Biocatalytic Reduction of Carbonyl Compounds by Purple Plants

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Abstract

The reduction of carbonyl compound is an important process, widely utilized in the synthesis of chiral alcohols for pharmaceuticals, perfumes, pesticides, condiments, and fine chemicals. Recent research in this field has increasingly focused on enhancing safety and minimizing environmental impacts The application of biocatalysts has emerged as a promising strategy, garnering significant interest. This study investigated the improvement of biocatalytic reduction of carbonyl compounds by utilizing purple plants in Thailand as catalysts. The research identified the most suitable purple plants for the reaction, and determined the optimal reaction conditions, including the substrate to plant ratio, pH levels, and temperature. Furthermore, the impact of surfactant on the reduction process was evaluated to achieve optimal conditions for producing high purity and high yields. The results indicated that the most effective catalyst was the cowpea (*Vigna unguiculata*), locally known as “thua pi”. The optimal reaction conditions were determined to be a substrate to catalyst ratio of 0.5 mmol to 100 g of wet plant material per 100 mL of H_2O, maintained at pH 8 and room temperature for 3 days. Under these conditions, the product was obtained with a 60% yield.These optimized conditons were subsequently applied to 15 different substrates, including various aldehydes and ketones, resulting in product yields ranging from 16% to 87%. These findings suggest that this biocatalyst has the potential to be utilized in an environmentally friendly reduction process.

Keyword: Biocatalytic reduction, purple plants, *Vigna unguiculata*, carbonyl reduction