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THE IMPORTANCE OF BOTANICAL SURVEY AND PROPER MANAGEMENT IN THE PROTECTION OF RARE, ENDANGERED OR VULNERABLE SPECIES OUTSIDE OF PROTECTED AREAS - WORKING EXAMPLE: *HYACINTELLA LEUCOPHAEA* (K. KOCH) SCHUR

Mihaela Ioana GEORGESCU, Adrian George PETICILĂ, Elisabeta DOBRESCU, Nicolaie COSTACHE

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: apeticila@gmail.com

Abstract

Botanical assessment is an important tool for many scientific works which provides information that allows the accomplishing of different evaluations on plant diversity and on anthropogenic actions; it could assist human activities on ecological reconstruction or on projects of green infrastructure. Hyacinthella leucophaea is a species of Pontic-Balkan origin, listed on the National Red List of plants from 1994 and considered rare in Romania. Through our botanical surveys and reviewed literature, we added new records on distribution of Hyacinthella populations in our country. Populations in a good state can maintain this status through proper management of the land, which would reduce the pressure of external factors.

Key words*: botanical survey, country distribution, grassland management, Hyacinthella leucophaea.*

INTRODUCTION

Assessing plant species or the botanical surveying of a vegetal community is a basic operation in order to correctly identify a vegetal association and to separate it from others in the field (Chifu et al., 2014). This is the first stage, also, in the mapping of vegetation from a research area (Ivan & Doniță, 1975; Cristea et al., 2004). The mapping of vegetation through finding in territory vegetal communities' priority to preservation have allowed to establish 32 habitats of communitarian interest that overlap on the Natural Park of Serra da Estrella (Portugal) and to define their management and preservation strategy (Meireles et al., 2009).

Floristic assessment allows to create vegetation databases (Attorre et al., 2014).

The data from botanical surveying will show the complexity of a plant community trough species richness, species diversity and structural relationships between them. An extensive inventory of vascular plants was performed in 4 years of field studies by Grădinaru (2021) to evaluate the impact of wind farms construction on composition and diversity of flora in two protected areas in Romania. Data collected allowed the rating of the floristic composition as an important indicator in assessing the specific richness of vascular plants and the dynamic stage of plant communities. It was also possible to establish the bioformes and lifespan of plant species, the geoelements, and the plant preferences for ecological factors which induce the distribution of plant populations in existing habitats. This complex assessment has highlighted the response of plant communities to precise anthropogenic actions as well as the applicable management strategies that can mitigate the effect of construction of wind farm on vegetation cover.

However, there are other uses of data result from botanical survey, such as the biodiversity rating, evaluation of species and habitats state of conservation, estimation on alien species rate of dispersion (Doroftei et al., 2005). V. Ciocârlan (2006) presenting 2 newly identified and 40 rare plant species in Romanian flora, most of them from Dobrogea, accentuated the danger of rarefaction and disappearing of some species under the strong intervention of human activity on vegetation cover. As a result of an inventory of flora species and habitats undertaken on the territory of Fântânița-Murfatlar site of

communitarian interest, Petrescu (2015) had identified 15 threatened plant species, of national interest and had delimited four habitats, all of them of communitarian interest. Nine plant associations, evaluated by the author for their current natural state, showed slight to medium perturbations due to anthropic activity. A botanical survey conducted in a protected area near Neajlov River, in the South of Romania had enriched the previous list with 50 new species, added to those discovered in former studies. The existing risk of disappearance of this area as anthropic impact grows in intensity was one of the conclusions resulted from this study (Onete et al., 2016). Subsequently, in research undertaken on crop fields in Oltenia area, deploying botanical surveying methods, a number of 25 species of invasive and potentially invasive alien plants have been identified, three of them being considered the most harmful and widespread - *Sorghum halepense*, *Xanthium italicum* and *Ambrosia artemisiifolia* (Răduțoiu & Bălănoiu, 2021). In 2021 Georgescu et al. reported *Humulus scandens*, an invasive even transformer species, from the Dâmbovița River banks, at 40 km South of Bucharest. Known as an ornamental plant, *H. scandens* was observed as a naturalised species in N. America and Europe in the late nineteen century. First recordings about this species as a naturalised one in our country are found in a paper dating from 1969.

Through the information provided, the assessment of plant communities could assist other domains such as the achievement of green infrastructures by interconnecting natural areas with those designed by man to preserve biodiversity in urban areas (Talal & Santelmann, 2019).

The botanical surveying additionally allows the finding of new chorology records of rare and periclitated plants. In his first tome of Illustrated Flora of Romania V. Ciocârlan (1988) indicated adjacent to description of *Gymnospermum altaicum*, a rare species in our country, that he did not find the in 1976, during his field researches. Following the botanical surveys performed in North Dobrogea in 2005 Doroftei & Mierlă record this species from areas specified by the reference literature and from other adjacent zones.

