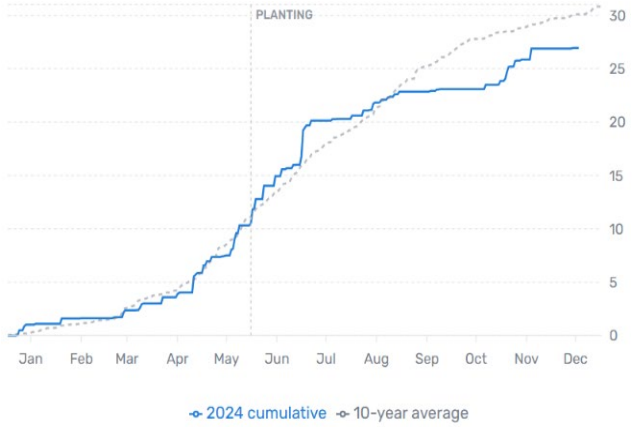
Biological Treatment Study - Year 3

Study ID: 1395159202401
County: Seward
Soil Type: Muir silt loam; 1-3% slopes
Planting Date: 5/30/24
Harvest Date: 9/30/24
Population: 140,000
Row Spacing (in): 30”
Hybrid: Connect™ CT2323E
Reps: 4
Previous Crop: Corn
Tillage: No-till
Herbicides: ***Pre:*** 5 oz/ac Verdict® + 12 oz/ac Outlook® ***Post:*** 32 oz/ac Liberty® + 32 oz/ac Enlist One® + 1.3 pt/ac Dual II® on 6/28/24. 32 oz/ac Enlist One® + 32 oz/ac glyphosate on 7/13/24
Seed Treatment: Variable
Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: None**Irrigation:** Pivot 6-8"
Rainfall (in):



Introduction: With increasing nitrogen costs, there is the thought that increasing microbes in the soil from biological products may help with releasing nutrients, thus allowing for less synthetic nitrogen applied. This long-term study evaluated several biological products at different nitrogen rates to determine any impacts on yield and economics. Years 1 and 2 compared a check treatment of nitrogen to reduced rates of nitrogen with the addition of biologicals such as Johnson Su compost extract or Pivot Bio® in corn. All treatments have remained on the same strips over time.

This is the third year of this study. The grower chose to grow soybeans and see if any differences could be observed in the treatment strips. Only the check treatment and Johnson Su compost extract were used on the same treatment strips as before. Johnson-Su compost was produced as an aerobic static compost made from straw and cow manure. It was extracted into water at a rate of 3lbs compost/8 gal of water and applied at 8 gal extract/ac in furrow at planting. Biology from compost is believed to improve fertility and help release soil nutrients. The treatments included applying the Johnson-Su compost extract in furrow at planting against an untreated check. Only 1 rep of stand counts were taken on 9/30/24, the day of harvest due to lodged soybeans. Follow-up Haney and PLFA tests will be taken in September 2025 to determine any changes in soil microbial content over time.

Results:

	Stand Count (plants/ac)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Untreated Check	105,000	9.2 A*	70 A	770 A
Johnson-Su Compost Extract	104,000	9.6 A	69 A	751 A
P-Value:	-	0.42	0.48	0.35

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, and $5/ac for Johnson-Su compost extract.

Summary:

- There was no significant difference found in yield between the addition of compost extract (69 bu/ac) and the untreated check (70 bu/ac).

- Furthermore, no significant difference was found in moisture or marginal net return between the two treatments.

Summary of Previous Years

Year 1 (2022)

Phospholipid fatty acid (PLFA) and Haney tests for the check and biological treatments at 0-8" depth taken on September 7, 2022, for one replication. No stats due to one rep.

	Total Biomass (ng/g)	Diversity Index	Total Bacteria Biomass (ng/g)	Total Fungi Biomass (ng/g)	Solvita® (ppm C)	Haney Soil Health Score
	---------- 2022 ----------					
Check	4040	1.02	1376	60	102.3	12.9
Johnson-Su High	3230	0.95	1108	24	125.8	16.4
Turned Compost High	2728	0.80	841	17	111.8	15.7
Pivot Bio	4381	1.11	1559	97	141.7	19.6

Treatments:

1. Check (total 142 lb N/ac): 48 lb N/ac with 2.75 gal/ac AgroLiquid® Pro-Germinator® 9-24-3-0.1% Iron and 0.25 gal zinc sulfate (4%) applied at planting and 94 lb N/ac applied as 32% UAN and thiosulfate on June 23.

2. Johnson-Su Compost High (total 106 lb N/ac): 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow and 58 lb N/ac applied as 32% UAN and thiosulfate on June 23.

