

THE MAHALEB CHERRY (*PRUNUS MAHALEB* L.) - A SPECIES SPECIFIC TO DOBROGEA'S PLATEAU

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Abstract

The present article has taken into account data from forest management plans realized during 1993-2007 for forests that belong to Forest Districts located in Dobrogea. All the data regarding the stand elements of Prunus Mahaleb L. were extracted from these plans for the management parcels in which this species is present. As such, the purpose of this paper was to analyze the main qualitative characteristics of stands (age), their structural characteristics (consistency, composition, average diameter and average height) as well as their site characteristics (altitude, slope, soil type). The total surface occupied by this species is of 1103.1 ha, with significant percentages in Constanța, Hârșova, Casimcea, Babadag and Măcin Forest Districts. The altitude at which Prunus mahaleb L. appears in Dobrogea Plateau ranges between 15 m at Cernavodă and 410 m at Măcin. The field's configuration is mainly undulated where Mahaleb species are present and covers a surface of 574 ha. The soils on which this species vegetates are: chernozem (218 ha), cambic chernozem (152 ha), lithic rendzic leptosol (60 ha), cambic phaeozem (43 ha), and rendzic leptosol (33 ha). The forest types in which Prunus mahaleb L. is present are: Soft oak from Dobrogea's silvosteppe with superficial soil (102 ha), Silvosteppe soft oak with oriental hornbeam (102 ha) and Dobrogea's Silvosteppe Turkey oak mixed hardwood stand (96 ha).

Mahaleb cherry has an important ecologic purpose, being used in improving degraded fields.

Key words: altitude, mahaleb cherry, site conditions, soils, stands.

INTRODUCTION

Dobrogea Plateau is bordered by the Danube Meadow and Delta at West and North, which overlap on evident tectonic dislocations. On the East, the Black Sea has underneath strong Dobrogean structures that continue through the seashore platform.

Dobrogea is a plateau region where fragmentation has caused the development of forms such as hill summits, large valley breeches and basins. They cover approximately 10 400 km², namely 4.3% from Romania's territory. From a morphologic point of view, the area is characterized by low altitudes (only some North-West peaks exceed 400 m; 89% are situated under 200 m), relief energy frequent under 100 m, values of 0.5-1 km/km² for horizontal fragmentation with 42-47 semi-permanent leakage and two evident slope

categories (0-5° - predominantly on plateaus, glacis, meadows - and over 30° on structural, petrographic slants and sea fronts) (Popescu, 2003). Even though Dobrogea is situated in a dry climate, the surface of degraded lands is sufficiently large (Mănescu, 2000).

Prunus mahaleb L. is present in Central and South Europe and West Asia. In our country, the species can be found in thinned forests from Dobrogea's silvosteppe ("shibliacs"), Moldova de Sud, and Banat. The species is thermophile, resistant to drought and requires a lot of summer heath. It vegetates well on skeletal and chalky dry soils and sometimes even on meadow ones (Clinovschi, 2005).

It is considered a very resistant tree to drought, sturdy and resistant to diseases. Consequently, the tree was used as parent stock for the horticulture production of cherries cultivated in the majority of Mediterranean countries

(Berrin, 2012; Al-Absi, 2010; Rankova, Z., 2006).

The plants' parts were used as traditional medicine for diabetes, gastro-intestinal problems and as tonic for curing different affections in the traditional Turkish medicine, having also an antibacterial activity (Seyyednejad et al., 2008). Furthermore, the resin obtained from the wood's exterior surface was used in treating gastritis. The oil extracted from seeds was used for fabricating liqueur and special wines due to its aromatic taste. The seeds were also used in treating diarrhea for Sudanese children. The fruits were used in pastries and bakeries (Berrin et al., 2012).

Concerning the genetic diversity, cluster analysis using UPGMA method and Dice's coefficient grouped the Mahaleb cherry into two main clusters with similarity coefficient ranging from 0.16 to 0.93 (Abedian et al., 2012).

