Hop and Medicinal Plants, Year XXII, No. 1-2, 2014
ISSN 2360 – 0179 print, ISSN 2360 – 0187 electronic

ONE HUNDRED TEN YEARS OF RESEARCH ON MEDICINAL PLANTS, AT THE AGRONOMY IN CLUJ (1904-2014)

MUNTEAN, Leon Sorin
University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture, 3-5 Mănăstur Street, 400372 Cluj-Napoca, Romania,
leon.muntean@usamvcluj.ro

The medicinal plant unit founded within the Agriculture Academy Cluj. In 2014, 110 years are celebrated from the founding of the unit in Cluj, specialized in the field of medicinal and aromatic plants, led by PhD. Béla Páter, former manager of the Agriculture Academy Cluj, between 1910-1919 and author of valuable books and studies in the field of cultivated or spontaneous aromatic and medicinal plants. B. Páter has founded, in 1903-1904, at the Agronomy in Cluj, an agro-botanical garden, conceived as a „*living laboratory*", for the teaching activity of the botanic discipline and an important foundation for scientific activity. The garden's plant collections included important agricultural species and an important number of medicinal plants, which have represented the foundation for settling a research center in the field of medicinal plants, and since 1904, for a medicinal plant unit, endowed also with a processing center for these plants (Chiţescu-Arva, 1927; Pater 1923; Şerban, 1938).

For 110, the preoccupations for capitalizing on medicinal and aromatic plants in our country have begun having a recognized scientific support, with the founding of the medicinal plant unit at the Agronomy in Cluj. It is one of the first experimental units in the world, specialized in the study and capitalization of medicinal and aromatic plants (Coiciu şi Racz, 1962; Muntean, 1990). PhD. Béla Páter has remained the leader of the medicinal plant unit until 1930, on his 70th birthday (Szabo şi Bela, 1970; Baicu, 1976). During the inter-war period, within the agro-botanical garden in Cluj, Acad. Iuliu Prodan, the outstanding botany professor at the Agronomy in Cluj, has cultivated and studied the *Iris* species (spontaneous and cultivated) in Romania.

Subsequently, the plant collections became diverse, with species from our country and flora from various regions of the Globe, forming an important foundation for documentation and research for teachers and students. The works developed within this unit were published in the "Informative bulletin of the botanical garden and botanical museum at the university of Cluj" (Baicu, 1976).

The medicinal plant unit, institution belonging to the Agriculture Academy Cluj, had an experimental field, laboratories for the analysis and distillation of medicinal plants, artificial heat systematic dryers for drying medicinal plants and hop (Chintescu-Arva, 1927). Thus, at the Agriculture Academy Cluj, the foundations were created for the experimental research in the field of plants used for healthcare purposes, from our country's flora. The research at that time and the subsequent one at the Agronomy in Cluj became recognized and appreciated nationally and internationally (Velican, 1965, Muntean et al., 2007). The studies in the field of medicinal plants continued at the Plant Improvement Unit in Cluj, a unit which, in 1960, was included in the Agronomy Institute of Cluj. Obviously, this research performed in Cluj, throughout the years, has completed the studies in the field of medicinal and aromatic plants performed by other similar institutions in our country (Coiciu şi Racz, 1962, Crăciun et al., 1976, 1977; Muntean et al., op. cit. 2007). Among these, the studies in the field of medicinal and aromatic plants performed within the Romanian Institute for Agronomy Research (ICAR) in 1930, at the experimental units in Bucharest, Cluj, Câmpia Turzii, Măgurele, Braşov, Valul lui Traian, and, since 1975, within the Research Unit for Medicinal and Aromatic plants (SCPMA) Fundulea, created at the same time with the founding of the Plafar Group, are worth mentioning, along with those performed in other units, located in different ecological conditions, in universities for superior agronomy education and pharmacy faculties.

The introduction in culture of medicinal and aromatic plants. The preoccupation regarding the capitalization on medicinal and aromatic plants in our country has gained a scientific support acknowledged since 1904 in Cluj (Pater, 1926; Pater, 1927). The medicinal plant unit in Cluj has followed, from the beginning, two goals: „the study and experimentation of medicinal plants which can be cultivated" and „finding the methods to use and capitalize on medicinal plants growing wild in our areas (Pater, 1927). Having a wide range of climatic and soil conditions, our country's flora is very diverse and rich,

