SMaRT ON-FARM RESEARCH REPORT

2017-Part 1

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SMaRT

Soybean Management and Research Technology

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THANK YOU to the farmer cooperators for contributing their land, equipment, and time during the busy planting and harvest seasons to help improve Michigan soybean production.

For more information on participating in a 2018 SMaRT project, see page 31.

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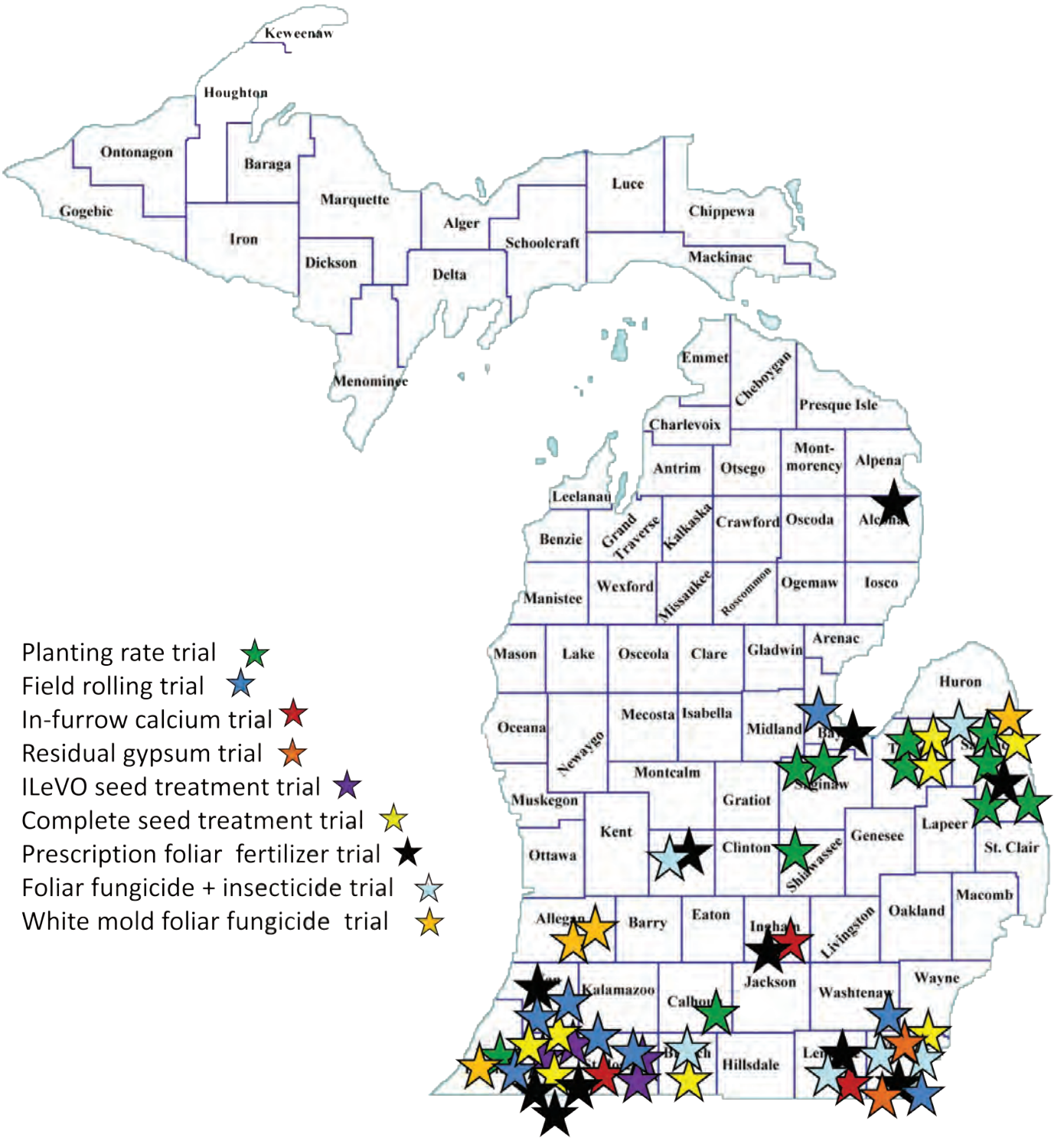
The SMaRT On-farm Research Program, which just completed its seventh season, is made possible by the checkoff investment of Michigan soybean growers. This year, 48 producers around the state conducted on-farm research trials within 9 projects. In this publication you'll find the results from 56 individual trial locations. The research projects were developed with producer input and represent some of the most challenging production issues confronting producers. Most of the projects were conducted at multiple locations and, in some cases, across several years improving the reliability of the results.

Agronomic and economic data is presented for each treatment. The projected USDA 2017-18 average soybean price of $9.20 per bushel and average 2017 prices for the product(s) and application costs associated with the treatments were used to determine the breakeven yields presented in the graphs.

Conducting these trials would not be possible without strong partnerships. One example is the unique collaboration between Michigan State University Extension (MSUE) and the Michigan Soybean Promotion Committee (MSPC) to jointly fund Mike Staton, MSUE state-wide soybean educator and SMaRT project coordinator. This program is also not possible without the efforts of Ned Birkey, in southeast MI, and Dan Rajzer, in southwest MI, with whom MSPC contracts to implement SMaRT trials and who are essential to this project's success. Ty Bodeis, MSPC soybean production specialist, took final plant stand counts, collected soil samples for soybean cyst nematode testing and nutrient analysis, and other valuable information presented in this report. We also want to thank MSU Extension educators, Martin Nagelkirk and James Dedecker, for their efforts in making this research possible.

Dr. Arnold Saxton, Professor Emeritus, University of Tennessee, provided the SAS statistical procedure used for analyzing the 2017 trial results and provided valuable input regarding experimental design and statistical analysis.

