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Bio 326

Dr.Beach

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Yeast has been used all over the world for so many things such as making bread, scientific research, and even making drinks both acholic and non-alcoholic. Over the course of human history mankind has taken advantage of yeast to produce some of the most commonly consumed beverages, beer and wine. This process has been used since Vedic period around 1700–1100 BC (Alba-Lois, 2010). Yeast metabolizes the sugars extracted from grains, which produces alcohol and carbon dioxide, and thereby turns wort into beer. In addition to fermenting the beer, yeast influences the character and flavor (Lodolo, 2008).

Not only can yeast make beer but it can also be edited to influences the characteristics and flavor of beer, such as clear and cloudy. One of the ways that this is possible is through a process of flocculation. Yeast flocculation is the aggregation of yeast cells into multicellular clumps called, flocs (Soares, 2011). They are called flocs because this process is regulated by the FLO genes FLO1, FLO5, FLO9, and FLO10, mainly the FLO5 gene drives flocculation. This means that if FLO5 is being expressed then there will be an increase in flocculation in the yeast cells (Mulders, 2010).

One of the ways that flocculation can be controlled is through the use of the SFL1 gene. The SFL1 gene is a transcriptional repressor of the FLO genes. This means that if SFL1 is expressed then the levels of flocculation and FLO genes will be lower (Bauer, 2007). Not only is SFL1 a transcriptional repressor of the FLO genes but SFL1 is also a transcriptional activator that could have an unrecognized effect on flocculation (Galeote, 2007). In this experiment *Saccharomyces cerevisiae* will be edited to over express the gene SFL1 which is a transcriptional repressor of the FLO genes and a transcriptional activator of stress response genes.

The purpose of this experiment is to see how the over expression of SFL1 affects flocculation is three different strains of yeast, one with low flocculation, one with high flocculation, and a lab strain as a control.

Literature Cited

Bauer J, Wendland J. Candida albicans Sfl1 Suppresses Flocculation and Filamentation. 2007 Oct 1 [accessed 2020 Feb 29]. https://ec.asm.org/content/6/10/1736

Galeote VA, Alexandre H. Sfl1p acts as an activator of the HSP30 gene in Saccharomyces cerevisiae. 2007 Aug [accessed 2020 Feb 29]. https://www.ncbi.nlm.nih.gov/pubmed/17594096

Lodolo, E.J., Kock, J.L., Axcell, B.C. and Brooks, M., 2008. The yeast Saccharomyces cerevisiae–the main character in beer brewing. *FEMS yeast research*, *8*(7), pp.1018-1036.

Luisa Alba-Lois L. Yeast Fermentation and the Making of Beer and Wine. 2010 [accessed 2020 Feb 29]. <https://www.nature.com/scitable/topicpage/yeast-fermentation-and-the-making-of-beer-14372813/>

Soares, E.V., 2011. Flocculation in Saccharomyces cerevisiae: a review. *Journal of applied microbiology*, *110*(1), pp.1-18.

Van Mulders SE, Ghequire M. Flocculation gene variability in industrial brewer's yeast strains. 2010 Dec [accessed 2020 Feb 29]. https://www.ncbi.nlm.nih.gov/pubmed/20809075