

KLUYVEROMYCES MARXIANUS STRAIN AND PROCESS OF SIMULTANEOUS SACCHARIFICATION AND FERMENTATION OF BRANCHED FRUCTANS FROM PLANTS OF THE GENUS AGAVE, GRAMINEAE AND GRASSES FOR THE PRODUCTION OF BIOETHANOL, AND TEQUILA AND METABOLITES OF INDUSTRIAL INTEREST

<i>Offering Organization:</i>	Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco, A.C.
<i>Type of Organization:</i>	Public Research Center
<i>Development Stage:</i>	Laboratory Tests
<i>Desired Relationship:</i>	<ul style="list-style-type: none"> – Technological research and development financing (technological partner) – Specialized application tests – Creation of a new company (Joint Venture) for the commercialization of the products outlined herein – Licensing of patents
<i>Sector:</i>	Food
<i>Area of knowledge:</i>	Industrial Biotechnology
<i>Key words:</i>	Yeasts, <i>Kluyveromyces marxianus</i> , fructans, fermentation, agave

DETAILED DESCRIPTION:

Problem to be solved:

Structurally, fructans are fructose polymers found naturally in dicotyledonous and monocotyledonous plants, grasses, gramineae and agaves. Owing to their prebiotic properties, these compounds are used as ingredients in the formulation of functional foods as a fat substitute, as a stabilizer, in the preparation of syrups and sweeteners. Moreover, through simultaneous hydrolysis and fermentation processes, microbial or enzymatic, fructans are used for the production of metabolites of industrial interest with respect to tequila, ethanol, aldehydes, higher alcohols, esters and organic acids. However, to-date these simultaneous processes have not seen much development because the complexity of the structure of the fructans requires highly specific enzymes.

Solution:

It has been found that the *Kluyveromyces marxianus* type yeasts, isolated from fermentation processes during the manufacture of agave beverages, act as a natural source of specific enzymes for the hydrolysis of branched fructans.

New and Innovative Aspects:

- Isolation, purification and characterization of a strain of *Kluyveromyces marxianus* (NRRL Y-50882) capable of producing an inoculum compound of extracellular fructanase and cells capable of hydrolyzing branched fructans and converting the hydrolysate sugars in ethanol and other metabolites of industrial interest all while with maintaining high performance.

TECHNICAL CHARACTERISTICS:

- Isolation, purification and characterization of the *Kluyveromyces marxianus* strain with accession number NRRL Y- 50882.

- Use of *Kluyveromyces marcianus* NRRL Y-50882 to produce extracellular enzymes with fructanase activity for the hydrolysis of branched and linear fructans and other sugars for conversion into metabolites of industrial interest with respect to tequila, ethanol, aldehydes, higher alcohols, esters and organic acids. The aforementioned to be accomplished using the following steps:
 - Formulate an induction medium for the production of extracellular fructanases.
 - Spread the pre-inoculum *Kluyveromyces marcianus* NRRL Y- 50882 using a suitable culture medium.
 - Produce a *Kluyveromyces marcianus* NRRL Y-50882 inoculum to obtain cells and extracellular fructanase enzymes.
 - Formulate the substrate medium for *Kluyveromyces marcianus* NRRL Y-50882 for the simultaneous saccharification and fermentation process of producing tequila and other metabolites of industrial interest.
- Simultaneous saccharification and fermentation process for producing tequila and other metabolites of industrial interest with *Kluyveromyces marcianus* NRRL Y- 50882 inoculums.

Main advantages derived from its utilization:

- The present invention provides an inoculum of a strain of *Kluyveromyces marxianus* (NRRL Y-50882) with highly specific enzymes for the hydrolysis of branched fructans, while simultaneously performing the conversion of the released sugars to ethanol without requiring the use of mixed cultures or genetic engineering to modify the metabolic capacity of the strains.

Applications:

- In the food, bioenergy and pharmaceutical industries for the production of bioethanol, tequila and other metabolites of industrial interest.

INTELLECTUAL PROPERTY

- MX/a/2014/008843

ABOUT THE OFFERING ORGANIZATION

<i>Presentation:</i>	El Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco, A.C. (CIATEJ) is a public research center that belongs to the national technology development and innovation network, the National Council for Science and Technology (CONACyT). CIATEJ is focused on the agricultural, food, health, and environmental sectors with an emphasis on the application of innovative biotechnology.
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