OPTIMIZED BIOETHANOL PRODUCTION FROM SUNFLOWER (HELIANTHUS ANNUUS) HEAD WASTE USING SACCHAROMYCES CEREVISIAE

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Agricultural waste pollutes the environment when dumped and is usually associated with health hazards. The agricultural waste contributes more than sixty percent of Lithuania's municipal solid waste, thus posing environmental concerns in both urban and rural areas. However, it is renewable and green source for bioethanol production because it contains generous amounts of reducing sugars, organic acids, and other essential nutrients. Therefore, this substrate can be considered as target for various valorisation techniques for proper management. In general, the usual management practices, such as landfilling, incineration, and open burning of agricultural waste, produce secondary waste. It therefore becomes necessary to control and recycle this waste for the sustainable production of useful products that reduce environmental pollution. Converting agricultural waste into bioethanol via fermentation provides an efficient and environmentally friendly method of eliminating this waste. The aim of the work was to analyze the ethanol content after pre-treating powdered sunflower heads (Helianthus annuus) with the commercial enzyme preparation Viscozyme under different substrate concentrations (10%, 15%, 20%, and 25% w/v). The Brix value was measured, and GC-FID analysis was employed to determine ethanol content. The results indicate that a 20% substrate loading ratio yields the maximum ethanol production (12.89±3.95%), with the Brix value decreasing from 8.6 after hydrolysis to 5.7 after five days of fermentation. This confirms that agricultural waste, particularly sunflower heads, can be a viable resource for bioethanol production, offering a sustainable waste-management solution that addresses both energy demands and environmental concerns.

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