

# BIO-SAVE<sup>®</sup> 10 LP

(Handling Instructions for Mixing, Applying, and Sampling)

## CITRUS FRUIT TREATMENT

### A. EQUIPMENT SETUP

1. Locate the applicator over brushes, before the waxer and after the washer and de-watering section.
2. Choose a pump that will deliver the correct amount of Bio-Save<sup>®</sup>. LMI pumps are the most flexible in range. Have the power for the Bio-Save<sup>®</sup> pump and the brush bed motor connected so the two will come on and go off at the same time. If not product will be wasted during breaks and shutdowns.
3. The cheapest application is a simple irrigation drip manifold. Two or three drip manifolds should be used. Attach sufficient tubing to place over the brush bed to reach desired location for nozzle bank or drip system.
4. Attach nozzle bar at the desired location on the brush bed allowing for 5–10 seconds of Bio-Save<sup>®</sup> contact time. Apply preferably over brushes, but donuts can be used. If donuts are used the customer will use about 25% more Bio-Save<sup>®</sup> material, belts 50% more.
5. Couple tubing to output line on applicator and to nozzle/drip bar.
6. **Before applying Bio-Save<sup>®</sup>, first, test the system with water to make sure all pump parameters and spray or drip applicators are correct.**

### B. MIXING/LOADING

(Bio-Save<sup>®</sup> 10 LP is a freeze-dried powder. It is packaged in a double-bagged foil pouch. The material is stored at refrigerated temperatures until ready for use.)

- 1) Open a pouch and **add the material to 25 gallons of water for a 500 gram pouch of Bio-Save<sup>®</sup> 10 LP and to 10 gallons for a 150 gram Bio-Save<sup>®</sup> 10 LP.**
  - (JET Harvest recommends mixing only as much material as needed on a 24–48 hour working day.)

- 2) Mix for 30 minutes before application and continue mixing throughout the application. If clumping occurs, mix first in a 5-gallon pail with 1–2 gallons of water. Wisk well, and then pour into tank.
  - Continuous mixing allows the active ingredients in the Bio-Save<sup>®</sup> 10 LP to utilize the oxygen made available by mixing, allowing the material to remain active in suspension longer.
  - Studies to date show the material is active until 48 hours after mixing.
- 3) Apply Bio-Save<sup>®</sup> 10 LP through a spray application system or drip system over a brush bed with a 5–10 second contact time. Nozzle size is not important.
  - Use a rate of one gallon of Bio-Save<sup>®</sup> suspension to 150–200 cartons of citrus fruit.
  - When using a spray application system do not allow the material to mist or you will lose viable material into the air.

#### C. APPLICATION

1. Start the brush bed and check applicator to make sure all parts are functioning properly.
2. Check nozzles, drip emitters and tubing for leaks and cleanliness. There should be no build-up of material in the tubing. Check tank and make sure it is clean.
3. Mix and load tank when needed. Every 24–48 hours the tank must be emptied and flush with fresh water. Do not continue to add Bio-Save<sup>®</sup> on top of old product for more than 24–48 hours.

#### D. CLEANUP

- 1) **Flush and clean** the Bio-Save<sup>®</sup> solution out of the application equipment and mixing tank **after each use**.
  - Flush lines with water at 30–40psi for about 15 minutes.
  - Bio-Save<sup>®</sup> is a bacterium. **If not properly cleaned**, the lines and the applicator will get plugged and other microbial contaminants will grow and interfere with the Bio-Save<sup>®</sup> application.
- 2) **Sanitize and rinse** the application equipment, mixing container, and conveyor system equipment **every 10–14 days**.

- Mix approximately 50 gallons of water to one-half cup of liquid chlorine or to 3–5 gallons of isopropyl or ethyl alcohol.
- Sanitize with sanitizing solution for five to ten minutes.
- After sanitizing, rinse with water at 30–40psi for about 15 minutes. **Do not** over sanitize or the Bio-Save<sup>®</sup> counts will be lower than expected. **Rinse well.**
- **Do not use a quaternary compound or high level of sanitizer. These products leave a residual and may kill the Bio-Save<sup>®</sup> or reduce the efficacy during your next application.**

#### E. PROPER HANDLING

- Bio-Save<sup>®</sup> 10 LP is packaged in a foil pouch. Store the Bio-Save<sup>®</sup> 10 LP at refrigerated temperatures or lower (freezer). The lower the storage temperature the longer the product can be stored.
- Do not allow Bio-Save<sup>®</sup> to be in temperatures above refrigeration for more than 24 hours. Storing above the recommended temperatures will reduce the product effectiveness.

For additional information handling or storing these very cold materials, please contact JET Harvest Solutions/Bio-Save<sup>®</sup> at 1-877-866-5773.

#### F. SAMPLING

##### 1. Wounding Samples

Objective:

To wound the pome fruit for analyzing Bio-Save<sup>®</sup> viability in the wounded tissue

Materials Needed:

Citrus Fruit

Citrus Fruit-wounding tool

Permanent marker

Procedure:

- 1) Randomly take 5 pieces of citrus fruit.

- 2) Mark them individually with a permanent marker or color tape so they can be picked up after treatment.
- 3) Punch 2 holes per fruit with the citrus fruit-wounding tool. The wound dimension is about 1 mm in diameter and 3 mm in depth. Circle the wounds with permanent marker so the wounds can be located at the lab.
- 4) Return the wounded fruit to its population to receive Bio-Save<sup>®</sup> and/or other treatments including wax.
- 5) Pick up the citrus fruit after treated. Keep the citrus fruit in a plastic bag with 1–2 holes.

#### 1. Shipment of Samples

- 1) Samples should be identified using a Bio-Save<sup>®</sup> **Information Sheet**. Complete all information on form.
- 2) For the best and most accurate results, ship the samples in **a plastic bag with some air holes**.
- 3) Place the bags of samples into a cooler with blue ice packs. Wrap the blue ice packs in newspaper so that the ice does not burn the fruit. (Try not to ship in cardboard box. It will not hold the temperature needed.)
- 4) Ship via 2<sup>nd</sup> day transit. The mailing address is on the **Information Sheet**.

\*\* Sampling procedures for U.S. testing. Outside the U.S. contact JET Harvest Solutions for testing information.