

Abstract

For our project we were experimenting with corn sugar, brown sugar, white sugar, powdered sugar, with glucose as the positive control and water as the negative control. We were testing to see how the different forms of sugar would react with yeast fermentation. We hypothesized that the forms of sugar will change the rate of yeast fermentation compared to the control group. According to our data it supports our hypothesis because different forms of sugar ended up fermenting the most when our negative control didn't ferment at all. The importance of experimenting with different forms of sugar to see how it would ferment with yeast is that baking is a big part of our industry and knowing how yeast will react with different sugars is very important.

Introduction

For this study we decided to investigate if different forms of glucose would have a different effect on yeast fermentation. In one study we referenced it noted yeast fermentation for the products beer and wine (Tarziu, 2023). Another study researched the strength, density and taste of dough with different forms/ concentrations used (National Center of Biotechnology Insitute, 2022). The variables we studied were comprised of white, brown, and powdered sugar along with, corn syrup, glucose concentrate, and water all mixed with a yeast solution. The glucose concentrate we used as our positive control and water as our negative control. We hypothesize that different forms of glucose will have different effects on the fermentation rate of yeast.

Methods

Materials & Location

For each trial for this experiment, we used 6 test tubes, 6 fermentation tubes, 7 pipettes, 1 pipe header, 7 stir sticks, 1 packet of yeast, and for each trial we had one less mL of sugar solution starting with 10mL of corn syrup solution, 10mL of brown sugar solution, 10 mL white sugar solution, 10mL of powdered sugar solution 10mL of glucose solution, and 10mL of water, then taking away 1mL every trial after that.

Procedure

For our experiment, we labeled 6 test tubes 1-6, 6 fermentation tubes 1-6, we had made our yeast solution with one yeast packet and 60 mL of water then stirred with a stir stick, then we added 10 mL of yeast solution to each test tube, then added 10 mL (after each trial we used 1 less mL of sugar solution) of each sugar solution(corn syrup, brown sugar, white sugar, powdered sugar, glucose solution, water) after all the test tubes were filled with yeast solution and sugar solution we used a different stir stick to stir each tube then poured them into the fermentation tubes, then put them in the incubator for 12 minutes then collected the data of the fermentation rate.

How Different Forms of Sugar Affect Yeast Fermentation

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Discussion

When comparing the rate of fermentation between different forms of sugar, there isn't exactly a clear/linear pattern at which CO2 is produced which can support our original hypothesis. Something that all the types of sugars had in common were a spike of CO2 production in correspondence to the milliliters of sugar added, specifically a spike in the range of 6-8 milliliters. We discovered that overall brown sugar was the most productive, however, corn syrup had the highest rate in a single trial, and all had different effects in CO2 production.

During our study we were surprised to not see one outlier in all of the trials, there was a steady amount of CO2 production between all of the sugars aside from the singular trial number four (7ml) where corn syrup has the highest rate. This study supported our hypothesis as there were different interactions between each form of sugar. In one of our references from the *National Center for Biotechnology Information*, they studied the effects of sugar on yeast pastry making and its impact on the products characteristics. Our reasoning behind performing these experiments were to see if/what differences can be found with different forms of sugars. The similarities our study had with other studies was the amount of CO2 produced with each type of sugar, but other studies did have a bit more in depth look than our capabilities, one looked at the dough strength, density, taste, etc. along with the amount of CO2, which is quite interesting as the sugar did have an effect in those areas.

Our study did show us different interactions from sugars and yeast but in the future if it were to be done again, some things could have been adjusted, we feel if the sugar solutions were mixed fresh with each trial to prevent the separation that this potentially could have altered results as they would have not started separating or different concentrations could be trialed.

Acknowledgements

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References/ Work Cited

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Fermentation Rates of Different Forms of Sugar

	10mL	9mL	8mL	7mL	6mL
Corn syru	0.16	0.16	0.82	1.02	0.73
Brown sug	0.20	0.25	0.86	0.93	0.85
White sug	0.15	0.16	0.85	0.92	0.86
Powdered	0.18	0.18	0.83	0.95	0.78
Glucose c	0.12	0.13	0.65	0.75	0.53
Water	0.00	0.00	0.00	0.00	0.00

Table 1. This table displays the rate at which CO2 was produced in correspondence to the volume of sugar added to 10 mL of yeast solution. All measurements are in CO2/min.

