

CRATAEGUS GENUS: PRESERVED PLANTS

DIANA VASILE¹, RALUCA ENESCU¹, MARIA DINCĂ¹

¹”Marin Drăcea” National Institute of Research and Development in Forestry

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ABSTRACT

Crataegus Genus is a complex group of small trees with more than 1000 species being native to northern temperate zones. The Herbarium hosts 200 plates that contain 30 Crataegus Genus species. Most plates belong to C. monogyna, C. pentagyna and C. oxyacantha. The majority of Crataegus species were gathered between the years 1934 and 1943. A large number of plates are signed by Al. Beldie, S. Pașcovski, Al. Borza, C.C.Georgescu and were gathered from Texas, Pennsylvania (USA), and from Romania (Bucharest, Argeș). The herbarium offers a unique perspective for the Crataegus genus species in regard to their location-temporal dynamic.

INTRODUCTION

Crataegus Genus belongs to the Maloideae subfamily, Rosaceae family and contains over 1000 species (Albarouki & Peterson, 2007; Kumar și colab., 2012). The Genus is present in Nordic temperate areas, namely North America, East and centre Asia and Europe, being represented by a complex group of tree and shrubs with spines (Pavlovic et al. 2019).

From the oldest times, Crataegus species were appreciated and used in traditional medicine based on plants practiced in both China and Europe. Crataegus fruits (hawthorn) are not only used in medicine, but also in the food industry as valuable ingredients due to their nutrient and compound content known for its health benefits (Bernatoniene și colab., 2008; Tadić și colab., 2008; Pavlovic et al. 2019). As such, the fruits are used for jam, jelly, drinks, wine and tin. Both hawthorn fruits and leaves are rich in phenolic compounds, considered to be the key bioactive compounds from this plant if we consider its antioxidant activity (Bleske și colab., 2008).

Flavone, flavonoid, epicatechin and procainamides are the main components of hawthorn (Liu și colab., 2011; Svedström și colab., 2006; Yang și Liu, 2012; Pavlovic et al. 2019).

Due to the great importance of *Crataegus* species, numerous samples were collected in herbariums starting with 1848 in order to be studied and researched by future generations.

Al. Beldie herbarium conserves plants from different parts of Romania (Cantar et al., 2019; Ciontu et al., 2019; Dinca et al., 2020; Crisan et al., 2020), from different countries (Plesca et al., 2019; Dinca et al., 2019; Vasile et al., 2019; Kachova et al., 2020), and belonging to numerous genera and families (Scarlatescu et al., 2017; Dinca et al., 2018; Vechiu et al., 2019; Plesca et al., 2020; Dinca et al., 2020).

The purpose of this study is to identify the *Crataegus* species present in “Al. Beldie” Herbarium together with the place from where they were gathered, the period in which they were collected, the botanists that sampled them and their current conservation degree.

MATERIAL AND METHOD

The research included all *Crataegus* species conserved in “Al. Beldie” Herbarium hosted by INCDS “Marin Drăcea”. The species vouchers are among the approximate 60.000 vouchers with herbaceous and wood species collected over time from Romania or exchanged from other worldwide herbariums.

The plants are in their original maps and are classified on phylogenetic principles. The data for each sample was taken from each voucher’s label that includes the species scientific and popular name; the specie’s taxonomy classification; the harvesting place and date; a few data about the habitat from where it was collected and the name of the researcher or botanist who collected it. At the same time, we have tried to verify the conservation state of these plants, using a conservation degree scale from 1 to 4 as follows: 1 = plant well conserved, entire and correctly attached to the voucher, 2 = plant detached from the voucher with detached but present parts, 3 = plant detached from the voucher with missing parts, and 4 = plant detached and fragmented, with over 50% missing parts.

RESULTS AND DISCUSSIONS

“Al Beldie” Herbarium contains 200 vouchers with 30 *Crataegus* species. We have observed that *C. monogyna*, *C. pentagyna* and *C. oxyacantha* have the most samples, amounting to 49%, 21% and 9% of the total vouchers identified in the herbarium (Fig.1).

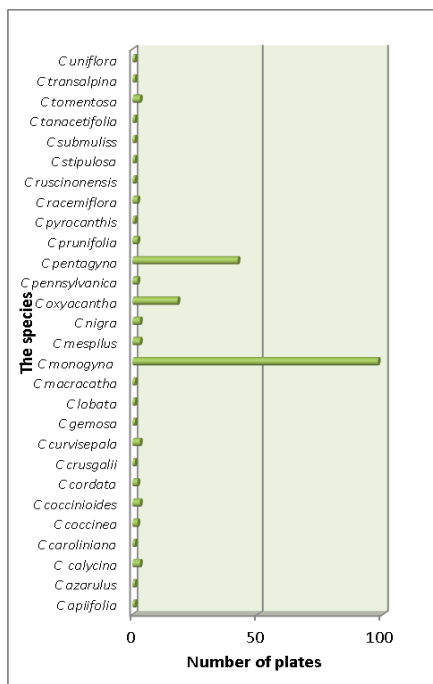


Fig.1. *Crataegus* species identified in the Herbarium

The oldest *Crataegus* voucher is of a well-preserved *C. monogyna*, collected in September 1848 by botanist F. Moisescu.

***Crataegus* species identified in the herbarium**

Crataegus. monogyna Jacq.

C. monogyna is widespread in Europe, North Africa and West Asia (Christensen et al. 1992), growing frequently in hedges, scrubs and forests. It can be found all over Europe, on all soils with average conditions for pH values, nutrients and water supply (Fichtner and Wissemann, 2021).

