Effects of Temperature on Fermentation Rates of Different Types of Yeast

Jacob Kuhn, Isabelle Vargas, Jaxon Reid
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Abstract

In our experiment, we found that lower temperatures around the temperatures of 60 and 65 degrees Celsius helped ferment the yeast more than a higher temperature would. We found that with the yeast, Safcider, it did not ferment at all because the temperatures of 60, 65, and 70 degrees were too hot for yeast to survive. The yeast died and did not ferment. Our hypothesis was, “Warmer temperatures will lead to more yeast growth of all different types of yeast.” We were proven wrong with our hypothesis and the results proved that colder temperatures (60 compared to 70) helped ferment the yeast more.

Introduction

The purpose of our experiment was to determine how different types of yeast respond to different temperatures and what temperatures help ferment yeast most efficiently. This experiment allows us to better understand that not all yeast can thrive under the same conditions compared to others By using different temperatures of water and leaving all other variables constant, we can see how the fermentation rate of each yeast is affected. We believe that fermentation rates will be higher at higher temperatures because reaction rates in chemistry increase as temperature increases.

Methods

Materials & Location

-Scale for measuring 5 grams of each yeast.
-Yeast packets (3 Active Dry yeast packets, 3 Nottingham yeast packets, 3 safcider packets)
-3 fermentation tubes for each yeast
-150 ml beaker for measuring 50 ml of water .
-Pipets (several for each experiment)
-Sucrose
-Three water baths at 60, 65, and 70 degrees Celsius

Procedure

We tested three yeasts: Active Dry, Nottingham, and Safcider. We took each yeast one at a time, measured 5 grams, and poured it into 50 milliliters of water. We then stirred the yeast solution together, took out 10 milliliters and added it three test tubes. To each test tube, we added 10 milliliters of sucrose and stirred the solution together. We then poured the yeast-sucrose solution into 3 separatee fermentation tubes. Each tube was labeled either 60 degrees Celsius, 65 degrees Celsius, and 70 degrees Celsius. We then put each fermentation tube into its corresponding water bath and observed the fermentation rate of each test tube when it was put in water. We did this whole process with all three yeasts and did the experiment over three trials.

Descriptive Title for your Table

	Active Dry Yeast			Nottingham Yeast			SafCider Yeast		
°F	60	65	70	60	65	70	60	65	70
Trial 1 (mL CO2)	5.5	6	5.1	4.5	2.5	0.5	0	0	0
Trial 2 (mL CO2)	6.6	3.5	2	5.4	3.2	2.3	1	1	0
Trial 3 (mL CO2)	6.2	5.4	0.7	5.5	3.8	2.5	1	1.8	0.6

Table 1. Temperatures and types of yeast are shown on the x-axis. Milliliters of CO2 is shown on the y-axis as the independent variable.

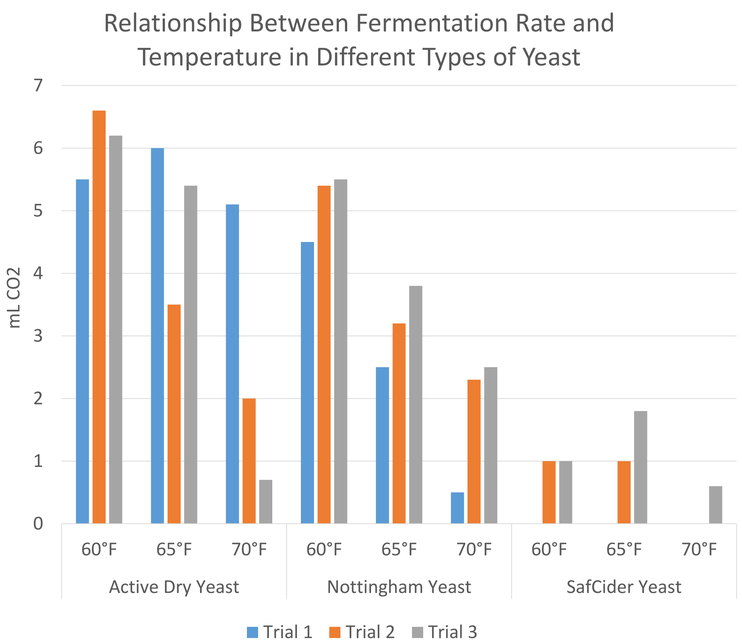

Figure 1. mL of CO2 produced are shown on the y-axis. Temperatures and types of yeast are shown on the x-axis. All three trials are grouped together in columns for each temperature.

Figure 2. Safcider yeast was killed at the tested temperatures. As shown in the picture, the yeast separated from the sucrose solution.

Discussion

Our research gave us a variety of results Each yeast reacted in a different way when submerged in the water baths. The Active Dry yeast reacted in the way that we predicted it would. The opportune temperature for fermentation was 65° C. We had a small error that did skew our data. When adding the sucrose and yeast into the test tubes, we added the sucrose first, which didn’t allow for the substances to fully mix before we placed them in the baths. The Nottingham yeast fermented best at 60° C, which was not the results we were expecting as we hypothesized that all yeasts would ferment at a higher rate with a higher temperature. The SafCider yeast gave us the most unexpected reaction. We saw little to no fermentation with this yeast and it actually separated from the sucrose, leaving behind a cloudy liquid sitting on top of the yeast. We found that this temperature is too high for cider yeast to ferment and kills the yeast. The best temperature to use is roughly 26-32° C, according to The American Homebrewers Association. If we were to do this experiment again, we would fully mix the substances every time we tested them, as well as use a wider range of temperatures to test, to set ourselves up for the best results. Overall, we found that 60 ° C had the highest fermentation rate for Active Dry and Nottingham yeast and all of the temperatures we tested were too hot for the SafCider yeast.

Acknowledgements

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