

Non-sterile bioproduction of organic acids using the yeast *Yarrowia lipolytica*

Citric acid from waste frying oil

- Citric acid (CA) is a versatile compound used as cleaner, decalcifier, in food and pharmaceuticals (as acidulant and stabilising agent), personal care products, animal feed up to metallurgy
- Market of citric acid: 2 million tons in 2018 (Research and Markets, 2019) produced in industrial *Aspergillus niger* process, main consumers are western Europe, America;; however most manufacturers located in Asia, e.g. China → high demand for import of citric acid
- UFZ has developed a robust and efficient yeast-based bioprocess for the local production of citric acid which further allows the valorisation of waste frying oil and wastewater → <https://incover-project.eu>

UFZ-Know-how:

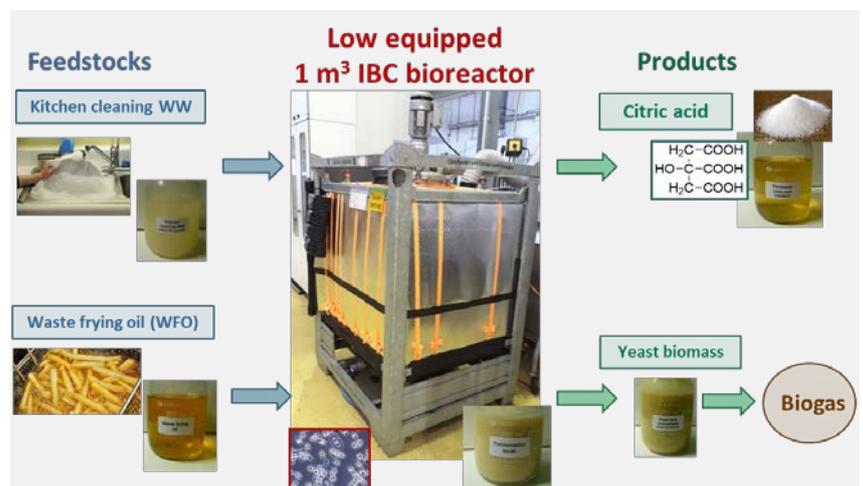
- Cultivation of yeast for the production of carboxylic acids under (non-) sterile conditions
- Process development and optimisation (e.g. enhancement product selectivity), analytical methods
- Sustainability assessment by means of life cycle analysis

UFZ-Experts:

Dr. Andreas Aurich
Steffi Hunger
Dr. Norbert Kohlheb
Prof. Dr. Roland A. Müller

General information:

[1] WO2018233851
[2] Early-stage sustainability assessment of biotechnological processes: A case study of citric acid production. Eng Life Sci. 2019;1–14.



Exemplary concept & solution: Canteen & Catering UFZ (600-700 lunch meals daily)

Industrial bioprocess	NEW Yeast-based bioprocess
➤ Fungi <i>Aspergillus niger</i>	➤ Yeast <i>Yarrowia lipolytica</i>
➤ Pre-treated by-product Molasses , sucrose	➤ Waste frying oil , and other by-products; no pre-treatment
➤ Tap or industrial water	➤ Valorisation of WW from food & beverage industries
➤ 130 kg/m³ CA in 5-8 d	➤ 120 – 170 kg/m³ CA in 7-14 d
➤ High equipped standard Bio-reactors	➤ Low equipped & low cost container based reactors
➤ Sterile process conditions	➤ Non-sterile process conditions
➤ Large centralised production capacities	➤ Decentralised production for local on-site consumption

Helmholtz-Centre for Environmental Research GmbH – UFZ

Knowledge & Technology Transfer
Permoserstraße 15, 04318 Leipzig

Dr. Joachim Nöller
E-mail: wtt@ufz.de
Phone.: 0049(0)341-235-1033
www.ufz.de

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