

ISOLATION AND CHARACTERISATION OF THE MICROBIOME OF SOURDOUGHS BASED ON DIFFERENT FLOUR TYPES

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Introduction. Since ancient times, sourdough has been widely used in the baking industry. The use of sourdough made it possible to obtain bread with a better taste and texture. The microbiome of the flour plays a significant role in the final result. The microbiome of flour comprises LAB and yeast, which mainly have a positive effect on the properties of final products and filamentous fungi of the genera *Alternaria*, *Cladosporium*, *Fusarium*, *Helminthosporium*, *Aspergillus*, *Penicillium*, *Eurotium* and *Mucor*, which contribute to the spoilage of the product, which becomes dangerous for the health of consumers [1,2]. The study of the properties of the natural microbiota of flour will make it possible to determine the conditions for the creation of sourdoughs some types, which will provide better organoleptic properties of final products [1]. Flour is also a complex multicomponent substrate from which potentially industrially valuable LAB strains can be isolated, for example, producers of exopolysaccharides. In the food industry, exopolysaccharides are used as thickeners, and in the manufacture of bread products they determine the softness of the products. When consumed, exopolysaccharides have a positive effect on the health of the consumer due to prebiotic, immunomodulatory, antioxidant, cholesterol-lowering, antimicrobial and antitumor properties [1,3]. In addition to exopolysaccharides, LAB are capable of synthesizing acetoin - the compound valuable for the food industry, which gives products the aroma of butter. LAB strains capable of synthesizing acetoin are more desirable for creating starter cultures. This work is devoted to the characterisation of the composition of the microbiota of starters and the further phenotypic characteristics of the isolated LAB [1].

The aim of the work is to investigate the diversity of the microbiome of different types of flour, isolate strains of LAB that synthesize exopolysaccharides from sourdoughs, and characterize them.

Materials and methods. In the work, sourdough based on oat, rice, corn, rye and buckwheat flour were used. Sourdough starters contained 20 g of flour and 30 ml of water, sourdough starters based on buckwheat flour - 20 g of flour and 50 ml of water. Sourdough was prepared at 30°C for 24 hours. LAB colony-forming units (CFU) were counted on MRS agar medium, yeast and molds were counted on GYA (glucose yeast agar with chloramphenicol). Determination of acetoin was carried out visually by the intensity of the pink color, which is characteristic of the product of the reaction of acetoin with α -naphthol in an alkaline medium, compared with the control - a suspension of the corresponding flour. In order to determine the ability to produce

exopolysaccharides, LAB was grown on modified MRS agar media with 5% sugars, namely glucose, fructose, sucrose or maltose. Determination of the taxonomic position of isolates was carried out according to morphological-cultural and physiological-biochemical characteristics using standart microbiological methods. The morphology of the cells, Gram staining, presence of catalase, the way of fermentation of carbohydrates and ability to grow at different temperatures were studied.

Results and discussion. In the composition of starters of different types of flour, LAB was determined in the amount of $1-6 \times 10^8$ CFU/g of starter, mold fungi - $2-43 \times 10^2$ CFU/g of starter, and in starters based on rice and corn flour, yeast were detected in the amount of $1-2 \times 10^2$ CFU/g sourdough starter. 9 strains of LAB were isolated that synthesize exopolysaccharides on MRS medium with 5% sucrose, and the absence of exopolysaccharide synthesis by these strains on MRS mediums with glucose, fructose, and maltose was observed. Of the 9 isolated strains, only 1 (from corn flour) synthesizes viscous exopolysaccharides, 1 strain (from rice flour) ferments glucose with the formation of CO₂, and 6 (2 from buckwheat, and 1 each from corn, rice, oat, and rye flour) - ferment gluconate with the formation of CO₂. For the strains that are capable of synthesizing acetoin, visual assessment showed the highest content of acetoin in sourdough based on rye flour, and the lowest - based on corn. Based on phenotypic studies, 6 strains were preliminarily assigned (2 from rye, 2 from buckwheat, 1 from corn and 1 from oat flour) to the genus *Lactobacillus* (according to the classification until 2020), 2 strains (1 from corn and 1 from rice flour) to the genus *Pediococcus* and 1 (from rice flour) to the genus *Leuconostoc*.

Conclusions. The microbiome of sourdough based on oat, rice, corn, rye and buckwheat flour was characterized. LAB strains that synthesize exopolysaccharides were isolated and characterized. According to the phenotypic characteristics, the strains were previously assigned to the genera *Lactobacillus*, *Pediococcus*, and *Leuconostoc*. One of the isolated strains synthesizes viscous exopolysaccharides, and strains from rye flour synthesize a greater amount of acetoin compared to strains from other types of flour, which can later be used in the creation of sourdough.

References:

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