

# 2023 Michigan Forage Variety Trial Report

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## 2023 Conditions

Precipitation in the East Lansing area was near average in April but was well below normal in May and June. Only two inches of rain fell at East Lansing in May and June, almost 5 inches below the average. The weather pattern changed in July and August as the totals for each month were more than twice the 30-year average. Some of the rain in August was combined with heavy wind. Consistent warmer temperatures arrived at Chatham in mid-May this year. Snow continued to fall through April into the first week of May. The last hard freeze was a few days before Memorial Day. Total rainfall was above average in April, May, and July but below the average in June, August, and September. Daily and monthly rainfall totals for East Lansing and Chatham in 2023 are in Appendix II and III.



## 2023 Forage Trial Summary

Harvest dates of first cutting at East Lansing was on schedule. Harvests after first-cut were determined by both maturity and the number of days since last harvest.

Red clover and grass trial cutting dates were determined by maturity and the amount of growth. Yield of the perennial forages was low in first and second cutting. Productivity of the alfalfa and red clover was improved later in the summer with the arrival of the much-needed rain. Even with the rain, growth of cool season perennial and annual grass was slow in mid-summer. The final grass cutting was removed in mid-November. At Chatham, the first cutting of the grass and alfalfa trials began in mid-June. The first cutting of alfalfa was on June 20, a week earlier than last year, the second cutting was 5 weeks after the first, and the third cutting was in late September with little or no regrowth after harvest. Perennial grass first cutting was at the same time as the alfalfa trials this year. The timothy grass first cutting was in mid-July, much later than the other grass species. Second-cut yields of the perennial grass species were obtained in September.

## Perennial Forage Variety Trials

### Alfalfa Variety Trials

Established Alfalfa trials were conducted at both East Lansing and Chatham. Three alfalfa trials are at East Lansing and two trials are at Chatham. Trials at East Lansing seeded from 2020 to 2022 are **Tables 1 to 3**. The trials seeded in 2021 and 2022 at Chatham are in **Tables 4 and 5**.

### Red Clover Variety Trials

There were two established red clover trials cut in 2023. Yields obtained in three cuttings the 2021 and 2022 seedings, respectively, are in **Tables 6 and 7**. A new red clover trial was established at East Lansing in August 2023.

### Perennial Cool-Season Grass Variety Trials

Perennial grass trials seeded at East Lansing in 2020 and 2022 were harvested three times and the 2021 trials were harvested two times in 2023. The 2020 perennial grass trials seeded at Chatham, depending on species, were harvested one or two times in 2023. Data from established trials at East Lansing are in **Tables 8 to 10**, and from Chatham are in **Table 11**. New perennial grass trials of timothy and orchardgrass were established at East Lansing in 2023.

# Annual Forage Variety Trials

## Annual, Italian, and Intermediate Ryegrass

A trial of annual, intermediate, and Italian ryegrass varieties was planted in May of 2022. This trial was harvested three times in the seeding year and four times in 2023. Winter survival and yield from four cuttings in 2023 are listed in **Table 12**. A new trial of Italian and annual ryegrass varieties was seeded in May 2023. This trial was harvested three times. Yields, per cut and total, are in **Table 13**.

## Small Grain Variety Trials

Triticale and hybrid rye were seeded in September 2022 and harvested for yield in May 2023. The winter small grains were seeded as two separate trials. Each trial was harvested two times for yield. The goal was to harvest each trial when most of entries were at the approximate maturity of Feekes stage 10.1. Plant height, maturity, yield, and percent dry matter at harvest are reported in **Table 14**.

## Sorghum Sudangrass

There were two separate trials of sudangrass, sorghum x sudangrass, and forage sorghum planted at East Lansing in 2023. One of the two trials was harvested twice for yield and the other harvested once. The two-cut trial data are listed in **Table 15** and the single harvest trial is in **Table 16**.

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Table 2	2021 EL Alfalfa 2023 Data Table	2021 East Lansing Alfalfa Variety Trial 2023 Data Table
Table 3	2022 EL Alfalfa 2023 Data Table	2022 East Lansing Alfalfa Variety Trial 2023 Data Table
Table 4	2021 UP Alfalfa 2023 Data Table	2021 Chatham Conventional Alfalfa Variety Trial 2023 Data Table
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Table 8	2020 EL Grass 2023 Data Table	2020 Seedings of Perennial Ryegrass, Timothy, Bromegrass (Smooth and Meadow), Tall Fescue, Meadow Fescue, and Orchardgrass - 2023 Data Tables, East Lansing, Michigan
Table 9	2021 EL Grass 2023 Data Table	2021 Seedings of Perennial Ryegrass, Timothy, and Tall Fescue - 2023 Data Tables, East Lansing, Michigan
Table 10	2022 EL Grass 2023 Data Table	2022 Seedings of Perennial Ryegrass, Timothy, and Orchardgrass - 2023 Data Tables, East Lansing, Michigan
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Table 14	2022-23 EL Winter Small Grain Forage Trials	2022-23 Winter Triticale and Hybrid Rye Small Grain Forage Variety Trials, East Lansing, MI
Table 15	2023 Sorghum Sudangrass Multi-cut Data Table	2023 Sorghum Sudangrass and Sudangrass Variety Trial with multiple harvest yield data. East Lansing, MI
Table 16	2023 Sorghum Sudangrass and Forage Sorghum Single-cut Data Table	2023 Sorghum Sudangrass and Forage Sorghum Variety Trial with One Cutting Yield Data. East Lansing, MI
Appendix I	Acknowledgements	Staff and Students at East Lansing and Chatham that assisted in data collection and management of the forage variety trials
Appendix II	East Lansing Rain	Data from the MSU Plant Soil and Microbial Science Agronomy Farm
Appendix III	Chatham Rain	National Weather Service Data at the Chatham UP Exp Station

**Table 1.** Michigan State University Alfalfa Variety Trial Yields (DM tons/acre), MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in August 2020

Variety	2023 DM Yields T/A, Four-cuts and Total				2023 Total	2022 Total	2021 Total	Trial Total
	Cut 1 June 3	Cut 2 July 7	Cut 3 August 5	Cut 4 Sep 30				
DSX 174085 †	3.37	1.69	1.93	1.26	8.24*	6.34*	8.31*	22.89*
SW 3407	3.04	1.68	1.85	1.09	7.67	6.03*	7.64	21.34
HybriForce 4420/WET	3.15	1.62	1.75	1.15	7.68	5.82	7.78	21.28
SW 4412Y	3.06	1.63	1.83	1.10	7.62	5.83	7.77	21.21
DSX 174083 †	3.37	1.62	1.88	1.12	7.99	5.86	7.34	21.19
HybriForce 4400	3.30	1.54	1.66	1.08	7.58	5.73	7.86	21.17
DSX 174082 †	3.20	1.53	1.83	1.10	7.66	5.88	7.62	21.16
SW 4506	3.16	1.63	1.79	1.01	7.58	5.89	7.59	21.07
SW 4107	2.96	1.52	1.71	1.01	7.20	5.98	7.75	20.93
SW 5509	2.99	1.60	1.84	1.01	7.43	6.03*	7.46	20.92
Vernal (certified)	2.80	1.33	1.46	0.91	6.50	5.06	6.96	18.52
Average	3.13	1.58	1.78	1.08	7.56	5.86	7.64	21.06
LSD 0.05	0.21	0.12	0.13	0.08	0.39	0.35	0.32	0.83
CV %	5.3	5.8	5.6	6.1	4.0	4.6	3.3	3.1
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI							
Design	Randomized Complete Block, 5 replications.							
Plot Size	3x23 ft plot (3x20 ft harvested)							
Seeded	August 7, 2020							
Cuttings	None in the seeding year, four in 2021, 2022, and 2023.							
Soil Type	Conover loam, pH 7.0							
Fertilizer	400 lbs/acre 6-24-24 prior to seeding. 500 lbs/acre gypsum and 500 lbs/acre 0-14-42 in the spring 2021 600 lbs per acre 0-14-42 in 2022 600 lbs per acre 0-20-50 in April 2023							
† Experimental Variety								
* Yield is not statistically different from the greatest value in the column.								

