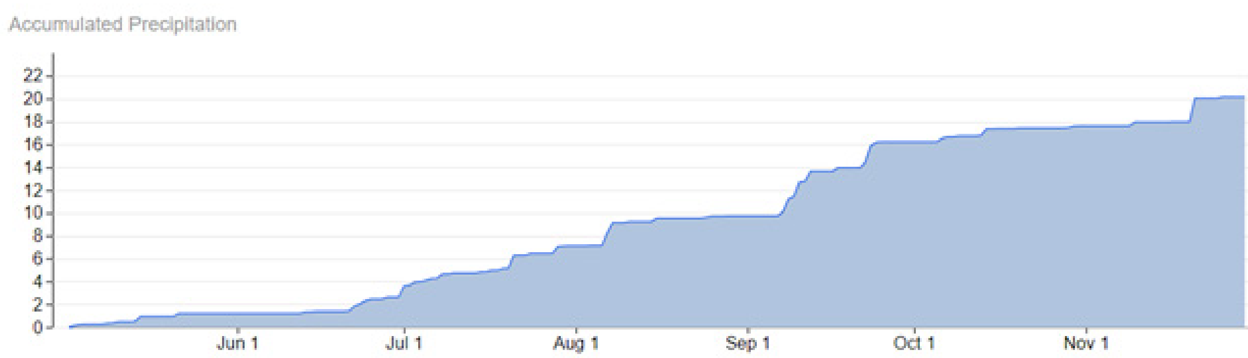
APPENDIX

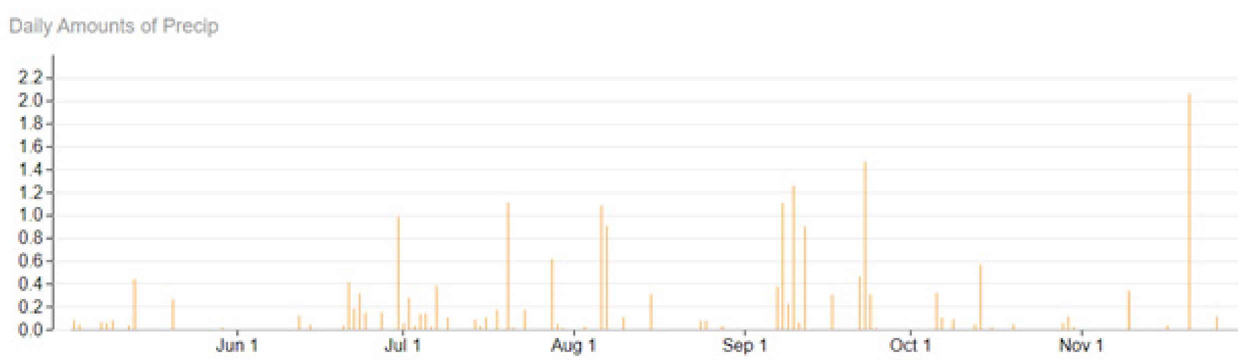
Precipitation WMREC (May 1-November 30, 2023)



