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The Potential of Apple Peel Microorganisms to Break Down Fatty Acids

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By: Kristine Vang and Samantha Patricio

Abstract

The objective of the study was to see how effective bacteria from apple peels would be in breaking down fatty acids found in organic material. Apple peel pieces were sampled twice onto Diluted Broth (DB) and Tributin agar plates in a series of dilutions. Bacteria selected from the DB diluted agar plates was replanted onto Tributyrin agar plates in order to observe its cultivation from the composted apple peels and its ability to break down tributyrin. Antibiotic resistant testing was also conducted in order to identify bacterial resistance and a Polymerase Chain Reaction (PCR) so to identify the cultivated bacteria. This experiment was conducted twice over a span of 2 months resulting in inconclusive results. Due to additional nutrients in the Tributin agar plates, the bacteria did not exhibit any breakdown of the material but rather used it to grow. The tributin agar plates indicated differentiation in color, size, and shape for each selected bacteria.

Intro & Methods

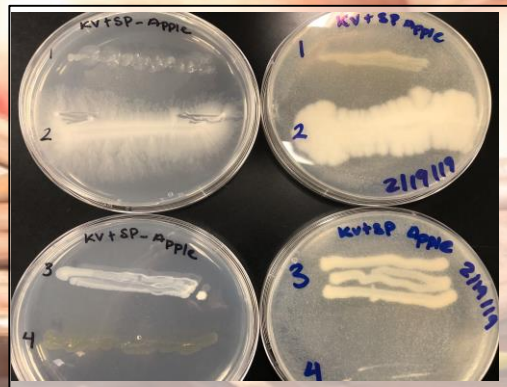
- Apple peels contain a fatty acid wax covering that's hard to decompose.
- The goal of this study was to see the ability of apple peel microorganism in break down of fatty acids on tributin agar plates.
- The outcome could impact the fatty acid break down in compost and the industry business. [1]

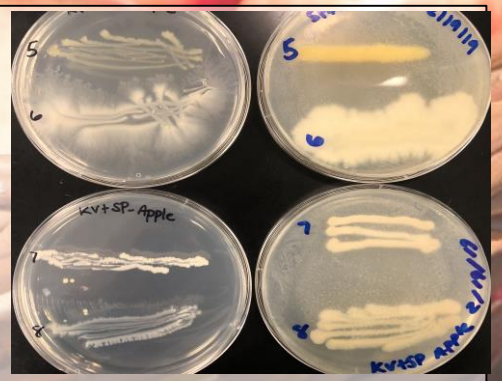
Diluted Broth & Tributin Agar plates

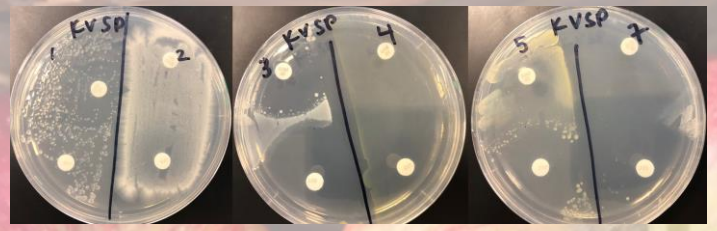
- Red apple peels composted in soil
- Peels cut into sterile water
- Three concentrations of sterile water and apple peel water onto Diluted broth agar plates.
- Cultivated bacteria transplanted on to Tributin agar plates.

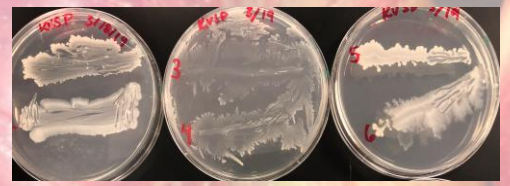
Antibacterial Resistance

- Lawn made from isolated bacteria
- Exposed to antibiotic disc, Sulfameth trimeth (SXT)









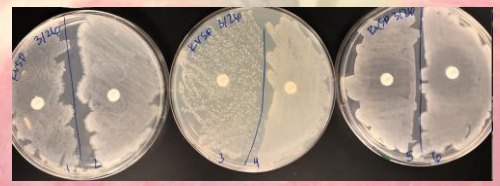


Table 1. Antibacterial resistance to the substance Sulfameth trimeth (SXT). Trial 1 and 2 were separately isolated and tested of DB plates, indicating susceptible and resistant bacteria (IR).

Samples - Trial 1	Results	Zone of Inhibition	Samples - Trial 2	Results	Zone of Inhibition
1	IR	--	1	Resistant	--
2	IR	--	2	Resistant	--
3	Not Resistant	4mm	3	Resistant	--
4	Resistant	--	4	Resistant	--
5	Not Resistant	2.8mm	5	Resistant	--
7	Not Resistant	3mm	6	Resistant	--

Results & Conclusion

- Tributin agar plates indicated a change in colorization and structure of the bacteria but no breakdown.
- Attempted to identify bacteria via the 16s ribosomal sequencing
- Trial two resulted in creation of biofilm, single bacterium was isolated.
- Results overall were inconclusive due to time and identification constrains.

Future Research

- For future research, conducting the experiment under different temperatures could indicate a difference in fatty acid breakdown.
- Changing the type of soil the apple peels were composted in.
- Leaving apple peels in the soil for a longer, shorter, specific period of time.
- Conduct better identification test using PCR or 16S ribosomal sequencing.

References

1. Sirisha, E., Rajasekar, N., & Narasu, M. (2010). Isolation and Optimization of Lipase Producing Bacteria from Oil Contaminated Soils. Advances in Biological Research, 5, 249-252.
2. Begum , Hasina, et al. "Availability and Utilization of Pigments from Microalgae." *Critical Reviews in Food Science and Nutrition*, vol. 56, no. 13, Feb. 2015, pp. 2209–2222.