exceeding 3500 species of superior plants, out of which a quarter used in empirical medicine and approximately 200 species studied from a chemical-pharmaco-dynamic perspective. Almost 900 plant species (according to certain estimates, almost 1000 de species), represent Romania's medicinal flora. For medicinal and aromatic purpose and for the internal and export needs, our country currently harvests, systematically, over 150 plant species (Muntean et al., 2007). The spontaneous flora cannot insure the increasing demand for vegetal raw materials, for the chemical and pharmaceutical industry and for other internal and external beneficiaries. By cultivating, according to scientific principles, medicinal and aromatic plants, the demand for vegetal raw materials is covered, for the national pharmaceutical industry, a product rich in active components and more homogenous is obtained, substitutes and falsifications can be avoided, the harvesting can be performed at the optimal time (when the content of active ingredients is maximum), followed by the drying or processing in fresh condition, new species can be acclimatized, which do not grow spontaneously in our country, plants considered natural monuments can be protected etc. All these advantages for cultivating medicinal and aromatic plants, compared to the possibilities offered by the spontaneous flora, has led to the gradual introduction of an increasing number of plants, for which the location and cultivation requires thorough knowledge, in order to achieve rich crops and a high content of active ingredients. Large productions of raw materials rich in active ingredients can only be obtained by applying differentiated culture technologies, based on thorough knowledge in biology and related to plant requirements, regarding the vegetation factors. All technological links must be known and applied, such as the breeding method, the necessary nutritive elements, the fertilization method, cleaning operations, fighting of pests and diseases, harvesting and production conditioning etc. (Păun et al., 1986, 1988, Muntean, 1996). In our country, in 1959, only 14 species of aromatic and medicinal plants were cultivated. Their number has gradually increased, currently reaching approximately 50 cultivated species. Compared to other plant groups (cereals, technical plants), the areas cultivated with medicinal and aromatic plants are much lower, but of great importance. The importance of their cultivation is not associated with the covered area, but with „their specific capitalization, as, usually, their result cannot be replaced. There are species only cultivated annually on several ha (10-20 ha), but, from the production on each ha, tens of thousands and even millions of medicine doses can be obtained,

necessary for healthcare or even the saving of human lives. This aspect contributes to the maintenance in cultivation of a significant number of species on small areas" (Coiciu and Racz, 1962*).* During the past years, a reorganization of the medicine industry has taken place in our country, materialized into the development of new production and capitalization units for medicinal and aromatic plants and for vegetal medicines, in the conditions of an increased exigency in the authorization of production spaces, analysis laboratories and quality standards for vegetal medicinal products. It is also worth mentioning that the Plafar Group no longer holds harvesting, procurement and condition monopoly on medicinal vegetal products; the large, government owned, industrial units and micro-production laboratories have divided, some operating as private units, while some could not face competition and became bankrupt (Tămaş and Oniga, 2001).

The systematic research in the field of medicinal and aromatic plants at the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca was resumed in 1970, according to an agreement with the medicine plant „Terapia" Cluj. Scientific research in this field, at SAMV Cluj-Napoca, developed and diversified after 1975 (under the leadership of PhD. Leon Sorin Muntean), when the phytotechnology discipline has entered agreements with SCPMA Fundulea, The faculty of Pharmacy in Cluj-Napoca, The Ministry of Education and Research, Plafar Cluj, including aspects related to bioecology, culture implementation, improvement and species cultivation technology: *Solanum laciniatum* Ait., *Colchicum autumnale* L., *Papaver bracteatum* Lindl., *Herniaria glabra* L., *Adonis aestivalis* L., *Genliana lutea* L., *Aconitum napellus* L., *Angelica archangelica* L., *Hypericum perforatum* L., *Valeriana officinalis* L., *Echinacea pallida* Nutt., *Echinacea purpurea* (L.) Moench. etc. The collaboration entered by USAMV Cluj-Napoca — Faculty of Agriculture, through the Phytotechnology discipline with Faculte Universitaire Agronomique Gembloux (Belgium) in 1998, in the field of medicinal and aromatic plants is also noteworthy (Muntean et al., 1999, 2002, 2005).

Since 1993, when the ***Research Center for Hop and Medicinal Plant Culture*** was founded at USAMV Cluj-Napoca (led, since its establishment, by PhD. Leon Sorin Muntean), a new phase was achieved in the study of these plants. This research center was founded and is organized to operate according to the Decision of the Senate of the University of Agricultural Sciences and Veterinary Medicine from

December 6, 1993, through the Decision of the Chancellor of USAMV Cluj-Napoca no. 84 from March 24, 1994, reconfirmed by the Senate of USAMV Cluj-Napoca on 25.10.2005, within the Phytotechnology Department of the Faculty of Agriculture within USAMV Cluj-Napoca and the disciplines working for achieving the center's research related goals. The foundation for the establishment of the research center was the long activity and the obtained results, especially during the last three decades, at the Phytotechnology Department, in the field of hop and cultivated medicinal and aromatic plants. The research included in the center's subject plan is performed on the experimental fields and in the laboratories of the Phytotechnology Department and those of other disciplines involved in this research at USAMV Cluj-Napoca and the Faculty of Pharmacy Cluj-Napoca, in collaboration with several research and production units in the area.

