

Which Method Of Fruit Cleaning Works Best?

Science Fair Logbook

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Scientific Question:

Does the solution used for cleaning fruit impact the amount of bacteria that will grow on the fruit under controlled conditions?

Hypothesis:

If you use the veggie wash , then it will remove the most bacteria from the fruit because it contains more fruit-cleaning properties than other solutions.

Prediction:

The veggie wash will be the best solution for cleaning fruit because it has the most bacteria-killing ingredients

Research:

No wash has no cleaning properties, it does nothing, we are using it as our control group.

Next type of cleaner is water. Water has some basic cleaning properties such as it is an excellent solvent which means that hydrophilic dirt will dissolve off of it.

The next type of the cleaner that we are testing is vinegar. The cleaning properties of vinegar are much better than just using water. Vinegar is 5% acetic acid which helps it break down dirt, bacteria, oils, and films.

Veggie Wash is a fruit and vegetable cleaner. This has the most benefits that we could find. There are many things that this “veggie wash” does. It breaks down the wax layer on your fruits and vegetables, dirt, pesticides, bacteria, and people handling residue.

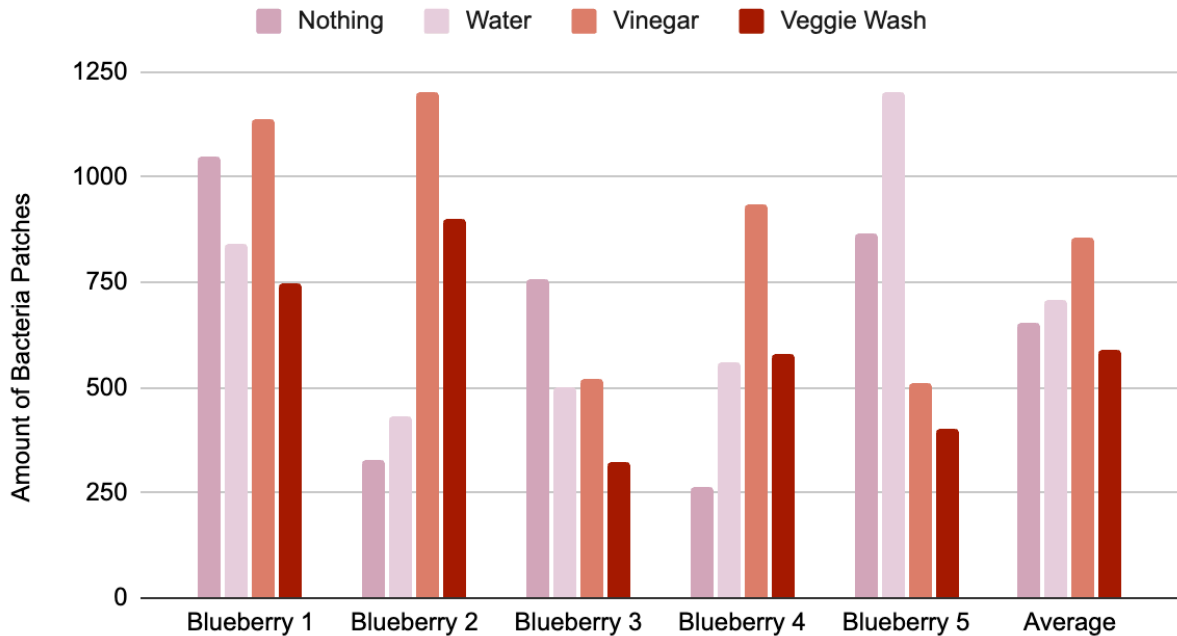
Ingredients in Veggie Wash: Water, Organic Ethanol, Organic Sunflower Oil, Organic Glycerin, Organic Lemon Oil, Organic Coconut Oil, Potassium Hydroxide, Citric Acid

What ingredients help clean fruits that are found in fruit washing methods? Some of the most effective and beneficial contents that help clean fruits include; acetic acid, chlorine (sodium hypochlorite), organic acids, electrolyzed water, hydrogen peroxide, citrus organic oils, potassium hydroxide and water.

