TARE

Thumb Ag Research & Education
2016 Field Trials

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TARE
Thumb Ag Research & Education

Introduction

2016 TARE Plot Report

This report represents the 12th year of a multi-county strategy for evaluating corn hybrids and soybean varieties as well as agronomic practices in Michigan's Thumb. The TARE Committee, comprised of farmer and agribusiness representatives, serves as an advisory board, and provides oversight for the project's direction, finances and equipment needs. We gratefully acknowledge the committee's contributions and the support provided by our industry partners, listed on the back cover of this publication.

Studies are analyzed to determine the Least Significant Difference (LSD) at the 0.05 (5%) level. The LSD represents the maximum difference between treatments (hybrid, variety, population, or evaluated input) for the difference to be attributed to the treatment rather than some external factor, like soil variability, or rainfall. An LSD at the 0.05 level means that statistically, we can be 95% confident with the results. Within studies any result that is **bolded,** or has a similar letter following the result is statistically the same. Therefore, if a treatment is bolded it yielded the same, statistically speaking, as the highest yielding treatment in that study. Any treatment result, within a study, that is not bolded yielded significantly less than the highest yielding treatment. We also include the Coefficient of Variation (CV). The CV is a measure of the variability of the data. The lower the CV, the more confident you can be that the data is good. Generally, a CV of less than 10% is good data. A CV of less than 5% is very good data.

We hope you find these results helpful as you make decisions for your farm business. We are most interested in conducting studies that area growers will find valuable, within the constraints of our line of equipment and supplies. It is you, the grower that we aim to provide with practical and useful information.

2016 Greater Thumb Area Field Crops Team

Bob Battel, Extension Educator, Corn and Soybeans

Phil Kaatz, Extension Educator, Forages

Martin Nagelkirk, Extension Educator, Wheat

Jim Vincent, Lead Technician

Chad Alexander, Project Technician

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TARE Corn Plots					
City	**Capac**	**Carsonville**	**Filion**	**Kingston**	**Unionville**
Location	S/E Martin & Speaker	S/W French Line & Ruth	S/W Kinde & Verona	S/W Rossman & White Creek	S/W Ackerman & Remington
Grower	Don Koning	Matt Frostic	Don Koth	Rich D'Arcy	Jason Haag
Fall Tillage		Disk ripper	Disk ripper	Disk ripper	Plow
Spring Tillage	Vertical tillage	Field cultivator	Field cultivator	Field cultivator	Field cultivator
Plot Length	90	90	90	90	90
Planted Pop	32,000	32,000	32,000	32,000	32,000
Planting Date	24-May	23-May	12-May	11-May	22-May
Harvest Date	12-Nov	19-Nov	31-Oct	4-Nov	26-Oct
Soil Fertility					
pH	6.2	5.5	7.1	7.4	7.9
P	136	74	80	58	92
K	418	416	222	82	190
Mg	217	146	239	126	251
Ca	2607	1108	1436	1132	2339
CEC	15.9	10.2	9.7	6.9	14.3

TARE Soybean Plots			
Location	S/E Fargo & Holly	S/W Fairgrove & Ringle	S/W Greening & Walker
Grower	Walsh Farms	Rob Foster	Anonymous
Fall Tillage	Plow		Vertical tillage
Spring Tillage	Field cultivator	Field cultivator	
Plot Length	75	75	75
Planted Pop	130,000	130,000	130,000
Planting Date	24-May	25-May	31-May
Harvest Date	14-Oct	22-Oct	18-Oct
Soil Fertility			
pH	7.1	7.4	6
P	140	47	47
K	176	187	69
Mg	156	322	73
Ca	1155	2468	870
CEC	7.5	15.5	8.7

Additional Plot Cooperators				
Plot Type	**Corn**	**Soybean**	**Corn**	**Alfalfa**
City	North Branch	North Branch	North Branch	Imlay City
Location	Five Lakes &	Five Lakes &	Coffron &	Winslow &
Grower	Steve Listwak	Steve Listwak	David Brusie & Sons	Mike Lauwers
Previous Crop	Soybean	Corn	Sugar beets	Alfalfa
Fall Tillage	---	---	Chisel	---
Spring Tillage	Field Cultivator	Field Cultivator	NH3 applicator	---
Spring Tillage	---	---	Field Cultivator	---
Plot Length	600	1,000	1,000	300
Planted Pop	26,000	100,000	32-36,000	18 lbs/A
Planting Date	6-May	8-May	10-May	2013
Harvest Date	4-Nov	14-Nov	7-Nov	Various

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Pigeon/Bad Axe

	Precipitation				GDD			
	2016	2015	2014	Normal	2016	2015	2014	Normal
May	1.54	2.51	3.16	2.92	329	367	303	291
June	1.90	3.12	2.72	2.91	479	414	525	467
July	1.64	3.76	4.09	3.04	646	582	546	601
August	6.19	4.99	3.97	3.68	605	571	396	551
September	2.83	3.79	3.24	3.82	427	519	348	360
Total	14.10	18.17	17.18	16.37	2,486	2,453	2,118	2,270
	-14%	11%	5%		10%	8%	-7%	

Sandusky

	Precipitation				GDD			
	2016	2015	2014	Normal	2016	2015	2014	Normal
May	2.96	2.45	3.61	2.57	348	396	282	317
June	3.83	2.65	2.40	2.81	485	472	519	486
July	4.95	1.87	4.06	2.71	657	558	525	622
August	5.77	4.38	3.55	2.86	695	644	353	575
September	1.71	2.72	3.96	4.1	477	535	310	377
Total	19.22	14.07	17.58	15.05	2,662	2,605	1,989	2,377
	28%	-7%	17%		12%	10%	-16%	

Fairgrove/Caro

	Precipitation				GDD			
	2016	2015	2014	Normal	2016	2015	2014	Normal
May	1.23	2.74	3.15	2.86	363	393	340	353
June	1.27	4.1	2.87	3.3	514	461	553	519
July	3.49	2.69	4.26	2.75	678	596	524	644
August	5.06	7.65	4.54	3.26	675	566	549	594
September	2.00	3.97	2.89	4.22	455	487	371	402
Total	13.05	21.15	17.71	16.39	2,685	2,503	2,337	2,512
	-20%	29%	8%		7%	0%	-7%	

Emmett

	Precipitation				GDD			
	2016	2015	2014	Normal	2016	2015	2014	Normal
May	2.76	7.34	2.44	3.22	347	418	345	294
June	1.52	6.3	1.79	3.73	501	502	538	519
July	2.90	3.37	3.30	2.61	684	632	541	663
August	5.74	3.21	5.06	2.74	711	603	576	604
September	3.11	2.51	2.64	2.56	477	542	386	380
Total	16.03	22.73	15.23	14.85	2,721	2,697	2,386	2,460
	8%	53%	3%		11%	10%	-3%	

Richville

	Precipitation				GDD			
	2016	2015	2014	Normal	2016	2015	2014	Normal
May	1.59	3.37	3.06	2.35	370	383	327	342
June	1.51	3.16	2.74	2.89	523	492	553	525
July	3.47	1.94	4.17	2.62	685	585	506	633
August	5.15	2.33	3.90	2.7	678	558	546	591
September	2.03	2.74	3.03	2.66	459	490	356	416
Total	13.75	13.54	16.9	13.22	2,714	2,508	2,288	2,507
	0.5%	2%	28%		8%	0%	-9%	

MSU Enviro-weather Summary of Precipitation and Growing Degree Days 2016

http://enviroweather.msu.edu

[1]GDD is the growing degree days based on 50°F and 86°F cutoff (corn method).

[2]"Normal" is the average precipitation from 1971 –2000 and is based on data collected at Bad Axe, Caro and Sandusky.

Percent change based on normal for each location.

2016 Corn Studies Introduction

Corn is established in 90 foot long by 15 foot wide plots. A planter modified for research is used for establishment. It plants six-30 inch wide rows. Plots are planted perpendicular to the field tile.

Corn is harvested with a 2144 Case IH combine with an attached HarvestMaster weigh system that records weight, moisture and test weight. The center 10 feet (four rows) is harvested for data.

The target planted population was 32,000 seeds per acre. Corn population across all plots was recorded about a month after planting. The average stand across all sites was 31,700 plants per acre.

Plots are established in a randomized complete block design (RCB) with four replications. Hybrid comparisons included 85-94 RM hybrids, 95-99 RM hybrids, 100-105 RM hybrids. The 100-105 RM hybrids are not planted at the Filion site because of the cooler temperature regime at that site.

Planting commenced on May 11, and continued the next day. A rain storm on the late afternoon May 12 delayed planting of the third, fourth, and fifth plots, May 22, 23 and 24. During that time, a planned sixth plot became unavailable, and the sixth plot was not planted.

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Michigan Corn www.micorn.org

Corn Hybrid Trial
100-105 Day RM
Glyphosate Resistant
Average of Locations

TARE Thumb Ag Research & Education

Average of All Locations

Company	RM	Trait	Seed Trt	TW	MS %	Bu/A
Beck's 5460 AM	104	AM	Poncho/Votivo 1250	55.0	19.4	**218.5**
Dairyland DS 9701RA	101	RR2,SSX,Refuge	P250	55.3	19.2	202.5
Dairyland DS 9805RA	105	RR2,SSX,Refuge	P250	54.5	19.4	208.2
Dyna-Gro D40SS48	100	SmartStax	P500 Votivo	56.1	19.0	202.7
Dyna-Gro D41VC71	101	VT2 Pro	P500 Votivo	55.7	19.3	206.2
Dyna-Gro D43VC50	103	VT2 Pro	P500 Votivo	54.8	19.6	207.3
GH G03A50-3010	103	GT/CB/LL	Avicta Complete 250	55.3	19.4	205.7
Great Lakes 5029VT2RIB	100	VT2	Poncho/VOTIVO	55.7	18.9	206.3
Great Lakes 5283STXRIB	102	STX	Poncho/VOTIVO	55.1	19.3	**213.5**
Great Lakes 5556VT2RIB	105	VT2	Poncho/VOTIVO	54.7	19.6	**211.5**
NK N45P-3122A	101	GT/CB/LL/WBC/RW	Avicta Complete 250	55.6	19.0	198.3
NuTech 5F-504	104	Mon810\TC1507\NK603	Poncho-Votivo 500	55.0	19.5	**219.8**
NuTech 5F-601	101	Mon810\TC1507\NK603	Poncho-Votivo 500	55.3	19.3	**220.8**
NuTech 5Z-503	103	Mon810\TC1507\NK603	Poncho-Votivo 500	55.0	19.5	**212.0**
Rupp Seeds XR D00-51	100	SSX	Poncho/Votivo 500	55.4	18.9	200.7
Rupp Seeds XR D02-93	102	VT2Pro	Acceleron 250	55.1	19.4	206.2
Rupp Seeds XR D03-71	103	VT2ProDG	Poncho/Votivo 500	55.1	19.4	206.3
Spirit Hybrids ST494GT3A	101			55.9	19.0	198.5
Stine Seed 9538-20	104	Agrisure Viptera 3110		54.8	19.6	188.9
Stine Seed R9428-32	101	SmartStax		55.7	19.2	207.7
Average				55.3	19.3	207.1
High				56.1	19.6	220.8
Low				54.5	18.9	188.9
CV (%)						8.2
LSD (Bu/A)						12.1

Yields adjusted to 15.0 % moisture.

Bolded Yields are not statistically different than highest yielding hybrid in column.

