

SCREENING OF LACTIC ACID BACTERIA BY ITS ABILITY OF RYE FLOUR FERMENTATION

Lipova I, Garmasheva I, Oleschenko L.

D.K. Zabolotny Institute of Microbiology and Virology of the NAS of Ukraine,

Department of physiology of industrial microorganisms

email: i.lipova@imv.org.ua

Bread is considered to be the leading staple food around the world. Rye bread is typically consumed in Central, Eastern, and Northern Europe, since rye is a local cereal whose flour is commonly used in these countries. Traditional baking process and novel modifications rely on the metabolic activities of lactic acid bacteria (LAB) in the sourdough. Along with organic acids production, biosynthesis of acetoin by LAB could be beneficial to achieve pleasant organoleptic properties and amylolytic activity of strains during flour fermentation can improve digestibility of the final product. In order to evaluate the eligibility of using LAB in food production, LAB strains should be tested negative for biogenic amines biosynthesis which are toxic for digestion.

The aim of our work was to conduct screening of LAB strains by its ability for acidification of rye flour, amylolytic activity, ability to produce acetoin and biogenic amines.

Materials and methods. 56 LAB strains belong to genera *Lactobacillus* (36 strains), *Leuconostoc* (19 strains) and *Enterococcus* (1 strain) were used. Bacteria were cultured in the MRS medium at 30°C for 24 hours. 20 g of rye flour with 30 ml water was inoculated with 1 mL of 24h LAB culture and control sample was not inoculated, to form sourdoughs that were stored at 30°C. Titratable acidity of sourdough was evaluated after 8 hours and 24 hours using 0.1 N NaOH solution according to the Association of Official Analytical Chemists (AOAC) method no. 947.05. All strains were examined for ability to synthesize acetoin (Kvasnikov, 1975), ability to produce biogenic amines (Bover-Cid, 1999). To evaluate amylolytic activity, modified MRS agar without glucose was used with 0.2% starch as a main carbon source. Statistical analysis was performed in Statistica Software version 12.0.

Results and discussion. According to obtained results of titratable acidity of rye sourdough 56 LAB strains were divided into 4 groups: the first group contains a control sample and 11 test-strains that are weak acidifiers in rye flour, the second group was formed of 22 LAB strains that produce moderate amount of acid after 8 hours as well as during next 16 hours of fermentation, the third group includes 16 strains of fast acidifiers that reach 6.3-10.4°T of acidity within 8 hours. But accumulation of acids slows down significantly to maximum of 4.5 °T gain next 16 hours, and the fourth group is represented by 7 strains that accumulate acids gradually and cross the threshold of 12°T of acidity after 24 hours of fermentation. 5 strains can synthesize acetoin in high amounts, 2 strains in moderate amounts and 6 strains are weak producers. 6 strains possess amylolytic activity. Screened strains have either amylolytic activity or ability to produce acetoin. 7 LAB strains showed ability to produce tyramine – biogenic amine that possesses toxicological effect, so these strains are eliminated because they don't meet the requirements for starters.

Conclusion. Totally 26 LAB strains were selected for further investigation aimed to develop effective rye sourdough for baking industry as a main starter and 14 strains could be considered as supporting second strain in sourdough.

