



Precision
Planting®

PRECISION TECHNOLOGY INSTITUTE

2022 RESEARCH SUMMARY
PONTIAC, IL

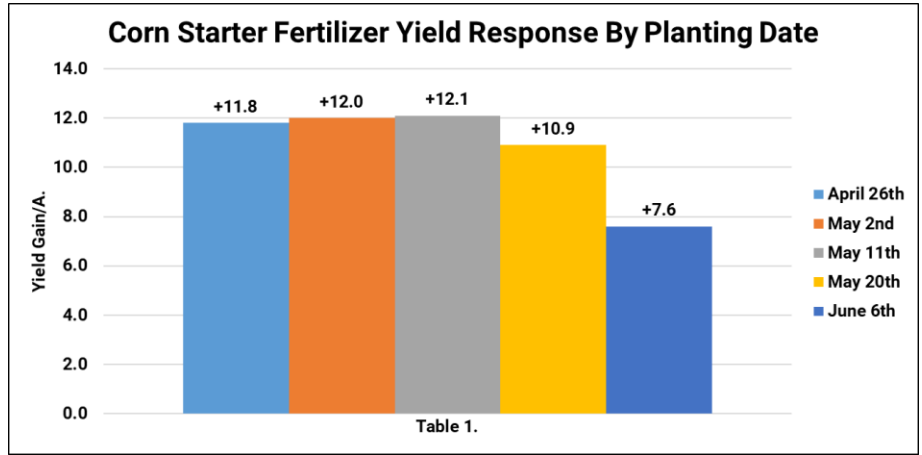
2022 Top and Bottom Return on Investment Performers

PTI Agronomic Study:	\$ ROI/A.	Page #
Top 10:		
1. High Management Soybeans	\$292.25	203-216
2. High Management Corn	\$252.74	54-82
3. NETAFIM® Drip Irrigation	\$168.80	54-56
4. Strip Cropping System	\$150.48	142-149
5. 15' & 30' Drainage Tile*	\$ 99.20	57-59
6. At-Plant Micronutrient: The Andersons® MicroMark® DG:10#	\$ 93.40	51-53
7. Multi-Genetic Corn Planting	\$ 85.80	37-38
8. SB FurrowForce® vs Dual Rubber Closing Wheels in No-Till	\$ 64.22	186-189
9. SB Marco NutriStart BOOST 14-12-4-6S: 15 Gal Conceal®	\$ 63.05	232
10. At-Plant Dual Band Conceal® vs Weed-n-Feed Nitrogen Prog.	\$ 61.20	114
Bottom 10:		
1. Optimum Corn Planting Date – May 20th	\$-170.07	7
2. Optimum Soybean Planting Date – April 26 th	\$-123.90	164
3. Planter All Wrong – Row Cleaners, DownForce, Singulation	\$-118.80	36
4. 20" Solar Corridor over 20" Corn: Population Average	\$ -92.70	141
5. 20" Corn Seeding Rate: Low Pop 32K vs EOSR* 40K	\$ -70.20	134-135
6. Corn High Speed Planting without High Speed Technology	\$ -66.60	27
7. Incorrect Corn Planting Depth	\$ -64.54	11-14
8. Growth Stage VT -20% Inclusion: Nitrogen Fixing/NUE* Study	\$ -63.62	90-91
9. 15" Corn Seeding Rate: Low Pop 32K vs EOSR* 40K	\$ -63.45	132-133
10. Overseeding Soybean Seeding Rate Study	\$ -61.68	253-255

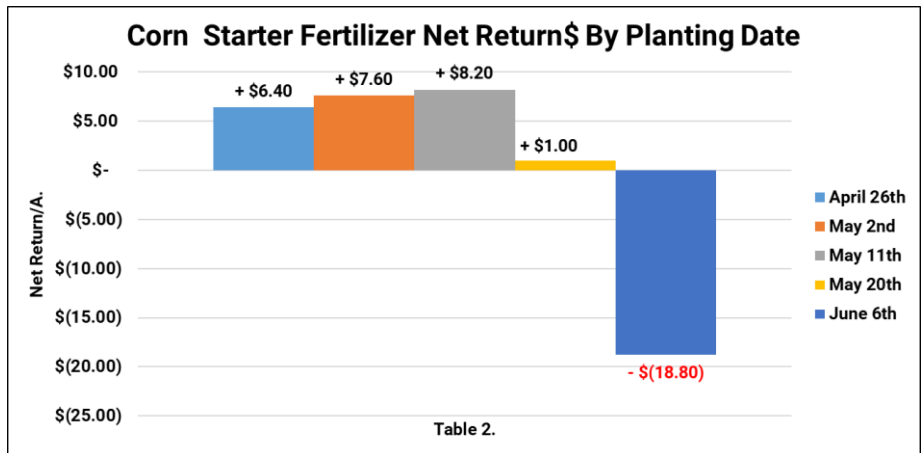
*Gross return/Economic Optimum Seeding Rate/Nitrogen Use Efficiency