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Michigan Corn www.micorn.org

Corn Hybrid Trial
100—105 Day RM
Glyphosate Resistance
Yield by Location

TARE Thumb Ag Research & Education

		Yield by Location Bu/A			
Company	**RM**	**Capac**	**Carsonville**	**Kingston**	**Unionville**
Beck's 5460 AM	104	**195.7**	**241.6**	**232.2**	**204.3**
Dairyland DS 9701RA	101	183.3	**228.3**	202.7	**195.8**
Dairyland DS 9805RA	105	**206.0**	214.7	213.1	**198.8**
Dyna-Gro D40SS48	100	182.1	223.5	211.1	**194.1**
Dyna-Gro D41VC71	101	**196.2**	224.4	210.2	**194.1**
Dyna-Gro D43VC50	103	169.2	225.9	219.9	**214.1**
GH G03A50-3010	103	185.8	**228.9**	209.9	**198.2**
Great Lakes 5029VT2RIB	100	178.8	**226.8**	222.6	**197.2**
Great Lakes 5283STXRIB	102	**195.3**	**236.5**	225.2	**196.9**
Great Lakes 5556VT2RIB	105	**193.2**	**227.9**	224.0	**200.7**
NK N45P-3122A	101	176.9	213.0	216.8	186.6
NuTech 5F-504	104	**205.8**	**237.4**	**234.5**	**201.5**
NuTech 5F-601	101	**207.7**	**240.9**	**229.6**	**204.8**
NuTech 5Z-503	103	192.2	**240.2**	218.6	**197.0**
Rupp Seeds XR D00-51	100	178.1	213.9	214.4	**196.3**
Rupp Seeds XR D02-93	102	184.3	**227.6**	216.4	**196.6**
Rupp Seeds XR D03-71	103	**192.7**	223.9	216.1	**192.4**
Spirit Hybrids ST494GT3A	101	180.0	223.0	207.9	183.1
Stine Seed 9538-20	104	163.9	212.6	206.0	173.2
Stine Seed R9428-32	101	**195.8**	**229.5**	224.7	180.8
Average		188.1	227.0	217.8	195.3
High		207.7	241.6	234.5	214.1
Low		163.9	212.6	202.7	173.2
CV (%)		7.1	5.5	7.0	9.6
LSD (Bu/A)		15.3	14.8	17.3	22.0

Yields adjusted to 15.0 % moisture.

Bolded Yields are not statistically different than highest yielding hybrid in column.

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Michigan Corn www.micorn.org

Corn Hybrid Trial
95—99 Day RM
Glyphosate Resistant
Average of Locations

TARE Thumb Ag Research & Education

				Average of All Locations		
Company Hybrid	**RM**	**Trait**	**Seed Trt**	**TW**	**MS %**	**Bu/A**
Beck's 4606 V2P	96	V2P	Poncho/Votivo 1250	56.8	17.4	192.2
Beck's 4721	97	AM		55.1	19.0	197.5
Beck's 4919	99	V2P	Poncho/Votivo 1250	56.6	18.0	187.4
Channel 197-68STXRIB	97	STXRIB	A500 Poncho/Votivo	55.8	18.8	**208.5**
Channel 199-00DGVT2PRIB	99	DGVT2PRIB	A500 Poncho/Votivo	55.9	18.4	197.4
Croplan 3611SS/RIB	96	SS	Acceleron	55.6	18.7	**205.2**
Croplan 3899VT2P/RIB	96	VT2P	Acceleron	55.5	18.7	**216.9**
Dairyland DS 9198RA	98	RR2,SSX,Refuge	P250	55.6	18.6	190.8
Dairyland DS 9599	99	6T3000	P250	55.1	19.0	197.5
Dairyland DS 3099-6	99	R2Y	P250	54.9	19.1	**208.2**
Dyna-Gro D35SS58	95	SmartStax	P500 Votivo	56.1	18.4	**207.2**
Dyna-Gro D37SS60	97	VT2 Pro	P500 Votivo	56.7	17.8	196.8
GH G95D32-3110	95	GT/CB/LL/WBC	Avicta Complete 250	55.6	18.7	**198.4**
Great Lakes 4548STXRIB	95	STX	Poncho/VOTIVO	56.2	18.4	**210.8**
Great Lakes 4879STXRIB	98	STX	Poncho/VOTIVO	55.3	19.0	**199.6**
NK N36G3010	96	GT/CB/LL	Avicta Complete 250	55.5	18.7	**200.0**
NuTech 5F-196	96	Mon810\TC1507\NK603	Poncho-Votivo 500	55.2	19.0	**206.2**
NuTech X5N-9901	99	GT,CB,RW	Poncho-Votivo 500	54.9	19.0	**206.3**
Rupp Seeds 8XP 680	95	SSX	Poncho/Votivo 500	56.3	18.1	191.5
Rupp Seeds XR D97-56	97	VT2Pro	Acceleron 250	57.0	17.3	191.2
Stine Seed R9314-20	95	Agrisure Viptera 3110		55.7	18.5	188.2
Average				55.7	18.6	200.3
High				57.0	19.1	216.9
Low				54.9	17.3	187.4
CV (%)						7.2
LSD (bu/A)						18.1

Yields adjusted to 15.0 % moisture.

Bolded Yields are not statistically different than highest yielding hybrid in column.

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Michigan Corn www.micorn.org

Corn Hybrid Trial
95—99 Day RM
Glyphosate Resistant
Yield by Location

TARE Thumb Ag Research & Education

		Yield by Location Bu/A				
Company Hybrid	**RM**	**Capac**	**Carsonville**	**Filion**	**Kingston**	**Unionville**
Beck's 4606 V2P	96	180.0	196.6	**204.9**	204.2	175.5
Beck's 4721	97	189.4	209.7	203.2	203.4	181.9
Beck's 4919	99	170.0	205.9	195.7	191.1	174.1
Channel 197-68STXRIB	97	**201.5**	**232.3**	**211.5**	207.1	189.9
Channel 199-00DGVT2PRIB	99	182.6	207.1	202.8	209.0	185.4
Croplan 3611SS/RIB	96	191.1	216.8	**215.1**	**221.6**	181.6
Croplan 3899VT2P/RIB	96	**199.8**	**227.1**	**217.5**	**228.8**	**211.0**
Dairyland DS 9198RA	98	176.8	198.7	201.7	194.4	182.5
Dairyland DS 9599	99	186.3	216.9	199.2	208.6	176.2
Dairyland DS 3099-6	99	**191.9**	**227.3**	193.2	**228.3**	**200.2**
Dyna-Gro D35SS58	95	**193.5**	**222.5**	**214.1**	211.0	**194.9**
Dyna-Gro D37SS60	97	182.6	207.7	**211.0**	200.5	182.3
GH G95D32-3110	95	186.4	216.1	**213.8**	205.2	170.4
Great Lakes 4548STXRIB	95	184.0	**223.5**	**217.0**	**226.1**	**203.2**
Great Lakes 4879STXRIB	98	170.1	208.6	**214.4**	**211.9**	**192.8**
NK N36G3010	96	184.5	212.6	**207.9**	198.4	**196.6**
NuTech 5F-196	96	**192.8**	**232.7**	200.4	**216.7**	188.6
NuTech X5N-9901	99	**205.4**	**227.0**	**206.8**	206.1	186.4
Rupp Seeds 8XP 680	95	167.4	211.1	**204.1**	206.4	168.4
Rupp Seeds XR D97-56	97	169.9	201.4	**209.0**	203.5	172.3
Stine Seed R9314-20	95	172.6	200.3	202.2	192.7	173.0
Average		184.7	214.4	206.9	208.3	185.1
High		205.4	232.7	217.5	228.8	211.0
Low		167.4	196.6	193.2	191.1	168.4
CV (%)		6.7	4.9	5.9	6.1	9.2
LSD (bu/A)		14.2	12.5	14.2	17.1	20.1

Yields adjusted to 15.0 % moisture.

Bolded Yields are not statistically different than highest yielding hybrid in column.

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Corn Hybrid Trial
85—94 Day RM
Glyphosate Resistant
Average of Locations

TARE Thumb Ag Research & Education

				Average of All Locations		
Company Hybrid	**RM**	**Trait**	**Seed Trt**	**TW**	**MS %**	**Yield Bu/A**
Beck's 4323	93	VR Agrisure	Poncho/Votivo 1250	56.0	18.0	**194.8**
Channel 192-08VT2PRIB	92	VT2PRIB	A500 Poncho/Votivo	56.1	17.8	**195.2**
Channel 194-14VT2PRIB	94	VT2PRIB	A500 Poncho/Votivo	56.1	17.8	**195.5**
Croplan 3399SS/RIB	93	SS	Acceleron	55.7	18.2	**194.6**
Croplan 3499VT3P/RIB	94	VT3P	Acceleron	55.9	18.0	**196.7**
Dyna-Gro D31SS31	91	SmartStax	P500 Votivo	56.2	17.7	186.3
Dyna-Gro D32SS56	92	SmartStax	P500 Votivo	56.1	17.8	**191.2**
Dyna-Gro D34VP52	94	VT3 Pro	P500 Votivo	55.8	18.1	**196.4**
GH G90Y04-3110A	92	GT/CB/LL/WBC	Avicta Complete 250	56.0	18.1	**193.0**
Great Lakes 4037VT2RIB	90	VT2	Poncho/VOTIVO	56.5	17.5	**191.7**
Great Lakes 4250STXRIB	92	STX	Poncho/VOTIVO	56.4	17.5	**192.8**
Great Lakes 4452VT2RIB	94	VT2	Poncho/VOTIVO	55.6	18.2	**201.0**
Mycogen 2V357	93			55.8	18.0	187.5
Mycogen CNX 153138G8	93			55.9	18.0	**189.6**
NK N18Q-3011A	86	GT/CB/LL/RW	Avicta Complete 250	55.9	18.0	**188.2**
NuTech 5D-091	91	Mon810\TC1507\NK603	Poncho-Votivo 500	55.7	18.0	181.6
NuTech 5N-293	93	GT,CB	Poncho-Votivo 500	55.7	18.2	**196.3**
Rupp Seeds XR D92-74	92	VT2Pro	Acceleron 250	56.7	17.3	**190.3**
Rupp Seeds XR T94-06	94	VT3Pro	Acceleron 250	55.9	18.1	**195.6**
Spirit Hybrids XSP093-16	93			56.0	18.1	**188.7**
Stine Seed R9209-32	91	SmartStax		55.7	18.1	**190.7**
Average				56.0	17.9	192.3
High				56.7	18.2	201.0
Low				55.6	17.3	181.6
CV (%)						7.6
LSD (Bu/A)						12.9

Yields adjusted to 15.0 % moisture.

Bolded Yields are not statistically different than highest yielding hybrid in column.

