



PRECISION TECHNOLOGY INSTITUTE

2020 RESEARCH SUMMARY
PONTIAC, IL





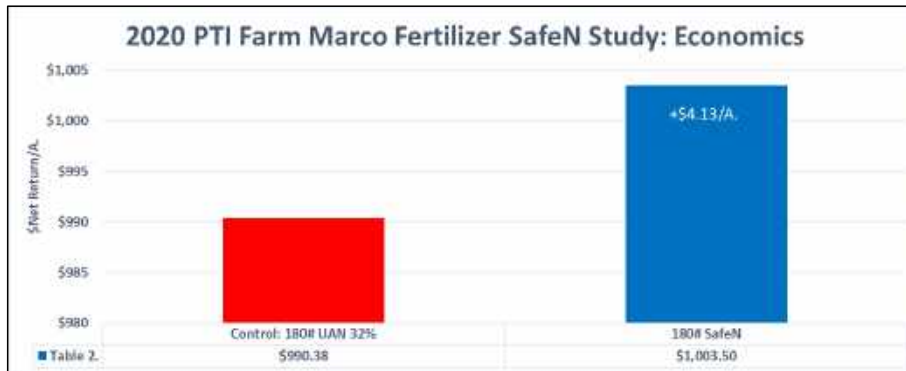
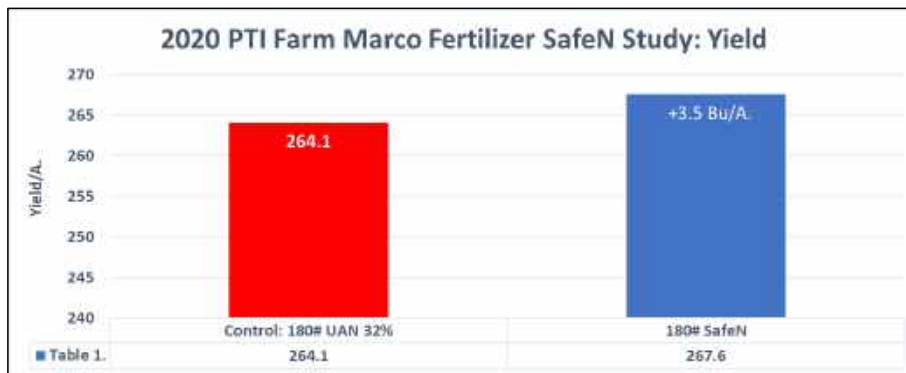
2020 PTI Results

Marco Safe "N" Study

Objective: To evaluate the yield and net return of Marco Fertilizer's Safe "N" Complete. Safe "N" is a 29-0-0-4S liquid nitrogen fertilizer partnered with 4% sulfur from ammonium thiosulfate (ATS). ATS has been researched as means to inhibit the nitrification process by slowing the breakdown of urease enzymes.



In this study Safe "N" is applied at a 180# N pre-plant Weed-N-Feed application in a corn-soybean rotation.



Results: SafeN nitrogen/sulfur treatments offered yield gains of +3.5 with positive economic returns of +\$4.13/A.



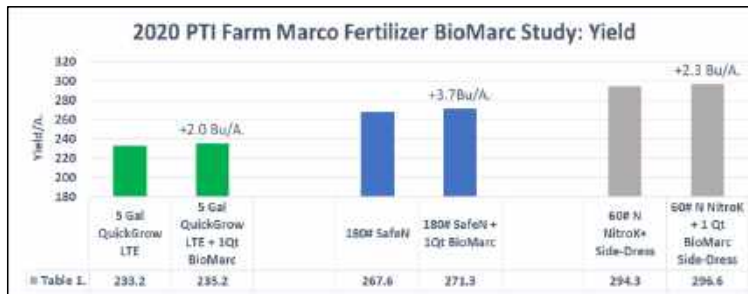
2020 PTI Results

Marco BioMarc Study

Objective: To evaluate the yield and net return of Marco Fertilizer's BioMarc, a unique combination of naturally extracted biostimulants, including kelp-based materials, coupled with nutrient-enabling technologies that enhance liquid fertilizer performance.