The aim of this paper is to emphasise the importance of botanical assessment through a work example on *Hyacinthella leucophaea* populations presence in our country.

H. leucophaea is a species of Pontic-Balkan origin, listed on the National Red List of Vascular Plants from Romania (Oltean et al., 1994, Sârbu et al., 2007) and considered rare in Romania (Sârbu et al., 2013). *H. leucophaea* is part of the sl. Jurineo arahnoideae-Euphorbion stepposae (Dobrescu, 1971) Coldea et Sârbu in Coldea 2012 (cl. Festuco-Brometea Br.-Bl et R.Tx in Br.-Bl.1949), typical associations for the xerophytic grasslands encounter mainly in the eastern part of our country. These grasslands contain a characteristic and constant number of Pontic-continental, Pannonic and Meridional elements that differentiate them from those of Central Europe (Chifu et al., 2014). The paper indicates: a) a review of the references on the distribution of the *Hyacinthella leucophaea* in our country; b) new records of distribution of H. leucophaea following our botanical surveys; c) an assessment of the anthropogenic activities with impact on the *H. leucophaea* populations development in the new recorded sites.

MATERIALS AND METHODS

The main sources of this paper are the reviewed literature on *Hyacinthella leucophaea* species distribution in our country and the field data collected during botanical surveying performed in two localities from Prahova and Constanta counties.

In Prahova County *Hyacinthella leucophaea* plants assessment was carried out near the Marginea Pădurii village, Jugureni commune, located at the base of Istrița Hill, part of Curvature Subcarpathians (Ghinea, 1996, 1997). The Sarmatian Istrița limestone (Frunzescu et al., 2010) permitted installation of a chalk grassland type as well as *Hyacinthella leucophaea* populations.

The second reporting site is located on the hills near Murfatlar town and Basarabi-Murfatlar Cave Complex (Constanța County). A small, xerophytic grassland cover a steep slope with South exposure with many rare plant species that are also reported from the Fântânița-Murfatlar - Site of Community Interest, placed at 2 km South from our assessment zone.

The botanical survey has taken place during March and April 2021 and 2022.

RESULTS AND DISCUSSIONS

Hyacinthella leucophaea is a geophyte, bulbous plant of 7-25 cm tall; two-three (four, rarely) leaves basal and unequal (the inferior one wider), erect and coriaceous, shorter than or equal with floriferous stem; cylindrical raceme with campanulate flowers, shortly bracteolate; perigone pale-blue; perigone lacinias twice shorter than the tube; stamens with violaceous anthers; valvicide capsules, wider than longer; spring (March-April) - flowering (Zahariadi, 1966) (Figure 1).

Figure 1. *Hyacinthella leucophaea* - Basarabi-Murfatlar populations (March, 2022)

Distribution of the *Hyacinthella leucophaea* (K. Koch) Schur populations in our country (review of the references):

Bacău County (Oprea, 2005): Onești, Perchiu hill (Burduja et al., 1971).

Brașov County: between Hărman and Sânpetru; Brașov, on the Tâmpa and Stejărișul mic Hills (Zahariadi, 1966), Cetății and Lat Hill (Morariu & Ularu, 1979); Lempeș Hill (Heltmann, 1973).

Buzău County (Dihoru, 2015): Breaza, Istrița hill (Morariu, 1978); Subcarpathian basin of Slănicul de Buzău (Ciocârlan, 1968); Buzău Plain (Șerbănescu et al., 1962); Buzău county - silvosteppe to hill (Dragu, 1986); Aldeni, Beceni on Balaurul hill (Ciocârlan, 1968; Oprea, 2005).

Botoșani County (Oprea, 2005): Ștefănești (Mititelu et al., 1993)

Constanța County: Mulfatlar in the Serplacula valley, Târgușor, Mircea Vodă (Zahariadi, 1966); Adamclisi, Gura Văii (Negrean et al., 2002), Hagieni (Ștefureac, 1970); Dumbrăveni, Esechioi (Parincu, 1997); Fântânița-Murfatlar (Bavaru, 1970); Cheia (Horeanu, 1973); Constanța, valea Siminocului, Tîrgușor, Mircea Vodă, Gura Dobrogei, Sidorman, Mangalia (Morariu, 1978); Medgidia (Prodan, 1935); Palazu Mic (Sârbu et al, 2003); Techirghiol – grasslands (Făgăraș et al, 2008).

Dolj County: Calafat, Craiova (meadow) (Morariu, 1978).

Galați County (Oprea, 2005): Pechea, Vârlezi (Morariu, 1978); Bazinul Chinejii (Sârbu, 1977).

Hunedoara County: Hunedoara on Căpruța hill, Găvojdia on Cazanăș hill (Morariu, 1978).

