Cultivation and High Capitalization of Medicinal and Aromatic Plants in the Romanian-Bulgarian Cross-Border Region

Manuela Elisabeta SIDOROFF, Anca OANCEA, Stefan POPESCU, George ROATA, Iris MATEESCU, Laura PAUN, Andrei BANCILA

National Institute of Research and Development for Biological Sciences, 296, Spl. Independentei, P.O. Box 17-16, Bucharest, 060031, Romania, Fax: +40-21-220.76 95, office@dbio.ro

Abstract. Nowadays, in a world with rapidly growing population, the utilization of the available natural resources in a best possible way is obviously of highest priority. Significant part of the natural resources for a given region is the local biodiversity. Being in a climatically favorable environment, the cross-border area Romania - Bulgaria has a rich variety of plants with high potential not only in pharmacology and cosmetics but in many other fields. That is why, the project "MedPlaNet- medicinal plant network for enhancement of the comparative advantage of Calarasi – Silistra cross-border area for sustainable development" developed an Oracle data base (http://medplanet.dbioro.eu) which includes a phyto-chemical screening of spontaneous and cultivated medicinal plants in the region, physical and chemical characteristics of the soils, technologies used for cultivation, harvesting and processing these herbs but also statistic studies about the use of medicinal and aromatic plants by the local population in both countries. The biologically active compounds identified in the medicinal plants are used in new formula of natural products as generators of new technologies for production and services, offering a chance for developing sound economy based on knowledge with high added value.

Keywords: medicinal plants, cultures, database, phytochemical study, soil characteristics, technologies, products

Introduction: Being in a climatically favorable environment, the Romania-Bulgaria cross-border area has a rich variety of plants with high content in active components that can be used for pharmaceutical and cosmetic products.

In order to implement the MedPlaNet project, we developed an Oracle database containing information about the most spread medicinal and aromatic plants in the cross-border region, the main active principles from the medicinal plants, the technologies used for cultivating, harvesting and processing them. After performing a phytochemical screening (using specific biochemical methods) of the active principles in the selected medicinal plants, we recommended in a scientific base some species for being cultivated in the mentioned area in order to use them for obtaining medicinal or cosmetic products.

We also performed a statistical study concerning the use of medicinal and aromatic plants in the target area.

By demonstrating how to cultivate and harvest medicinal plants, how to obtain active principles and natural products containing them we intended to offer to the local communities a base for economic development and for a new area identity.

Aims and objectives: The researches performed aimed to provide information about medicinal and aromatic plants, appropriate technologies used and natural products that can be obtained from these plants. This information is organized in a database and is available through an internet portal. The local farmers from the cross-border area can implement the obtained results in order to develop new businesses using medicinal and aromatic plants.
The work objectives were: to elaborate a study concerning the opportunities for increasing the usage of medicinal plants and other derivatives from natural products; to create a database containing information about medicinal plants, active principles, technologies and local farmers; to set up two pilot cultures for demonstrating the medicinal and aromatic plants cultivation and harvesting technologies.

Materials and methods: The study about the medicinal and aromatic plants available in the cross-border area is structured on the following issues:

- inventory of the medicinal and aromatic plants cultivated and from the spontaneous flora.
- inventory of the mainly used techniques and technologies for cultivating, harvesting and processing the medicinal and aromatic plants.
- phytochemical screening of the predominant medicinal plants found in the cross-border area.
- evaluation of the general health condition of the population in the area, identification of the best ways of improving it using medicinal plants, natural products and statistical analysis of the results.

The main results of the study were organized in an Oracle database, using a dedicated server running Red Hat 5.4 with Oracle 10g. The database is structured in several tables containing different kinds of information regarding the medicinal plants: general description, technologies for cultivating, harvesting and processing, active principles contained by the plants. The database also contains information about the farmers and processors in the area, both individuals and legal entities.

A framework technology for cultivating and harvesting the representative medicinal and aromatic plants in the area was applied in the pilot cultures for 16 species.

Results and discussion: 81 species of medicinal and aromatic plants from spontaneous and cultivated flora (the most common in the cross-border area) were inventoried. A sheet was realized for each of the plants, containing the following information: scientific name, popular name, description of the species, ecology (soil type, humidity and light needs), plant organs that are used in traditional medicine, active principles, pharmacological action and therapeutic uses, toxicity, what kind of products can be obtained and how to use them.

