Yeast Counts Over Two Weeks Given Solutions With Varying Sugar Concentrations

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Biology 160: General Biology w/ Lab

Abstract

We set out to find out how yeast survive given different concentrations of sugar over time. We hypothesized that the yeast given a higher concentration of sugar would have a higher rate of survival, and we found that we were correct, but were surprised by the results of the yeast in lower concentrations as well. Ultimately, we wanted to gain an understanding of what it takes for yeast to thrive and reproduce in different circumstances.

Introduction

We wanted to know how sugar concentration affects yeast growth over time. We thought that the yeast given the most sugar would grow more than the yeast given less.

In our experiment, our control group was the yeast given no sugar. The independent variable was the amount of sugar given to each group, and the dependent variable was the amount of yeast in each mixture.

We used the same type and amount of yeast in each mixture. We also kept the temperature and type of sugar constant for each mixture, and each of the yeast mixtures spent the same amount of time in the sugar solutions. The only variable we manipulated was how much sugar was given to the yeast.

Methods

Materials & Location

In order to perform this experiment, we used different concentrations of fructose in 25 mL Erlenmeyer flasks, 10mL graduated cylinder and 10mL pipettes to measure and dilute the yeast, a balance, methylene blue to stain cells, a microscope with a hemocytometer and tally counters to count the yeast cells.

Procedure

First, we mixed one packet of yeast with 50 mL of water. We created our sugar concentration solutions by adding 1, 2, 3 and 4 grams of fructose to 10 mL of water each. We then added 10 mL of our yeast mixture to each of the sugar concentration solutions, with a 0% sugar control group. We added methylene blue to the control mixture and found our initial count using the hemocytometer. Every Tuesday and Friday after our initial count, we diluted the yeast and sugar mixtures 1 mL yeast/sugar: 10mL water, added methylene blue and counted and recorded the cells in each one.

Yeast Count By Concentration

	Yeast Count Dates				
Sugar Concentration	3-Mar	7-Mar	10-Mar	14-Mar	17-Mar
10%	2,400,000	65,400,000	61,200,000	65,200,000	54,000,000
20%	2,400,000	57,800,000	51,800,000	44,400,000	78,800,000
30%	2,400,000	41,000,000	52,400,000	50,600,000	54,400,000
40%	2,400,000	31,400,000	43,800,000	52,400,000	80,400,000

Table 1. This table represents the amount of yeast cells counted per concentration over the course of two weeks.

Yeast Count in Two Weeks

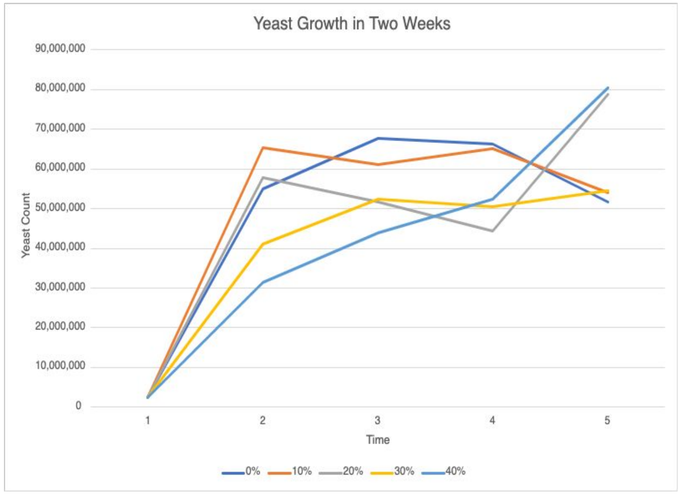

Figure 1. The chart shows the total yeast count each time we tallied the amount of yeast in each sugar solution. This shows that the yeast given 40% solution had the most growth over time, and the 20% had the next highest growth.

Discussion

We found that the group with the highest yeast count was the 40% concentration group and the group with the lowest count was the 0% control group. The 20% concentration had the second highest count as opposed to the 30% concentration, which is what we expected. We also found that the 10% and 30% concentrations had nearly the same counts. We were correct in that the highest concentration of sugar yielded the highest yeast count, however, that conclusion would suggest that 30% would produce the next highest, and so on, but that wasn't our finding. This data would suggest that a higher concentration of sugar does not always correlate with increased yeast production. We know that when yeast are given no sugar, they will not survive at the same rate as yeast given sugar.

When we participated in the fermentation lab earlier this quarter, we found that the yeast fermented at a higher rate when given a 20% sugar concentration vs less or more sugar. This supports our finding that more sugar isn't necessarily better for yeast survival. Performing this experiment over a greater period of time allowed us to find that yeast counts peak at a certain time depending on concentration, but eventually plateau and then decline.

The implications of our experiment can be applied to different circumstances within food and beverage production, such as bread and beer. People working in these industries should understand how certain conditions affect yeast behavior and viability.

Acknowledgements

Thank you to Lauren Maniatis and Bethany for assisting in accumulating materials and consulting with us regarding our experiment design and procedures. Thank you also to Whatcom Community College for providing the lab materials and work space.

References/ Work Cited

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