

# Assessment of Solutions Used for the Purpose of Determining Spotted Wing Drosophila Larval Infestation in Blueberry Fruit

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**Introduction:** it is necessary for packers and growers to do fruit quality assessments before shipping fruit. One way to do this is to use a 'fruit dunk' method. Some solution recipes were used in the industry in 2010, and my intent was to test which ones recover the most larvae, are easiest to use, and most cost effective for use in BC blueberries.

**Objective:** to test how well each of the main 'fruit dunk' solutions work to float out SWD larvae from blueberry fruit.

## Methods:

First larvae test: Put ripe fruit known to be infested with SWD in flat containers (~80g, or 30 fruit), solutions were added, stirred, and the number of larvae that float on the surface were counted. After the first count, berries were squished within the solution, stirred again, and then the second count of floating larvae was done. This was replicated 5 times.

Four treatments:

CFIA sugar	0.7 kg brown sugar + 4 L water
Low sugar	0.25 kg white granulated sugar+ 4 L water
Salt	0.25 kg table salt + 4 L water
Water only	water

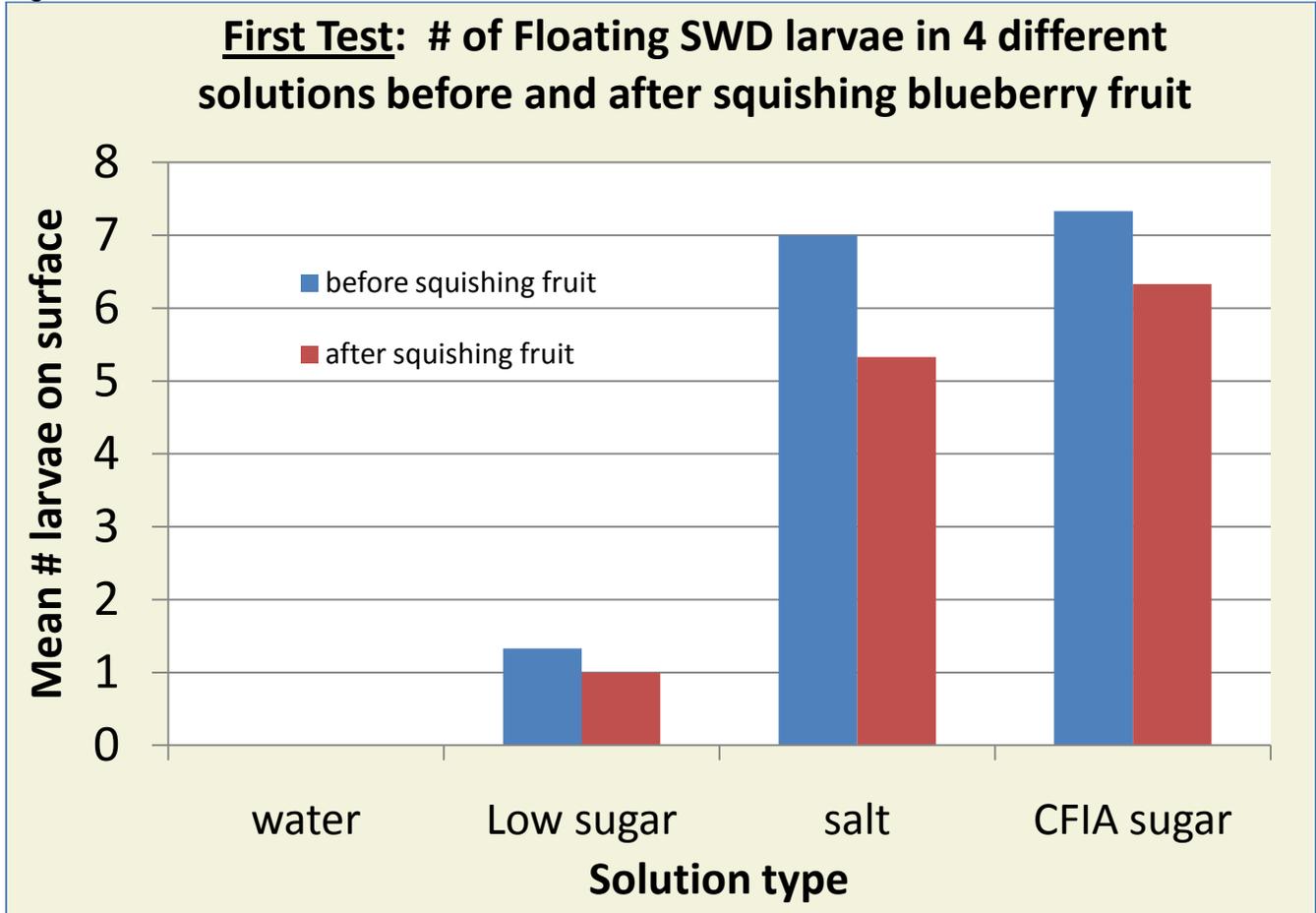
Floating fruit observations: Floating fruit may make it more difficult to see larvae and therefore make counting less accurate and more time consuming. To investigate this I recorded observations for fruit samples in each solution in a baggie, as well as in the First larvae test.

