

## MTF Research Summary

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**Project Name:** Effects of dried leaf matter on weed populations and soil health

**How the MTF funding will be used to support project(s):** Support funding will allow researchers to evaluate weed control and soil effects from dried leaf matter mulched into turfgrass plots. Three trials testing mulching effects at various rates and heights of cut will be conducted; Lawn Height Maple Mulch, Fairway Height Maple Mulch, and High-Rate Mixed Mulch.

**Project update:** Three experiments have been initiated at the Hancock Turfgrass Research Center, East Lansing, MI. In 2021, two maple leaf mulch trials were initiated: one on lawn height turf [Lawn Height Maple Mulch] and the other on fairway height turf [Fairway Height Maple Mulch]. In 2022, a third trial was initiated on lawn height turf [High-Rate Mixed Mulch] using a much higher rate of mixed species mulched leaves from silver maple (*Acer saccharinum*), red maple (*Acer rubrum*) and eastern cottonwood (*Populus deltoides*). We have been collecting soil temperature and volumetric water content data throughout the winter when weather conditions allow. Analysis is in progress for the fairway height trial with a focus on evaluating effects on *Poa annua*. We expect it may take a few years of applications to see potential differences. Mulch applications for all three trials were made November 28, 2022.

### *Key Points Learned to Date:*

- Mulching leaves into turf in the fall can significantly reduce broadleaf weed populations in spring and enhance green-up.
- Lawn height treatments receiving 20 lbs of dried mulch in November of 2021 showed significantly less dandelions and dandelion flowers than the non-treated control in May of 2022 (figure 1).

**Results:** Results for the lawn height trial initiated in 2021 have corroborated findings of previous, related research conducted at MSU. Treatments receiving 20lbs of mulch in November of 2021 showed significantly less dandelions than the non-treated control in May of 2022.

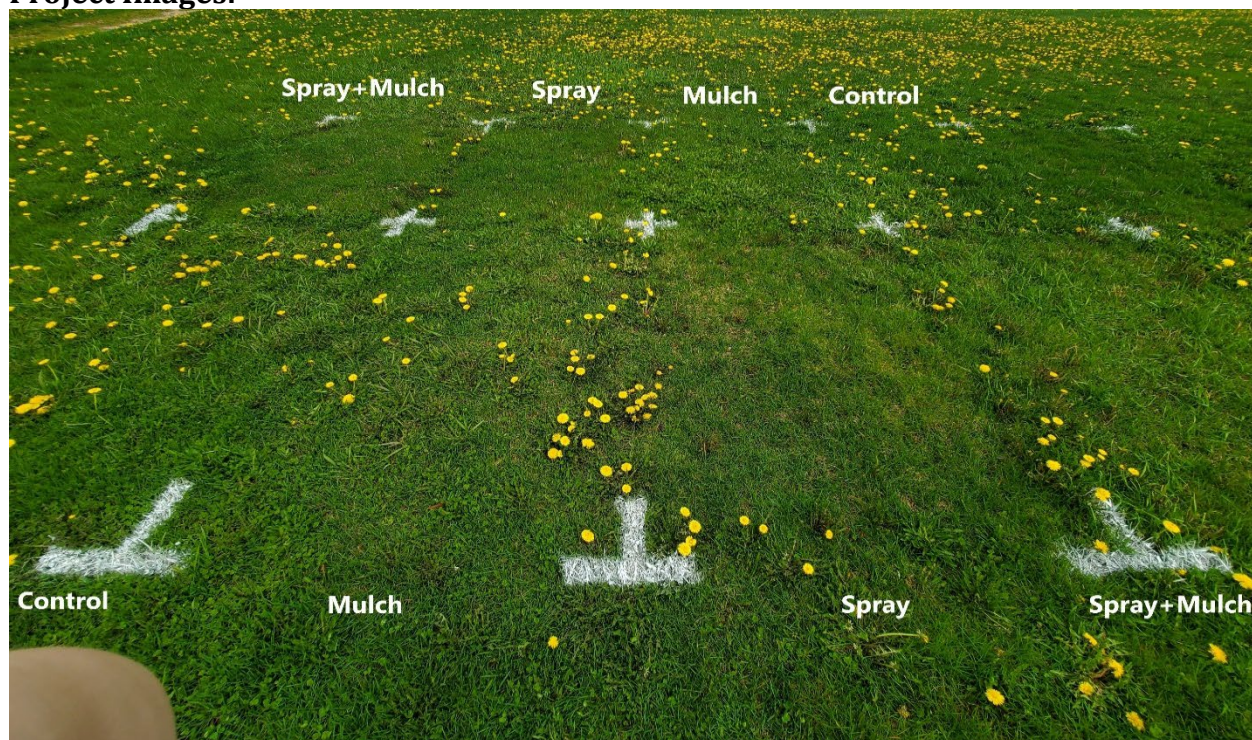
Treatment	Rate	Dandelion on 5/10/22	
		% Cover	Flower Count
Trimec + Mulch	1 fl oz + 20 lbs	5 c	0 c
Trimec	1 fl oz/1000ft <sup>2</sup>	7 c	0 c
Mulch	20 lbs	31 b	14 b
Control		40 a	35 a