Corn Starter Fertilizer Response by Planting Date Study Continued

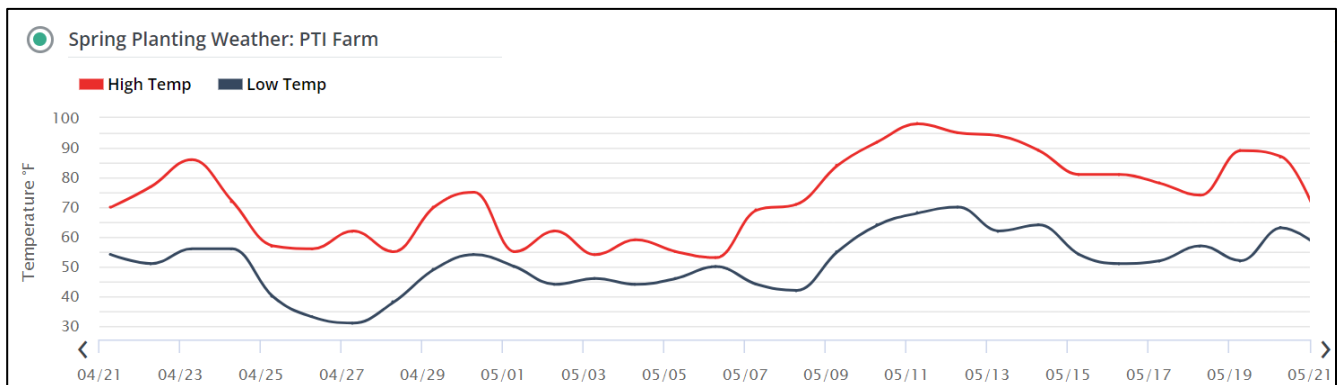
Results: Table 1. illustrates that every planting date achieved yield gains from starter fertilizer. All April and May planting dates resulted in yield gains of +10.9 to +12.1 Bu/A., while the last planting date of June 6th trended lower at +7.6 Bu/A. gains.



Economics indicate positive return on investment for all April and May plantings, however only ranged from +\$1 to +\$8.20/A. These disappointing revenue gains are the result of fertilizer costs increasing nearly 40% over 2021 prices.



June 6th planting dates (the last planting date) resulted in a negative return on investment of **-\$18.80/A.**



Planting Date: Varied Hybrid: GH11V78 Population: 36K Row Width: 30" Rotation: CAB Corn Price: \$6.00 Triple Option®: \$7.80/Gal
 Nacqurs Throwback: \$7.56/Gal K-Fuse®: \$6.60/Gal \$40 Fertilizer Reallocation

Marco Fertilizer High Management Corn Nutritional Study

Objective: To evaluate the yield and economic impact of a corn liquid starter fertilizer and foliar nutritional program from Marco Fertilizer in a high management irrigated environment. This trial consisted of the following:

Treatments and Placement:


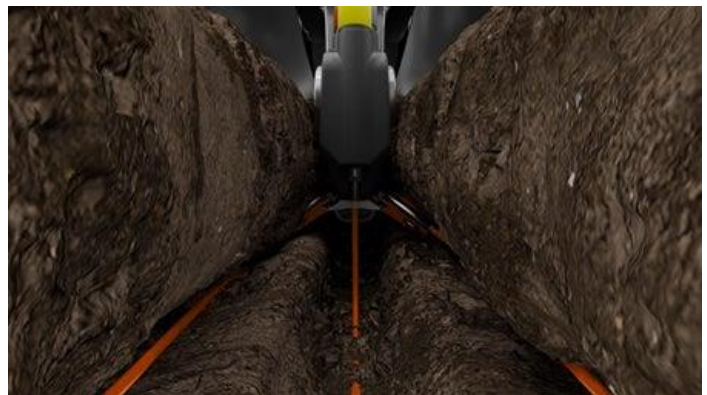
#1. Control:	No Irrigation, Only Foliar VT + R3 Foliar Fungicide
#2 At-Plant Fertility:	
Conceal® Dual Band (Figure 1.)	27 Gal/A. NitroK Complete
FurrowJet® Center: (Figure 2.)	12.8oz TerraMax MicroAZ-IF Liquid Inoculant
FurrowJet® Wings: (Figure 2.)	3 Gal/A. QuickGrow Complete
	3 Gal/A. Water
#3 Foliar Applications:	
	V4: SideDress 20 Gal NitroK Complete
	V5: 1# NutriComplete 8-12-40
	V10: 1# NutriComplete 8-12-40
	VT: 1# NutriComplete + 13.7oz/A. Miravis®Neo
	R3: 1# NutriComplete + 13.7oz TrivaPro®

