New emerging techniques in combination with conventional methods in improving the quality, safety, and nutrient values of food products: current state, further challenges, and the future

Amin Mousavi Khaneghah

Department of Food Science and Nutrition, Faculty of Food Engineering, University of Campinas (UNICAMP), Rua Monteiro Lobato, Campinas, São Paulo, Brazil

Corresponding author: Dr. Amin Mousavi Khaneghah, Department of Food Science and Nutrition, Faculty of Food Engineering, University of Campinas (UNICAMP), Rua Monteiro Lobato, 80, Caixa Postal: 6121, 13083-862, Campinas, São Paulo, Brazil. Email: mousavi@unicamp.br; mousavi.amin@gmail.com

15 November 2021; Published: 4 December 2021

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EDITORIAL

Quality, safety, and nutrient values of food products can be changed under various conditions along the production chain, even on consumers' tables. Although based on the scientific reports, many techniques, including conventional and emerging technologies, are approached during harvest, post-harvest, processing, storage, and distribution of food products, the idea of minimal processing of food products still attracted considerable attention. Moreover, owing to the raised concerns regarding final products' biological and chemical safety, the approach of suitable processing technique was always associated with serious concerns. Among them, the biology-based process techniques, such as fermentation, are widely used as the most environment-friendly specific and efficient approaches for processing wide range of food products. In addition, the application of newly introduced technologies, such as cold plasma, ozone, irradiation, or enzymatic and bioremediation in improving the quality, safety, and nutrient values of food products, is among the hot research topics. However, based on the available data, application of emerging technologies alone, or in combination with conventional techniques, is in the primary stage of evaluation; their extensive applications for processing of food products to deliver a safe product with a high level of quality and *nutrient values* could be forecasted. In this regard, each of the methods mentioned above alone or in combination could aid us in processing a variety of food products.

The use of natural compounds to preserve food products and new tools for monitoring food safety is of great

interest. In this study, the growth rate, including the lag time of *Listeria innocua* in ground lamb as a function of storage temperature (4, 10, 25, and 37°C), influences the coriander seed essential oil (CEO) as an antimicrobial agent, was modeled. As a result, the CEO increased the *L. innocua* growth rate lag phase and improved the shelf life of ground lamb. It is also recommended to use Fourier-transform infrared spectroscopy (FTIR) to monitor spoilage in meat (Omidi-Mirzaei *et al.*, 2020). Gavahian *et al.* (2020) investigated the resistance of chlorpyrifos pesticide pollution against arc and dielectric barrier discharge (DBD) plasma. According to their findings, while the temperature of the samples remained steady during the DBD plasma treatment, arc plasma changed the temperature of the sample at a rate of about 3.75°C·min⁻¹ and yielded a sample with a final temperature of 60°C. However, contrary to the general belief that plasma is an efficient technique for pesticide degradation, chemical analyses showed high chlorpyrifos resistance against both arc and DBD plasma under the conditions used in the present study. In another interesting study, Tariq *et al.* (2020) studied the effect of micronutrient foliar supplementation on the production and eminence of plum (*Prunus domestica* L.). While the foliar method offers plants a chance for rapid and easy uptake of micronutrients, the quality of fruit was significantly improved by applying T6 micronutrients consortia. The authors concluded that treatment with T6 micronutrients as a foliar application is a better approach for significant improvement in quality and yield attributes of plum in micronutrient deficient conditions. A new