The adaptability of Mahaleb cherry to continental climate, tolerance to drought, hot summer, poor soils, high pH and lime tolerance are valuable rootstock traits considering the forecasted environmental conditions due to the climate changes (Hrotko, 2016). Because seeds of the Mahaleb cherry, used as a rootstock in cherry production, germinate and emerge poorly due to seed dormancy, it is recommended that GA₃ should be used in addition to cold stratification for improving germination percentage and speed of Mahaleb cherry seeds (Al-Absi, 2010).

In Romania the species is one of the most frequent cherry species used in the reconstruction of forest fields, being used for controlling soil erosion of degraded fields (Enescu, 2015), together with sea buckthorn (Constandache et al., 2016), black locust (Murariu et al., 2018), or pines (Silvestru-Grigore, 2018).

The species is useful on coarse soils with a high content of calcium carbonate, in field's marginal and post-marginal rows and in highway protection belts (Costandache et al.,

2006). In addition, it is well adapted to climatic changes (Vizitiu et al., 2018).

MATERIALS AND METHODS

The present article was created based on data from forest management plans realized during 1993-2007 for forests that belong to forest districts located in Dobrogea (10 forest management plans realized during 1993-2007 – ***Forest management plans).

Data regarding the Mahaleb cherry stand elements were extracted from these plans.

They contain a description of all environmental and stand characteristics. Firstly, the stand elements represented by Mahaleb cherry were extracted with the help of Excel (853 elements), followed by the data for each element.

The following stand and environment characteristics were analysed, specific to areas where Mahaleb cherry species are present: distribution, altitude, relief forms, soils, forest type, mixture, pruning, stand structure, current growth and production class.

RESULTS

1. Distribution of Mahaleb cherry in Dobrogea Plateau

The investigations have shown that Mahaleb cherry is present in all 10 forest districts from the studied area, occupying a total surface of 1103.1 ha. If we consider the total surface of forests from Dobrogea Plateau, Mahaleb cherry occupies only 1%.

The forest districts with a higher presence for this species are: Constanța (342.4 ha), Hârșova (117.6 ha), Casimcea (106.1 ha), Babadag (97.8 ha) and Măcin (88.3 ha). They are followed by a group of forest districts where the species has an average distribution: Ciucurova (71.9 ha), Cerna (82.6 ha) and Băneasa (76.6 ha). Mahaleb cherry has a reduced presence in Niculițel (52.2 ha) and Cernavodă forest districts (68.7 ha) (Figure 1).

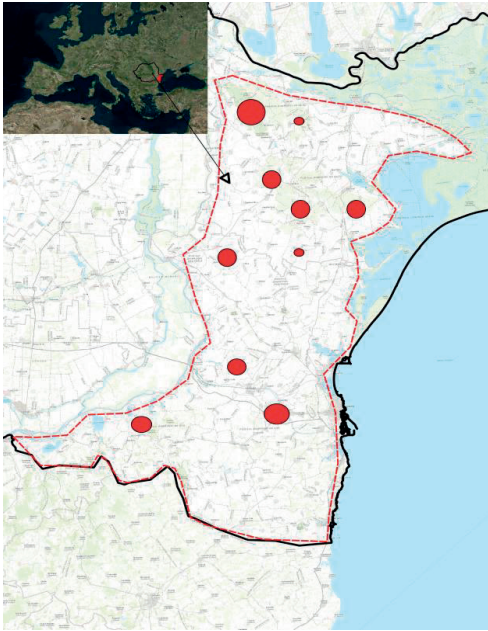


Figure 1. Distribution of *Prunus mahaleb* stands from Dobrogea Plateau

2. Site characteristics specific to Mahaleb cherry stands from Dobrogea Plateau

The main site characteristics of these stands are the following: the relief form, the field's configuration and the altitude.

The slope is **the relief form** characteristic for these stands with the plateau occupying 31% of the stands' total surface while low plain and average plain have values of 1% and 3% (Figure 2).