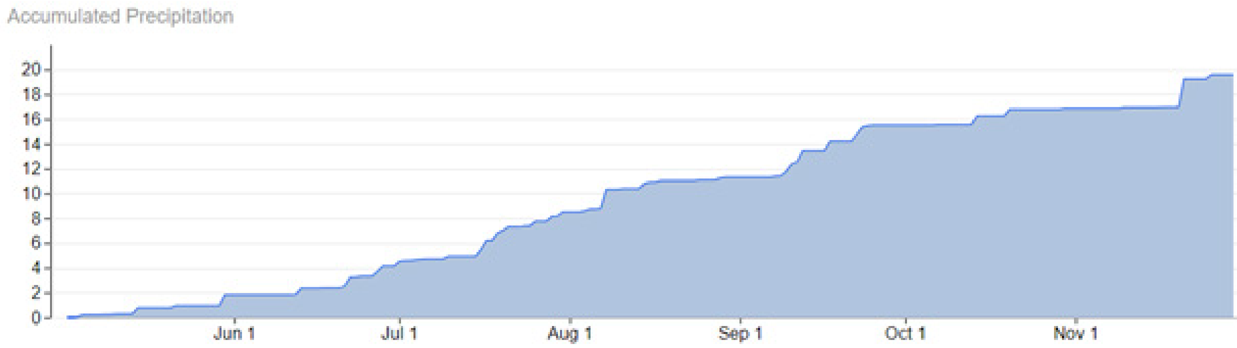


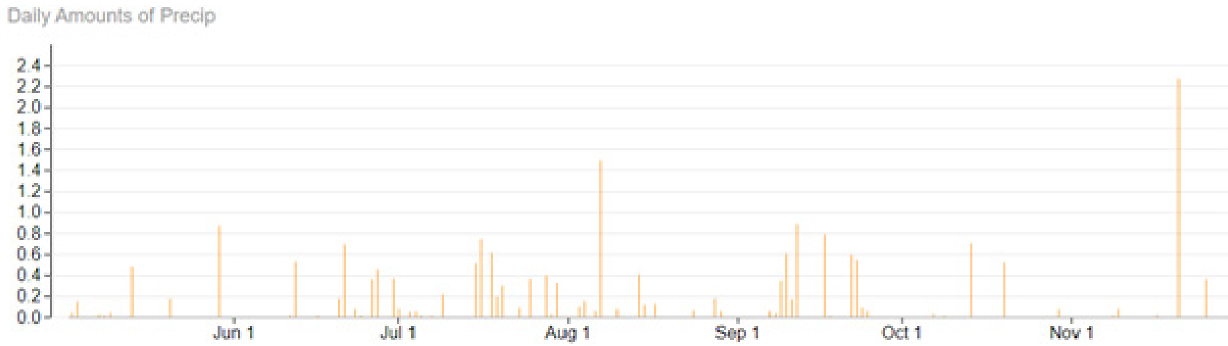
Precipitation CMREC (May 1-November 30, 2023)





Precipitation WYE (May 1-November 30, 2023)





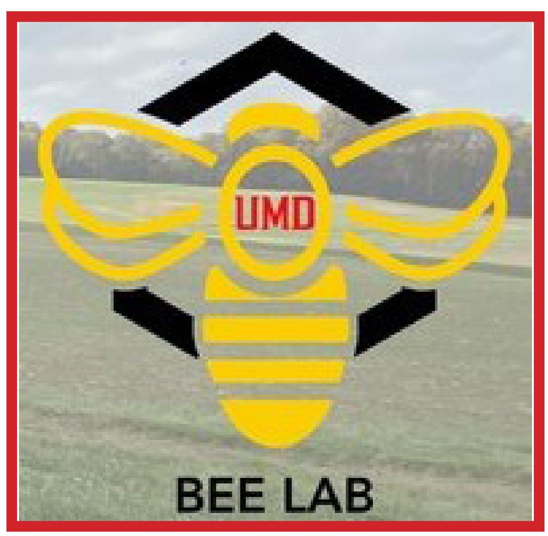
UMD Bee Lab and the New UMD Bee Squad

https://www.umdbeelab.com/ https://umdbeesquad.com/

About The Lab

The Honey Bee Lab at the University of Maryland has diverse personnel with multidisciplinary scientific backgrounds who bring a fresh perspective to solving problems. Research in the laboratory is focused on an epidemiological approach to honey bee health. We are proud to share our research into the major mechanisms that are responsible for recurring high loss levels in honey bee populations, such as pests and pathogens associated with honey bees, loss of natural forage habitat due to large monocultural croplands, and pressure from human induced changes in the environment.

Our team has led and managed the USDA APHIS National Honey Bee Disease Survey since 2009. We are also a major partner and founding member of the Bee Informed Partnership (BIP), who collaborates closely with beekeepers from across the country to study and better understand the loss in honey bee colonies in the United States.