Iași County : Șorogari (Petrescu, 1916) ; Valea Lungă (Mititelu, 1974); mal lac Chirița (Oprea, 2005).

Mehedinți County: Dudașul Schelei, Oglănicului valley (Morariu, 1978); in quarry grasslands, between Schela Cladovei and Cracul Găioarei (Roman, 1974).

Olt County: Obârșia on Braniștea Catârilor (Morariu, 1978).

Prahova County: Tohani hill (Morariu, 1978).

Sibiu County: Mediaș (Morariu, 1978); Moșna (Drăgulescu, 2003).

Suceava County (Oprea, 2005): Frumoasa on the southern slopes (Mititelu et al., 1970); Ponoare, Liteni (Mititelu et al., 1989).

Tulcea County: Beștepe hill, Măcin (Morariu, 1978); Culmea Pricopanului (Ștefureac, 1970); Agighiol hills (Grădinaru, 2021).

Vaslui County: Bârlad on the Dealu Mare and in Crâng, Zorileni (Mititelu et al, 1989); Movila lui Burcel reservation (Dobrescu et al, 1982); Mânjești, Tanacu - Dealul Glodului reservation (Vițalariu, 1968), Satu Nou-Solești on Poștei hill (Dobrescu, 1974); Rateș Cuza (Oprea, 2005); Mitoc (Horeanu & Vițalariu, 1992).

Consequently to our botanical survey, we may add two new mentions on list of *Hyacinthella leucophaea* distribution in our country:

Prahova County: Marginea Pădurii village, Jugureni commune; coordinates: N - 45.099321;

E - 26.428394; on the south-western slope of a plateau, at an altitude of 510 m (Figure 2).

Figure 2. South-western slope of Marginea Pădurii plateau (March, 2022)

Constanța County: Murfatlat town, on the Tibișir hill, at the back of Basarabi-Murfatlar Cave Complex; coordinates: N - 44.167092; E – 28.4055005; on a rapid slope with south-western exposition (Figure 3).

Figure 3. South-western slope of Tibișir hill (Octobre, 2021)

Festuco-Brometea class comprises secondary xerophilous and meso-xerophilous steppe grasslands, many of them located on the rough ground where a strong influence of anthropogenic factors could degrade them (Chifu et al., 2014).

On the southwestern slope of the Marginea Pădurii grassland can be found elements of Festuco-Brometea association, on a limestone substrate that appear frequently on the surface. Late in March and in April, together with *Hyacinthella leucophaea* can be seen plants of *Adonis vernalis, Carex caryophyllea, Potentilla cinerea, Pulsatilla montana* subsp. *dacica* species, and then plants of *Anthericum ramosum, Muscari neglectum* (Figure 4), *Anthyllis vulneraria*, or *Trifolium montanum* species.

Figure 4. *Muscari neglectum* (Marginea Pădurii southwestern slope - July, 2021)

Figure 5. *Hyacinthella leucophaea* (Marginea Pădurii - March, 2022)

On the plateau, due to specific ecological conditions, the Festuco-Brometea association intersect a grassland with species from Arrhenatheretalia order; this type of grassland also cover the opposite slope with North-East exposition. The entire surface is maintained by repeated mowing during the growing season. The meadow is not used for grazing. Grassland burning at the end of the vegetative resting season does not affect *H. leucophaea* population (Figure 5).

The second recording of *H. leucophaea* is for a grassland near the Basarabi-Murfatlar Cave Complex that covers a small area, located on a very steep slope; here can be seen species of the *Agropyretum pectiniformae* (Prodan, 1939) Dihoru 1970 association some of them also found in the Fântânița - Murfatlar reservation (Petrescu, 2015). The vegetal cover is slightly perturbed and are not signs of anthropogenic actions. Among identified plant species there are populations of *Crocus pallasii* observed late in autumn (Figure 6), *Echinops ritro* subsp. *ruthenicus, Satureja coerulea* or *Asparagus verticillatus*.

Figure 6. *Crocus pallasii* (Basarabi - Murfatlar October, 2021)

Together with *H. leucophaea* in March can be seen individuals of *Carex caryophyllea* and *Gagea pusilla* plants.

CONCLUSIONS

Botanical assessment is an important tool for many scientific works, providing information that permits to accomplish different evaluations on plant diversity and on anthropogenic actions; it could assist human activities on ecological reconstruction or on projects of green infrastructure.

Through our botanical surveys and reviewed literature, we added new records on distribution of Hyacinthella populations in our country.

The assessment of anthropogenic actions shows a low perturbation of vegetative cover on new recorded sites for Hyacinthella populations.

Places that shelter populations of rare or threatened species outside the protection zones are important biological reserves for endangered species and fragile ecosystems.

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