

## **STAGHORN SUMAC (*RHUS TYPHINA* L.) FROM DOBROGEA'S FORESTS**

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Received 21 October 2020; accepted 29 December 2020

### **ABSTRACT**

*The present article takes into account data from forest management plans realised for forests from Dobrogea Forest Districts during 1994-2001. Data concerning staghorn sumac were then extracted from this database. As such, the purpose of this paper was to analyse the main qualitative (age) and quantitative characteristics (consistency, composition, average diameter and average height) of stands, as well as their site attributes (altitude, slope, soil type). The study has led to the identification of 221 stand elements, with staghorn sumac species occupying a total surface of 334,14ha. The specie's presence was more predominant in the following forest districts: Babadag (104,1 ha), Cerna (52,8 ha), Cernavodă (51,9 ha) and Ciucurova (47,2 ha). The majority of staghorn sumac stands are situated at altitudes between 101-150 m. The soils on which this species vegetates are: lithic rendzina (63ha), erodisol (51 ha), regosol (31,9 ha), cambic rendzinic erodisol(31,6 ha), chernozem(25,9 ha), rendzina (29,5 ha) and cambic chernozem(15,2 ha). The flora identified in these stands is: *Poa pratensis* and *Carex brizoides-Agrostis alba*. The silvosteppe soft oak with superficial soil (161,3 ha) is the representative forest type for staghorn sumac stands. The species is also renowned for its ornamental purpose provided by its decorative leaves and fruits.*

**KEY WORDS:** *staghorn sumac, soils, structure, soil type, altitude.*

### **INTRODUCTION**

Dobrogea is a plateau region where fragmentation has led to the development of hill summits, large river valleys and depressions. Dobrogea's Plateau is bordered by the Danube's Meadow and Delta in west and north (overlying on some evident tectonic dislocations), and by the Black Sea in east (under which the strongly flexured Dobrogean structures continue) (Popescu, 2003). Even though Dobrogea is situated in a dry climate, the surface of degraded lands is significantly higher (Mănescu, 2000).

Staghorn sumac is frequently found in Romania in hill and plain areas where it grows spontaneously or cultivated. Archaeological discoveries have attested the fact that the specie's fruits were intensely used over time in medicinal purposes or as spices in both North-America and Europe (XI century).

The red staghorn sumac originates from east and centre North America and Canada and was introduced exclusively as ornamental species in our country. The species is adaptable to the conditions from the temperate area: has a long vegetation season, requires summer heat and fertile soils and tolerates dust and smoke. In addition, it can develop on sandy and poor soils, river strands or on less salty soils. The temperament is of light and the species strongly suckering (Clinovschi, 2005).

The species is resistant to drought and frost, tolerates well pollution and shadow even though it prefers light, and tends to become an invasive plant.

Indigenous population have used the plant in their alimentation, mainly as a drink that stimulates appetite (rhubus juice). Nowadays, the species is used in industries such as food, nutraceutical and cosmetics for treating gastro-intestinal affections or diarrhea. Investigations have proved that staghorn sumac extracts have strong antimicrobial and antioxidant properties (Wang Sunan *et al.*, 2017; Kossah Rima *et al.*, 2011; Olchowika *et al.*, 2012; Lai *et al.*, 2014).

The species was introduced in China's Botanical Garden in 1959, being frequently used for rehabilitating degraded fields from the majority of mountain areas located in North China. This usage was determined by its tolerance to most exposures, even in poor soils with a strong growth (Wang *et al.*, 2008).

Staghorn sumac supports well poor park soils with a moderate alkalinity degree and prefers stations with a lot of summer heath. Important for the context of climatic changes, the species resists well to drought and frost.

*Rhus typhina* is an exotic ornamental shrub due to its exceptionally decorative leaves and fruits. Staghorn sumac can also be used in improving degraded lands (Enescu, 2015), together with sea buckthorn (Constandache *et al.*, 2016), black locust (Murariu *et al.*, 2018) or pines (Silvestru-Grigore, 2018). Furthermore, the species can be used in shelterbelts (Popov *et al.*, 2018) or in agro-forestry systems (Kachova *et al.*, 2015).

#### **MATERIAL AND METHOD**

The present study was created on data from forest management plans realized for forests from forest districts located in Dobrogea (10 forest management plans realized during 1994-2001 – \*\*\*Forest management plans). Data regarding the elements of staghorn sumac stands were then extracted from these plans that contain descriptions of all environments and stand characteristics. With the help of Excel, we have firstly extracted staghorn sumac stand elements (291 elements) and then the data regarding these elements.

