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YEAST CELL WALL POLYSACCHARIDES: β-GLUCANS & MANNANS

Yeast cell wall polysaccharides and particularly the β -glucans and mannans are gaining interest in the food and feed industry as ingredients, nutritional supplements and functional food. The Carbohydrate Competence Centre (Eurofins Food Testing, The Netherlands) is proud to be able to offer tests suitable for yeast β-glucan and mannan determination.

Introduction

The major part of the yeast cell wall and other fungi consist of polysaccharides. The three main polysaccharide groups that form the cell wall are: β-glucans, polymers of mannose (mannans as mannoproteins) and chitin (*circa* 60, 40 and 2% respectively). Due to their health benefits they find wide application in food, pet-food and feed products as well as supplements. This flyer provides information about β-glucans and mannans with emphasis on those derived from baker's yeast (*S. cerevisiae*).

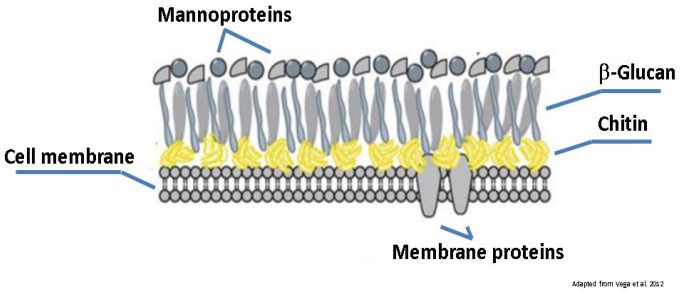


Figure 1: *Fungal cell wall and components*

- Predominately, yeast β-glucans form long chains of a β -(1→3) linked glucan backbone with β-(1→6) linked glucose side branches. Different fungal cell walls contain different glucans and side-chain linkages.
- β-glucans are considered as insoluble dietary fibre.
- Mannan is a highly branched polysaccharide linked to proteins. It has a backbone of α-(1→6) linked mannose units with α-(1→2)– and α-(1→3)– linked side chains that average about two sugars units in length. These side-chains are also known as mannan-oligosaccharides (MOS).

Health Benefits & Safety Claims

It is recognized that insoluble yeast β-glucans:

- have immune-modulating effects against infectious diseases and cancer
- enhance antibiotic efficiency in infections with antibiotic-resistant bacteria.
- β-glucans from baker's yeast have received the GRAS status (FDA 1997) and are regulated in Europe as "novel food" (EFSA 2011/EC 2011)

It has been shown that mannan-oligosaccharides (MOS):

- Improve gastrointestinal health by preventing binding of pathogens to host's cells

Applications & Uses

Yeast β-glucans may find application as:

- functional food ingredients in immune health products
- nutritional supplements
- food ingredient in baked goods, baking mixes, cereals and cereal mixes, beverages, fruit preparations and fruit juices, dairy products, plant protein products, soups and soup mixes.

Yeast MOS find application as:

- nutritional supplement for companion animals (pets)
- nutritional supplement for farm animals (pigs, poultry, calves, etc.)
- nutritional supplement in aquacultures (fish farming)

Why quantifying β-glucans and MOS?

- R&D for feed and human nutritional products
- Quality assurance during purchase and production
- Labeling of products

Method

Methods of analysis

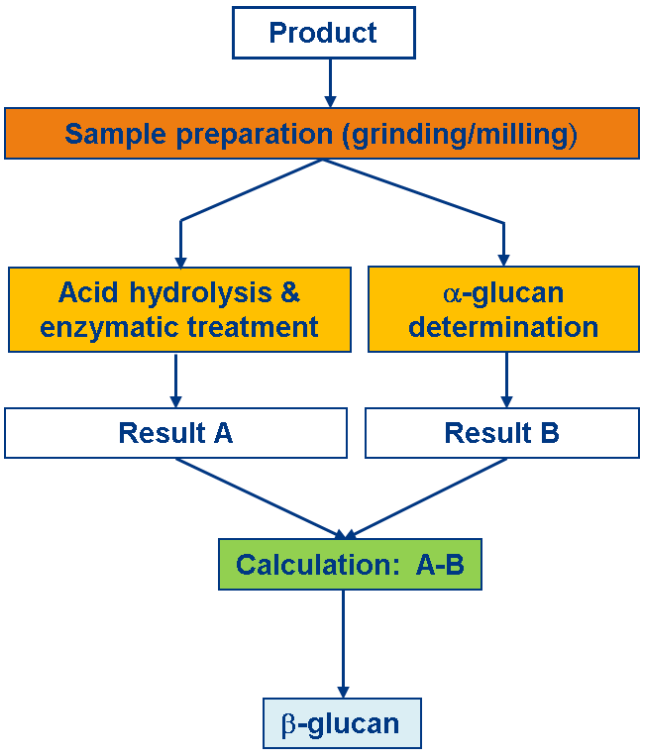
Although there are no official methods for yeast β-glucan or mannan (MOS) available, the Carbohydrate Competence Center is proudly offering in-house developed methods.

Yeast β-glucan determination (test-code HEC1J)

The test for yeast β-glucan determination is based on combination of enzymatic and acid hydrolysis. A representation of the method's principle is shown in Scheme 1. The test is suitable for pure yeast β-glucan raw material/ingredients or products that contain >40% β-glucan. Other types of β-glucan (e.g. cereal β-glucan, cellulose, curdlan etc.) will be also quantified and therefore, if expected to be present, the result can be considered as a total β-glucan content. α-glucans (such as starch, maltodextrins etc.) do not disturb the analysis.

Mannan determination (test-code: contact us)

The test is based on strong acid hydrolysis and quantification of the liberated mannose content. From the mannose content the total mannan content in the sample is calculated and reported. Since acid hydrolysis is a non-selective treatment, all poly– and oligosaccharides present in a sample will be hydrolyzed to their monomer building blocks (monosaccharides). It is therefore assumed, that all liberated mannose is originated from the yeast cell wall mannan. Correction for the content (if expected) of free mannose can also be done. The test can only be performed as special project. Please contact us for advice and applicability of the test.



Scheme 1: *Schematic representation of the yeast β-glucan determination method.*

Test code	Applicability
HEC1J (yeast β-glucan)	**Suitable for pure yeast β-glucan ingredients or products with >40% β-glucan content.**
Mannan Contact us	**Performed only as special project with a minimum request of 4 samples. Contact us for more information and applicability**

Contact us

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