What are the effects of good fruit cleaner ingredients? Acetic Acid - Destroys the bacteria's cell structure. Chlorine (Sodium hypochlorite) - Breaks the chemical bonds in the bacteria's molecules. Organic Acids - Alters the bacteria's membrane. Electrolyzed Water - Produces hypochlorous acid, which kills bacteria. Hydrogen Peroxide - Produces destructive hydroxyl free radicals that attack bacteria membranes. Citrus Organic Oils - Binds the bacteria wall and disrupts its growth. Potassium Hydroxide - Kills microorganisms such as bacteria.

Data:

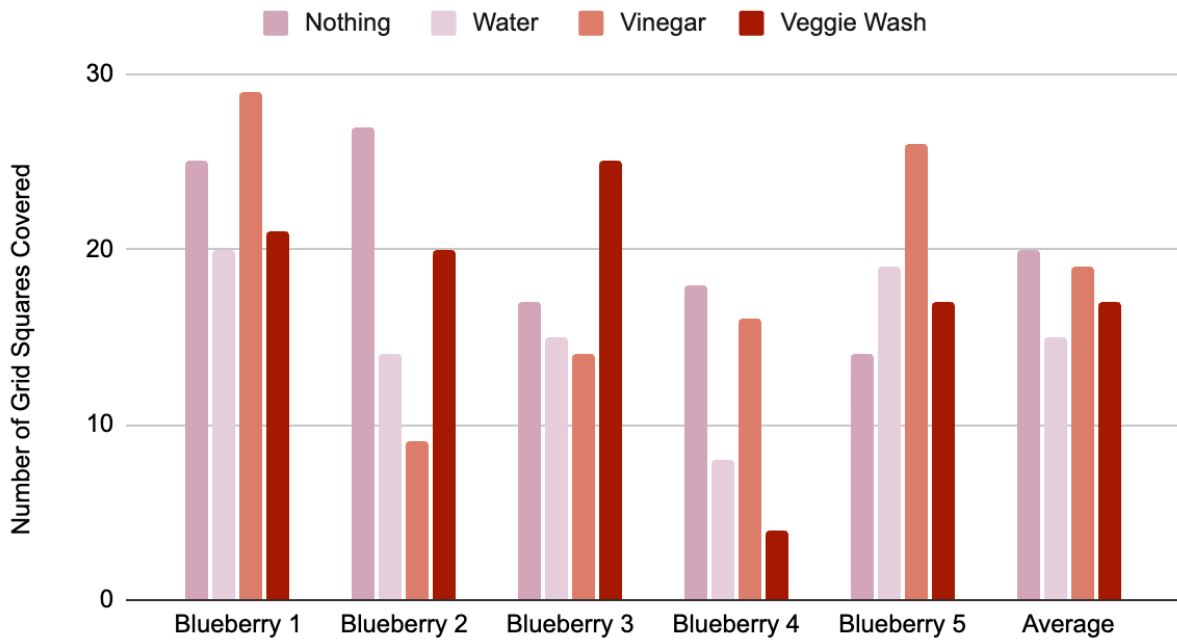
Nothing , Water , Vinegar and Veggie Wash



24 hours:

We had 5 petri dishes per type of cleaner. This shows that so far veggie wash is the cleanest. With an average of 591 bacteria colonies. In second place is nothing with an average of 653. In third place is water with an average of 706 bacteria colonies. Lastly is vinegar with a whopping average of 857 bacteria colonies.

