Research Study

BiOWiSH® Crop Liquid

Evaluation of BiOWiSH® Crop Liquid on Sorghum Production in Australia

Sorghum

Executive Summary

BiOWiSH Technologies partnered with Pacific Seeds in Allora, Queensland to test the effects of BiOWiSH® Crop Liquid added to fertilizer to create an Enhanced Efficiency Fertilizer (EEF) for sorghum production in Australia. The study used a standard liquid starter fertility program as a Control and compared it to the same program with BiOWiSH® Crop Liquid mixed with either the Phosphorous (P) or Nitrogen (N) fertilizer.

The trial compared three treatments:

• Control, Standard Regional N and P Starter Fertility Program
• Control + BiOWiSH® added to P Fertilizer
• Control + BiOWiSH® added to N Fertilizer

The results indicate that the addition of BiOWiSH® Crop Liquid optimized yield potential by improved nutrient uptake for sorghum in this study. A 3.5% yield increase was observed for the Control + BiOWiSH® added to the Phosphorus treatment. Similarly, a 3.8% yield increase was observed for the Control + BiOWiSH® added to a Nitrogen treatment. As a result, both BiOWiSH® treatments led to higher profit in this study.

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

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.

About Pacific Seeds
Pacific Seeds has been at the forefront of the agricultural innovation and research since it was established in Queensland in 1962. Over the last sixty years, they have strived to develop new technology to improve management and operations in the crop production industry by partnering with local and international producers.

Objectives

The purpose of this study was evaluate the performance of BiOWiSH® Crop Liquid mixed with two common liquid starter fertilizer products to create an Enhanced Efficiency Fertilizer (EEF) compared to the Control. The study focused on the yield and economic benefits of using BiOWiSH® for sorghum production in the state of Queensland in northeastern Australia.

Implementation Program

The study was conducted in Allora, which is located in the Southern Downs Region of Queensland, Australia. The trial was set up using a randomized complete block design (RCBD), consisting of three treatments with three replicates. The field was conventional tillage production of sorghum (sorghum bicolor). There were four rows in each replicate, and each row had a length of 100 m (328 ft). The study included three fertilizer treatments: Control, Control + BiOWiSH® added to the Phosphorous (P) fertilizer and Control + BiOWiSH® added to the Nitrogen (N) fertilizer. BiOWiSH® Crop Liquid was added to the fertilizers at the manufacturer's recommended rate for both BiOWiSH® treatments. The Control is a standard starter fertilizer program used by growers in the region, according to Pacific Seeds.

Table 1. Treatments, Fertilizers, and Application Timing

Treatment	Fertilizer	Application Rate L/ha [gal/acre]	Application Timing
Control	P Fertilizer 9-11-0-0	70 [7]	In-furrow at planting
	N Fertilizer 43-0-0	200 [21]	Banded at planting
Control + BiOWiSH® added to P Fertilizer	P Fertilizer 9-11-0-0	70 [7]	In-furrow at planting
	N Fertilizer 43-0-0	200 [21]	Banded at planting
Control + BiOWiSH® added to N Fertilizer	P Fertilizer 9-11-0-0	70 [7]	In-furrow at planting
	N Fertilizer 43-0-0	200 [21]	Banded at planting

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

Results

Both starter fertilizer programs mixed with BiOWiSH® Crop Liquid optimized yield potential by improved nutrient uptake. When added to Phosphorous (P) fertilizer, BiOWiSH® resulted in a 3.5% yield increase. Likewise, a 3.8% yield increase was observed when BiOWiSH® was added to the Nitrogen (N) fertilizer.

Table 2. Yield and Net Income Table

Treatment	**Yield** MT/ha [tons/acre]	**Yield Increase** MT/ha [tons/acre]	**Yield Increase** (%)	**Net Income** USD/ha [USD/acre]	**Profit Change** USD/ha [USD/acre]
Control	6.25 [2.79]	-	-	1143 [463]	-
Control + BiOWiSH® added to P Fertilizer	6.47 [2.88]	0.22 [0.10]	3.5	1187 [480]	44 [17]
Control + BiOWiSH® added to N Fertilizer	6.49 [2.89]	0.24 [0.11]	3.8	1185 [479]	42 [16]

**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.*

Conclusion

BiOWiSH® endophytic *Bacillus* deliver soil nutrients to crops through the rhizophagy cycle creating a symbiotic relationship between the plant and soil microbes. This enabled optimized yield potential by improved nutrient uptake, which led to profit changes of $44 USD/ha ($17 USD/acre) and $42 USD/ha ($16 USD/acre) for the BiOWiSH® Crop Liquid additions to the P and N fertilizers, respectively.

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