Figure 1. Conceal Placement



Figure 2. FurrowJet® Placement

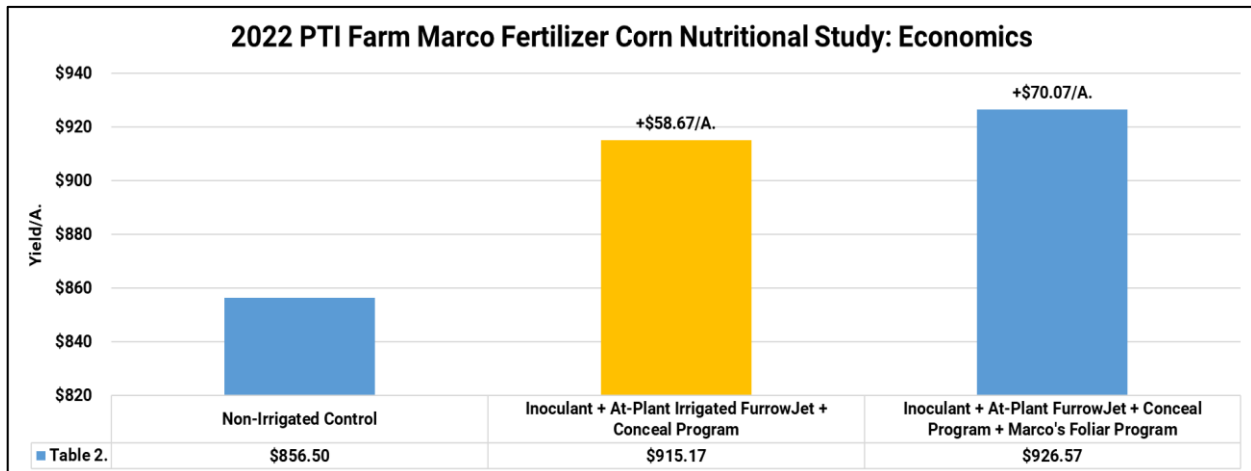
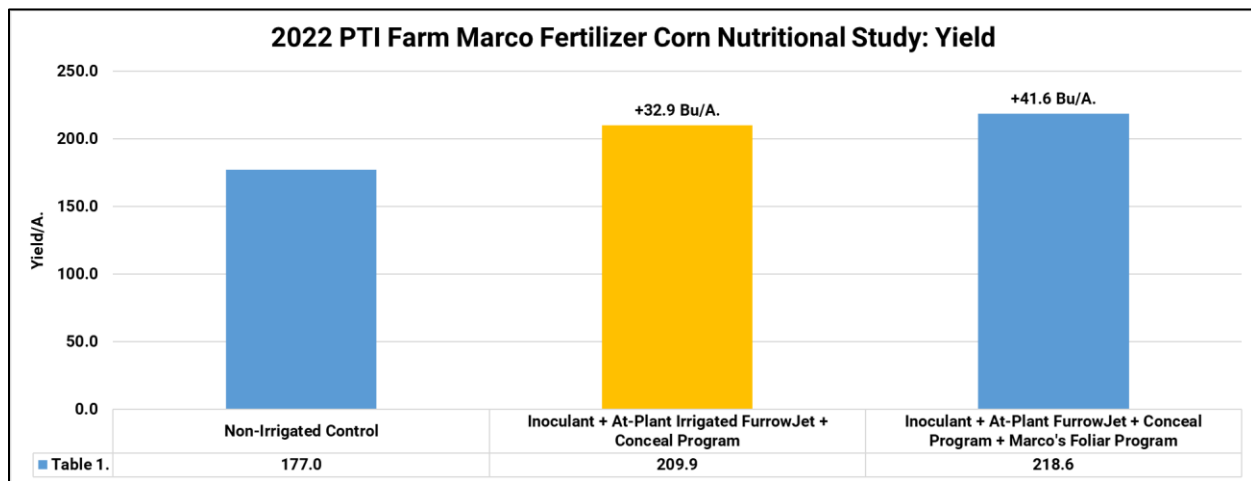


Marco Fertilizer Corn Nutritional Study Continued

Irrigation on all treatments (excluding control) received 6.25" of rain throughout the growing season, as well as 5 Gal/A. Ammonium thiosulfate 12-0-0-26S + 2 Gal/A. 10% Boron as fertigation thru the V10-VT growth stages. All treatments were initially planted on April 28th, but replanted on June 15th. No at-plant fertility was additionally applied at replant. All treatments received 13.7oz/A. of Miravis® Neo at VT and 13.7oz/A. of TrivaPro® at R3 growth stages.

Results: Irrigated treatments contributed +37.25 Bu/A. average yield gains. Foliar treatments offered 8.7 Bu/A. gains over stand-alone at-plant FurrowJet®/Conceal® applications (Table 1).

Table 2. illustrates economic returns of both treatments in a high management environment versus a status quo low management program. After all costs, the high management program increased net returns by +\$58.67 to +\$70.07/A.