You can find Realtime results about these efforts at our database portals: https://research.beeinformed.org/state_reports/
Click here to purchase UMD Honey

Donations

If you are able to help support our mission to improve honey bee health, we greatly appreciate whatever you can give.

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Thank you for your support!

Farm Tour for the National Cooperative Business Association

Kelly Nichols | kellyn@umd.edu | University of Maryland Extension, Montgomery County

On October 2, 2023, University of Maryland Extension hosted a farm tour for National Cooperative Business Association members as part of their pre-conference activities. Eleven members attended. Tour stops included farms and ag businesses in Howard and Montgomery Counties. The full list of tour stops is below.

1. The Roving Radish, Howard County's meal kit service. Led by manager James Zoller, attendees learned how locally and regionally grown foods are sourced, how the meal kits are distributed to those who live, work, and play in Howard County, and how this is one step to increasing local food access at affordable prices.
2. Larriland Farm, an orchard and vegetable farm owned and operated by the Moore family since 1973. Attendees learned about fruit production, the opportunities and challenges with running a family business, and they also had the opportunity to pick their own apples.
3. The Central Maryland Research & Education Center (CMREC) in Clarksville. Attendees learned about the University's dairy farm, the role of research centers in university-led research, and current research including a grazing study with annual forages and a hazelnut and truffle study. Brian Spielman, farm manager, Dave Clement, Extension pathology specialist, and Amanda Grev, Extension forage specialist presented.
4. Lone Oak Brewing Company, a relatively new on-farm brewery which grows some of the barley on the farm. Led by co-owner Chris Miller, attendees learned about the beer-making process and the opportunities and challenges with on-farm alcohol production in central Maryland.

Attendees learn from Emily and Guy Moore at Larriland Farm.

Dave Clement, Extension Pathology Specialist, showcases the hazelnut and truffle study.

Brian Spielman, CMREC-Clarksville Farm Manager, gives an overview of the farm's daily operations.

Attendees enjoyed the

Research Update: Performance of Dairy Heifers on Pasture Relative to TMR-fed Counterparts

Amanda Grev PhD, Forage and Pasture Specialist, University of Maryland Extension
Jeff Semler, Principal Agent, University of Maryland Extension

Over the past several years, a study was completed at the Central Maryland Research and Education Center Clarksville Dairy farm to investigate the effects of improved grazing management on pregnant dairy heifer performance. The objectives were to determine the effect of improved grazing management on heifer growth characteristics, as well as the economic feasibility of using a rotational grazing system to mitigate costs associated with the replacement program. Heifers are also being followed through their first lactation to investigate potential carry-over effects on first lactation performance.

Methods

Pregnant Holstein dairy heifers (n=166; 2021-2023) from the University of Maryland Dairy were utilized for this study. Heifers were enrolled in the study on a rolling basis, with heifers added following pregnancy confirmation and removed approximately 3 weeks prior to calving. Upon enrollment, heifers were randomly assigned to one of two treatments groups: control (CON) or grazing (ROT). Heifer groups varied in size throughout the study period (ranging from 15 to 22 per group) but were kept consistent between treatments at any given time.

Heifers in the CON group received a total mixed ration (TMR) once per day and had access to one continuously managed 6-acre perennial pasture consisting of mostly endophyte-infected tall fescue. Heifers in the ROT group were rotationally grazed across 21 acres of both perennial and annual pastures subdivided into approximately 0.6-acre paddocks; heifers were rotated to a new paddock every 1-3 days, depending on forage availability. Perennial pastures within the rotational grazing system were similar to the control pasture and consisted of mostly endophyte-infected tall fescue. Annual pastures within the rotational grazing system were established on a seasonal, rotating basis using cool-season annuals (triticale/oat/annual ryegrass/crimson clover mixture) followed by warm-season annuals (sudangrass/cowpea mixture). Heifers in the ROT group also received a daily ground corn/mineral mix at a rate of 1 pound per head per day to ensure appropriate mineral intake. An overview of the pasture layout and sizing for both groups is depicted in Fig. 1.