2017 SMaRT Trial Locations



- Planting rate trial
- Field rolling trial
- In-furrow calcium trial
- Residual gypsum trial
- ILeVO seed treatment trial
- Complete seed treatment trial
- Prescription foliar fertilizer trial
- Foliar fungicide + insecticide trial
- White mold foliar fungicide trial

2014 to 2016 Residual Broadcast Gypsum Trial

Purpose: Interest in the use of gypsum is increasing in Michigan. Gypsum is an excellent source of calcium and sulfur, both of which are essential crop nutrients. Calcium deficiency symptoms in field crops have never been identified in Michigan. However, sulfur can be low in coarse-textured soils low in organic matter. The purpose of this trial was to evaluate the short-term and long-term effects of broadcast gypsum on crop yields in Michigan rotations.

Procedure: To determine the immediate effect of broadcast gypsum on soybean yields, a broadcast gypsum application was compared to an untreated control at one location in 2014, 10 locations in 2015 and one location in 2016. To determine the residual effects on soybean yields, the gypsum was applied prior to corn at 4 sites (Sanilac 14, Saginaw 15, Monroe 16-1 and Monroe 16-2). The gypsum was applied in the spring at all locations except the Sanilac 14 site where it was applied following wheat harvest in 2014. The gypsum application rate for each location was based on the soil's cation exchange capacity (CEC). One half ton per acre was applied when the CEC was below 10 meq/100g, one ton per acre was applied at CECs between 10 and 15 meq/100g and two tons per acre were applied when the CEC exceeded 15 meq/100g. Baseline soil samples were collected from 11 sites (table 1). Treated and untreated strips were geo-referenced at 11 sites so we could evaluate the residual effects of gypsum on crop yields and soil infiltration rates.

Results: The immediate effect of a broadcast gypsum application on soybean yields has been summarized in the 2016 SMaRT On-Farm Research Report which is available online at http://michigansoybean.org/checkoff-at-work/production/. The residual effects of gypsum on crop yields and soil infiltration rates are presented in tables 2 and 3. The 2015 gypsum applications improved wheat yield by 8.2 bushels per acre at one site and corn yield by 9.1 bushels per acre at another site in 2016 (table 2). The 2016 gypsum applications did not increase soybean yields in two locations in 2017. The 2015 and 2016 gypsum applications did not improve soil infiltration rates at any of the 11 locations in 2016 and 2017 (table 3).

We want to thank Gypsoil for providing and delivering the gypsum for the 2015 and 2016 trials.

Lime spreader

Gypsum provides both

calcium and sulfur

to the soil but consistent yield benefits have not been realized in three years of trials

Table 1. Baseline soil test levels for 11 of the broadcast gypsum trials conducted in 2014, 2015 and 2016

Location	Organic Matter (%)	Magnesium (ppm)	Calcium (ppm)	CEC (meq/100g)	Sulfur (ppm)	Magnesium Saturation (%)	Calcium Saturation (%)
Cass 15-1	15.9	165	2600	24.4	13	5.6	53.3
Clinton 15	3.4	310	2100	13.4	15	19.2	78.1
Monroe 15-3	4.1	365	2150	14.2	8	21.5	75.9
Monroe 15-2	2.6	205	1500	10.8	13	15.9	69.7
Monroe 15-1	3.2	215	1850	11.4	11	15.8	81.4
Hillsdale 15	2.7	220	1350	10.1	7	18.1	66.7
Branch 15-2	2.2	145	800	6.8	8	17.9	59.1
Presque Isle 14	--	87	822	5.1	--	14.3	81.3
Presque Isle 15	2.0	170	1750	10.5	8	13.5	83.6
Washtenaw 16	--	206	1032	9.9	--	24.2	71.4
Monroe 16-1	--	344	2586	17.5	--	17.6	79.3
Monroe 16-2	2.8	212	1275	10.1	9	17.9	64.1

Table 2. Residual effects of a single broadcast gypsum application on crop yields in 2016 and 2017

Location	Gypsum application timing	Crop	Untreated control	Broadcast gypsum	$LSD_{0.10}$
			---------- Yield (bu/ac) ----------		
Sanilac 14	Summer 2014	Soybeans in 2016	65.8	64.8	4.4
Monroe 15-2	Spring 2015	Soybeans in 2016	44.7	45.8	4.1
Monroe 16-1	Spring 2016	Soybeans in 2017	39.7	43.0	5.4
Monroe 16-2	Spring 2016	Soybeans in 2017	70.6	70.0	1.2
Average		**Soybean**	**55.2**	**55.9**	**1.6**
Monroe 15-3	Spring 2015	Wheat in 2016	81.0	84.4	10.4
Monroe 15-1	Spring 2015	Wheat in 2016	81.9 b	90.1 a	7.2
Average		**Wheat**	**81.5 b**	**87.3 a**	**5.0**
Clinton 15	Spring 2015	Corn in 2016	187.9	185.2	7.0
Cass 15-2	Spring 2015	Corn in 2016	174.8 b	183.9 a	3.4
Cass 15-1	Spring 2015	Corn in 2016	181.7	181.2	18.4
Average		**Corn**	**181.9**	**183.5**	**5.2**

Table 3. Residual effects of a single broadcast gypsum application on soil infiltration rates in 2016 and 2017.

Location	Gypsum application timing	Infiltration test timing	Untreated control	Broadcast gypsum	$LSD_{0.10}$
			----- *Infiltration rate (minutes) -----		
Monroe 15-3	Spring 2015	Spring 2016	9	22	21
Monroe 15-1	Spring 2015	Spring 2016	2	18	38
Hillsdale 15	Spring 2015	Spring 2016	2	2	1
Branch 15-2	Spring 2015	Spring 2016	9	6	8
Cass 15-2	Spring 2015	Spring 2016	1	2	1
Monroe 15-2	Spring 2015	Spring 2016	4	4	3
Clinton 15	Spring 2015	Spring 2016	16	27	40
Sanilac 14	Summer 2014	Spring 2016	17	33	62
Saginaw 15	Spring 2015	Spring 2016	7	6	4
Monroe 16-1	Spring 2016	Spring 2017	6	3	4
Monroe 16-2	Spring 2016	Spring 2017	7	5	5
Average			**10**	**11**	**6**

*Time required for one inch of water to infiltrate into a saturated soil

2015, 2016 and 2017 Planting Rate Trial

Purpose: Soybean planting rates were the highest ranking topic identified by soybean producers for evaluation in the SMaRT trials. The producers were interested in evaluating the effect of reduced planting rates on soybean yields and income. There are two main factors driving the increased interest in reducing soybean planting rates – seed cost and white mold. The purpose of this trial was to evaluate how reducing planting rates will affect soybean yield and income.