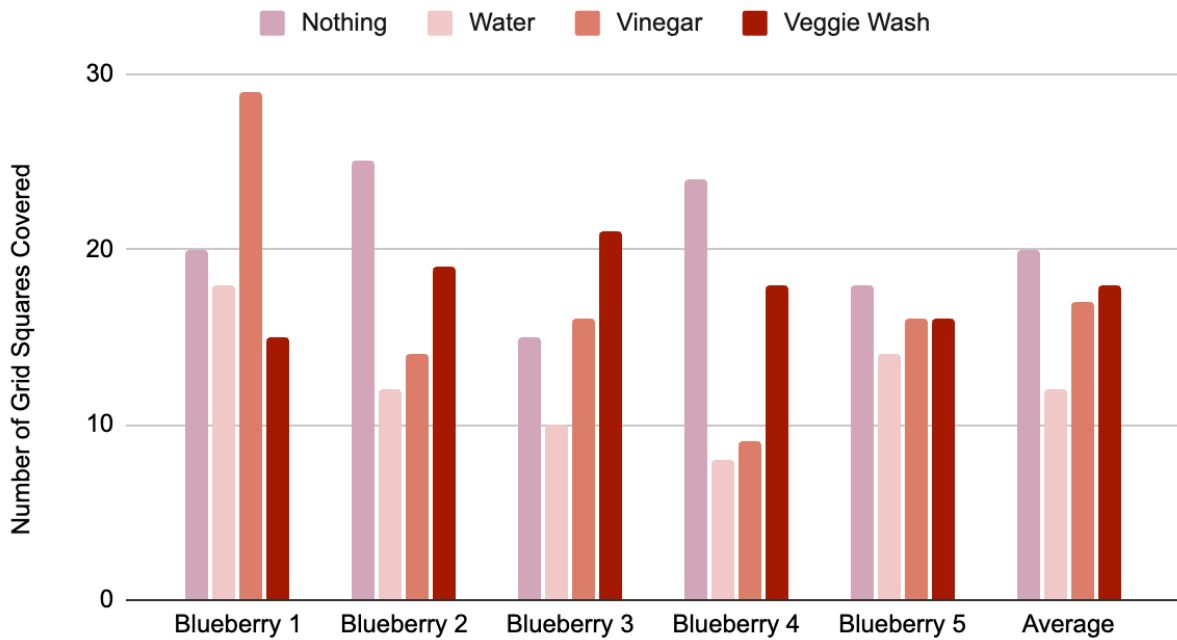
Nothing , Water , Vinegar and Veggie Wash



48 hours:

We still have 5 petri dishes for this cleaner. The best cleaning one is water with an average of 15 squares covered in bacteria per petri dish. In second place Veggie wash with and had an average of 17 squares covered per petri dish. In third place there was vinegar which had an average of 19 squares covered in bacteria. Lastly there is nothing with an average amount of squares covered in bacteria being 20.

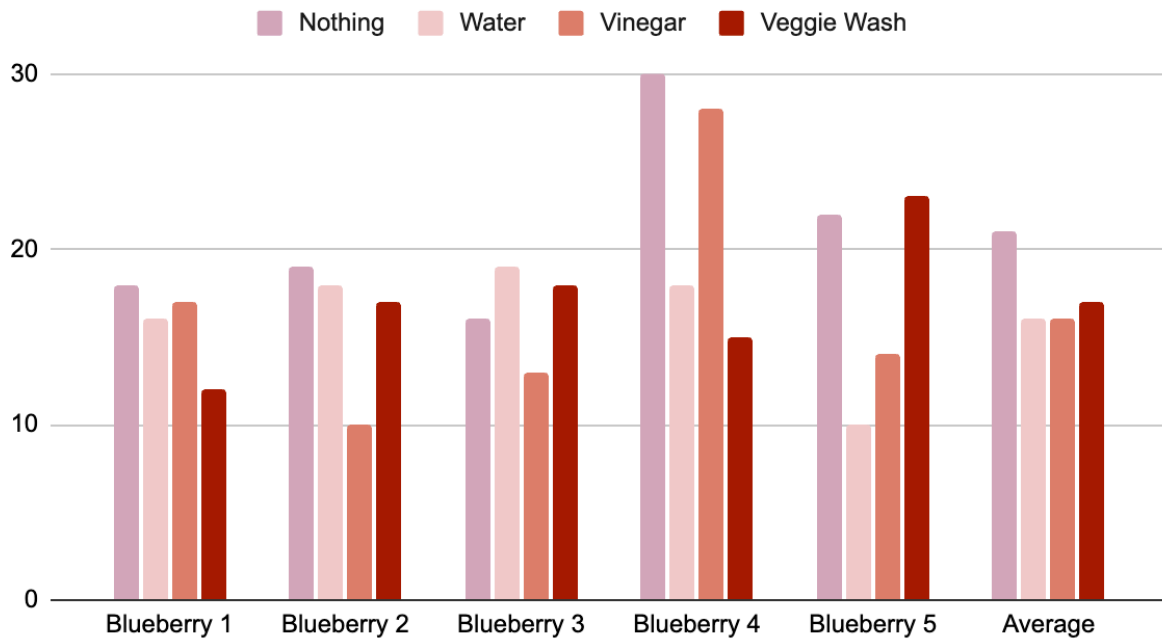
Nothing , Water , Vinegar and Veggie Wash



