

Evaluating the Effectiveness of Different Spices on the Inhibition of the Growth of Various Microorganisms

I) Problem:

Do spices affect the growth of microorganisms?

II) Background Information:

Throughout history, spices have served many purposes. The Chinese recorded the use of spices in cooking as far back as 2000 B. C. The ancient Egyptians enjoyed spicy foods and used spices in their embalming and mummification processes as well as in incenses and perfumes. By the Middle Ages, spices had been introduced to Europe. The European desire for spices was the motivation behind Marco Polo's voyage to the Orient and Columbus's voyage in search of a more direct route to the Spice Islands resulted in the discovery of America.

The use of spices in medical practice has been reported as far back as 1000 B. C. in Indian medical literature. During the Middle Ages, it was believed that pepper could ward off the black death (plague). Chili peppers have been used by many cultures as a cure for a variety of illnesses from the common cold to asthma. Cloves have been used in medicines to aid digestion and relieve toothaches. Black pepper, chili powder, and cloves are both bactericidal (able to kill bacteria) and bacteriostatic (able to prevent bacteria from reproducing).

Our spices are really old and probably have been used as medicines back then too. They have very different variables.

III) Hypothesis:

If Black Pepper helps bacteria grow then the black pepper will have the most bacteria.

IV) Experiment Plan:

Materials

Nutrient agar plates	Applicator sticks
Black pepper agar plate	Microorganism cultures
Chili powder agar plate	Cloves agar plate

Procedure

- 1) Be sure to follow sterile techniques during this lab so that contamination doesn't occur and ruin the results of this lab.
- 2) With a sterile applicator stick, pick up some of the assigned microorganism culture from the culture dish.
- 3) Streak the culture across the center of the nutrient agar plate in a straight line, beginning and ending about 2cm from each edge of the dish.
- 4) Discard the applicator stick in the autoclavable disposal bag.
- 5) Repeat steps 2-4 for the other three dishes of spice agar.
- 6) Label each dish with the type of agar and the microorganism's name.
- 7) Incubate the dishes for at least five days.

- 8) Record the growth of the microorganism on each plate in both qualitative and quantitative terms in the data collection section of this lab.
- 9) Share, collate, and record class results.

Experimental Components

Manipulated (Independent) Variable: *Black pepper, chili powder, cloves.*

Responding (Dependent) Variable: *The amount of bacteria*

Controlled (Constants) Variables: *Same length of time, same growing environments, same tools*

Control: *The plate without spices*

V) Data Collection:

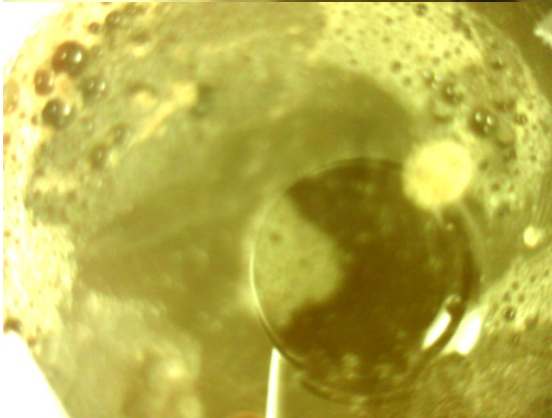
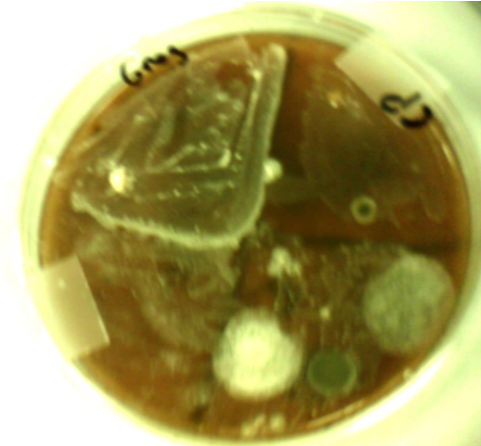
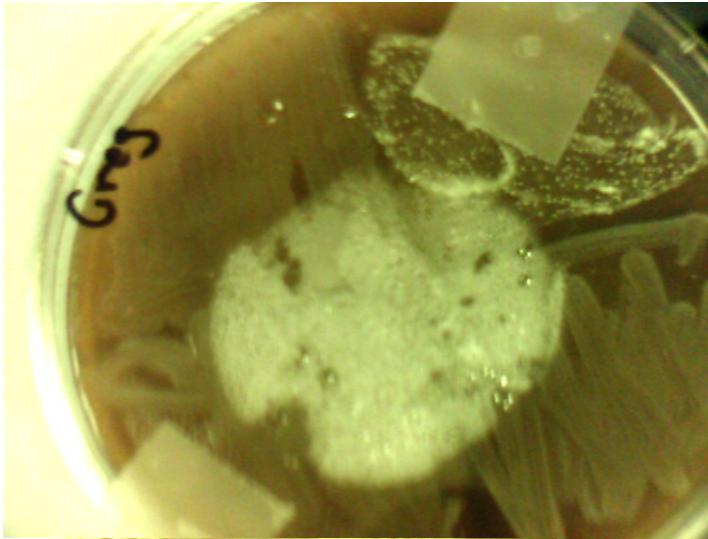
(Data should be recorded in both a qualitative and quantitative format. Qualitative data would be recorded as general observations and/or pictures. Quantitative data involves the recording of numbers, usually through measurements of some type.)

Qualitative Observations: Chili powder has a lot of bacteria while Cloves has very little bacteria and black pepper has an average amount of bacteria.

Data Table 1:

Microorganism type	Nutrient agar	Black pepper	Chili powder	Cloves
Bacillus cereus	8	5	3	2
Escherichia coli	7	6	6	7
Pseudomonas fluorescens	3	4	2	1
Saccharomyces cerevisiae	1	6	9	8

Photos:



VI) Conclusion

-Write 1+ paragraph(s) that explains the meaning of the collected data.

The meaning of the data is the ranking of how much bacteria that has grown. You number it 1 through 9. 1 meant a little and 9 meant a lot of bacteria. This helped us with our project and let us see it more clearly.

-Write 1+ paragraph(s) that answers the question asked in step one.

The growth of microorganisms is affected by spices because they are at different levels. This shows that the answer is yes to the question. They slow the growth of microorganisms. Cloves were the best at stopping the growth of microorganisms. Chili did slow the growth but not as well as the other spices. The control grew the most bacteria.

-Write 1+ paragraph(s) that explains any problems with the lab procedure that might have affected the results of the data collection. Explain what you would do different if you were to repeat this lab.

The lab problems that we had included finding background information. It took us a while to find that research.