BioMarc was tested in three different corn studies including SafeN pre-plant nitrogen, FurrowJet® system with Marco QuickGrow LTE starter fertilizer, and NitroK side-dress studies all listed in the 2020 PTI Yield Summary Book, listed on pages 56,58, and 105.



Results: As a tank-mix partner, BioMarc resulted in average yield contributions of +2.0 to +3.7 Bu/A. throughout our 2020 corn trials. These yield gains resulted in average economic gains ranging from **-\$0.50/A.** to **+\$5.88/A.**



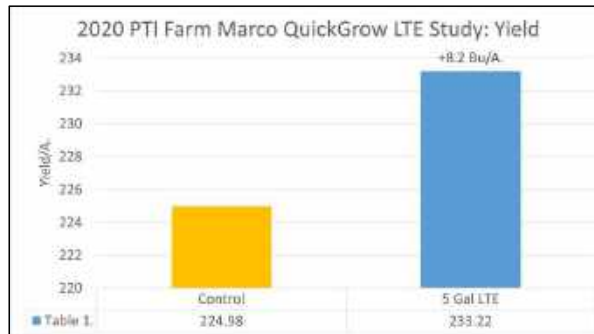
2020 PTI Results

Marco QuickGrow™ LTE FurrowJet® Study

Objective: To evaluate the yield and net return of Marco Fertilizer’s QuickGrow LTE 6-20-4-.25Zn-2.7S liquid starter fertilizer at a rate of 5 Gal/A. applied in an at-plant 3-way FurrowJet® system application. QuickGrow LTE is a 70% polyphosphate and 30% orthophosphate formulation of nitrogen, phosphorus, potassium, sulfur, and EDTA Zn.

Results: Table 1. illustrates that applications of 5 Gal/A. rates of Marco QuickGrow LTE resulted in yield gains of +8.2 Bu/A.

As we focus on return on investment (Table 2.), calculates that 5 Gal/A. rates proved additional net revenue of +\$43.25/A. over the untreated control.



Planting Date: 4/27 Hybrid: DKC 53-91 Population: 36K Row Width: 30" Rotation: CAB Corn Price: \$3.75 LTE \$3.50/Gal \$30 Fert. Reallocation



