Research Study

BiOWiSH® Crop Liquid

BiOWiSH® Crop Liquid Increases Yield in Waxy Corn

Waxy Corn

Executive Summary

BiOWiSH Technologies, Inc. conducted a study in collaboration with Heilongjiang Bayi Agricultural University to determine the efficacy of using fertilizer coated with BiOWiSH® Crop Liquid in waxy corn cultivation at the second accumulated temperate zone of Heilongjiang Province. The experiment used a local standard fertilizer program as a Control and compared it to the same fertilizer program coated with BiOWiSH® Crop Liquid.

The results of this study illustrate that the addition of BiOWiSH® Crop Liquid to the Control fertilizer program increased waxy corn yield and the quality of waxy corn, resulting in higher profit.

Background

About Heilongjiang Bayi Agricultural University
The research team of Heilongjiang Bayi Agricultural University is an expert team composed of experienced scientific researchers and field personnel.

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 can be coated onto dry fertilizer or mixed with liquid fertilizer to create an enhanced efficiency fertilizer that optimizes yield potential, expresses plant vigor and improves soil productivity 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
- Increases nutrient availability
- Enhances root development
- Improves plant vigor
- Enhances native microbial activity in the soil
- Improves soil productivity

Available Sizes

- 50 gal/190 L
- 264 gal/1000 L

Objectives

The objective of this research study was to determine the efficacy of BiOWiSH® Crop Liquid technology, manufactured in the USA by BiOWiSH Technologies on waxy corn production when added to a fertilizer program common to the production area in the second accumulated temperate zone of Heilongjiang Province. The focus was on BiOWiSH® Crop Liquid's impact on yield, quality and grower economics.

Implementation Program

The study was conducted in Longjiang County, Qiqihar City, Heilongjiang Province on waxy corn (Zea mays L. sinensis Kulesh,) in loamy soil. A Randomized Complete Block Design (RCBD) was adopted. The experiment was set up with two treatments, and each treatment had three replicates. Each of the six plots were 30 m^2 (322.91 sq ft) in area and consisted of six rows of corn that were 0.65m (2.3 ft) wide by 7.7m (25.26 ft) long. The trial included two fertilizer treatments: Control and Control + BiOWiSH® Crop Liquid. The Control is a standard conventional grower fertilizer program as defined by the third-party research institution. The Control fertilizer was DAP 15-42-0, but the fertility program also included 375 kg/ha (334.57 lbs/acre) of urea at planting and topdress, and 120 kg/ha (107.06 lbs/acres) of KCl applied at planting. Pest and disease management techniques were implemented on site when required. The trial measured plant growth metrics such as plant height and ear location, root length, kernel rows, and kernels per row. In addition to the plant metrics, fresh yield was collected in order to determine the economic return from the individual treatments.

Table 1. Treatment Rates

Treatment	Fertilizer	Application Rate kg/ha [lbs/acre]	Application Phase
Control	Urea	375	Base fertilizer 30% + Topdress 70%
	KCl	120	Base Fertilizer
	DAP 15-42-0	300	Base Fertilizer
Control + BiOWiSH® Crop Liquid	Urea	375	Base fertilizer 30% + Topdress 70%
	KCl	120	Base Fertilizer
	DAP 15-42-0 + BiOWiSH® Crop Liquid	300	Base Fertilizer

**BiOWiSH® Crop Liquid was added at the manufacturer's recommended rate.*

Results

Table 2. Plant Height and Ear Location

Plant height is an important indicator of crop growth and biomass. It shows that plants are able to access soil moisture and soil nutrients for carbohydrate production and subsequent development at early growth stages, which has been correlated with better potential crop productivity.

Treatment	Plant Height cm [in]	Increase %	Ear Location cm [in]	Increase %
Control	236 [93.1]	-	96 [37.9]	-
Control + BiOWiSH® Crop Liquid	243 [95.6]	3.0	98 [38.4]	2.0

Table 3. Ear Traits

Various ear traits are an important indicator of crop's growth and viability.

Treatment	Rows	Kernels in Row	Total Kernels per Ear
Control	15.3	38.57	587.87
Control + BiOWiSH® Crop Liquid	15.5	39.03	602.60

**Rows, kernels in rows, and total kernels per ear were all collected and counted independently, not calculated. Kernel rows and total kernel numbers are major determinations of yield in corn. Increased numbers of both are the most direct way of achieving higher yields in corn production.*

Table 4. Root Length

Root length is an important indicator of a crop's ability to adsorb nutrients. When a root system is more developed, it has greater surface area contact with the soil and is more advantageous for nutrient absorption.

Treatment	Root Length cm [in]	Increase %
Control	33 [13.0]	-
Control +BiOWiSH® Crop Liquid	34 [13.3]	2

Table 5. Economic Analysis

BiOWiSH® Crop Liquid enhanced fertilizer showed a 5.2% yield increase over the grower practice. This increase resulted in a $235 USD/ha ($95 USD/acre) higher yield.

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	20.09 [8.96]	-		4,270 [1,728]	-
Control + BiOWiSH® Crop Liquid	21.14 [9.43]	1.05 [0.47]	5.2	4,505 [1,823]	235 [95]

**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

This study demonstrates that the addition of BiOWiSH® Crop Liquid to the local standard fertilizer program in Heilongjiang Province increased waxy corn yield by 5.2%, resulting in increased profit of $235 USD/ha ($95 USD/acre). When compared to the standard grower practice, the study also showed that the addition of BiOWiSH® Crop Liquid resulted in fuller, higher quality ears of corn with a marked increase in kernel rows per ear, kernels per row, total kernels, ear location, plant height and root length.

The use of BiOWiSH® Crop Liquid enhanced fertilizer resulted in improved waxy corn production, providing a significant return on investment opportunity for the grower.

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