

**UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY
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DOCTORAL SCHOOL OF AGRICULTURAL ENGINEERING SCIENCES
FIELD: FOOD ENGINEERING**

HABILITATION THESIS

Modern trends towards the valorization of unconventional raw materials through new technologies applied in functional products manufacturing

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Abstract

This Habilitation Thesis highlights the research and professional results of my scientific and academic activity in the field of Food Product Engineering, carried out together with colleagues from the Faculty of Food Science and Technology and with collaborators from national and international institutions such as the University of Agricultural Sciences and Veterinary Medicine of Banat "King Michael I of Romania" in Timișoara and the Polytechnic University of Valencia, Food Investigation and Innovation Group, Food Technology Department, Spain. Furthermore, academic and research career development plans are presented in this habilitation thesis.

The habilitation thesis entitled *Modern trends towards the valorization of unconventional raw materials through new technologies applied in functional products manufacturing* presents the most important personal achievements in terms of scientific and publishing activity reflected in 10 articles indexed web of science as corresponding author, 7 indexed ISI web of science articles as first author, 13 web of science indexed articles as co-author, 1 international chapter as first author, 1 international chapter as co-author, 1 national scientific book, 1 patent as first author, 1 patent as co-author, 2 didactic manuals (unic author), 2 practical work classes and 26 BDI scientific papers. The scientific work covers specific topics of food engineering based on fermentations of unconventional substrates with various starter cultures of lactic acid bacteria, characterization and valorization of by-products in the food industry and modern trends applied in the manufacture of new functional products.

After a short introductory chapter, the second chapter follows, which contains the most important results obtained in the scientific career, divided into three research directions, such as: (2.1.) fermentations of unconventional substrates and applications in the food industry, (2.2) modern trends on the valorization of by-products from the food industry and (2.3.) modern technologies applied in obtaining new functional products.

Chapter 2.1. characterizes from a physicochemical point of view the unconventional raw materials used as fermentation substrate for lactic acid bacteria (LAB), the adaptability of LAB and their influence on the bioactive compounds of the obtained sourdough as well as the valorization of fermented sourdoughs into new functional products. The final manufactured products are characterized in terms of nutritional, sensory and organoleptic characteristics.

Chapter 2.2. presents new trends in the valorization of by-products generated by the food industry such as brewer spent grains, spent malt rootlets, apple pomace, their physicochemical characterization and valorization in the range of pastry products. Furthermore, to take a step

forward in terms of the influence of bioactive compounds on human health, the in vitro digestibility of brewer spent grains minerals and B-group vitamins are analyzed and presented in this chapter. Also, the identification of modern and sustainable methods for extraction and valorization of by-products bioactive compounds generated from the food industry are presented and compared with conventional ones.

The research direction 2.3. Modern technologies applied to the production of new functional products presents the extrusion process and its influence on the bioactive compounds identified in different raw materials such as rosehip powder (*Rosa canina* L.), lucerne powder (*Medicago sativa* L.), but also the valorization of buckwheat flour (*Fagopyrum esculentum*) and flour obtained from buckwheat sprouts in new functional products. Different biopolymers such as pea protein, maltodextrin, resistant maltodextrin and β - cyclodextrin were used in order to protect the bioactive compounds during the extrusion process, and the in vitro digestibility process was used to highlight the bioaccessibility of bioactive compounds in the obtained extrudates such as vitamin C content, folate, total phenols, antioxidant activity and total carotenoids.

Chapter III of the habilitation thesis contains the professional, scientific, and academic career development plan with research and teaching directions and section IV contains the bibliographical references.