2020 PTI Results

Corn Summary of 2020 FurrowJet® Applications

Study	Classification	Yield/A.	\$ROI	Page #
Conventional Till High Yield Netafim DripTape Irrigated Corn	Starter Fertilizer	58.8	\$ 78.19	41
April 5th Corn Plant Date w/Starter	Starter Fertilizer	23.8	\$ 56.60	12
Nachurs imPulse FurrowJet Tri-Band 5Gal	Starter Fertilizer	11.2	\$ 55.50	66
Nachurs imPulse FurrowJet Center 4Gal	Starter Fertilizer	7.6	\$ 45.30	64
Corn Marco QuickGrow LTE 5 Gal	Starter Fertilizer	8.2	\$ 43.25	58
Nachurs imPulse FurrowJet Wings 5Gal	Starter Fertilizer	8.8	\$ 43.20	65
Strip Till High Yield Netafim DripTape Irrigated FurrowJet Tri-Band & Conceal. Co	Starter Fertilizer	29.5	\$ 40.76	45
May 14th Corn Plant Date w/Starter	Starter Fertilizer	19.2	\$ 39.42	12
QLF 7-21-3 MKP FurrowJet Center	Starter Fertilizer + Carbon Based Sugar	5.2	\$ 37.10	74
April 11th Corn Plant Date w/Starter	Starter Fertilizer	18.5	\$ 36.85	12
10 Gal: 10-34-0	Starter Fertilizer	9.5	\$ 36.63	72
QLF 7-21-3 MKP + Boost FurrowJet Wings	Starter Fertilizer + Carbon Based Sugar	5.0	\$ 36.46	74
Nachurs Start2Finish	Starter Fertilizer	23.1	\$ 31.80	67
Andersons Soz RG6 + 3Gal ATS	Starter Fertilizer	9	\$ 20.32	61
Capture LFR 8 Soz	Insecticide	10.0	\$ 19.69	83
Capture 4oz	Insecticide	7.5	\$ 18.03	83
AgroLiquid Starter Fertility Program	Starter Fertilizer	14.6	\$ 18.85	63
Sunrise Coop PCT FIC	Starter Fertilizer + Biological	5.2	\$ 14.79	73
10 Gal: 10-34-0 FJ vs Conceal	Starter Fertilizer	3.9	\$ 14.77	73
Temistry LFB	Fungicide + Insecticide	8.1	\$ 14.17	84
Pivot Bio PROVEN 25% N Reduction Center vs Wings	Biological	3.8	\$ 12.32	69
QLF Boost 2gal + Marco QuickGrow LTE 5Gal	Carbon Based Sugar	5.0	\$ 12.19	59
Mantiror LFR	Fungicide + Insecticide	7.6	\$ 12.05	79
Strip Till High Yield Netafim DripTape Irrigated FurrowJet Wings, Corn	Starter Fertilizer	10.0	\$ 11.71	45
AgroLiquid access 2 Gal	Starter Fertilizer	5.0	\$ 9.75	62
Corn FurrowJet Side Wall Cut	Mechanical	2.6	\$ 9.75	88
Riser	Starter Fertilizer	6.0	\$ 8.92	81
Ethos XA	Starter Fertilizer	7.8	\$ 8.80	82
QLF Boost 3gal + Marco QuickGrow LTE 5Gal	Carbon Based Sugar	3.2	\$ 8.72	59
April 23rd Corn Plant Date w/Starter	Starter Fertilizer	11	\$ 8.65	12
Xyruy LFB	Starter Fertilizer	6.2	\$ 8.17	85
Strip Till High Yield Netafim DripTape Irrigated FurrowJet Center, Corn	Starter Fertilizer	5.25	\$ 7.41	45
QLF AgroGold RC FIC	Starter Fertilizer	4.0	\$ 6.11	76
AgroLiquid access 1 Gal	Starter Fertilizer	2.8	\$ 6.00	62
Andersons 5Gal Season Pass 6-18-6 + Microcarb + 3pt BioPass FIC	Starter Fertilizer	2.6	\$ 3.89	61
Pivot Bio PROVEN w/25% N Reduction FIC	Biological	-1.7	\$ 1.02	68
Combo of SabrEx/Excelorate	Starter Fertilizer + Micronutrient + Biological	2.9	\$ 0.76	86
SabrEx Corn IF	Biological	1.7	\$ 0.39	86
5Gal Marco LTE + 1qt BioMarc	Micronutrient	2.0	\$ 0.50	57
Excelorate	Starter Fertilizer + Micronutrient	1.0	\$ 0.73	86
AgroLiquid access 3 Gal	Starter Fertilizer	3.4	\$ 0.75	62
Andersons 5Gal Season Pass 6-18-6 + Microcarb + 3pt BioPass FIC	Starter Fertilizer	1.3	\$ 1.02	61
Xenathon	BioFungicide	2.2	\$ 1.69	80
Pivot Bio PROVEN 100%N	Biological	2.6	\$ 1.28	68
May 23rd Corn Plant Date w/Starter	Starter Fertilizer	6.0	\$ 0.03	12
AgroLiquid access 4 Gal	Starter Fertilizer	1.3	\$ 0.50	62
Pivot Bio PROVEN Wing + Starter	Biological + Starter Fertilizer	-8.4	\$ 0.39	70
Pivot Bio PROVEN Center + Starter	Biological + Starter Fertilizer	-9.8	\$ 0.75	70
Averages:		7.58	\$ 15.28	

