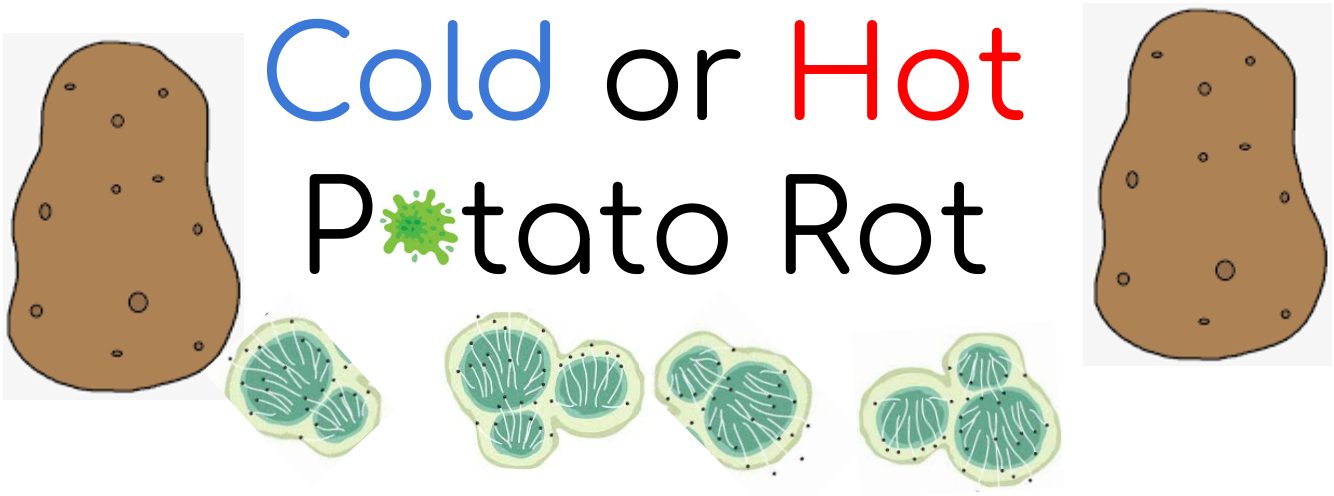


Problem

If I put potatoes in different temperature environments, will the temperature affect how fast they rot? I want to see which potatoes will have more rot at the end of a certain period. They will each be exposed to a different temperature range. The most mold at the end will answer this question.

Abstract

Everyone is looking for a temperature in which to store their potatoes. When doing research, you always get mixed answers and results from people who have tried different methods. This project is meant to determine the best temperature to store your potatoes at in order to reduce rot. I researched the best temperature to store potatoes, as well as the different factors that cause rot, leading me to believe that the hottest temperature would generate the most rot. This experiment tests potatoes under three different temperatures. Two potatoes were placed under a heat lamp with the average temperatures ranging from 92 to 96 degrees fahrenheit. Two more were placed inside a fridge at temperatures from 42 to 46 degrees. The last two were placed on a desk, resembling a room temperature environment of 76 to 80 degrees.

My hypothesis was that, if potatoes were placed in three different temperature environments, then the potatoes in the hottest environment would have the most rot at the end of the experiment. Because I learned that bacteria grows best at high temperatures, my hypothesis was based on fact.

At the end of 44 days, I observed which potatoes had the most rot by using a simple grading scale. The results of my experiment were that the hot potatoes had the most rot. Both showed severe wrinkling, with one having black liquid oozing from the bottom. The room temperature potatoes had proof that they were starting to wrinkle with slight depressions around each pore. The cold potatoes had only slight discoloration.

Project Overview

For my science fair project, I will be testing the effects of temperature on potatoes. I will be putting two potatoes under a heat lamp. This group will be at a temperature of 92-96 degrees Fahrenheit. The control group will be the two potatoes that I will place on the counter. These will be around 76-80 degrees. My last group will be the two that will go in the fridge at a temperature of 42-46 degrees. After 44 days, I will determine which group developed the most mold using a simple grading scale. This will show what temperature causes the most rot.

Research

What causes rot? There are many factors that cause rot. A few include enzymes,

oxidation, and microorganisms.(University of Nebraska) Enzymes are the chemicals that help in the ripening process.(University of Nebraska) These will cause a potato to rot by making it overripe.(University of Nebraska) Oxidation is the reaction of air to food components.(University of Nebraska) Microorganisms like bacteria, yeast, and mold eat away at the food, causing it to rot.(University of Nebraska) These do not grow in the freezer and grow best at room temperature.(University of Nebraska)

How does heat affect the rotting process? Bacteria grows best at temperatures of 40 to 140 degrees fahrenheit.(Jillian Cubala) When in this temperature range, E. coli and Salmonella can develop.(Jillian Cubala) It also develops in a moist, warm environment.(Florida Department of Agriculture)

The recommended storage temperature for potatoes is 43-50 degrees fahrenheit.(Krista Green) This would be around the temperature of a fridge.