The main species of medicinal and aromatic plants studied during the past decades at USAMV Cluj-Napoca and the research directions on biology, content of active ingredients, improvement and cultivation technology are the following (Muntean et al., 2008, 2011):

- *Echinacea pallida* Nutt., *Echinacea purpurea* (L.) Moench. (Fam. *Asteraceae*): genetics studies and improvement operations; studies on seed germination; biology of the plants bred through seeds and seedling; the active ingredient content per vegetation phases; technological cultivation measures; improvement operations through which breeds were created. ***Napoca*** — first Romanian breed of *E. pallida* Nutt; ***Cluj,*** first Romanian breed of *Echinacea purpurea* (L.) Moench:
- *Valeriana officinalis* L., (Fam. *Valeriianaceae),* initiation of improvement operations; seed germination according to age and external factors; study of selected species, breeds and clones; biology and active ingredient content, according to the cultivation method; improvement works; technological cultivation methods,
- *Solanum laciniatum* Ait, (Fam. *Solanaceae),* biology and ecology research; determination of the main technological cultivation methods; raw material active ingredient content; initiation of improvement operations.
- *Papaver bracteatum* Lindl., (Fam. *Papaveraceae),* biology studies on vegetation cycles; active ingredients per organs and sampling of raw materials; main technological cultivation methods;

- *Colchicum autumnale* L„ (Fam. *Liliaceae*), dynamics of the plant's growth and development from seed and bulbotubers; active ingredient content per organs; cultivation method through sowing and bulbotuber plantation; initiation of improvement operations;
- *Aconitum napellus* L„ (Fam. *Ranunculaceae),* biology research; active ingredient content; technological cultivation methods;
- *Angelica archangelica* L„ (Fam. *Apiaceae),* biology research and active ingredient content; cultivation methods;
- *Melissa officinalis* L., (Fam. *Lamiaceae),* biology and ecology research, studies on seed germination; active ingredient content per vegetation phases; technological cultivation methods;
- *Tagetes patula* L., (Fam. *Asteraceae),* biology studies and active ingredient content; cultivation methods:
- *Ocimum basilicum, (*Fam. *Lamiaceae),* biology research and active ingredient content; technological cultivation methods;
- *Salvia officinalis* L., (Fam. *Lamiaceae),* biology research and active ingredient content; technological cultivation methods;
- *Hermiaria glabra* L., (Fam. *Caryophyllaceae),* biology research; determination of the active ingredient content and sampling of raw materials; cultivation methods;
- *Calendula officinalis* L., (Fam. *Asteraceae*), biology research and active ingredient content; cultivation technology aspects;
- *Cnicus benedictus* L., *(*Fam. *Asteraceae*), biology research and active ingredient content; cultivation method;
- *Cynara scolymus* L., (Fam. *Asteraceae),* biology research and active ingredient content; technological cultivation methods;
- *Galega officinalis* L., (Fam. *Fabaceae),* biology and active ingredient content; cultivation method;
- *Adonis aestivalis* L., (Fam. *Ranunculaceae),* biology and pigment content aspects; cultivation methods;
- *Gentiana lutea* L., *Gentiana asclepiadea* L. (Fam. *Gentianaceae),* biology studies and active ingredient content; culture implementation in the sub-humid conditions in Cluj;
- *Centaurium umbellatum* L., (Fam. *Gentianaceae),* biology research, bitterness indexes per vegetation phases;
- *Hypericum perforatum* L., (Fam. *Hypericaceae*), biology aspects, active ingredient content per organs and vegetation phases;
- *Oenothera biennies* L., (Fam. *Onagraceae),* biology studies; oil content and organic acid share (saturated and unsaturated);

- *Crysanthemum cinerariaefolium*, (Trev) Vis (Fam. *Asteraceae)*, biology studies and active ingredient content; technological cultivation methods;
- *Agastache foeniculum* (Pursh) Kuntze, (Fam. *Lamiaceae)* biology research; active ingredients; cultivation method;

The results of the research related to medicinal and aromatic plants, performed within USAMV Cluj-Napoca, can be found in the doctorate papers sustained in the university, in the books and manuals published by the institution's teaching staff, diploma projects and various published scientific papers.

