

## BiOWiSH® Crop Technology

### Institute of Agricultural Research and Training of Nigeria Maize

#### Background

Farmers in Africa are facing tremendous challenges as they try to solve the ongoing hunger epidemic on the continent. It's estimated that Africa is home to nearly 30% of the planet's chronically hungry.<sup>1</sup> Recent research has estimated global food production will need to double by 2050 to meet growing demands. With its high birth rates, Africa will likely shoulder the bulk of that burden, but its low incomes limit access to imported foods.

Making Africa's challenge even more difficult is limited access to suitable farm land. A large part of upland soils of sub-Saharan Africa is susceptible to nutrient depletion because of low buffering capacities, which diminish the fraction of nutrients in soil that are available to the plants. As a result, nutrient balance is negative and soil fertility is declining in many farming areas. Many farmers have turned to inorganic fertilizers to keep their crops growing. The fertilizers do increase yields, but they can also cause environmental and health issues. Nitrogen leaching into groundwater and phosphorus runoff into surface waters resulting from heavy fertilization has prompted legislation regulating the amounts of nitrogen and phosphorus in soil.

These new regulations have forced more and more farmers to look for low-input, sustainable alternatives. Unfortunately, many of the products they've tried aren't as successful as the inorganic fertilizers.

As part of its efforts to increase crop production, the Institute of Agricultural Research and Training of Nigeria carried out extensive tests to determine the effectiveness of BiOWiSH® Crop in rain-fed maize production.

#### Objectives

The goals of this project were to quantify the ability of BiOWiSH® Crop to increase maize yields when used without the presence of inorganic fertilizers.

#### Solution

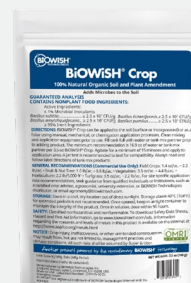
BiOWiSH® Crop, a certified organic fertilizer developed by Chicago-based BiOWiSH Technologies, was chosen for the trial because of its proven ability to increase nutrient uptake by plants even in less than ideal conditions. BiOWiSH® Crop also improves plant vigor and stimulates native microbial activity in the soil.

#### Implementation Program

The Institute of Agricultural Research and Training of Nigeria conducted replicated agronomy field studies to evaluate the performance of BiOWiSH® Crop on maize crop production. The trial was conducted in a derived savanna in Nigeria. BiOWiSH® Crop was applied at rates of zero (control), 150, and 300 g/ha without the presence of inorganic fertilizers. The treatments were replicated three times as a split plot in a randomized complete block design.

BiOWiSH® Crop was sprayed on the plots immediately after planting. The maize was thinned to 1 plant/stand two weeks after planting. Plants were harvested about 4 months after planting.

#### BiOWiSH® Crop



- Improves crop yields
- Increases nutrient availability
- Enhances root development
- Improves plant vigor
- Stimulates native microbial activity in the soil
- Improves soil productivity

#### Available Sizes

- 100 g/3.5 oz
- 1 kg/2.2 lbs
- 5 kg/11 lbs
- 10 kg/22 lbs

<sup>1</sup>Kenneth R. Weiss. July 22, 2012. "As the world's population grows, hunger persists on a massive scale." *Los Angeles Times*. Retrieved August 2012.

## Results

Plants treated with BiOWiSH® Crop were taller, had larger leaf areas and higher grain yields. Researchers also determined that increasing the concentration of BiOWiSH® Crop resulted in taller plants.

The leaf area of plants that received 300 g/ha of BiOWiSH® Crop were larger than plants that received either no BiOWiSH® Crop or BiOWiSH® Crop at a rate of 150 g/ha.

Applying BiOWiSH® Crop at 300 g/ha (without the inorganic fertilizer) gave the highest grain yield of 3234 kg/ha, a 101% increase in grain production over the control plants.

Treatment	Grain Yield [kg/ha] lb/acre	Leaf Area [cm <sup>2</sup> ] in <sup>2</sup>
<b>Control (No BiOWiSH®)</b>	[1604] 1431.1	[5087] 788.5
<b>150 g/ha BiOWiSH®</b>	[2938] 2621.2	[4733] 733.6
<b>300 g/ha BiOWiSH®</b>	[3234] 2885.3	[5535] 857.9

The increased grain yield translated to increased profits for farmers. Using a grain price of \$0.40/kg, BiOWiSH® has a potential return on investment of up to 4455% and the potential to increase Nigerian maize farming profits by more than \$2 billion dollars annually.

BiOWiSH® Return on Investment (ROI) to Grower							
Treatment	Maize grain yield [kg/ha] lb/acre	BiOWiSH® cost [US\$/ha] US\$/ac	Maize grain price [US\$/kg] US\$/lb	Net Profit [US\$/ha] US\$/ac	ROI	Nigeria Maize Crop Value Added	Nigeria All Crops Value Added*
<b>150 g/ha BiOWiSH®</b>	[2938] 2621.2	[\$11.72] \$4.74	[\$0.40] \$0.18	[\$521.89] \$211.20	4455%	\$1,740,935,296	\$19,485,039,387
<b>300 g/ha BiOWiSH®</b>	[3234] 2885.3	[\$23.43] \$9.48	[\$0.40] \$0.18	[\$628.57] \$254.37	2683%	\$2,096,821,520	\$23,468,218,492

## Conclusion

Researchers determined using BiOWiSH® Crop improved the vigor of maize especially at the early growth stage and also enhanced growth and yield performance. They concluded that BiOWiSH® Crop can be used to increase crop production and growth. At the end of the study, the researchers recommended BiOWiSH® Crop to farmers for boosting crop production in maize and endorsed additional testing on other crop types, including vegetables, grains, legumes, root and tuber, ornamental, and tree crops.

Adding BiOWiSH® Crop to the growers' program also increased available nutrients in the soil and resulting plant nutrient availability, and Brix (sugar) levels in the fruit. Anecdotal evidence also reported that all programs exhibited good plant vigor and color.

FAO stat total 2009 maize total hectares for Nigeria is 3,335,860.  
All dollars are USD.

FAO stat total 2009 all crops total hectares for Nigeria is 37,335,887.  
\*Assumes similar improvement in yield across other crop species.



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