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Michigan Corn www.micorn.org

Corn Hybrid Trial
85—94 Day RM
Glyphosate Resistant
Yield by Location

TARE Thumb Ag Research & Education

		Yield by Location Bu/A			
Company - Hybrid	**RM**	**Capac**	**Filion**	**Kingston**	**Unionville**
Beck's 4323	93	**181.3**	194.4	**216.2**	**187.1**
Channel 192-08VT2PRIB	92	**181.1**	**203.0**	201.1	**195.4**
Channel 194-14VT2PRIB	94	**189.4**	**199.8**	204.4	**188.3**
Croplan 3399SS/RIB	93	**189.7**	**205.2**	202.4	**181.0**
Croplan 3499VT3P/RIB	94	**193.0**	**205.8**	202.9	**185.3**
Dyna-Gro D31SS31	91	175.4	**198.6**	196.7	174.7
Dyna-Gro D32SS56	92	179.6	192.6	202.1	**190.3**
Dyna-Gro D34VP52	94	179.9	**206.5**	204.4	**194.8**
GH G90Y04-3110A	92	**183.7**	**197.1**	**206.9**	**184.1**
Great Lakes 4037VT2RIB	90	170.5	**207.3**	202.9	**186.3**
Great Lakes 4250STXRIB	92	**184.6**	**201.9**	**211.4**	173.6
Great Lakes 4452VT2RIB	94	**191.0**	**208.7**	**211.5**	**192.8**
Mycogen 2V357	93	173.4	**203.0**	196.4	177.5
Mycogen CNX 153138G8	93	163.5	**201.9**	**209.8**	**183.0**
NK N18Q-3011A	86	171.9	**203.5**	194.3	**183.0**
NuTech 5D-091	91	170.1	185.8	198.3	172.1
NuTech 5N-293	93	**187.1**	**197.8**	**218.3**	**182.1**
Rupp Seeds XR D92-74	92	179.1	194.0	206.0	**182.0**
Rupp Seeds XR T94-06	94	**188.4**	**208.5**	197.9	**187.5**
Spirit Hybrids XSP093-16	93	**180.6**	**208.4**	204.2	161.6
Stine Seed R9209-32	91	174.8	**202.5**	205.8	**179.8**
Average		180.4	201.2	204.5	183.0
High		193.0	208.7	218.3	195.4
Low		163.5	185.8	194.3	161.6
CV (%)		5.9	5.7	5.1	8.2
LSD (Bu/A)		12.5	13.1	12.2	17.7

Yields adjusted to 15.0 % moisture.

Bolded Yields are not statistically different than highest yielding hybrid in column.

MycoGold Seed Treatment on Corn

Purpose:

The Purpose of this study was to determine if the seed treatment "MycoGold" had an effect on yield in corn. MycoGold is marketed as a biological inoculant featuring mycorrhizal fungi. It is a dry powder inoculant intended to be mixed with the seed just prior to planting. The application rate is four ounces of product per 50 pounds of seed.
The hybrid used in this study was Rupp XR D94-26. This study was conducted at our Kingston, Unionville, Carsonville, and Capac sites.

Results:
Averaged across all four sites, there was no significant difference in moisture or yield at the 90% confidence interval. There was a significant increase in yield at the Kingston site, and a significant decrease in moisture at the Unionville site.

MycoGold: mycorrhizal fungi seed treatment										
Location:	Kingston		Capac		Carsonville		Unionville		Combined	
	% MS	Yield Bu/A	% MS	Yield Bu/A	% MS	Yield Bu/A	% MS	Yield Bu/A	% MS	Yield Bu/A
MycoGold	18.49	199.02 a	19.7	170.59	17.64	203.67	18.22 a	170.91	18.51	186.05
UTC	18.43	193.17 b	19.58	173.51	17.86	209.38	18.37 b	164.44	18.56	185.13
CV (%)	0.43	1.93	0.63	2.61	0.86	2.8	0.19	7.03	4.11	10.63
LSD (0.90)	ns	4.39	ns	ns	ns	ns	0.04	ns	ns	ns

Corn Nitrogen Rate Study

Location:	North Branch, MI
Grower:	David Brusie & Sons
Soil Type:	Sandy loam
Previous Crop:	Sugar beets
Hybrid:	Pioneer P1057
Planting Pop:	36,500
N Rate:	Various
Starter Fertilizer:	13 Gal. 9-24-3 10 Gal. 28 UAN
Plot Design:	RCB
Replications:	Three
Plot Area:	66 x 1000
Harvest Area:	30 x 985
Planting Date:	10-May-2016
Harvest Date:	7-Nov-2016

Purpose:

This study was developed to provide corn producers with an evaluation of a hybrid response to different rates of nitrogen (N) applied as anhydrous ammonia (NH_3) prior to planting. The study will also provide the efficiency of nitrogen usage of the corn hybrid.

Michigan State University nitrogen fertilizer recommendations are based on application rates that will supply the economic optimum nitrogen rate (EONR) rather than fertilizing to meet a yield goal. These recommendations are aimed at giving growers the maximum return to nitrogen (MRTN).

Nitrogen usage for corn has historically been over-applied and has economic and environmental impacts. Economically, N is one of the largest fertilizer input costs directly affecting net income/acre. Environmentally, excess N will find its way to our groundwater.

Methods:

The study was conducted by David Brusie & Sons Farms in North Branch, MI. Nitrogen NH3 rates of 42, 82, 122, 162, and 202 were applied prior to planting using a Raven Rate Controller in randomized complete block design with three replications. Pioneer P0157 was planted with a starter supplying 43 lbs. of N. Corn was planted at 36,500 plants/acre.

All replications were planted in 66 X 1000 ft. strips and harvested using a 12-row JD combine and sampled for % moisture (%MS), test weight (TW), and yield using a weigh wagon.

Results:

There was no significant yield difference between the highest three N rates. There were no significant differences in TW or % MS for any of the treatments. The EONR was within $1.79/acre for the highest three N rates.

Treatment: NH_3 Rate + starter = Total N	% MS	TW	Yield Bu/A	Applied Lbs N/Bu	Gross $ Income /A	Cash Price	May '16 NH3 $/LB	Total NH_3 Cost	EONR $/A
245	20.3	57.1	244.2 a	1.00	$ 720.30	$ 2.95	$ 0.37	$ 74.74	$ 645.56
205	20.5	57.0	239.8 a	0.86	$ 707.29	$ 2.95	$ 0.37	$ 59.94	$ 647.35
165	20.2	57.7	234.4 ab	0.70	$ 691.55	$ 2.95	$ 0.37	$ 45.14	$ 646.41
125	20.0	57.5	221.0 b	0.57	$ 651.86	$ 2.95	$ 0.37	$ 30.34	$ 621.52
85	20.1	57.2	191.5 c	0.44	$ 564.89	$ 2.95	$ 0.37	$ 15.54	$ 549.35
LSD (.95)	NS	NS	15.7						

Corn Population in 30 inch rows

Purpose:

The purpose of this study was to determine the most economical seeding rate for corn at rates ranging from 28,000 seeds/acre to 40,000 seeds/acre in increments of 2,000 seeds/acre. Similar studies were conducted several years ago, with populations ranging from 24,000 seeds/acre to 36,000 seeds/acre. At that time, the most economical rates were determined to be between 32,000 and 34,000 seeds per acre.

The hybrid used in this study was Rupp XR D94-26. The price of seed used was $240 for an 80,000 count bag, therefore every 2,000 seed/acre increase, equaled an increased cost of $6.00 per acre (roughly 2 Bu/A).

Results:

Averaged across five sites, all populations yielded statistically the same. One site, Carsonville, had some statistical differences and the 40K, 38K, 36K, and 34K were significantly higher than the populations of 32K or less.

Target Population	Final Population
28,000	27,250
30,000	29,375
32,000	31,625
34,000	33,750
36,000	35,125
38,000	37,250
40,000	38,750

Population	Location				Average Bu/A	Seed $ Cost/A
	Capac	Kingston	Carsonville	Unionville		
40K	189.2 a	214.9 a	219.2 a	213.4 a	209.2 a	$ 120.00
38K	189.9 a	215.0 a	215.5 a	211.7 a	208.0 a	$ 114.00
36K	193.0 a	213.8 a	216.6 ab	208.7 a	208.0 a	$ 108.00
34K	188.8 a	208.4 a	223.1 a	200.8 a	205.3 a	$ 102.00
32K	190.2 a	208.3 a	212.0 b	193.6 a	201.0 a	$ 96.00
30K	186.3 a	213.2 a	210.0 b	195.4 a	201.2 a	$ 90.00
28K	185.7 a	209.0 a	206.9 b	197.1 a	199.7 a	$ 84.00
Average	**189.0**	**211.8**	**214.8**	**202.9**	**204.6**	
High	193.0	215.0	223.1	213.4	209.2	
Low	185.7	208.3	206.9	193.6	199.7	
CV (%)	3.8	4.7	3.8	8.4	9.3	
LSD (bu/A)	NS	NS	9.9	NS	NS	

2016 Soybean Studies Introduction

Soybeans are established in 75 foot long by 15 foot wide plots. A planter modified for research is used for establishment. It plants six-30 inch wide rows. Plots are planted perpendicular to the field tile.

Soybeans are harvested with a 2144 Case IH combine with an attached HarvestMaster weigh system that records weight, moisture and test weight. All six rows are harvested for data.

The target population was 130,000 seeds per acre at three sites. Stand counts were taken in June, and it was determined that plant stands were 124,560, or 95.8% of target population. Plots are established in a randomized complete block design (RCB). The plots at all sites were replicated four times.

Studies include conventional varieties (Fairgrove site only), Liberty Link (Fairgrove site only), Xtend soybeans (Dicamba and Glyphosate resistant), Group 2.2RR and less, and Group 2.3RR and more. The Xtend soybeans were planted in their own block, regardless of maturity, because at planting time it was unclear if there would be a market for Xtend soybeans. We wanted to give ourselves the option of harvesting them separately.

Planting began the evening of May 24, and the second plot was put in on May 25. The third site was planted on May 31. A planned fourth site was abandoned, due to a forecasted heavy rainfall. The grower was given the option to plant the field rather than wait for us.

The Avoca site was heavily infested with glyphosate resistant marestail. As a result, only the 2.3+RR study was salvageable. Due to a miscommunication with the farmer-cooperator, the Fairgrove site was too narrow, and the Xtend, and 2.3+ studies were not planted in completion.

This project had funds provided by the Michigan Soybean Promotion Committee

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Soybean Variety Trial
Maturity 2.3 or More
Glyphosate Resistant
Average of Locations

TARE
Thumb Ag Research & Education

			Average of All Locations		
Company Variety	**Mat**	**SCN Source**	**TW**	**MS %**	**Yield Bu/A**
Channel 2306R2	2.3	PI88788	58.9	14.2	**54.0**
Channel 2609R2	2.6	PI88788	58.9	14.4	**56.6**
Dairyland DSR 2330R2Y	2.3	PI88788	58.9	14.1	**53.8**
Dyna-Gro S23RY85	2.3	PI88788	58.4	14.3	**53.8**
Dyna-Gro S24RY87	2.4	PI88788	58.4	14.2	**56.4**
Dyna-Gro S25RY44	2.5	PI88788	58.5	14.3	**56.8**
Dyna-Gro S26RS75	2.6	PI88788	58.2	14.4	**53.9**
Dyna-Gro S26RY37	2.6	PI88788	58.6	14.4	**54.9**
Great Lakes 2469NR2	2.4	PI88788	59.1	14.1	52.5
Mycogen 5N245	2.4	PI88788	59.2	13.9	52.1
Rupp Seeds RS 7242	2.4	PI88788	58.7	14.4	52.2
Rupp Seeds RS 7239	2.3	PI88788	58.7	14.3	**53.7**
Rupp Seeds RS 7251	2.5	PI88788	58.6	14.4	**53.2**
Average			58.7	14.3	54.1
High			59.2	14.4	56.8
Low			58.2	13.9	52.1
CV (%)					8.7
LSD (Bu/A)					4.4

Yields are adjusted to 13.0% moisture.
Bolded yields are not statistically different than the highest yielding variety in column.

