Organic Acids from Starch and Glycerol

What is this technology?

Methods and yeast strains for producing industrially important organic acids (itaconic, citric) from sugars and from glycerol, a by-product from the manufacture of biodiesel fuel.

Industrially-important organic acids made from starch and glycerol

- New uses for agricultural products, including starch and glycerol, a by-product of biodiesel production.
- Yeast fermentations will circumvent some technological limitations associated with filamentous fungi.

Itaconic acid, a chemical feedstock

Itaconic acid is a high-priced (~$4/kg) raw chemical having a market volume of about 15,000 metric tons. It is used in the polymer industry and for manufacturing synthetic fibers, coatings, adhesives, thickeners and binders. The yeast *Pseudozyma antarctica* NRRL Y-7808 produced itaconic acid when grown on simple sugars with nitrogen limitation.

Citric acid, for food, beverage, and industrial applications

Citric acid has a world market of about 400,000 metric tons, at $1-2/kg, for use in foods, beverages, confectionery, toxic waste treatments, and other industrial applications. Citric acid is produced by the yeast *Yarrowia lipolytica* from biodiesel glycerol and from a number of other carbon sources. Under newly defined growth conditions, the yeast produced citric acid from crude glycerol with good yields (~56%) having minimized amounts of an undesirable coproduct, isocitric acid.

How is this technology unique?

Production of itaconic acid and citric acid by the methods described utilizes new yeast strains and new fermentation techniques, and avoids some of the difficulties involved in working with filamentous fungi (*Aspergillus* species) used currently for commercial production: complex growth and carefully-controlled conditions, and high broth viscosity.

Stage of Development

- The process for fermentation of itaconic acid is described in a patent application filed by NCAUR scientists.
- The process for producing citric acid from glycerol has been published and the cultures are available from the ARS Culture Collection.

Moving Forward

These fermentation processes are available for partnership with industry.

Contact Information

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