The species is a broad-leaved shrub or sometimes even a tree that can reach 2-8 m in height. Its branches have sharp spines of approximately 1 cm length. *Crataegus monogyna* has both an ornamental and ecologic value. During its blooming, from May to June, the species has numerous white flowers, while its pollen and nectar is used by many insects. In August, when the fructification process starts, the entire shrub takes a dark red colour due to the large number of small, red fruits that are preferred by numerous birds (Fichtner and Wissemann, 2021).



Photo 2. *C. monogyna* Jacq.

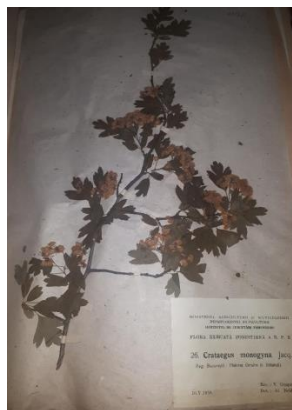


Photo 3. *C. monogyna* Jacq. with inflorescence

Crataegus pentagyna W. et K. in Willd

It is a shrub that can reach 6m in height. Young stems are pubescent, with ovate, diamond-ovate up to obovate leaves that are narrow or truncated at the base. They are long (2-6 cm), and approximately similar in width, with 2 – 5 (5) pairs of irregular, serrated lobes. The inferior pair reaches to median vein while their front side is glabrous or hairy. The inferior side is strongly hairy during young ages, but it becomes glabrescent or hairy later on and only on the nerves (Turner, 1979).

The species is resistant to frost, drought or strong winds and can also tolerate atmospheric pollution. It prefers light (sandy), average (clay) and heavy (clay) soils, as well as acid, neutral and basic ones (alkaline) and even very alkaline soils. It is a light and semi-shadow species (Brickell 1990). June is the blooming period, while the flowers are concentrated in multiflora corymbs, are erect, lax, with white petals and red anthers. The fruit has approximately 1 cm in diameter, is black-purple in colour and has five rather large seeds (pentagyna) at the fruit's centre. These usually form a common body and give the impression of a single seed (Dirr and Heuser 1987).

Crataegus oxyacantha L.

A small tree that can reach 9,00 m in height, it has grey stems, 3,0-3,5 cm ovate or rhomb leaves that are cuneate at the basis and a long petiole. The flowers reach 5 – 5,7 mm, are white and have 5 petals and many stamina. The fruits are glabrous, crimson and pulpy (Christensen 1992).

The majority of samples were collected between 1933 and 1943 (Fig.6) and were kept well so that nowadays they are in a very good conservation state (Fig.7), even though some of them are older than 170 years.

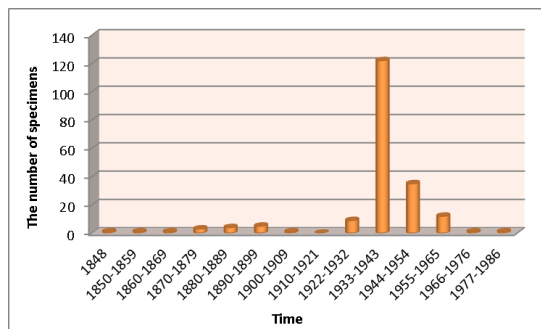


Fig.6. The time interval in which the majority of samples from the herbarium were collected

Most of the vouchers (190) contain entire and well-fixed plants (1st conservation degree). However, there are some vouchers with entire plants and detached parts (2nd conservation degree) as well as vouchers with detached plants and missing parts (3^d conservation degree).

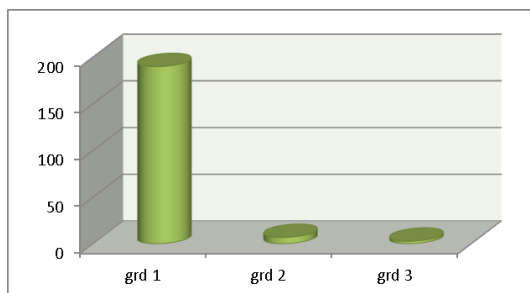


Fig.7. Conservation state for Crataegus samples

The herbarium vouchers originate from Bucharest’s Polytechnic School Herbarium, Cretzoiu Herbarium, Agriculture and Silviculture Ministry’s Herbarium, Museum Botanicum Universitas – Cluj, The Institute of Scientific Research and Forest Experimentation (ICEF) but also from foreign collections such as Plants of Texas, Herbarium du Docteur Gillot Autun, Herbarium of A.B. Seymour, Flora Suecica and Erbario di Carlo Costa-Reghini.

The majority of plants were collected from Romania, namely from Ilfov, Timiș, Buzău, Argeș, Sibiu, Vrancea, Arad counties and

from Bucegi Mountains. A small part of them were also collected from Texas, Pennsylvania, Serbia and Athos Mountain.

Crataegus species were collected by both Romanian botanists such as Al. Beldie, AL. Borza, At. Haralamb, C.C. Georgescu, I. Lupe and P. Cretzoiu as well as by foreign ones such as Olof Bakman, B. Holmgreen, Wolf, Richter, and S. Stankov.

CONCLUSIONS

Herbariums were always rich sources of information for ecologists and biogeographers, playing a major role in societies as they contribute in evaluating biodiversity losses caused by anthropic activities.

The *Crataegus* samples present in our herbarium are extremely useful as they are large plant collections of 200 vouchers that are in a very good conservation state. Furthermore, most of them have labels that are rich in information regarding their harvesting location, the time period in which they were collected, the botanist who gathered or identified them and so on. The herbarium samples can be used anytime in defining conservation priorities, in documenting the decline of species and in reconstructing the recent evolution of phonologic phenomena.

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