Michigan Soybean Promotion Committee
The Soybean Checkoff
This project had funds provided by the Michigan Soybean Promotion Committee

MICHIGAN STATE UNIVERSITY | Extension

Soybean Variety Trial
Maturity 2.3 or More
Glyphosate Resistant
Yield By Locations

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Company Variety	Mat	Trait	Seed Trt	Port Sanilac Bu/A	Avoca Bu/A
Channel 2306R2	2.3	GENRR2Y	Acceleron FI	**61.7**	**46.3**
Channel 2609R2	2.6	GENRR2Y	Acceleron FI	**64.9**	**48.3**
Dairyland DSR 2330R2Y	2.3	R2Y		58.5	**49.0**
Dyna-Gro S23RY85	2.3	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	**61.0**	**46.6**
Dyna-Gro S24RY87	2.4	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	**63.8**	**49.1**
Dyna-Gro S25RY44	2.5	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	**64.6**	**49.0**
Dyna-Gro S26RS75	2.6	RS2Y	Acceleron Dynashield Imidacloprid Vibrance	60.0	**47.9**
Dyna-Gro S26RY37	2.6	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	**62.4**	**47.3**
Great Lakes 2469NR2	2.4	Roundup	Agrishield/Clariva	**60.3**	**44.7**
Mycogen 5N245	2.4			**60.6**	43.6
Rupp Seeds RS 7242	2.4	RR2Y	CruiserMaxx	**60.2**	44.1
Rupp Seeds RS 7239	2.3	RR2Y	CruiserMaxx	**60.5**	**46.8**
Rupp Seeds RS 7251	2.5	RR2Y	CruiserMaxx	**62.1**	44.3
Average				61.6	46.7
High				64.9	49.1
Low				58.5	43.6
CV (%)				6.4	8.4
LSD (bu./A)				4.7	4.7

Yields are adjusted to 13.0% moisture

Bolded yields are not statistically different than the highest yielding variety in column.

Michigan Soybean Promotion Committee
The Soybean Checkoff

This project had funds provided by the Michigan Soybean Promotion Committee

			Average of All Locations		
Company Variety	**Mat**	**SCN Source**	**TW**	**MS(%)**	**Yield (bu./A)**
Channel 1808R2	1.8	PI88788	59.7	13.3	**58.4**
Channel 2108R2	2.1	PI88788	59.8	13.2	**59.0**
Croplan R2C1994	1.9	PI88788	58.3	13.9	**59.8**
Croplan R2C2025	2.0	PI88788	58.8	14.2	**58.2**
Croplan R2C2072	2.0	PI88788	58.8	14.2	**58.9**
Croplan R2C2124	2.1	PI88788	58.6	13.9	**58.9**
Dairyland DSR 1721R2Y	1.7	PI88788	59.8	13.4	57.3
Dairyland DSR 2110R2Y	2.1	PI88788	59.7	13.4	**60.3**
DF Seeds DF 5141 N R2Y	1.4	PI88788	58.2	14.0	**61.6**
DF Seeds DF 5173 N R2Y	1.7	PI88788	58.3	14.0	**63.5**
DF Seeds DF 5227 N R2Y	2.2	PI88788	58.3	13.9	**59.0**
Dyna-Gro S17RY67	1.7	PI88788	58.7	14.0	**58.5**
Dyna-Gro S18RY25	1.8	PI88788	59.0	14.0	55.3
Dyna-Gro S19RY65	1.9	PI88788	59.0	14.0	56.9
Great Lakes 1367NR2	1.3	PI88788	59.8	13.4	**61.5**
Great Lakes 1865NR2	1.8	PI88788	59.8	13.4	57.8
Great Lakes 1953NR2	1.9	PI88788	59.8	13.4	53.7
Great Lakes 2269NR2	2.2	PI88788	59.9	13.3	56.9
Mycogen 5N182	1.8	PI88788	59.7	13.4	56.4
Mycogen 5N206	2.0	PI88788	59.8	13.5	**60.7**
Rupp Seeds RS 7177	1.7	PI88788	59.3	13.7	**60.4**
Rupp Seeds RS 7205	2.0	PI88788	59.0	14.1	**58.2**
Stine Seed 19RF32	1.9	PI88788	58.4	13.9	**61.2**
Stine Seed 20RD20	2.0	PI88788	58.3	13.9	**62.1**
Average			59.1	13.7	58.9
High			59.9	14.2	63.5
Low			58.2	13.2	53.7
CV (%)					7.9
LSD (bu./A)					5.5

Yields are adjusted to 13.0% moisture.

Bolded yields are not statistically different than the highest yielding variety in column.

Michigan Soybean Promotion Committee
The Soybean Checkoff

This project had funds provided by the Michigan Soybean Promotion Committee

MICHIGAN STATE UNIVERSITY | Extension

Soybean Variety Trial
Maturity 2.2 or Less
Glyphosate Resistant
Yield by Location

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				Fairgrove	Sandusky
Company Variety	**Mat**	**Trait**	**Seed Trt**	**Bu/A**	**Bu/A**
Channel 1808R2	1.8	GENRR2Y	Acceleron FI	**70.4**	**58.4**
Channel 2108R2	2.1	GENRR2Y	Acceleron FI	**70.1**	**59.0**
Croplan R2C1994	1.9	RR2	Warden CX	**73.1**	**59.8**
Croplan R2C2025	2.0	RR2	Warden CX	**69.4**	**58.2**
Croplan R2C2072	2.0	RR2	Warden CX	65.1	**58.9**
Croplan R2C2124	2.1	RR2	Warden CX	65.7	**58.9**
Dairyland DSR 1721R2Y	1.7	R2Y		62.2	57.3
Dairyland DSR 2110R2Y	2.1	R2Y		**69.6**	**60.3**
DF Seeds DF 5141 N R2Y	1.4	R2Y	Acceleron, Poncho/Votivo	58.8	**61.6**
DF Seeds DF 5173 N R2Y	1.7	R2Y	Acceleron, Poncho/Votivo	64.9	**63.5**
DF Seeds DF 5227 N R2Y	2.2	R2Y	Acceleron, Poncho/Votivo	63.9	**59.0**
Dyna-Gro S17RY67	1.7	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	**66.6**	**58.5**
Dyna-Gro S18RY25	1.8	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	65.3	55.3
Dyna-Gro S19RY65	1.9	RR2Y	Acceleron Dynashield Imidacloprid Vibrance	62.2	56.9
Great Lakes 1367NR2	1.3	Roundup	Agrishield/Clariva	**67.8**	**61.5**
Great Lakes 1865NR2	1.8	Roundup	Agrishield/Clariva	**69.8**	57.8
Great Lakes 1953NR2	1.9	Roundup	Agrishield/Clariva	**71.2**	53.7
Great Lakes 2269NR2	2.2	Roundup	Agrishield/Clariva	**70.4**	56.9
Mycogen 5N182	1.8			**70.7**	56.4
Mycogen 5N206	2.0			**68.5**	**60.7**
Rupp Seeds RS 7177	1.7	RR2Y	CruiserMaxx	**71.0**	**60.4**
Rupp Seeds RS 7205	2.0	RR2Y	CruiserMaxx	**70.4**	**58.2**
Stine Seed 19RF32	1.9	Roundup		**68.8**	**61.2**
Stine Seed 20RD20	2.0	Roundup		**70.2**	**62.1**
Average				67.8	58.9
High				73.1	63.5
Low				58.8	53.7
CV (%)				8.1	7.9
LSD (bu./A)				6.5	5.5

Yields are adjusted to 13.0% moisture.

Bolded yields are not statistically different than the highest yielding variety in column.

Michigan Soybean Promotion Committee
The Soybean Checkoff

This project had funds provided by the Michigan Soybean Promotion Committee

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Soybean Variety Trial
Conventional Non-GMO
Fairgrove, MI

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Company	Mat	Seed Treat	SCN Source	TW	MS %	Bu/A
Dairyland Seed 2400	2.4		None	58.0	15.1	**62.4**
DF Seeds DF 155F	2.5	Acceleron, Poncho/	None	57.4	15.3	51.1
DF Seeds DF 192	1.9	Acceleron, Poncho/	PI88788	57.8	15.1	**64.5**
DF Seeds Jackson f	2.5	Acceleron, Poncho/	None	57.6	15.2	**60.8**
DF Seeds lily	2.5	Acceleron, Poncho/	PI88788	57.6	15.3	**62.3**
Great Lakes Hybrids 2254N	2.2	Agrishield/Clariva	PI88788	58.2	14.7	**63.2**
Rupp Seeds RS 2225	2.3	CruiserMaxx	PI88788	58.0	15.1	**65.4**
Rupp Seeds RS 2207	2.2		PI88788	58.1	15.0	**64.3**
Sevita Genetics ZFSelect 1610	1.1	CruiserMaxx	None	58.4	14.6	50.3
Sevita GeneticsZFSelect 1611	1.1	CruiserMaxx	None	58.2	14.6	52.9
Sevita Genetics ZFSelect 1708	0.9	CruiserMaxx	None	58.5	14.4	59.7
Sevita Genetics ZFSelect 1709	0.9	CruiserMaxx	None	58.3	14.8	58.9
Zeeland Farm Services ZFS 1326	2.6	EclipseUS Quad IM	PI88788	58.4	14.5	**64.0**
Zeeland Farm Services ZFS 1414	1.4	EclipseUS Quad IM	None	57.8	15.2	**62.9**
Zeeland Farm Services ZFS 1420LS	2.2	EclipseUS Quad IM	None	58.1	14.9	**65.9**
Zeeland Farm Services ZFS1665	1.6		PI88788	58.0	15.1	**67.1**
Zeeland Farm Services ZFS1993	1.9		PI88788	57.9	15.2	**62.4**
Average				58.0	14.9	61.1
High				58.5	15.3	67.1
Low				57.4	14.4	50.3
CV (%)						9.5
LSD (bu/A)						6.9

Yields adjusted to 13.0 % moisture
Bolded yields are not statistically different than the highest yielding variety in column.

Michigan Soybean Promotion Committee
The Soybean Checkoff

This project had funds provided by the Michigan Soybean Promotion Committee

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Soybean Variety Trial
Liberty Link
Specialty Soybeans

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Company Variety	Mat	Seed Treat	SCN Source	MS %	TW	Bu/A
DF Seeds DF 9127 N LL	1.2	Acceleron, Poncho/Votivo	PI88788	13.5	58.9	59.8
DF Seeds DF 9232 N LL	2.3	Acceleron, Poncho/Votivo	PI88788	13.6	59.2	**67.0**
DF Seeds DF 9171 N LL	1.7	Acceleron, Poncho/Votivo	PI88788	13.3	59.4	**68.3**
DF Seeds DF 9221 N LL	2.2	Acceleron, Poncho/Votivo	PI88788	13.1	59.5	61.0
Great Lakes 1769NLL	1.7	Agrishield/Clariva	PI88788	13.5	59.0	**64.8**
Great Lakes 2264NLL	2.2	Agrishield/Clariva	PI88788	13.5	59.1	**64.9**
Rupp Seeds Inc RS6230	2.2	CruiserMaxx	PI88788	13.3	59.4	62.5
Rupp Seeds Inc RS6267	2.6	CruiserMaxx	PI88788	13.7	58.9	**67.1**
Stine Seed Co 23LF32	2.3		PI88788	13.5	59.2	64.4
Stine Seed Co 25LH32	2.5		PI88788	13.6	59.0	**70.8**
Average				13.5	59.2	65.1
High				13.7	59.5	70.8
Low				13.1	58.9	59.8
CV (%)						8.1
LSD (Bu/A)						6.5

Yields adjusted to 13.0 % moisture
Bolded yields are not statistically different than the highest yielding variety in column.

Michigan Soybean Promotion Committee
The Soybean Checkoff
This project had funds provided by the Michigan Soybean Promotion Committee

Company	Mat	Seed Trt	SCN Source	TW	MS %	Bu/A
Croplan RX1836	1.8	Warden CX	PI88788	59.8	13.4	**57.4**
Croplan RX2146	2.1	Warden CX	PI88788	59.8	13.3	**57.7**
DF Seeds DF 7217 N X R2Y	2.3	Acceleron, Poncho/ Votivo + N Force	PI88788	59.8	13.3	**59.8**
Dyna-Gro S21XT77	2.1	Acceleron Dynashield Imidacloprid Vibrance	PI88788	60.0	13.1	**55.9**
Great Lakes 1760NRX	1.7	Agrishield/Clariva	PI88788	59.9	13.2	**55.0**
Great Lakes 2063NRX	2.0	Agrishield/Clariva	PI88788	59.9	13.2	**55.9**
Great Lakes 2465NRX	2.4	Agrishield/Clariva	PI88788	60.0	13.2	**56.9**
Average				59.9	13.2	56.9
High				60.0	13.4	59.8
Low				59.8	13.1	55.0
CV (%)						8.3
LSD Bu/A						NS

Yields adjusted to 13.0 % moisture

Bolded yields are not statistically different than the highest yielding variety in column.

