

CAPACITATI

Summary

Project Site: <http://ccb-stejarul.ro/EGRE-LAIC.html>

Novelty degree. The researches developed within the project represents an integrated model for the comparative study of several less studied *Lamiaceae* species, both from *Lamioideae* and *Nepetoideae* subfamily, in order to assess the capitalization opportunities for these species as source of bioactive compounds with antioxidant activity and anti-inflammatory potential. The study focused on holistic approach, for various plant material sources from Romania and Republic of Moldova – wild populations and experimental cultures (collections, conventional cultures and plant tissue cultures). The phytochemical screening aimed at the identification and characterization of plant varieties with an optimum content in bioactive compounds (volatile oil and phenolic compounds) and also at the identification of the optimum cultivation (cultivation system) and harvest (habitat, phenophase, meteorological and climatic features) parameters. The plant material from R. of Moldova, for the envisaged species, was not previously studied from the phytochemical point of view and also for the biological activity of the plant extracts. Furthermore, for *N. parviflora* species were not identified studies on the *in vitro* plant tissue culture techniques.

The study of several species and habitats less investigated has impact in the development of a database for the identification and isolation of new chemo-varieties, representing perspectives for future studies with scientific, economic and social relevance.

The analysis methods and cultivation techniques (conventional and unconventional) may be included in capitalization kits for the capitalization of medicinal and aromatic plant species, and transferred to **business incubators** for their inclusion in the economic circuit through **entrepreneurial activities** at local, regional and cross-border levels – with social benefits by diversifying the capitalization chain and by generating added values.

By engaging PhD and postdoctoral researches (9) in the research activities, which are also involved in teaching activities, new methods and research approaches were developed and deepened.

The **strengthening of the cooperation network** was achieved by developing joint activities and by integrating the interdisciplinary studies – implemented by different teams, in the complex approach of the project.

The experience within the project created the prerequisites of a dynamics for applying for new financing lines – for research and technological transfer (innovative start-ups and spin-offs).

The collaboration will be extended by **the implementation of the project with international funding** - REART project No. IZ73Z0_152265, financed through the SCOPES Program - Scientific Co-operation between Eastern Europe and Switzerland 2013-2016, which was created on the research model developed within this bilateral collaboration (Romania – R. of Moldova).

For the implementation of the REART project, will contribute members of 3 research teams, partners in this bilateral program (the Botanical Garden, Chisinau, CCB „Stejarul”, UMF Iasi), thus **achieving the consolidation and enlargement of the active collaboration network**.

For the achievement of the project specific objectives (for the 2 stages), research activities were developed for the identification and characterization (from the ecologic, biologic, taxonomic and biomorphologic point of view) of several species in *Nepeta*, *Agastache*, *Perilla* and *Lamium* genus, from the wild flora, collections and experimental studies, and also the assessment of the variability and bioproductivity for volatile and nonvolatile (phenolic acids and flavonoids) compounds with antioxidant activity and anti-inflammatory potential.

In this respect, for *Nepeta* and *Lamium* species, **several wild sites from Romania and R. of Moldova were identified and characterized from the ecological point of view**, these sites being also collection sites for the experimental plant material that was subjected to the phytochemical assessments.

The **histo-anatomical characterization** of *P. frutescens* and *A. rugosa* species has applicability in taxonomical studies for *Lamiaceae* species that synthesize volatile oils – by assessing the impact of the ecological and anthropic (pollution) factors, and also on the histo-phytochemical studies on the synthesis and accumulation of volatile oils on the level of several structures (organs and structures).

CAPACITATI

For *P. frutescens* and *A. rugosa* species – allochthonous species, **conventional and unconventional (in vitro) culture techniques were developed**, in order to assess the bio-productive potential in the pedological and climatic features of R. of Moldova and Romania, and also in to produce experimental plant material for the phytochemical studies.

The development of the *in vitro* multiplication protocol for *N. parviflora* species – with special conservation status (listed in the Red List of vascular plants from Romania as vulnerable species), has applicability also for producing seeding material which can be used for the achievement of *ex situ* collections and for the repopulation of the specific sites.

The phytochemical analysis through spectrophotometric and chromatographic methods (TLC, HPLC, GC-MS) had as aim the identification and quantification of bioactive compounds which are well known for their antioxidant activity and with anti-inflammatory potential – phenolic compounds (phenolic acids and flavonoids) and volatile oils.

The qualitative and quantitative phytochemical assessments for the phenolic compounds highlighted an intra- and inter-specific phytochemical diversity for the studies *Lamiaceae* species.

In the *Nepeta* genus, for the *N. parviflora* species (at the flowering stage) was observed, within this experiment, the highest values for phenolic compounds (total content and on compounds groups). For the *N. pannonica* species the highest content in phenolic compounds was observed in the flower samples when compared with the leaves samples – fact that is important in selecting the optimum raw material for processing.

For *P. frutescens* species the variability of the phenolic compound content was observed – based on the maturation degree of the plant, the cultivation conditions and the experimental variant (source of the seeding material).

In the *Lamium* genus, the *L. purpureum* species highlighted the highest content for phenolic acids and total phenolic compounds, for the *L. amplexicaule* species being observed the highest content in flavonoids.

The assessment of the volatile oil content was also achieved – both quantitatively and qualitatively, for the *Nepeta* and *Agastache* species.

For **the assessment of the antioxidant activity**, several *Nepetoideae* (*Nepeta parviflora* and *N. pannonica* species) and *Lamioideae* (*Lamium maculatum* and *L. album* species) were tested.

Considering the role of the oxidative stress in the inflammatory processes, the present study aimed the assessment of the capacity of several selected plant species extracts to inactivate some synthetic free radicals (DPPH, ABTS).

For both antioxidant tests, the extracts obtained from the aerial parts of *N. parviflora* samples harvested at the flowering stage and those of *L. maculatum*, having the highest content in total phenolic compounds, were the most active. It is obvious the fact that the antioxidant activity of the extract was due mainly to the phenolic compounds content.

The anti-inflammatory, anti-tumor and antioxidant activity may be used clinically in the control of the rheumatism, carcinogenesis and oxidative stress – related pathogenesis.

The teams of the 2 Botanical Gardens (Iasi and Chisinau) partners in the project were responsible mainly for the identification and the ecological, biological and taxonomical characterization of the studied *Lamiaceae* species, the characterization of the wild habitats and the development of the conventional culture techniques. The team of CCB “Stejarul” performed the phytochemical assessments for the plant material harvested from the wild populations and experimental cultures (developed by in the 2 Botanical Gardens and at CCB “Stejarul”) from R. of Moldova nad Romania. The assessment of the antioxidant potential of the *Nepeta* and *Lamium* species was performed by the team of the Faculty of Pharmacy (UMF).

The results of the developed research activities were disseminated by attending 7 conferences (4 international and 3 national conferences), where 15 communications were presented (13 posters, 1 oral presentation, 1 plenary lecture).