Second larvae test: Larvae were collected from infested blueberry fruit and immediately added to solutions. Five to ten third instar larvae were added to vials of each of the four solutions (no berries). Vials were left to stand at room temperature for a few minutes, and then the number of larvae remaining on the surface and the number that sank to the bottom were recorded. This was repeated 3 times.

## Results:

First larvae test: (Figure 1.) Larvae floated up almost immediately in "CFIA sugar" and "Salt" solutions. The "CFIA sugar" and "Salt" always resulted in the most larvae floating to the top, and clearly better than just water or the Low sugar solution. Squishing berries didn't appear to increase the number of larvae floating, in fact there was a small decrease in number of larvae after squishing.

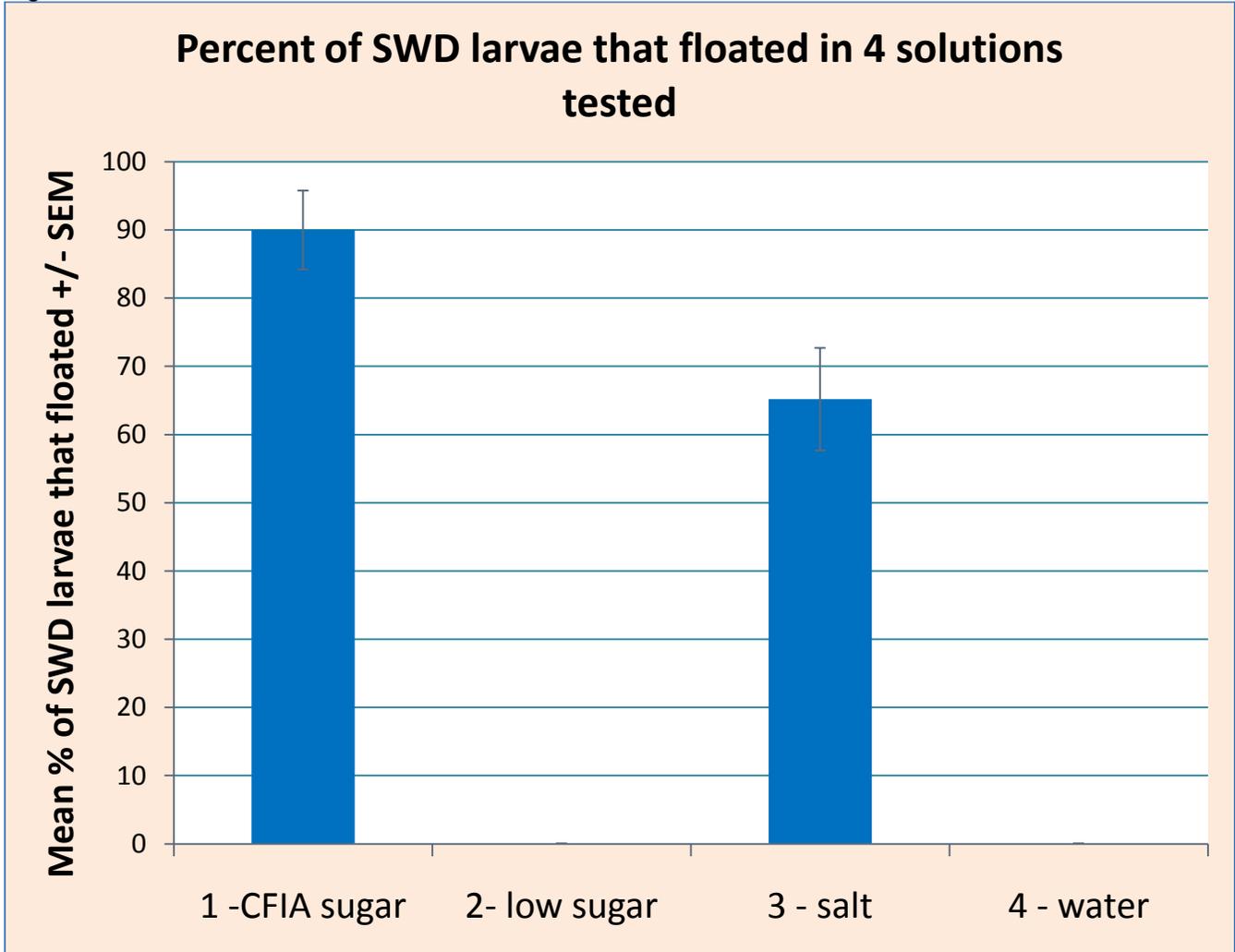
Figure 1.



