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Monitoring Cell Viability During Storage and Fermentation Efficiency of Freeze-dried Kefir Culture in Wine-Making

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Abstract

Low alcohol wines (<10.5% vol) represent the new entry in the global wine market and raise the consumers' interest mostly for life style and economic reasons. A growing interest has also been observed in mixed cultures for conducting simultaneous alcoholic and malolactic wine fermentation.Since, the use of wet mixed cultures is incompatible with the commercial and industrial needs there is a preference for freeze-dried cultures,due to significant technological advantages.Moreover, immobilized cell technology is known to result in increased survival rates and stability during freeze-drying, processing and storage. Thus, the aim of the present study was to evaluate the viability of freeze-dried cells and their fermentation efficiency in low-alcohol wine-making, after mid- and long-term storage in various temperatures. Kefir culture was immobilized on natural supports and the effect of various cryoprotectantsduring freeze-drying and the storage temperature on cell viability was investigated. The results showed that cell immobilization, the cryoprotectant used and the storage temperature affected viable cell levels, although not significantly in all cases. Remarkably, freeze-dried immobilized kefir cells produced using no cryoprotectantmaintained cell viability up to 69%, 59%,and 58% for yeasts/molds, lactobacilli and lactococci, respectively, after 6 months on freezing temperatures (-18 °C). The fermentation efficiency of the freeze-dried kefir cells was further tested and important enological attributes were determined. Both cell immobilization and the storage temperature affected positively important kinetic parameters, although not significantly in all cases. In contrast, cryoprotectant residues remained in the final product,affecting negatively the sensory profile.

Keywords: Low alcohol wines, immobilized kefir culture, freeze-drying, cryoprotectants, storage, viability, fermentation efficiency

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