72 hours:

We had five petri dishes per type of cleaner. The best fruit cleaner was water with an average of an average of 12 grid squares covered. The next best cleaner is vinegar with an average of 17 grid squares filled with bacteria. Veggie Wash was the next best with an average of 18 grid squares covered with bacteria. Lastly control was the worst at fruit cleaning with an average of 20 squares covered with bacteria.

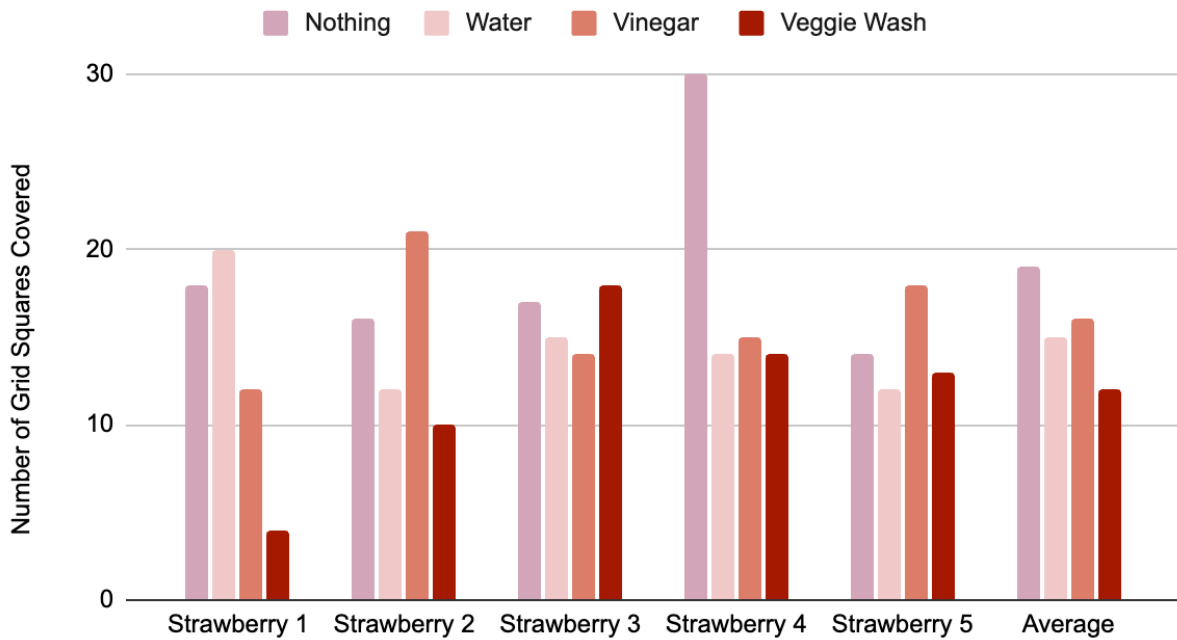
Nothing, Water, Vinegar and Veggie Wash



120 hours:

We had five petri dishes per type of cleaner. The best type of cleaner was water with an average of 16 bacteria colonies. The second best type of cleaner was vinegar with an average of 16. Now both had 16 but water had lower numbers then vinegar. In third was Veggie Wash with an average of 17 bacteria grid squares covered. In last place is control with an average of 21 bacteria grid squares covered.