**Figure 1.** The effects of herbicide and mulch on Dandelions in lawn height turf, evaluated 28 weeks after application at the Hancock Turfgrass Research Center, East Lansing, MI—2022.

**Grad Student(s) Involved:** None

**Benefit Group:** These experiments will benefit home lawn care operators, golf course managers, municipalities and homeowners. Research could lead to better cultural practice recommendations. If mulching in leaves during the fall improves soil health and controls weeds, then seasonal herbicide and fertilizer inputs could be minimized and financial costs cut.

#### Project Images:



**Figure 2.** Lawn Height Maple Mulch Dandelion control in May 2022 at Hancock Turfgrass Research Center, East Lansing-MI.





**Figure 3.** Fairway Height Maple Mulch Trial after mulch application in November 2022 at Hancock Turfgrass Research Center, East Lansing-MI.



**Figure 4.** High-Rate Mixed Mulch Trial PRE-application in November 28, 2022 at Hancock Turfgrass Research Center, East Lansing-MI.





**Figure 5.** Lawn Height Maple Mulch Trial snow cover in December 2022 at Hancock Turfgrass Research Center, East Lansing-MI.

**Estimated project duration:** Studies initiated in fall 2021 and will continue through fall 2024.

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**Project Name:** Effects of PGR/herbicide applications on annual bluegrass seedhead suppression

**How the MTF funding will be used to support project(s):** Support funding will allow researchers to evaluate annual bluegrass seedhead suppression potential in PGR products (alone or in combination with Proxy) applied during the fall and winter on a mixed *Poa annua*/*Agrostis stolonifera* research green.

**Project update:** An experiment was initiated at the Hancock Turfgrass Research Center, East Lansing, MI. Fall applications (timing code A) were applied on November 28, 2022. Sequential applications (B and C) will be made after 200 GDD (base temp 32F).

*Key Points Learned to Date:*

- The PGR Proxy is the primary tool used to suppress/decrease annual bluegrass seedheads and numerous golf course superintendents apply the product 1-3 times starting in the late fall prior to seed head production in the spring. However, some superintendents believe the suppression with the product is not as good as it used to be while others are curious if tank mixing with other products may enhance the suppression. Treatments in this study were chosen to address those concerns.

**Expected Results:** We expect to see similar results on green height turf as has been observed on fairway height turf. There will likely be differences in seedhead suppression efficacy based on the product and the timing structure of its application.

