

## BiOWiSH® Crop Technology

### Two Choy Sum Farms Experience Increased Yield and Profitability with BiOWiSH® Crop



Choy Sum

#### Background

Vietnam is a highly agrarian country with rich alluvial deltas and mountainous areas, each with distinct soil types. BiOWiSH conducted a series of trials to determine the effectiveness of BiOWiSH® Crop in increasing yields of vegetable crops in this region. In this case, BiOWiSH® Crop was tested on choy sum.

#### Objectives

BiOWiSH Technologies engaged the National Field Fertilizer Testing Department to test the efficacy of BiOWiSH® Crop for increasing yields of choy sum, a leafy vegetable common in Asian cuisine. The study was conducted in two provinces over two consecutive seasons:

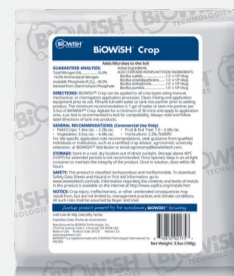
1. Hai Phong province, part of the Red River Delta with acrisol soils
2. Bac Giang province, a mountainous area with fluvisol soils

The objective of this study was to evaluate the costs and yields to determine how BiOWiSH® Crop increased the farmers' crop production and revenue over varying soil conditions, environments, and management practices.

#### Solution

The fields used in this study were typical for the region. For the trial, both farms compared the standard fertilizer management practices for their province (Control) with the same fertilizer programs plus the addition of two rates of BiOWiSH® Crop. Pest and disease management practices were independent and remained standard for each farmer's field.

#### BiOWiSH® Crop



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

#### Available Sizes

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

## Trial Application Protocol

Each study had a randomized plot layout with four replicates.

During this trial, BiOWiSH® Crop was applied using a backpack sprayer, the typical practice for the region. The first treatment was BiOWiSH® Crop applied at the rate of 5.0 oz/a, while the second treatment was BiOWiSH® Crop applied at the rate of 7.49 oz/a following the timings in the below table:

Application of BiOWiSH® Crop	Days after planting	Treatment 1 oz/a [g/ha]	Treatment 2 oz/a [g/ha]
First application	5	2.85 [200]	4.21 [295]
Second application	12	2.14 [150]	3.28 [230]
Total application of BiOWiSH® Crop for each treatment		5.0 [350]	7.49 [525]

## Fertilizer Program

The fertilizer program for each location was distinct and applied at different times according to each farmer's own management program. Each fertilizer application was replicated over both seasons. The total amount of fertilizers applied over the season were:

### Hai Phong Province:

Poultry Manure Compost: 4.96 lb/a [5.56 kg/ha]

Superphosphate (P<sub>2</sub>O<sub>5</sub>): 198 lb/a [222 kg/ha]

Urea (46-0-0): 124 lb/a [139 kg/ha]

### Bac Giang Province:

Organic Fertilizer: 741 lb/a [831kg/ha]

NPK (5-10-30): 123 lb/a [138 kg/ha]

## Results & Discussion

The market price for choy sum in Vietnam at the time of the trial harvest was used for all economic calculations.

### Hai Phong Province

Season one treatments:	Yield t/a [t/ha]	Yield increase t/a [t/ha]	Yield increase %	Revenue increase USD/a	Revenue increase %
Normal fertilizer rate	6.69 [15.0]	-	-	-	-
Normal fertilizer rate + BiOWiSH® Crop at 5.0 oz/a	7.41 [16.6]	0.72 [1.6]	10.5	331.84	11.1
Normal fertilizer rate + BiOWiSH® Crop at 7.5 oz/a	7.49 [16.8]	0.80 [1.8]	11.8	369.69	12.4

Season two treatments:	Yield t/a [t/ha]	Yield increase t/a [t/ha]	Yield increase %	Revenue increase USD/a	Revenue increase %
Normal fertilizer rate	6.38 [14.3]	-	-	-	-
Normal fertilizer rate + BiOWiSH® Crop at 5.0 oz/a	7.05 [15.8]	0.67 [1.5]	10.5	305.94	10.8
Normal fertilizer rate + BiOWiSH® Crop at 7.5 oz/a	7.09 [15.9]	0.71 [1.6]	11.2	336.70	11.9