Soybean Seed Treatment

Purpose:

The purpose of this study was to determine if soybean seed treated with an insecticide plus fungicides, CruiserMaxx + Vibrance, had an effect on soybean emergence and yield.
This study was planted at the St. Clair and Sanilac soybean sites. The variety used in this study was NK S20-16 Brand.

Results:

Emergence scores were taken about one month after planting. Statistics were not run on the emergence results. In both locations, the treatment appears to have had no effect on emergence.

The differences in yield between treated and untreated seed were insignificant.

These soybeans were planted late in the season, on May 24 and 31 at the St. Clair and Sanilac sites, respectively.

Soybean Emergence			
	St. Clair	Sanilac	Average
	Plants/A		
Treated	110,000	119,000	114,500
Untreated	115,000	122,500	118,750

Soybean Yield			
	St. Clair	Sanilac	Average
	Yield (bu/A)		
Treated	46	54.4	50.2
Untreated	45.4	54.5	50
CV (%)	8	5	
LSD (bu/A)	4.6	3.5	NS

Michigan Soybean Promotion Committee The Soybean Checkoff
This project had funds provided by the Michigan Soybean Promotion Committee

MICHIGAN STATE UNIVERSITY | Extension

Soybean Variety Study
Soybean Cyst Nematode Resistance Analysis

TARE Thumb Ag Research & Education

Purpose:

Soybean cyst nematode (SCN) (*Heterodera glycines),* remains the number one cause of yield loss for soybeans in the United States. In order to determine the significance of this pest at sites in the Thumb area, this project was developed to measure the effect that variety selection has on SCN. This study takes into account the levels of SCN at planting and harvest times to determine the ability of these varieties to yield in environments that have confirmed SCN.

Each site or field is unique and may have different types of SCN. **The ability to withstand SCN at one site may not indicate the ability of the variety to withstand SCN at other farms and field sites.** Several genes provide resistance to SCN in soybeans for each of the sources of resistance (PI88788, Peking, etc.). Not every soybean variety described as resistant to SCN necessarily possesses as many copies of the resistance gene. Therefore, SCN-resistant soybean varieties can vary greatly in the amount for nematode resistance they possess, as well as in their agronomic performance.

Methods:

At the Fairgrove soybean variety trials for TARE, each of the replications for each variety were sampled for SCN. The sampling of each variety replication was done at the time of planting (Pi) and after harvest (Pf) to detect if there had been an increase in SCN during the growing season. The replications for samples were combined according to variety and submitted to the MSU Diagnostic Lab for detection of SCN cysts, SCN eggs, and SCN juveniles. The samples was type tested to determine the predominant SCN population HG Types at this site. This field has been in a corn/soybean rotation.

The only source of SCN resistance in the varieties submitted (n=62) was PI88788 (87%). The other varieties (n=9) were susceptible varieties with no SCN resistance. The susceptible varieties were only found in the conventional trial.

Other TARE soybean sites were not tested.

Results:

The results for this study are reported by group in Table 1. The SCN reproduction factor is: (Pf) # SCN eggs & juveniles at harvest divided by (Pi) # SCN eggs & juveniles at planting (Pf/Pi=SCN reproduction factor). A SCN reproduction factor (Pf/Pi) of 1.0 or less indicates that there was no increase or a reduction in SCN eggs & juveniles during the growing season.

A factor greater than 1.0 indicates a breakdown of SCN resistance to the source. Individual variety reproduction factors *Pf/Pi* ranged 4 to 41,000. Table 1 shows the averages for each group of soybeans. ALL varieties showed PI88788 resistance breaking down.

The HG type testing for this site indicates a Type 2 (PI88788). Repeated use of the same resistance source will result in the SCN population adapting to this source.

Three years of data has been summarized to show the trend in SCN resistance in this field (Table 2).

Management considerations:

This trial provides an example of what can happen when the same source of resistance is grown Table 1.

- Producers should monitor their fields for SCN whenever a soybean crop is grown.
- Yield is not a good indicator of a varieties ability to withstand SCN. This particular field will likely experience a dramatic reduction in yield the next time soybeans are grown, even with resistance.
- Use crop rotation as part of your management program, using more than one year of a non-host if SCN numbers are above 10,000 or above. Plan on staying out of soybeans two years.

Michigan Soybean Promotion Committee www.michigansoybean.org

This project had funds provided by the Michigan Soybean Promotion Committee

Trial	# Varieties	# PI88788	# Susceptible	Pi	Pf	Pf/Pi	Yield Bu/A
Conventional	17	8	---	137	16,280	118.8	64.1
		---	9	98	24,638	251.4	58.3
Early	24	24	0	195	5,122	26.3	67.8
Xtend	7	7	0	54	2,857	52.9	---
Late	13	13	0	207	5,092	24.6	---
Liberty Link	10	10	0	122	15,456	126.7	65.1
			Plot (Weighted Average)	154	10,080	65.5	64.9

Table 1. 2016 Soybean Cyst Nematode Resistance Analysis

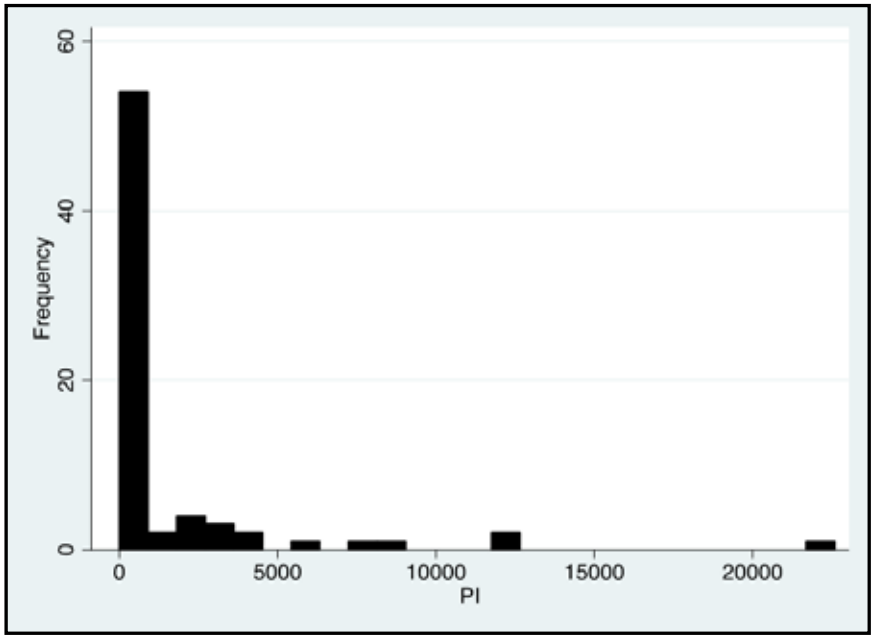

Figure 1. SCN Pf/Pi Factor distribution

	2012			2014			2016		
	Pi	*Pf*	*Pf/Pi*	*Pi*	*Pf*	*Pf/Pi*	*Pi*	*Pf*	*Pf/Pi*
Averages	693	3,256	4.7	213	2,089	9.8	154	10,080	65.5

Table 2. SCN reproduction factor (*Pf/Pi*) trends in the same field in a corn/soybean rotation.

For more information contact Phil Kaatz at kaatz@msu.edu or at 810-667-0341

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This project had funds provided by the Michigan Soybean Promotion Committee

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Corn & Soybean Study
Yard Waste Compost

TARE Thumb Ag Research & Education

County:	Lapeer
Cooperator:	Steve Listwak
Nearest town:	North Branch
Soil Type:	Boyer loamy sand
Tillage:	Conventional
Previous crop:	Corn
Fertilizer:	180 Lbs 0-0-60
Herbicide:	2 pt Matador
	.375oz Synchrony XP
Row width:	30 inch
Variety	DF Lily
Planting date:	8-May-16
Harvest date:	14-Nov-16
Exp. Design:	RCBD

Purpose:

This study was started to see if compost generated from yard waste and applied in a corn/soybean rotation could be done economically. Compost has been used to increase soil quality in soils through increased organic matter, increased water holding capacity, providing an environment for diversity in soil life, increasing plant nutrient levels, and reduced fertilizer input levels. This project will be continuing for up to five years.

Soybean Treatment	MS %	T.W.	Yield Bu/A
With compost	11.7	58.2	53.6
Without compost	11.7	58.0	49.9
		LSD @ 0.05 =	NS
		CV (%) =	5.1

Methods:

Yard wasted generated from the Metropolitan Detroit area was composted and the end product was spread in two separate fields (corn/soybean rotations) at a rate of approximately five tons per acre providing approximately 2.2 tons of dry matter compost per acre. The product was incorporated just after application and then planted to corn and soybeans. There were three replications of a control and the five ton compost treatment. Normal fertilizer and herbicide applications were applied at appropriate times. The middle of each plot was harvested using a JD 9500. Plots were weighed using a weigh wagon.

Results:

There were no statistical differences between any of the treatments in 2016. This is the fourth year of a five-year study.

County:	Lapeer
Cooperator:	Steve Listwak
Nearest town:	North Branch
Soil Type:	McBride sandy loam
Tillage:	Conventional
Previous crop:	Soybeans
Fertilizer:	
Herbicide:	
Row width:	30 inch
Hybrid	Dairyland DS 9599
Planting date:	5-May-16
Harvest date:	4-Nov-16
Exp. Design:	RCBD

Corn Treatment	MS %	T.W.	Yield
With compost	20.2	53.2	162.2
Without compost	20.2	54.1	166.8
		LSD @ 0.05 =	NS
		CV (%) =	4.9

Alfalfa Sulfur Source Trial

Purpose:

The purpose of this trial is to determine the efficacy of two sulfur products compared to an untreated control for yield and quality. The hypothesis is that a field that has shown symptoms of sulfur deficiency would respond to different types of products and have varying results.

Following a statewide alfalfa sulfur survey that showed a trend for sulfur deficiency, alfalfa producers are asking what is the best product to use to supply a sulfur source for alfalfa? This is a multi-year project.

Methods:

Two different sources of sulfur were selected. The products were: 1.)Ammonium sulfate containing 24% sulfur and is a readily available fertilizer that is easy to spread; and 2.) A pelletized gypsum product, BioAg SuperCal SO_4 containing 16% sulfur is also easily spread. Each product was applied at a rate that equaled 37 lbs/A of sulfur. Thirty feet strips were spread in a replicated complete block design and the middle 15 feet was harvested four times during the growing season using a 15 foot haybine. Tissue samples (45 stems/treatment) were taken from each replication prior to each cutting to determine the level of nutrient availability. In each treatment replication and cutting, a section of each swath was cut, weighed, and sampled for forage quality using near infrared equipment (NIR).

Results:

There was no significant difference in yield for the three treatments.

For the tissue samples, there were statistical differences over the control for nitrogen (1st, 3rd, and 4th cutting, and sulfur (1st, 3rd, and 4th cutting).

This preliminary data has provides enough variation to warrant a more thorough study to be conducted.