**Table 2.** Michigan State University Alfalfa Variety Trial Yields (DM tons/acre), MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2021.

Variety	2023 DM Yields T/A, Four-cuts and Total					2022 Total	2021 Total	Trial Total
	Cut 1 June 3	Cut 2 July 7	Cut 3 August 4	Cut 4 Sept 30	2023 Total			
HybriForce-4420/WET	3.07	1.20	1.70	1.17	7.14*	5.02*	0.69	12.86*
HybriForce-4400	3.21	1.21	1.58	1.07	7.06*	4.92*	0.64	12.61*
SW5517	2.98	1.13	1.63	1.10	6.84*	4.92*	0.54	12.30*
SW5520Y	2.80	1.09	1.62	1.17	6.67*	4.90*	0.57	12.14*
54VR10	2.89	1.14	1.58	1.06	6.67*	4.78*	0.60	12.06*
54VQ52	2.84	1.03	1.64	1.08	6.59*	4.76*	0.59	11.95*
Bison	2.90	1.06	1.59	1.05	6.61*	4.60	0.72	11.92
SW5615	2.75	1.09	1.59	1.08	6.51*	4.77*	0.56	11.83
FF 42.A3	2.85	1.05	1.57	1.08	6.55*	4.59	0.63	11.77
54Q16	2.82	1.04	1.48	1.00	6.34	4.64	0.56	11.54
SW5614	2.63	1.04	1.49	1.04	6.20	4.72*	0.59	11.51
55H96	2.74	0.95	1.42	0.86	5.97	4.37	0.55	10.90
Vernal (certified)	2.57	0.87	1.29	0.86	5.59	4.29	0.64	10.52
Average	2.85	1.07	1.55	1.05	6.52	4.71	0.61	11.84
LSD 0.05	0.35	0.16	0.14	0.14	0.67	0.31	0.06	0.92
CV%	8.6	10.6	6.3	9.2	7.2	4.5	6.5	5.4
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI							
Design	Randomized Complete Block, 4 replications.							
Plot Size	3x22 ft plot (3x19 ft harvested)							
Seeded	May 13, 2021							
Cuttings	Two in the seeding year (one for yield), four in 2022 and 2023.							
Soil Type	Conover loam, pH 6.8							
Fertilizer	400 lbs/acre 6-24-24 prior to seeding. 500 lbs per acre 0-14-42 in 2022. 600 lbs per acre 0-20-50 in April 2023							
† Experimental Variety								
* Yield is not statistically different from the greatest value in the column.								

**Table 3.** Michigan State University Alfalfa Variety Trial Yields (DM tons/acre), MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2022.

Variety	2023 DM Yields T/A, Four-cuts and Total				2023 Total	2022 Total	Trial Total
	Cut 1 June 3	Cut 2 July 7	Cut 3 August 4	Cut 4 Sept 30			
DSX-184021 †	2.86	0.93	1.84	1.11	6.74*	1.97	8.71*
DSX-174083 †	2.67	0.90	1.81	1.07	6.46*	1.87	8.33*
HybriForce-4420/WET	2.68	0.90	1.69	1.07	6.34*	1.97	8.32*
54VQ52	2.86	0.86	1.69	1.04	6.44*	1.87	8.31*
Mariner V	2.62	0.95	1.71	0.99	6.26*	2.05	8.31*
Viking 394AP	2.74	0.82	1.75	1.03	6.34*	1.93	8.27*
54Q29	2.58	0.85	1.67	1.12	6.22*	1.96	8.18*
HybriForce-4400	2.63	0.85	1.70	1.02	6.21*	1.97	8.18*
AFX184035 †	2.51	0.92	1.79	1.09	6.31*	1.85	8.16*
AFX 479	2.55	0.87	1.62	1.02	6.06	1.84	7.90
SW5615	2.62	0.88	1.63	1.00	6.14	1.73	7.87
Viking 374HD	2.58	0.86	1.66	0.94	6.05	1.79	7.84
Signature	2.47	0.81	1.60	0.92	5.80	1.85	7.65
FF 42.A3	2.37	0.88	1.63	0.99	5.87	1.75	7.61
54Q16	2.47	0.78	1.52	0.91	5.68	1.75	7.43
Average	2.61	0.87	1.69	1.02	6.19	1.88	8.07
LSD 0.05	0.33	0	0.14	0.11	0.53	0.27	0.75
CV%	8.9	7.7	5.8	7.8	6.0	10.3	6.5
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI						
Design	Randomized Complete Block, 4 replications.						
Plot Size	3x22 ft plot (3x19 ft harvested)						
Seeded	May 24, 2022						
Cuttings	Two in the seeding year, four in 2023.						
Soil Type	Conover loam, pH 6.8						
Fertilizer	400 lbs/acre 6-24-24 prior to seeding. 600 lbs per acre 0-20-50 in April 2023						
† Experimental Variety							
* Yield is not statistically different from the greatest value in the column.							

Table 4. Michigan State University Alfalfa Variety Trial Yields (DM tons/acre) Upper Peninsula Research Station, Chatham, Michigan. Seeded August 2021.

	2023 DM Yields T/A, Three-cuts and Total					
	Cut 1	Cut 2	Cut 3	2023	2022	Trial
	June 22	July 31	Sept 20	Total	Total	Total
SW 4412	2.34	1.75	0.79	4.88*	5.00*	9.88*
SW 4107	2.30	1.71	0.85	4.86*	4.77*	9.63*
SW 4506	2.25	1.71	0.92	4.88*	4.75*	9.63*
SW 5509	2.28	1.66	0.90	4.83*	4.74*	9.57*
HybriForce-4400	2.29	1.71	0.92	4.92*	4.64*	9.56*
HybriForce-4420/WET	2.19	1.64	0.81	4.63*	4.76*	9.39*
SW 3407	2.24	1.66	0.90	4.80*	4.59	9.39*
Bison	2.00	1.46	0.95	4.42	4.16	8.58
Average	2.24	1.66	0.88	4.78	4.68	9.45
LSD 0.05	0.22	0.13	0.15	0.26	0.38	0.55
CV%	6.9	5.4	11.5	3.6	5.5	4.0
Location	Michigan State University UP Research and Extension Center Chatham, Alger County, Michigan.					
Design	Four replications					
Plot Size	3 x 23ft plot (3 x 20 ft harvested)					
Seeded	August 3, 2021					
Cuttings	Three in 2022 and 2023.					
Soil Type	Eben Very Cobbly Sandy Loam					
* Yield is not statistically different from the greatest value in the column.						

Table 5. Michigan State University Conventional Alfalfa Variety Trial Yields (DM tons/acre) Upper Peninsula Research Station, Chatham, Michigan. Seeded 2022.

