

Executive Summary

The scientific, professional and academic activity, developed subsequently to achieving the PhD Diploma, proving the originality and relevance, is revealed by the original studies and interdisciplinary research in chemistry and plant biochemistry.

The present paper is the result of an interdisciplinary perspective research covering a broad range of life science and applied biotechnology areas, to promote a synergy in the fields of education and research, which resulted in the development of high order learning objectives, overcoming the strict limits.

The topics addressed in the personal research activity refer to issues such as:

- heavy metal pollution of soil and plant—the studies realised bring contributions to a better understanding of the biochemical mechanisms involved in the uptake of metals and metal extraction methods from plants and their use for therapeutic purposes;
- modeling the study of soil structural features (study of heavy metal pollution of soil and plants, identification of bioindicator plant species, study of the influence of heavy metals on the chemical composition of plants);
- evaluation of plant–metal interactions, the mechanisms and the quantitative significance (quantification of the effects of accumulation of metals on other essential plant elements);
- isolation, characterization and differentiation of active ingredients with therapeutic effect (methods used to analyze alternative models that describe patterns of pollution remediation);
- obtaining, characterization and utilisation of active ingredients enriched or not with heavy metals with an important effect on the bioavailability and thus to the therapeutic effect obtained.

The studied interactions have not been described before in the literature and the results are useful for understanding the adverse effects that are caused by metal pollution and may represent the foundation of a rational and natural bioremediation and of plant adaptation to the ecosystem. Sustainable development has now become a global issue. In this area of research I coordinated in the quality of director, two national projects and one international project, and I participated as principal investigator of the research team, to five national and one international project.

In the realisation of these projects I have contributed with studies on the investigation of heavy metal pollution of soil and plants; assessing the influence of heavy metals on plant composition, species identification for biomonitoring; investigating of active principles with pharmacological effects; interrelationships between plants, nutrition and metabolism; quantification of chemical and biological parameters using biomarkers; mechanisms by which complex mixtures of plant compounds interact to modulate the biological activity; the influence of environmental factors on natural compounds /plant active principles; approaches for chemical characterization of medicinal plants and herbal mixtures using different techniques.

Identification and quantification of active principles or bio–active compounds (with antioxidant activity that helps fighting the adverse effects that could occur) from various matrices are, in many

cases, the starting point for further experimental research in the areas of bioanalysis, toxicology analysis, food analysis, phytochemistry, kinetics and structural analysis.

The goal aimed in my research was to develop simple and accurate bioanalytical methods, providing high speed of analysis, in terms of sample processing and time of analysis in atomic absorption spectrophotometry, quantitative and qualitative spectrophotometric analysis and spectroscopy in the infrared domain (studies on lycopene, flavonoids, alkaloids, capsaicin etc.).

Personal research in bioanalytical chemistry applied to plants / bioactive compounds led to the development and improvement of standardised analytical methods with some advantages over standard methods published in the specific literature regarding the sample preparation method, qualitative and quantitative spectrophotometry and infrared spectroscopy and detection parameters (specificity and sensitivity). After achieving the PhD Degree, I published five books to CNCSIS recognised publishing houses and one book as co-author in Cambridge Scholars Publishing Ltd.

[\[http://www.c-s-p.org/Marketing.htm\]](http://www.c-s-p.org/Marketing.htm) I studied realised research and published over 70 papers containing original results in the areas of active ingredients or bioactive compounds. My work has appeared in many journals. Abstracts of four oral presentations at international conferences were published in journals with impact factor greater than 4 [\[http://www.sciencedirect.com/science?_ob=ArticleListURL&_method=list&_ArticleListID=109243080&_sort=r&_st=13&view=c&_acct=C000228598&_version=1&_urlVersion=0&_userid=10&md5=cd3fc43a0ed4f32b24b3c225500c57c0&searchtype](http://www.sciencedirect.com/science?_ob=ArticleListURL&_method=list&_ArticleListID=109243080&_sort=r&_st=13&view=c&_acct=C000228598&_version=1&_urlVersion=0&_userid=10&md5=cd3fc43a0ed4f32b24b3c225500c57c0&searchtype=a)

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19 articles were published in journals with impact factor and the rest of them were published in BDI indexed journals or presented at international conferences.

Leadership expressed in quality by first author and in series of publications on a subject or target area is confirmed 9 articles from those with Impact factor (Thomson Reuters (formerly ISI) Web of Knowledge). 5 papers have impact factor 3.28 (2011) and relative influence score 1.727 (2011) and one paper has an impact factor of 2.598 and relative influence score 1.6 (these papers are "open access" and were rated 'Highly accessed' [\[http://journal.chemistrycentral.com/mostviewed\]](http://journal.chemistrycentral.com/mostviewed), this demonstrating that the research realised and the published studies are of interest to researchers from other areas of the world. [\[http://apps.webofknowledge.com/summary.do?qid=15&mode=AuthorFinder&product=WOS&product=WOS&SID=W1jEgcJHCfgDmNnckEh&SID=W1jEgcJHCfgDmNnckEh&search_mode=AuthorFinder\]](http://apps.webofknowledge.com/summary.do?qid=15&mode=AuthorFinder&product=WOS&product=WOS&SID=W1jEgcJHCfgDmNnckEh&SID=W1jEgcJHCfgDmNnckEh&search_mode=AuthorFinder).

