THE HERBARIUM – A DATA SOURCE FOR ALLIUM GENUS SPECIES

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Abstract. Allium is an extremely diversified genus that encompasses more than 750 species almost exclusively distributed in the North hemisphere (Mediterranean Europe, Asia, North America, South America and sub-Saharan Africa). The Allium genus includes some species that are economically valuable and cultivated worldwide, such as the common onion, garlic, scallion or chive. Other species have important medicinal properties or are used in horticulture. The purpose of this paper is to inventory the Allium genus species present in the Al. Beldie Herbarium from INCDS “Marin Drăcea” Bucharest and describe some of them. The Herbarium host 111 plates that contain 56 Allium genus species. Most plates belong to Allium schoenoprasum L., Allium oleraceum L. and Allium ursinum L. and the most Allium genus species were gathered in 1932 and 1942. A large number of plates are signed by Al. Beldie, while others belong to S. Pașcovski, Al. Borza, C. C. Georgescu and were gathered from Italy (Naples, Sicily), Bulgaria, Alps or Pyrenees and from Romania from Bucegi Mountains (most of them), Băile Herculane, Iași, Tulcea. The herbarium offers a unique perspective for the Allium genus species in regard with their location-temporal dynamic. The information can be used as a starting point for comparing distribution changes from the past and the future.

Keywords: gathered, genus, herbarium, properties, species.

INTRODUCTION

The Alliaceae family is a much known family of perennial herbaceous plants belonging to Asparagales Order.

The taxonomy position of Allium genus and its connected genus was for a long period a controversial subject. For example, in the early angiosperm classifications (MELCHIOR, 1964), they were situated in the Liliaceae Family (STEARN 1992). Later, due to their inflorescence structure, they were included in Amaryllidaceae Family. Recently, based on some molecular analysis, a division in a larger number of small monophyletic families was realized. Furthermore, in the most recent and competent monocotiledonate taxonomy treaty, Allium genus and its close relatives were acknowledged as a distinct family (Alliaceae), very close to Amaryllidaceae Family (FRITSCH AND FRIESEN 2002).

The Angiosperm Phylogeny Group II System from 2003 also acknowledges the family and places it in the Asparagales Order, monocotiledonate phylum (LYANTAGAYE, 2011).

Allium is an extremely diversified genus that encompasses more than 750 species almost exclusively distributed in the North hemisphere (Mediterranean Europe, Asia, North America, South America and sub-Saharan Africa) (STEARN 1992, LANZOTTI 2006). This number is based on the Allium species as live plants from savage environments as well as the cultivated ones or the dry and pressed species from herbariums.

The Allium genus is characterized by the fact that their bulbs are enveloped in membranous or fiber tunics. The plants can vary in height between 5 cm and 150 cm, the flowers are forming an umbrella over a stem with no leaves, while the petals are free or almost free (FRIESEN et al. 2006).
Most species produce remarkable quantities of cysteine sulfoxides, which provide their specific smell and taste. Furthermore, the genus includes some species that are economically valuable and cultivated worldwide, such as the common onion, garlic, scallion or chive. Other species have important medicinal properties or are used in horticulture (Fritsch and Friesen 2002).

The purpose of this paper is to inventory the Allium genus species present in the Al. Beldie Herbarium from INCDS ”Marin Drăcea” Bucharest and describe some of them, as the majority of traditional taxonomy plant studies were based on dry specimens sheltered in herbariums.

MATERIAL AND METHODS
The ”Al. Beldie” Herbarium from INCDS ”Marin Drăcea” Bucharest, is realized in the memory of Dr.Doc. Forest Engineer Alexandru Beldie and contains samples with over 60,000 plates that host herbaceous and ligneous species, moss, reindeer moss and fern, plants from the Red List and many others (VASILE ET AL. 2016a).

The collection contains 10,000 sheets with plants collected by Al. Beldie himself, while the rest of 50,000 plates originate from private collections donated by certain researchers or from foreign herbariums obtained through exchanges.

All the plant species, including the Allium ones, are kept in their original maps and are deposited in drawers belonging to 30 wood modules from within the Institute.

