Case Study

BiOWiSH® Crop Liquid

Brazil Soybean Demonstration Trial Summary


Soybean

Executive Summary

BiOWiSH Technologies facilitated a series of seven soybean demo trials across major soybean growing areas of Brazil. The goal of these studies was to evaluate the efficacy of BiOWiSH® Crop Liquid coated onto Monoammonium Phosphate (MAP) and NPK solid fertilizers to create an Enhanced Efficiency Fertilizer (EEF) for soybean production. These trials were conducted on-farm.

The trial compared two treatments:

- Control, Standard Regional Fertility Program
- Control + BiOWiSH® Crop Liquid

The study determined that the addition of BiOWiSH® Crop Liquid optimized yield potential by improved nutrient uptake for soybean production in Brazil. In this trial, an 8.7% average yield increase (296 kg/ha, 4 bu/acre) was observed for the Control + BiOWiSH® Crop Liquid treatment across all locations, which led to higher profit on average.

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

Objectives

This series of trials was conducted to evaluate the performance of BiOWiSH® Crop Liquid coated onto solid fertilizers to create an Enhanced Efficiency Fertilizer (EEF) for soybean production in Brazil, compared to the Control. The focus was on the BiOWiSH® EEF's on-farm impact to yield, physiology, and grower economics.

Implementation Program

Trial Design

In this trial, fertilizers commonly used in the location of each trial were used on the soybean crop at their recommended rates. Each field site in this series of trials was a working farm, with the Control areas receiving uncoated fertilizers. In the treated areas, the fertilizers were coated with BiOWiSH® Crop Liquid at the manufacturer's recommended rate. Each farm compared the standard areas with the BiOWiSH® areas by weighing the unloading vehicles in the farmer's harvesting process (truck, grain trailer, etc.). All harvests were monitored by BiOWiSH personnel, partner companies and the producer or manager responsible for the area. The table below details fertilizer treatment types, rates, and timings at each location.

Table 1. Treatments, Fertilizers, and Application Timings

Crop	Location	Treatment	Application Rate kg/ha [lbs/acre]
Soy	Rio Verde - Goiás	Control (MAP 11-52-0)	200 [178]
		Control + BiOWiSH® Crop Liquid	200 [178]
Soy	Jataí - Goiás	Control (MAP 11-52-0)	200 [178]
		Control + BiOWiSH® Crop Liquid	200 [178]
Soy	Goiatuba - Goiás	Control (MAP 11-52-0)	180 [161]
		Control + BiOWiSH® Crop Liquid	180 [161]
Soy	Itumbiara – Goiás	Control (NPK 7-24-0-24S)	310 [277]
		Control + BiOWiSH® Crop Liquid	310 [277]
Soy	Ponta Grossa – Paraná	Control (NPK 5-16-20)	200 [178]
		Control + BiOWiSH® Crop Liquid	200 [178]
Soy	Sengés – Paraná	Control (NPK 0-28-0)	200 [250]
		Control + BiOWiSH® Crop Liquid	200 [250]
Soy	Teixeira Soares – Paraná	Control (NPK 0-20-20)	300 [268]
		Control + BiOWiSH® Crop Liquid	300 [268]

**BiOWiSH® Crop Liquid used at manufacturer's recommended rate.*

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

Plant Measurements

At each location, the Normalized Difference Vegetation Index (NDVI) was measured via satellite images at canopy closure. The results of these measurements are presented below in Table 3.

Results

Yield and Economic Summary

Yield and economic parameters averaged across the seven on-farm demonstration trials are presented below. The Control + BiOWiSH® Crop Liquid treatment optimized yield potential by improved nutrient uptake by 8.7% on average in soybean. Net income and profit change were calculated based on crop and input cost values at each farm, and then averaged across locations.

Table 2. Average Yield and Net Income Table

Treatment	Yield kg/ha [bu/acre]	Yield Increase kg/ha [bu/acre]	Yield Increase (%)	Net Income USD/ha [USD/acre]	Profit Change USD/ha [USD/acre]
Control	3920 [58]	-	-	1809 [732]	-
Control + BiOWiSH® Crop Liquid	4216 [63]	296 [4]	8.7	1935 [783]	126 [51]

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

***Net income is the crop value minus the fertility program cost. It does not account for non-fertility expenses.*

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

Plant Measurements

Plant measurements for individual locations are presented in the table below. The increases in canopy coverage and NDVI measured for the BiOWiSH® treatments indicate improved soil conditions for increased plant vigor for the BiOWiSH® treatments across locations.

Table 3. Plant Measurement Results

Crop	Location	Treatment	Yield Uplift %	NDVI
Soy	Rio Verde - Goiás	Control (MAP 11-52-0)	-	0.78
		Control + BiOWiSH® Crop Liquid	24.2	0.80
Soy	Jataí - Goiás	Control (MAP 11-52-0)	-	0.95
		Control + BiOWiSH® Crop Liquid	4.7	0.96
Soy	Goiatuba - Goiás	Control (MAP 11-52-0)	-	0.95
		Control + BiOWiSH® Crop Liquid	4.2	0.95
Soy	Itumbiara – Goiás	Control (NPK 7-24-0-24S)	-	0.95
		Control + BiOWiSH® Crop Liquid	8.4	0.95
Soy	Ponta Grossa – Paraná	Control (NPK 5-16-20)	-	0.92
		Control + BiOWiSH® Crop Liquid	8.3	0.93
Soy	Sengés – Paraná	Control (NPK 0-28-0)	-	0.95
		Control + BiOWiSH® Crop Liquid	2.8	0.95
Soy	Teixeira Soares – Paraná	Control (NPK 0-20-20)	-	0.95
		Control + BiOWiSH® Crop Liquid	8.6	0.95

Conclusion

BiOWiSH®'s endophytic *Bacillus* deliver nutrients from the soil to plants through the rhizophagy cycle, creating a symbiotic relationship between the plant and soil microorganisms. BiOWiSH® Crop Liquid, when added to the standard soybean fertility programs of each region, optimized yield potential by 8.7% (296 kg/ha, 4 bu/acre) on average across the seven on-farm demonstration trials. Based on average crop and input cost values at each location, this resulted in an average profit increase of $126 USD/ha ($51 USD/acre) for the farmers taking part in this demonstration program.

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