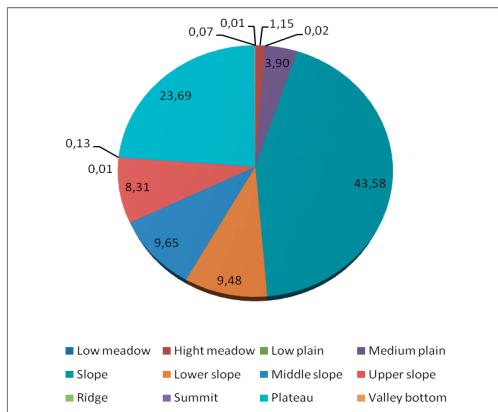


Figure 2. Relief forms characteristic for *Prunus mahaleb* stands from Dobrogea Plateau

The field's configuration is levelled and covers 566 ha, followed by the sinuous one (510 ha) and the fragmented one (26 ha). The relief forms cause changes in the climatic and edaphic regimes, influencing indirectly the forest vegetation.

The altitude at which Mahaleb cherry appears in Dobrogea Plateau ranges between 15 m at Cernavodă and 410 m at Măcin.

Generally speaking, the altitude characteristic for this species is situated between 101-150 m. By calculating the average altitude of all parcels in which this species is present in this area, we reach a value of 122 m (Figure 3).

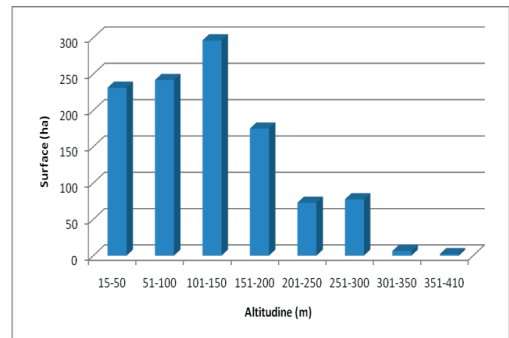


Figure 3. Altitude of *Prunus mahaleb* stands from Dobrogea Plateau

The field's slope is situated between 6° and 50°, with most fields characterised by reduced slopes of 0°-20° (Figure 4).

The slope is strongly correlated with the exposition and altitude and influences environment conditions.

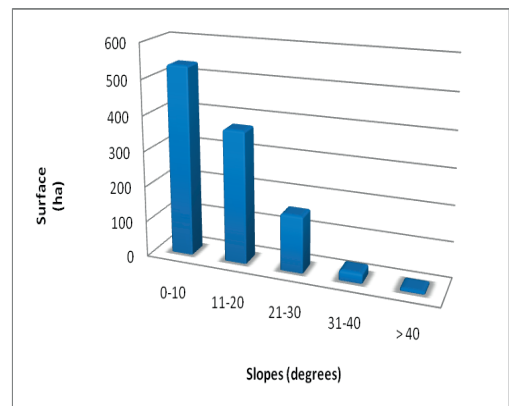


Figure 4. Field slope for *Prunus mahaleb* stands from Dobrogea Plateau

The exposition of the fields characteristic for these stands is mainly South-East, as well as North (Figure 5).

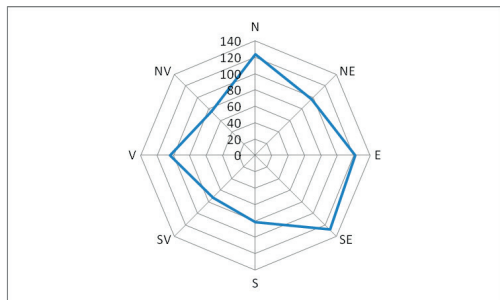


Figure 5. Field exposition for *Prunus mahaleb* stands from Dobrogea Plateau

The soils on which the Mahaleb cherry vegetates are: chernozem (218 ha), cambic chernozem (152 ha), lithic rendzic leptosol (60 ha), cambic phaeozem (43 ha), and rendzic leptosol (33 ha).

These soils have an intense microbiologic activity (Onet et al., 2019) and proper chemical properties (Crisan et al., 2020), but suffer from a lack of water supply in certain periods of the year (Dinca et al., 2020).

