

## BiOWiSH® Fruit & Vegetable Wash

### Corbana Banana Corporation Costa Rica

#### Background

The banana harvesting process includes manually cutting bananas into the bunches you see in stores. Prior to placing the bananas into shipping boxes, they are put through a wash process. During the wash process, bananas release latex that needs to be removed to prevent the bananas from being stained. The staining makes the bananas look spoiled and therefore they can't be sold. Traditionally, bananas are soaked in pools of water containing chlorine and other chemicals. This consumes a massive quantity of water because the water in the pools must be replaced daily.

#### Objectives

Corbana Banana Corporation wanted to see if BiOWiSH® Fruit & Vegetable Wash could improve fruit quality and reduce water usage.

#### Solution

BiOWiSH® Fruit & Vegetable Wash is 100% natural, bio-degradable, and safe for everyday use in a diverse range of applications. It has been shown effective at increasing storage life, maintaining freshness, reducing water usage, and saving man-hours used for cleaning.

#### Results

During testing by Corbana Banana Corporation, BiOWiSH® effectively removed the latex from the bananas in the pool, allowing the facility to use the same water for four days without any problems. In addition to lowering water usage, the facility also reduced electricity and diesel costs.

In addition to the attributes above, the BiOWiSH® programs had higher yields than the most common best management practice in the area.



Latex from BiOWiSH® Bananas



Latex from Control Bananas

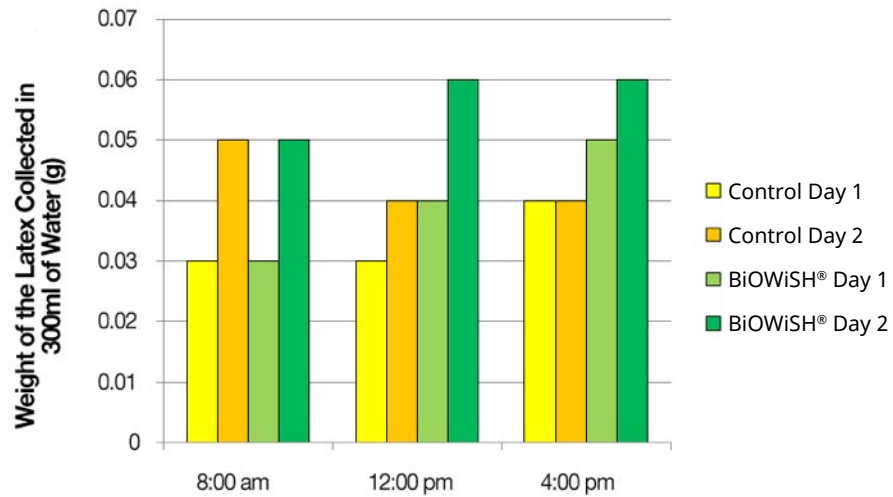
### BiOWiSH® Fruit & Vegetable Wash



- Increases storage life
- Cleans fruits & vegetables
- Resolves latex issues
- Reduces wash process chemicals
- Reduces odor from wash water
- Reduces water & energy usage
- Reduces cleaning and labor
- Approved under Washington State Department of Agriculture Organic Food Program

#### Available Sizes

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



*Effect of BiOWiSH® Fruit & Vegetable Wash program (24 h after treatment) on the latex turbidity and water from the washing pile of bananas.*

Corbana also determined that the quality of the fruit was better with water that had been treated with BiOWiSH® Fruit & Vegetable Wash. The study found using BiOWiSH® Fruit & Vegetable Wash reduced post-harvest disease because the microbes helped remove fungus from the water.



BiOWiSH® Banana



Control Banana

Treatment	Crown Rot (%)	Crown Mold (%)	Maturation Degree	# Fingers per Box
<b>Bactrol 500<sup>1</sup></b>	1.9 ± 1.9	17.5 ± 5.5	4.8 ± 0.1	95.9 ± 3.8
<b>BiOWiSH<sup>®</sup> program</b>	1.3 ± 1.6	12.4 ± 4.1	4.7 ± 0.2	96.2 ± 2.2
<b>P&gt;F</b>	0.4714	0.0464	0.3906	0.7889
<b>Lineal effect per hour</b>	0.9670	0.2744	≥0.4490	0.1107

<sup>1</sup> Commercial bioremediation <sup>2</sup>BiOWiSH<sup>®</sup> Fruit & Vegetable Wash + citric acid

Bananas treated with BiOWiSH<sup>®</sup> Fruit & Vegetable Wash also required less rewashing and had fewer defects when they arrived at their final destination in England. Multiple farms were evaluated. Results below represent the farms with consistent results and a high volume of bananas (more than 200 pounds).

	% Flawless fruit	% Minor flaws	% Critical flaws	Consistency
<b>BiOWiSH<sup>®</sup> (17lb boxes)</b>	95.6%	1.6%	2.8%	100%
<b>Control (17lb boxes)</b>	91.8%	3.0%	5.2%	80%
<b>BiOWiSH<sup>®</sup> (18.14 lb boxes)</b>	95.1%	3.8%	1.1%	93.3%
<b>Control (18.14 lb boxes)</b>	92.8%	3.2%	4.0%	86.7%

## Conclusion

Using BiOWiSH<sup>®</sup> Fruit & Vegetable Wash improves the banana harvesting process. Bananas treated with BiOWiSH<sup>®</sup> Fruit & Vegetable Wash were of better quality and had reduced levels of post-harvest disease than bananas in the control groups. BiOWiSH<sup>®</sup> also effectively removed the latex from bananas, reducing water usage, as well as electricity and diesel costs.



BiOWiSH<sup>™</sup> is a registered trademark of BiOWiSH Technologies International, Inc.

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