Planting Date: June 15th DKC 56-65, Golden Harvest® 03R40, 02K73, AgriGold® 639-70 Population: 36K Row Width: 30" Rotation: CAB Corn Price: \$6.00
 Conceal® I Program: \$19.98/A. FurrowJet® + Inoculant Program: \$24/A Foliar Program: \$40.80/A. Fert Reallocation: \$30/A. Irrigation: \$40/A. Fertigation + N: \$84.75/A

Marco Fertilizer/QLF™ At-Plant High Management Corn Study

Objective: To evaluate the yield and economic impact of a corn liquid starter fertilizer and foliar nutritional program from Marco Fertilizer and QLF™ Agronomy in a high management irrigated environment.

All treatments were initially planted on April 28th but replanted on June 15th. No at-plant fertility was additionally applied at replant. 5.0" of rainfall was applied via NETAFIM® drip irrigation.

This trial focuses on evaluating the following individual planter treatments:

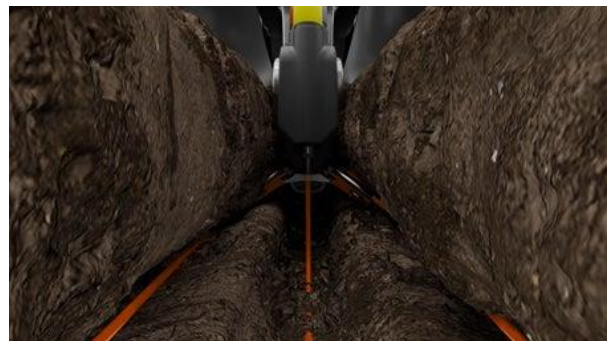
Treatments and Placement:

#1. Control:	Irrigation + Full Foliar Program
#2 At-Plant Conceal® Dual Band: (Figure 1.)	20 Gal/A. UAN, 1 Gal/A. 10% Boron 4 Gal/A. QLF™ BOOST™ 10 Gal/A. Marco NutriStart BOOST 14-12-4-6S
#3 At-Plant FurrowJet® Center: (Figure 2.)	1 Gal/A. Purple Cow Organics CX-1 1 Gal/A. QLF™ 5-5-5-1S 1Pt QLF™ Kelpak® Double Strength
#3 At-Plant FurrowJet® Wings: (Figure 2.)	5 Gal/A. Marco QuickGrow LTE 6-20-4-2.7S-.25Zn 1 Gal/A. QLF BOOST™



