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TEZA DE ABILITARE

STUDII FARMACOGNOSTICE ASUPRA UNOR SPECII VEGETALE CU POLIFENOLI

REZUMAT

Prof.dr. ILIOARA ELENA ONIGA

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PHARMACOGNOSTIC STUDIES ON SOME VEGETAL SPECIES WITH POLYPHENOLS

HABILITATION THESIS

ABSTRACT

The presented habilitation thesis includes the most important scientific, professional and academic achievements, since obtaining the PhD title (1997). During this period, I continued the previous activities, which were always oriented towards the pharmaceutical field, mostly in the direction of knowledge and exploitation of medicinal plants.

The studies made on natural resources for their therapeutic use represent an important sector in the context of actual research in the pharmaceutical field. For a better exploitation of indigenous plants, their in-depth pharmacognostic knowledge and study are very important, for a more accurate establishment of their therapeutic indications, potential side effects, but also for avoiding substitution and falsifications, situations in which the consequences could be sometimes critical.

In this context, major part of research targeted the phytochemical analysis of some vegetal raw materials, obtained from the spontaneous flora, or from crops, in order to characterize them from pharmacognostic point of view, for an optimal therapeutic exploitation.

The thesis is structured in 2 parts, which present the scientific professional and academic achievements, as well as the prospects in these directions.

First research activities after the achievement of PhD title continued the PhD topic, with new studies on *Echinacea* species. These conducted to obtaining two patents, (co-author, in collaboration with the Faculty of Agricultural Sciences – USAVM Cluj), which resulted in defining two indigenous varieties of *Echinacea*.

Most of phytochemical studies aimed the identification and quantification of active principles from the class of polyphenols: flavonoids, caffeic acid derivatives, tannins, benzene derivatives, salicylic acid and its derivatives etc. To these activities, there were often added tests which had as a purpose the evaluation of the antioxidant potential (correlated to the polyphenols concentration), the antimicrobial activity, the anti-inflammatory potential of the extracts etc.

Polyphenols represent plants' metabolites, which include phenolic acids, flavonoids (flavonols, flavones, isoflavones,flavanones, anthocyanins), tannins, lignans etc. The

pharmacological properties of these active principles may be due to some mechanisms, based on their antioxidant capacity, correlated to their chemical structure, which facilitates this potential.

A part of the studies were made in the context of some funded research projects and they represented important contributions regarding composition and properties of the active compounds from several species, such as *Hyssopus officinalis,* harvested from different areas of the country, *Hypericum species* from Transilvania's spontaneous flora, species and varieties from crops - *Calendula officinalis, Humulus lupulus, Melissa officinalis*, and so on.The results obtained from another project showed the advantages of using the ozone as a preservative for apples, without producing qualitative or quantitative changes of flavonoids / anthocyanins and carotenoids from the fruits' peel.

Other researches were made using as a raw material different species from *Lamiaceae* family, harvested from crops (*Ocimum sp., Salvia sp., Mentha sp.*) and species from spontaneous flora, (*Achillea* and *Viola* genus). The results allowed the pharmacognostic characterization of these species, together with the establishment of differentiation criteria, in terms of botanical and phytochemical aspects, also identifying active principles from the class of polyphenols (flavonoids, phenyl-propane derivatives, salicylic acid derivatives, quinones, phenols) and evaluation of some pharmacological properties (anti-inflammatory potential, antimicrobial, antioxidant capacity etc).

The analysis of polyphenolic compounds was extended towards some species from *Fabaceae* family, (*Glycyrrhiza glabra, G. echinata, Ononis spinosa*), from which isoflavonoids (active principles with phytoestrogen potential) were analyzed.

In order to exploit the indigenous natural resources, as sources of polyphenolic active principles, medicinal species harvested from different areas of the country were studied (*Tanacetum vulgare, Populus sp., Epilobium sp.*), the phenolic profile, antioxidant and antimicrobial activity of the extracts were established. Similar studies were also made for exotic species (*Balanites aegyptica, Artabothrys hildebrandtii*).

Analysis of arbutin from leaves and fruits of *Vaccinium vitis-idaea* confirmed the presence of hydroquinone derivatives in the leaves with antiseptic urinary properties. Although the fruits (cowberries) are recommended in treating urinary tract infections, their efficacy is based on the presence of proantocyanins in their composition, acting by the inhibition of bacterial adhesion onto mucous membranes.

Research made on the presented medicinal plants brought new information for a better therapeutic exploitation, for obtaining standardized products, with an appropriate quality level.

Results of the research made after PhD title was obtained, were published in 106 scientific articles (25 in ISI journals and 19in journals indexed in IDB) .

My teaching activity was conducted at the Discipline of Pharmacognosy and it consisted in preparing and teaching courses and practical works of Pharmacognosy for students from the Faculty of Pharmacy (in Romanian and French languages), introducing and teaching the optional course of Phytotherapy, post-universitary courses for pharmacists, courses for masters programme (Cosmetology and Applied pharmaceutical sciences) and residency (specialization – Pharmaceutical Laboratory). To contribute to a better learning of students, I developed teaching materials, I published 13 books of Pharmacognosy and Medicinal plants and I participated to drafting of other 12 chapters in speciality books, as a co-author.

The last part of the thesis refers to the scientific, professional and academic perspectives. Regarding this issue, I will pursue continuation of my professional training in accordance with the actual standards, in order to teach high-level courses, for students, pharmacists, residents, MA students. To contribute to the formation of future pharmacists of European standards, I will pursue permanent update of teaching materials, in order to maintain the excellence educational level.

Scientific activity from the next period will continue to develop the discipline topics, with pharmacognostic analysis of vegetal raw materials, in order to obtain phytopreparations of appropriate quality, standardized in active principles, consistent with current quality requirements. Thus, we will continue studies on some species with polyphenols (*Hypericum sp., Calendula officinalis, Heracleum sp., Ajuga sp., Trifolium pratense, Thea sinensis* etc), with completion of existing pharmacognostic data and obtaining results which can sustain an optimal therapeutic exploitation.

Another research direction is represented by species from *Amaryllidaceae* family, known mostly for their ornamental use, but also as an important source of galantamine, an alkaloid used in treating Alzheimer disease. The considered studies could complete the phytochemical data upon this indigenous species and could lead to the extension of therapeutic potential to new directions. This research will be conducted in the context of a project of research with internal funding, being underway.

The obtained results will be presented at scientific meetings and they will be published in Scientific Journals.

All these prospects will be achievable through continuation of effective collaboration with colleagues from discipline, from faculty, university or other profile institutions.