

## SUMMARY

### **Biological and phytochemical *in situ* and *ex situ* study of the species of genus *Sideritis* L. with conservation status in Bulgaria**

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The present thesis aims at biological and phytochemical study of the *Sideritis* species with conservation status in Bulgaria. The study includes broad range of topics related to the analysis of flora in the localities of target species, evaluation of their population status, morphometric variation of the perennial species, reproduction biology of *Sideritis syriaca*. The quantitative and qualitative composition of the phenolic compounds of the species was studied in detail both in their natural localities and in cultivation. Additionally, the anti-tumor activity of *S. scardica* and *S. syriaca* was studied in laboratory test.

As a result of the floristic analysis total 358 plant species were recorded in the localities of *Sideritis scardica*, 155 species in the localities of *S. syriaca* and 98 species in the localities of *S. lanata*. In the case of *S. scardica* the highest plant diversity was found in the localities in the Rhodopes and Slavyanka, where the percentage of endemic species was very high. Predominant geolements in the localities of all three species were these having Mediterranean component. The species of conservation importance and medicinal plants in the localities of the three species studied were identified and analyzed. The natural habitats of all studied localities of the three species are of high nature conservation importance and are among the priority habitats for the EU. The population status of the three species studied indicates necessity of measures for their conservation. The most endangered species is *S. syriaca*, whose populations are characterized by the lowest census number and occupy the smallest area.

The morphometric variation of *S. scardica* and *S. syriaca* underlined the differences between the two taxa, but also distinguished the population of *S. scardica* from Chervenata

stena as having an intermediate position and, therefore, needing further investigation. The stem, foliar, and calyx's epidermis was similar in *S. scardica* and *S. syriaca*. The embryological study of *S. syriaca* revealed a high reproductive capacity and confirmed the sexual reproduction as main type of reproduction for this species, thus limiting at some extent its adaptive mechanisms.

The phytochemical studies have shown that the quantity of total phenolics in *S. scardica* and *S. syriaca* has similar values but the quantity of flavonoids in the second species was lower. The content of the two studied groups of compounds was significantly lower in *S. lanata*. The accumulation of phenolic compounds was higher in the leaves, as compared to flowers. The comparison between wild and cultivated plants showed that in some cases the quantity of biologically active substances in the cultivated plants is not inferior to that in wild plants and can be even higher, which fact allows to recommend the cultivation of the two species – *S. scardica* and *S. syriaca*. The qualitative HPLC analysis included two species more (*S. raeseri* and *S. taurica*), and the qualitative composition was quite similar, thus underlining the genetic similarity of the species studied. The phenolic composition allowed to distinguish the species belonging to the two sections *Hesiodia* and *Empedoclia*. Some differences were found between *S. syriaca* from Bulgaria (Strandzha) and from Crete Island, and the Bulgarian sample was closer to *S. taurica* from Turkey, which indicates unresolved taxonomic relationships and necessity of further studies in this respect.

High phytotoxic activity of methanol extract of *S. scardica* was recorded regarding the tumor cell line HCT-116, which offers new perspectives for studying the medicinal properties of the species and its application.

Numerous activities were performed within the framework of scientific and applied project, aimed at conservation of *S. scardica*. These include meeting with local people in the regions close to the natural localities, providing information about the species status (as presentation and printed materials), about the measures for its conservation and possibilities for conservation. An experimental field for observations and investigations was established and planting material was produced, which was put at disposal of people willing to cultivate the species. An initiative for change of the conservation status of the species was launched, consisting of well-grounded proposal for its protection. As a result of these efforts, an order signed by the Minister was issued by the Ministry of Environment and Waters, fully prohibiting the collecting of *S. scardica* from its natural localities.