Variety	2023 DM Yields T/A, Three-cuts and Total			
	Cut 1 June 22	Cut 2 July 27	Cut 3 Sept 20	2023 Total
Viking 394AP	2.34	1.62	0.84	4.80*
HybriForce-4400	2.37	1.55	0.83	4.76*
54Q16	2.52	1.58	0.65	4.75*
54VQ52	2.38	1.49	0.75	4.63*
DSX-174083 †	2.24	1.64	0.73	4.62*
54Q29	2.30	1.52	0.78	4.60*
HybriForce-4420/WET	2.25	1.56	0.74	4.55
Viking 374HD	2.13	1.54	0.69	4.36
Average	2.32	1.56	0.75	4.63
LSD 0.05	0.18	0.10	0.14	0.21
CV%	5.4	4.3	12.7	3.1
Location	Michigan State University UP Research and Extension Center Chatham, Alger County, Michigan.			
Design	Randomized complete block, Four replications			
Plot Size	3 x 23ft plot (3 x 20 ft harvested)			
Seeded	July 2022			
Cuttings	Three in 2023.			
Soil Type	Eben Very Cobbly Sandy Loam			
† Experimental Variety				
* Yield is not statistically different from the greatest value in the column.				



**Table 6.** Michigan State University Red Clover Variety Trial Yields (DM tons/acre), MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2021.

Variety	2023 DM Yields T/A, Three-cuts and Total				2022 Total	2021 Total	Trial Total
	Cut 1 June 2	Cut 2 July 19	Cut 3 August 31	2023 Total			
Evolve	2.72	0.92	1.16	4.80	4.69*	1.22	10.71*
Commercial Check 1	2.61	0.85	1.04	4.50	4.66*	1.50	10.66*
Redkin	2.66	0.91	1.18	4.75	4.47	1.25	10.47*
Commercial Check 2	2.38	0.80	0.66	3.84	4.70*	1.45	9.99
TP 12 †	2.54	0.79	0.71	4.03	4.56*	1.30	9.89
VNS Red Clover	2.04	0.72	0.28	3.03	4.38	1.35	8.77
Average	2.49	0.83	0.84	4.16	4.58	1.34	10.08
LSD 0.05	0.18	0.08	0.10	0.26	0.16	0.16	0.38
CV%	6.2	8.2	9.5	5.2	2.9	9.8	3.2

Location	Michigan State University PSM Agronomy Farm, East Lansing, MI
Design	Randomized Complete Block, 6 replications.
Plot Size	3x22 ft plot (3x19 ft harvested)
Seeded	May 13, 2021
Cuttings	Two in the seeding year, (one for yield), four in 2022, three in 2023.
Soil Type	Conover loam, pH 6.8
Fertilizer	400 lbs/acre 6-24-24 prior to seeding. 500 lbs/acre 0-14-42 in the spring 2022 600 lbs per acre 0-20-50 in April 2023
Notes	Common variety stand thinning by fourth cut in 2022.

† Experimental Variety

\* Yield is not statistically different from the greatest value in the column.

**Table 7.** Michigan State University Red Clover Variety Trial Yields (DM tons/acre), MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2022

Variety	2023 DM Yields T/A, Three-cuts and Total			2023 Total	2022 Total	Trial Total
	Cut 1 June 2	Cut 2 July 19	Cut 3 August 31			
BAR TP V23 †	3.23	1.31	1.76	6.29*	2.14	8.44*
Evolve	3.06	1.30	1.71	6.07*	2.26	8.33*
Commercial check	2.99	1.17	1.67	5.83*	2.42	8.24*
Redkin	3.01	1.19	1.75	5.95*	2.15	8.10*
BAR TS RWR †	3.08	1.19	1.66	5.93*	2.14	8.07*
Freedom!MR	2.97	1.20	1.76	5.93*	2.08	8.01*
Ruby Red Brand	2.97	1.20	1.82	5.99*	2.01	8.00*
Medallion	2.93	1.09	1.40	5.43	2.05	7.48
VNS Red Clover	2.56	0.99	0.72	4.27	2.03	6.30
Average	2.98	1.18	1.58	5.74	2.14	7.89
LSD 0.05	0.46	0.21	0.11	0.62	0.29	0.74
CV %	10.7	12.2	4.8	7.4	9.3	6.4
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI					
Design	Randomized Complete Block, 4 replications.					
Plot Size	3x22 ft plot (3x19 ft harvested)					
Seeded	May 24, 2022					
Cuttings	Two in the seeding year, four in 2023.					
Soil Type	Conover loam, pH 6.8					
Fertilizer	400 lbs/acre 6-24-24 prior to seeding. 600 lbs per acre 0-20-50 in April 2023					
† Experimental Variety						
* Yield is not statistically different from the greatest value in the column.						

**Table 8.** Michigan State University Perennial Grass Variety Trial Yields (DM tons/acre) of Tall Fescue, Meadow Fescue, Orchardgrass, Perennial Ryegrass, Timothy, and Bromegrass (Smooth and Meadow). MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded August 2020.

### Orchardgrass

Variety	Heading Date	2023 DM yields T/A, Three-cuts and Total				2023 Total	2022 Total	2021 Total	Trial Total
		Cut 1 May 28	Cut 2 August 5	Cut 3 Nov 13	2023 Total				
OG 80 †	5/23/2023	2.06	0.86	0.75	3.67*	3.01	7.81*	14.50*	
Echelon	5/24/2023	2.17	0.82	0.55	3.54*	3.19*	7.62*	14.35*	
Inavale	5/22/2023	2.51	0.86	0.53	3.89*	3.25*	7.03	14.17*	
Intensiv	5/27/2023	2.22	0.97	0.43	3.62*	2.94	7.26	13.82*	
OG 96 †	5/24/2023	2.13	0.89	0.63	3.65*	2.96	6.98	13.60*	
Potomac	5/17/2023	2.39	0.68	0.51	3.59*	3.16*	6.19	12.94	
Ammo	5/19/2023	2.52	0.55	0.50	3.57*	2.64	6.53	12.74	
BAR DGLF 2094 †	5/26/2023	1.98	0.91	0.45	3.33	2.91	6.46	12.70	
PST DG-A1737 †	5/26/2023	1.72	0.90	0.59	3.22	2.37	6.76	12.35	
PST DG-1739 †	5/22/2023	2.30	0.57	0.45	3.32	2.56	6.36	12.24	
BAR DGLF 2095 †	Veg	1.97	0.82	0.42	3.21	3.03*	5.89	12.13	
Average		2.18	0.80	0.53	3.51	2.91	6.81	13.23	
LSD 0.05		0.32	0.20	0.08	0.52	0.23	0.53	0.98	
CV%		10.1	16.9	11.0	10.3	5.4	5.4	5.1	

### Tall Fescue

Variety	Heading Date	2023 DM yields T/A, Three-cuts and Total				2023 Total	2022 Total	2021 Total	Trial Total
		Cut 1 May 28	Cut 2 August 5	Cut 3 Nov 13	2023 Total				
PST FA-A1733 †	5/25/2023	1.81	1.06	0.68	3.55*	3.10*	8.05*	14.69*	
Armory	5/24/2023	1.92	0.86	0.49	3.26*	3.07*	8.11*	14.44*	
BAR FAF 137 †	Veg	1.55	1.03	0.60	3.18*	3.02*	8.22*	14.42*	
BAR FAF 146 †	5/26/2023	1.81	0.88	0.46	3.16*	3.17*	7.70*	14.03*	
Bariane	Veg	1.49	1.03	0.48	3.00*	2.78	7.33	13.10	
7FACF82 †	Veg	1.40	0.99	0.48	2.86	2.59	7.59*	13.05	
BAR FAF 135 †	Veg	1.31	0.89	0.57	2.78	2.70	7.42	12.89	
BAR FAFL 239 †	5/26/2023	1.82	0.71	0.46	2.99	2.37	7.32	12.68	
BAR FA 9125 †	Veg	0.79	0.86	0.51	2.15	1.96	6.10	10.21	
Average		1.54	0.92	0.53	2.99	2.75	7.54	13.28	
LSD 0.05		0.30	0.19	0.14	0.55	0.36	0.66	1.13	
CV%		13.1	14.4	17.7	12.6	8.7	5.9	5.8	

Notes - Kentucky 31 minus dropped from the trial due to orchardgrass contamination.