A database was created for all plants belonging to Allium Genus, as well as for Hieracium (DINCĂ L. ET AL. 2017a), Androsace (DINCĂ M. ET AL. 2017), Melica and Eragrostis (CĂNTAR ILIE and DINCĂ MARIA, 2017), Arabis (DINCĂ L. ET AL. 2017b), Ornithogalum (ENESCU and DINCĂ L., 2017), Potentilla (CRIŞAN ET AL., 2017) and Veronica (DINCĂ L. ET AL. 2017c). This database contains the drawer number, species present in the drawer maps, the afferent collection, harvest date, harvest place, the person who determined or collected the plant, as well as its conservation degree. As such, the conservation degree has assigned a numerical code that ranges from 1 to 4, where 1 represents a well conserved plant, complete and correctly attached to the plate, 2 – a plant detached from the plate, with existent but detached parts, 3 – a plant detached from the plate, lacking some parts and 4 – detached and fragmented plant, with over 50% of its parts missing.

RESULTS AND DISCUSSIONS
Allium genus species present in the herbarium

Most plates belong to Allium schoenoprasum L., Allium oleraceum L. and Allium ursinum L. (Fig. 1).

Fig. 1. Allium genus species present in the herbarium

**Allium schoenoprasum** L. – known as **chive**, is a monocotyledonate perennial species, similar to onion. It is the smallest onion species and the most widespread. Its name originates from the Greek language (skhoínos = bulrush or cane and prason= scallion). The English name (chives), derives from the Latin word cepa (DE WILDE-DUYFIES 1976).

The chive does not produce large bulbs (Fig. 2), but forms new auxiliary sprouts after forming two or three leaves with sprouts attached to short rhizomes. The plant forms dense agglomerations with narrow, linear and empty leaves that usually reach 15-30 cm in height. Flowers appear under the shape of dense umbrellas and not as bulbils (bulbil=s small sprouts with leaves as scales that appear on the stem) as is the case for many other Allium species that have fewer space between flowers.

Both leaves and flowers are eatable. The leaves are massively used in Europe cuisine, while the flowers are mainly used in salads. The taste is similar with onions but is more lightly (DE WILDE-DUYFIES 1976).

Fig. 2. A. schoenoprasum L. exemplary from Pyrenees Mountains, 1857

The chive produces sulphur compounds (including methyl sulphur and disulphur) very similar with garlic, but in lower quantities. Even though they have medicinal properties (antifungal, antimicrobial, improves the circulation etc.), it has a limited usage in medicine. The high quantity of sulphur compounds can help in eradicating harmful insects, so that it can
be used as chaperon plant besides other garden plants (POULSEN, 1990; VAN DER MEER, 1997; HANELT, 2001; MAXTED & RHODES 2016).

The species is extremely polymorph and is cultivated both as vegetable as well as ornamental. The chive was cultivated in Japan and Italy from where it was distributed in Central and West Europe in the early Medieval Age (HELM, 1956; HANELT, 2001). *Allium oleraceum* L. (*field garlic*) (Fig. 3) - is a species of wild garlic from Eurasia. As such, it is a bulbous perennial plant that grows wildly in dry areas and can reach 80 centimeters in height. It reproduces through seeds and bulbs (LINNAEUS 1753).

This plant prefers a partial or complete exposure to sun and tends to grow on slightly humid and loamy soils, even though it can also grow on other types of soils. Field garlic disseminates quickly, as a herb and it can be very difficult to get read of it (GLEASON & CRONQUIST 1991).

*Allium ursinum* L. (*bear’s garlic*) – its name ("ursinum") originates from Latin, namely from "ursus" (bear) and is connected to the legend that bears, after their winter sleep, eat this plant in order to eliminate the toxins from their organism and to regain their power (REJEWSKI, 1996). Another etymological hypothesis is connected to "Ursa major", a constellation in the north hemisphere, because *A. ursinum* was for ancient Greeks one of the most Nordic *Allium* species (BÖHLING 2008). The name of “wild garlic” can also be found but causes confusions with other *Allium* species (*A. vineale* or *A. canadense*), as well as with Tulbaghia species (DEFELICE 2003; LYANTAGAYE 2011).