The following stand and environment characteristics corresponding to the species presence area were analysed: spreading, altitude, relief forms, soils, forest types, mixture, stand structure, current growth and production class.

## RESULTS AND DISCUSSION

### 1. The distribution of red staghorn sumac in Dobrogea's Plateau

The research has shown that the red staghorn sumac is present in all the 9 forest districts from the studied area, covering a surface of 334,9 ha. As such, the species occupies 334,9 ha from the total surface of forests present in Dobrogea's Plateau. The areas with a higher staghorn sumac presence are located in the following forest districts: Babadag (104,1 ha), Cerna (52,8 ha), Cernavodă (51,9 ha) and Ciucurova (47,2 ha).

These are followed by a group of forest districts in which staghorn sumac has an average distribution: Măcin (16,3 ha) and Niculițel (15,6 ha) while Casimcea (6,3 ha) and Hârșova (4,9 ha) register a low presence (fig.1).

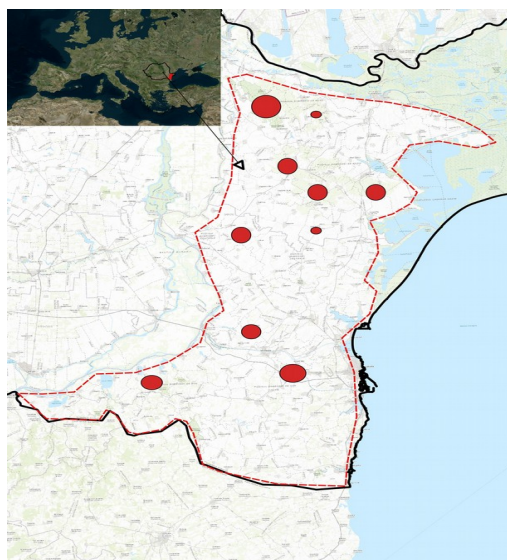


FIG. 1. The distribution of *Rhus typhina* stands from Dobrogea's Plateau.

### 2. Site characteristics specific for red staghorn sumac stands from Dobrogea's Plateau

**The relief forms** characteristic for these stands are: slopes, covering 209,6 ha (62%) and plateaus with 41,6 ha (13%). Other relief forms such as low meadow and average plain occupy small surfaces, lower than 10% from the stands' total surface (fig. 2).

These relief forms cause changes in the climatic and edaphic regimes, influencing forest vegetation indirectly.

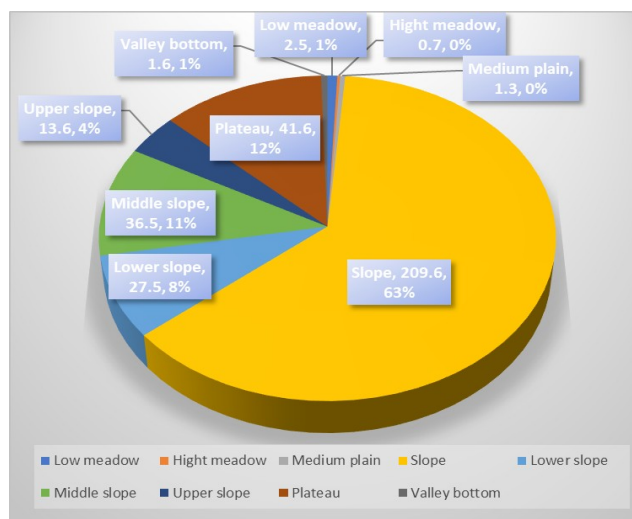


FIG. 2. Relief forms characteristic for *Rhus typhina* stands present in Dobrogea's Plateau.

**The altitude** at which red staghorn sumac appears in Dobrogea's Plateau ranges between 50 m in Cernavodă and 420 m in Ciucurova. It can be observed that the characteristic altitude for this species is situated between 101-150 m (fig. 3).

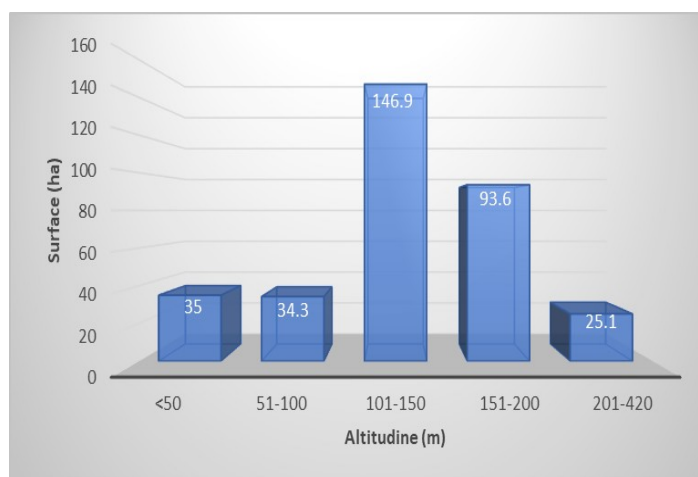


FIG. 3 . Altitude ranges of *Rhus typhina* stands from Dobrogea's Plateau.

