Volume 24(1), 17 - 22, 2020
JOURNAL of Horticulture, Forestry and Biotechnology
www.journal-hfb.usab-tm.ro

Oleaster (*Eleagnus angustifolia* L.) – A Constituent Element of the Biodiversity from Dobrogea Plateau

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Abstract The present paper has taken into study data from forest management plans realized for forests belonging to Dobrogea's forest districts during 1993-2007. The study then focused on data regarding the stand elements of *Eleagnus angustifolia* L. (oleaster) that were extracted from the landscape parcels in whose composition the species is present. The total surface occupied by this species is of 947 ha, being more prevalent in Babadag, Macin, Constanta and Harsova Forest Districts. The altitude where *Eleagnus Angustifolia* L. appears in Dobrogrea Plateau ranges from 8 m at Macin and 510 m at Cernavodă. The field configuration is mainly undulated and covers a surface of 574 ha. The soils on which this species vegetates are: salic chernozem (107 ha), chernozem (105 ha), rendzina (90 ha), lithic rendzina (77 ha), erodosol (74 ha), and cambic chernozem (57 ha). The forest types in which Eleagnus Angustifolia L. appears are: Silvosteppe soft oak with oriental hornbeam (279 ha), Pure soft oak from Dobrogea's silvosteppe with superficial soil (226 ha), Dobrogea's plain of inferior productivity (67 ha), and Dobrogea's silvosteppe Turkey oak mixed hardwood stand (44 ha). Oleaster has an extremely important ecologic purpose, being used for improving degraded fields. Its considerable presence in Dobrogea's Plateaus is caused exactly by the plantations realized in these kinds of degraded areas.

Key words

stand, oleaster, forest soil, structure, pruning

Dobrogea's Plateau is located in South-East Romania, being bordered by the Danube Delta and meadow in West and North, by the Black Sea in East and by the Bulgarian border in South. The location is a plateau region composed of limestone and Sarmatian slate. The North part is higher and can reach 350 - 400 m and even 467 m in its highest peak (Greci Peak from Măcinului Mountains). On the other hand, the sought part records heights less than 200 m. The climate is characterised by an average temperature under 8^0 Celsius, with cold winters and chilly summers. Eutric cambisol, luvisol and preluvisol are the specific forest soils for this area [5, 16].

Elaeagnus Genus belongs to Elaeagnaceae Family, being widespread from north Asia and Himalaya to Europe [22]. Elaeagnus angustifolia L. (Russian olive, oleaster) is a species originating from Eurasia and was also introduced in North America at the end of the XIX century as a reconstruction or horticultural plant. As such, the plant has adapted well to humid areas. Due to his well-developed root system, the species can be used on fields affected by landslides or erosion [10]. In Romania, the species has recorded good results in steppe forest covers, on marine sands and on saltings (seashore, Danube Delta), having a major ecologic purpose in fixing and improving unstable fields (ravines, shores, cloughs), in preventing weeds and grazing.

The investigations have also shown that the species has a series of pharmacological and therapeutic effects, including antimicrobial, insecticidal, antioxidant, anti-arthritic effects, wound healing, cardio protective, hypolipidemic, antinociceptive, anti-inflammatory, antimutagenic, antitumourand gastroprotective activity [12].

Different parts of the species and especially its fruits have been used for treating numerous diseases in traditional medicine. For example, the traditional Iranian medicine used it for treating patients with rheumatoid arthritis. *Eleagnus Angustifolia* L. fruits can be consumed fresh or dried and have numerous benefits caused by significant quantities of vitamins (vitamin C and B1) and minerals (calcium, magnesium, potassium and iron) [13]. Furthermore, the fruits were used for treating dysentery, tetanus, nausea, vomit, icterus or asthma. Essential oils extracted from the fruits are used in creating perfumes and aromas [1, 11, 14].

Even though it is one of the few species capable to resist on soils with high salinity, the species is considered as very invasive, being largely spread in riverine habitats for the west part of North America [20]. Due to its high resistance, *Eleagnus angustifolia*

L. was planted widely in China's west regions on saline soils for preventing winds and for stabilizing sands [18].
This species plays an essential role in maintaining the function of ecosystems from arid areas due to its tolerance towards severe drought, high soil salinity and alkalinity [15]. As such, the species is resistant to drought and frost [2].
Besides its benefits, *Eleagnus Angustifolia* L. is found on the list of worldwide ornamental species [19].