3. The characteristics of Mahaleb cherry stands from Dobrogea Plateau

The forest types in which the Mahaleb cherry is present are: Soft oak from Dobrogea's silvosteppe with superficial soil (102 ha), Silvosteppe soft oak with oriental hornbeam (102 ha) and Turkey oak mixed hardwood stand from Dobrogea's silvosteppe (96 ha).

As it can be seen, almost all forest types are specific to Dobrogea and situations in which a certain type of forest has in its name a well-defined geographic area are extremely rare in the Romanian forest typology.

These forests ensure numerous ecosystem services, besides the wood that they provide to their owners, such as game species (Dincă et al., 2018) or numerous non-wood forest products (Dincă et al., 2020).

The stand's age is a quantitative structural characteristic with direct implications in the qualitative structural aspects. The Mahaleb cherry stands age is young, ranging between 1 and 100 years (Figure 6).

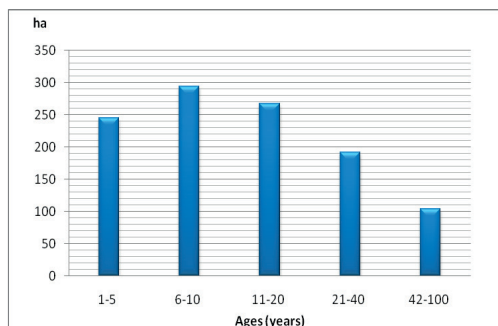


Figure 6. Age of *Prunus mahaleb* stands from Dobrogea Plateau

The specie's participation percentage in the stand's composition is of 100% - pure stands or lower - mixed stands.

The mixture is intimate (244 ha), in stripes (241.1 ha) or mixt (intimate + groups = 220.7 ha) (Figure 7).

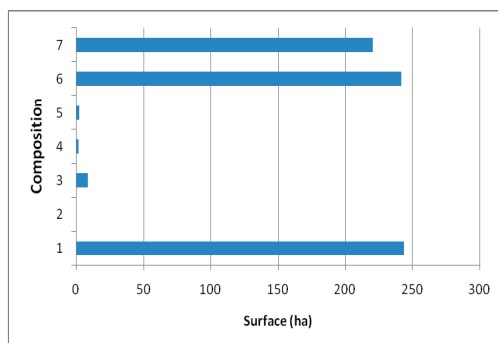


Figure 7. Composition of *Prunus mahaleb* stands from Dobrogea Plateau

The current growth of Mahaleb cherry stands from this area ranges between 0.1 m³/year/ha and 2.1 m³/year/ha.

The stand's production class is inferior (4th class = 419.9 ha; 5th class = 393.5 ha), and at best average (3^d class = 5.9 ha).

CONCLUSIONS

The realized study has led to the identification of 853 stands from Dobrogea Plateau in whose composition we can encounter Mahaleb cherry species (from pure stands to stands in which the specie's presence is of 10%).

The total surface occupied by this species is of 947 ha, with a higher percentage in Constanța,

Casimcea, Hârșova, and Babadag Forest Districts.

The local conditions are represented by sinuous slopes situated at average altitudes of 101-150 m, with an average slope of 12^g, mainly north and southeast expositions and a typical chernozem soil type.

The main characteristics of these stands are the following: **forest types** - Soft oak from Dobrogea's silvosteppe with superficial soil (102 ha), Silvosteppe soft oak with oriental hornbeam (102 ha) and Turkey oak mixed hardwood stand from Dobrogea's silvosteppe (96 ha); **young stands**, aged 6-20; **inferior production classes** (classes 4 and 5) and at best average; **pure stands or mixed** with other broad-leaved species (in this case, the mixtures are intimate, in stripes or mixed); **current growth** ranging between 0.1 m³/year/ha and 2.1 m³/year/ha.

Mahaleb cherry has an extremely important ecologic purpose, being used in improving degraded lands. This species is one of the few broad-leaved species that can vegetate on sunny slopes and on arid fields.

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