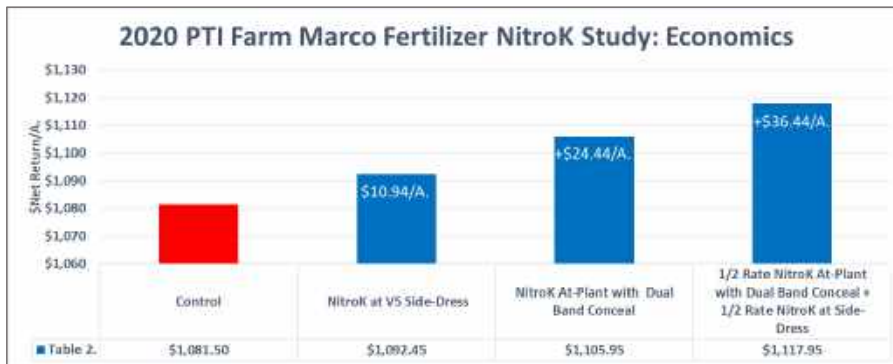
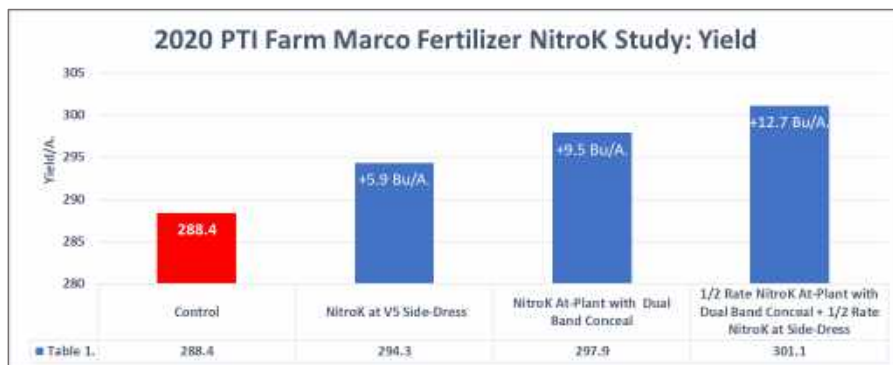




2020 PTI Results

Marco Nitro K Conceal® Study

Objective: To evaluate the yield and net return of Marco Fertilizer’s NitroK, a 22-0-4-4S liquid fertilizer as a nutritional aid in providing season long availability of nitrogen, potassium, and sulfur. In this study, NitroK is applied at a 60# N rate as a 32% UAN tank-mix partner in a V5 side-dress, as well as an at-plant dual band Conceal® system application.



Results: Table 1. illustrates all NitroK applications provided yield benefit, however 50% split applications of NitroK in both at-plant dual band Conceal® system, along with a 50% side-dress application proved highest yield advantages of +12.7 Bu/A. with economic returns of +\$36.44/A. (Table 2). Applying NitroK as an at-plant dual band treatment offered a 61% yield improvement over later V5 side-dressing, totaling +\$13.50/A.



2020 PTI Results

Corn 2020 Summary of Conceal® Applications

Treatment	Classification	+/- Yield Gain	ROI \$	Page #
Triple Split N Program over WNF	Nitrogen	28.4	\$ 106.50	101-103
Conventional Till High Yield Netafim DripTape Irrigated Corn	N, K, S, B, Carbon Based Sugar	58.8	\$ 78.19	41
Strip Till High Yield Netafim DripTape Irrigated Conceal Dual Band	N, K, S, B, Carbon Based Sugar	20.25	\$ 75.94	45
100% Dual Band over WNF	Nitrogen	18.3	\$ 68.63	99
100% Single Band over WNF	Nitrogen	11.3	\$ 42.38	99
Strip Till High Yield Netafim DripTape Irrigated Furrowlet Tri Band & Conceal	N, K, S, B, P, Biological, Carbon Based Sugar	29.5	\$ 40.76	45
Conceal Dual Band over Dribble Dual Band	Nitrogen	12.2	\$ 36.64	107
Marco NitroK 50% Conceal 50% Sidress	Nitrogen	12.7	\$ 36.44	105
Conceal Rate/Placement: 25% Conceal+25%WNF+50% Side-Dress	Nitrogen	9	\$ 33.86	102
Nachurs Start2Finish	Potassium	13.1	\$ 31.80	67
Conceal Rate/Placement: 50% Conceal Single Band+50% Side-Dress	Nitrogen	7.9	\$ 29.60	102
Centuro N Stabilizer	Nitrogen	10.5	\$ 28.41	53
Conceal Rate/Placement: 50% Conceal Dual Band+50% Side-Dress	Nitrogen	4.9	\$ 27.49	102
Boron Rate Study 2QT 10% Boron Dual Band Conceal	Boron	8.1	\$ 26.38	112
Single vs Dual Band - Dual	Nitrogen	7	\$ 26.25	100
Conceal Rate/Placement: 75% Conceal Dual Band+50% Side-Dress	Nitrogen	12	\$ 24.86	102
Marco NitroK Dual Band Conceal	Nitrogen, Potassium	9.5	\$ 24.44	105
The Andersons Root Growth Stimulator	Biological + N + S	7.79	\$ 21.66	61
K-Fuse Potassium: 5gal	Potassium	11.7	\$ 20.94	104
Andersons 5oz RGS + 3Gal ATS	Biological + N + S	9	\$ 20.32	61
AgroLiquid Starter Fertility Program	Nitrogen + Sulfur	14.6	\$ 18.95	63
3 gal ATS Conceal Dual Band	Nitrogen + Sulfur	5.1	\$ 14.13	111
QLF 2 Gal. Boost + N	Nitrogen + Carbon Based Sugar	5	\$ 12.19	77
1qt 5% Boron Dual Band Conceal	Boron	5.5	\$ 6.98	111
QLF Boost 1Gal Conceal	Nitrogen + Carbon Based Sugar	2.7	\$ 6.84	77
Marco Safe N	Nitrogen + Sulfur	3.5	\$ 4.13	56
Averages:		13.01	\$ 34.42	