Trt	Treatment	Form		Rate	Appl
No.	Name	Type	Rate	Unit	Code
1	Proxy	L	5	fl oz/1000 ft2	A B C
2	Proxy	L	5	fl oz/1000 ft2	A B C
	Anuew	D	1	oz/a	B
	Anuew	D	2	oz/a	C
3	Proxy	L	5	fl oz/1000 ft2	B C
	Anuew	D	1	oz/a	B
	Anuew	D	2	oz/a	C
4	Proxy	L	5	fl oz/1000 ft2	A B C
	Anuew	D	5	oz/a	A
	Anuew	D	1	oz/a	B
	Anuew	D	2	oz/a	C
5	Proxy	L	5	fl oz/1000 ft2	A B C
	Primo	L	5.5	fl oz/a	B C
6	Proxy	L	5	fl oz/1000 ft2	A B C
	Primo	L	5.5	fl oz/a	A B C
7	Anuew	D	8	oz/a	A
	Anuew	D	1	oz/a	B
	Anuew	D	2	oz/a	C
8	Primo	L	5.5	fl oz/a	A B C
9	Anuew	D	8	oz/a	A
	Trimmit	L	5	fl oz/a	A
10	Proxy	L	5	fl oz/1000 ft2	A B
	Pylex	L	0.25	fl oz/a	A B
11	Proxy	L	5	fl oz/1000 ft2	A B C
	Induce	L	0.5	% v/v	A B C
12	Proxy	L	5	fl oz/1000 ft2	A B C
	LPI-6731-1	L	8	fl oz/1000 ft2	A B C
13	Proxy	L	5	fl oz/1000 ft2	A B C
	Oskie	L	3.3	fl oz/1000 ft2	A B C
14	Proxy	L	5	fl oz/1000 ft2	A B C
	HM 0814	L	3	fl oz/1000 ft2	A B C
15	Proxy	L	5	fl oz/1000 ft2	A B C
	Urea	SG	0.25	lb ai/1000 ft2	A B C
16	Control				

**Figure 1.** Treatment list for annual bluegrass seedhead suppression trial at the Hancock Turfgrass Research Center, East Lansing, MI—2022.

**Grad Student(s) Involved:** None

**Benefit Group:** This research will benefit golf course superintendents and possibly appease golfers. In Michigan, annual bluegrass typically produces seedheads during May, when golfers are eager to hit the courses. Seedheads are white to bright silver in color and are considered by as unsightly on greens and fairways, may result in allergic reactions, and may result in bumpy putting surfaces. Carefully planned PGR applications during the off

season can help minimize seedheads and make for a more aesthetically pleasing start of golf season.

**Project Images:**



**Figure 2.** Annual bluegrass seedhead suppression trial in January 2023, 5 weeks after application at Hancock Turfgrass Research Center, East Lansing-MI.





**Figure 3.** Annual bluegrass seedhead suppression trial in January 2023, 5 weeks after application at Hancock Turfgrass Research Center, East Lansing-MI.

**Estimated project duration:** Study initiated November 28, 2022 and will continue through summer 2023 with potential extension.

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**Project Name:** NTERA Organic Crabgrass Control Trials

**How the MTF funding will be used to support project(s):** Support funding will allow researchers to evaluate the efficacy of corn gluten meal and Fiesta herbicide on crabgrass control as part of the NTERA Organic Crabgrass Control Trials. We will also look at effects on broadleaf weeds and take visual assessments of turf color and quality throughout the trial period. Publication of results from this trial and cooperating trials is targeted for submission in Crop, Forage and Turfgrass Management.

**Project update:** This project is on its third year. Treatment applications will begin in spring 2023 before crabgrass emergence and will continue until roughly 8 weeks POST-emergence.

*Key Points Learned to Date:*

- Corn gluten meal shows little effect on crabgrass and broadleaf weed control but positively impacts turfgrass color.

- Fiesta has a high rate of broadleaf weed control but does not seem to control crabgrass. After reduction of broadleaf weed populations on Fiesta plots, crabgrass is able to spread into open areas without competition leading to significantly higher rates of crabgrass compared to control plots.

**Expected Results:** We expect to see similar results in 2023 as we did in the 2021 and 2022 growing seasons.

Treatment	Broadleaf Weeds % Cover		Crabgrass % Cover	
	8/11/22	9/6/22	8/11/22	9/6/22
Control	76 a	87 a	12 bc	18 b
CGM	77 a	82 a	10 bc	16 b
Fiesta	9 c	14 c	59 a	69 a
Fiesta	6 c	10 c	63 a	71 a
CGM + Fiesta	55 b	53 b	26 b	21 b
CGM + Fiesta	16 c	17 c	58 a	56 a
Sustane 8-2-4	70 ab	67 ab	11 bc	14 b
Dimension 2EW	77 a	78 a	1 c	5 b

**Figure 1.** Effects of treatments on crabgrass and broadleaf weed cover at the Hancock Turfgrass Research Center, East Lansing, MI—2022.

**Grad Student(s) Involved:** None

**Benefit Group:** This research is a collaborative effort among 13 universities. All 13 universities are taking part to examine the potential impact and usefulness of the suggested herbicidal properties of corn gluten meal on crabgrass and dandelion growth. Many homeowners and advocacy groups are looking for ways to minimize herbicide use on their lawns and frequently ask about organic alternatives including corn gluten meal.