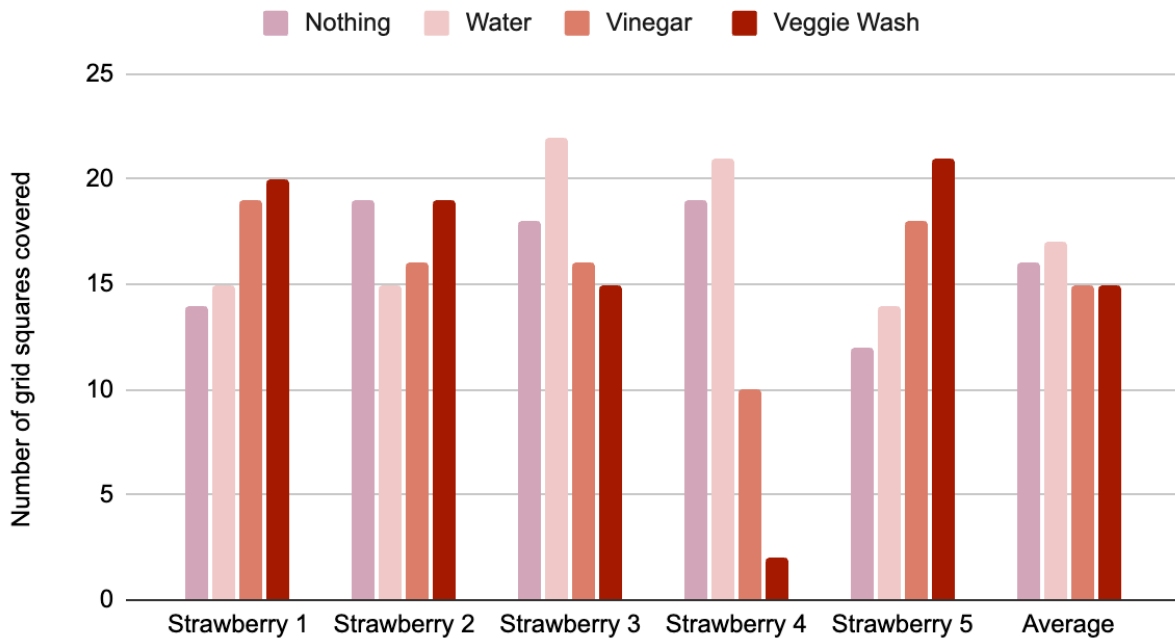
Nothing, Water , Vinegar and Veggie Wash



24 hours (strawberries):

We used five petri dishes per type of cleaner. The cleanest was Veggie Wash with an average of 12 grid squares covered. The second cleanest is water with an average of 15 grid squares covered with bacteria. The next one is vinegar with an average of 16 grid squares filled with bacteria. Lastly there is control or nothing with an average of 19 grid squares covered with bacteria.