Conceal® 3" away, 1.5" deep from the seed trench



Marco QuickGrow LTE FurrowJet® Study

Objective: To evaluate the yield and net return of Marco Fertilizer’s QuickGrow LTE 6-20-4-.25Zn-2.7S liquid starter fertilizer. QuickGrow LTE is a 70% polyphosphate and 30% orthophosphate formulation of nitrogen, phosphorus, potassium, sulfur, and EDTA Zn. Marco LTE starter treatments are applied at 4 and 5Gal/A. as a FurrowJet® *wing* treatment only (Figure 1.).

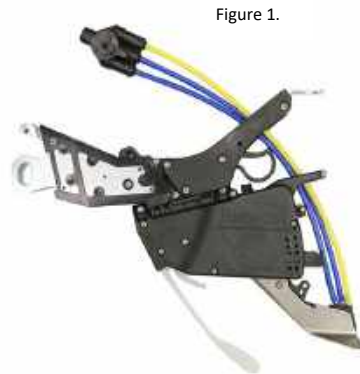
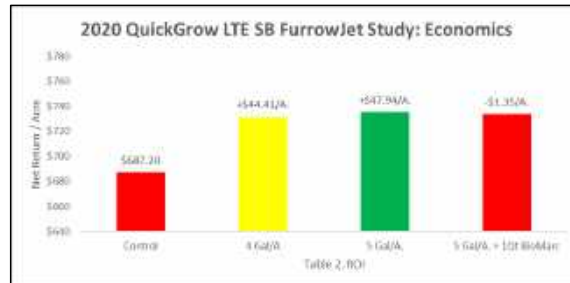
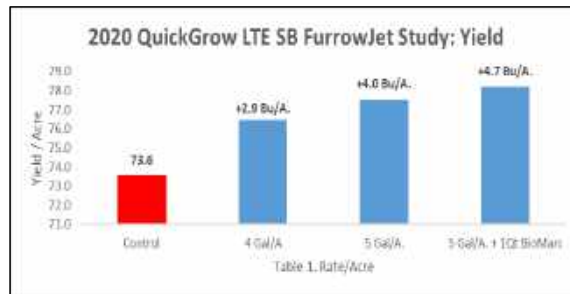


Figure 1.

Results: 5 Gal/A. rates showed both agronomic and economic optimum rate with yield advantages of +4.0 Bu/A. and a return on investment of +\$47.94/A. (Tables 1-2).

As an additional entry, we added BioMarc to the 5 Gal/A. treatment. BioMarc, is a unique combination of naturally extracted biostimulants including kelp-based materials, coupled with nutrient-enabling technologies that enhance liquid fertilizer performance. BioMarc provided +0.7 Bu/A. yield gains and provided a negative return on investment of **-\$1.35/A.**



Planting Date: May 17 Variety: GH 3582E3 Population: 130K Row Width: 30" Rotation: BAC SB Price: \$9.75 Marco LTE: \$3.50/Gal
 BioMarc: \$28/Gal Dry Fertilizer Reallocation: \$30/Acre

Marco Fertilizer NutriStart BOOST 14-12-4-6S Study

Objective: This irrigated soybean application trial evaluates the yield and net return of Conceal® system dual band treatments of NutriStart™ BOOST 14-12-12-4-6S at 10, 15, and 20 Gal/A. rates. This liquid fertilizer is a 70% polyphosphate and 30% orthophosphate formula designed for non-in furrow applications in soybeans. NutriStart products are manufactured with Marco 10-34-0, Potassium - soluble potash (K2O), Sulfur - Ammonium Thio-Sulfate and Zinc - 9% EDTA or ammoniated.