Table 8. 2020 Perennial Grass East Lansing continued (page 2 of 3)

<b>Meadow Fescue</b>								
Variety	Heading Date	2023 DM yields T/A, Three-cuts and Total				2022 Total	2021 Total	Trial Total
		Cut 1 May 28	Cut 2 August 5	Cut 3 Nov 13	2023 Total			
BAR FPF82 †	5/28/2023	1.72	0.67	0.46	2.86*	2.62*	6.31	11.79*
Pradel	5/26/2023	1.42	0.78	0.50	2.70*	2.51*	6.35	11.57*
PST FP-A1750 †	5/27/2023	1.32	0.64	0.47	2.43	2.41	6.67*	11.51*
BAR FPF 77-2 †	5/27/2023	1.60	0.78	0.38	2.76*	2.66*	5.95	11.38*
PST FP-A1747 †	5/27/2023	1.31	0.75	0.42	2.49	2.54*	6.34	11.37*
Driftless	5/27/2023	1.46	0.78	0.52	2.76*	2.54*	6.02	11.32*
BAR FP 2044 †	5/27/2023	1.19	0.66	0.37	2.23	2.15	5.88	10.26
Average		1.43	0.72	0.45	2.60	2.49	6.22	11.31
LSD 0.05		0.22	0.18	0.11	0.36	0.18	0.30	0.51
CV%		10.2	16.9	16.9	9.2	5.0	3.2	3.0
<b>Perennial ryegrass</b>								
Variety	Heading Date	2023 DM yields T/A, Three-cuts and Total				2022 Total	2021 Total	Trial Total
		Cut 1 May 28	Cut 2 August 5	Cut 3 Nov 13	2023 Total			
Remington	Veg	1.03	0.68	0.35	2.06*	1.90*	6.64*	10.60*
Remington NEA	Veg	0.89	0.79	0.31	1.99*	1.76*	6.62*	10.37*
PST LP-A1703 †	Veg	0.73	0.63	0.33	1.69*	1.57*	5.55	8.80*
DSV LP-A1902 †	5/24/2023	1.65	0.45	0.19	2.29*	1.51	4.85	8.65
DSV LP-A1901 †	Veg	0.88	0.50	0.25	1.63	1.45	5.26	8.34
Average		1.04	0.61	0.29	1.93	1.64	5.78	9.35
LSD 0.05		0.50	0.15	0.10	0.65	0.37	0.46	0.80
CV%		31.3	15.7	22.4	22	14.8	5.2	5.6
<b>Timothy</b>								
Variety	Heading Date	2023 DM yield T/A - One cutting			2022 Total	2021 Total	Trial Total	
		May 28						
Barfleo	Veg	2.23*			3.24*	6.66*	12.13*	
Baronaise	Veg	1.83*			2.73	5.72	10.29	
Climax	Veg	1.58			2.63	5.24	9.45	
Average		1.88			2.87	5.87	10.6	
LSD 0.05		0.54			0.29	0.37	0.41	
CV%		16.8			5.8	3.6	2.2	
Notes -Three cuttings in 2021, One in 2022 and 2023.								

Table 8. 2020 Perennial Grass East Lansing continued next page

Table 8. 2020 Perennial Grass East Lansing continued (page 3 of 3)

<b>Bromegrass (Smooth and Meadow)</b>									
<b>Smooth Brome</b>	Heading Date	2023 DM yields T/A, Three-cuts and Total				2023 Total	2022 Total	2021 Total	Trial Total
		Cut 1 May 28	Cut 2 Aug 5	Cut 3 Nov 13	2023 Total				
Lincoln	Veg	2.51	0.43	0.26	3.20	2.61	9.19	15.00	
Artillery	Veg	2.34	0.51	0.25	3.11	2.67	8.79	14.57	
Average		2.43	0.47	0.26	3.16	2.64	8.99	14.79	
LSD 0.05 (smooth bromegrass)		0.31	0.09	0.09	0.27 ns	0.30 ns	0.41 ns	0.57 ns	
CV%		7.4	10.9	19.6	4.9	6.5	2.6	2.2	
<b>Meadow Brome</b>	Heading Date	2023 DM yields T/A, Three-cuts and Total				2023 Total	2022 Total	2021 Total	Trial Total
		Cut 1 May 28	Cut 2 Aug 5	Cut 3 Nov 13	2023 Total				
Commercial Check	5/17/2023	2.51	0.85	0.46	3.82	3.35	8.46	15.64	
Arsenal	5/16/2023	2.50	0.71	0.44	3.65	3.10	8.80*	15.55	
Average		2.51	0.78	0.45	3.74	3.23	8.63	15.6	
LSD 0.05 (meadow brome)		0.30	0.13	0.14	0.42 ns	0.59 ns	0.30	0.67 ns	
CV%		6.9	9.8	17.1	6.5	10.4	2.0	2.4	
<b>All Bromegrass</b>									
Average		2.47	0.63	0.35	3.45	2.93	8.81	15.19	
LSD 0.05		0.25	0.09	0.08	0.28	0.38	0.38	0.55	
CV%		7.5	10.8	16.0	5.6	9.5	3.1	2.6	
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI								
Design	Randomized complete block design, 4 replications.								
Plots Size	Plot size 3 ft (5 rows with 6 inch spacing) by 20 ft long All five rows by 17 ft long harvested for yield								
Seeded	August 8, 2020. Species were seeded in 6 separate trials.								
Fertilizer	300 lbs/acre 19-19-19 in the spring 2023. 50 lbs/acre N as Urea after cut 1 in 2023								
Cuttings	None in the seeding year, Three in 2021, 2022, and 2023. One in timothy in 2022 and 2023								
Heading date	Date when 50% of all tillers have a fully emerged grass head. An emerged head is completely clear of the flag leaf								
†	Experimental Variety.								
*	Yield is not statistically different from the greatest value in the column.								
ns	Total yield among varieties in this column are not statistically different.								

**Table 9.** Michigan State University Perennial Grass Variety Trial Yields (DM tons/acre) of Tall Fescue, Perennial Ryegrass, and Timothy. MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2021.