The inventoried techniques and technologies used for medicinal plants cultivation can be included in a framework technology with the following steps: ecological zoning, crop rotation, fertilization, soil works, seeds and planting material, care works, harvesting and processing. As the cultivation technology used is the same with the established technology for the medicinal and aromatic plants\(^1\), we obtained good crops for all the 16 species cultivated in Romania and Bulgaria.

A phytochemical screening was realized concerning the content in bioactive compounds (amino acids\(^2\), proteins, alkaloids, saponins\(^3\)\(^4\), tannins\(^5\), triterpenoids, glycosides\(^6\), carbohydrates\(^7\), vitamin A and vitamin E, flavones, poliphenolcarboxilic acids, volatile oils). The methods used for the screening (specific identification reaction, thin layer chromatography – TLC and high performance thin layer chromatography – HPTLC) were efficient in analyzing and identifying the active principles from the hydro-alcoholic and aqueous extracts.

All of the study results are structured in a three languages database available on the web site www.medplanet.dbioro.eu (fig. 1).
The database containing informations about medicinal and aromatic plants

Although in Romania another database containing information about medicinal plants already exists (www.plante-medicinale.ro), the database created in our institute refers to the medicinal plants specific to the Calarasi – Silistra cross-border area and also offers information about the existing and potential farmers interested in this field.

Concerning the statistical study about the use of medicinal and aromatic plants in the target area, two types of questionnaires were filled in by patients and medics. A result distribution, a statistical analysis of each question and a comparative analysis of the answers were performed, based on age, country and social status. The statistical study showed that most of the Romanian and Bulgarian patients use phytotherapy for treating some diseases; concerning the disease prevention, the Bulgarian people use medicinal plants in a higher degree than the Romanians (Table 1).

Statistical analysis concerning the use of medicinal plants in the target area

<table>
<thead>
<tr>
<th>Question</th>
<th>% answers “yes”</th>
<th>% answers “no”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you know the benefits of using medicinal plants in preventing and treating diseases?</td>
<td>69</td>
<td>31</td>
</tr>
<tr>
<td>Have you used medicinal plants to prevent diseases?</td>
<td>64</td>
<td>36</td>
</tr>
<tr>
<td>Have you used medicinal plants at doctor’s recommandation?</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>Have you noticed beneficial effects from the use of medicinal plants?</td>
<td>67</td>
<td>33</td>
</tr>
<tr>
<td>If you have not already used, would you like to know the therapeutic indications and use of medicinal plants?</td>
<td>97</td>
<td>3</td>
</tr>
<tr>
<td>Do you know the benefits of using medicinal plants in preventing and treating diseases?</td>
<td>91</td>
<td>9</td>
</tr>
<tr>
<td>Have you used medicinal plants for treating diseases?</td>
<td>78</td>
<td>22</td>
</tr>
</tbody>
</table>

Tab. 1
The cultivation and capitalization of medicinal and aromatic plants are activities with long tradition and importance, both in Bulgaria\textsuperscript{7} and Romania. According to Onisei et al.\textsuperscript{9}, there is a long tradition of medicinal plants used as therapeutic remedies in most of houses, villages and hospitals in Romania.

Based on the study results, two pilot cultures were set up in Calarasi county and in Silistra district. We cultivated 16, respectively 4 medicinal and aromatic plants using appropriate technologies. After harvesting them, active principles and volatile oils were obtained. For the local farmers there were elaborated training courses and guidelines about the cultivation, harvesting and processing the medicinal and aromatic plants. In the institute laboratories there were established technologies for obtaining some natural products based on medicinal plants: soaps, body oils, cosmetic creams, spa objects, tea, tinctures and volatile oils.

**Conclusions:** The study concerning the most common medicinal and aromatic plants and the pytochemical screening performed allowed us to select 16 species with high content in active principles that were cultivated using a framework technology in pilot cultures. The database created offers to the farmers complete information about medicinal and aromatic plants. The active principles from medicinal plants can be used for obtaining natural pharmaceutical or cosmetic products. The statistical study about the use of medicinal plants demonstrated that most of the people in the cross-border region know and use these plants and natural products for treating and preventing some diseases.

**REFERENCES**


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