2016 Alfalfa - Sulfur Product: Yield and Quality Trial

	DM Yields - tons per acre				
	Cut 1	Cut 2	Cut 3	Cut 4	2016 Total
Control	2.55	1.47	1.07	0.77	5.86
Ammonium Sulfate	2.74	1.73	1.13	0.91	6.52
BioAg SuperCal SO4	2.35	1.76	1.06	0.84	6.01
Average	2.54	1.66	1.09	0.84	6.13
LSD 0.05	0.77	0.41	0.41	0.14	NS
CV %	13.4	10.8	16.4	7.1	8.2

Huron Conservation District Phosphorus Reduction Study

Purpose:

The purpose of the trial is to determine the impact of the three P fertilizer rates on net income while growing crops common to the area, and on soil P levels.

Methods:

Two fields, located outside Elkton, have had continuous strips of no (0), low (24 lbs./A), and high(47 lbs./A) phosphorus. Corn (Great Lakes 4548VT2RIB) 95 day was planted on May 10, 2016 at 36,000 seeds per acre. All strips received 135# N, 0# K2O, 5# manganese, 5# Zinc, and plus the appropriate P fertilizer. Strip tillage was used to apply starter N 28%. The P and micro nutrients were applied by the planter 2x2. On June 15, 75#/A nitrogen was side-dressed with 28% injected. A burndown, 32 oz Roundup + 1 pt. 2,4-D, were applied 8 days prior to planting. This was used to burn down a growing cover crop. Another spray application was done on June 7 with 32 oz Roundup + 3 oz Status. The plot was harvested on November 1st. The table below shows the average grain moisture, test weight, and yield of each strip. The final column shows the income minus the cost of phosphorus fertilizer.

Front Field

Per acre P Rate	MS%	TW	Yield	Income less P cost*
No - 0 Lb	18.5	58.5	129.3	$387.9
Low - 24 Lb	18.3	58.8	138.1	$403.5
High - 47 Lb	18.7	58.5	141.9	$404.6

Back Field

Per acre P Rate	MS%	TW	Yield	Income less P cost*
No - 0 Lb	18.6	58.5	140.5	$421.5
Low - 24 Lb	18.1	58.9	140.6	$411.0
High - 47 Lb	18.2	59.0	141.4	$403.1

*Corn at $3.00 per acre and P fertilizer at $0.45 per unit

Statistics were not run on these results. All strips that received P fertilizer did have a greater yield than the strips that received no P. However, the increase in yield was not enough to offset the cost of additional phosphorus fertilizer.

***Back Field** did show higher yield average. The back field had a water control structure installed on the tile outlet early March. After planting, the structure was closed to 2' of the lowest level in the field. The structure remained closed until 10 days prior to planting. This is an automated system where we can open, close, and adjust water levels remotely from the office.

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TARE Thumb Ag Research & Education

Fungicide efficacy trial: response of a stripe rust susceptible soft winter wheat variety, 2016

Abbreviated report (the entire report can be found at http://fieldcrop.msu.edu/wheat/)

Martin Nagelkirk, Michigan State University Extension

A fungicide efficacy trial was conducted on soft winter wheat in collaboration with industry to observe the performance of various fungicide products. Ambassador soft white winter wheat was used in a randomized, complete block design with four replications. The variety is susceptible to stripe rust, which reached unprecedented levels in MI and in this trial.

The trial found differences in yield and disease severity but no difference in grain moisture or test weight, or in Fusarium head scab or DON.

Statistical analysis was by the Adam Byrne, Research Associate, MSU.

Location:	JGDM McConnachie Fms Sandusky, MI
Collaborators:	Bayer, Syngenta, BASF, & MI Wheat
Soil type:	Capac silt loam
Previous crop:	dry beans
Variety:	Ambassador
N rate:	125 lbs/ac
Plot design:	RCB
Reps:	4
Plot area:	15x60 ft
Treatment area:	15x60 ft
Harvest area:	15x55 ft
Planting date:	2-Oct-15
Seeding rate:	1.8 m/ac
Harvest date:	16-Jul-16
Herbicide:	none
Insecticide:	none

Table 1: Effect of fungicides on the performance of soft winter wheat and disease levels

Sandusky, MI, 2016 (abbreviated table)

	fungicide treatment [1]	timing [2]			yield bu/ac 13%M		leaf [3] spot 1 to 5		stripe rust [4] 8-Jun		stripe rust [4] 17-Jun	
		T1	T2	T3								
1	non treated control				92.2	d	2.8	a	18	a	86	a
2	Trivapro 14.6 oz	x			113.4	abc	0.5	cde	7	bc	37	de
3	Trivapro 14.6 oz + Palisade 12.5 oz.	x			115.9	abc	0.3	de	10	abc	57	bcde
4	Trivapro 14.6 oz		x		119.4	a	1.3	abcd	1	e	5	g
5	Priaxor 2 oz	x			105.6	c	0.0	e	8	abc	73	ab
6	Priaxor 2 oz fb Caramba 13.5 oz.	x		x	119.3	a	0.7	abcde	5	cd	10	fg
7	BAS73401F 3.5 oz	x			114.2	abc	0.3	de	12	abc	61	bcde
8	BAS73401F 3.5 oz fb Caramba 13.5 oz	x		x	117.6	ab	0.5	cde	3	de	7	g
9	Caramba 13.5 oz			x	114.7	abc	1.3	abcd	15	abc	43	cde
10	Caramba 17 oz			x	116.5	ab	1.3	abc	18	a	54	bcde
11	Stratego YLD 2.5 oz	x			107.4	bc	0.8	bcde	11	abc	58	bcde
12	Stratego YLD 2 oz fb Prosaro 6.5 oz	x		x	118.6	ab	0.3	de	9	bc	34	ef
13	Prosaro 6.5oz			x	110.3	abc	2.0	abc	15	abc	61	bcde
14	Prosaro 8.2 oz			x	112.7	abc	2.3	ab	11	abc	48	cde
15	Amtide Propiconazole 4 oz	x			109.1	abc	0.3	de	7	bc	51	bcde
16	Prosaro 6.5oz + Baythroid 3oz			x	112.5	abc	1.8	abc	12	abc	53	bcde
	P value				*0.0028*		*0.0001*		*0.0034*		*0.0001*	

[1] all fungicides applied with Induce nonionic surfactant at 0.125% except Trivapro treatments had 0.250%;

[2] T1 = first joint (g.s. 6); T2 = full flag (g.s.9); T3 = early flower (g.s.10.51).

[3] leaf spot was primarily Septoria trtici and was rated on a relative scale of 0 to 5 (0= on disease).

[4] stripe rust; expressed as amount of visible disease on surface of flag leaf as percent.

[5] DON levels below 0.03 are undetectible and assign a value of 0

Effect of late-season application of fungicides on stripe rust severity

Stripe rust was a very serious wheat disease in 2016. Below is some data that was opportunistically collected on stripe rust from a trial that was designed to measure the effect of fungicides on Fusarium head scab. This trial was a split plot design with three replications. Individual plots measured 15 x 60 feet. All fungicides were applied with a NIS at 0.125 percent. The data subset related to stripe rust is in the table below. The following are some summary comments:

1. The more susceptible varieties (Ambassador and D 9242) gained an average of 14 bu/ac with the use of fungicides; the moderately resistant varieties (25R40 and Red Dragon) only gained an average of 4 bu)
2. Applying a fungicide after the disease has advanced to the flag leaf is too late for adequate control on susceptible varieties (note relatively high disease scores on susceptible varieties despite fungicide treatment).
3. Single applications of Monsoon (generic tebuconazole) were less effective in reducing the severity of S rust and, consequently, in improving yields.
4. Single applications, averaged across all varieties and fungicide treatments, benefited yields by 8 bu/ac; an additional 2 bu/ac was gained when the single applications was followed by (fb) another application three days later.
5. There did not appear to be any significant differences in grain test weight or harvest moisture due to the various treatments.
6. There was a moderately strong correlation between stripe rust severity score and grain yield ($R^2 = 0.72$)

Effect of late season fungicide applications on the grain yield and Stripe rust severity for four wheat varieties, Deckervile, MI 2016

Treatment[1]	***Ambassador***		***D9242***		***25R40***		***Red Dragon***		***average***	
	yield	S. rust[3]	yield	S. rust[3]	yield	S. rust[3]	yield	S. rust[3]	yield	S. rust[3]
UTC	87	100	93	95	134	8	115	45	107	62
Prosaro	98	68	111	13	138	1	119	13	117	24
Caramba	100	57	110	17	135	3	119	11	116	22
Monsoon (tebuconazole)	93	88	100	26	134	2	118	17	111	33
Proline	103	57	107	22	140	1	121	10	118	23
Prosaro fb Caramba[2]	99	68	106	22	137	1	120	11	116	26
Caramba fb Folicur[2]	104	65	113	10	136	2	120	8	118	21
Proline fb Folicur[2]	105	66	109	19	140	1	122	6	119	23

[1] *Application rates per acre: Prosaro, 6.5 oz; Caramba, 14 oz; Monsoon, 4 oz: Proline, 5.7 c*

[2] *the first product listed was applied at early flowering and was followed by (fb) the second fungicde 4 days later.*

[3] *Stripe rust rating of the flag leaf expressed as a percent of the area showing disease sign or symptom*

Response of wheat varieties to intensive management

As in past years, a trial was established in collaboration with MCIA to measure the response of various varieties to selected inputs. The varieties included two soft white varieties (Jupiter and 6012), and two soft red varieties (Red Dragon and Whale). The five treatments - in addition to the non-treated control – are listed in the table. The treatments represent an escalating progression of inputs.

The yields of all varieties increased with the addition of Prosaro at early flowering or an extra 40 lbs N per ac (first table). When both Prosaro and additional N were applied, yields improved by 15 bu when averaged across varieties. The highest yields were attained where the varieties received two applications of fungicides (both Prosaro and Priaxor) in addition to the extra N fertilizer. In the absence of plant lodging, the addition of Palisade to the combination of Prosaro and extra N did not significantly affect yields. The treatments did not significantly affect test weight or moisture. The second table provides the yield response from the varieties grown in both 2015 and 2016, In general, the response of the varieties is similar between the two seasons.