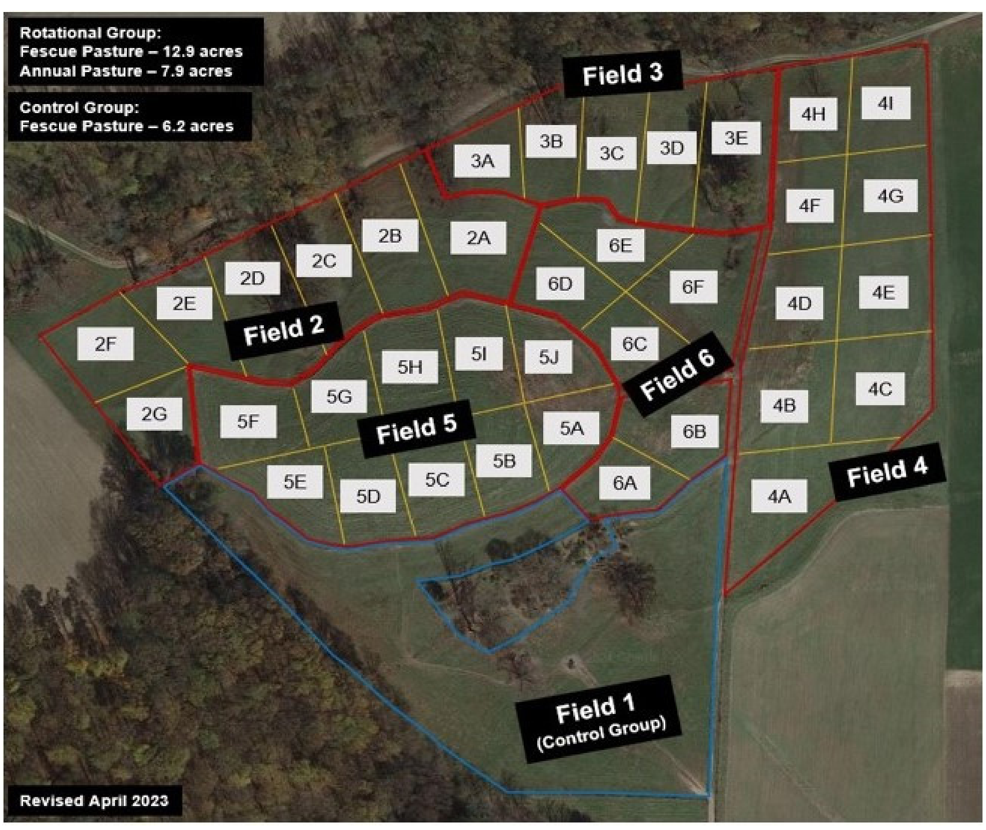

Figure 1. Pasture map depicting grazing areas for the control (blue) and grazing (red) treatment groups, as well as the paddock subdivisions for the grazing group (yellow). Annual pastures were located in fields 5 and 6.

The study ran annually from around the beginning of April through the end of December. Throughout the growing season, heifers in the ROT group alternated between annual and perennial pastures based on forage availability and growth; actual dates spent grazing the different forage types varied from year to year, but as an example the grazing dates for 2021 are shown in Figure 2. Throughout the study, both groups of heifers were measured every two weeks to determine bodyweight, body condition score, and hip height. Forage samples were collected every two weeks to determine forage nutritive value; for each treatment group, samples were collected from the paddock immediately prior to grazing.

