Research Study

BiOWiSH® Crop Liquid

Evaluation of BiOWiSH® Crop Liquid on Yield in Field Corn

Field Corn

Executive Summary

BiOWiSH Technologies, Inc. engaged Helena Agri-Enterprises, LLC as a third-party Contract Research Organization (CRO) to conduct a study to determine the effects of BiOWiSH® Crop Liquid coated UAN on corn production in Iowa.

The trial compared two treatments:

- A regional liquid fertilizer program (Control)
- The same fertilizer program with BiOWiSH® Crop Liquid added (Control + BiOWiSH® Crop Liquid)

In this study, the Control + BiOWiSH® Crop Liquid program indicated improved soil conditions for increased plant vigor.

Background

About BiOWiSH Technologies
Headquartered in Cincinnati, Ohio, BiOWiSH Technologies, Inc. is a global provider of biotechnology solutions. As a leader in the agricultural market, we help farmers increase crop production sustainably, safely, and cost effectively. Our revolutionary BiOWiSH® Crop Liquid is a blend of proprietary microbial cultures that can be coated onto dry fertilizer or mixed with liquid fertilizers to create an enhanced efficiency fertilizer. BiOWiSH® endophytic *Bacillus* deliver soil nutrients to crops through the rhizophagy cycle creating a symbiotic relationship between the plant and soil microbes. This helps farmers achieve consistent results across a broad range of operating conditions, climates, and environments. By unifying nature and science, BiOWiSH reinvents the way food is grown. For more information, visit biowishtech.com.

BiOWiSH® Crop Liquid

- Optimizes yield potential by improved nutrient uptake
- Increases nutrient use efficiency and supports nutrient uptake
- Optimizes soil conditions for greater root mass
- Improves soil conditions for increased plant vigor
- Enhances beneficial microbes in the rhizosphere

Available Size

- 264 gal/1000 L

About Helena Agri-Enterprises, LLC

Helena Agri-Enterprises, LLC is a leading provider of crop production and crop protection products in the United States and worldwide. Headquartered in the USA, the company has been in the agronomic products supply business for more than 50 years and has expanded their contract research services over the last decade. As an independent CRO, Helena R&D is a team of highly trained and experienced study directors, field researchers, and support staff. They are one of several independent CROs that BiOWiSH Technologies, Inc. works with to independently evaluate our agronomy products.

Objectives

The objective of this research study was to determine the effects of BiOWiSH® Crop Liquid technology on crop vigor, and yield in corn production.

Implementation Program

Applications were made using the grower's commercial fertilizer equipment. The grower's fertilizer program was 21 gallons per acre (169.4 L/ha) of UAN-32 (Control). The comparison treatment, (Control + BiOWiSH®), consisted of 21 gallons per acre (169.4 L/ha) of UAN and 1.33 gallons per acre (12.4 L/ha) of a humic acid product blended with BiOWiSH® Crop Liquid at the manufacturer's recommended rate. No blending issues were observed. The application was applied as a side dress at the V3 timing with 2-inch beside x 2 inch below (5 cm x 5 cm) placement.

Table 1. Fertilizer Treatments and Application Timings

Treatment	Fertilizer	Rate gal/ac [L/ha]	Timing
Control	UAN 32% N	21 [196.4]	V-3
Control + BiOWiSH® Crop Liquid	UAN 32% N	21 [196.4]	V-3
	Hydra-Hume®	1.33 [12.4]	

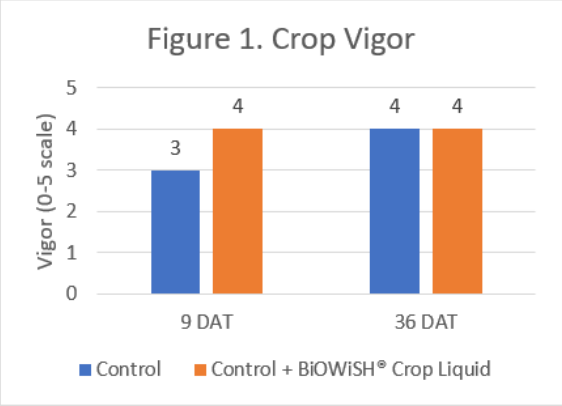
**BiOWiSH® Crop Liquid used at manufacturer's recommended rate.*
***Hydra-Hume® is a registered trademark of Helena Holding Company.*

The efficacy of the fertilizer treatments was assessed by taking measurements of crop vigor (0-5 with 0=low vigor and 5=high vigor), and yield. Yield data, along with local commodity pricing, were used to calculate net income and profit change.