**The field's slope** ranges between 6° and 50°, with most fields being characterised by low slopes, between 11°-15° (fig. 4).

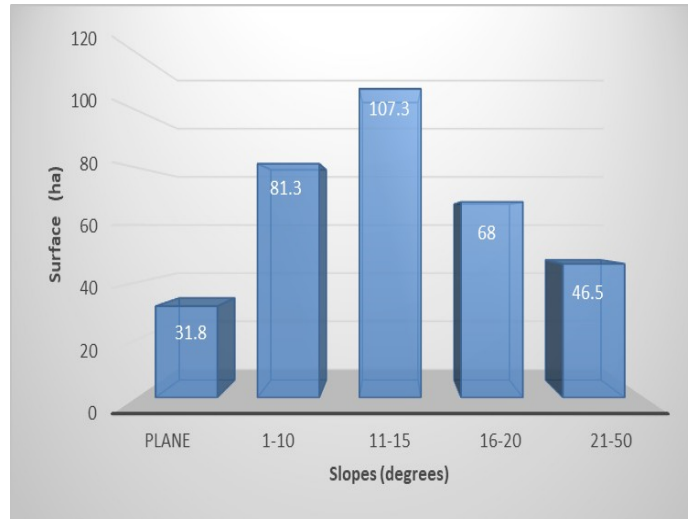


FIG. 4. Field slopes of *Rhus typhina* stands from Dobrogea's Plateau.

The field's exposition influences the radiation quantum, affecting individual or collective biologic processes. The specific field exposition for these stands is northeast, east and southeast (fig.5).

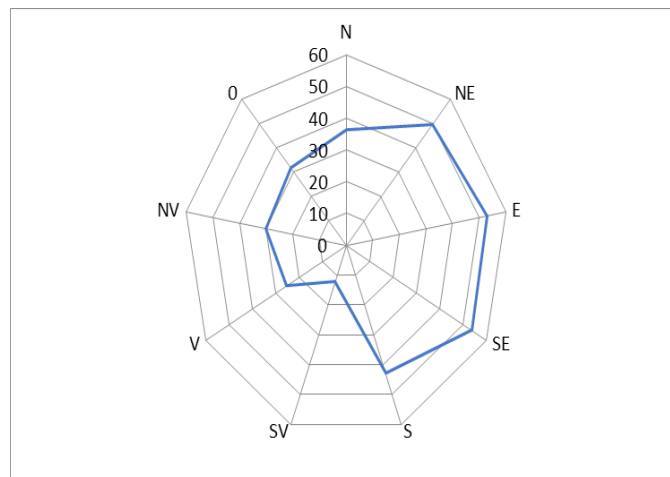


FIG. 5. Field exposition for *Rhus typhina* stands from Dobrogea's Plateau.

The soils on which the red staghorn sumac vegetates are: lithyc rendzina (63ha), erodisol (51 ha), regosol (31,9 ha), cambic rendzic erodisol (31,6 ha),

chernozem (25,9 ha), rendzina (29,5 ha) and cambic chernozem (15,2 ha). These soils have an intense microbiologic activity (Onet *et al.*, 2019), and proper chemical properties (Crisan *et al.*, 2020; Spârchez *et al.*, 2017), but lack water provision during certain periods of the year (Dinca *et al.*, 2020).

### 3. The characteristics of red staghorn sumac stands from Dobrogea's Plateau:

**The flora specific** for these stands is: *Erachypodium-Geum-Pulmonaria* =22,4 ha, *Poa pratensis* = 44,5 ha, *Carex brizoides-Agrostis alba* = 44,2 ha, *Carex riparia-Iris pseudacorus* =15,1 ha and *Carex-Poa pratensis* = 9,9 ha.

**The forest types** in which the red staghorn sumac appears are: Dobrogean silvosteppe soft oak with superficial soil (161,3 ha), silvosteppe soft oak with oriental hornbeam (60,8 ha), Dobrogean oak-tug stand with brown oak and soft oak (22 ha), Dobrogean oak-tug stand with soft oak (7,4 ha), silvosteppe brown oak from Dobrogea's hill with average productivity (10 ha). Besides the wood they provide to their owners, these forests fulfil numerous ecosystem services such as game species (Dincă *et al.*, 2018) and numerous non-wood products (Dincă *et al.*, 2020; Tivary *et al.*, 2020).

