Organic Vs. Non-Organic

Group Name: Apple

Control Condition: non-organic, conventionally grown apple

Experimental Condition: organic apple

Synopsis:

The question that we are trying to answer in our group’s lab experiment is: which will produce more bacteria, organic apples or non-organic conventionally grown apples? Our hypothesis is that organic produce will create and fester with more bacteria. We will do this by having each lab pair test two organic apples and two non-organic apples. By conducting this lab experiment we will see if there is a difference between organic and non-organic produce. The results of this experiment will aid the understanding of the environmental impact that organic produce has on the human body in terms of the amount and variation of bacteria in relation to human food.

Hypothesis:

1. Bacterial count Hypothesis: If two samples of bacteria are collected from apples, one being organic, and the other conventionally grown, then the organic apple will have more traces of monocytogenes, E. coli, and Salmonella.
2. Motility Hypothesis: If two samples of bacteria are collected from apples, one being organic, and the other conventionally grown, the monocytogenes, E. coli, and Salmonella will be more motile than that on the conventionally grown one.
3. Grain Stain Hypothesis: If two samples of bacteria are collected from apples, one being organic, and the other conventionally grown, he monocytogenes, E. coli, and Salmonella on organic apple will gram negative than those on non organic one.
4. Antibiotic resistance Hypothesis:
5. Ampicillin sensitivity: If two samples of bacteria are collected from apples, one being organic, and the other conventionally grown, bacteria (monocytogenes, E. coli, and Salmonella) on the Organic Apple is more Ampicillin sensitive than the non-organic one.
6. Kanamycin sensitivity: If two samples of bacteria are collected from apples, one being organic, and the other conventionally grown, bacteria (monocytogenes, E. coli, and Salmonella) on the Organic Apple is more Kanamycin sensitive than the bacteria from the non-organic one.
7. Gentamicin sensitivity: If two samples of bacteria are collected from apples, one being organic, and the other conventionally grown, bacteria (monocytogenes, E. coli, and Salmonella) on the Organic Apple is more gentamicin sensitive than the bacteria from the non-organic one.

Organic produce will have more bacteria.

Rationale:

Pesticides have been shown to affect bacterial diversity (Feld, 2015). In addition to this statement, the same experiment conducted showed results where not only the diversity was affected but the amount of bacteria as well (Feld, 2015). The results showed that the amount of bacteria was reduced when pesticides were applied to the grass (Feld, 2015). Pesticide exposure is also noted to reduce the response to antibiotics (Rivera- Ramirez, 2017). Salmonellosis, scherichia coli O157, and monocytogenes have all been reported to maintain on vegetables, even those exposed to pesticides. Both of these bacterias show high rates of motility. Therefore, it is hypothesised that the rate of the motility will remain the same, if the bacteria is present on both vegetables (Tarun, 2007). In addition, these specific types of bacteria are all grain negative. Therefore, we hypothesis that the bacteria that remains on the non organic vegetable will be mainly gram negative ("Bacterial and Viral Classification, Structure and Function.").

Impact:

People have been obsessed with the concept of “organic” foods, but they seem to be more infatuated with the word “organic” than what it actually is. In actuality it is a set of requirements that the food producer must pass in order to gain the use of the word “organic” on the label of their food. Organic does not mean the food is healthier or better for you, but in concept it is grown with more ecologically conscious growing and producing methods. Just because it is grown organically does not mean that it doesn’t have any problems. The main determinants of bacterial count are; growing location, fertilizer use, pesticide use, other agricultural practices, and shipping and handling procedures. Organically grown produce is mainly grown with mass amounts of fertilizer, which is one of the main sources for bacterial growth on the produce. In one study, it was found that “the survival of E. coli in organic soil was threefold greater than the survival of E. coli in sandy soil (which is used primarily in conventionally-grown produce)” (Maffei, 2017). Another reason that bacteria growth may be more likely in organic produce is due to the fact that pesticides are not supposed to be used in the production of organic fruits and vegetables, but there have been many cases in which pesticides have been found on organic produce (Burke 2017). Although there may be a higher chance of consuming dangerous bacteria from organic food, the food is still grown in a way that does not do major harm to the environment, and uses methods that can have long term benefits to the soil, unlike many non-organic farms that have destroyed the land they were built on. In this experiment we are not trying to slander organically grown fruits, but simply gain further knowledge on the bacteria they may carry and see how much they differ from non organic produce.

Maffei, Daniele F., Batalha, Erika Y., Landgraf, Mariza, Schaffner, Donald W., Franco Bernadette D.G.M."Microbiology of Organic and Conventionally Grown Fresh Produce."*Sciencedirect*. N.p., 20 Dec. 2016. Web. 10 Jan. 2017.

Burke, Maria. "Don't Worry, It's Organic." *Chemistry World*. Royal Society of Chemistry, 1 June 2014. Web. 11 Jan. 2017.

Materials (for the entire class):

-20 organic apples

-20 non-organic apples

-240 cotton swabs

-40 petri dishes

-tape

-10 sharpies

Materials (by group):

-2 organic apples

-2 non-organic apples

-24 cotton swabs

-4 petri dishes

-tape

-sharpie

Protocol:

To create the most effective experiment possible we will be swabbing two organic squashes and two non organic squashes. This will allow for every bacteria swab to be from a different area on the vegetable. This will reduce the risk for error within the experiment and allow for the most accurate representation of data. After the swabs have been left alone to grow the colonies chosen to be isolated will be picked due to their similarities. We will look at ten colonies from both the control and from the variable. The colonies we choose from the variable group will be the most visually similar of the bunch, as will the colonies chosen from the control group. This will also eliminate the swabs that may have been tampered with; therefore, their result would be different from the bunch and would not show accurate data. The colonies tested for gram staining will once again be picked due to which colonies are the most similar. By eliminating the colonies that act as outliers, the most accurate data that truly shows what the experiment displayed will be chosen and study. This will give the most concrete evidence in order to prove or disprove the hypothesis stated above.

Procedure:

1. Gather group’s materials
2. Label petri dishes: organic, non-organic, overnight organic, overnight non-organic with the tape and sharpie
3. Swab each apple three times
4. Put cotton swabs into petri dish accordingly (if you swabbed an organic apple, put it in the petri dish labeled organic and vise versa)
5. Record results and compare the data

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