Figure 1. Conceal Placement



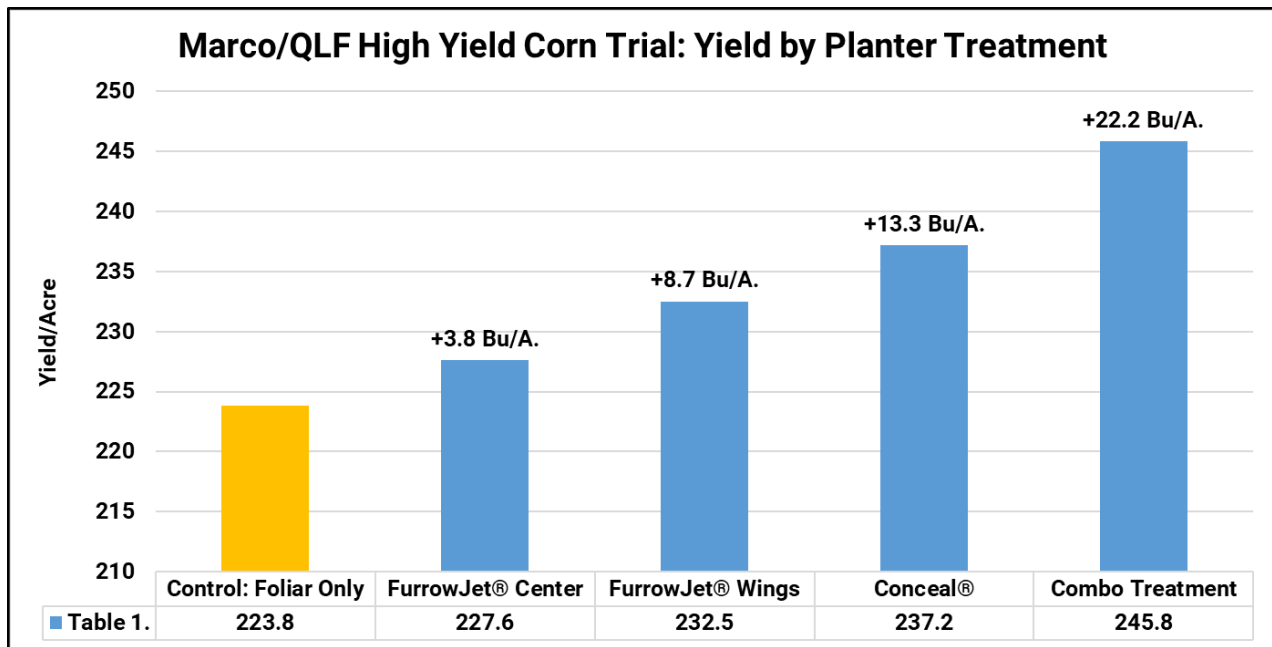
Figure 2. FurrowJet® Placement



Marco Fertilizer/QLF™ At-Plant High Management Corn Study

Foliar Applications:	V4:	1 Gal QLF Amino-15™ 15-0-1-0.5S, 1Pt QLF Kelpack®PRO
All Treatments	V3:	3 Gal QLF Amino-15™, 1 Qt QLF PowerAid micros
	V10:	3 Gal QLF Amino-15™, 1# Marco NutriComplete
	V10:	Fertigation: 1 Gal 10% Boron, 1 Gal QLF BOOST™
	VT:	13.7oz/A. Miravis®Neo
	VT:	1# Marco NutriComplete, 3 Gal QLF Amino-15™
	R3:	13.7oz TrivaPro®
	R3:	1 Gal QLF BOOST™, 1Pt Live Earth Fulvic Acid

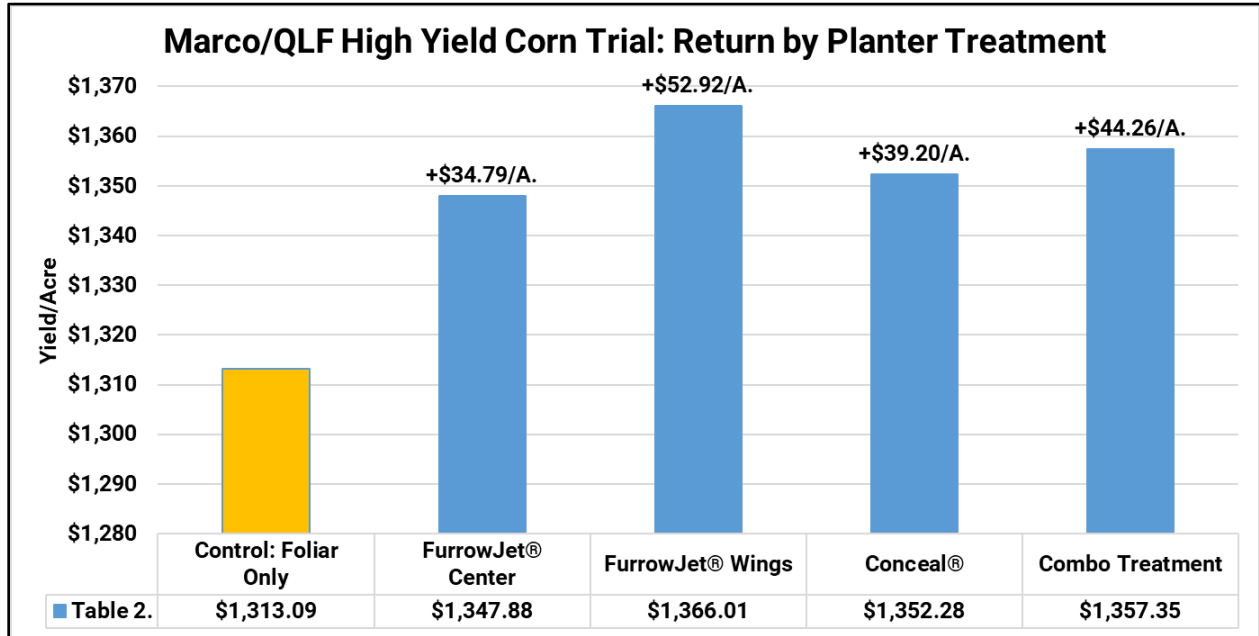
Results: Table 1. Illustrates individual yield response by treatment. All treatments achieved positive yield gain, however full combination treatments offered highest yield response of +22.2 Bu/A. at 245.8 Bu/A. Conceal® treatments offered the highest individual contribution with gains of +13.3 Bu/A., while FurrowJet® treatments resulted in yield gains ranging gains of +3.8 to +8.7 Bu/A. respectively.



Marco Fertilizer/QLF™ At-Plant High Management Corn Study

Table 2. illustrates individual return on investment response by treatment. All treatments obtained positive return on investment ranging from +\$34.79 to +\$52.92/A.

However, FurrowJet® wing treatments of Marco QuickGrow LTE + 1 Gal QLF BOOST™ proved highest returns of +\$52.92/A.



Planting Date: June 15th Hybrid: Pioneer® 0306Q Population: 36K Row Width: 30" Rotation: CAB Corn Price: \$6.00

Conceal® Program: \$70.84/A. FurrowJet® Center Program: \$17.80/A FurrowJet® Wing Program: \$29/A. Fert Reallocation: \$30/A.

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 rates of 4, 6 and 8 Gal/A. applied in an at-plant 3-way FurrowJet® system. QuickGrow LTE is a 70% polyphosphate and 30% orthophosphate formulation of nitrogen, phosphorus, potassium, sulfur, and 9% Zn.