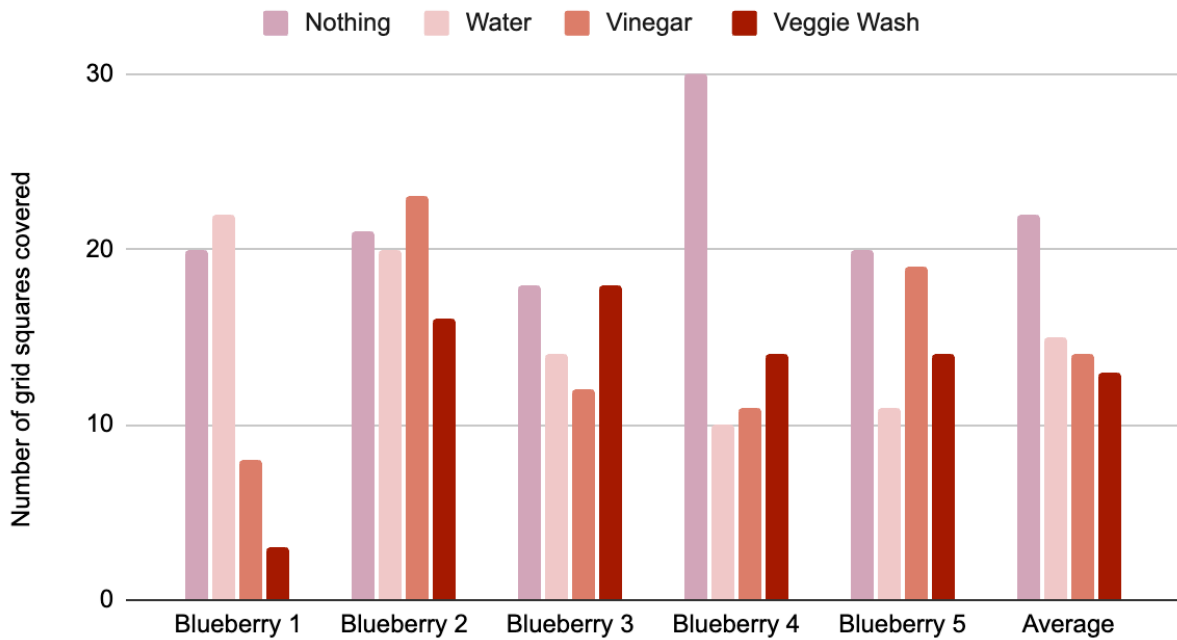
Nothing, Water, Vinegar and Veggie Wash



48 hours (Strawberries):

We had five petri dishes per type of cleaner. The best one was Veggie wash with an average of 15 bacteria colonies now this does tie with Vinegar it overall had lower numbers. Next is Vinegar with an average of 16 grid squares being covered with bacteria. In third is control with an average of 16 grid squares being filled with bacteria. Lastly is water with an average of 17 grid squares covered with bacteria.

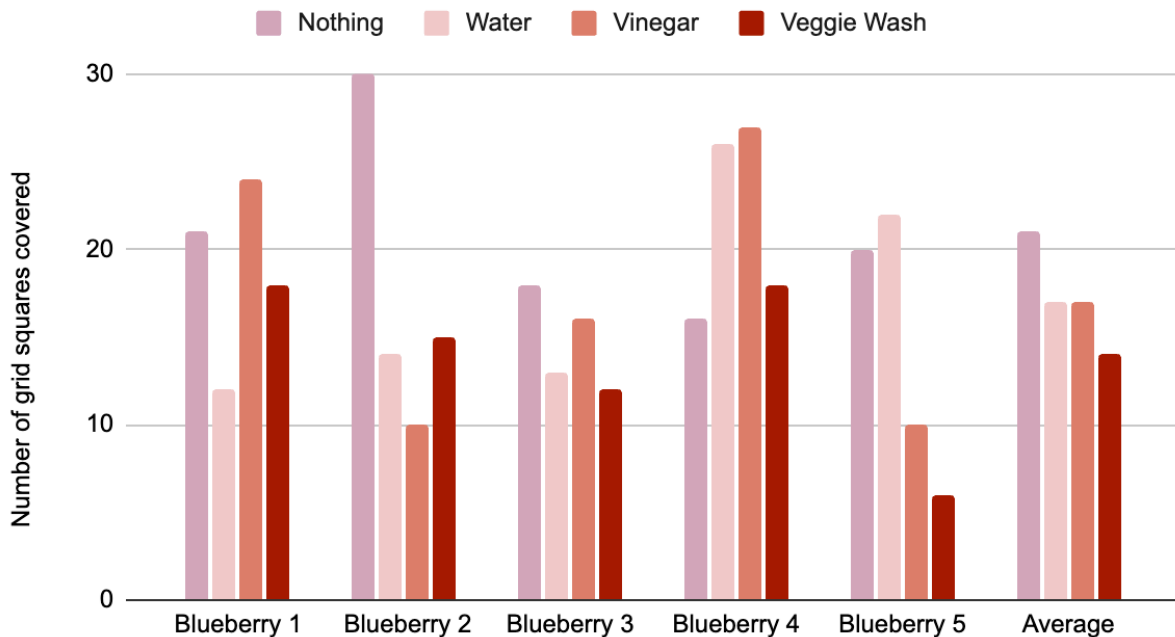
Nothing, Water, Vinegar and Veggie Wash



72 hours:

We had five petri dishes per type of cleaner. The results were... The best cleaning solution was Veggie Wash with an average of 13 grid squares covered with bacteria. Next is Vinegar with an average of 14 grid squares filled with bacteria. In third is water with an average of 15 grid squares covered in bacteria. Lastly is Control with an average of 22 grid squares covered with bacteria.

