



Halophile plants within the Salt Massif from Sărățel area, Romania

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Abstract. The area called "Salt Massif from Sărățel" ("Masivul de sare de la Sărățel" in Romanian) was declared as a protected natural area of national interest, with an area of 5 ha. The purpose of establishing the Salt Massif from Sărățel reserve was to preserve the natural, geological, floristic and faunal heritage in the protected area, mainly the salt diapir (salt massif). Concerning the vegetation, a few halophile species could be found within the area. The previous studies provide between three and five species. During the field research we found four halophile species, namely *Aster tripolium*, *Atriplex hastata*, *Puccinellia distans*, and *Salicornia europaea*. Some uses of these plants are also briefly discussed.

Key Words: pond, protected area, river, site, soil.

Introduction. The area named "Salt Massif from Sărățel" (in Romanian "Masivul de sare de la Sărățel") was declared a protected area by Decision no. 58/1976 of the Bistrița-Năsăud County People's Council, and reconfirmed by Bistrița-Năsăud County Council Decision no. 3/1995. Later on, by the Law no. 5/2000 regarding the approval of the National Territorial Development Plan - Section III - protected areas, it was declared as a protected natural area of national interest, being included in category III of the International Union for Conservation of Nature, within an area of 5 ha (Ielenicz 2002).

The purpose of establishing the Salt Massif from Sărățel reserve was to preserve the natural, geological, floristic and faunal heritage in the protected area, with the main object of protection being the salt diapir (salt massif) covered by thin quaternary alluvial deposits of the Șieu and Budac rivers which in a few points are removed, the massive salt appearing on the surface, resulting in the appearance of salty springs, salt water puddles, saline efflorescences and halophile plant species (Chintăuan 2000; Chintăuan et al 2004). The aim of the present study was to make an inventory of the halophile plant species within the Salt Massif protected area.

Material and Method. The location of the protected area is 14 km from Bistrița municipality, at the confluence of the Bistrița Ardeleană, Budac and Șieu rivers (Figure 1) (Anca et al 1979; Ghinea 2002; Chintăuan et al 2004; Rusu et al 2012; Gavriiloaie et al 2023). The geographical coordinates of the center of the protected natural area are 47°34'20" N and 24°30'02" E. From the administrative point of view, the Salt Massif is located on the territory of several localities, namely Mărișelu and Șieu Măgheruș communes, and Domnești, Simionești and Sărata villages. Going towards Sărățel village, a field road branches off to the right that leads us to the place called "At the mud" ("La mol" in Romanian) (Figure 2). Here, on the left bank of the Șieu River, in an old meander, there is a pond with salty water and salty mud. The pond, with a surface of only 100 m², has a bank facing the road (south) higher than that facing the river; it is fed with salt water by several bottom springs. Within the entire surface of 5 ha of the protected area of Salt Massif, the place called "La mol" is actually the space where the halophile plant species are mostly found.



Figure 1. Study site.



Figure 2. "La mol" place (up), with the open pond within (down).

The study took place between May to October 2025. We made one trip per month during the period of study, performing direct observations on the field which covered the entire area of the salt massif. A small digital camera (Technika SH-Z625 6MP) was used for taking photos. During the study both primary and secondary data were employed. The primary data were obtained directly from the field, while the secondary data were obtained from the previous published studies concerning the Romanian flora in general and the vegetation in the studied area particularly. The data were structured in a table. The plants were determined up to the species level, using available literature (Prodan & Buia 1966; Todor 1968; Nyárádi et al 1972; Simionescu 1973; Fitter et al 1976; Bock et al 1987; Keith et al 1999; Grigore 2008; Eisenrich et al 2018). Concerning the common Romanian names, we used both old and recent literature (Todor 1968; Simionescu 1973; Pârnu et al 1985; Drăgulescu 2018).

Results and Discussion. There are only two papers which deal with the halophile plants from the studied area, namely Chintăuan et al (2004) and Svoboda (2006). While Chintăuan et al (2004) mentioned five species, Svoboda (2006) only mentioned three species; during the research on the field we found four species (Table 1).

