

Betreuer/-in	Bahar Abrishamchi
Arbeitstitel	Comparative evaluation of technological deflocculation methods for top-fermenting yeast aggregates
Art der Arbeit und Studiengang	<input checked="" type="checkbox"/> Bachelor-/ Diplomarbeit <input type="checkbox"/> Masterarbeit Geeignet für alle aus den Studiengängen: Mikrobiologie Bioprozesstechnik Biotechnologie Lebensmitteltechnologie Brauwesen und Getränketechnologie
Nullhypothese und Beschreibung des Status Quo	<p>Yeast-driven processes under anaerobic conditions represent a central biochemical step in the beverage industry. To study the effect of cell age on brewing analytical attributes, a non-invasive separation method has been developed. The prerequisite for such precise age-fractionation is, however, that yeast cells be in a single-cell state. In particular, top-fermenting ale yeasts exhibit a pronounced tendency to flocculate as fermentation progresses, forming multicellular aggregates that hinder further age-related fractionation.</p> <p>The objective of this Bachelor's thesis is the development of a reliable deflocculation method that enables the dissociation of yeast aggregates into single cells, thereby allowing subsequent age-dependent separation and characterization. The method should preserve cell integrity, viability, and physiological state, ensuring its suitability for downstream biological analyses.</p> <p>Within the scope of this project, four industrial top-fermenting yeast strains will be investigated. These strains will be subjected to a range of mechanical and chemical deflocculation treatments, selected based on their reported effectiveness and practical applicability in brewing and laboratory workflows.</p> <p>Each treatment will be evaluated with respect to its ability to disrupt flocs as well as its impact on cellular stress and viability. Stress responses will be quantified using appropriate physiological and viability assays, allowing comparison of the different treatments in terms of efficiency versus cellular stress.</p> <p>Based on these results, the most effective and least stress-inducing deflocculation protocol will be identified and optimized. The final method will provide a standardized preparatory step for future studies aimed at age-resolved analysis of top-fermenting yeast populations.</p>

Methodenaufstellung	<p>After a comprehensive literature review to identify the most promising chemical treatments for the disruption of yeast flocs, a set of candidate treatments will be selected for experimental evaluation.</p> <p>The deflocculation experiments will be performed on four pre-selected top-fermenting yeast strains. The yeast cell aggregates will be exposed to a range of chemical treatments in the presence or absence of controlled shear forces.</p> <p>The efficiency of floc disruption will be assessed using both quantitative and qualitative methods. Particle size distributions of treated and untreated samples will be measured using a Mastersizer, allowing a quantitative evaluation of aggregate size reduction. In parallel, light microscopy will be used for visual and morphological assessment of the cell aggregates and the degree of deflocculation.</p> <p>For the most promising treatment conditions, the physiological stress imposed on the cells will be evaluated by measuring Intracellular pH (ICP) of individual cells on a cytometry platform.</p> <p>To assess the suitability of deflocculated cells for downstream applications, the adsorption behavior of treated yeast cells to the linker protein used for age fractionation will be analyzed. This will be performed using a titration assay, in which yeast cells are incubated with an increasing concentration of the fluorescently labeled linker protein, followed by fluorescence measurements to quantify binding efficiency and saturation behavior.</p>
Zeitraum	10-12 Wochen
Arbeitssprache	Englisch
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