

BiOWiSH® Crop Liquid

Evaluation of BiOWiSH® Crop Liquid on Sweet Corn Production in Australia



Executive Summary

BiOWiSH Technologies, Inc. partnered with a leading global fertilizer manufacturer and engaged Agreco Australia as a third-party Contract Research Organization (CRO) to conduct a study to determine the effects of BiOWiSH® Crop Liquid coated onto urea to create an Enhanced Efficiency Fertilizer (EEF) for sweet corn production in Queensland, Australia.

Sweet corn refers to the varieties of maize that are sweet tasting and grown for human consumption. It is grown in most of the states in Australia and the planted acreage exceeds 5,000 hectares. The ears of corn are used in fresh food markets and processing. The nitrogen (N) requirement of the crop is high with N removal exceeding 300 kg/ha.

The trial compared three treatments:

- Control, Standard Urea Fertility Program
- Control + BiOWiSH® Crop Liquid
- N Optimized Fertility Program + BiOWiSH® Crop Liquid

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 Agreco Australia

Agreco Australia is an independent agronomic research and consultancy firm located in Bundaberg, Queensland. They offer clients tailored agronomic research, technical advice and practical solutions to ensure the best possible outcomes through accurate and confidential agronomic research.

Objectives

The objective of this research study was to determine the effects of BiOWiSH® Crop Liquid coated onto urea (46-0-0) to create an Enhanced Efficiency Fertilizer (EEF) for sweet corn production when compared to a fertility program common to the production area at standard and N Optimized application rates. The urea was applied at planting as well as later in the season as a side dress application. The focus of this study was on BiOWiSH® Crop Liquid's impact on yield and grower economics.

Implementation Program

A replicated field trial with six replicates was conducted at a dedicated research facility in Bundaberg, Queensland. Applications of urea were applied twice during the growing season, including a banded application at planting followed by a sidedress fertilizer application four weeks later. The trial was planted using the "Overland R" variety at a seeding density of 133,333 plants per hectare (53,980 plants/acre). The plot size was 21m² (68.9 ft). Recommended disease and insect control practices were followed to minimize outside influences on yield.

In this trial, the Control is a standard regional fertility program at a rate of 235 kg/ha (210 lbs/acre) of urea split over two applications. This program was compared to the same program and rate of fertilizer with the addition of BiOWiSH® Crop Liquid, as well as a N Optimized program at a rate of 212 kg/ha (189 lbs/acre).

Table 1. Treatments, Fertilizers, and Application Timings

Treatment	Application Rate kg/ha [lbs/acre]	Application Timing
Control	175 [156]	Banded at planting
	60 [54]	Sidedress
Control + BiOWiSH® Crop Liquid	175 [156]	Banded at planting
	60 [54]	Sidedress
N Optimized Fertility Program + BiOWiSH® Crop Liquid	158 [141]	Banded at planting
	54 [48]	Sidedress

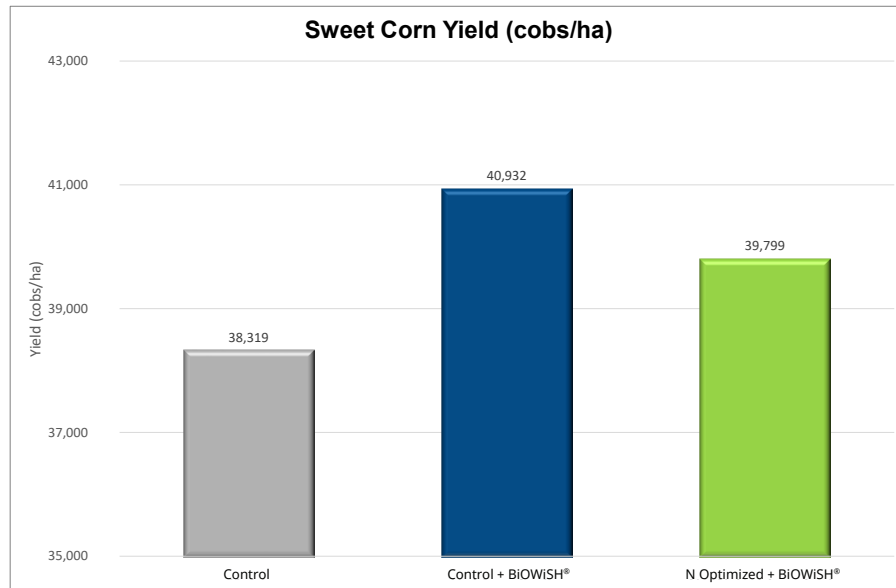
*BiOWiSH® Crop Liquid used at manufacturer's recommended rate.

Results

Yield Parameters

The Control + BiOWiSH® treatment showed an increased yield of 2,613 cobs/ha (1,057 cobs/acre) over the Control, and the N Optimized Fertility Program + BiOWiSH® showed an increased yield of 1,480 cobs/ha (599 cobs/acre) over the Control.

Figure 1. Yield Parameters



Economics

BiOWiSH® Crop Liquid, when coated onto urea as an EEF, optimized yield potential by improved nutrient uptake in sweet corn. When added to a standard fertility program, a yield increase of 6.8% was observed. This increase improved the net income and resulted in a \$278 USD/ha (\$112 USD/acre) profit increase for the farmer. In addition, when applied as part of an N Optimized Fertility Program, BiOWiSH® resulted in a yield increased of 3.9% despite a reduction in fertilizer, which led to a profit increase of \$167 USD/ha (\$68 USD/acre).

Table 2. Yield and Net Income Table

Treatment	Yield cobs/ha [cobs/acre]	Yield Increase cobs/ha [cobs/acre]	Yield Increase (%)	Net Income USD/ha [USD/acre]	Profit Change USD/ha [USD/acre]
Control	38,319 [15,507]	-	-	4,035 [1,476]	-
Control + BiOWiSH® Crop Liquid	40,932 [16,565]	2,613 [1,057]	6.8	4,313 [1,578]	278 [112]
N Optimized Fertility Program + BiOWiSH® Crop Liquid	39,799 [16,106]	1,480 [599]	3.9	4,202 [1,538]	167 [68]

*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. The study determined that the BiOWiSH® EEF optimized yield potential by improved nutrient uptake, which led to yield increases over the Control by 6.8% for the Control + BiOWiSH® treatment, and by 3.9% in the N Optimized + BiOWiSH® treatment. This significant yield increase for the Control + BiOWiSH® treatment improved profitability by \$278 USD/ha (\$112 USD/acre) over the Control and by \$167 USD/ha (\$68 USD/acre) for the N Optimized + BiOWiSH® treatment.



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