<b>Tall Fescue</b>						
Variety	Heading Date	2023 DM yields T/A, Two-cuts and Total			2022 Total	Trial Total
		Cut 1 May 28	Cut 2 Oct 4	2023 Total		
Bar Fafr 160184 †	5/23/2023	2.37	1.32	3.69*	2.86*	6.55*
Bar Fafr 181197 †	5/24/2023	1.99	1.23	3.22	2.63*	5.85
Bar Fafr 184270 †	5/23/2023	2.55	0.97	3.51*	2.32	5.83
STF 43	5/28/2023	1.73	1.31	3.05	2.44	5.49
Average		2.16	1.21	3.37	2.56	5.93
LSD 0.05		0.38	0.13	0.45	0.23	0.44
CV%		14.2	8.7	10.9	7.7	6.0
<b>Perennial ryegrass</b>						
Variety	Heading Date	2023 DM yields T/A, Two-cuts and Total			2022 Total	Trial Total
		Cut 1 May 28	Cut 2 Oct 4	2023 Total		
Remington NEA2	Veg	0.86	0.62	1.48*	2.53	4.01*
Dexter 1	Veg	0.91	0.43	1.34*	2.42	3.76*
Bar LP237 †	Veg	0.66	0.51	1.17	2.32	3.49
Average		0.81	0.52	1.33	2.42	3.75
LSD 0.05		0.30	0.12	0.35	0.32 ns	0.51
CV%		21.5	12.8	15.2	7.7	7.9
<b>Timothy</b>						
Variety	Heading Date	2023 DM yields T/A, Two-cuts and Total			2022 Total	Trial Total
		Cut 1 May 28	Cut 2 Oct 4	2023 Total		
Valor	5/28/2023	2.38	0.74	3.11*	3.54*	6.66*
Zenyatta	5/27/2023	2.49	0.74	3.23*	3.42*	6.65*
Climax	Veg	1.71	0.62	2.32	3.12	5.44
Average		2.19	0.7	2.89	3.36	6.25
LSD 0.05		0.55	0.14	0.60	0.26	0.68
CV%		14.4	11.2	11.9	4.5	6.3
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI					
Design	Randomized complete block design, 4 replications.					
Plots Size	Plot size 5 ft (8 rows with 6 inch spacing) by 20 ft long					
Seeded	May 14, 2021					
Fertilizer	200 lbs/acre 19-19-19 and 300 lbs/acre 6-24-24 in April 2023. 50 lbs/acre N as Urea after cut 1					
Cuttings	Two in the seeding year (no yield data), Three in 2022 and 2023 Species were seeded in 3 separate trials.					
Heading date	Date when 50% of all tillers have a fully emerged grass head. An emerged head is completely clear of the flag leaf					
† Experimental Variety.						
* Yield is not statistically different from the greatest value in the column.						
ns - Total yield among varieties in this column are not statistically different.						

**Table 10.** Michigan State University Perennial Grass Variety Trial Yields (DM tons/acre) of Orchardgrass, Perennial Ryegrass, and Timothy. MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in August 2022.

<b>Orchardgrass</b>		2023 DM yields T/A, Three-cuts and Total					
Variety	Heading Date	Cut 1 May 27	Cut 2 July 18	Cut 3 Oct 1	2023 Total	2022 Total	Trial Total
OG 96 †	5/24/2023	3.36	1.47	1.39	6.23*	1.10	7.33*
Barlegro	Veg	3.77	1.40	1.30	6.47*	0.75	7.22*
Intensiv	5/25/2023	3.86	1.35	1.18	6.39*	0.79	7.18*
Captur	5/26/2023	3.01	1.64	1.38	6.03*	0.97	7.00*
BAR DGL22100-D †	5/27/2023	3.80	1.34	1.18	6.32*	0.67	6.99*
BAR DGL22100-C †	5/26/2023	3.68	1.27	1.16	6.11*	0.67	6.78
Swante	5/24/2023	3.71	1.26	1.01	5.99*	0.77	6.76
Potomac	5/18/2023	3.37	1.31	1.20	5.88	0.84	6.72
BAR DGL22098 †	5/20/2023	3.49	1.28	1.18	5.95	0.67	6.62
Ammo	5/20/2023	3.80	1.08	1.06	5.94	0.58	6.52
BAR DGL22099 †	5/23/2023	3.66	1.07	1.09	5.82	0.65	6.47
Persist II	5/20/2023	3.31	1.25	1.23	5.79	0.58	6.37
Persist	5/17/2023	3.24	1.21	1.16	5.60	0.75	6.35
Average		3.54	1.30	1.19	6.04	0.75	6.79
LSD 0.05		0.34	0.12	0.19	0.49	0.13	0.49
CV %		6.7	6.6	11.3	5.7	12.1	5.1
<b>Perennial ryegrass</b>		2023 DM yields T/A, Three-cuts and Total					
Variety	Heading Date	Cut 1 May 27	Cut 2 July 9	Cut 3 Oct 1	2023 Total	2022 Total	Trial Total
Halsey	5/26/2023	3.46	1.34	0.41	5.20*	1.54	6.74*
TetraGain SLT	Veg	3.73	0.90	0.57	5.20*	0.87	6.07
Commercial Check	Veg	3.05	0.95	0.62	4.62	0.98	5.60
Dexter 1	Veg	3.06	0.74	0.64	4.44	0.99	5.43
Average		3.33	0.98	0.56	4.87	1.10	5.96
LSD 0.05		0.28	0.26	0.10	0.50	0.15	0.59
CV %		5.2	16.4	10.9	6.5	8.8	6.2

Table 10 - East Lansing 2022 Perennial grass seeding continued next page

Table 10 - East Lansing 2022 Perennial grass seeding continued (page 2 of 2)

<b>Timothy</b>		2023 DM yields T/A, Three-cuts and Total			
Variety	Heading Date	Cut 1 May 27	Cut 2 July 18	Cut 3 Oct 1	2023 Total
Sahara DT	Veg	3.25	1.31	1.17	5.73*
Zenyatta	Veg	3.44	1.04	1.18	5.66*
Valor	Veg	3.22	1.07	1.14	5.43*
Climax	Veg	2.93	0.98	0.85	4.76
Average		3.21	1.10	1.09	5.40
LSD 0.05		0.41	0.15	0.13	0.33
CV %		8.0	8.5	7.6	3.9
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI				
Design	Randomized complete block design, 4 replications.				
Plots Size	Plot size 5 ft (8 rows with 6 inch spacing) by 20 ft long				
Seeded	August 12, 2022. Species were seeded in 3 separate trials.				
Fertilizer	200 lbs/acre 19-19-19 and 300 lbs/acre 6-24-24 in April 2023. 50 lbs/acre N as Urea after cut 1 and 2				
Cuttings	One in the seeding year of Perennial ryegrass and orchardgrass Three in 2023				
Heading date	Date when 50% of all tillers have a fully emerged grass head. An emerged head is completely clear of the flag leaf				
† Experimental Variety.					
* Yield is not statistically different from the greatest value in the column.					



**Table 11.** Michigan State University Perennial Grass Variety Trial Yields (DM tons/acre) of Tall Fescue, Meadow Fescue, Orchardgrass, Timothy, and Bromegrass (Smooth and Meadow). Upper Peninsula Research and Extension Center, Chatham, Michigan. Seeded August 2020