BACKGROUND

Location	JGDM Farms Deckerville, MI
Soil Type	Capac silt loam
Previous crop:	dry beans
Variety:	various
Fall fertilizer	225 lbs 9-16-24-8
Planting date:	Oct 2. '15
Seeding rate:	1.8 m/ac
Harvest date:	July 20,'16

PLOT DESIGN

Design:	randomized split block
Replications:	four
Plot area:	15 x 60 ft

VARIABLES

Varieties:	Jupiter, 6012, Red Dragon, Whale
Nitrogen rate:	100 or 140 lbs/ac as 28% UAN
Fungicide variable:	Prosaro 7 oz/ac @ early flower w/ NIS
Fungicide variable:	Priaxor 3 oz/ac @ g.s. first joint. w/ NIS
Growth Regulator:	Palisade, 11oz/ac @ 2nd joint

Effect of mangement and varieties on grain yield, test weight and moisture, Sandusky, MI 2016

treatment	Jupiter			6012			Red Dragon			Whale			*average*		
	yield bu/ac; 13M	tst wt lbs/bu	moist. %	yield bu/ac; 13M	test wt lbs/bu	moist. %	yield bu/ac; 13M	test wt lbs/bu	moist. %	yield bu/ac; 13M	test wt lbs/bu	moist. %	yield bu/ac; 13M	test wt lbs/bu	moist. %
1. untreated (100 N)	118	58	17	119	59	17	118	58	17	114	58	20	*117*	*58*	*18*
2. 140 N	120	58	17	122	59	17	121	59	17	116	58	20	*120*	*58*	*18*
3. Prosaro (100 # N)	123	58	17	126	59	17	119	58	17	117	58	20	*121*	*58*	*18*
4. Prosaro, 140 N	137	58	17	129	59	17	121	59	17	121	57	25	*127*	*58*	*19*
5. Prosaro, 140 N, Prioxor	140	58	18	133	59	17	133	58	17	123	58	26	*132*	*58*	*19*
6. Prosaro, 140 N, Palisade	137	58	17	129	59	17	125	59	17	119	58	23	*128*	*58*	*19*
average	*129*	*58*	*17*	*126*	*59*	*17*	*123*	*58*	*17*	*118*	*58*	*22*	*124*	*58*	*18*

Effect of variety and treatments on grain yield, 2015 and 2016

treatment	Jupiter		Red Dragon		Whale		*average*
	2015 yield bu/ac	2016 yield bu/ac	2015 yield bu/ac	2016 yield bu/ac	2015 yield bu/ac	2016 yield bu/ac	*2015 & 2016*
1. untreated (100 N)	99	118	104	118	101	114	*109*
2. 140 lbs N	104	123	108	119	111	117	*114*
3. Prosaro (100 N)	106	120	113	121	109	116	*114*
4. Prosaro, 140 N	112	137	115	127	117	121	*121*
5. Prosaro, 140 N, Prioxor	116	140	117	134	120	123	*125*
6. Prosaro, 140 N, Palisade	110	137	113	125	121	119	*121*
average	*108*	*129*	*112*	*124*	*113*	*118*	*117*

For additional information, contact Martin Nagelkirk (nagelkir@msu.edu)

2017 Custom Machine and Work Rate Estimates

FIRM Team Fact Sheet Number 16-3
Available at http://www.firm.msue.msu.edu
Author : Dennis Stein, Senior District Farm Business Management Educator
Michigan State University Extension • November 2016

	2017 Production season costs estimates						updated 11.02.16
Farm Labor Unskilled [7]= $ per hour	$14.00				1.99 per gallon of fuel		
Farm Labor skilled [7]= $ per hour	$16.40				2.19 per gallon lube & fuel cost		
Farm Labor- milking cows per hour	$12.00						
TRACTORS ONLY:		max.	min.	Custom $/Hour	Machine Cost $/Hour	Est. Fuel Gal. / Hour	Est. Fuel Cost per Hour
No driver,or fuel cost	MFWD - 260 hp.	$92.30	$57.20	$71.67	$106.51	11.44	$25.00
	MFWD - 200 hp.	$140.00	$45.00	$52.52	$73.29	7.04	$15.38
	MFWD - 130 hp.	$100.00	$40.00	$35.74	$47.48	5.72	$12.50
Est. Tractor Cost $0.27/hp/hr.	2- WD - 75 hp.	$90.00	$30.00	$22.70	$24.49	3.3	$7.21
Est. Fuel use .044 gal. diesel/PTO hp / hour	2- WD - 40 hp.	$65.00	$20.00	$13.82	$9.03	1.76	$3.85
Auto Steer systems charge per acre				$2.89			
TILLAGE OPERATIONS:	Custom $/Acre [1]	max.	min.	Total Machine Cost/ Ac [3]	Machine Rate per Hour [4]	Acres/Hr. [5]	Est. Fuel Gal./Acre [6]
Plowing: Moldboard (6 bottom)	**$19.20**	$35.00	$10.00	**$24.06**	$100.33	4.17	1.32
Chisel Plow (23 ft.)	**$15.45**	$26.00	$7.00	**$10.35**	$134.86	13.03	0.64
Chisel – front disk (16.3 ft.)	**$17.05**	$25.00	$10.00	**$13.96**	$128.57	9.21	1.04
Vertical tillage	**$15.31**	$25.00	$8.00				
Disk-V.Ripper combo (22.5 ft)	**$23.15**	$35.00	$14.00	**$22.23**	$257.65	11.59	1.61
V- Ripper	**$17.31**	$35.00	$10.00	**$15.72**	$97.15	6.18	1.10
Subsoiler 30" - 10ft (12-15")	**$20.23**	$27.50	$14.16				
Discing - tandem (21 ft)	**#DIV/0!**			**$11.33**	$138.45	12.22	0.74
Field Cultivator (23 ft.) + incorp.	**$13.61**	$20.00	$8.50				
Field Cultivator (23 ft.)	**$12.77**	$25.00	$7.00	**$7.09**	$92.03	12.98	0.34
Harrow	**$9.16**	$13.00	$5.00				
Soil Finisher	**$14.03**	$26.00	$8.00				
Disk- Tandem 21 ft.	**$13.34**	$20.35	$8.00	**$10.62**	$129.78	12.22	0.74
Row Cultivate (12 rows)	**$11.90**	$20.00	$8.00	**$7.73**	$119.43	15.45	0.46
Row Cultivate-high residue (12rows)	**$12.32**	$16.00	$7.00				
Stalk Shredder (20 ft.)	**$12.76**	$19.00	$7.00	**$13.39**	$103.91	7.76	0.74
Rotary Hoe (21 ft.)	**$9.13**	$15.00	$5.00	**$0.00**	$0.00	25.96	0.18
Land Rolling	**$7.45**	$12.00	$5.00				
Highboy spraying	**$9.50**						
Boom Sprayer-self-Prop.80ft.	**$7.49**	$18.49	$4.00	**$3.96**	$174.72	44.12	0.07
Boom Sprayer-pull type 90ft.	**$7.33**	$11.00	$4.00	**$3.95**	$182.06	46.09	0.12
PLANTING:	Custom $/Acre [1]	max.	min.	Total Machine Cost/ Ac [3]	Machine Rate per Hour [4]	Acres/Hr. [5]	Est. Fuel Gal./Acre [6]
Planter- 12 row -w/fert& insect 30" corn-soys	**$19.34**	$30.00	$12.00	**$16.79**	$235.06	14.00	0.40
Planter- 12 row no attachments	**$17.46**	$28.00	$10.00	**$15.25**	$213.50	14.00	0.40
Planter only	**$12.15**						
Planter only- notill	**$13.50**						
Planter- soybean 15" rows	**$19.19**	$22.00	$10.00				
Planter- No Till w/spliter & w/fert	**$20.65**	$30.00	$12.00				
Planter- Min Till with fert&insect	**$19.31**	$33.50	$12.00	**$16.79**	$213.74	12.73	0.53
Planter conventional - Dry Beans	**$17.82**	$24.00	$14.00				
GPS mapping addition to planting	**$3.00**						
Variable rate seeding	**$2.48**	$5.00	$0.00				
Drill Soybeans Conventional	**$15.50**	$22.00	$9.00				
Drill-AirSeeder with cart-52ft	**$17.17**			**$20.56**	$453.55	22.06	0.52
Drill- No Till (15 ft.)	**$18.44**	$28.00	$12.00	**$24.11**	$153.34	6.36	0.90
Drill- No Till - drill only no tractor	**$12.40**	$18.00	$9.00				
Drill Grain, press wheels (16ft)	**$15.23**	$22.00	$10.00	**$15.01**	$101.92	6.79	0.61
Grain drill- only-no tractor	**$10.50**						
Seed Tender	**$3.15**	$6.00	$0.00				
Pest Control- scouting	**$3.50**	$7.45	$2.00				
Pest Scouting-with drone	**$2.55**	$4.00	$1.00				

SUGAR BEETS:	Custom $/Acre [1]	max.	min.	Total Machine Cost/ Ac [3]	Machine Rate per Hour [4]	Acres/Hr. [5]	Est. Fuel Gal./Acre [6]
Sugar Beets - Planting (12 row)	$32.50	$40.00	$18.00		$0.00	4.67	0.99
Sugar Beet Cultivation	$16.50				$0.00	5.60	0.81
Sugar Beet Topper	$16.50				$0.00	7.13	0.56
Sugar Beet Harvester	$130.00	$200.00	$75.00		$0.00	3.03	2.22
Sugar Beet Cart	$35.00				$0.00	5.20	1.80
HARVESTING:	Custom $/Acre [1]	max.	min.	Total Machine Cost/ Ac [3]	Machine Rate per Hour [4]	Acres/Hr. [5]	Est. Fuel Gal./Acre [6]
Combine - 8 row (Corn)	$35.50	$55.00	$23.00	$36.01	$244.51	6.79	2.00
Corn Head for combine	$9.93	$15.00	$5.00				
Combine 12 row- stalk chopper head	$40.10	$57.00	$26.00	$49.86	$372.45	7.47	1.90
Combine Small grains (20 ft head)	$31.02	$649.00	$18.00	$32.49	$220.61	6.79	1.70
Combine Soybeans (30 ft. head)	$31.59	$52.00	$22.25	$24.89	$253.38	10.18	1.70
Combine Soybeans- air reel- flex 25ft.	$35.55	$50.00	$28.00	$34.57	$256.51	7.42	2.04
Soybean head for combine	$9.45	$13.25	$6.00				
Combine, cart, haul to storage - Corn	$38.96	$85.00	$23.82				
Combine, cart, haul to storage - Soybeans	$37.14	$37.50	$23.11				
GPS mapping addition to harvesting	$2.45	$5.00	$0.00				
Picker 2 row- Ear Corn + 3 wagons	$31.39	$35.00	$25.00				
Combine Field Beans (belt pickup)	$38.00	$72.00	$24.00	$31.35	$244.84	7.81	1.55
Pulling Dry Beans (knife 6 row)	$9.75						
Pulling Dry Beans (rod 6 row)	$10.15						
Dry Bean – windrowing (6 row)	$9.75						
Grain Cart- corn / acre	$6.13	$11.00	$2.00	$15.99	$109.85	6.87	1.44
Grain Cart only- corn / acre	$3.25						
Chopping Forage- Pull type 3row	6.65			$67.37	$139.46	2.07	3.38
Chopping Forage -Pull type Pickup hd-10ft	$9.50/ ton			$32.58	$107.84	3.31	1.40
Chopping Forage-Self-propelled 400 hp /hr	$270/ hr.			$177.52	per hour		
Chopping C.Silage-Self-prop 6row 625hp /hr	$470/ hr.			$233.28	per hour		2.58
Chopping Silage- Self propelled- per ton	$7.01	$10.50	$5.00				
Chopping Haylage- Self propelled /Ton	$7.89	$12.00	$7.50				
Snaplage / ton	$4.92	$15.00	$4.00				
Silo Filling-Tower silo - per ton 1Tractor, 1Chopper & Driver, Wagons	10.75						
Bunk Filling - per ton Includes chop, haul, filling & packing	$10.24	$12.50	$7.50				
Silage Bagging per ft. (9 ft diameter)	$8.48	$13.00	$9.00				
Mowing	$13.65	$17.58	$7.59				
Raking	$6.37	$2.00	$3.00	$2.89	$75.66	26.18	0.07
Tedding	$6.68	$10.00	$4.39				
Windrowing - hay or straw	$11.23	$17.00	$11.00	$14.57	$176.59	12.12	0.32
Swathing hay or small grains	$15.10	$25.00	$9.00	$14.57	$176.59	12.12	0.32
Mower-Conditioner Pull-type (9 ft.)	$14.62	$21.00	$8.00				
Mower-Conditioner- Self Propelled (16ft)	$15.50	$19.00	$10.00				
Mower - Conditioner- Rotary (12ft)	$13.84			$10.67	$93.15	8.73	0.38
Small Square Baling /bale - Hay	$0.91	$1.07	$0.34	$15.51	$67.62	4.36	0.40
Bale / Straw	$0.85						
Mow, Rake, Baler & Handle - small sqr.	$2.24	$4.00	$1.00				
Baler, Rake & Handle - Lrg Round	$20.00/acre						
Complete Mow to Hay harvesting per ton	$35.00						
Wrapping Bales	$4.50	$10.00	$4.00				
Baling Round- 600-800 # per bale	$9.61 per bale	$17.00	$5.78	$10.70			
Baling Round -1200 -1500 #- per bale	$10.79 per bale	$16.00	$5.75	$9.19	$86.85	9.45	0.35
Baler 1000# Round/ with wrapper	$10.70 per bale	$23.00	$9.00	$14.55	$137.50	9.45	0.35
Mow-Rake-Bale-fld Haul- Lrg. Round/bale	$19.30 per bale	$30.00	$10.00				
Baling -1500 #- Lrg. Round - stalks/straw	$12.38 per bale	$23.00	$8.43				
Baling -1500#- Lrg. Round - stalks / straw - with wrap	$13.90 per bale	$16.00	$10.00				
Picking up w/accumulator- lrg. sq. bale	$3.83	$4.00	$3.00				
Hauling round bales / bale / loaded mile	$3.75						
Hauling square bales/bale/loaded mile	$0.09	$0.19	$0.01				
Baling – Lrg Sqr. Hay 4x3x6	$10.50 per bale	$10.00	$2.50				
Baling – Lrg Sqr. Hay 4x3x8	$12.25	$21.00	$6.00	$14.10	$164.27	11.65	0.49