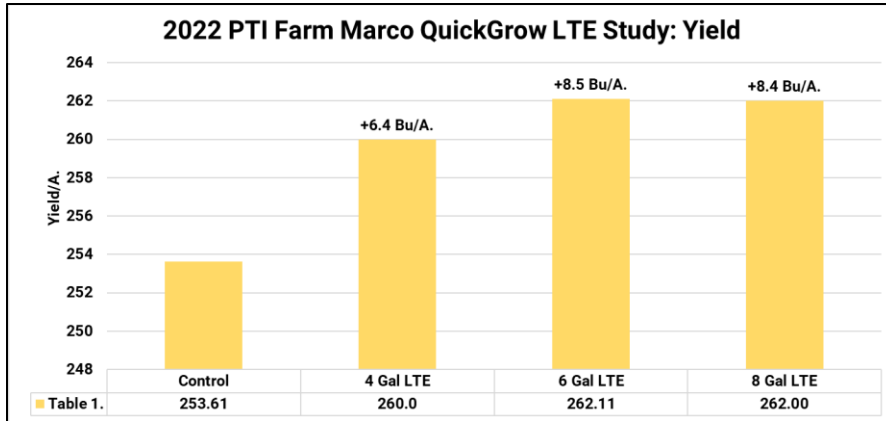
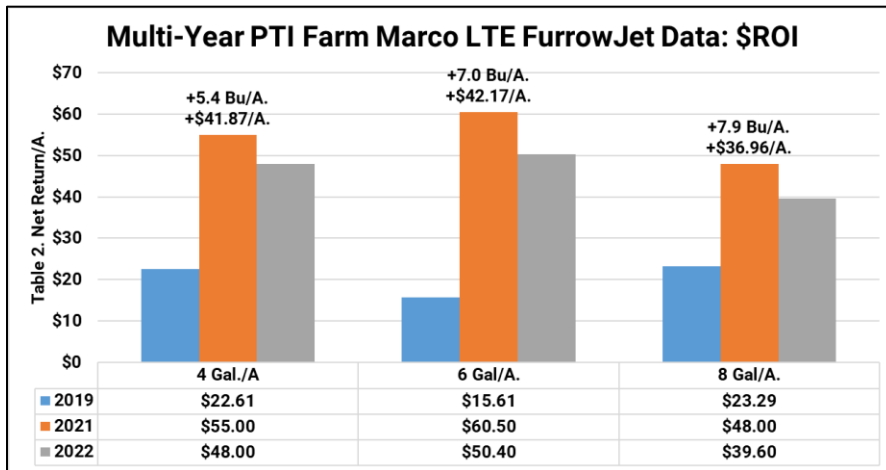


Figure 1. FurrowJet® Placement



Results: Table 1. illustrates all rates of Marco QuickGrow LTE resulted in positive yield gains. However, 6 Gal/A. rates achieved both agronomic and economic optimum rate, with yield gains of +8.5 Bu/A. and net returns of +\$50.40/A.

Table 2. summarizes multi-year data, indicating 6 Gal/A. being economic optimum rate over the 2019, 2021, and 2022 time period. All applications are implemented with a \$30/A. reallocation.

Marco Fertilizer High Management Soybean Study

Objective: To evaluate the yield and economic impact of a soybean liquid starter fertilizer and foliar nutritional program from Marco Fertilizer in a high management irrigated environment. This trial consisted of the following:

Treatments and Placement:


#1. Control:	Irrigation + R1 and R3 Foliar Fungicide
#2 At-Plant Fertility:	
Conceal® Dual Band (Figure 1.)	15 Gal/A. BOOST 14-12-14-6S
FurrowJet® Center: (Figure 2.)	12.8oz TerraMax MicroAZ-IF Liquid™ Inoculant
FurrowJet® Wings: (Figure 2.)	3 Gal/A. NutriStart Complete
	3 Gal/A. Water
#3 Foliar Applications:	
	V4: 1# NutriComplete 8-12-40
	R1: 1# NutriComplete 8-12-40
	R3: 1# NutriComplete 8-12-40