Procedure: Eleven planting rate trials were conducted each year from 2015 to 2017. Four target planting rates (80,000, 100,000, 130,000 and 160,000 seeds per acre) were compared at all sites except Sanilac 3 which used the three highest rates, in 2015. Stand counts were taken to determine actual final plant stands at each location.

Results: The planting rate trials produced mixed results in 2015. At three sites, the 160,000 planting rate produced the highest yield. However, it also produced the lowest yield at two other locations. The lowest three planting rates each produced the highest yield at three trials. When all the locations were combined and analyzed, the yield for the 80,000 planting rate was 1.8 bushels per acre lower than the 100,000, 130,000 and 160,000 planting rates. However, there was no difference in the yields produced by the highest three planting rates.

The more challenging weather and soil conditions occurring in 2016 an 2017 favored the higher planting rates. In 2016, the 160,000 planting rate beat the 80,000 rate at six locations, the 100,000 rate at three locations and the 130,000 at one location. The 130,000 rate beat the 80,000 rate at six sites, the 100,000 rate at two sites and the 160,000 rate at one site. In 2017, the 160,000 planting rate beat the 80,000 rate at seven locations, the 100,000 rate at two locations and never beat the 130,000 rate. The 130,000 rate beat the 80,000 rate at three sites and the 100,000 rate at two sites. When all the locations for both 2016 and 2017 were combined and analyzed by year, the two highest planting rates produced identical yields and they yielded 1.3 bushels per acre higher than the 100,000 rate and 2.7 bushels per acre more than the 80,000 rate.

When all 33 sites (2015, 2016 and 2017) were combined and analyzed, the highest two planting rates produced similar yields and beat the 100,000 rate by 0.8 of a bushel per acre and the 80,000 rate by 2.3 bushels per acre.

Projected market prices and conservative seed costs were used to determine the income (gross income – seed cost) produced by the four planting rates. In 2015, the lowest two planting rates generated more income per acre than the higher two planting rates. In 2016 and 2017, the lowest three planting rates were more profitable than the highest planting rate.

Most of the trials were conducted in the Thumb area and further research is needed to determine how lowering planting rates will affect soybean yield and income across a wide range of tillage systems, planting systems, soil types and weather conditions.

Typical branching on a plant from the lowest two planting rates.

2015

Table 1. Tillage, planting equipment, row spacing, planting date, planting depth and seed treatment in 2015

Location	Tillage operations (fall/spring)	Planter/drill	Row spacing	Planting date	Planting depth	Seed treatment
Cass 1	No-till	JD 750	15″	May 13	1″	PPST FST/IST
St. Joseph	Strip tillage	Monosem NG4	Twin 8″	April 29	1.5″	PPST FST/IST
Tuscola	No-till	JD 1790	15″	May 21	1.25″	PPST FST/IST
Sanilac 1	CP/FC (2X)	Case IH 1250	30″	May 21	1.75″	Poncho/VOTiVO/Acceleron
Sanilac 2	CP/FC	John Deere 1790	15″	May 5	1.25″	Poncho/VOTiVO/Acceleron
Berrien	D/D	JD 1770	30″	May 22	1″	Cruiser Maxx
Cass 2	DR/FC	JD 1790	15″	May 14	1″	PPST FST/IST
Monroe	CP/FC	JD 1780	15″	May 9	1″	Tag Team
Ingham	Strip till	Great Plains YP825A	Twin 7″	May 13	1.5″	Poncho/VOTiVO/Acceleron
Sanilac 3	DR/FC	JD DB60	20″	May1	1.25″	PPST FST/IST
Fairgrove	CP/FC (2X)	JD 7200/Kinze units	28″	May 19	1″	Clariva Complete Beans

CP = chisel plow, FC = field cultivator, D = disc, VT = vertical tillage and DR = disc ripper

2016

Table 2. Tillage, planting equipment, row spacing, CEC, planting date, planting depth and seed treatment in 2016

Location	Tillage operations (fall/spring)	Planter/drill	Row spacing	CEC	Planting date	Planting depth	Seed treatment
Tuscola 1	No-till	JD 1790	15″	9.6	May 19	1.25″	Pioneer PPST FST/IST
Sanilac 1	DR/FC	JD DB44	22″	8.7	May 21	1.5″	Seed Shield + First Up
Sanilac 2	DR/VT (2x)	JD 1780	20″	7.9	May 7	1.5″	Insecticide + fungicide
Tuscola 2	CP/FC	JD 1790	15″	16	May 9	1.5″	Cruiser Maxx
Tuscola 3	CP/FC	JD 1790	15″	6	May 9	1.5″	Cruiser Maxx
Sanilac 3	CP/FC	GP 35-3000	24″	9.4	May 20	1.25″	None
Cass	CP/FC	JD 1790	15″	6.2	May 23	1″	Pioneer PPST FST/IST
Calhoun	No-till	JD 1770	30″	5.1	May 16	1″	None
Barry	CP/D, packer	Case IH 1250	30″	5-6	June 2	1.75″	Vault
Ionia	DR/FC	JD 1990 CCS	15″	6.6	May 19	1″	Insecticide + Fungicide
Ingham	Strip-till	GP YP825	Twin 7″	21.9	May 25	1.5″	Poncho/VOTiVO/Acceleron

CP = chisel plow, FC = field cultivator, D = disc, VT = vertical tillage and DR = disc ripper

2017

Table 3. Tillage, planting equipment, row spacing (CEC), planting date, planting depth and seed treatment in 2017