Fermentation Rates of Different Forms of Sugar

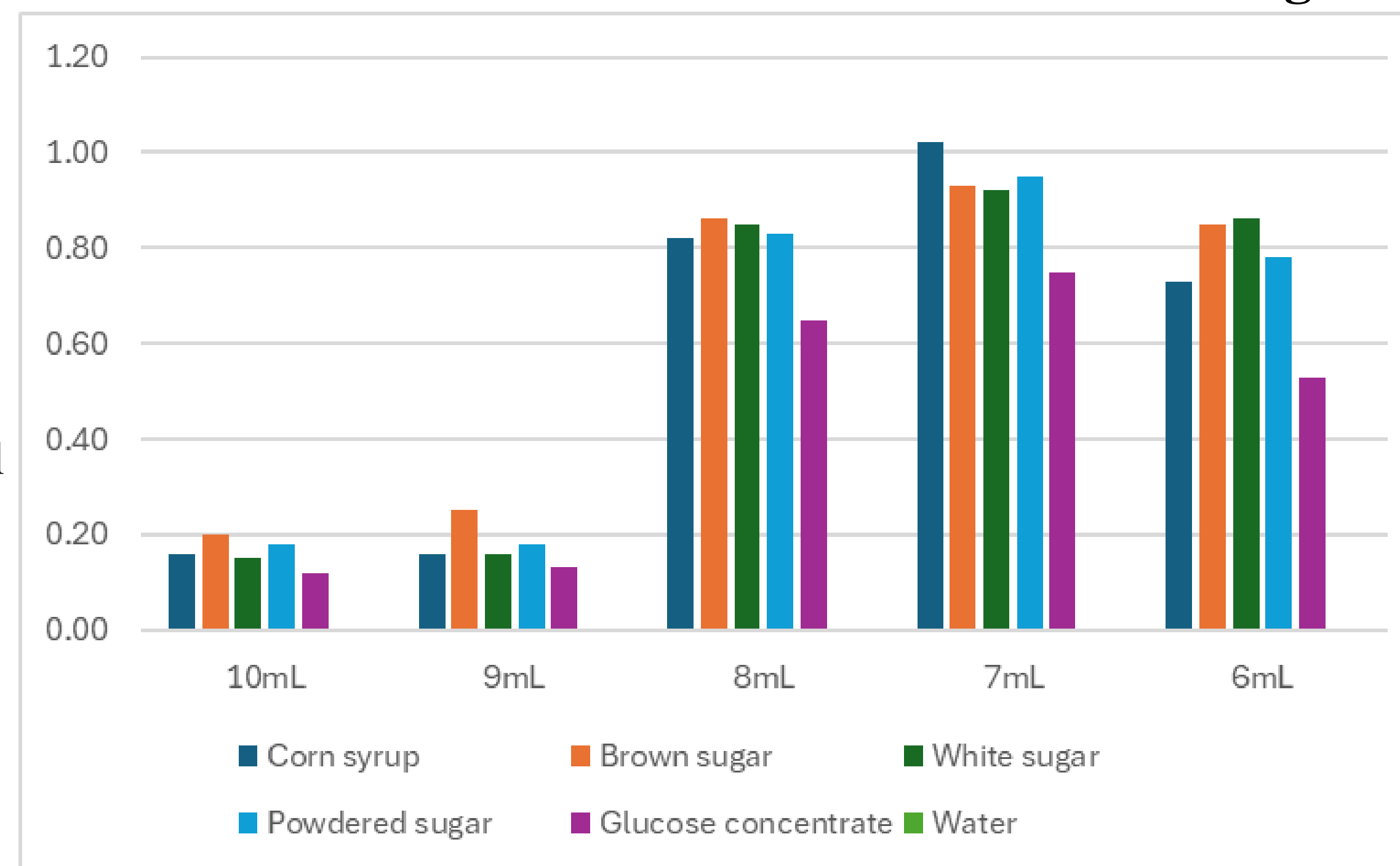


Figure 2. This graph provides a visual for our data, comparing the total rate of fermentation between the different types of sugar.