

YEAST BIOMASS TORULOPSIS ETHANOLITOLERANS GROWN ON SYNTHETIC ETHANOL MEDIUM - POSSIBILITIES OF USAGE IN HUMAN AND ANIMAL NUTRITION

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INTRODUCTION

Yeasts have been the most important group of microorganisms exploited by mankind. Except the diverse traditional using in human and animal nutrition, yeast are finding importance as producers of heterogeneous proteins, as important biological agents for biotransformations, or as producers of natural flavour compounds. Industrial proved technology of yeast biomass production on a synthetic medium with ethanol as only carbon source is presented. *Torulopsis ethanolitolerans* biomass has been widely used as food and feed ingredients in Czech Republic. Because of high growth rate and usage of pure synthetic medium the yeast strain is especially suitable for the industrial production of genetically modified proteins or biotransformations. At present the yeast biomass is commercially available as an antidiabetic preparation in the Czech Republic (DIASTABIL, Bioferm), thermolysed dried Cr-enriched yeast biomass, and Se-enriched yeast biomass (VITASTABIL, Bioferm) for food supplementation with organic form of selenium.

TECHNOLOGY DESCRIPTION AND PARAMETERS

Torulopsis ethanolitolerans yeast strain

Yeast strain *Torulopsis ethanolitolerans*, ATCC 1, RIFS 417, isolated from industrial sulphite fodder cultivated on synthetic ethanol as the only source of carbon belong to the genus *Torulopsis* BERLESE. This species differs from all recently accepted *Torulopsis* species (resp. Candidate species) by their metabolic profile.

Fermentation process

Aerobic fermentation on a synthetic medium with ethanol as only carbon source without any growth factors. Sterile conditions are not necessary.

Basic technological scheme is at the Fig.1. Fig. 2 a 3 show illustrative photos.

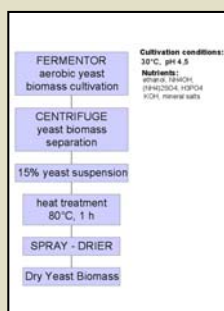


Fig. 1: Technological scheme of the yeast biomass production

Fig. 2: Propagation station - yeast inoculum preparation

Fig. 3: Main fermentors

Composition of the yeast biomass

Typical composition of the yeast biomass *Torulopsis ethanolitolerans* (% of d.m.):

Ash	7.3%
Total Nitrogen	9.3%
Protein (N x 6,25)	58.3%
Lipids	7.4%
Nucleic acids	9.8%

The protein content is higher in comparison with most of other yeast species.

EXAMPLES OF YEAST PRODUCTS AND BIOTECHNOLOGIES



Mannan Oligosaccharide, MOS: naturally derived extract of yeast cell walls - feed ingredient, fermentation additive, and food gelating agent, block colonisation of pathogenic microorganisms in the digestive track, substitution of veterinary antibiotics.



Organic chromium yeast, Glucose Tolerance Factor: chromium enriched yeast biomass contains natural chromium complexes - prevention of diabetes mellitus II. type, reduction of high cholesterol levels, positive effects in human and animal nutrition.
Reference: Beran M., Stahl R., and Beran M., Jr.: Glycaemic Activity of Chromium (III) -Nicotinamide Adenine Dinucleotide Phosphate Complex and its Presence in Yeast Extracts. *Analyst* 120, 979-981, 1995.



Organic selenium yeast: selenium enriched yeast biomass - antioxidant - anticarcinogenic activity, essential for thyroid hormones metabolism, complex positive effects in human and animal nutrition.

References: Kvičala J., Zamrazil, V., and Beran M.: Selenium and thyroid hormones status during a year of selenium and iodine supplementation. *Metal Ions in Biology and Medicine*, vol. 6. Eds. J.A.Cenleno, et al. John Libbey Eurotext, Paris © 2000, pp. 251 - 253.

Beran M., Adámek L., Eybl V., Topolčan O., and Brtko, J.: Determination of the biological activity of a selenium-containing, yeast-based dietetic preparation in a feeding experiment with rats. *Biomarkers and Environment* 1, 2, 1997.



Yeast biomass enriched with other essential elements and biologically active compounds: yeast biomass enriched by Mg, Zn, Fe, Co, Mn, Cu, J and other elements in different combinations. Yeast biomass enriched with L-carnitin, rutin and other and biologically active compounds. Complex positive effects in human and animal nutrition.

Reference: Beran M., Molík P., Beran M., and Zórad S.: Manganese and Chromium Bioactive Complexes from Natural Materials and their Role in Glucose Metabolism. *Epietheorese klinikes farmakologias KAI farmakokinetics, International edition* 11, 142-144 (1997) © PHARMAKON - Press.



Probiotics - vital yeast culture: improve microbiological profile and activity in the digestive track, significant health and conversion benefits in livestock and poultry.



High quality protein, B complex vitamins, and mineral source for human and animal nutrition.



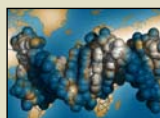
Yeast enzymes and other biologically active compounds: such as α -amylases, β -glucanases, proteinases, amino acids and other.



Yeast hydrolysates, thermolysates, autolysates, extracts: natural flavours, natural salt substitutes, ingredients to soups, stocks, sauces, snacks, biscuits, savoury spreads and other.



β -glucans: essential components of yeast cell wall are particularly important to support the non-specific human and animal immune system, food and feed supplements, food gelating agent.



Production strain for the industrial production of genetical ly modified proteins or biotransformations.