Location	Tillage operations (fall/spring)	Planter/drill	Row spacing	CEC	Planting date	Planting depth	Seed treatment
Sanilac 1	DR/FC	JD DB44	22″	10.5	May 19	1.5″	Seed Shield + First up
Sanilac 2	DR/VT (2X)	JD 1780	20″	10.0	May 15	1.5″	Pioneer PPST FST/IST
Tuscola 1	VT/none	JD 1790	15″	6.7	May 23	1.25″	Pioneer PPST FST/IST
Sanilac 3	VT/VT	Kinze 3500	30″		May 24	1.0″	Seed Shield Beans
Sanilac 4	CP/FC	IH 1250	30″	9.0	May 31	1.75″	Seed Shield Beans
Saginaw 1	CP/FC	JD 7100	15″	7.5	June 7	1.5″	Pioneer PPST FST/IST
Saginaw 2	CP/FC	JD7100	15″	6.0	June 7	1.5″	Pioneer PPST FST/IST
Shiawassee	No-till	JD 1990	15″	15	May 15	1.5″	Pioneer PPST FST/IST
Tuscola 2	No-till/wheat & Rye	JD 1790	15″	8.8	May 15	1.25″	Cruiser Maxx
Calhoun	No-till	JD 1770	30″		May 8	1″	None
Berrien	D/D	JD 7000	30″	37	May 22	1.5″	Cruiser Maxx

CP = chisel plow, FC = field cultivator, D = disc, VT = vertical tillage and DR = disc ripper

Planting Rate Trial continued

2015

Table 4. Target planting rates and actual plant stands in 2015

	Target planting rate (seeds/ac)			
Location	**80,000**	**100,000**	**130,000**	**160,000**
	Actual plant stands (plants/ac)			
Cass 1	79,100	85,100	122,900	133,100
St. Joseph	69,800	82,600	110,100	138,100
Tuscola	54,500	80,300	100,800	126,600
Sanilac 1	63,200	79,400	113,200	138,400
Sanilac 2	71,600	90,500	117,300	136,200
Berrien	78,500	97,400	129,500	150,600
Cass 2	78,300	91,200	123,000	150,000
Monroe	51,500	71,000	92,300	105,800
Ingham	79,900	100,200	136,500	180,000
Sanilac 3	--	98,800	116,700	143,900
Fairgrove	73,300	92,300	121,700	151,300
Average (all locations)	**70,000**	**88,100**	**116,700**	**141,300**
	Average stand loss (%)			
	13	12	10	12

2016

Table 5. Target planting rates and actual plant stands in 2016

	Target planting rate (seeds/ac)			
Location	**80,000**	**100,000**	**130,000**	**160,000**
	Actual plant stands (plants/ac)			
Tuscola 1	66,000	84,900	99,700	128,200
Sanilac 1	77,100	93,600	120,700	149,100
Sanilac 2	59,200	72,700	90,700	124,900
Tuscola 2	66,600	76,700	98,300	118,300
Tuscola 3	65,000	80,000	107,700	122,600
Sanilac 3	59,800	78,200	117,700	150,900
Cass	75,300	91,900	117,000	142,300
Calhoun	57,300	74,500	86,800	115800
Barry	59,000	77,200	106,000	130,000
Ionia	69,900	87,500	107,200	128,200
Ingham	79,400	87,500	117,700	138,200
Average (all locations)	**66,800**	**82,200**	**106,300**	**131,700**
	Average stand loss (%)			
	17	18	18	18

2017

Table 6. Target planting rates and actual plant stands in 2017

	Target planting rate (seeds/ac)			
Location	**80,000**	**100,000**	**130,000**	**160,000**
	Actual plant stands (plants/ac)			
Sanilac 1	71,200	86,400	101,300	123,100
Sanilac 2	66,900	78,900	101,200	124,400
Tuscola 1	65,000	84,400	97,600	117,600
Sanilac 3	72,400	88,000	107,800	131,800
Sanilac 4	73,000	96,900	124,700	155,400
Saginaw 1	50,500	61,300	82,300	89,200
Saginaw 2	44,000	61,300	78,400	92,500
Shiawassee	61,600	78,800	102,100	131,300
Tuscola 2	73,900	88,700	112,200	132,900
Calhoun	59,600	71,200	88,500	109,300
Berrien	69,800	86,700	108,400	126,500
Average (all locations)	**64,400**	**80,200**	**100,400**	**121,300**
	Average stand loss (%)			
	20	20	23	24

2015

Table 7. Effect of four planting rates on soybean yield and income in 2015

	Target planting rate (seeds/ac)				
Location	**80,000**	**100,000**	**130,000**	**160,000**	**$LSD_{0.10}$**
	Yield (bushels/ac)				
Cass 1	48.9 c	51.1 bc	53.3 ab	54.5 a	2.4
St. Joseph	63.8	63.9	64.0	64.7	1.1
Tuscola	60.1 ab	60.1 ab	61.5 a	59.1 b	2.2
Sanilac 1	52.7	56.2	54.2	53.0	5.1
Sanilac 2	63.2 a	61.1 b	59.8 b	57.9 c	1.7
Berrien	72.1 b	75.0 ab	74.5 ab	75.9 a	3.7
Cass 2	72.0	73.1	71.6	72.4	1.6
Monroe	38.9 b	47.3 ab	45.6 ab	49.8 a	9.7
Ingham	46.5	46.3	45.6	47.6	5.6
Sanilac 3	--	62.4 a	59.8 b	58.8 c	1.0
Fairgrove	65.8	66.9	69.0	66.6	4.0
Average yield	**58.4 b**	**60.1 a**	**59.9 a**	**60.2 a**	**1.4**
	Income ($/ac)				
Average income	**$500**	**$507**	**$492**	**$482**	

Seed cost = $60 per 140,000 seed unit

2016

Table 8. Effect of four planting rates on soybean yield and income in 2016

	Target planting rate (seeds/ac)				
Location	**80,000**	**100,000**	**130,000**	**160,000**	**$LSD_{0.10}$**
	Yield (bushels/ac)				
Tuscola 1	67.2 b	66.6 b	69.7 a	71.7 a	2.5
Sanilac 1	80.3	80.5	80.7	79.0	2.4
Sanilac 2	75.0 b	76.9 b	76.9 b	79.3 a	2.1
Tuscola 2	78.0 b	79.7 ab	81.2 a	80.7 a	2.6
Tuscola 3	71.9 c	74.7 b	76.4 ab	77.7 a	2.6
Sanilac 3	61.6 b	66.7 a	68.1 a	69.2 a	3.2
Cass	75.6 ab	75.3 ab	76.2 a	74.5 b	1.5
Calhoun	62 b	63.3 b	67.8 a	64.8 ab	4.2
Barry	55.0	56.1	55.3	56.8	3.6
Ionia	77.0 c	78.3 bc	78.9 ab	80.1 a	1.4
Ingham	53.0	53.0	54.7	51.4	5.9
Average yield	**68.7 c**	**70.1 b**	**71.4 a**	**71.4 a**	**0.9**
	Income ($/ac)				
Average income	**$598**	**$602**	**$601**	**$588**	