Results

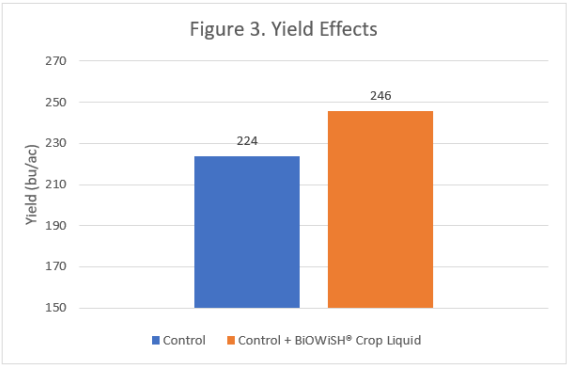
Crop Health:

No phytotoxicity was observed with either of the treatments. Initial evaluation of BiOWiSH® enhanced fertilizer indicated improved soil conditions for increased plant vigor as compared to the grower standard treatment.

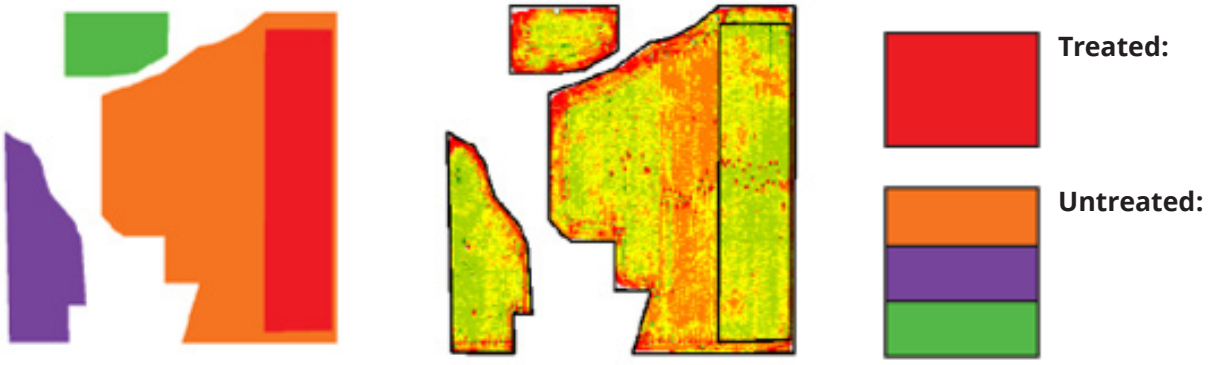


Yield Effects:

Yield results showed a 22 bu/ac (1.3 MT/ha) increase in the block treated with BiOWiSH® enhanced fertilizer versus the grower practice. This equates to a 9.8% yield increase (Figure 3). Note: 53 lbs/bu was used for the conversion from bu/ac to MT/ha.



Grain Yield by Management Zone:



Note: Darker colors indicate higher yield.

Economic Analysis

BiOWiSH® Crop Liquid enhanced fertilizer showed a 9.8% yield increase over the grower practice and this increase resulted in a $68 USD per acre ($168 per hectare) higher profit per acre.

Table 2. Economic Effects of BiOWiSH® Crop Liquid Enhanced Fertilizer in Field Corn

Treatment	**Grain Yield** bu/acre [MT/ha]	**Net Income Gain** USD/acre [USD/ha]	**Profit Change** USD/acre [USD/ha]
Control (most common practice)	224 [13.3]	752 [1858]	-
Control + BiOWiSH® Crop Liquid	246 [14.6]	820 [2026]	68 [168]

**Calculations for conversions between imperial and metric units are based on the original source data; slight rounding differences may occur within reported publication values.*

***Profit change is the difference between net income of the respective program and the Control.*

****53 lbs/bu was used for the conversion from bu/ac to MT/ha.*

Conclusion

BiOWiSH® enhanced fertilizer optimized yield potential by improved nutrient uptake on grain yield in corn in this large block trial. This increased profitability and demonstrated that the addition of BiOWiSH® Crop Liquid to a corn grain production fertilizer program offers a significant return on investment opportunity to the farmer.

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