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DOMAIN: AGRONOMY

HABILITATION THESIS

CONTRIBUTIONS TO THE STUDY OF THE VASCULAR FLORA AND VEGETATION OF ROMANIA AND OF THE PHENOMENON OF VASCULAR PLANTS INVASION

Prof. Culiță SÎRBU, PhD

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ABSTRACT

In this habilitation thesis, I have presented a selection of the main results published after obtaining the PhD degree, which I consider relevant to my own academic, scientific and professional career. I also have presented the main directions and ways of action which I intend to follow for the future development of my career.

The thesis is structured and edited according to the specific rules of USAMV Iaşi (derived from the legislation in force), as follows: abstract; scientific, professional and academic achievements, on thematic lines; plans for the future development of the career; bibliographical references.

The thesis includes a number of 3 tables and 52 figures (13 graphics and 39 photos). Of these, 2 tables and 28 photos are published here for the first time; the other ones were taken from various articles and books previously published by me (as single author or co-author).

I. The results selected for highlighting the evolution and development of my own career, after obtaining the PhD degree, have been structured in the **first section of the thesis**, in three directions of research (summarized below), in which the personal achievements are documented by references to the published articles and books (as single author, or co-author), between 2002-2015, in the context of the current state of knowledge in the field, highlighting the relevance and originality of personal contributions. For each direction, I have presented: a brief introduction; a general methodology; a selection of results and discussion; conclusions (in Romanian and English).

1. The vascular flora:

a) New reports in the flora: *Artemisia lancea* and *Lepidium oblongum* was reported first time as alien plant species in the flora of Europe. A number of 24 species were reported first time in the spontaneous flora of Romania: 1 indigenous (*Fritillaria meleagroides*), 10 xenophytes and 13 hemerophytes. Over 50 species were reported for the first time in the spontaneous flora of some historical provinces of the country (mostly in Moldavia), 3 of which are indigenous (*Corispermum marschallii*, *Festuca filiformis*, *Pedicularis sylvatica*), while the others are alien (xenophytes or hemerophytes). *Corispermum canescens* has been confirmed in Romania, by herbarium specimens. *Dipsacus strigosus* (xenophyte) and *Vitis labrusca* × *V. vulpina* (hemerophyte) have been reported, in this thesis, for the first time, in the spontaneous flora of Transylvania;

b) Monographic studies on the vascular flora were performed in the Stânişoarei Mountains (Eastern Carpathians). Some synthetic data have been selected, such as: the specific diversity (1408 species and 113 subspecies);

floristic novelties for the area; presence of rare species (endemits, relicts, endangered species); some phytogeographic considerations; arguments and proposals for the conservation of certain areas with high floristic diversity etc.;

c) Other floristic contributions: the vascular flora of the Rarău Massif (Eastern Carpathians) (1443 plant taxa); the vascular flora of the natural reserve "Fânațul de la Glodeni", Vaslui County (315 plant species).

2. The vegetation of Romania

a) Description of 3 syntaxa proposed as new to science, namely: Association *Balloto nigrae-Ailanthetum altissimae* Sîrbu & Oprea 2011; Ass. *Symphyto taurici-Fagetum taurici* Oprea, Sîrbu & Goia 2011; Ass. *Achilleo-Festucetum pseudovinae* (Magyar 1928) Soó (1933) 1945 subass. *asteretosum sedifolii* Sîrbu & Oprea 2009;

b) The monographic treatment of the class *Stellarietea mediae* in the vegetation of Romania: the anthropogenic pioneer plant communities from Romania, belonging to this class, have been classified in 2 subclasses, 4 orders, 11 alliances, 53 associations and 25 subassociations of the syntaxonomic system;

c) The phytosociological monography of the Stânişoarei Mountains: based on data obtained through our field research and the literature, a number of 71 plant associations and 13 subassociations, belonging to 45 alliances, 33 orders and 23 classes of vegetation have been identified and described;

d) The use of the algorithm of the deductive method [Kopecký *et al.* 1995] for classification the phytocoenoses from Eastern Romania invaded by the neophyte *Symphyotrichum ciliatum*. By applying the algorithm, these phytocoenoses were classified into 7 categories (3 of which have the status of *derivate communities*). The ability of this species to invade various plant communities, as a dominant species, do not validate it as diagnostic species for a particular plant association or alliance, as it has previously been considered in the literature.

e) Other contributions: the vegetation of some mesotrophic-eutrophic marshes from the Neamț and Bacău Counties; the vegetation of the xero-mesophilous grasslands from the natural reserve "Fânațul de la Glodeni" etc.

3. The invasion of alien plants

a) The continuous expansion of some alien plants with invasive character. According to our data (2011), the alien flora of Romania includes a total number of 671 species of vascular plants; among these, 112 species can be considered invasive, considering their high capacity to spread in nature, and in many cases, their negative impact on natural biodiversity, economy and human health.

b) The invasion of neophytes in natural and anthropogenic habitats from Romania. Our results, in line with the ones known from references (from

other countries), showed a high variability of habitats concerning the level of invasion by neophytes. The disturbance (natural or anthropogenic) has been identified as one of the main factors which cause the susceptibility of habitats to be invaded. The invasive neophytes can be considered either as "generalist" (able to invade a wide range of habitats) or "specialist" (able to invade a limited number of similar habitats, however not less aggressive). These results are useful for an adequate management of biological invasion.

The invasion history, current distribution in Romania and habitat preferences have been investigated for tree alien species (neophytes) of the Romanian flora (*Lepidium densiflorum*, *L. virginicum* and *Symphyotrichum ciliatum*). Our data confirmed their invasive character. Given the abrupt increase in the slope of the invasion curve during the last decades, we assumed that the three species are still far from reaching their saturation phase of invasion in Romania.

c) The risk of contamination with germs of invasive plants in the cross-border trade. We identified the invasive neophytes which showed the greatest potential to be transported through mutual agricultural trade between Romania and Slovakia, as well as the goods susceptible, to the greatest extent, to contain propagules of invasive plants in the cross-border trade.

d) Neophytes listed as quarantine vascular plants for Romania. Many vascular plants, listed by various normative acts, as "quarantine" weeds, in fact are present in the spontaneous flora of Romania, some of them being invasive. I insisted on the necessity of improving the quarantine legislation of Romania, as well as on the active involvement of the responsible factors in early detection and eradication of alien weeds with invasive potential, before they become real plagues, difficult to control.

e) The hemerophytic flora from Moldavia includes (up the year 2007), a number of 169 vascular species, in most cases originated from Mediterranean basin, Asia and America. The deliberately introduction of these species by man was made especially for their ornamental value, but also for other uses (alimentary, medicinal, fodder, aromatic etc.), or to enrich some scientific or didactic collections. The most hemerophytes from Moldavia (63.3%) are casually found as sub-spontaneous ones; a significant proportion of species (21.3%) are invasive in anthropic and natural habitats, causing important damages; the other 15.4% of them are completely naturalized, being able to become invasive in short time if the future evolutions of genetic, ecologic and anthropogenic factors will be favorable.

II. In the second section of the habilitation thesis, I listed the main objectives which I proposed myself to follow for the future development of the teaching and research activities (which fit to the strategic objectives of the faculty and the university), as well as the possible actions to implement them.