Currently and in perspective, **the main research directions** in the field of medicinal and aromatic plants, in the Research Center for Hop and Medicinal Plant Culture within USAMV Cluj-Napoca are the following:

- culture implementation of new species of medicinal and aromatic plants from the spontaneous flora in our country or new plants for our country;

- biology and ecology studies on new species and breeds of medicinal and aromatic plants, introduced for cultivation;

-research on the dynamics of active ingredient accumulation, according to the cultivated biologic material and the applied technological measures;

- development of the improvement operations for several species of medicinal and aromatic plants;

- determination of the breeding method and main technological measures for medicinal and aromatic plants newly implemented for cultivation;

- determination of the harvesting moment and method, for the purpose of obtaining high productions of vegetal raw materials, rich in active ingredients;

- development of biology and cultivation technology research for medicinal and aromatic plants, specific for the ecological conditions in the Cluj area;

- establishing new technological measures, based on ecological principles, reducing the consumption of pesticides, in order to prevent environmental pollution and the pollution of the vegetal raw materials;

- collaboration with Romanian research units, in the field of medicinal and aromatic plants and in the field of the capitalization on vegetal raw materials;

- entering an international collaboration on issues related to bioecology, improvement and cultivation technology for medicinal and aromatic plants;

The medicinal and aromatic plant species representing the object of the research are the aforementioned ones, together with new species to be taken over for study. The research performed during the last years within USAMV Cluj-Napoca, related to biology, cultivation technology and active ingredient content has been noteworthy, for species belonging to the genus *Echinacea, Valeriana, Angelica, Geum, Melissa, Mentha, Digitalis, Calendula, Cynara, Crysanthemum, Agastache* etc. materialized into valuable doctorate theses.

For some of the aforementioned species, biology and technology research is completed, being recommended and applied within their cultivation technologies.

Research results within the center and their expansion into production are published in the magazine *„Hop and medicinal plants"* (1993-2008) and *„Hop and Medicinal Plants"* (2008-present), published by the Research Center for Hop and Medicinal Plant Culture within USAMV Cluj-Napoca.

The center's magazine also includes other research on hop and medicinal plant cultivation, performed in various national and international research units, along with various aspects concerning the specialists in this field of activity. It is an important method of scientific, technical and management information, for all the persons working in the field, including beer and pharmaceutical industry. The works performed within the center, in the field of hop, medicinal and aromatic plants are also published in the scientific bulletin of USAMV Cluj-Napoca or other national and international publications.

References

1. Baicu, G., 1976, Pharmaceutical practice, July;
2. Chiţescu-Arva, M., 1927, Agriculture Academy Cluj, Publishing House Cartea Românească;
3. Coiciu, E. and G. Racz, 1962, Medicinal and aromatic plants, Publishing House Academiei Române;
4. Crăciun, E. et al., 1976, Nature's pharmacy vol. 1, Publishing House Ceres Bucharest;
5. Crăciun, E. et al., 1977, Nature's pharmacy vol. 2, Publishing House Ceres Bucharest;
6. Muntean L.S. et al., 2007, Cultivated and spontaneous medicinal plant handbook, Publishing House Risoprint Cluj-Napoca;
7. Muntean, L.S. et al., 1999, Hop and Medicinal Plants, p. 99-106;
8. Muntean, L.S. et al., 2002, Hop and Medicinal Plants, p. 121-127;
9. Muntean, L.S. et al., 2005, Hop and Medicinal Plants, p. 157-164;
10. Muntean, L.S. et al., 2008, Hop and Medicinal Plants, p.72-80;
11. Muntean, L.S. et al., 2011, Hop and Medicinal Plants, p.36-47;
12. Muntean, L.S., 1990, Medicinal and aromatic plants cultivated in Romania, Publishing House Dacia Cluj-Napoca;
13. Muntean, L.S., 1996, Medicinal and aromatic plant culture, Publishing House Dacia Cluj-Napoca;
14. Pater, B., 1923, The Informative Bulletin of the University Botanical Garden in Cluj;
15. Pater, B., 1926, Culture of medicinal plants, Publishing House Bucovina, Bucharest;
16. Pater, B., 1927, The activity of the medicinal plant unit in Cluj during the year 1926, Agricultural bulletin, vol. VIII, no. 7-9/1927
17. Pater, B., 1927, Wild medicinal plants, Publishing House Bucovina, Bucharest;
18. Păun E. et al., 1986, Cultivated medicinal and aromatic plant handbook, vol. I, Publishing House Acad. Române, Bucharest;

19. Păun E. et al., 1988, Cultivated medicinal and aromatic plant handbook, vol. I and vol. II, Publishing House Acad. Române, Bucharest;
20. Şerban, M., 1938, Report 1918- 1938, The Academy for Superior Agronomy Studies;
21. Szabo, A. and P. Bela, 1970, Muveledes, Bucharest, 3 (55-57);
22. Tămaş, M. and Ilioara Oniga, 2001, Romanian phytotherapeutic products, 2nd Ed, Publishing House UMF Cluj-Napoca;
23. Velican, V., 1965, Medicinal plants in phytotechnology, EAS Bucharest;