**The age** of red staghorn sumac trees is young, ranging from 1 and 45 years. The most well represented age categories are those of 6-10 years and 11-15 years (fig. 6).

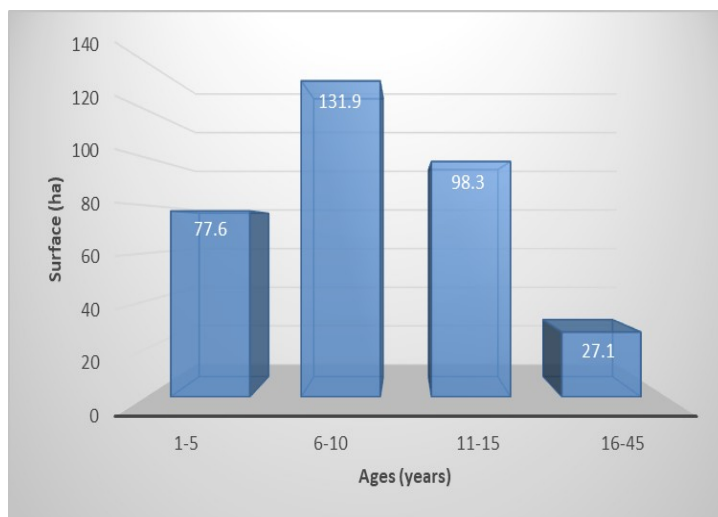


FIG. 6. Age of *Rhus typhina* stands from Dobrogea's Plateau.

**The stand's structure** is predominantly even-aged (331 ha), relatively even-aged (2,9 ha) and relatively uneven-aged (0,8 ha) (fig.7).

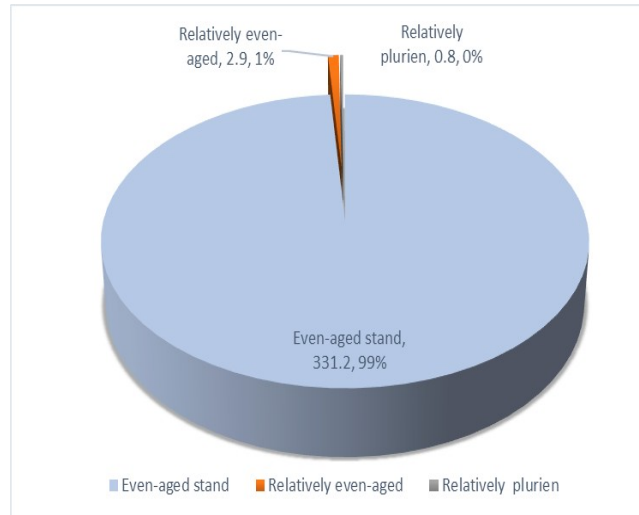


FIG.7 . Structure of *Rhus typhina* stands in Dobrogea's Plateau.

*The mixture present in this stand* is intimate (104,9 ha), in strips (77,5 ha) or mixed (intimate+groups =42,8 ha). (fig. 8).

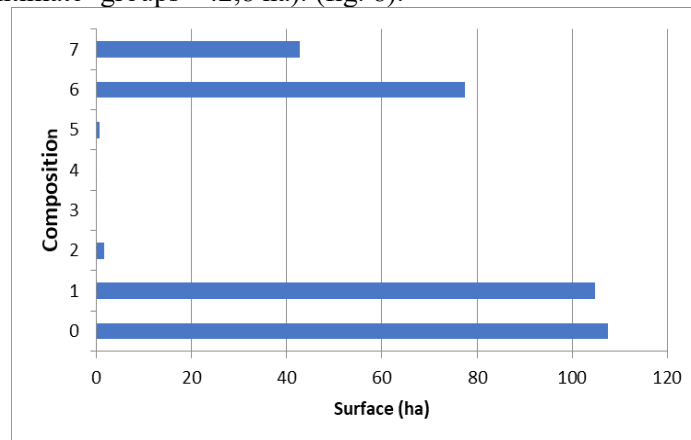


FIG. 8 . Composition of *Rhus typhina* stands from Dobrogea's Plateau.

*The production classes* of these stands are mainly inferior (IV and V) with 269 ha covered, while the superior production classes (I and II) occupy only 0,9 ha (fig. 9).