FERTILIZER:	Custom $/Acre [1]	max.	min.	Total Machine Cost/ Ac [3]	Machine Rate per Hour [4]	Acres/Hr. [5]	Est. Fuel Gal./Acre [6]
Fertilizer Dry Bulk: Spreading	$6.54	$12.00	$2.00				
Fertilizer dry Bulk Spreader only-	$3.61	$5.00	$2.00				
Lime application	$7.55	$13.48	$3.00				
Fertilizer- Liquid-Knifed In	$11.56	$21.00	$6.36				
Fertilizer - side dressing	$11.12	$15.00	$6.00				
Liquid-Sprayed:	$7.25	$11.00	$4.00				
Fertilizer- Anhydrous: 21 ft.	$12.95	$25.00	$6.00				
Soil Testing - GPS grid samples	$7.05	$10.00	$4.00				
Manure Hauling-semi-solid & Load & Spread / hr.	$128.46	$400.00	$100.00				
Liquid Manure Spreader Injected-1000 gal.	$11.50	$17.00	$10.00				
Liquid Manure spreader only /hr.	$55.00						
Solid Manure spreader only /hr	$55.00						
Liquid Manure injected Drag Line -1000 gal.	$12.58	$17.00	$9.50				
Manure Pump, Hauling, Spreading - liquid (9500 gallon cap.) per hour	$86 / hour						
Manure Pump, Hauling, Injecting - 1000 gal. liquid (9500 gallon cap.)	$12.00 per 1000 gal.						
Bobcat/Skid Loader / hr.	$64.85	$85.00	$20.00				
Mowing CRP or pasture / acre	$19.73	$25.00	$12.00				
Ditch Mowing	$65 per hour	$100.00	$25.00				
Brush Hogging/ acre	$22.30	$50.00	$6.78				
Grain Drying- continuous flow /point/ bu.	$0.05/pt./bu.	$0.11	$0.01				
Grain Drying- inbin dryer /point/bu.	$0.06/pt/bu.	$0.07	$0.04				
Grain Auger/ bu.	$0.06	$0.10	$0.01				
Grain Auger only / bu	$0.04						
Blower- silo filling / hour	$20.00						
Grain Storage/ mo.	$0.03/bu./mo.	$0.07	$0.02				
Grain Storage for season	$ 0.21 per bu.	$0.44	$0.04				
Grain Haul - per bu.- field to farmstead	$0.09/ up to 10 miles	$0.15	$0.06				
Grain Haul - per bu.- farm to mkt 25mi	$0.17 up to 25 miles	$0.50	$0.10				
Grain haul per loaded mile	$3.13	$4.25	$2.00				
Livestock hauling trailer/ loaded mile	$2.76	$4.00	$2.00				
Power Washing per hr.	$43.25	$50.00	$35.00				
Rock picking	$13.83	$20.00	$7.41				
Backhoe /hour	$91.48	$150.00	$50.00				
Auto Steer System	$1.50						
Machine storage sqr. Ft. per year	$0.53						
Custom Farming- Corn	$121.12	$190.50	$70.00	(all machine operations for growing & harvest)			
Custom Farming- Soybeans	$107.02	$170.00	$60.00	(all machine operations for growing & harvest)			
Custom Farming- Sm Grains	$92.25	$111.13	$67.31	(all machine operations for growing & harvest)			

Fuel cost is calculated by adding fuel, oil and lube cost then adding 15% to this power fuel cost. *$2.185* *** base fuel & lube price used* *$ 1.90*

1 Custom $ per acre: Represents the rate obtained from surveys of actual farm data surveys for 2016 from Universities listed below to do this type of machine work for another farm on a general basis. Higher or lower rates apply in each situation depending on crop conditions, soil conditions, size of fields and their locations. The rates listed included machine, power unit & operator where needed.

2 Fuel $ per acre: adjusted to reflect fuel and lubrication (15% additional) from the base fuel price noted above.

As a thumb rule, it is estimated that each $1.00 increase in fuel cost, will increase most machine operations by an additional 15%.

3 Total Machine Cost/Acre: Includes tractor, fuel cost**, lubricants, repairs, maintenance, labor and overhead costs including depreciation. This could be considered as an estimate of the ownership cost and operation of this machine on a per acre basis. No profit or return to management, which would be necessary for on going enterprises were included in this number. Values are based on "Farm Machinery Economic Cost Estimates for 2016, University of Minnesota

4 Machine Rate per Hour: This number takes the Total Machine Cost per Acre and factors in the estimated Acres per Hour to give a value that represents an estimate of the hourly operational and ownership cost of machinery supported by ©University of Minnesota, Machinery Economic cost estimates for 2016. If the machine is run at full capacity (or engine clock hours) this per acre rate should be the custom work value generated.

5 Acres/ Hour: This is an estimate of the acres this machine should average on a per hour basis with normal down time.

6 Gal./ Acre: This is an estimated machine use of fuel consumed to do this activity and is based on a factor of 0.044 gallons of diesel fuel per PTO horsepower-hour on an average. Your individual machines fuel use may vary from this number.

7 Labor cost: charged for the Machine Cost column at rate of $18.00 per hour unskilled tasks and $25.00 per hour for skilled labor (planter, sprayer, harvester). Costs were developed as an adjusted estimate of common rates being used by farms in this area to cover their cost of operation.

- University of Minnesota, Machinery Economic cost estimates for 2016 @ http://www.extension.iastate.edu/agdm/crops/pdf/a3-10.pdf
- 2016 Iowa Farm Custom Rate Survey - Ag Decision Maker • Alejandro Plastina @ http://www.extension.iastate.edu/agdm/crops/pdf/a3-10.pdf
- 2016 Pennsylvania 2016 Machinery Custom Rates, Adam Pike @ https://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Machinery_Custom_Rates
- Kansas Custom Rates Comparison for 2016, Gregg Ibendahi @ http://www.agmanager.info/kansas-custom-rates-comparison-2016-0
- 2016 Nebraska Farm Custom Rates, Jim Jansen & Roger Wilson @ http://extension.unl.edu/statewide/colfax/2016-nebraska-farm-custom-rates-0

- Kentucky-Custom Machinery Rates 2016 ⬩ Greg Halic, March 2016 @ http://www.uky.edu/Ag/AgriculturalEconomics/pubs/CustomRatesKY.pdf
- 2016 Ohio Farm Custom Rates, Barry Ward & F.John Barker @ https://u.osu.edu/marrison.2/files/2016/06/OAM-Ohio-Farm-Custom-Rates-2016-wbn5aq.pdf
- 2013 Custom Farm Work Rates on North Dokota farms, Dwight Aakre ⬩ https://www.ag.ndsu.edu/pubs/agecon/market/ec499.pdf

* This report is a summary of information extracted from various sources. Your actual cost may vary greatly from the numbers presented. It is recommended that you calculate your own cost and economic returns necessary for the operation of machinery and equipment on your individual farm. This document was compiled by: Dennis Stein, District Farm Business Management, Extension Educator Michigan State University Extension, 362 Green Street, Caro, Michigan 48723. Conatct information: Email: steind@msu.edu or web page: http://msue.anr.msu.edu/topic/info/farm_management . Factsheet revised November 2016

HOW TO FIGURE YOUR MACHINE WORK RATES

If you are hiring or doing custom work, the following will help you determine the custom rate. Custom rates are based on tradition or usual rates set in the community, the bargaining positions of both parties (i.e., availability of machinery services and demand for machinery services in your local area) and cost of operating the machines on your farm.

Cost of ownership and operation can be determined as follows:

Ownership cost per unit (e.g., acre, bushel, ton, hour)using the DIRTI 5:

1. **D**epreciation: $\frac{\text{original cost - salvage value}}{\text{years of use}}$			$ _____
2. **I**nterest: interest rat x AIV[a]			$ _____
3. **R**epairs: estmated 2 to 5 % of original cost			$ _____
4. **T**axes: (0 in Michigan -i.e., no taxes on personal property used in agriculture)			$ _____
5. **I**nsurance: (estimated 0.5% x AIV for insurance premium)			$ _____
6. Total ownership cost per year (add lines 1 thru 5)			$ _____
A. Ownership cost per unit: total ownership cost ÷ estimated annual use (acre, hour, bushel, ton)		(A)	$ _____
Operating Cost per (acre, hour, bushel, ton)			
1. Tractor: fuel (gallon fuel per unit x price/gallon) x 1.15[b]			$ _____
or			
2. Machine: gas or fuel gallons per unit			$ _____
3. Labor: hours per unit x wage rate (if labor wage unit is per acre, bushel or ton multiply this wage by acres bushels or tons per hour to determine wage/hour)			$ _____
B. Total operating cost per unit		(B)	$ _____
C. Total ownership and **operating cost** per unit		(A+B)	$ _____
D. Desired profit margin and / or risk premium	4.500%	%	
E. Custom Rate (per acre, hour, bushel, ton) Line C x [1+(Line D/100)]			$ _____

a Average investment value (AIV) = (cost basis + trade in value) ÷ 2.
b The addition of 15 percent above fuel cost is for oil & lube. maintenance.

Custom Machine rate calculator is available on line at Ohio State University: http://aede.osu.edu/research/osu-farm-management/decision-tools

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2016 Participating Seed Companies:

BECK'S
Beck's Hybrids
6767 E 276th St.
Atlanta, IN 46031
www.beckshybrids.com

CHANNEL BIOSEED
Monsanto Company
800 N. Lindbergh Blvd.
St. Louis, MO 63167
www.channel.com

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Croplan Genetics
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St. Paul, MN 55164-5324
www.croplangenetics.com

D.F. SEEDS
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905 S. Jackson St.
Dansville, MI 48819
www.dfseeds.com

DAIRYLAND
Dairyland Seed Company
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West Bend, WI 53095
www.dairylandseed.com

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Crop Production Services
443 Allenby Drive
Marysville, OH 43040
www.dyna-groseed.com

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www.greatlakeshybrids.com

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Indianapolis, IN 46268
www.mycogen.com

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Ames, IA 50010
www.nutechseed.com

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www.ruppseeds.com

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K0E 1J0
www.sevita.com

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14575 University Ave.
Waukee, IA 50263
www.spirithybrids.com

STINE
Stine Seed Co.
22555 Laredo Trl.
Adel, IA 50003
www.stineseed.com

ZF SELECT
Zeeland Farm Services, Inc.
2525 84th Avenue
Zeeland, MI 49464
www.zfsinc.com

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