<b>Tall Fescue</b>						
Variety	2023 DM yields T/A, Two-cuts			2022 Total	2021 Total	Trial Total
	Cut 1 June 20	Cut 2 Sept 21	2023 Total			
BAR FAF 135 †	1.24	0.77	2.01*	2.76*	1.45*	6.22*
BAR FAF 146 †	1.22	0.51	1.72*	2.81*	1.49*	6.03*
Armory	1.17	0.32	1.49*	2.96*	1.43*	5.89*
Bariane	1.06	0.51	1.56*	2.49*	1.55*	5.60*
BAR FAF 137 †	0.88	0.59	1.47*	2.37	1.29*	5.13*
7FACF82 †	1.08	0.56	1.64*	2.17	1.10	4.91
BAR FAFL 239 †	1.07	0.25	1.32	2.56*	1.00	4.87
BAR FA 9125 †	0.73	0.61	1.34	1.78	1.05	4.17
Average	1.06	0.52	1.57	2.49	1.30	5.35
LSD 0.05	0.36	0.33	0.60	0.51	0.30	1.15
CV%	22.3	43.6	25.4	13.7	15.9	14.4
<b>Meadow Fescue</b>						
Variety	2023 DM yields T/A, Two-cuts			2022 Total	2021 Total	Trial Total
	Cut 1 June 21	Cut 2 Sept 20	2023 Total			
BAR FPF 82 †	1.21	0.40	1.61	2.25*	2.55*	6.40*
Pradel	0.95	0.70	1.65	2.39*	2.28*	6.32*
BAR FPF 77-2 †	1.18	0.33	1.52	2.48*	1.99	5.98*
Driftless	1.06	0.48	1.54	2.30*	2.05	5.89*
BAR FP 2044 †	0.85	0.66	1.51	2.06	2.19	5.75
Average	1.05	0.51	1.57	2.3	2.21	6.07
LSD 0.05	0.09	0.10	0.17 ns	0.23	0.35	0.64
CV%	5.9	13.1	7.3	6.7	10.4	6.9
<b>Orchardgrass</b>						
Variety	2023 DM yields T/A, Two-cuts			2022 Total	2021 Total	Trial Total
	Cut 1 June 21	Cut 2 Sept 20	2023 Total			
BAR DGLF 2095 †	1.43	0.60	2.04	1.76*	1.79*	5.59*
Potomac	1.36	0.47	1.83	1.74*	1.68*	5.25*
Intensiv	1.37	0.48	1.85	1.60*	1.57*	5.02*
Ammo	1.35	0.37	1.72	1.50*	1.25*	4.47*
BAR DGLF 2094 †	1.05	0.41	1.46	1.16	1.14	3.75
Average	1.31	0.47	1.78	1.55	1.49	4.82
LSD 0.05	0.40	0.27	0.63 ns	0.54	0.58	1.69
CV%	19.6	38.2	23.2	22.8	25.4	22.8

Table 11. 2020 Perennial Grass Chatham continued next page

Table 11. 2020 Perennial Grass Chatham continued (page 2 of 2)

<b>Meadow Brome</b>	2023 DM yields T/A, Two-cuts			2022	2021	Trial
	Cut 1	Cut 2	2023			
Variety	June 20	Sept 21	Total	Total	Total	Total
Arsenal	1.26	0.60	1.86	2.42	2.44	6.72
Commercial check	1.28	0.54	1.82	2.10	2.45	6.37
Average	1.27	0.57	1.84	2.26	2.45	6.55
LSD 0.05	0.49	0.19	0.65 ns	1.10 ns	0.60 ns	2.22 ns
CV%	17.1	14.8	15.6	21.6	10.9	15.1
<b>Smooth Brome</b>						
Variety	2023 One-cutting, DM T/A			2022	2021	Trial
	June 20					
Artillery	1.69			1.90	2.04	5.64
Lincoln	1.77			1.84	1.90	5.51
Average	1.73			1.87	1.97	5.58
LSD 0.05	0.55 ns			0.54 ns	0.36 ns	1.24 ns
CV%	14.2			12.9	8.1	9.9
<b>Timothy</b>						
Variety	2023 One-cutting, DM T/A			2022	2021	Trial
	July 13					
Climax	2.68*			2.93*	1.28	6.89
Barfleo	2.45			2.85*	1.27	6.56
Baronaise	2.65*			2.61	1.27	6.53
Average	2.59			2.80	1.27	6.66
LSD 0.05	0.20			0.31	0.42 ns	0.89 ns
CV%	4.8			6.3	19.3	7.7
Location	Michigan State University UP Research and Extension Center Chatham, Alger County, Michigan.					
Soil Type	Eben Very Cobbly Sandy Loam					
Design	Randomized complete block design with four replications. Each species planted and harvested as a separate trial.					
Plot Size	Plot size 20 ft long, 3 x 17 ft harvested for yield					
Seeded	August 2020					
Cuttings	None in the seeding year. Each species planted and harvested as a separate trial.					
† Experimental Variety						
* Yield is not statistically different from the greatest value in the column.						
ns - Total yield among varieties in this column are not statistically different.						

Table 12. Michigan State University 2023 Annual Grass Variety Trial Yields (DM tons/acre) of Annual, Intermediate, and Italian ryegrass varieties seeded at the MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2022.

Variety	Type	% Stand April 27	2023 DM Yields T/A, Four-cuts and Total				2023 Total	2022 Total	Trial Total
			Cut 1 May 22	Cut 2 July 1	Cut 3 Aug 5	Cut 4 Nov 13			
Halsey	Intermediate	85	2.57	0.36	0.68	0.36	3.97*	2.43	6.40*
Dexter	Annual	88	2.76	0.50	0.64	0.35	4.26*	2.03	6.29*
Koga	Annual	65	2.77	0.50	0.73	0.32	4.32*	1.82	6.14*
Green Spirit	Italian	90	2.48	0.33	0.49	0.43	3.72	2.41	6.13*
Grazekeeper	Annual	63	2.69	0.55	0.68	0.25	4.17*	1.89	6.06*
Meroa	Annual	80	2.61	0.39	0.65	0.29	3.95*	1.97	5.92*
Mantis	Annual	50	2.20	0.37	0.19	-	2.76	2.87*	5.63
Marshall	Annual	50	2.29	0.56	0.14	-	2.98	2.41	5.39
Average			2.54	0.45	0.53	0.34	3.77	2.23	6.00
LSD 0.05			0.35	0.12	0.12	0.11	0.47	0.24	0.58
CV%			9.5	19.1	14.9	21.9	8.50	7.20	6.5

Location Michigan State University PSM Agronomy Farm, East Lansing, MI  
 Design Randomized complete block design, 4 replications.  
 Seeded May 17, 2022.  
 Plots Size Plot size 5 ft (8 rows with 6 inch spacing) by 20 ft long  
 Fertilizer Fertilized 50 lbs N per acre as Urea in April 27, 2023 and after cut 1.  
 Cuttings Three in the seeding year. Four in 2023.  
 Notes Mantis' and 'Marshall' did not regrow after cut 3 in 2023

\* Yield is not statistically different from the greatest value in the column.

Table 13. Michigan State University 2023 Annual Grass Variety Trial Yields (DM tons/acre), MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Seeded in May 2023.

Variety		2023 DM Yields T/A, Three-cuts and Total			
		Cut 1 July 9	Cut 2 Aug 31	Cut 3 Nov 13	2023 Total
BAREXTRA	Italian	1.27	2.02	0.74	4.03
BAR 14 LMT 503 †	Italian	1.33	1.93	0.73	3.98
BAR LMD TB+ †	Italian	1.27	2.07	0.58	3.92
Marshall	Annual	1.72	1.49	0.45	3.66
Ador	Italian	1.52	1.29	0.53	3.34
Average		1.42	1.76	0.61	3.79
LSD 0.05		0.34	0.33	0.11	0.46
CV %		15.5	12.2	11.3	8.0
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI				
Design	Randomized complete block design, 4 replications.				
Plots Size	Plot size 5 ft (8 rows with 6 inch spacing) by 20 ft long				
Seeded	May 6, 2023				
Cuttings	Three in the seeding year.				
Maturity notes	First cutting - Marshall the only entry with seed heads Second cutting - Marshall, Ador, and BAR LMB TB+ with seed heads. Marshall and Ador more mature than BAR LMD TB+ BAR 14 LMT 503 and BAREXTRA vegetative				
† Experimental Variety					

**Table 14.** Michigan State University 2022-2023 Winter Small Grain Forage Variety Trial Yields (DM tons/acre).  
MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Planted September 2022