Figure 1. Conceal Placement



Figure 2. FurrowJet® Placement



Marco QuickGrow LTE FurrowJet® Study

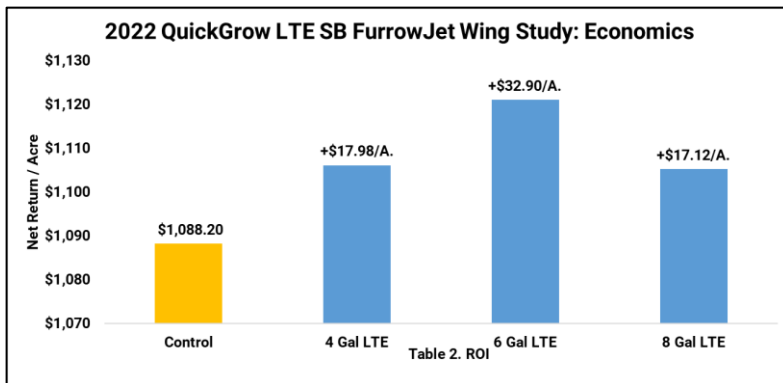
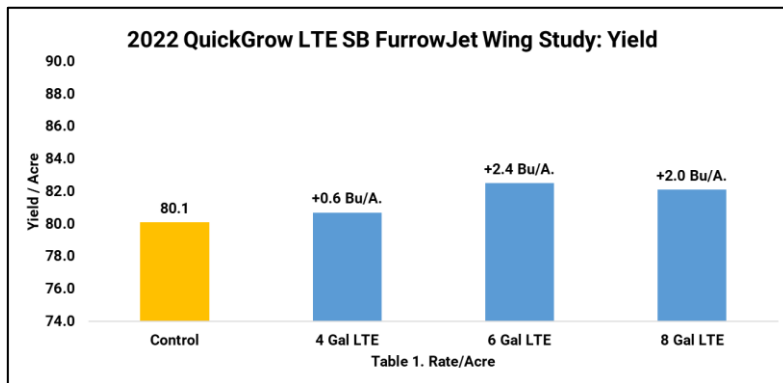
Objective: To evaluate the yield and net return of Marco Fertilizer’s QuickGrow LTE 6-20-4-.25Zn-2.7S liquid starter fertilizer. QuickGrow LTE is a 70% polyphosphate and 30% orthophosphate formulation of nitrogen, phosphorus, potassium, sulfur, and EDTA Zn. Marco LTE starter treatments are applied at 4, 6 and 8Gal/A. as a FurrowJet® *wing* treatment only (Figure 1 & 2).

Results: 6 Gal/A. rates showed both agronomic and economic optimum rate with yield gains of +2.4 Bu/A. and a return on investment of +\$32.90/A. (Tables 1-2).

Figure 1. FurrowJet®



Figure 2. FurrowJet® Wing Placement



Planting Date: May 16th

Variety: Asgrow® 35XF1

Population: 130K

Row Width: 30"

Rotation: BAC

SB Price: \$13.96

Marco LTE: \$5.10/Gal

Fertilizer Reallocation: \$30/Acre

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

Objective: This 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 Thiosulfate and Zinc - 9% EDTA.



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 +1.3 to +5.0 Bu/A., however 15 Gal/A. provided the economic optimum rate resulting in a positive return on investment of +\$63.05/A.

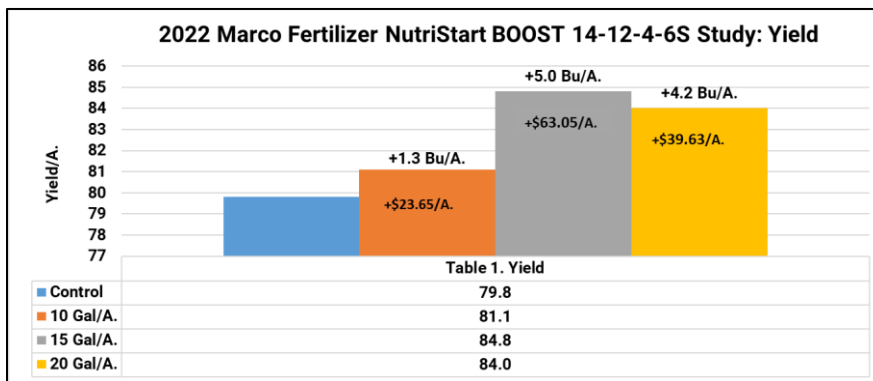


Table 2. reveals long-term multi-year economics during 2018-2022. Over this 4-year period, economic optimum has occurred at the 15 Gal/A. rate of NutriStart BOOST with an average return on investment of +\$47.21/A. NutriStart BOOST has been a solid performer at the PTI farm achieving some of the highest yield and economic gains in soybeans.