Nothing , Water , Vinegar and Veggie Wash



120 hours (strawberries):

We had five petri dishes per type of cleaner. The best cleaner was Veggie Wash with an average of 14 grid squares per petri dish that are covered with bacteria. Next was Vinegar now it is tied with water but because the numbers are overall lower the average for this type of cleaner has an average of 17 grid squares filled with bacteria. Next is Water with an average of also 17 grid squares covered with bacteria. Lastly is control with an average of 21 grid squares covered with bacteria.

Analysis:

24 hours:

Veggie Wash grew the least bacteria in both rounds of the experiment. In both sets the amount of bacteria stayed consistent and overall was the best at 24 hours. The next best one at cleaning fruit is Water, water was the best in the blueberries experiment but in the strawberries one it

was close to control so it was the next best. In the strawberries experiment they were very consistent but in the blueberries one there is one large spike on blueberry 5. The next best type of cleaner is Control now in the strawberries experiment Control was not the greatest but in the strawberries experiment while in the blueberries experiment there is a large margin. The worst type was Vinegar. Now in the strawberries experiment it was better than the Control but in the blueberries experiment it was better By a small margin.

48 hours:

At 48 hours Veggie Wash grew the least bacteria in the strawberry round of the experiment, while water performed the best in the blueberry round. Both of their final averages were 16. They worked equally as well. The Veggie Wash's average in the blueberries was 17 and in the strawberries it was 15. The water's results were viceversa it had an average of 15 in the blueberries and an average of 15 in the strawberries. The next best one at cleaning fruit is vinegar, vinegar's bacteria growth pattern was quite unpredictable. However it came close to nothing, since its total average was 17 and nothing was 18. The worst type was nothing. In both rounds of blueberry and strawberry the bacteria amounts weren't very consistent. Since it would spike in bacteria and suddenly drop then maintain the amount.

72 hours:

At 72 hours the best type of cleaner was Water with an average 14 grid squares covered with bacteria. In the blueberries round water was very consistent with the amount of bacteria results. While in the strawberries round there were some spikes that caused the data to be higher or lower. The next best was Veggie Wash with an average of 15 grid squares covered with bacteria. Overall Veggie Wash was very consistent with the amount of bacteria, until there is one very low amount of bacteria. The third best type of cleaner was Vinegar with an average of 16 grid squares covered with bacteria. It was quite consistent with the amounts of bacteria. Lastly is control with on average 21 grid squares covered with bacteria. Overall it was consistent.

120 hours:

At 120 hours Veggie Wash performed the best. The bacteria levels had no spikes and were consistent. The bacteria levels weren't too high. The water did the second best, and had a relatively stable and consistent amount of bacteria. The amounts of bacteria for the most part had little to no spikes. The vinegar did the third best. The bacteria had some spikes but also remained consistent in some parts. The worst fruit cleaning solution is nothing/no wash. It was consistent with the bacteria amounts and had quite high bacteria levels. There are rarely any spikes.

Conclusion:

In this experiment we wanted to know what was the best type of fruit/vegetable cleaner. We tested to see if the more cleaning properties that are in Veggie Wash and Vinegar will do better. We predicted that the fruit cleaner with the most cleaning properties would be the best because it had the most properties that would kill bacteria. Overall the experiment showed that Veggie Wash is the best type of fruit cleaner and it reduced the amount of bacteria with a large margin. Our hypothesis was therefore correct since Veggie Wash performed the best. This is because it has the largest amount of cleaning properties.