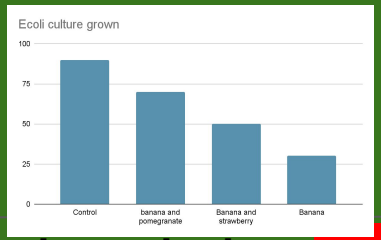
Eco-heal: A safe organic way to heal

Hypothesis:

If a pomegranate is used with a banana leaf, then it will be the most effective against E. Coli as a natural bandage.

Data analysis and graph :

The banana leaf itself had the least amount of bacterial colonization while the dishes with the fruit and the control dish had greater amounts of colonization. The control had the most bacterial colonization, the banana and pomegranate had the second most bacterial colonization, and the banana and strawberry had the third most bacterial colonization.



Methodology:

- Add E. coli to all 4 dishes and incubate for a day at 37 degrees celsius.
- Put a banana leaf in the 1st dish, a banana leaf mixed with strawberry in the 2nd, a banana leaf with a pomegranate peel in the 3rd, and leave the fourth empty.
- Incubate them at 37 degrees celsius.
- Record the bacterial colonies of each dish.

Interpretation and conclusion:

In conclusion, our hypothesis proved to be incorrect. Pomegranate, used with a banana leaf, is not the most effective against E. coli as a natural bandage. However, the data shows that a banana leaf itself is instead the most effective against E. coli as a natural bandage. This while surprising, is not a shock due to the fact that banana leafs have been used as a good bandage for decades throughout history.

Abstract

Throughout history banana leaves have been used as a natural bandage. There have been multiple ways to sterilize banana the banana leaves with the most common way being wilting which is done by passing the leaf over a flame.

Purpose

We know that while banana leaves are proven to be great natural bandage, we believed that they could possibly be made even more effective if fruit was used with them. The fruit we used to improve the effectiveness were pomegranates because the have a very good plant-based immune system and strawberries because they can boost the amount of white blood cells. On paper these combinations seemed like they could help enhance the banana leafs ability to fight off E. coli.

Research question

Problem: How to make banana leaves even more effective as natural bandages.

Hypothesis

Prediction: If a pomegranate is used with a banana leaf, then it will be the most effective against E. Coli as a natural bandage.

Variables

- **Independent variable: if fruit was added to banana leaf and what fruit it was.**
- **Dependent variables: Banana leaf**
- **Controlled variable: E coli**

Investigative Method

- Our goal was to see if we could make organic bandages more effective using
- We followed an order of putting the fruit if any that we were testing and then squishing said fruit with the pressure of the banana leaf so that the juices could infiltrate the plate and then spreading the bacteria that way the bacteria would be attacked the second it enters to determine the effectiveness of the fruit and its natural immunities against the bacteria.

Procedure

Step 1: Streak E. coli on agar plate, do this 4 times.
Step 2: Incubate for a day in 37 degrees celsius.

Step 3: Steam banana leaves repeat three times

Step 4: Skin pomegranate peel and slice strawberries

Step 5: Crush up banana leaves into four separate containers: one as just banana leaves, one for banana and strawberry slices, and one for pomegranate peels with banana leaves.

Step 6: Add compounds of banana leaves to separate containers of e coli.

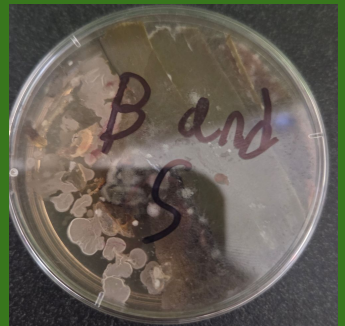
Step 7: Incubate each dish at 37 degrees celsius.

Step 8: Record results of colonies in the dish.