Floating fruit observations: CFIA sugar: fruit as well as larvae floated; sometimes difficult to see larvae. Most fruit sank in “Salt”, making it easier to count larvae. Fruit and larvae either disperse throughout (“Low sugar”), or sink to the bottom (“water only”) resulting in very few larvae floating on top.

Second larvae test: All larvae sank to the bottom in “Low sugar” and “water only” (Figure 2.) Nearly all larvae floated at the top for “CFIA sugar”. It was split for the “Salt”; 63% of the larvae floated, and 37% sank to the bottom.

Figure 2.



### Discussion and Conclusions:

Salt solution floated about 63% of the total larvae, making it the second ranking solution for efficient larvae recovery. Additionally, the fruit in the salt solution mostly sank, making it fairly easy to count the floating larvae. CFIA sugar floated at least 90% of the SWD larvae, making it the best solution for larvae tests. However, CFIA sugar also floats all the blueberry fruit. Floating fruit appears to impede efficient and thorough counting of floating larvae, to the extent that in an infested fruit sample (as in “first larvae test”) the same number of larvae will be counted in both salt and CFIA sugar solutions.

There appears to be no advantage to squishing blueberry fruit to count larvae in solution. This could be due to the larvae sustaining damage from squishing, or that it is difficult to distinguish the larvae from the berry tissue, which has white ‘threads’ within. Squishing before first larvae count may be an alternative approach to test, however, larvae float out very quickly in solution and it may not be necessary for assessment of small fruits. Squishing is part of regular protocol in larger fruit like cherries when testing for cherry fruit fly larvae (*Rhagoletis* spp., a bigger larvae).

For practical purposes, such as in berry processing plants, the salt solution results in comparable larval recovery to CFIA sugar, and is therefore suitable for assessment of blueberry fruit. Additionally, salt is cheaper than sugar, less messy, and you need less of it to create a useful solution.



Next Steps: These studies need to be repeated for all BC berry crops, in order to establish some larvae monitoring protocols that will be useful to berry packers and growers.