3. Johnson-Su Compost Low (total 48 lb N/ac): 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow.

4. Turned Compost High (total 106 lb N/ac): 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow and 58 lb N/ac applied as 32% UAN and thiosulfate on June 23.

5. Turned Compost Low (total 48 lb N/ac): 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow.

6. Pivot Bio PROVEN® 40 (total 106 lb N/ac): 48 lb N/ac with 2.75 gal/ac AgroLiquid® Pro-Germinator® 9-24-3-0.1% Iron and 0.25 gal zinc sulfate (4%) applied at planting and 58 lb N/ac applied as 32% UAN and thiosulfate on June 23. Pivot Bio PROVEN® 40 was applied with starter at planting.

	Stand Count (plants/ac)	Stalk Rot (%)	Test Weight (lb/bu)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	31,500 A*	31.88 C	58 A	16.0 A	235 A	1,399 A
Johnson-Su High	31,500 A	46.88 BC	58 A	15.4 A	220 AB	1,365 A
Johnson-Su Low	31,000 A	75.63 A	58 A	14.9 A	167 C	1,095 C
Turned Compost High	30,500 A	58.25 AB	58 A	15.5 A	212 AB	1,315 AB
Turned Compost Low	29,625 A	59.38 AB	58 A	15.6 A	164 C	1,068 C
Pivot Bio Proven® 40	31,625 A	61.88 AB	58 A	15.6 A	195 B	1,155 BC
P-Value	0.276	0.004	0.659	0.697	<0.0001	0.0001

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on $6.57/bu corn, $6/ac for Turned compost, $4/ac for Johnson-Su, $21/ac for Pivot Bio PROVEN® 40, $1.27/lb of sidedress N, and $28/ac for starter.

Summary (Year 1, 2022): There were no differences in stand counts, grain moisture, or test weight among the treatments evaluated. Stalk rot varied greatly among the treatments and was lowest for the check treatment. The check treatment had the highest yield. Yields for Johnson-Su and turned compost were significantly higher when the treatment had an additional 58 lb N/ac compared to the same treatments with no sidedress N.

Summary of Previous Years (Continued)

Year 2 (2023)

Treatments:

Check High (nothing applied in-furrow; total of 188 lb N/ac)
Check Low (nothing applied in-furrow; total of 144 lb N/ac)
Johnson-Su High (Johnson-Su applied at 8 gal/ac in-furrow; total of 188 lb N/ac)
Johnson-Su Low (Johnson-Su applied at 8 gal/ac in-furrow; total of 144 lb N/ac)
Liquid Pro + Zn High (Liquid Pro + Zn in-furrow; total of 188 lb N/ac)
Liquid Pro + Zn Low (Liquid Pro + Zn in-furrow; total of 144 lb N/ac)
Pivot Bio PROVEN® 40 High (Pivot Bio PROVEN® 40 applied in-furrow; total of 188 lb N/ac)
Pivot Bio PROVEN® 40 Low (Pivot Bio PROVEN® 40 applied in-furrow; total of 144 lb N/ac)

	Harvest Stand Count (plants/ac)	Stalk Rot (%)	Test Weight (lb/bu)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	32,000 A*	39.17 AB	59 A	16.3 A	245 A	1,419 A
Reduced Check	31,500 A	29.17 AB	59 A	16.0 A	233 A	1,379 A
Johnson-Su High	31,833 A	38.33 AB	59 A	16.7 A	242 A	1,392 A
Johnson-Su Low	30,167 A	58.33 A	59 A	15.5 A	227 A	1,334 A
Liquid pro + Zn High	31,500 A	30.00 AB	58 A	16.9 A	244 A	1,384 A
Liquid pro + Zn Low	30,833 A	37.50 AB	59 A	16.3 A	237 A	1,373 A
Pivot Bio PROVEN® 40 High	32,667 A	30.83 AB	58 A	15.9 A	244 A	1,391 A
Pivot Bio PROVEN® 40 Low	31,667 A	21.67 B	59 A	15.9 A	237 A	1,383 A
P-Value	0.669	0.072	0.409	0.314	0.886	0.990

alues with the same letter are not significantly different at a 90% confidence level.
ushels per acre corrected to 15.5% moisture.
Marginal net return based on $5.91/bu corn, $0.78/lb N, $20/ac for Pivot Bio PROVEN® 40, $5/ac for Johnson-Su, and $27.50/ac for Liquid Pro Zn.

ummary: There were no differences in stand counts, moisture, test weight, yield, or net return between ıe treatments. The Johnson-Su Low treatment had higher stalk rot than the Pivot Bio PROVEN® 40 Low eatment.