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## TEZĂ ABILITARE

### Genul Veronica și Ruscus abordare fitochimică Rezumat

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## Abstract

This habilitation thesis presents the most important research direction after the PhD thesis. After 2004 (when I obtained the PhD title) I have continued the researches concerning some genus of Scrophulariaceae family, especially Veronica genus in a research project “The Veronica genus – identification of interrelations between the biological and ecological diversity of the species identified in protected areas and at the national level in order to characterize, preserve and durable use of the genetic resources”. These studies were published in: **Crișan Gianina**, M. Tămaș, V. Miclăuș, T. Krausz, Vl. Șandor: *A Comparative study of Some Veronica Species*, Rev. Med. Chir. Soc. Med. Nat., Vol.III, nr.1, Iași, **2007**; **Crișan Gianina**, Tămaș M.: *Specii indigene cu importanță medicinală ale genului Veronica L. (Scrophulariaceae)*, Hameiul și plantele medicinale, Editura Academic Press Cluj-Napoca **2005**, 13, 1-2, 189-192; Gevrenova R., Nikolova M., **Crișan G.**: *A HPLC Analysis of the Surface Flavonoid Aglycones in Veronica Chamaedrys L*, Farmatzia 52, 3, **2005**, 16-19; **Crișan G.**, Tămaș M.: *Analiza iridoidelor din specii de Veronica L. (Scrophulariaceae)*, Analele Științifice ale Universității de Stat de Medicină și farmacie”Nicolae Testemițeanu” Chișinău, **2005**, 1, 444-447; Kiss B., Popa DS., **Crișan G.**, Bojiță M., Loghin F., The evaluation of antioxidant potential of *Veronica officinalis* and *Rosmarinus officinalis* extracts by monitoring malondialdehyde and glutathione levels in rats, *Farmacia*, **2009**, 57, 4, 432-441; **Gianina Crișan**, Laurian Vlase, Georgeta Balica, Dana Muntean, Cristina Ștefănescu, Ramona Păltinean, Mircea Tămaș, Sorin Leucuța, LC/MS Analysis of aucubin and catalpol of some Veronica species, *Farmacia*, vol. 58, nr. 2, **2010**, 237-242.

Other studies concern Scrophularia genus and they are materialised in the publication: **G. Crișan**, B. Kiss, L. Vlase, G. Balica, M. Tămaș, HPLC Determination of Some Phenolic Compounds of *Scrophularia nodosa* and *S. scopolii*, *Chemistry of Natural Compounds* , vol. 45, No. 6, **2009**, 885-888.

Another research direction was in the field of in vitro cell culture of *Ruscus aculeatus* in a research project „*Ruscus aculeatus* between protection and medical use. Applied biotechnologies for obtaining in vitro biomass containing active principles”. In Romania this species is on the red

list of endangered vascular plants and therefore it cannot be exploited from the wild flora. The biomass obtained by cell and tissues culture in vitro could provide the raw material for the pharmaceutical industry in order to produce the active principles.

The aim of the project combines the fundamental research with the applied studies. In order to achieve these goals the main steps were the following: 1) obtaining of *Ruscus aculeatus* plantlets by in vitro aseptic germination of plant seeds; micro-propagation and obtaining of callus cultures and cell suspensions (root cultures grown in liquid medium) 2) biotransformation of steroidal saponins precursors in the desired compounds by cell culture and usage of *Agrobacterium rhizogenes* as versatile system of biotransformation 3) qualitative and quantitative analysis of steroidal saponins from the *Ruscus aculeatus* rhizomes and roots and also from the in vitro biomass 4) anti-inflammatory effect evaluation. Following the above mentioned steps, it was studied the influence of different factors (type of explants, phyto-hormones, carbon source, precursors) over the callus and cell suspensions inducing and growth. We have analyzed the biosynthesis and the accumulation of steroidal saponins in the cell cultures. We have performed sequential histological and biochemical studies on the roots and stems of the in vitro regenerated plantlets of this species in order to determine the place and the way the secondary metabolites are biosynthesized and accumulated.

The results of this project were published in the following articles: Balica G., Tămaș M., Deliu C., **Crișan Gianina**: *Biotechnological and phytochemical research on Ruscus aculeatus L.*, Proceedings of the 4<sup>th</sup> Conference of Medicinal and Aromatic Plants of South East European Countries, Iași **2006**, 347-353, ISBN 973-8392-32-2; Balica G., **Crișan G.**, Deliu C., Vlase L., Tămaș M., Study on polyphenols from phylloclades, young shoots and in vitro shoots cultures of *Ruscus aculeatus L.*, *Rev. Med. Chir. Soc. Med. Nat.*, Iași, **2008**, Vol. 112, nr. 2, Supliment nr. 1: 34-37; Vlase L., Kiss B., Balica Georgeta, Tămaș M., **Crișan Gianina.**, Leucuta S.: High – Throughput LC/MS/MS Analysis of Ruscogenin and Neoruscogenin in *Ruscus aculeatus L.*, *Journal of AOAC International*, vol. 92, nr. 4 , **2009**, 1055-1059; Marcela Achim, Georgeta Balica, Laurian Vlase, **Gianina Crisan**, Mircea Tamas, Sorin E. Leucuta, Forme farmaceutice topice cu extract fluid de *Ruscus aculeatus*: formulare, preparare si caracterizare fizică, *Clujul medical* nr. 1, vol. 83, **2010**, 99-103; Balica G., Voștinaru O., Tămaș M., **Crișan G.**, Mogoșan C., Anti-inflammatory effect of the crude steroidal saponin from the rhizomes of *Ruscus*

*aculeatus* L. (Ruscaceae) in two rat models of acute inflammation, *Journal of Food, Agriculture and Environment*, vol. 11, **2013**, 106-108.

Finally, the Habilitation Thesis presents the main directions of development of the academic and research activity.