How do decomposers affect the rotting process? Decomposers, including bacteria, are a big factor in the rotting process. Decomposers need air to thrive.(Science World) They also speed up the decomposition process when the temperature gets hotter.(Science World) The higher the nitrogen to carbon ratio, the more energy the decomposers can receive, making the process even faster.(Science World)

Hypothesis

If potatoes are put in 3 different temperature environments, then the potatoes in the hottest environment will have the most rot at the end of the experiment.

Variables

Independent: Environment temperature

Dependent: Amount of rot that develops due to the different temperatures.

Controlled:

- Plate
- Two potatoes
- Size of Potatoes
- Size of the range of temperatures
- Date of project start
- Date of project end

Materials

Thermometers
Potatoes

Plates
Fridge
Heat lamp

Procedures

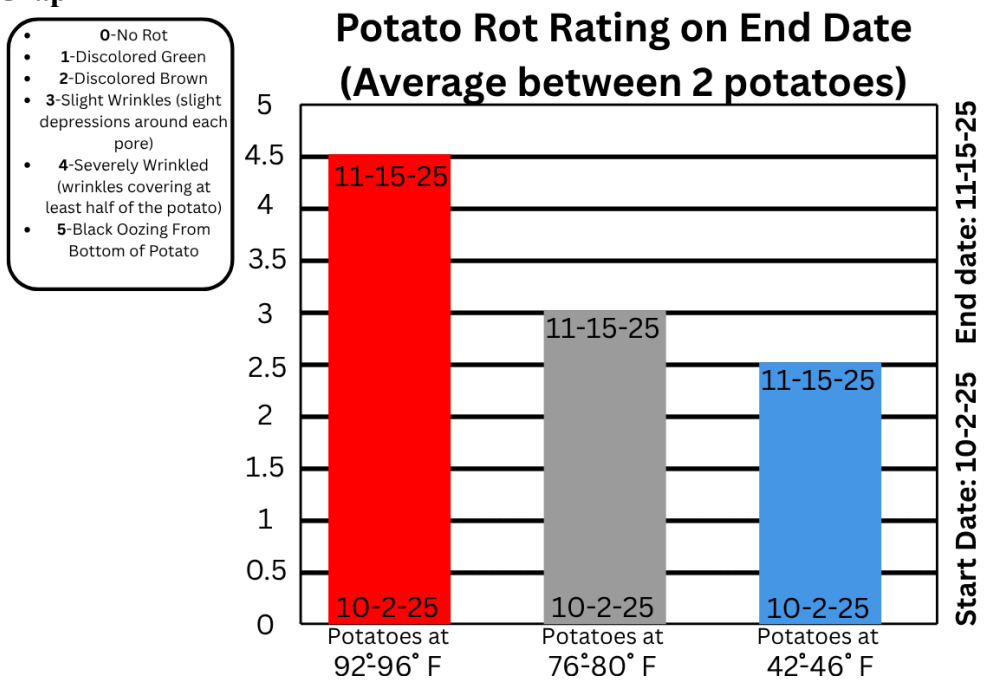
1. Set up a heat lamp and fridge space, along with space on a desk or counter.
2. Put two potatoes on a paper plate. Do this three times.
3. Put one of these plates under a heat lamp with a thermometer.
4. Put the second plate in a fridge with a thermometer (preferably one that does not open frequently)
5. Put the last on a desk or counter with a thermometer.
6. Record the temperatures for about three days, once in the afternoon and once in the morning.
7. Use this to make an estimated range of temperatures to use in the data.
8. After 44 days, record which group has the most rot.

Data/Observations Table

Rating of Rot: 0-No Rot, 1-Discolored Green, 2-Discolored Brown, 3-Slight Wrinkles (slight depressions around each pore), 4-Severely Wrinkled (wrinkles covering at least half of the potato), 5-Black Oozing From Bottom of Potato

Date	Under heat lamp 92º-96ºF	In the fridge 42º-46ºF	On the desk 76º-80ºF
Start 10-2-25	0	0	0
End 11-15-25	Potato1- 5 Potato2- 4 Average 4.5	Potato1- 3 Potato2- 2 Average 2.5	Potato1- 3 Potato2- 3 Average 3

Graph



Results

The results of this experiment were as the hypothesis predicted. The hotter the temperature that the potatoes were kept at, the more rot was evident. On the end date, the potatoes under the heat lamp showed a large amount of wrinkling. One even showed black liquid oozing from the bottom. Those on top of the desk showed a minimal amount of wrinkling. The potatoes that were placed in the refrigerator had the least rot, showing only slight discoloration.

Conclusion

The results of this experiment proved that the hottest potatoes showed the most rot. The research that was done prior to the experiment showed that the hotter the temperature, the faster rot will develop. Therefore, the research was supported by the

results. The hypothesis was also supported in the results. The hypothesis stated that if potatoes are placed in three different temperature environments, then the potatoes in the hottest temperature will have the most rot at the conclusion of the experiment. This is exactly what happened, proving the hypothesis to be accurate.

Recommendations

I think that this project could have been improved with some small changes. First, I would change the object that is supposed to rot. The potatoes took a long time, not showing big differences with rot. A greater difference could have been seen if I had used something like an apple or carrot. These are more likely to rot faster. Second, I would have liked to have a more controlled environment. I would like to have a fixed temperature and controlled humidity to make the experiment more stable and controlled.

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