Table 1

Halophile plant species within the Salt Massif from Sărățel area

Family	Species		References
	Scientific name	Common name	
Asteraceae	<i>Aster tripolium</i>	albăstrică, steliță	Chintăuan et al (2004); Svoboda (2006); present study
Chenopodiaceae	<i>Atriplex hastata</i>	lobodă	Chintăuan et al (2004); present study
Plumbaginaceae	<i>Limonium gmelini</i>	ridichioară, sică	Chintăuan et al (2004)
Poaceae	<i>Puccinellia distans</i>	bălănică	Chintăuan et al (2004); Svoboda (2006); present study
Amaranthaceae	<i>Salicornia europaea</i>	brâncă, căpriță, iarbă sărată	Chintăuan et al (2004); Svoboda (2006); present study

Table 1 shows that we found four species of halophile plants (Figure 3), namely *A. tripolium*, *A. hastata*, *P. distans*, and *S. europaea*. We did not find the species *L. gmelini* which has been mentioned by Chintăuan et al (2004). In addition to the three species mentioned by Svoboda (2006) we also found *A. hastata* at the study location. All the four species we found thrive within and around the location named "La mol" (Figure 2). In addition to this location, the species *S. europaea* used to be present a few hundred meters upstream the "La mol" place, on the banks of the Șieu River, where a bridge over the river has been built in 2023 (Gavriloaie et al 2023). It seems that after the bridge construction the species disappeared; we searched the area on both river banks and we did not spot any trace of the species. The bridge construction however did not affect the presence of all the four species we have discovered at "La mol" place.

Besides their role in the ecosystem structure, the species also have some other uses. The young leaves and shoots of *A. hastata* are edible raw or cooked and suffice as a spinach substitute (Mabey 2012; Francis-Baker 2021). *S. europaea* is harvested and prepared in several ways, notably pickled in vinegar as a condiment or as an addition in salads; it is known as 'perce-pierre' (rock-perch) on the English Channel coast, where it is eaten like spinach. Its naturally salty taste and its fleshy, crunchy texture make it a refined and unusual vegetable, readily available in local markets Keith et al (1999).

The roots of *A. tripolium* were once used to treat external eye conditions and sore throats (Bock et al 1987; Keith et al 1999). According to Eisenrich et al (2018), *S. europaea* was used in the past to treat urinary disorders. Panth et al (2016) have shown that low-sodium salt obtained from this plant is effective in treating high blood pressure and fatty

liver disease. Rahman et al (2018) stated that the desalted powder of *S. europaea* is effective in treating obesity and arteriosclerosis.



Aster tripolium



Atriplex hastata



Puccinellia distans



Salicornia europaea

Figure 3. The halophile plant species found within the Salt Massif from Sărățel area.

According to Govantes-Edwards et al (2016) and Spohn & Spohn (2024), in the past the ash of *S. europaea* was used to be added to glass melts, which caused the glass to become liquid at lower temperatures. *P. distans* is grazed and well tolerated by sheep and cows (Cozma 2006).

Conclusions. Four species of halophile plants were discovered in the Salt Massif from Sărățel area: *Aster tripolium*, *Atriplex hastata*, *Puccinellia distans*, and *Salicornia europaea*. Within the 5 ha of the entire protected area, they were only found at the place called "La mol" and its surroundings. The populations of these plants were not affected by the construction of a bridge over the Șieu River, upstream the "La mol" location. Some of these plants also have pharmaceutical or culinary uses.

Conflict of interest. The authors declare that there is no conflict of interest.