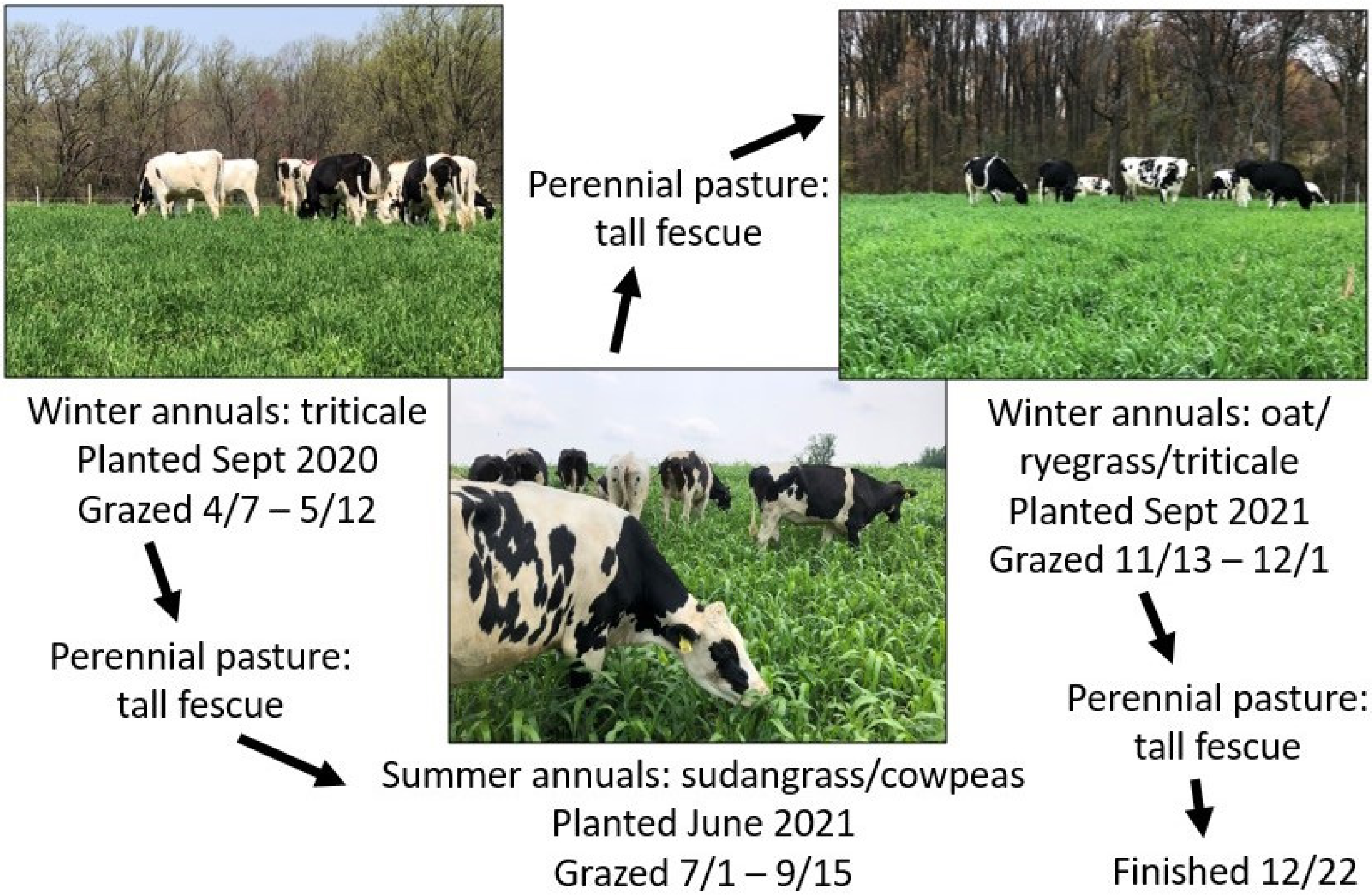

Figure 2. Timeline of seasonal grazing rotation across forages for heifers in the grazing treatment group in 2021

Results

Analysis of the results for this study are in progress, but some preliminary results from the first grazing season (2021) are presented here. On average, heifers were enrolled in the study for 140 days. The average nutrient composition of the TMR fed to the CON heifers and the pastures grazed by both CON and ROT heifers are shown in Table 1.

