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Specific lipases: The pros and cons for their roles in bread making

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Bread, usually defined as a spongy material formed partly or fully by amorphous biopolymers, is not physically stable since it holds different colloidal systems such as emulsion, foam and gel. In the last few decades, a wide range of additives has been used to achieve the stabilization of these systems which leads to improvements in dough handling, bread quality and shelf-life. The first part of presentation includes general background and relevant literature review on technological significance of wheat flour lipids and emulsifiers. It was well established that endogenous polar lipids, despite their low levels in wheat flour significantly improve the baking performance of wheat flour. Emulsifiers like SSL and DATEM have been used as dough conditioners and/or crumb softeners in bread making for their ability to bind to/modify gluten proteins, to form a lipid monolayer and/or single lamellar phase systems at the gas/liquid interface and to form complexes with gelatinized starch. Enzymes are regarded as clean label improvers since they are assumed to become denatured during baking and have no remaining activity in the final products. The use of lipases for substitution of emulsifiers in the bakery products is quite recent as compared to other enzymes. Lipases having broad substrate specificity have been proposed to improve dough and bread characteristics and to play roles in the retardation of bread staling. The mechanisms underlying the technological effects of lipases are closely linked to the hydrolysis of one or more fatty acids from nonpolar and/or polar lipids to form the corresponding more polar mono- and diacyl-forms. Lipases, therefore, offer the opportunity to generate surface active compounds in situ, and possibly to substitute or reduce the use of emulsifiers. The remainder of this presentation summarizes the results of three research projects with the focus on exploring the lipase functionality in bread making: Lipase improved the dough properties by leading to an increase in the dough stability, maximum resistance to extension, hardness and amylose-lipid formation, and a decrease in the softening degree and stickiness and; lipase addition gave better specific volume, softness, elasticity, sensory attributes and image processing futures of breads. During storage, the extent of changes in unfrozen water content and recrystallization of amylopectin as well as in hardness and elasticity was markedly reduced. Combination of lipase with CMC, guar gam or xylanase brought about further improvement in those bread quality and staling properties. These findings suggested that the impact of lipase on bread making is similar to or to a greater extent than that of DATEM or SSL.

Biography

Abdullah Sinan Colakoglu is working as an Assistant Professor in Food Engineering at Kahramanmaras Sutcu Imam University, Turkey. He received his BSc degree from Cukurova University; MSc degree from The Ohio State University, USA and PhD degree from Ankara University, Turkey. He has been active in Food Science for over 15 years and worked primarily on Food Chemistry. His research mainly includes thermal and oxidative stability of lipids by thermal analyses and bread quality and staling by thermal and mechanical analyses. He has completed four research projects supported by The Scientific and Technological Research Council of Turkey and University research funds. His research team is currently working on characterization of whey butter obtained from different collection centers. He has produced 36 international and national publications and cited over 80 times. He has served as the Editor for *International Journal of Food Science and Biotechnology*, and Reviewer for the *journal of food and Turkish Journal of Agriculture - Food Science and Technology.*

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