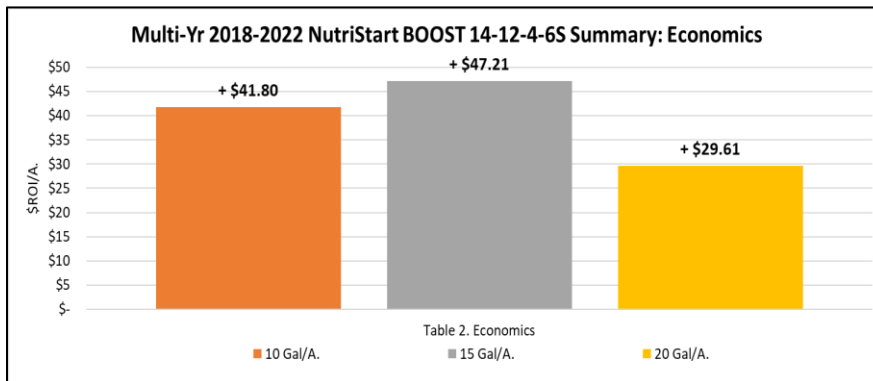


Figure 1. Conceal Dual Placement



Soybean Summary of 2022 FurrowJet® Applications

Study	Classification	Yield (Bu/A.)	\$ROI	Page #
AgroLiquid SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	3.9	\$ 65.03	207-208
Stoller SB High Management Nutritional Study FJ	PGR, Starter Fertilizer	3.7	\$ 62.11	213-214
Nachurs SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	9.5	\$ 47.64	205-206
AgroLiquid SB At Plant Nutritional Program: FJ 3-Way	Starter Fertilizer	1.9	\$ 37.11	230-231
Stoller USA SB FJ: Combo	PGR, Starter Fertilizer	4.1	\$ 34.44	220-221
Anderson's SB At Plant Nutritional Program: FJ Wings	Starter Fertilizer	1.1	\$ 33.43	228-229
Marco QuickGrow LTE: 6Gal	Starter Fertilizer	2.4	\$ 32.90	222
Nachurs SB At Plant Nutritional Program: FJ Wings	Starter Fertilizer	1.2	\$ 26.11	226-227
Anderson's SB At Plant Nutritional Program: FJ Center	Starter Fertilizer	1.3	\$ 25.93	228-229
AgroLiquid SB At Plant Nutritional Program: FJ Center	Starter Fertilizer	0.8	\$ 21.76	230-231
QLF 7-21-3: 3 Gal	Starter Fertilizer	0.6	\$ 20.98	223
Anderson's SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	8.9	\$ 20.69	209-210
Marco QuickGrow LTE: 4Gal	Starter Fertilizer	0.6	\$ 17.98	222
Marco QuickGrow LTE: 8Gal	Starter Fertilizer	2	\$ 17.12	222
Stoller USA SB FJ: Center	PGR, Starter Fertilizer	1.3	\$ 13.90	220-221
QLF 5-5-5-1S FJ	Starter Fertilizer	1.6	\$ 12.74	225
FurrowJet Side Wall Cut	Mechanical	0.9	\$ 12.56	224
QLF 7-21-3: 5 Gal	Starter Fertilizer	0.8	\$ 12.17	223
TerraMax Liquid IF	Innoculant	1.1	\$ 11.58	191
Nachurs SB At Plant Nutritional Program: FJ Center	Starter Fertilizer	0.6	\$ 11.39	226-227
Marco SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	5.4	\$ 7.58	211-212
Stoller USA SB FJ: Wings	PGR, Starter Fertilizer	0.8	\$ (7.38)	220-221
QLF 7-21-3: 10 Gal	Starter Fertilizer	0.9	\$ (15.44)	223
April 26th Soybean Planting Date with Starter	Starter Fertilizer	2.2	\$ (20.29)	167-168
March 17th Soybean Planting Date with Starter	Starter Fertilizer	1.3	\$ (32.85)	167-168
May 18th Soybean Planting Date with Starter	Starter Fertilizer	0.7	\$ (41.23)	167-168
Average		2.29	\$ 16.46	



Soybean Summary of 2022 Conceal® Applications

Study	Classification	Yield (Bu/A.)	\$ROI	Page #
Marco 14-12-4-6S: 15Gal	Starter Fertilizer	5	\$ 63.05	232
Nachurs SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	9.5	\$ 47.64	205-206
Brandt High Management SB Conceal	Starter Fertilizer	5.4	\$ 40.73	215-216
Marco 14-12-4-6S: 20Gal	Starter Fertilizer	4.2	\$ 39.63	232
Nachurs SB At Plant Nutritional Program: Conceal	Starter Fertilizer	5.4	\$ 28.58	226-227
Marco 14-12-4-6S: 10Gal	Starter Fertilizer	1.3	\$ 23.65	232
Anderson's SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	8.9	\$ 20.69	209-210
Nachurs K-Fuse SB: 3 Gal	Starter Fertilizer	2.9	\$ 20.68	233
Nachurs K-Fuse SB: 1 Gal	Starter Fertilizer	1.7	\$ 17.13	233
Marco SB High Management Nutritional Study Conceal & FJ	Starter Fertilizer	5.4	\$ 7.58	211-212
Nachurs K-Fuse SB: 5 Gal	Starter Fertilizer	2.9	\$ 7.48	233
April 26th Soybean Planting Date with Starter	Starter Fertilizer	2.2	\$ (20.29)	167-168
Anderson's At Plant Nutritional Program: Conceal	Starter Fertilizer	3.3	\$ (23.33)	228-229
March 17th Soybean Planting Date with Starter	Starter Fertilizer	1.3	\$ (32.85)	167-168
May 18th Soybean Planting Date with Starter	Starter Fertilizer	0.7	\$ (41.23)	167-168
Average		4.01	\$ 13.28	