Nutrient (% DM)	Control Treatment		Grazing Treatment		
	Fescue	TMR	Fescue	Sudangrass	Triticale
DM	23.4	40.2	21.4	19.1	17.0
NDF	52.9	46.0	53.1	46.9	44.7
CP	18.8	15.2	18.4	19.6	19.3
TDN	64.0	65.2	64.8	68.3	69.8
Starch	1.7	11.0	1.9	4.1	3.0
Sugar	8.3	5.1	7.4	7.0	13.8

Table 1. Nutrient profile of forages and TMR for control and grazing treatment groups

Initial bodyweight, body condition score, and hip height were similar between treatment groups (Figure 3). Final bodyweight and hip height were also similar between the two groups, but final body condition score was greater for CON heifers (3.7) compared to ROT heifers (3.5; Figure 3B). Although final bodyweight was not statistically different between treatment groups, average daily gain was greater for CON heifers (1.9 lb/d) compared to ROT heifers (1.5 lb/d) over the 2021 grazing season.
Implications of the slightly lower body condition of ROT heifers is unknown, but we hypothesize that there may be a positive effect on first lactation performance since heifer body condition was still good and it is well-established that cows that calve with higher body condition are predisposed to metabolic problems (e.g., ketosis, fatty liver, etc.). Performance of heifers from both treatment groups are being tracked as heifers go through their first lactation; additional data analysis will explore possible carry-over effects of these management systems on first lactation milk production, health, and reproductive performance once all heifers have calved.

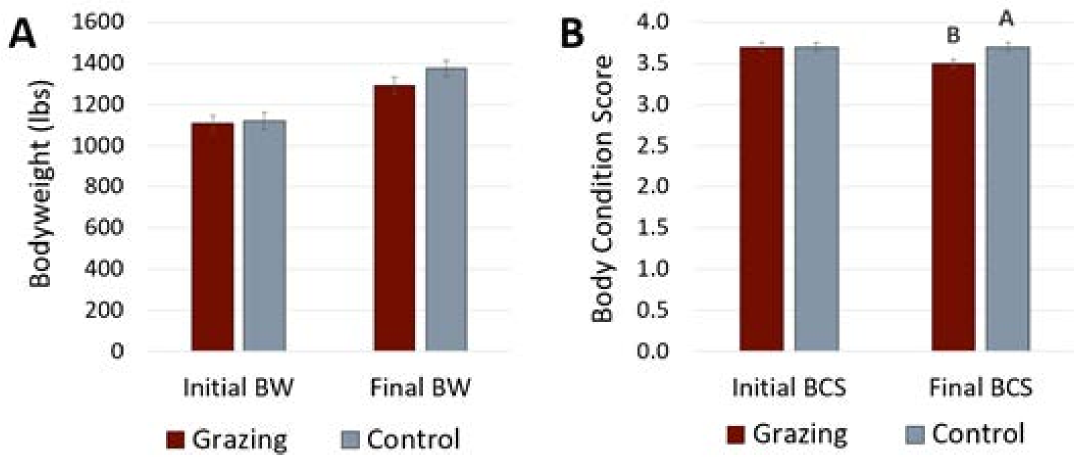

Figure 3. Initial and final bodyweight (A) and body condition score (B) for heifers in the control and grazing treatment groups