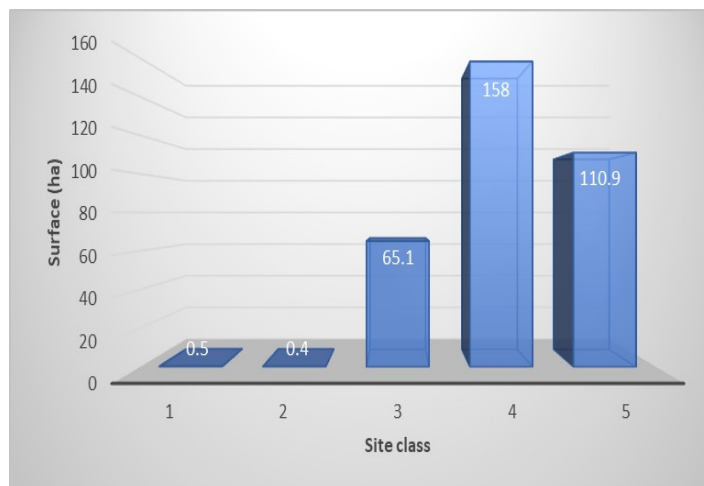


FIG. 9. Forest distribution of production classes.

From the total surface of studied stands, it can be observed that 152 hectares are occupied by stands with appropriate consistency (0.6-0.7). Furthermore, barreland stands are also present (0.4-0.5), with stands occupying 115 ha. (fig. 10).

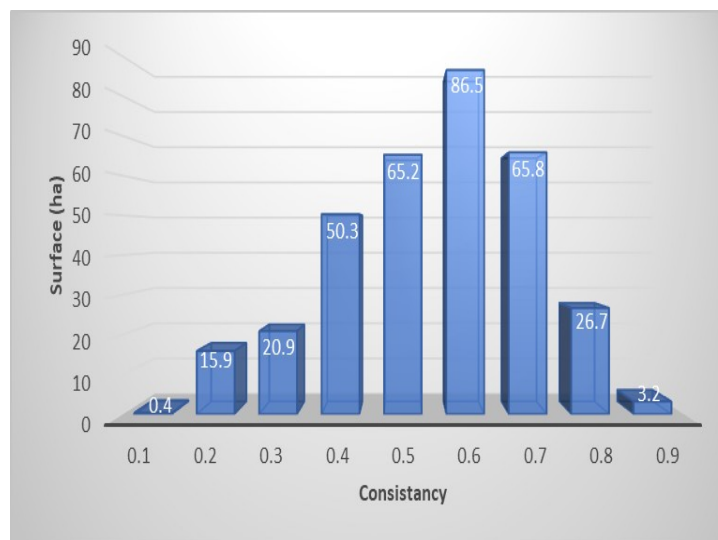


FIG. 10. Consistency of staghorn sumac stand in Dobrogea's Plateau

The distance from forest roads is relatively small in Dobrogea's Plateau, while large distances can be found in stands from Danube's Delta.



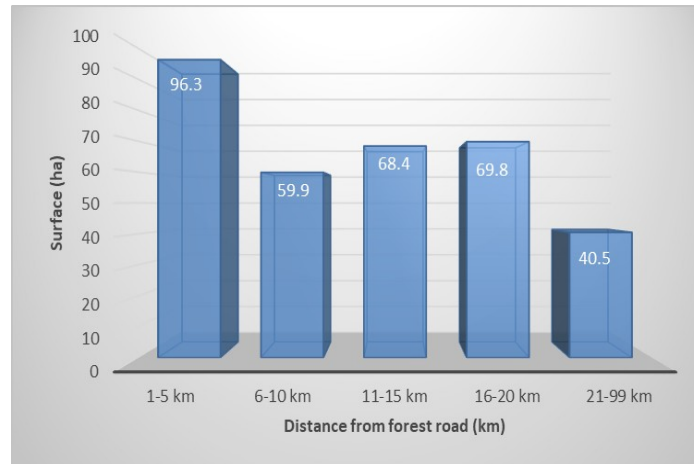


FIG. 11. Distance from forest roads for staghorn sumac stands in Dobrogea's Plateau

## CONCLUSION

The present study has identified 221 stand elements for the staghorn sumac species which covers a total surface of 334,14 ha. The majority of staghorn sumac stands is located at altitudes between 101-150 m and has a relatively young age (between 1 and 45 years). The specific flora type for these stands is represented by *Poa pratensis* and *Carex brizoides-Agrostis alba*. Dobrogean silvosteppe pure soft oak with superficial soil is the most representative forest type (161,3 ha).

Staghorn sumac is a species resistant to drought and pollution, has no special demands from the soil and has an ornamental and industrial value caused by its tannin production.

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