aspect covering interactions between cells and their surroundings via electromagnetic waves was introduced by applying ultra-weak photon emission (UPE). The UPE originates from the relaxation of electronically excited species resulting from oxidative metabolic processes and oxidative stress associated with reactive oxygen species (ROS). This comprehensive review provided an overview regarding the assessment quality of food products with the aid of UPE via evaluating the correlations between UPE and food quality indices (Nematollahi *et al.*, 2020). Gonçalves *et al.* (2020) provided an extensive review regarding approaches of enzyme-based methods to control microbial biofilms in dairy processing environments. The authors concluded that proteases, amylases, cellulases, and DNases are among the most recently studied enzymes that could be associated with the main biocides used in the dairy industry to increase the effect of removal of biofilm. In an updated review, the potentials of various probiotic bacteria and their metabolites to prevent *C. botulinum* toxicity are overviewed (Alizadeh *et al.*, 2020). The physical stability of microliposomes in bene (*Pistacia atlantica*) oil with different formulations was assessed by Nikkhah *et al.* (2020). Based on the study results, bene oil-loaded liposomes with the lecithin:cholesterol formulation ratio of 40:20 was chosen as an optimal formulation because of its smaller particle size, higher zeta potential, and suitable stability, which could be used in trapping, delivering, and releasing hydrophilic, adipose-friendly, and amphiphilic compounds (dual-friendly).

Acknowledgements

The Guest Editor would like to thank the Editor-in-Chief of *Quality Assurance and Safety of Crops & Foods*, Prof. Dr. Hamit KOKSEL, for his support during this special issue. In addition, the author thanks the support of the publisher at Codon Publications. The guest editor also thanks the journal secretary for his effort and timely editorial works. Besides, the guest editor sincerely appreciates the effort of reviewers that accepted his invitation and devoted their time to help with publishing a

high-quality special issue. Finally, he thanks the researchers worldwide who submitted their valuable research findings to this special issue.

References

- Alizadeh, A.M., Hashempour-Baltork, F., Alizadeh-Sani, M., Maleki, M., Azizi-Lalabad, M. and Khosravi-Darani, K., 2020. Inhibition of *Clostridium* (C.) botulinum and its toxins by probiotic bacteria and their metabolites: an update review. *Quality Assurance and Safety of Crops & Foods* 12(SP1): 59–68. <https://doi.org/10.15586/qas.v12iSP1.823>
- Gavahian, M., Meng-Jen, T. and Khaneghah, A.M., 2020. Emerging techniques in food science: the resistance of chlorpyrifos pesticide pollution against arc and dielectric barrier discharge plasma. *Quality Assurance and Safety of Crops & Foods* 12(SP1): 9–17. <https://doi.org/10.15586/qas.v12iSP1.807>
- Gonçalves, S., Lee, S., Khaneghah, A.M. and Oliveira, C., 2020. Enzyme-based approaches to control microbial biofilms in dairy processing environments: a review. *Quality Assurance and Safety of Crops & Foods* 12(SP1): 50–58. <https://doi.org/10.15586/qas.v12iSP1.828>
- Nematollahi, M.A., Alinasab, Z., Nassiri, S.M. and Khaneghah, A.M., 2020. Ultra-weak photon emission: a nondestructive detection tool for food quality and safety assessment. *Quality Assurance and Safety of Crops & Foods* 12(SP1): 18–31. <https://doi.org/10.15586/qas.v12iSP1.766>
- Nikkhah, M., Khoshkhoo, Z., Hosseini, S.E., Shotorbani, P.M. and Basti, A.A., 2020. Physical stability of microliposomes in bene (*Pistacia atlantica*) oil with different formulations. *Quality Assurance and Safety of Crops & Foods* 12(SP1): 41–49. <https://doi.org/10.15586/qas.v12iSP1.827>
- Omidi-Mirzaei, M., Hojjati, M., Behbahani, B.A. and Noshad, M., 2020. Modeling the growth rate of *Listeria innocua* influenced by coriander seed essential oil and storage temperature in meat using FTIR. *Quality Assurance and Safety of Crops & Foods* 12(SP1): 1–8. <https://doi.org/10.15586/qas.v12iSP1.776>
- Tariq, M., Khan, F., Shah, A.H., Fahad, S., Wahid, F., Ali, J., ... & Danish, S., 2020. Effect of micronutrients foliar supplementation on the production and eminence of plum (*Prunus domestica* L.). *Quality Assurance and Safety of Crops & Foods* 12(SP1): 32–40. <https://doi.org/10.15586/qas.v12iSP1.793>