Material and Method

The present article has used data from forest management plans realized for forests belonging to forests districts located in Dobrogea (10 forest management plans realized during 1993-2007 – ***Forest management plans). The data regarding the stand elements of oleaster included in management parcels were extracted from these plans (regardless of their participation percentage). A total number of 469 stand elements were analysed. The most important ones were centralised and analysed from the multitude of characteristics representative for a single stand element, (by using the Excel program), namely: location, relief form, field configuration, altitude, slope, soils, forest types, age, mixture, current growth, production class.

Results and Discussions

1. The widespread of oleaster in Dobrogea's Plateau

Oleaster is present in all 10 forest districts present in the studied area, occupying a surface of 947 ha. However, oleaster occupies only 1% from the total surface of forests present in Dobrogea's Plateau (103.491 ha). Correlated with the reduced presence of the species in the national forest fund, this surface represents altogether an important measure. The forest districts with an increased oleaster presence are Babadag (165 ha), Macin (144 ha), Constanta (142 ha) and Harsova (119 ha). They are followed by a group of forest districts where oleaster has an average spreading, namely Ciucurova (88 ha), Cernavoda (77 ha), Cerna (74 ha) and Baneasa (72 ha). Oleaster records scarce distributions in Niculitel (35 ha) and Casimcea forest districts (30 ha), fig. 1.

Fig. 1. Distribution of oleaster stands from Dobrogea's Plateau (original map: http://geografiebranesti.blogspot.com)

2. Specific site characteristics for oleaster stands located in Dobrogea's Plateau

The slope is the characteristic ***relief form*** for these stands, while plateaus occupy only 9% of the total stand surface, and high meadows and medium plains only 1%.

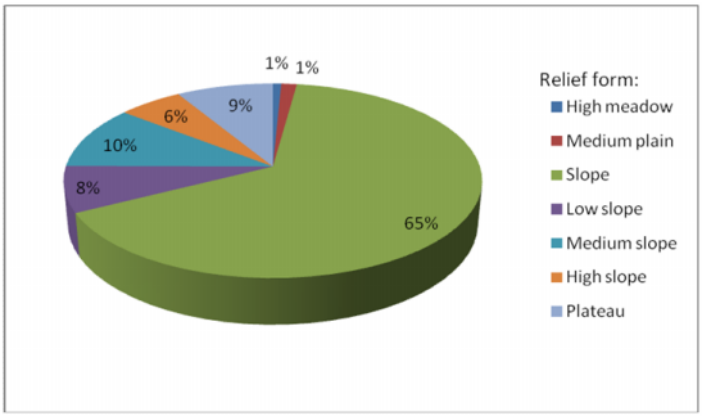

Fig. 2. Characteristic relief forms for oleaster stands from Dobrogea's Plateau

Field configuration is especially undulated (574 ha), followed by plain (313 ha) and battered (59 ha).

The altitude where oleaster is present in Dobrogea's Plateau ranges from 8 m in Macin to 510 m in Cernavoda. The average altitude of all parcels in which oleaster is present is of 116 m. From a general point of view, the characteristic altitude for this species is of 101-150 m., which is also the average calculated altitude (fig. 3).

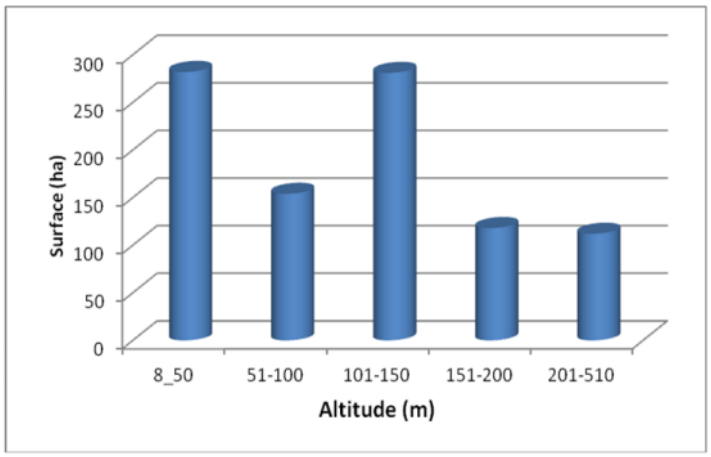

Fig. 3. Altitude of oleaster stands from Dobrogea's Plateau

Field slope ranges between 5^g and 50^g, with most fields being characterised by small slopes of 11^g-20^g (figure 4).