Conceal® system is an ideal placement for this product as its far enough away from the seed furrow to prevent seed injury, yet close enough to enable access to seedling nutrition (Figure 1).

Results: Table 1. illustrates that all rates of 14-12-4-6S proved positive yield gains from +2.2 Bu/A. to +4.2 Bu/A., however 10 Gal/A. provided the economic optimum rate applied resulting in a positive return on investment of +\$28.95/A.

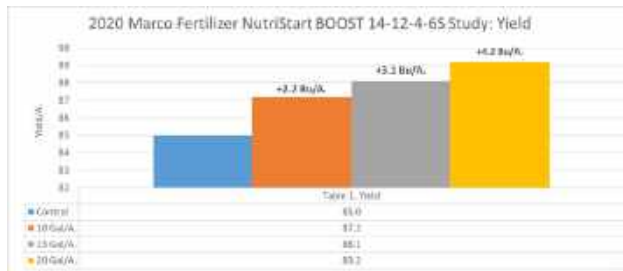


Table 2. reveals long-term multi-year economics during 2018-2020. Over this 3-year period, economic optimum has occurred at the 10 Gal/A. rate of NutriStart BOOST with an average return on investment of +\$46.37/A. NutriStart BOOST has been a solid performer at the PTI farm achieving some of the highest yield and economic gains in soybeans.

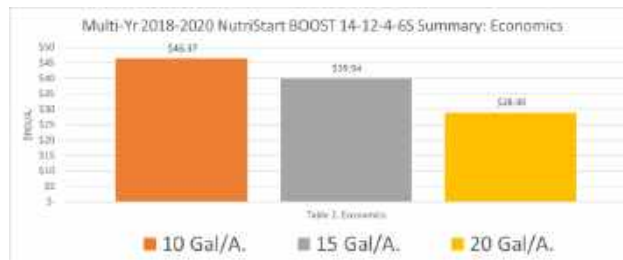


Figure 1. Conceal® Dual Placement 3" from furrow





2020 PTI Results

Soybeans Summary of 2020 FurrowJet® Applications

Soybean FurrowJet 2020		Classification	Bu/A.	\$ROI	Page #
1	Marco QuickGrow LTE FJ 5 Gal Soybean	Fertility	4	\$ 47.94	168
2	High Yield Irrigated Conventional Till 5 Point Touch Soybeans	Irrigated Fertility	16	\$ 47.34	164-145
3	Marco QuickGrow LTE FJ 4 Gal Soybean	Fertility	3.9	\$ 44.41	169
4	20" Irrigated Strip Till Cover Crop + Conceal and FJ High Management over Irrigated Conceal Soybean	Irrigated Fertility + Cover Crop	5	\$ 31.73	148
5	Soybean AgroLiquid 5-Calcite	Calcium + Sulfur	7.4	\$ 23.40	174
6	April 5th Plant Date w/Starter	Planting Date/Fertility	4.9	\$ 20.74	154
7	April 11th Plant Date w/Starter	Planting Date/Fertility	4.5	\$ 17.65	154
8	April 23rd Plant Date w/Starter	Planting Date/Fertility	4.5	\$ 16.75	154
9	The Andersons 2Gal First Pass 3-15-15 + MicroCarb + 1pt Biopass F/W Soybean	Fertility	1.1	\$ 16.38	169-170
10	High Yield Irrigated Conventional Till FJ Combo Soybeans	Irrigated Fertility	6.1	\$ 16.24	144-145
11	DLF 7-21-3MKP Farmwaleet Wings	Fertility	1.9	\$ 15.92	179
12	High Yield Irrigated Conventional Till F/W Soybeans	Irrigated Fertility	3.4	\$ 12.47	144-145
13	The Andersons 2qt. Kornit + .5 Gal. SweetN'Leazy + 1pt. Illinois FK Soybean	Fertility	0.5	\$ 12.47	169-170
14	3Gal Triple Option FJ + 5Gal Kluse Conceal Soybean	Fertility	2.6	\$ 11.66	171
15	Soybean AgroLiquid Farmwaleet Program	Fertility	3.8	\$ 7.89	172
16	Soybean AgroLiquid LiberateCa	Fertility	0.8	\$ 7.80	173
17	The Andersons 3 Way combo Soybean	Fertility	4.6	\$ 0.08	169-170
18	Soybean Marco Quickgrow LTE 5 Gal + 1 Qt BioMirc	Fertility	4.7	\$ (1.35)	169
19	HF Irrigated Conventional Till FJ Soybeans	Fertility	2.4	\$ (2.61)	144-145
20	3Gal Triple Option FJ + 5Gal Kluse Conceal + 1qt. Finish Line Foliar + 1Gal Balance	Fertility	3.2	\$ (3.64)	171
21	3Gal Triple Option FJ + 5Gal Kluse Conceal + 1qt. Finish Line Foliar	Fertility	2.7	\$ (4.64)	171
22	AgroGold + Seatonix FJ	Biological	0.32	\$ (5.88)	181
23	May 14th Plant Date w/Starter	Planting Date/Fertility	2.1	\$ (6.39)	154
24	May 23rd SB Plant Date w/Starter	Planting Date/Fertility	0.8	\$ (18.55)	154
25	June 1st SB Plant Date w/Starter	Planting Date/Fertility	0.8	\$ (18.81)	154
Averages:			3.48	\$ 11.70	



