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WINE-MAKING SUSTAINABILITY IN THE ERA OF CIRCULAR ECONOMY: THE CASE OF WINE LEES

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Winemaking, as an agro-industrial process, generates substantial quantities of by-products like grape pomace and wine lees. The latter refers to the residue left behind during racking or bottling of wine and is predominantly composed of dead yeast cells, along with ethanol, phenolic compounds, and tartrates. Yeast extract, a widely used nutrient media component, is a powder-like substance derived from commercially grown yeast biomass, serving as a nitrogen source. In the context of by-products' valorization, wine lees, being rich in dead yeast cells, can be utilized through the process of autolysis for the production of an autolysate, acting as a yeast extract substitute. In the present study, the effect of different parameters, e.g. pH, temperature, on wine lees autolysis efficiency was examined, which was calculated based on the free α -amino nitrogen increase in autolysates. In addition, growth of two major winemaking microorganisms, i.e., *Lactiplantibacillus plantarum* and *Saccharomyces cerevisiae*, was monitored in culture media containing wine lees yeast extract and commercial yeast extract. The effect of yeast extracts mixing, concentration and inoculum cell concentration on major kinetic parameters was evaluated. Results indicate that a significant free α -amino nitrogen increase was observed, reaching a maximum of 834%, while the amino acid profile of autolysates was significantly affected by autolysis temperature. Regarding *L. plantarum* growth, results indicate that similar kinetic parameters were reported for media containing either wine lees or commercial yeast extract, while lag phase duration was not significantly affected by inoculum cell concentration. Moreover, regarding *S. cerevisiae* growth, it appears that addition of both yeast extracts resulted in increased maximum specific growth rate values, although negatively affecting lag phase duration and maximum cell concentration. Findings of the present study appear promising towards the holistic valorization of wine lees, promoting the concept of circular economy and sustainable development for wineries.

Keywords: wine lees, yeast extract, L. plantarum, S. cerevisiae

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