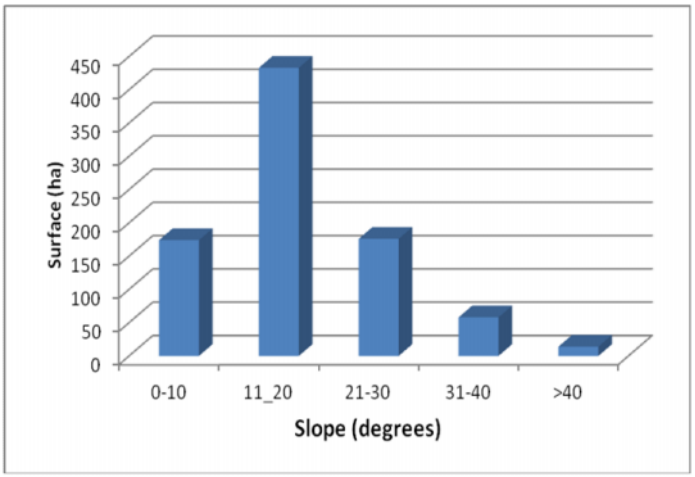

Fig. 4. Field slope of oleaster stands from Dobrogea's Plateau

The south and north-east field **expositions** are specific for these stands (figure 5).

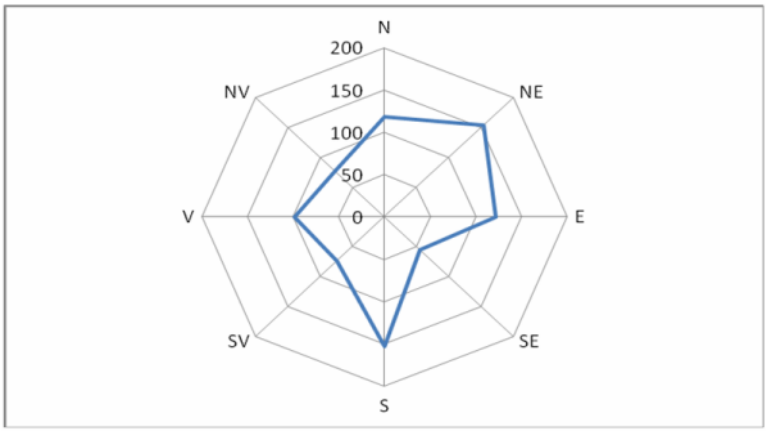

Fig. 5. Field exposition of oleaster stands from Dobrogea's Plateau

The soils on which oleaster vegetates are: salic chernozem (107 ha), chernozem (105 ha), rendzina (90 ha), lithic rendzina (77 ha), erodosol (74 ha), and cambic chernozem (57 ha).

Extremely important is the fact that oleaster resists well on salic chernozem, a soil that is totally unfavourable for other trees as well as on erodosol. As such, the species can be used in the ecological reconstruction of degraded fields [3, 8, 21]. All other soils are rich in micro-organisms and chemical elements and are relatively well supplied with water [17, 4, 16, 7].

3. Characteristics of oleaster stands from Dobrogea's Plateau:

The forest types in which oleaster appear are: Silvosteppe soft oak with oriental hornbeam (279 ha), Pure soft oak from Dobrogea's silvosteppe with superficial soil (226 ha), Dobrogea's plain of inferior productivity (67 ha), and Dobrogea's silvosteppe Turkey oak mixed hardwood stand (44 ha).

As it can be seen, almost all types of forests are specific to Dobrogea. The fact that a certain type of forest has in its name a geographic area well established is extremely rare in the Romanian forest typology. These forests ensure numerous ecosystem services, besides the wood that they provide for the owners, such as game species [6] or numerous non-wood forest products [9].