It is a bulbous plant with a narrow and elongated bulb of approximately 1,5-6 cm in height that has few fir at the basis. It can reproduce itself vegetative as the bulb sometimes forms “daughter bulbs”. The contractile roots start to form after three years (MACKŮ AND KREJČA 1989; ČINCURA ET AL. 1990). If the soil is sufficiently mellow, the roots can penetrate deep in the soil and reach up to the depth of 27 cm (ELLENBERG 1988).
A. ursinum forms a stem of up to 50 cm in height, at the end of which inflorescence appear from April to the first part of May. The inflorescences have a semispherical shape, umbrella type, which holds up to 30 white flowers (Fig.4).

The plant usually has 2-3 leaves that are neat, flat, elliptically-lanceolate, with a distinct limb, well developed, sharp at the peak, narrowing progressively in the petiole. The leave’s breadth is of 20-64 mm (SZAFER ET AL., 1988) (Fig.5).

A. ursinum mainly regenerates through seeds, while the vegetative regeneration is less important. The seeds are black and sub globular with a length of 2-3 mm and concentrated in tricotomic capsules (HERMY ET AL., 1999, SENDL 1995). These maturate in June and July and fall directly on the field, being too heavy to be transported by the wind. As such, their transport on longer distances is done via water or wild animals (EGGERT 1992).

All the plant’s parts are eatable. The leaves are collected in April and May for medicinal purposes, while the bulbs are harvested in September and October. The harvest is done in raw state, directly from the forest. In Romania, A. ursinum is gathered in significant amounts (VASILE ET AL., 2016b).

In previous eras, the plant was cultivated as vegetable, medicinal plant and spice in Central and North Europe. During the last years, the plant started to be cultivated as garden plant, near houses in Germany and mountain regions from Caucus (HANELT, 2001).

Years, places and persons that gathered the herbarium species

The most Allium genus species were gathered in 1932 and 1942, while the least number of species date to 1975-1992 (Fig.6).
The Allium species were mainly gathered from Europe, namely Italy (Naples, Sicily), Bulgaria, Alps or Pyrenees. From Romania, the plants were collected from Bucegi Mountains (most of them), Bâile Herculane, Iași, Tulcea, Mangalia, Cluj, Hunedoara, Retezat Mountains etc. "Al Beldie" Herbarium contains Allium species collected or acknowledged by renowned local and foreign botanists. A large number of plates are signed by Al. Beldie, while others belong to S. Pașcovski, Al. Borza, C. C.Georgescu, Bujoreanu, Grinteșcu, I.D. Tătăranu, M. Haret, E.L. Nyárády.

A large number of plates belong to foreign botanists such as A. Becker, A. Arval, E. Reverdron, etc.

The plates’ conservation state
The plates are very well conserved and maintained, so that the plants are entire and well fixed (grd.1) or entire and with some parts detached from the plate (grd.2). Only a small number of plants are detached from the plate and have missing parts (grd.3) (Fig.7). This aspect is caused by the fact that each plate is protected by Parched paper that is folded over the plate in order to protect the attached plant against colliding with the neighboring plate ("protection shirt").
CONCLUSIONS

From the 750 Allium genus species outspread in the North hemisphere, 56 species in a very good conservation state and kept in 111 plates were identified in the "Al. Beldie" herbarium.

The herbarium offers a unique perspective for the Allium genus species in regard with their location-temporal dynamic. Even though the herbarium data can be heterogeneous in regard with the description of the location and habitats, their limitations being caused by different sampling criteria and efforts, the herbarium proves to be very useful when the plants' distribution models are explored on a large scale.

By studying the Allium exemplars from the herbarium, it can be observed that they offer data concerning their harvest, geographic locations, so that characteristics regarding their apparition can be estimated, together with establishing their habitats. Furthermore, this information can be used as a starting point for comparing distribution changes from the past and the future.

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