The professional experience has been enhanced through participation in 12 national and international training/colaboations, and post-academic courses in pollution, ecotoxicology, pharmacy, cosmetics and validation of analytical methods in 2006–2012. The work in the described fields contributes to the scientific and academic knowledge and is supported by 5 patents [\[http://apps.webofknowledge.com\]](http://apps.webofknowledge.com). To facilitate transfer of knowledge results of activity research in the socio-economic, I attended most of international salons Innovation, Research and New Technologies, of Brussels (BELGIUM), Zagreb (Croatia) and Geneva (Switzerland) in 2006–2011, and in 2008 we received a diploma with gold medal

KIWIE 2008—*Korea International Women's Invention Exposition*, Seoul (KOREA) [<http://www.invention-ifa.ch/kiwie/seoul.htm>]

The scientific development plans in chemistry and biochemistry of plants is heading towards the same issues mentioned above. Bioanalytical research will aim the study of kinetic processes involving bioactive substance and evaluating the effects of heavy metals on ecosystems.

Future research will focus on studying biochemical bioavailability of active principles from different matrices and their influencing factors. Studies on the development of bio-analytical methods will be focused towards obtaining rapid and simple method of analysis, by optimizing the parameters and the methods of detection. Regarding the teaching activity, courses in chemistry and biochemistry of plants will be improved by adding new information from the literature, as well as for the practical work placements.

The course *"Modelling mechanisms based on biochemical interactions of forest ecosystems"* presented to master students will be completed with the presentation of new types and methodologies for establishing and modelling the interactions in an ecosystem (based on chemical composition in order to fulfil environmental protection and sustainable development).

Since universities are fundamental link that integrates research and education, with decisive role in disseminating knowledge in social and economic and given the academic and teaching involvement, I consider sustainable development by designing research involving forms and methods of study whose foundation is to ensure a balance between the natural potential of plants and socio-economic systems.

According to the current estimates and the agreement signed, this will be possible publishing papers and books in the field of chemistry and biochemistry of plants; thus in autumn 2013 shall defend in Springer Publishing house, book „Environmental Indicators” where I have written the chapter „Markers indicators of soil pollution” (contact [Betty van Herk](#), Springer, Environmental Sciences, Mailing address: P.O. Box 17, 3300 AA Dordrecht, The Netherlands, Street address: Van Godewijkstraat 30, 3311 GX Dordrecht, The Netherlands, www.springer.com}), in order to give a training handbook for the students as future professionals in research and practice.

In the last year I attempted to publish my studies, in journals with impact factor (Thomson Reuters (formerly ISI) Web of Knowledge), considering that such publications are those which give visibility, impact and prestige internationally, of those involved in education and research; and as a confirmation of this, I have been contacted by many editors, for to part the editorial board for scientific journals, that are indexed in databases acknowledged so much of analyzes the National Science Foundation, USA, how and the European Commission, that use these publications when analyzes state research to level internationally. Research is a must for a modern education system. I consider that we cannot talk about international prestige of a university without research

Considering the modest results obtained so far in assessing biological effects of bioactive compounds, as evidenced by current research studies, I think I should continue this research and the results (by examining the factors that determine the success or failure) will be the design of specific methodologies of analysis and diagnostic of biologically active substances.

I will continue investigating the possibilities to adapt the methods proposed to assess antioxidant activity in varied environments: food, cosmetics, nutritive supplements *etc.* and diversification of their application. I will continue to pursue optimization of the procedure of determining antioxidant activity based on area under the curve as the results obtained this way are closest to the real values and eliminate the fluctuations caused by fixing the time at which measurements are made. The proposed methods will be improved and I will seek to generate new biologically relevant radicals through which to achieve detection and assessment systems of the antioxidant activity, considering great attention given worldwide to this current research direction.

Formulation of development strategy for my future career is defined by the strategic mission of the university, choosing appropriate strategy to achieve the objectives and methods of achieving them being my full responsibility and will be addressed in order to contribute to visibility of research and exploitation of knowledge in order to prepare an training programme closely linked to the needs and motivations of learners.

I wish that the transfer of knowledge to be flexible enough to meet multiple objectives, and the choice of content, to be adapted with maximum accuracy specific to real teaching needs.

I am aware that the purpose of teaching / learning is to endorse the learner with a set of knowledge and skills in order to be able to use them to meet the needs of knowledge and communication. It is therefore essential that the professor know exactly or better the student needs in order to conceive, plan and focus teaching material according to their needs and expectations.

I'll try to promote through my actions respect for human rights including equality as a basis of democracy, appreciation and understanding of differences between value systems of different religious and ethnic groups; growing sense of belonging to their city, country, EU and Europe in general to the world, showing the desire to participate in democratic decision-making at all levels accountable, manifestation of understanding and respect for common values necessary to ensure social cohesion, such as respect for democratic principles; involvement in civic activities, support for diversity and social cohesion and sustainable development, openness to the values and the personal life of others.

"Creativity is a natural extension of our enthusiasm" (*Earl Nightingale*)