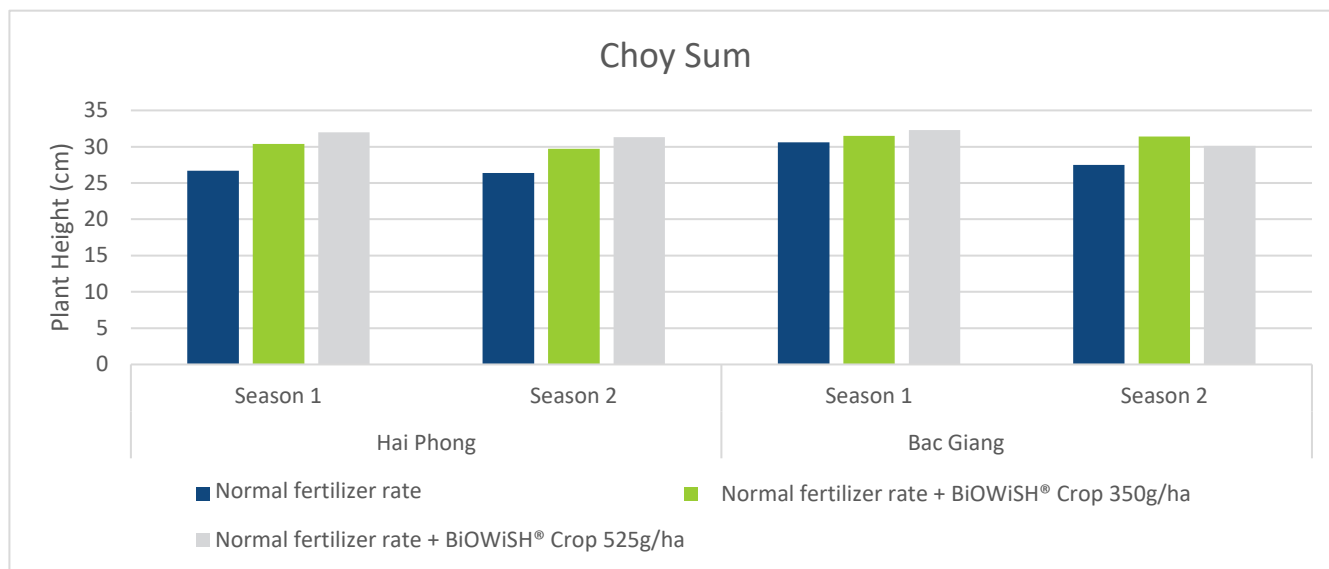
## Bac Giang Province

Season one treatments:	Yield t/a [t/ha]	Yield increase t/a [t/ha]	Yield increase %	Revenue increase USD/a	Revenue increase %
Normal fertilizer rate	6.65 [14.9]	-	-	-	-
Normal fertilizer rate + BiOWiSH® Crop at 5.0 oz/a	7.23 [16.2]	0.58 [1.3]	8.7	254.80	9.7
Normal fertilizer rate + BiOWiSH® Crop at 7.5 oz/a	7.41 [16.6]	0.76 [1.7]	11.4	308.70	11.7

Season two treatments:	Yield t/a [t/ha]	Yield increase t/a [t/ha]	Yield increase %	Revenue increase USD/a	Revenue increase %
Normal fertilizer rate	6.42 [14.4]	-	-	-	-
Normal fertilizer rate + BiOWiSH® Crop at 5.0 oz/a	7.13 [16.0]	0.71 [1.6]	11.1	293.11	11.6
Normal fertilizer rate + BiOWiSH® Crop at 7.5 oz/a	7.23 [16.2]	0.81 [1.8]	12.5	327.41	12.9

Plant height was collected at harvest and is reported in the graph below:



As a result of adding the maximum (7.5 oz/a) rate of BiOWiSH® Crop to current fertilizer practices, the farm in Hai Phong achieved an 11.8% yield increase in season one and 11.2% in season two, averaging a 12.2% revenue increase over the two seasons. With the same maximum (7.5 oz/a) rate added to current fertilizer practices, the farm in Bac Giang achieved 11.4% and 12.5% yield increase in season one and season two, respectively. They averaged a 12.3% increase in revenue over both seasons.

These results show that BiOWiSH® Crop sustainably increases yield and profitability for choy sum farmers when supplementing standard fertilizer programs in different growing seasons, soil types, and environmental conditions.



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