What Do Different Sugars Have On The Effect of Yeast Growth

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Abstract

Our research project investigates how different sugars effect the growth of yeast. We hypothesize yeast culture growth after one week intubation will show what sugar source fuels yeast the best. Our data that we have collected supports our hypothesis. The accuracy in our count and math throughout this experiment was crucial in order to get reliable and accurate results.

Introduction

This study reviewed how food sources affect the growth of yeast. We referenced biology 160's hemocytometer introduction and protocol (hemocytometer protocol **and** hemocytometer intro) and Single-Celled Science: Yeasty Beasties (Buddies, S.2014) **to set up an experiment to investigate questions about yeast growth and food sources. Using the hemocytometer information we were able to navigate an experiment to test our hypothesis. The hypothesis of the experiment was yeast culture growth after 1 week incubation will show what food source fuels yeast the best. In our experiment the food sources were 4 types of sugar: sucrose, maltose, glucose, lactose. We mixed the source with a yeast concentration and used a water source as the control and incubated the specimens for 48 hours then counted the yeast cells after 7 days. Calculations were performed after counting 3 trials of specimens and data verified the sugar source with the highest yeast cells count.**

Methods

Materials & Location

The contents of our experiment included: Yeast, water, and sugars (sucrose, maltose, glucose, lactose). To accurately and precisely measure we used the following instruments: pipettes, microscope, hemocytometers, counters, and test tubes. The entirety of the experiment took place at Whatcom Community College, Kulshan Building, Lab 110.

Procedure

1)This experiment began with a yeast solution of 50 ml of water for one packet of yeast.

2) We then took 5mL of full-strength yeast mixture and 5mL of each of the different sugar mixtures and combined them in a test tube to incubate for 48 hours and refrigerated for 5 days.

3) After the yeast incubated, we created a diluted solution of the yeast/sugar mixture (5mL H20/ 5mL sugar-yeast). This mixture was placed in hemocytometers for viability to be examined and calculated under a microscope.

4) To ensure accuracy, this trial was tested 3 times and recorded for comparison.

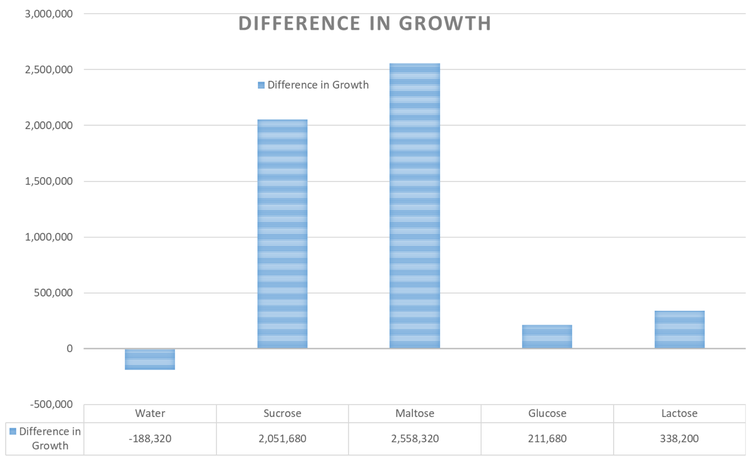

Figure 1: **This graph illustrates how cell growth was affected by each sugar. We measure the difference in growth, meaning we subtracted out original count (7,675,000 live cells/mL) from each of the end results. This led us to see what the total growth amount was by the end of our investigation**

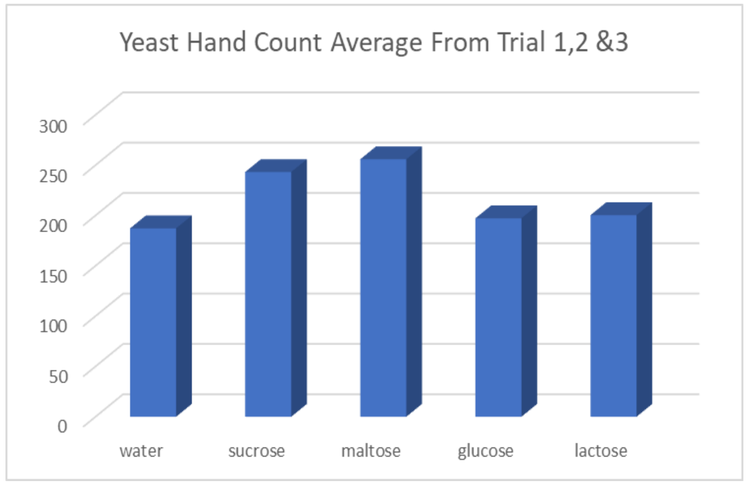

Figure 2:
Average count by hand via microscope of each source from trial 1, 2, and 3.

Discussion

Our hypothesis purposed, after a 1-week period of yeast being processed through incubation with a variety of sugar sources we would be able to determine which sugar source fueled yeast growth the best. To investigate what sugar source effects yeast growth, we conducted a 1-week experiment involving 3 trials of 4 sugar sources and 1 water source mixed with a yeast concentration. The sugar sources (maltose, lactose, sucrose, glucose) were the dependent variable, with the yeast concentration as the controlled variable and the water specimen was the control group. 3 trials of the 5 sources/yeast combinations were placed into specimen tubes, covered, and stored into an incubator for 48 hours. Incubation enhanced the yeast's metabolism response to its combined source. After 2 days the specimens were transferred to a fridge until day 7. On day 7, all 3 trials if specimens were sampled. The samples were diluted with water, then prepared to undergo a hemocytometer protocol (hemocytometer protocol) and were evaluated for yeast cell growth. Sample sources were counted twice per trial and recorded. Overall cell count per source was averaged, calculated, and then compared to the initial cell count of 7,675,000 live yeast cells/mL. Maltose showed a 2,558,320 live yeast cell/mL increase of growth to the initial yeast concentration after 7 days, confirming it as the best sugar source in the experiment for yeast growth.

The results showed the water control group as a poor source for yeast growth. After 1 week the cell count was reduced, verifying cell death. Sucrose and maltose counts were close in average, but maltose had over 500,000 yeast cells more than sucrose in the experiment. Conducting our experiment with multiple trials provided sufficient data to support our hypothesis, as there some were challenges with running a study for our first time. But by reviewing Single-Celled Science: Yeasty Beasties (Buddies, S.2014) and referencing the hemocytometer protocol and hemocytometer intro we successfully navigated our experiment in a similar manner. We used the hemocytometer resources for cell counting the samples on a hemocytometer slide under a microscope, following the protocol for measurements and calculations of the yeast cells. At the end of the experiment our results were comparable to the prior hemocytometer lab performed in class. Confirming our data collected was a reliable source of support to our investigation.

Limitations to the study included duration and protocol setup. Ratio of dilution in the experiment fluctuated per specimen type due to high yeast concentration growth after being stored for 7 days. If duration was study was shorter, cell counting for the samples would be more manageable and consistent for collecting data. Recommendations for future research would be using smaller amounts of ingredients when conducting a similar experiment. The overall sample that gets measured is microscopic. Having a large specimen source could contribute to inconsistent distribution of the samples which could affect the entire experiment.

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References/ Work Cited

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