## Project Images:



**Figure 2.** NTERA Organic Crabgrass Control Trial viewed from SE corner on August 25, 2022 at Hancock Turfgrass Research Center, East Lansing-MI.



**Figure 3.** NTERA Organic Crabgrass Control Trial viewed from NE corner on September 6, 2022 at Hancock Turfgrass Research Center, East Lansing-MI.



**Estimated project duration:** Study initiated in spring 2021 and will cease fall of 2023.

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**Project Name:** Efficacy of green and fairway PGR applications for annual bluegrass control

**How the MTF funding will be used to support project(s):** Support funding will allow researchers to evaluate the efficacy of spring and fall PGR applications on reducing annual bluegrass populations in mixed *Poa annua*/*Agrostis stolonifera* greens and fairways. Percent annual bluegrass cover, turf color, and turf quality will be rated throughout the season. Turf tolerance to products will also be measured and any phytotoxicity to the bentgrass will be noted.

**Project update:** These trials were initiated in 2020 and are our longest running trials. They show PGR efficacy on annual bluegrass over multi-year applications and also provide an interesting example of the subjective nature of qualitative data. Annual bluegrass cover changes considerably throughout the year and/or the populations remain the same but color shifts from darker green (blending in with the bentgrass) to a bright contrasting green routinely. Qualitative ratings also vary between people giving the estimations. At field day 2022 for example, we asked groups at that stop to estimate percent annual bluegrass cover and had numbers ranging from 20% all the way up to 80% on a single plot. There are certain times of the year where studies like these are easier to rate (i.e. May when the foliage is brighter green and the plants are producing silver seedheads).

*Key Points Learned to Date:*

- Observable differences in annual bluegrass control was not apparent until 2021.
- At the end of 2021, PoaCure and Trimmit 2SC treatments had the least ABG cover in both green and fairway trials.
- By the end of 2022, PoaCure treatments had the least ABG cover in both green and fairway trials.
- Phytotoxicity occurred on the green trial in all treatments after fall 2020 applications. Trimmit 2SC treatments had the highest phytotoxicity throughout the 2020 and 2021 years.
- Phytotoxicity in the fairway trial was not observed until fall of 2021, but followed the same results as the putting green trial.



**Expected Results:** We expect to see similar results as we did in the 2021 and 2022 growing seasons, but with a continued decline in annual bluegrass populations for PGR treatments.

Treatment	Rate	Green % ABG Cover		Fairway % ABG Cover	
		10/12/21	10/21/22	10/12/21	9/20/22
Control		61 a	71 a	49 a	54 a
Cutless MEC	24 fl oz/A	41 b	54 b	41 b	31 b
Trimmit 2SC	0.37 fl oz/1000ft <sup>2</sup>	23 c	29 c	24 c	11 c
Poacure	0.6 (Grn) 1.2 (Fwy) fl oz/1000ft <sup>2</sup>	28 c	19 d	20 c	6 d

**Figure 1.** Effects of PGR treatments on percent annual bluegrass plot cover in the fall at the Hancock Turfgrass Research Center, East Lansing, MI—2021, 2022.

**Grad Student(s) Involved:** None

**Benefit Group:** This research will benefit golf courses by suggesting optimal products and application timings for annual bluegrass control on greens and fairways. It is important to know how many applications will be needed and for how long before significant control is observed. PGRs tend to be expensive and multiple applications during the spring and fall may not be financially feasible if multiple years are needed to achieve acceptable control. This data can be used to give insights into what can be expected from multiple years of applications. In 2023 we intend to add several products to the study.

**Project Images:**



**Figure 2.** PGRs for annual bluegrass control trial (Green) on 2 June 2022 at Hancock Turfgrass Research Center, East Lansing-MI.



**Figure 3.** PGRs for annual bluegrass control trial (Fairway) on 16 May 2022 at Hancock Turfgrass Research Center, East Lansing-MI.



**Estimated project duration:** Studies initiated in fall 2020 and will continue through fall 2023 with potential extension.

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**Project Name:** Evaluating POST-emergence herbicides for Broadleaf weed control made in the heat of the summer when broadleaf weeds have the thickest cuticles.

