

Abstract

In this experiment, we studied how ale, wine, and baker's yeast affect fermentation rates. We hypothesized that wine yeast would ferment the fastest because it tolerates higher alcohol levels and processes sugar efficiently. Our results rejected this hypothesis. Understanding these differences is important for improving baking and brewing processes, making them more efficient and better suited to specific industrial needs.

Introduction

This study analyzed how ale, wine, and baker's yeast affect fermentation rates, with yeast type as the independent variable and fermentation rate as the dependent variable. Using fermentation tubes and a 20% sucrose solution, we hypothesized that wine yeast would ferment the fastest, used in all three yeast types, dominates fermentation due to its high fermentative capacity and stress tolerance, such as low pH and high osmotic pressure (Warringer et al., 2011; García-Ríos et al., 2014). These traits make it ideal for examining performance differences among strains.

The study aims to improve baking and brewing efficiency by identifying the most effective yeast, optimizing product quality and resource use.

Methods

Materials & Location

For this experiment, we used 50mL beakers, pipettes, 10mL of water added to different yeast solutions, using baking, ale, & wine yeast, as well as adding 10mL of Sucrose sugar to the yeast solutions in test tubes, before transferring these solutions from test tubes to fermentation tubes. This was done during our Lab sessions.

Procedure

What we did was first combine the different yeasts with the 10mL of water in the beakers to make the solution we needed before using pipettes to transfer this solution to the test tubes, after which we also combined 10mL of Fructose with it. After everything was combined in the test tubes, we transferred the solution to the fermentation tubes to be placed in an incubator for 10 minutes, before taking the fermentation tubes back out to record where the level of our solution was at now, compared to the level the solution was at when it was poured in the fermentation tubes. Showing us how the different yeasts reacted to the Sugar we used to ferment it.

How does the type of yeast effect fermentation rate?

Daniel Almaraz, Ngoc Le, Aixa Sandoval

Biology 160: General Biology

Fermentation rate every 10min

Wine	Ale	Active dry
1.32	9.1	6.8

Table 1. This data represents the fermentation rate of three different yeast types, measured in CO₂ production (mL) every 10 minutes over a period of three weeks using fermentation tubes.