Seed cost = $60 per 140,000 seed unit

2017

Table 9. Effect of four planting rates on soybean yield and income in 2017

	Target planting rate (seeds/ac)				
Location	**80,000**	**100,000**	**130,000**	**160,000**	**$LSD_{0.10}$**
	Yield (bushels/ac)				
Sanilac 1	61.0 bc	60.9 c	62.1 ab	62.2 a	1.1
Sanilac 2	69.0 ab	69.9 a	68.9 ab	67.6 b	1.7
Tuscola 1	50.8 ab	50.1 b	53.9 a	52.5 ab	3.4
Sanilac 3	54.3 b	56.7 ab	55.7 ab	57.3 a	2.8
Sanilac 4	36.8 b	39.8 ab	41.4 a	42.9 a	3.8
Saginaw 1	39.5	40.1	42.1	41.6	4.3
Saginaw 2	38.9 b	40.5 ab	41.0 ab	42.5 a	3.4
Shiawassee	42.5 c	44.2 bc	46.8 a	45.8 ab	1.9
Tuscola 2	56.4 c	59.4 b	61.5 ab	63.6 a	2.7
Calhoun	44.0 b	45.8 ab	46.0 ab	46.4 a	2.2
Berrien	64.2	65.2	66.4	65.2	4.3
Average yield	**50.7 c**	**52.0 b**	**53.3 a**	**53.4 a**	**0.9**
	Income ($/ac)				
Average income	**$429**	**$432**	**$431**	**$418**	

Seed cost = $64 per 140,000 seed unit

Planting Rate Trial continued

Figure 1. Effect of four planting rates on soybean yields at 11 locations in 2015

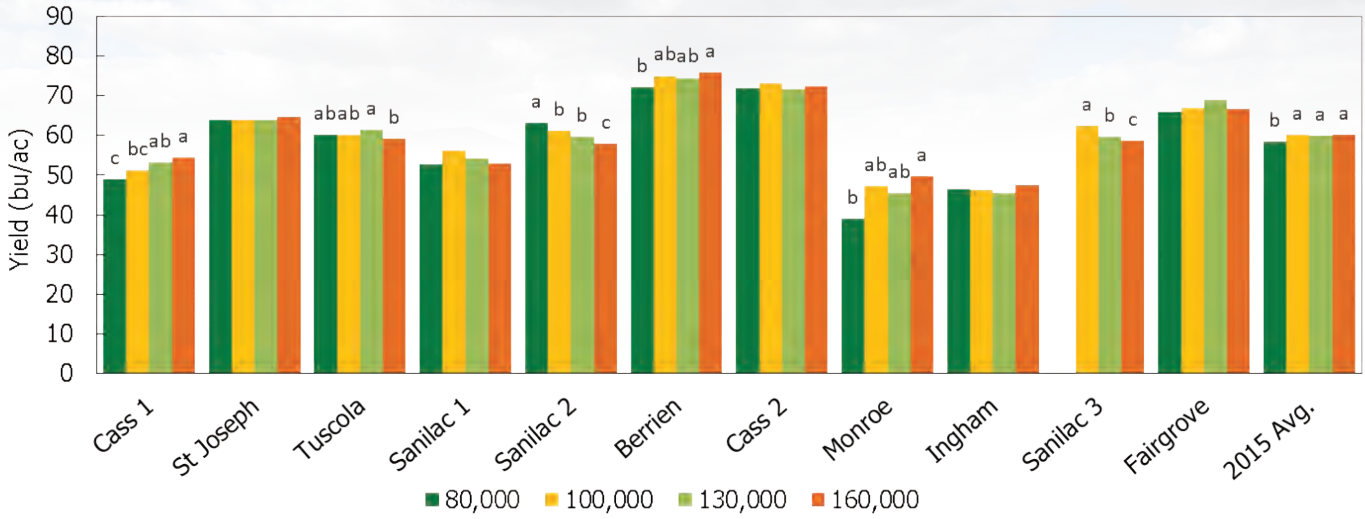


Figure 2. Effect of four planting rates on soybean yields at 11 locations in 2016

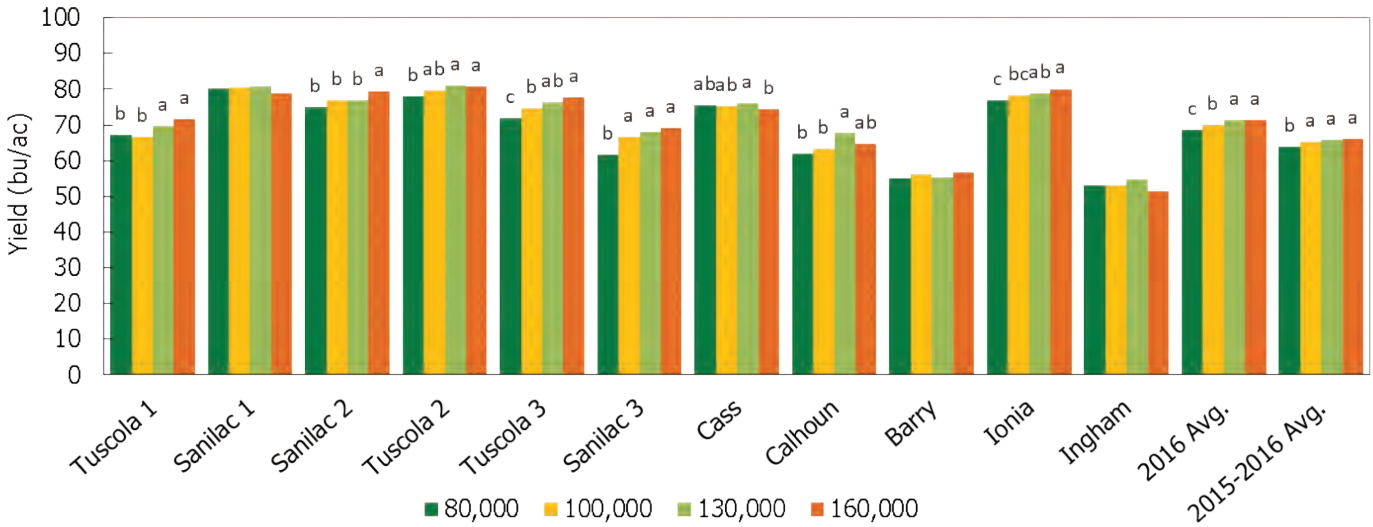


Figure 3. Effect of four planting rates on soybean yields at 11 locations in 2017