**How the MTF funding will be used to support project(s):** Support funding will allow researchers to evaluate the short and long term efficacy of POST-emergence broadleaf herbicides based on a single late season application. Broadleaf weed percent plot cover will be rated following application and continue the following year to determine longer term effectiveness of products. Turf tolerance will be evaluated and any phytotoxicity of products will be recorded.

**Project update:** This trial was initiated on July 28, 2021, and ratings were taken until 5 August 2022.

*Key Points Learned to Date:*

- All products with the exception of Pylex provided significant broadleaf weed control at 11 weeks after application on 12 October 2021.
- By August 5<sup>th</sup> the following year (1 year after application) all products with the exception of Pylex provided significant control of broadleaf weeds.
- With the exception of Pylex and Sure Power, all products provided the most broadleaf weed control by 5 August 2022.
- There was no significant difference in turf tolerance between treatments following application.
- There was no significant difference in crabgrass percent cover between treatments in summer 2022.

**Expected Results:** We expected to see similar results among products with exception to Pylex. Pylex is a group 27 herbicide (HPPD inhibitor) and needs to be applied every few weeks to retain effectiveness. It provided significant early control that waned into late summer and fall of 2021. Crabgrass encroached into plots the following summer after broadleaf weed populations had been reduced. The lack of competition leading to increased crabgrass cover is something we have noticed on other broadleaf weed control trials. There were visual differences noticeable in the trial (figure 3) but they were not statistically significant.

Treatment	Rate (fl oz/A)	Broadleaf Weeds % Control	
		10/12/21	8/5/22
Sure Power	48	91 a	68 b
Escalade II	40	93 a	85 ab
GameOn	56	96 a	81 ab
4 Speed XT	56	94 a	82 ab
Speedzone EW	64	97 a	93 a
Tzone	56	95 a	89 ab
Pylex	2	18 b	5 c
Super Trimec	48	97 a	89 ab

**Figure 1.** Effects of POST-emergence herbicides on broadleaf weed control 11 weeks after application and 1 year after application at the Hancock Turfgrass Research Center, East Lansing, MI—2021, 2022.

**Grad Student(s) Involved:** None

**Benefit Group:** This research will benefit home lawn care providers and golf course managers by suggesting optimal products and application timings for POST-emergence broadleaf weed control during the heat of the summer when cuticle thickness is greatest.

**Project Images:**



**Figure 2.** POST-emergence herbicides for Broadleaf weed control on 10 May 2022 at Hancock Turfgrass Research Center, East Lansing-MI.





**Figure 3.** POST-emergence herbicides for Broadleaf weed control on 11 August 2022 at Hancock Turfgrass Research Center, East Lansing-MI.

**Estimated project duration:** Study was initiated in summer 2021 and ratings continued through summer 2022.

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**Project Name:** Evaluating GDD model accuracy when applying PRE and POST emergence herbicides for crabgrass control

**How the MTF funding will be used to support project(s):** Support funding will allow researchers to evaluate the accuracy of GDD models when making PRE and POST emergence herbicide applications for crabgrass control. Percent crabgrass cover will be visually estimated throughout the growing season.

**Project update:** This trial was initiated in 2021 and continued in 2022.

*Key Points Learned to Date:*

- It seems apparent the GDD model regarding preemergent application of crabgrass herbicides may be significantly narrower than the model suggests.

**Expected Results:** We expected to see similar results in 2022 as we did in 2021.

**Grad Student(s) Involved:** None



**Benefit Group:** This research will benefit lawn care operators, homeowners, and golf course superintendents by suggesting optimal application timings for PRE and POST-emergence herbicides for crabgrass control.

**Project Images:**



**Figure 2.** GDD model for Crabgrass Application Timing Trial on 30 August 2021 at Hancock Turfgrass Research Center, East Lansing-MI.





**Figure 3.** GDD model for Crabgrass Application Timing Trial on 16 August 2022 at Hancock Turfgrass Research Center, East Lansing-MI.

**Estimated project duration:** Study initiated in spring 2021 and continued into the fall of 2022. Data to date suggest that preemergent applications of crabgrass herbicides can be applied up to 6 weeks after the current GDD model suggest. In 2023 we will perform the study again with more pre and post crabgrass herbicides.