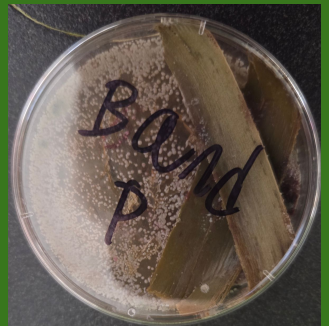
Control

Banana leaf

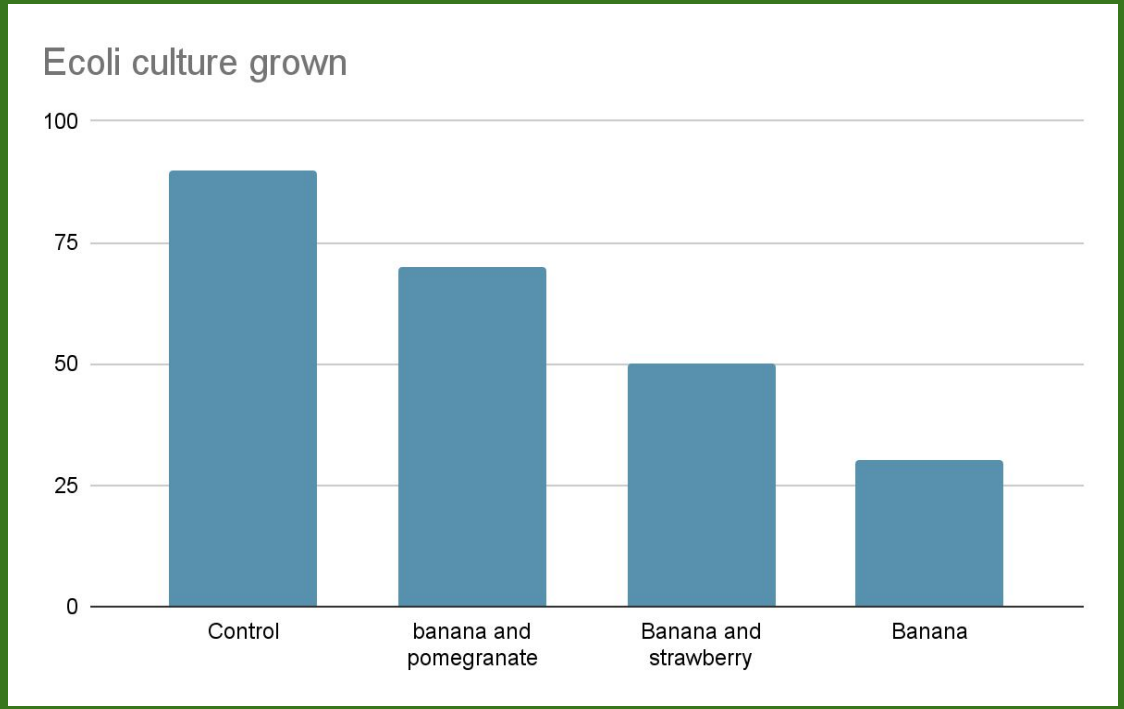
Strawberry with banana leaf



Pomegranate with banana leaf



Data



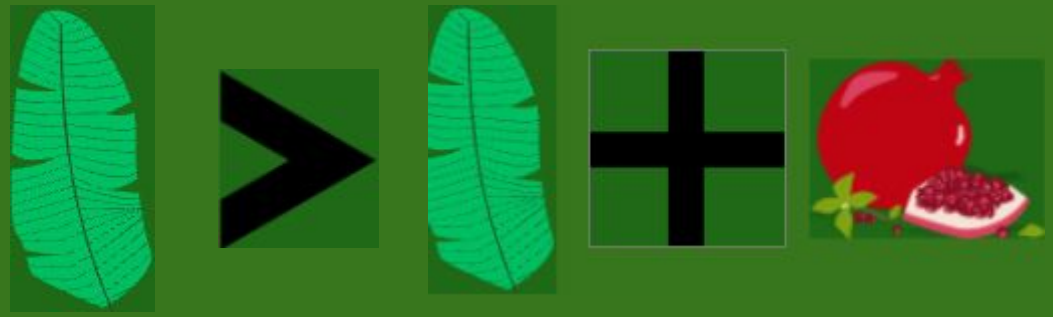
Combination	Percentage of plate covered
control	90%
Banana	30%
Banana and strawberry	50%
Banana and pomegranate	70%

Results

The banana leaf itself had the least amount of bacterial colonization while the dishes with the fruit and the control dish had greater amounts of colonization. The control had the most bacterial colonization, the banana and pomegranate had the second most bacterial colonization, and the banana and strawberry had the third most bacterial colonization.

Discussion and interpretation

We have discussed our results and it appears that while we thought the pomegranate with the banana leaf would prove to be the best in fighting off the bacterial infection it actually proved to be the exact opposite having more bacterial colonization than the banana leaf itself and the banana leaf with strawberry. The banana leaf itself was the best out of all three when combating the bacterial infection. The pomegranate and strawberry most likely worked against the banana leaf because of their high sugar content. This appeared to serve as food to the bacteria which helped boost the bacterial colonization despite the banana leaf working against the bacteria.



Implications and ideas for future research

The implication left by this experiment is that the fruit we used had too high of a sugar content to help fight against the E. coli.

Limitations and discussions

We could improve our idea by swapping pomegranate and strawberry with maybe oranges because of their high citric content or oregano oil because it has shown strong activity against E. coli. Another way we could improve our idea by using a liquefied sample of E coli because using the agar version of the E. coli could have caused the E. coli to spread unevenly. This wouldn't be possible if we incubated a liquified version of E. coli.

References

https://pmc.ncbi.nlm.nih.gov/articles/PMC3671682/

https://www.fruitnet.com/fresh-produce-journal/berries-could-help-heal-wounds/179856.article

https://pubmed.ncbi.nlm.nih.gov/23387359/

Inspiration for this experiment:
https://www.cnbc.com/2021/10/22/singapore-scientists-turn-durian-husks-into-bandages.html