<b>Triticale</b>			2023 DM yields T/A, Two-cuts and Total			
Variety	Maturity	Height inches	Cut 1 - May 23		Cut 2 - July 1	2023 Total
			yield	DM %	yield ††	
Ace	10.3	28.0	2.90*	15.9	0.58	3.48*
Gunner	9.9	29.8	2.72*	13.9	0.67*	3.39*
Flex 719	10.0	32.5	2.83*	14.8	0.51	3.33*
Exp 0220 †	10.0	30.5	2.79*	14.4	0.50	3.29*
Exp 0305 †	9.6	31.0	2.47	14.2	0.77*	3.24*
Exp 71321 †	10.3	25.5	2.68*	15.3	0.45	3.13
Exp 0209 †	10.1	29.5	2.53	14.5	0.54	3.07
Average		29.5	2.70	14.7	0.57	3.28
LSD 0.05		2.8	0.31	0.7	0.12	0.32
CV%		6.3	7.6	3.1	13.6	6.6
<b>Hybrid Rye</b>			2023 DM yields T/A, Two-cuts and Total			
Variety	Maturity	Height inches	Cut 1 - May 16		Cut 2 - July 1	2023 Total
			yield	DM %	yield ††	
Aviator	10.1	33.3	2.53	14.7	1.44	3.96
Progas	10.2	32.3	2.37	14.6	1.43	3.80
ProPower	10.1	30.5	2.25	13.5	1.52	3.76
Average		32.0	2.38	14.3	1.46	3.84
LSD 0.05		2.0	0.38 ns	1.2	0.18 ns	0.40 ns
CV%		3.6	9.1	4.7	7.0	5.9
Location	Michigan State University PSM Agronomy Farm, East Lansing, MI					
Seeding date	September 27, 2022					
Plot size	Plot Size 5 ft wide x 19 ft long, 3 ft x 16 ft harvested for yield					
Design	Randomized complete block, 4 replications Triticale and Hybrid Rye established as two trials					
Maturity	Feekes stage on the day of harvest					
Plant height	Height in inches - measured at the base of the flag leaf on the day of harvest					
Cutting height	Four inches with a self-propelled flail harvester					
Fertilizer	November 12, 2022 - 200 lbs per acre each of 19-19-19 and 6-24-24 April 3, 2022 - 170 lbs per acre Urea and 100 lbs per acre AMS (21-0-0-S)					
Notes - second cut	Growth was shorter and more mature (Feekes 10.5.1 to 10.5.3) than first cut.					
† Experimental Variety						
†† DM % in cut two not significantly different among hybrid rye (39 to 40 %) or triticale entries (35-37 %)						

**Table 15.** Michigan State University 2023 Multiple-cutting Sorghum Sudangrass Variety Trial Yields (DM tons/acre). MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Planted June 17, 2023.

Variety	Type	Heading date	Sept 1, 2023		Cut 1 - 9/1/2023		Cut 2 - 10/23/2023		2023 Total yield
			Lodging score	Height Feet	Yield tons/acre	DM %	Yield tons/acre	DM %	
Viking 100	Sorghum x sudangrass	Aug 26	1.0	7.9	5.48	19.3	0.69	26.3	6.17
Piper (check)	Sudangrass	Aug 26	1.0	7.9	4.78	22.3	1.13	25.7	5.91
Viking 200 BMR	Sorghum x sudangrass	Aug 25	1.3	8.4	4.90	20.1	0.76	26.2	5.66
Viking 150	Sorghum x sudangrass	Veg	1.0	7.0	4.95	17.1	0.54	28.3	5.49
Blackhawk 12 BMR	Sorghum x sudangrass	Sept 1	1.8	6.6	4.67	18.5	0.63	27.8	5.31
Viking 510 BMR	Sudangrass	Aug 29	2.8	6.6	4.39	18.1	0.67	28.9	5.05
Viking 232 BMR	Sorghum x sudangrass	Veg	1.3	5.4	4.36	18.0	0.51	24.8	4.87
Viking O.225	Sorghum x sudangrass	Veg	5.8	6.6	3.96	16.0	0.30	31.4	4.26
Viking O.210	Sorghum x sudangrass	Sept 1	4.8	6.5	3.47	16.2	0.58	25.3	4.05
Average				7.0	4.55	18.4	0.65	27.2	5.20
LSD 0.05				0.5	0.67	1.58	0.16	1.47	0.70
CV%				4.6	10.1	5.9	16.5	3.8	9.2
Location	Michigan State Univeristy PSM Agronomy Farm, East Lansing, Michigan								
Seeding Date	June 17, 2023 with a self-propelled walk behind nursery seeder. 30 lbs/acre seeding rate.								
Plot Size	9 rows by 25 ft long seeded, 6 inch row spacing.								
Harvest area	3 ft 17 ft harvest area long from the center of each plot.								
Fertility	300 lbs per acre 19-19-19 prior to seeding. 100 lbs/a N broadcast on July 10								
Irrigation	June 20, 2023 for emergence and establishment. Trial was seeded into dry soil!								
Lodging scale	1 - upright, no lodging, 2 - ends of the plot leaning, 3- more than just the end of the plot leaning, 6 -moderate leaning the entire plot.								
Heading	Estimate of when 50% of the plants have an emerged seed head.								
Height	Height at the base of the seed head, or the top leaf if vegetative								
Notes	Harvest yield was obtained by harvesting with a Carter flail harvester. % Dry matter was determined by collecting a subsample from each plot. Heavy rain with wind on August 15 followed by another event on August 24 resulted in lodging this year. Tornadoes in the area on August 24.								

Table 16. Michigan State University 2023 Single-cut Sorghum Sudangrass and Forage Sorghum Variety Trial Yields (DM tons/acre). MSU Plant Soil and Microbial Sciences Agronomy Farm, East Lansing, Michigan. Planted June 17, 2023

Variety	Type	Seeding rate lbs/acre	Cut 1 - 9/29/2023		Lodging †		Heading date	Height Feet
			Yield tons/acre	DM %	% affected	Rating		
Viking 150	Sorghum x sudangrass	30	9.28	23.93	0	1	Sept 11	8.4
Viking 300 BMR PPS	Sorghum x sudangrass	30	7.92	23.54	25	2.3	Veg	7.6
Viking O.225	Sorghum x sudangrass	30	7.06	22.38	53	4.3	Sept 19	7.0
Viking 401	Forage Sorghum	10	5.11	17.93	100	10.0	Sept 14	n/a
Average			7.34	21.95				
LSD 0.05			1.74	2.27				
CV %			14.8	6.4				
Location	Michigan State Univeristy PSM Agronomy Farm, East Lansing, Michigan							
Seeding Date	June 17, 2023 with a self-propelled walk behind nursery seeder.							
Plot Size	9 rows by 25 ft long seeded, 6 inch row spacing.							
Harvest	Yield was determined by harvesting from the center of each plot. % dry matter determined by chipping a subsample of the harvested material from each plot.							
Fertility	300 lbs per acre 19-19-19 prior to seeding. 100 lbs/a N broadcast on July 10							
Heading	Estimate of when 50% of the plants have an emerged seed head.							
Height	Height at the base of the seed head, or the top leaf if vegetative							
Irrigation	June 20, 2023 for emergence. Trial was seeded into dry soil!							
† Lodging	% affected - percent of the plot area with lodged plants. Lodging rating: 1 = upright, 10 equals flat i.e. a % affected score of 25 and lodging rating of 2 is an estimate that 25 % of the plants are leaning 10 degrees. 1 = upright, 2 = 10 degrees, 3 = 20 degrees... 10 = 90 degrees or flat							
Notes	Heavy rain with wind on August 15 followed by another event on August 24 resulted in lodging this year. Tornadoes in the area on August 24.							

