Seminars in Biotechnology BTEC 591 & BTEC 691

"Use of Predictive Food Microbiology to Determine the Shelf-life of Foods"

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Fatih Tarlak was born in 1987, Bursa. He received his B.Sc. degree from Department of Chemical Engineering, Gazi University in 2009. In 2010, he started his M.Sc. study at the Department of Chemical Engineering, Gebze Technical University under the supervision of Prof. Dr. Hasan Sadıkoğlu and Assoc. Prof. Dr. Tunahan Çakır. Between 2011 and 2013, he worked in a project entitled "Investigation of the cellular objective behind the metabolic behaviours of the cell by using bottom-up and top-down approaches of systems biology in an integrative manner: Applications to the metabolisms of microorganisms and human". Being as a research assistant, he pursued his Ph.D. study under the supervision of Prof. Dr. Murat Özdemir at the Department of Chemical Engineering, Institute of Natural and Applied Sciences, Gebze Technical University. During his Ph.D. study, he worked in two projects entitled "Modelling of microorganisms in mushroom (*Agaricus bisporus*) under different growth conditions" and "Reduction of microbial load and extension of shelf-life of button mushroom with application of acidic sodium chloride". In the last six months of his Ph.D. study, he was a visiting researcher in the Department of Food Science and Human Nutrition, the Agricultural University of Athens, Athens, Greece under the supervision of Prof. Dr. George-John Nychas. After receiving his Ph.D. degree in 2018, he joined HIBRO group as a post-doctoral student. He conducted modelling studies for the microbial interactions in fish-based food products in the Department of Food Science and Technology, the University of Cordoba, Cordoba, Spain under the supervision of Prof. Dr. Fernando Pérez-Rodríguez. Now he works as an Assistant Professor at the Department of Nutrition and Dietetics and an Associate Dean of the Faculty of Health Science, Istanbul Gedik University, Turkey.

Abstract

Predictive microbiology can be considered as an important field in food microbiology in which it uses predictive models to describe the microbial growth in different food products. Predictive models estimate the growth of microorganisms quickly, efficiently and in a cost-effective way as compared to traditional methods of enumeration which are long-lasting, expensive and time-consuming. The mathematical models used in predictive microbiology are mainly categorised as primary and secondary models. The primary models are the mathematical equations that define the growth data as a function of time under a constant environmental condition. The secondary models describe the effects of environmental factors, such as temperature, pH and water activity (a_w) on the parameters of the primary models, including the maximum specific growth rate and lag phase duration which are the most critical growth kinetic parameters. The combination of primary and secondary models provides valuable information to set limits for the quantitative detection of the microbial spoilage and assess product shelf-life.