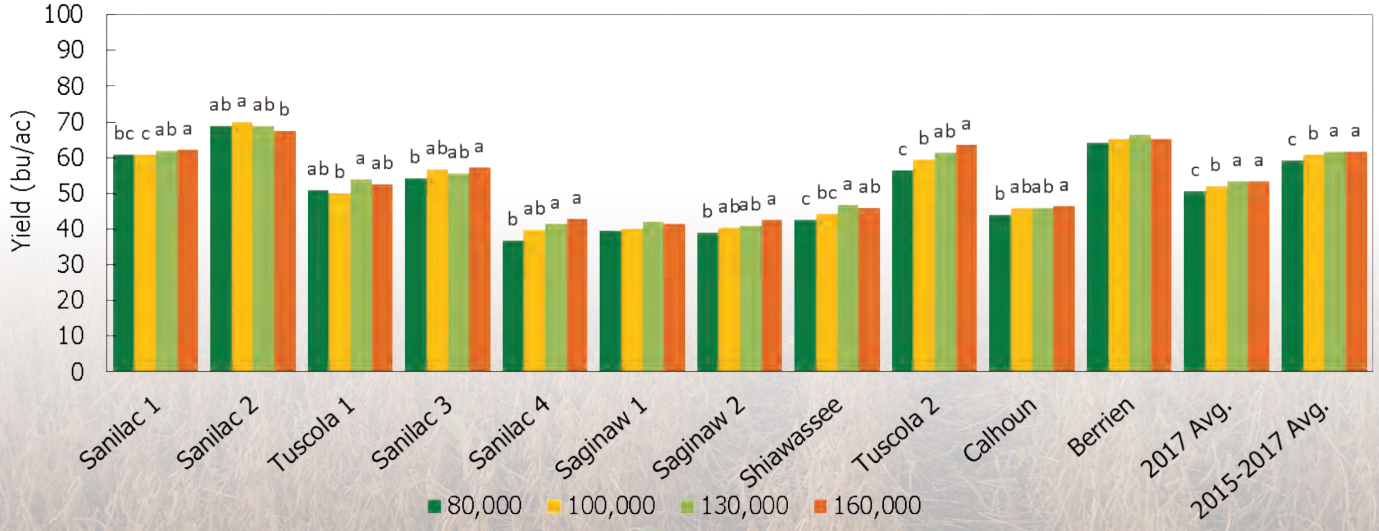
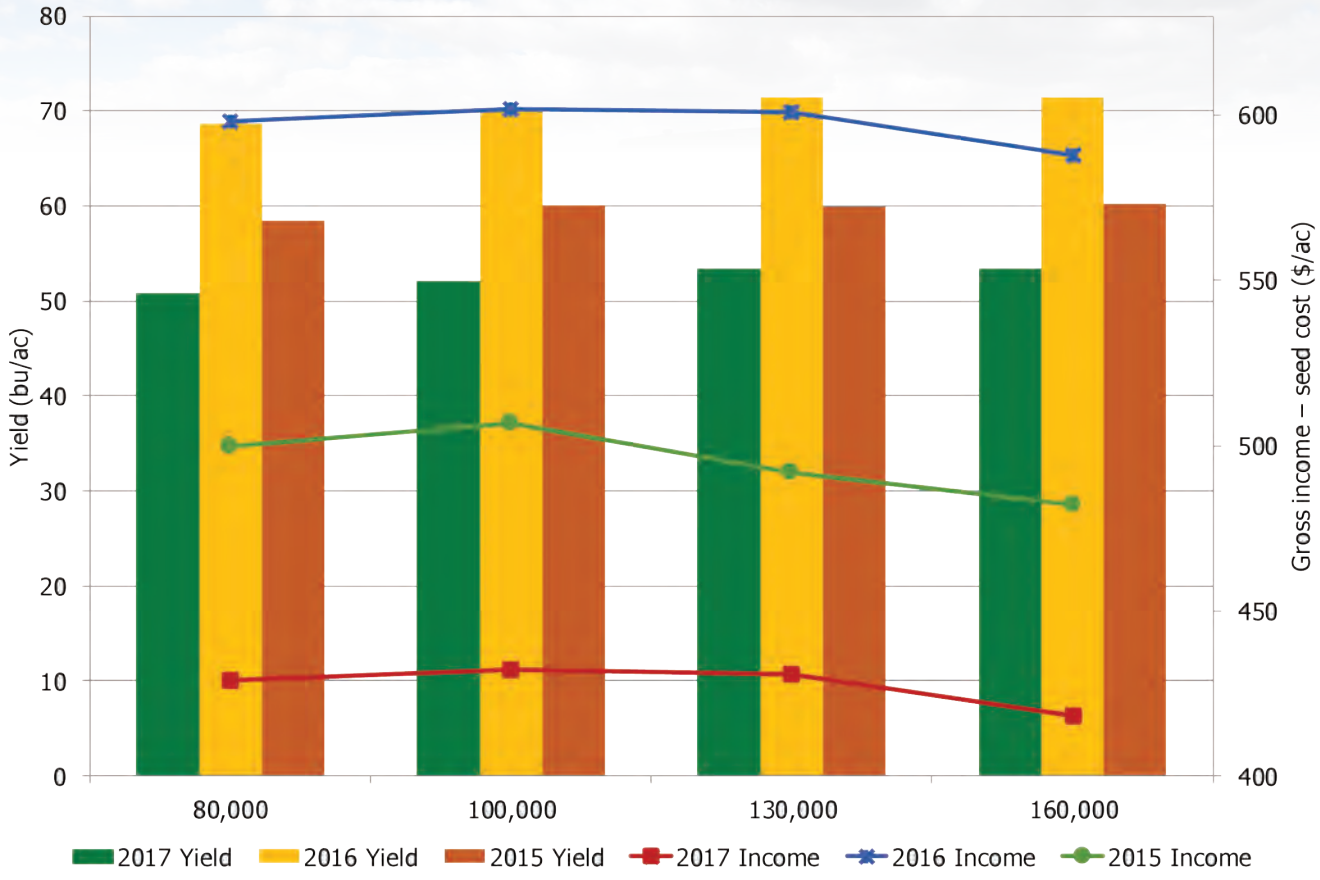