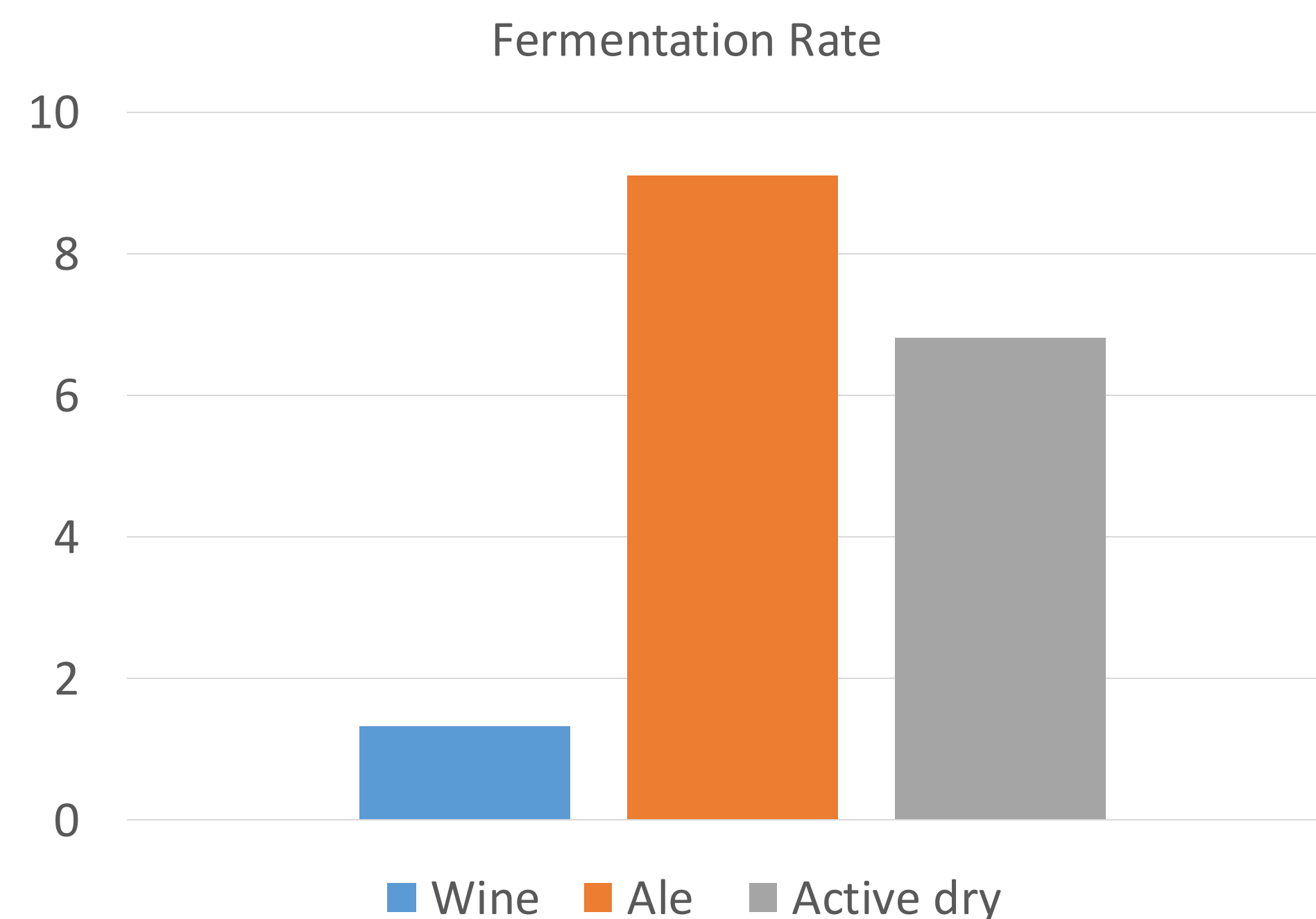


Figure 1. Fermentation rates of three types of yeast measured over three weeks using fermentation tubes. Ale consistently exhibits the highest fermentation rate throughout the three-week period.

Discussion

We hypothesized that wine yeast would have the fastest rate of fermentation, compared to ale & baker's yeast. During the duration of our tests with the different yeasts, we recorded that ale yeast fermented the fastest, compared to the wine & baker's yeast which seemed to ferment at slower rates. With the wine yeasts reaching levels 1.1(W1), 1.1-2.1(W2) & 1.3-1(W3) from their starting levels throughout the 3 weeks of testing, ale yeast reaching levels ranging from 8(W1), 6-7(W2) & 11-10.5(W3) from their starting levels; and baker's yeast levels reaching from their starting levels ranging from 7(W1), 8-6(W2) & 5-8(W3) throughout the weeks. Given these numbers, it's clear that among the different yeasts, wine yeast is the one that seems to ferment the fastest when combined with a 20% sucrose concentration.

The purpose of these tests was to prove our hypothesis that wine yeast ferments the fastest among the 3 yeasts chosen. With the results gleaned from the 3 week's-worth of tests, it's clear that the wine yeast ferments the fastest, given that it reached the lowest levels among all the yeasts. Despite the fermentation tubes being different sizes, as well as the fact that not all the yeasts were most likely put in the same fermentation tubes as before, when comparing the results of the 3 weeks of tests on the yeasts, I think it's safe to say that the fermentation of ale yeast is the fastest, compared to the others.

Our tests over the weeks showed that our hypothesis—that ale yeast ferments faster than wine and baker's yeast—was incorrect. However, one limitation of our study was the possibility that yeast samples were not consistently placed in the same fermentation tubes across tests. Something I suggest for anyone who may perform a similar project to this is to record which solution is put in which fermentation tube. Like I said before, I'm not sure we put the same kind of yeast solution in the same fermentation tubes as the first test. So, recording which fermentation tube is used for which solution is important, so you can make your results from tests performed as accurate as possible.

Acknowledgements

First, I would like to express my gratitude to Lauren Maniatis for guiding us through the process, ensuring we understood each step necessary to complete the research and use the proper equipment. Her commitment to asking us questions to help us keep up with the process and her willingness to observe us during the experiment are things I truly appreciate. I would also like to extend my sincere thanks to Bethany, our lab technician, for helping us prepare the yeast and assisting us in finding the specific strain we needed for our research.

References/ Work Cited

Jenifer Molinet., Francisco A.Cubillos, (2020, November 01). Frontiers in Genetics. *Wild Yeast for the Future: Exploring the Use of Wild Strains for Wine and Beer Fermentation*, volume 11, page 1. Retrieved July, 30, 2020.