The age of oleaster stands is relatively young, ranging between 1 and 55 years (fig. 6).

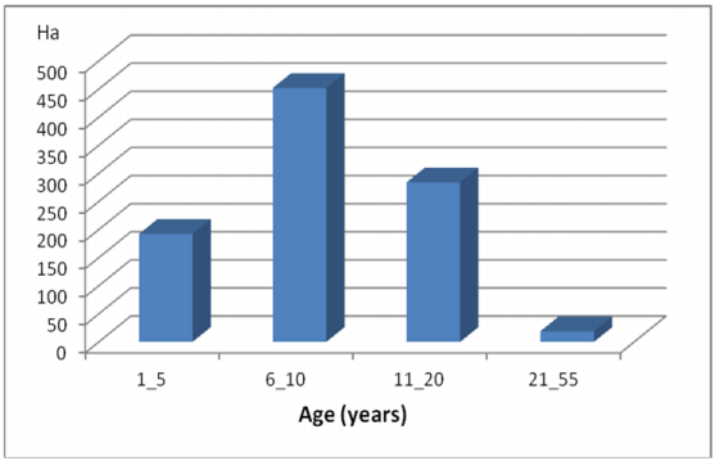

Fig. 6. Age of oleaster stands from Dobrogea's Plateau

The species participation ***percentage*** in the stand's composition is of 100% (pure stands) or smaller (mixed stands) (fig. 7). ***The mixture*** is intimate (184 ha), in stripes (161 ha), or mixed (intimate+groups=150 ha).

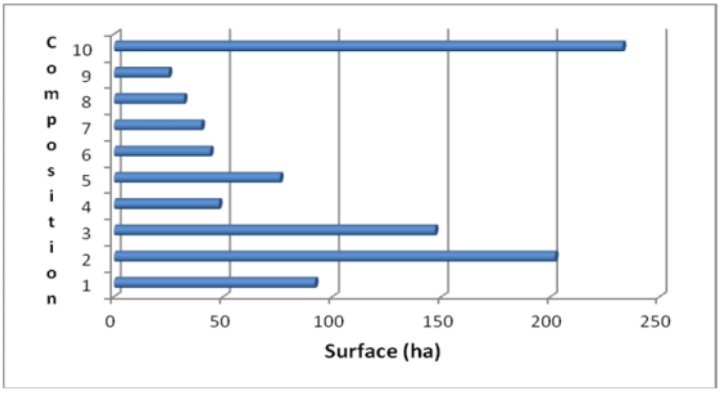

Fig. 7. Composition of oleaster stands from Dobrogea's Plateau

The current growth of oleaster stands from this ranges between 0.1 m^3/year/ha and 3.8 m^3/year/ha.
The stands' production class is inferior (4^{th} class = 430 ha; 5^{th} class = 310 ha), and average at the very most (3^{d} class = 204 ha).

Conclusions

A number of 469 stands were identified in Dobrogea's Plateau as containing oleaster (from pure stands to stands in which the oleaster percentage is under 10%).
The total surface occupied by this species in this area is of 947 ha, with the most important percentages recorded in Babadag, Macin, Constanta and Harsova Forest Districts.
Site conditions for these stands are represented by undulated slopes situated at average altitudes of 101-150 m, with average slopes of 11^{g} - 20^{g}, predominantly south and north-east expositions and salic chernozem and chernozem soils.
The stands' characteristics are the following: Silvosteppe soft oak with oriental hornbeam or pure soft oak from Dobrogea's silvosteppe with superficial soil; young stands of 1-20 years; inferior up to average production classes; pure oleaster stands or mixed with other broad-leaved species where the mixtures are intimate, in stripes or mixed; low current growth between 0.1 m^3/year/ha and 3.8 m^3/year/ha.
Even though it does not realize stands of high dimensions or growths, oleaster has an extremely important ecologic purpose, being used for improving degraded lands.
Its high presence in Dobrogea's Plateau is caused exactly by the plantations realized in these types of areas.
In addition, the species is one of the few forest species that can vegetate on salting fields.

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