Investigating the Effects of Disaccharides and Monosaccharides on the Rate of Respiration in Saccharomyces cerevisiae (S. cerevisiae)

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Saccharomyces cerevisiae has a preference for consuming disaccharides and monosaccharides relative to any other carbon source. It is able to respire either aerobically or anaerobically, releasing energy as ATP and producing carbon dioxide waste in both processes. The effects of different types of disaccharides (maltose, sucrose) and monosaccharides (fructose, glucose) on the rates of respiration in S. cerevisiae (yeast) were examined in this experiment. It was hypothesized that allowing S. cerevisiae to respire in the presence of monosaccharides will yield higher concentrations of carbon dioxide gas produced, which would also result in higher rates of respiration compared to respiration in the presence of disaccharides. For each trial, 1g of S. cerevisiae was mixed in a plastic bottle with 2g of different types of disaccharides and monosaccharides dissolved in water and left to respire for 5 minutes in a water bath while the concentration of carbon dioxide gas produced was measured by utilizing a carbon dioxide gas probe. Data was analyzed using a one-way ANOVA. The monosaccharide fructose yielded the highest average concentration of carbon dioxide gas produced (3498.6ppm, SD 1.55ppm) and S. cerevisiae respiration rate, followed by disaccharide sucrose (2324.2ppm, SD 1.65ppm), monosaccharide glucose (1812.6ppm, SD 1.51ppm) and disaccharide maltose (1747.2ppm, SD 3.77ppm). ($p < 0.05$) This experiment suggests that fructose is the most optimal sugar for short-term respiration in this strain of S. cerevisiae. This is supported by the fact that the fructose is followed by sucrose, which is a disaccharide comprising a fructose and glucose monomers.

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