## **Appendix I**

### **Acknowledgements of the staff and students at Chatham and East Lansing**

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## Appendix II

<b>East Lansing, Michigan</b>													
Rainfall data at the Michigan State University Agronomy farm by date, Summer 2023													
Date	Inches	Date	Inches	Date	Inches	Date	Inches	Date	Inches	Date	Inches	Date	Inches
April 1		May 1	0.04	June 1		July 1		August 1		Sept 1		Oct 1	
April 2	0.25	May 2	0.34	June 2		July 2	1.11	August 2		Sept 2		Oct 2	
April 3		May 3	0.13	June 3		July 3	0.64	August 3		Sept 3		Oct 3	
April 4	0.43	May 4	0.04	June 4		July 4		August 4		Sept 4		Oct 4	
April 5	0.53	May 5		June 5		July 5		August 5		Sept 5		Oct 5	
April 6	0.94	May 6		June 6		July 6	0.18	August 6		Sept 6		Oct 6	2.60
April 7		May 7		June 7		July 7	0.17	August 7	0.62	Sept 7	0.55	Oct 7	0.24
April 8		May 8	0.07	June 8		July 8		August 8	0.03	Sept 8	0.28	Oct 8	0.14
April 9		May 9	0.05	June 9		July 9		August 9		Sept 9		Oct 9	
April 10		May 10		June 10		July 10	0.04	August 10		Sept 10		Oct 10	
April 11		May 11		June 11		July 11		August 11	0.03	Sept 11		Oct 11	0.11
April 12		May 12		June 12	0.13	July 12		August 12		Sept 12	0.19	Oct 12	
April 13		May 13		June 13	0.01	July 13	1.73	August 13	0.01	Sept 13	0.03	Oct 13	
April 14		May 14		June 14		July 14	0.87	August 14		Sept 14		Oct 14	0.32
April 15		May 15		June 15		July 15		August 15	0.58	Sept 15		Oct 15	0.30
April 16		May 16		June 16		July 16		August 16	1.93	Sept 16		Oct 16	0.05
April 17	0.21	May 17		June 17		July 17	0.70	August 17		Sept 17		Oct 17	
April 18	0.08	May 18		June 18		July 18		August 18	0.79	Sept 18		Oct 18	
April 19		May 19		June 19		July 19		August 19		Sept 19		Oct 19	
April 20	0.22	May 20	0.50	June 20		July 20		August 20		Sept 20		Oct 20	0.41
April 21		May 21		June 21		July 21	0.11	August 21		Sept 21		Oct 21	0.20
April 22	0.06	May 22		June 22		July 22		August 22		Sept 22		Oct 22	0.02
April 23	0.13	May 23		June 23		July 23		August 23		Sept 23		Oct 23	
April 24		May 24		June 24		July 24	0.03	August 24	2.18	Sept 24		Oct 24	
April 25		May 25		June 25		July 25		August 25		Sept 25		Oct 25	
April 26	0.10	May 26		June 26	0.02	July 26		August 26		Sept 26	0.03	Oct 26	0.29
April 27		May 27		June 27	0.58	July 27	0.79	August 27		Sept 27	0.04	Oct 27	0.24
April 28		May 28		June 28		July 28		August 28		Sept 28	0.56	Oct 28	0.06
April 29	0.24	May 29		June 29		July 29		August 29		Sept 29	0.15	Oct 29	0.01
April 30	0.22	May 30		June 30	0.09	July 30		August 30		Sept 30		Oct 30	0.26
		May 31				July 31	0.50	August 31				Oct 31	0.13
2023 Totals	3.41		1.17		0.83		6.87		6.17		1.83		5.38
Normal †	3.03		3.36		3.45		2.84		3.23		3.50		2.53

† Thirty year (1991 to 2020) averages in the Lansing Michigan area. <https://www.weather.gov>

### Appendix III

<b>Chatham, Michigan</b>													
Rainfall data at the Michigan State University UP Experiment Station by date, Summer 2023 ( <a href="https://www.weather.gov">https://www.weather.gov</a> )													
Date	Inches	Date	Inches	Date	Inches	Date	Inches	Date	Inches	Date	Inches	Date	Inches
April 1	0.81†	May 1	2.46	June 1		July 1		August 1		Sept 1		Oct 1	1.22
April 2	0.20†	May 2	1.30†	June 2		July 2		August 2		Sept 2		Oct 2	0.38
April 3		May 3	0.15†	June 3		July 3		August 3	0.30	Sept 3		Oct 3	
April 4		May 4		June 4		July 4		August 4		Sept 4		Oct 4	
April 5	0.54	May 5	0.09	June 5		July 5	0.65	August 5		Sept 5		Oct 5	
April 6		May 6	0.16	June 6		July 6	0.01	August 6		Sept 6	0.35	Oct 6	0.05
April 7	0.01	May 7	0.59	June 7		July 7		August 7		Sept 7	0.35	Oct 7	0.73
April 8		May 8		June 8		July 8		August 8		Sept 8	0.03	Oct 8	0.40
April 9		May 9		June 9		July 9	0.10	August 9		Sept 9		Oct 9	0.03
April 10		May 10		June 10		July 10	0.05	August 10		Sept 10	0.08	Oct 10	0.42
April 11		May 11		June 11	0.10	July 11	0.60	August 11		Sept 11	0.40	Oct 11	0.18
April 12		May 12		June 12		July 12		August 12	0.28	Sept 12	0.12	Oct 12	0.13
April 13		May 13		June 13	0.51	July 13		August 13		Sept 13	0.22	Oct 13	0.01
April 14		May 14		June 14	0.42	July 14		August 14		Sept 14	0.01	Oct 14	T
April 15		May 15		June 15	0.02	July 15	0.72	August 15		Sept 15		Oct 15	
April 16	0.10	May 16		June 16	0.02	July 16	0.24	August 16		Sept 16	T	Oct 16	
April 17		May 17		June 17		July 17	0.13	August 17	0.61	Sept 17		Oct 17	
April 18	0.17†	May 18		June 18		July 18	0.05	August 18	0.02	Sept 18		Oct 18	
April 19	0.05†	May 19	0.43	June 19		July 19	0.20	August 19		Sept 19		Oct 19	0.14
April 20		May 20	0.36	June 20		July 20	0.62	August 20		Sept 20		Oct 20	0.24
April 21	0.39	May 21		June 21		July 21		August 21		Sept 21		Oct 21	
April 22	0.01	May 22		June 22		July 22		August 22	0.70	Sept 22		Oct 22	
April 23		May 23		June 23		July 23	0.12	August 23	0.03	Sept 23		Oct 23	
April 24		May 24	0.02	June 24		July 24	0.01	August 24	0.01	Sept 24		Oct 24	
April 25	0.16†	May 25		June 25		July 25		August 25		Sept 25		Oct 25	1.10
April 26		May 26		June 26	0.28	July 26		August 26	0.11	Sept 26		Oct 26	0.05
April 27	0.13	May 27		June 27	0.15	July 27		August 27		Sept 27		Oct 27	0.36
April 28	0.26	May 28		June 28		July 28	0.45	August 28		Sept 28		Oct 28	
April 29		May 29		June 29	0.38	July 29		August 29	0.08	Sept 29		Oct 29	
April 30	1.00	May 30		June 30		July 30		August 30	0.12	Sept 30	0.14	Oct 30	
		May 31				July 31		August 31				Oct 31	
2023 Totals	3.83		5.56		1.88		3.95		2.26		1.70		5.44
Normal ††	2.44		3.27		3.37		3.58		3.03		4.25		4.74

† Precipitation was snow, reported as inches of rain

†† Thirty year (1991 to 2020) averages from the Experiment Station in Chatham. <https://www.weather.gov>