

**Banat's University of Agricultural Sciences and Veterinary
Medicine „King Mihai I of Romania” from Timisoara
Faculty of Food Processing Technology**



HABILITATION THESIS

**Bioactive compounds in food technology, with a special focus on
their contribution to antioxidant properties and color stability**

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Habilitation Thesis

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Teză de abilitare

Compuși bioactivi în tehnologia produselor alimentare, cu un accent special pe contribuția lor la proprietățile antioxidante și stabilitatea culorii

Abstract

The present habilitation thesis consists of three main parts: **(I) Scientific, academic and professional achievements**, **(II) Career evolution and development plans** and **(III) References**, related to the content of the first two parts.

Part I (divided in two sections: *Section I. Scientific achievements* and *Section II. Professional and academic achievements*) is the core of the thesis, in which are described the most important scientific results, proving the originality and relevance, published in **10 selected papers** (ISI quoted) and the main professional and academic achievements, all referring to the interval 2003-2013, which corresponds to the period after defending the PhD thesis (November 2002) and confirmed by the Ministry of Education and Research (April 2003).

In **Section I** are presented the main topics addressed in research activity during all this time, as follows: **(1) The effect of bottle aging on chromatic and antioxidant properties of red wines**; **(2) The impact of processing and storage on antioxidant characteristic and color of fruit and gelled fruit products**; **(3) The capitalization of some by-products from food processing**; **(4) Use of some natural bioactive compounds for prevention and control of mycotoxins production in cereals**.

Research activity in the field of red wine analysis has been directed towards the following topics: (i) red wine color analysis during aging using selective UV-VIS methods, including also the evaluation of indices expressing the wine “*chemical age*” and “*the degree of ionization of anthocyanins*”; (ii) assessment the contribution of copigmentation and polymeric pigments to the red wine color stabilization during aging; (iii) evaluating the changes of antioxidant properties in response to aging of bottled wines. On this subject, I published in 2008 the book entitled “*The analysis of red wine color*” and a book chapter entitled “*Phenolics compounds with antioxidant activity in grapes and wine*”. Also, I have published 2 articles in ISI quoted journals, 8 articles in other national and international journals and 3 papers were presented at international conferences. 2 of these ISI quoted papers (*selected papers 1 and 2*) were presented in detail in **Section I/1**. Related to this direction I have taught 4 courses (2 of them to bachelor and 2 to Master). In this field, I wrote 3 course books and 2 practical work textbooks and also, I participated in 2 national programs related to antioxidant compounds in some various vegetal products which included also, grapes and wine.

In the field of fruit/gelled fruit products I have contributed with studies on the following topics: (i) impact of *Individual Quick Freezing* (IQF) and long-term storage of frozen fruit on their color stability and antioxidant properties; (ii) effect of thermal processing and storage on antioxidant characteristics and color quality of some low-sugar jam from various fruit rich in antocyanins; (iii) improving the color stability and increasing the amount of antioxidants retained in gelled products using different doses and types of pectin (high and low-esterified, amidated). The funding for this study was supported by a research project with the private sector, coordinated by me as director. In this field, I have published 5 articles in ISI quoted journals, 2 articles in other international journals and 2 papers were presented at international conferences. 4 of these papers (*selected papers 3-6*) were presented in detail in **Section I/2**. Also, I participated in 2 national research projects focused on the nutritional benefits offered by a diet rich in antioxidant compounds from vegetables and fruits.

In the field of by-products derived from food processing, I approached the following topics: (i) obtaining of crude freeze-dried extracts rich in polyphenolic compounds from pomace and grape seeds; (ii) assessment of inhibitory potential of freeze-dried grape seeds extract on

oxidative lipid degradation occurring in sunflower oil used in some food thermal applications; (iii) obtaining and characterization of some oils from by-products of fruits processing. On this topic, I have published 3 articles in ISI quoted journals, 2 papers in national journal included in international data basis and a paper was presented at an international conference. 2 of these papers (*selected papers 7 and 8*) were included in this thesis, **Section I/3**.

The interest for the fourth research direction, regarding the prevention and control of mycotoxins production in cereals using natural bioactive compounds has started since 2004 when I was involved in a national grant focused on reducing of fungal mycotoxin content from cereal products by food processing. Work on this topic has stagnated from 2006 to 2010, when I worked in a project funded by National Bank regarding the obtaining and characterization dietetic floury products (there are some notable achievements of us in this field: 3 trademarks registered to OSIM, a book to which I'm co-author and a book in which I wrote a chapter). The research activity on this topic was resumed starting from 2010 when I participated in the team of an international project from Regional Program of Cooperation with South-East Europe (ReP-SEE). In the realisation of this project I have contributed with studies on the following topics: (i) assessing the mycotoxin contamination of cereals and medicinal herbs in west area of Romania; (ii) investigating the inhibitory potential of some natural extracts and essential oils on mycotoxins production in cereals. On this topic, I was co-author for 2 chapters in a book published in English in partnership with teams from Serbia and Croatia. I have published 3 articles in ISI quoted journals and other 2 papers were presented at international conferences. 2 of these ISI quoted papers (*selected papers 9 and 10*) were detailed in **Section I/4**.

Apart from these key directions in the last two years I have performed studies concerning the use of Fourier Transform Infrared (FT-IR) spectroscopy, as a rapid, non-destructive method, for detection of olive oil adulteration and degradation. This research topic has started since 2012 when I won a Bilateral Project Romania-Greece. This co-operation is focused on strengthening the relation between the two teams (from Romania and Greece) with complementary skills and establishing a framework for further collaboration. During this project, I organized 2 lectures with international participation, I have published 3 articles with international partnership and also, we performed mobilities in Greece.

Section II briefly presents the main professional and academic achievements after the Ph.D. Overall, in this period I published 23 articles in ISI quoted journals (10 as *first author*, 1 as *corresponding author* and 12 as *co-author*), 7 books to CNCSIS recognized publishing houses, 4 book chapters and 2 practical work textbooks. Also, I coordinated as director 2 research projects (a bilateral project Romania-Greece, won by competition and a project funded by private sector). I participated as researcher in the team of 7 national projects, one international research project and I have been short-term expert, responsible for curriculum analysis, in a POSDRU project.

Part II shows *the plans for career evolution and development*. For this purpose are presented the research topics that will be continue or will be developed. Also, are presented the main indicators to quantify the professional and academic development as well as the future actions that will be performed in order to fulfill the proposed objectives. Based on the activities developed so far, an extensive set of activities in my interest fields, both at national and international level, are expected. The results could be significantly enhanced if the research team will be consolidated by including of Master students and PhD students. It have to be underlined that my active role will continuously increase in the future and the main indicators to quantify my career evolution and development will be researches, lectures and applicative works developed in the mentioned directions.

Part III groups *the bibliographic references* associated to the content of the first two parts.