References

- Anca V., Anuță I., Ardelean S., Burean L., Ceuca P., et al., 1979 [The counties of the homeland - Bistrița-Năsăud, monograph]. Sport-Turism, Bucharest, 239 pp. [in Romanian]
- Bock C., Bournerias M., Codron D., Dominik M., 1987 [Guide to wild plants]. Reader's Digest, Paris, 415 pp. [in French]
- Chintăuan I., 2000 [Bistrița-Năsăud, its nature and monuments]. 2nd edition. Carpatica, Cluj-Napoca, 111 pp. [in Romanian]
- Chintăuan I., Ștefan V., Marquier I., Coldea G., 2004 [Protected areas from Bistrița-Năsăud]. SUPERGRAPH, Cluj-Napoca, pp. 47-50. [in Romanian]
- Cozma C., 2006 [The geobotanical study of the salt loving pasture lands from the northeastern part of Moldavia]. *Lucrări științifice USAMV Iași - Seria Horticultură* 49:1159-1162. [in Romanian]
- Drăgulescu C., 2018 [Romanian dictionary of plant names]. The Publishing House of "Lucian Blaga" University, Sibiu, 688 pp. [in Romanian]
- Eisenrich W., Handel A., Zimmer U. E., 2018 [Plant and animal identifier]. Casa, Oradea, 559 pp. [in Romanian]
- Fitter R., Fitter A., Blamey M., 1976 [Wild flower guide]. Delachaux & Niestlé, Neuchâtel - Paris, 336 pp. [in French]
- Francis-Baker T., 2021 Concise foraging guide. Bloomsbury Wildlife, 211 pp.
- Gavriloaie C., Petrescu-Mag I. V., Costea C., 2023 Environmental impact during and after the construction of the bridge over Șieu River near Sărățel village (Bistrița-Năsăud county, Romania). *AES Bioflux* 15(2):81-88.
- Ghinea D., 2002 [Geographical encyclopedia of Romania]. Editura Enciclopedică, Bucharest, 1456 pp. [in Romanian]
- Govantes-Edwards D. J., Duckworth C. N., Córdoba R., 2016 Recipes and experimentation? The transmission of glassmaking techniques in Medieval Iberia. *Journal of Medieval Iberian Studies* 8(2):176-195.
- Grigore M. N., 2008 [Halophytotaxonomy: list of salt marsh plants in Romania]. PIM, Iași, 137 pp. [in Romanian]
- Ielenicz M., 2002 [Physical geography dictionary]. Corint, Bucharest, 504 pp. [in Romanian]
- Keith P., Malaval J. C., Malvaud F., Marlière P., Moutou F., Touret L., 1999 [Nature in France: a practical guide to recognizing everything at a glance]. Reader's Digest, Paris, 328 pp. [in French]
- Law No. 5/2000, published in Official Monitor of Romania No. 152/April 12/2000. Available at: https://www.cdep.ro/pls/legis/legis_pck.htp_act_text? idt=22636. Accessed: August 2023. [in Romanian]
- Mabey R., 2012 Food for free. Collins, 464 pp.
- Nyáradi E. I., Anghel G., Beldie A., Buia A., Csürös Ș., Dobrescu C., Gergely I., Ghișa E., Morariu I., Nyáradi A., Papp C., Paucă A., Răvăruț M., Șerbănescu I., Ștefureac T., Todor I., Țopa E., Váczy C., Veican V., 1972 [Flora of the Socialist Republic of Romania]. Volume XII. Academia R. S. R., Bucharest, 810 pp. [in Romanian]

- Panth N., Park S. H., Kim H. J., Kim D. H., Oak M. H., 2016 Protective effect of *Salicornia europaea* extracts on high salt intake-induced vascular dysfunction and hypertension. *International Journal of Molecular Sciences* 17(7):1176.
- Pârvu C., Godeanu S. Stroe L., 1985 [Guide to the world of plants and animals]. Editura Ceres, Bucharest, 209 pp. [in Romanian]
- Prodan I., Buia A., 1966 [Illustrated small flora of Romania]. Editura Agro-Silvică, Bucharest, 676 pp. [in Romanian]
- Rahman M. M., Kim M. J., Kim J. H., Kim S. H., Go H. K., Kweon M. H., Kim D. H., 2018 Desalted *Salicornia europaea* powder and its active constituent, trans-ferulic acid, exert anti-obesity effects by suppressing adipogenic-related factors. *Pharmaceutical Biology* 56(1):183-191.
- Rusu C., Gavriiloaie C., Damian R., 2012 [Research in the Sărățel salt massif (Bistrița-Năsăud, Romania)]. *Ecoterra* 30:23-27. [in Romanian]
- Simionescu I., 1973 [The flora of Romania]. 4th edition. Albatros, Bucharest, 422 pp. [in Romanian]
- Spohn M., Spohn R., 2024 [What flower is this]? Casa, Oradea, 317 pp. [in Romanian]
- Svoboda C., 2006 [Halophilic plants from Bistrița-Năsăud county]. In: [Salt, time and human]. Cavruc V., Chiricescu A. (eds), Angustia, Sfântu Gheorghe, pp. 25-27. [in Romanian]
- Todor I., 1968 [Small atlas of plants from the flora of R.S.R.]. Editura Didactică și Pedagogică, Bucharest, 277 pp. [in Romanian]

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