

BiOWiSH® Crop Liquid

Evaluation of BiOWiSH® Crop Liquid on Yield in Corn Silage



Executive Summary

BiOWiSH Technologies 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 mixed with Urea Ammonium Nitrate -32% (UAN 32%) on corn silage production in California.

The trial compared two treatments:

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

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 Sizes

- 50 gal/190 L
- 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 the trial was to evaluate the performance of BiOWiSH® Crop Liquid when mixed with liquid fertilizers as a fertilizer enhancement for corn silage, compared to the Control.

Implementation Program

This trial was conducted in a commercial silage corn field near Los Banos, CA. The field was planted in late-June, and the Control program consisted of a sidedress fertilizer application in mid-July at the rate of 55 gallons of fertilizer blend per acre (UAN 32% + Hydra-Hume + Trafix Zn) or 514.5 L/ha. The trial was set up as a split block with the BiOWiSH® treatment in an 18.2 acre (7.37 ha) treated section on the field. BiOWiSH® Crop Liquid was mixed with the liquid fertilizer at the manufacturer's recommended rate. The balance of the field received the standard fertilizer treatment. Plant height was measured at 10 different points on the treated and untreated sides of the field. Primary ear length, diameter and number of kernel rows were measured at these sites. Additionally, crude protein, TDN (total digestible nutrients) and RVF (relative feed value) were calculated from harvest samples.

Commercial yield weights were collected by recording weights of the truck loads from the treated section of the field and the truck loads from the grower standard section. The area harvested from each section was measured to determine fresh weight yield/acre.

Treatment	Fertilizer	Application Rate gal/acre [L/ha]	Application Phase
Control	UAN 32% N	52.5 [491.1]	Sidedress
	Hydra-Hume	2.0 [18.7]	
	Trafix Zn	0.5 [4.7]	
Control + BiOWiSH®	UAN 32% N	52.5 [491.1]	Sidedress
	Hydra-Hume	2.0 [18.7]	
	Trafix Zn	0.5 [4.7]	

*Hydra-Hume® and Trafix Zn® are registered trademarks of Helena Holding Company.

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

Results

Due to improved soil conditions for increased plant vigor, higher ear development measurements were observed in the treated group over the Control. Plant samples were collected and measured across ten sites within the plot areas. Post-harvest silage samples showed higher values for crude protein, total digestible nutrients (TDN) and relative feed value (RFV) for the BiOWiSH® treatment relative to the Control.

Treatment	Ear Characteristics			Feed Quality Analysis		
	Ear Length in [cm]	Ear Diameter in [cm]	Kernel Row Count # kernels	Crude Protein (%)	TDN (%)	RFV
Control	9.8 [25]	20.1 [51]	14.9	8.07	67.5	141
Control + BiOWiSH®	10.2 [26]	20.8 [53]	15.7	8.31	69.3	174

Yields were measure with scales on the haul-out trucks. The overall weight of silage was corrected for acreage to a “ton/acre” standard. Through optimizing yield potential by improved nutrient uptake, BiOWiSH® Crop Liquid increased yield by 5.99 ton/acre (13.43 MT/ha) for a 32.9% increase over the Control. Overall, this yield increase led to a profit change of \$198 USD/acre (\$490 USD/ha) for the BiOWiSH® treatment using crop and input cost values at the time of this study.

Treatment	Yield tons/acres [MT/ha]	Yield Increase tons/acre [MT/ha]	Yield Increase (%)	Net Income USD/acre [USD/ha]	Profit Change USD/acre [USD/ha]
Control	18.18 [40.75]	-	-	525 [1297]	-
Control + BiOWiSH®	24.17 [54.18]	5.99 [13.43]	32.9	723 [1787]	198 [490]

*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 enables optimized yield potential by improved nutrient uptake, which led to a 32.9% higher yield and a profit change of \$198 USD/acre (\$490 USD/ha) in this study.

Furthermore, BiOWiSH® Crop Liquid, as part of a regional fertilizer program, improved soil conditions for increased plant vigor and optimized biomass yield potential by improved nutrient uptake. Ear length, ear diameter, and kernel rows increased in individual plant measurements. The post-harvest quality measurements of crude protein, TDN and RFV increased as well.



BiOWiSH® is a registered trademark of BiOWiSH Technologies International, Inc.

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