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Assessing the succinic acid production capabilities of *Corynebacterium glutamicum* using industrial feedstock

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Background: The study focuses on succinic acid production in synthetic and industrial media using wild type *Corynebacterium glutamicum*, a known carboxylic acid producer. The South African sugar industry is facing many challenges, largely due to increased competition and the implementation of a sugar levy, which has resulted in a decrease in demand. Sugarcane material was selected as a cheap and abundant carbon source to assess the succinic acid production capabilities of *C. glutamicum*. Results: Small-scale flask studies (700 mL) showed that glucose was the favorable sugar source when compared to xylose, recording a maximum value of $18.87 \pm 1.27 \text{ g L}^{-1}$ succinic acid. Evaluation of the industrial small-scale flask studies concluded that molasses was the top-performing sugarcane material in comparison to the sugarcane juice, reaching a succinic acid concentration of $20.31 \pm 0.75 \text{ g L}^{-1}$. The productivities achieved in the small-scale studies when using molasses was $0.56 \text{ g L}^{-1} \text{ h}^{-1}$, which was less than that recorded for the glucose-based media, at $0.67 \text{ g L}^{-1} \text{ h}^{-1}$, which was an expected outcome due to the complexity of the molasses. These studies were then successfully scaled up to 30 L biostat reactors, where the fermentations were run to mimic the micro-aerobic conditions experienced in the flasks but in a more controlled environment. Conclusion: The highest concentration of produced succinic acid was obtained when using molasses as the carbon source, reaching a maximum of $28.89 \pm 0.10 \text{ g L}^{-1}$. The study recognizes the potential for the South African sugar industry to diversify its product offerings through the adoption of biochemical production.