Figure 4. Planting rate effects on soybean yield and income in 2015, 2016 and 2017



The SMaRT project has conducted 33 on-farm replicated soybean planting rate trials from 2015 to 2017. The trials have been conducted over a range of growing conditions. Planting conditions were nearly ideal in 2015 but were more challenging in 2016 and 2017. The growing conditions in 2016 produced a record soybean yield in Michigan, whereas the excessive early rainfall and the lack of rain in August and September caused significant yield reductions in many areas of the state in 2017.

Michigan soybean producers can use the results from these trials in several ways. The most obvious way is to select the most profitable planting rates for their farms. We want to be clear that we are not recommending that Michigan soybean producers plant 80,000 or even 100,000 seeds per acre. However, it is very impressive how consistently well the 130,000 planting rate performed across the 33 trials and three growing seasons. It produced higher yields than the 160,000 rate at four locations and produced a lower yield than the 160,000 rate in only one trial.

The information can also help Michigan soybean producers make replanting decisions. The 80,000 planting rate results show that some very low plant stands can produce surprisingly high yields.

2016 and 2017 ILeVO® Seed Treatment Trial

Purpose: Soybean producers have identified seed treatments as a high priority for evaluation in SMaRT on-farm research trials. ILeVO was selected because Sudden Death Syndrome (SDS) is increasing in Michigan. The purpose of this trial was to evaluate the effect of ILeVO seed treatment on soybean yields and income in fields having a history of (SDS).

Procedure: This trial compared two treatments (a complete seed treatment *without* ILeVO vs. the same complete seed treatment *with* ILeVO). Seven trials were conducted in 2016 and four trials were conducted in 2017. The cooperating producers worked closely with their seed dealers to ensure that all seed planted in each trial was the same variety and seed lot. All seed treatments were applied by local seed dealers and the ILeVO was applied at 1.18 oz per 140,000 seeds.

Soil samples were collected from the same areas in each treatment after planting and again before harvest to determine the effect the ILeVO had on soybean cyst nematode (SCN) population development. The number of SCN eggs and juveniles found in the pre-harvest sample (PF) was divided by those in the post-planting sample (PI) to determine the SCN reproductive index (PF/PI). A lower reproductive index indicates less SCN reproduction.

Results: The occurrence of above-ground symptoms of SDS was minimal at all of the sites in 2016 and 2017. Despite this, the ILeVo seed treatment increased soybean yields by 5 bushels per acre at two of the seven locations in 2016 and by 2.1 bushels per acre at one site in 2017 (figure 1). The numerical yield increases occurring at the other sites were not statistically significant. However, when all the 2016 sites were combined and analyzed, ILeVO increased soybean yields by 2.8 bushels per acre and increased income by $14.00 per acre. In 2017, the average yield increase due to ILeVO dropped to 1.8 bushels per acre.

ILeVO's effect on SCN population development was mixed in 2016 (table 2) with numerically lower SCN development at three locations and numerically higher development at two locations. In 2017, there was a stronger trend for the ILeVO to suppress in-season SCN reproduction.

We want to thank local seed dealers and Bayer Crop Science for contributing to these trials.

Seed tender for handling bulk soybean seed

Foliar sypmtoms of Sudden Death Syndrome

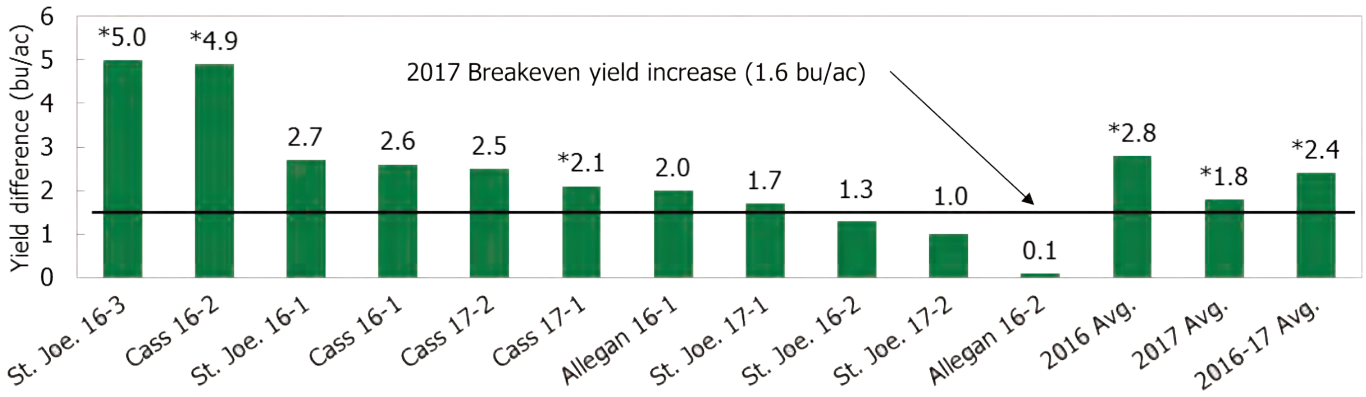
Planting no-till soybeans in Shiawassee County

Table 1. The effect of a ILeVO seed treatment on soybean yield and income in 2016 and 2017

