

## BiOWiSH® Fruit & Vegetable Wash

### Gavilán Banana Operation Costa Rica

#### Background

A banana production facility in the town of Gavilán, Costa Rica, produces an average of 2,500 boxes of bananas per day using a closed loop wash system. The operational management plan includes emptying and cleaning the wash pool at the end of each production day. The facility also has an on-site water treatment unit.

In addition to high water and energy usage, latex released from the banana during the wash process is a major operational and fruit quality challenge. Latex naturally has a very adhesive characteristic. If the latex issue is left unmanaged in the wash pool, a percentage of the bananas will incur a latex stain resembling spoiled fruit. The visual appearance of the latex stained banana influences the export grading quality and the resulting price or volume sold.

Traditionally, the best management practice for controlling the latex issue has been to use high concentrations of harsh chemicals, such as chlorine, hydrogen peroxide, coagulants or other chemicals. This practice requires a high volume of replacement water and daily cleaning of the wash pools.

#### Objectives

The facility began using a product made in the USA by BiOWiSH Technologies. BiOWiSH® Fruit & Vegetable Wash is a natural alternative to the use of harsh chemicals in the wash pools and improves the production issues. The facility recorded several standard water quality parameters over a production period versus the traditional practice. The water quality parameters included Total Solids (TS), Total Suspended Solids (TSS), Settleable Solids (SS) and Biochemical Oxygen Demand (BOD). In addition, visual observations of the adhesive nature of the latex were recorded.

#### Solution

Made in the United States, 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 and electricity usage, and saving man-hours used for cleaning.

### 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

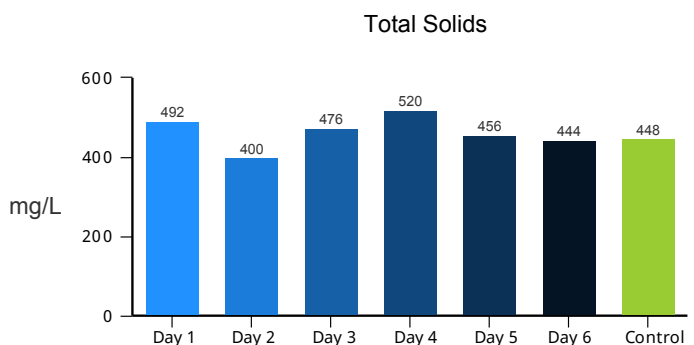
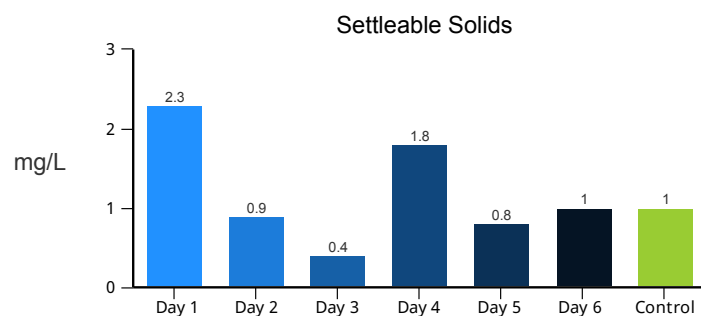
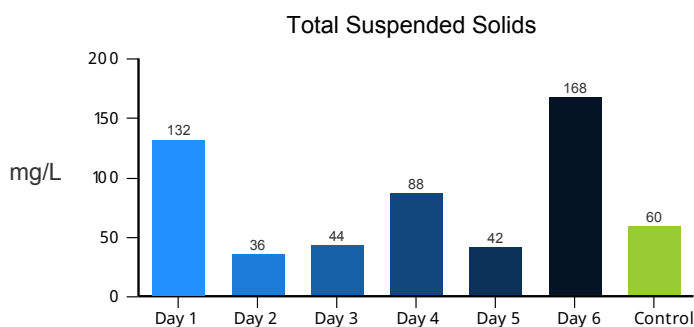
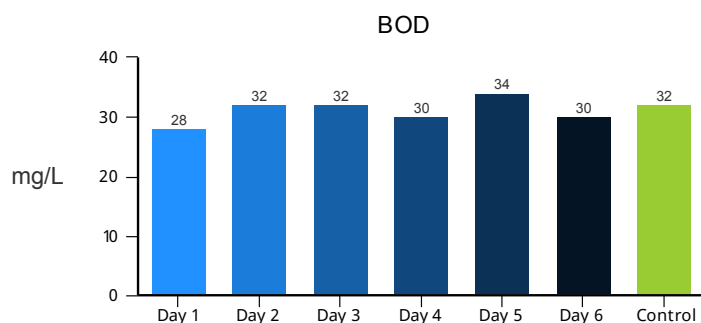
## Results

BiOWiSH® Fruit & Vegetable Wash treated water was used for all six production days and compared to the first day of production wash water as a control for the normal management practice. Samples were taken from the same locations in the pool at the same time each day to allow for the most accurate comparison. The table and associated graphs below illustrate the ability of the BiOWiSH® Fruit & Vegetable Wash product to maintain water quality for all six days of production.

All treatments were applied via drip irrigation.

**Table 1: Laboratory Results: Banana Wash Pool Water**

|          | Production day | TS<br>(mg/L) | TS<br>(mg/L) | SS<br>(mg/L) | BOD<br>(mg/L) |
|----------|----------------|--------------|--------------|--------------|---------------|
| BiOWiSH® | Day 1          | 492          | 132          | 2.3          | 28            |
| BiOWiSH® | Day 2          | 400          | 36           | 0.9          | 32            |
| BiOWiSH® | Day 3          | 476          | 44           | 0.4          | 32            |
| BiOWiSH® | Day 4          | 520          | 88           | 1.8          | 30            |
| BiOWiSH® | Day 5          | 456          | 42           | 0.8          | 34            |
| BiOWiSH® | Day 6          | 444          | 168          | 1.0          | 32            |
| Control  | Day 1          | 448          | 60           | 1.0          | 32            |



When using BiOWiSH® Fruit & Vegetable Wash as part of the management practice the latex has a distinct color and physical change which is noticed within minutes of adding the product to the wash water. In addition to not adhering to the banana, the latex can be handled without the sticky feel.



## Conclusion

The water quality maintained in the wash pools when using BiOWiSH® Fruit & Vegetable Wash resulted in dramatic reductions in water use and energy saving from less pump use. Laboratory water quality analysis for the samples taken from the wash pools with BiOWiSH® Fruit & Vegetable Wash illustrated the consistent water quality for an entire production week thereby improving the environmental impact of water use and pollution from discharge water.

The BiOWiSH® Fruit & Vegetable Wash was effective at removing latex and providing a cleaner banana for packing which grades higher in export countries. The facility manager stated, “BiOWiSH® effectively resolved latex related issues and made it significantly easier to clean the wash basins.” In addition, workers notice their latex free aprons, gloves, trays, and wash pool walls. All around, removing the adhesive nature of the latex is a benefit experienced throughout the post-harvest processing of bananas.

The Gavilán facility is just one of several banana packing operations, including many open or run to waste systems, which have tested and continued to use the BiOWiSH® Fruit & Vegetable Wash as a best management practice.



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