

Sustainable Production of Bio-based Succinic Acid

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The undeniable request for new synthetic routes for bulk chemicals production, which today, are mostly oil-derived, has arrived together with the urgent need for finding renewable feedstocks. Industrial biotechnology is often regarded as a potentially environmentally friendly alternative technology to replace traditional chemical synthesis of several commodity chemicals from petrochemical based oil refineries, contributing to a more sustainable chemical industry.

During the last decades of the 20th century, biotechnology and biochemical engineering have brought to light sugars as alternative raw-materials to produce a wide range of biobased chemicals aiming for a place of their own in the world chemical market. It is therefore natural that the United States Department of Energy (US DOE) has identified several biobased chemicals as market opportunities for reducing fossil fuel dependency in the chemical industry. These 15 compounds have in common their versatility, as they are often building blocks for other added value chemicals.

Succinic acid, a dicarboxylic acid, has been used as a precursor for many industrially important chemicals as shown in Figure 1. Over the last decade, much progress has been made on the development of a bio-based process for succinic acid production that can ultimately become competitive with the conventional chemical process. And therefore it was identified as one of the top candidates as an alternative to oil-derived bulk chemicals.

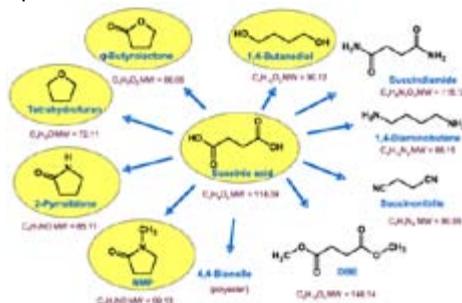


Figure 1 — Succinic Acid derivatives identified by the US DOE

The scope of this work is to show how succinic acid can be produced in a cost-effective way from glucose by fed-batch fermentation using recombinant *Corynebacterium glutamicum* Δ *ldhA-pCRA717* (Okino, et al. 2008). This project presents and discusses the impact of a wheat flour by-products based route to produce succinic acid. An upstream/downstream process has been designed and optimized for a 10% world market share (18000 ton/year) and the land footprint was determined.

REFERENCES

- Okino, S., Noburyu, R., Suda, M., Jojima, T., Masayuki, I., & Yukawa, H. (2008). An efficient succinic acid production process in a metabolically engineered *Corynebacterium glutamicum* strain. *Applied Microbiology and Biotechnology* (81), 459-464.
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