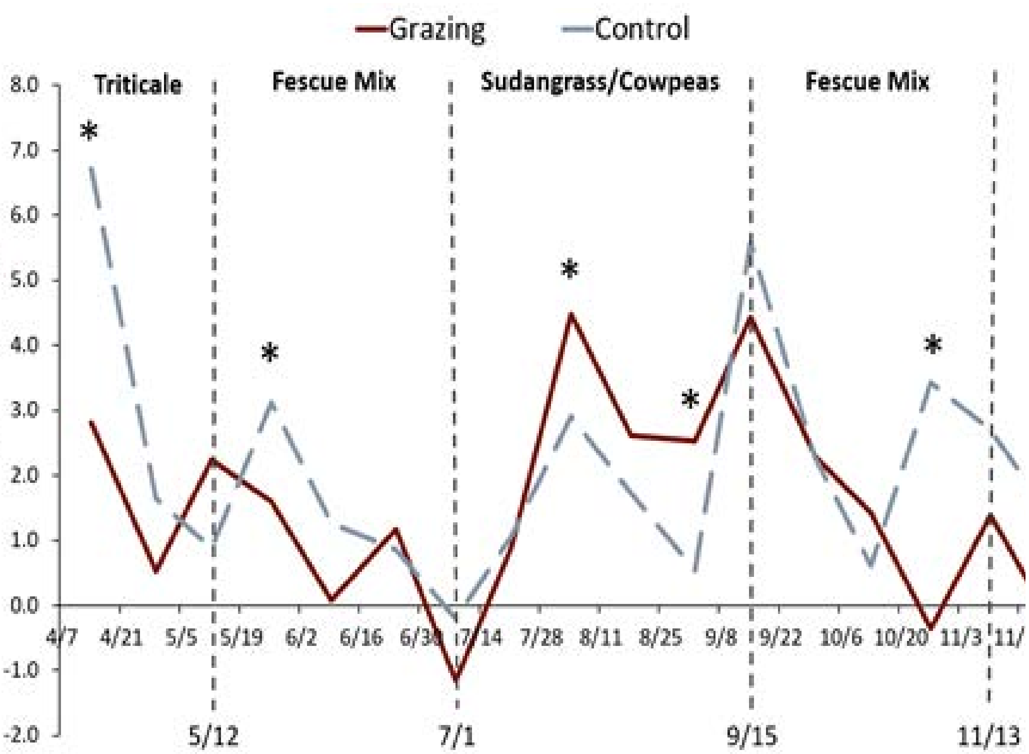

Figure 4. Heifer average daily gain across weigh periods during the 2021 grazing season for heifers in the control and grazing treatment groups. Vertical dashed lines indicate when changes in pasture type occurred for the

Interestingly, heifers in both groups lost weight following their enrollment in the study, suggesting that both groups required an adaptation period to adjust to their new environment. Prior to study enrollment, all heifers were group-housed in a barn and fed a TMR once daily. Following study enrollment, CON heifers required an average of 23 days to regain their starting bodyweight while ROT heifers required an average of 35 days. The longer adaptation period for the ROT heifers is not surprising given that they experienced a more dramatic change in housing and diet compared to the CON heifers.

Heifer average daily gains varied considerably across weigh periods; this variability in daily bodyweight gains for both groups of heifers is demonstrated in Figure 4. Variability in daily gains was likely due to a number of factors, including heifer adaptation, heifers entering/leaving the study, changes in forage type and forage quality over time (especially for the ROT group), and varying weather conditions throughout the grazing season. The ROT heifers appeared to perform substantially better while grazing the warm-season annual mixture (sudangrass/cowpea) during the heat of the summer, which might be expected given the nutrient profile of this pasture (shown in Table 1).

Take Home & Conclusions

A detailed economic analysis comparing expenses between these systems is forthcoming. Although these preliminary results indicate a slower growth rate for ROT heifers, final body weights and body condition scores of these heifers were still acceptable and they achieved or exceeded 85% of mature bodyweight at first calving. Because the replacement heifer program is typically the second or third greatest expense on the dairy and feed often exceeds 50% of those costs, increasing utilization of pasture may be an economical choice for some producers to reduce costs on their farm without compromising performance.
Producers looking to improve grazing systems on their farm should begin by exploring simple management changes including the implementation (or increased intensity) of rotational grazing practices. Incorporation of annual forages into the grazing system may also help improve animal performance by offsetting the reduced summer growth (i.e. summer slump) in perennial pastures and mitigating the palatability and forage intake issues associated with endophyte-infected tall fescue pastures during the summer.

Future Plans

Moving forward, a full analysis of all three years of this study will be completed, along with a comprehensive analysis comparing the economics behind heifer performance within each of these systems. Future studies will continue to explore how improvements in pasture management affect heifer performance and the economic viability of the heifer program.

Acknowledgements

We are grateful for the assistance provided by the staff at the Clarksville Dairy Farm in support of this study. This study was partially funded by the Maryland Agricultural Experiment Station Competitive Grants Program and by a Northeast SARE Research and Education Grant.

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