Location	Untreated control	ILeVO	LSD $_{0.10}$	Yield difference
	---------- Yield (bu/ac) ----------			Yield (bu/ac)
St. Joseph 16-3	66.8 b	71.8 a	2.3	5.0
Cass 16-2	52.0 b	56.9 a	4.5	4.9
St. Joseph 16-1	52.2	54.9	4.2	2.7
Cass 16-1	27.2	29.8	4.6	2.6
Cass 17-2	50.3	52.8	2.7	2.5
Cass 17-1	60.2 b	62.3 a	1.5	2.1
Allegan 16-1	67.7	69.6	2.2	2.0
St. Joseph 17-1	51.9	53.6	3.5	1.7
St. Joseph 16-2	72.7	74.0	2.5	1.3
St. Joseph 17-2	48.8	49.8	1.8	1.0
Allegan 16-2	62.2	62.3	4.2	0.1
Average (2016-2017)	**55.6 b**	**58.0 a**	**0.8**	**2.4**
	---------- Income ($/ac) ----------			
Average income	**$512**	**$519**		

ILeVO cost = $15.00 per 140,000 seed unit

Figure 1. Yield difference produced by ILeVO seed treatment in 2016 and 2017



* The yield difference was statistically significant at these locations

Table 2. ILeVO seed treatment effects on SCN population development in 2016 and 2017

Location	SCN population after planting (PI)		SCN population before harvest (PF)		SCN reproductive index (PF/PI)	
	Control	ILeVO	Control	ILeVO	Control	ILeVO
	---------- SCN eggs and juveniles per 100 cm^3 of soil ----------					
St. Joseph 16-3	--	--	2,070	1,225	--	--
Cass 16-2	470	440	5,450	3,372	12	7.7
St. Joseph 16-1	440	235	39,150	40,900	89	174
Cass 17-2	255	190	6,780	3,260	27	17
Cass 17-1	1	1	190	78	190	78
Cass 16-1	15	4	1,690	626	113	156
Allegan 16-1	21	30	5,470	2,240	260	75
St. Joseph 17-1	22	66	14,190	7,040	645	107
St. Joseph 16-2	81	51	2,947	1,735	36	34
St. Joseph 17-2	25	0.5	1,075	114	43	228
Allegan 16-2	0	0	0	0		

The SCN reproductive index measures SCN reproduction during the growing season (lower numbers = less reproduction).

2017 In-furrow Calcium Fertilizer Trial

Purpose: Some soybean producers have the capability of applying in-furrow products at planting. These producers are looking for products that will increase soybean yields and profits when applied in-furrow. The purpose of this trial was to evaluate how an in-furrow application of LiberateCa™, a liquid calcium fertilizer from AgroLiquid will affect soybean yield and income in 2017.

Procedure: An in-furrow application of LiberateCa was compared to an untreated control at three locations in 2017. The LiberateCa was applied at 1 quart per acre.

Results: The in-furrow LiberateCa application did not increase soybean yields in any of the trial locations. The lack of a positive yield response is probably due to the fact that the soil calcium levels were medium to high at all three sites.

We want to thank the Center for Excellence for coordinating this trial.

In-furrow stater fertilizer

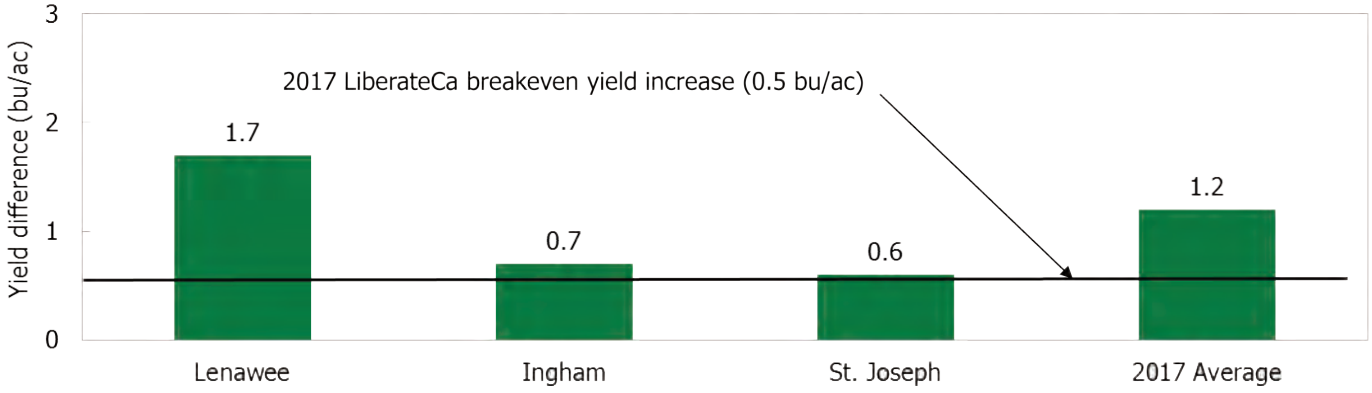
Low volume, low cost

starter fertilizer is convenient but significant yield increase was not found

Table 1. Soil test levels at the 2017 in-furrow LiberateCa trial locations

Location	Phosphorus	Potassium	Magnesium	Calcium	Soil pH	Mg base saturation	Ca base saturation
	---------- Parts per million ----------				1:1	-------- Percent --------	
Lenawee	144	122	149	899	6.2	23	58
Ingham	18	93	175	2100	6.7	11	78
St. Joseph	65	92	112	780	6.6	16	65

Figure 1. Yield difference produced by an in-furrow application of LiberateCa in 2017



*The yield difference was not statistically significant at any of these locations

Table 2. The effect of an in-furrow application of LiberateCa on soybean yield and income in 2017

Location	Untreated control	LiberateCa	LSD $_{0.10}$	Yield difference
	---------- Yield (bu/ac) ----------			Yield (bu/ac)
Lenawee	48.1	49.8	3.1	1.7
Ingham	39.3	40.0	1.3	0.7
St. Joseph	84.4	85.0	1.6	0.6
Average	**57.1**	**58.3**	**1.4**	**1.2**
	---------- Income ($/ac) ----------			
Average income	**$525**	**$531**		

LiberateCa cost = $5.00 per acre