Soybeans Summary of 2020 Conceal® Applications

Soybean Conceal 2020		Classification	Bu/A.	\$ROI	Page #
1	High Yield Irrigated Conventional Till 5 Point Touch Soybeans	Irrigated Fertility	16	\$ 47.34	144-145
2	High Yield Irrigated Conventional Till Conceal Soybeans	Irrigated Fertility	10.5	\$ 36.96	144-145
3	Marco NutriStart BOOST 14-12-4-6s 10Gal. Soybeans	Fertility	2.2	\$ 28.95	177
4	The Andersons Soc. RGS Conceal + 10Gal 14-12-4-6s Soybean	Fertility	2.8	\$ 28.63	169-170
5	Marco NutriStart BOOST 14-12-4-6s 15Gal. Soybeans	Fertility	3.1	\$ 26.47	177
6	Marco NutriStart BOOST 14-12-4-6s 20Gal. Soybeans	Fertility	4.2	\$ 25.95	177
7	April 5th Plant Date w/Starter Fertilizer	Planting Date/Fertility	4.9	\$ 20.74	154
8	Soybean Mathurs K-Fuse 3 Gal	Potassium Fertility	2.1	\$ 20.48	178
9	April 11th Plant Date w/Starter Fertilizer	Planting Date/Fertility	4.5	\$ 17.65	154
10	Soybean Mathurs K-Fuse 5 Gal	Potassium Fertility	3.8	\$ 17.55	178
11	April 23rd Plant Date w/Starter Fertilizer	Planting Date/Fertility	4.5	\$ 16.75	154
12	Soybean DLF Boost	Carbon Based Sugar	2.7	\$ 14.89	182
13	Soybean Mathurs K-Fuse 1 Gal	Potassium Fertility	1.2	\$ 11.70	178
14	3Gal Triple Option FJ + 5Gal Kluse Conceal Soybean	Fertility	2.6	\$ 11.66	171
15	The Andersons 3 Way combo Soybean	Fertility	4.6	\$ 0.08	169-170
16	3Gal Triple Option FJ + 5Gal Kluse Conceal + 1qt. Finish Line Foliar + 1Gal Balance	Fertility	3.2	\$ (3.64)	171
17	3Gal Triple Option FJ + 5Gal Kluse Conceal + 1qt. Finish Line Foliar	Fertility	2.7	\$ (4.64)	171
18	May 14th Plant Date w/Starter Fertilizer	Planting Date/Fertility	2.1	\$ (6.39)	154
19	May 23rd SB Plant Date w/Starter Fertilizer	Planting Date/Fertility	0.8	\$ (18.55)	154
20	June 1st SB Plant Date w/Starter Fertilizer	Planting Date/Fertility	0.8	\$ (18.81)	154
Averages:			3.84	\$ 13.69	