

FLORISTIC CHARACTERISTICS OF *ARBUTUS UNEDO* L. AND *ARBUTUS ANDRACHNE* L. AS MEDICINAL PLANTS

Florističke karakteristike *Arbutus unedo* L. i *Arbutus andrachne* L kao ljekovitih biljaka

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Abstract

Arbutus unedo L. and *Arbutus andrachne* L., belonging to *Ericaceae* family and being evergreen, are two important species having economic values in natural flora of Turkey. These species spread as enclave in the Black Sea Region, while they are found naturally in the Mediterranean and Aegean Region of Turkey. *Arbutus unedo*, whose fruits contain a high amount of sugar (42% - 52%), is widely preferred in the subbranches of the food industry such as jam, marmalade and sweetener, especially in the beverage industry in Europe. *Arbutus andrachne* is a species that has an effect on the circulatory system and besides it has antihemorrhagic and urinal antiseptic properties. In this study, floristic characteristics of *Arbutus unedo* and *A. andrachne*, spreading in places where the Mediterranean climate is predominant in Turkey, being characteristic elements of maquis formation in coastal areas of Black Sea Region, are investigated. Within the scope of the study, sample plots were taken in Bartın, Kastamonu, Sinop, Samsun, Ordu and Trabzon regions. It was determined that the most common native species accompanying these species (only woody plant taxa) are different. These species are frequently spread together with *Castanea sativa* in Bartın, *Quercus* sp. + *Carpinus betulus* in Kastamonu, *Castanea sativa* + *Pinus sylvestris* + *Fagus orientalis* in Sinop, *Pinus brutia* in Samsun, *Quercus* sp. in Ordu and *Quercus* sp. + *Carpinus betulus* in Trabzon. In addition, shrub species such as *Erica arborea*, *Laurus nobilis*, *Ruscus aculeatus*, *Smilax excelsa*, *Rubus* sp. and *Cistus* sp. accompany to these species in all of these sample plots.

Key words: *Arbutus unedo*, *Arbutus andrachne*, floristic characteristics, medicinal and aromatic uses.

INTRODUCTION - Uvod

The genus *Arbutus* from *Ericaceae* family is represented by two species with edible fruits; *Arbutus andrachne* L. and *Arbutus unedo* L. These two species are different from each other with regard to flowering time, inflorescence and bark

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characteristics. *Arbutus andrachne* L. (Strawberry tree) is native to the Mediterranean region and southwestern Asia. The species, having small trees, is generally short than 4 m high; the wood is used for several purposes such as making carved spindles, stools and small furniture (DAVIS, 1978). *Arbutus unedo* L. is similar to the strawberry tree, but they differ in lamina number and panicle positions. The fruits of *A. andrachne* and *A. unedo* are also similar in shape and red fruit skin colors. However, *A. unedo* has larger fruits, with more fruit flesh that is orange. Both species spreads in coastal parts of Anatolia (BAYTOP, 1999). Indeed, natural hybrids of these two species, *A. x andrachnoides*, have also been reported in several locations of Anatolia (DAVIS, 1978). Even though the species are not cultivated, their fruits are harvested from the wild and consumed as fresh fruits. It is used as a landscape plant and as a complement in the cut flower industry, mainly during Christmas time when it bears flowers and fruits (METAXAS et al 2004). The fruits of the species are also processed to prepare jam, fruit jelly, wine, spirits and liqueur (BAYTOP, 1997; AYAZ ET AL., 2000).

Strawberry tree grows in maquis areas of the Mediterranean, Aegean, Marmara and Black Sea coasts in Turkey (YALTIRIK and ERDINC, 2002). *A. unedo* has been extensively found in the central North and North-west of Turkey (DAVIS, 1978). The strawberry tree populations are generally located along the coasts in these two areas. And, this study was carried out in order to identify the dendroflora of the *Arbutus unedo* and *A. andrachne*.

MATERIALS AND METHODS – *Materijal i metode*

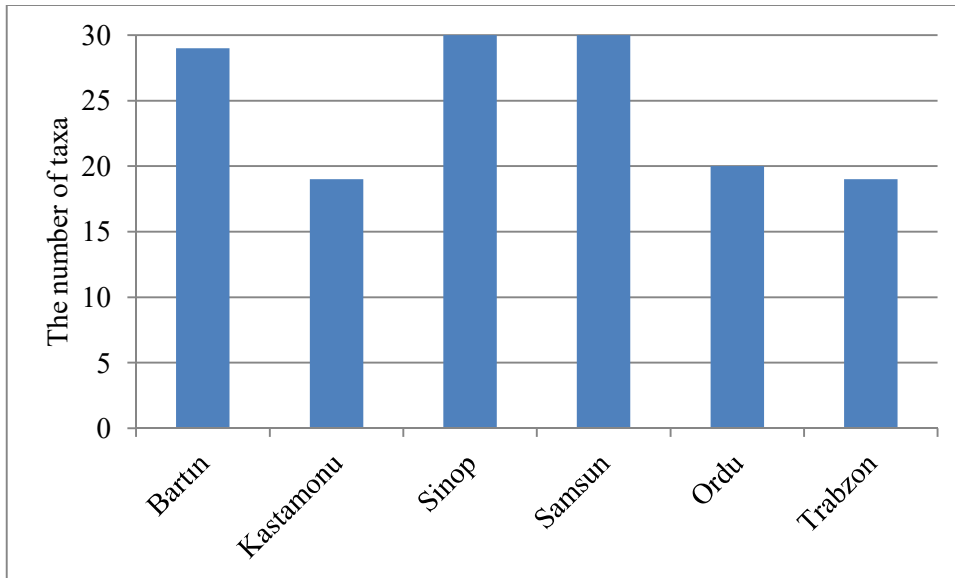
In this study, sample plots were taken in Bartın, Kastamonu, Sinop, Samsun, Ordu and Trabzon regions in northern part of Turkey. The research material consists of woody plant taxa obtained from the areas where *A. unedo* and *A. andrachne* species are distributed. Woody flora elements in the natural distribution areas of *Arbutus* species were determined in the terrestrial investigations and determinations made in six different locations to represent the North Anatolian region. For this purpose, the photographs of collected woody taxa were taken and the samples from plant species being the hard-to- identify during the field works were obtained. “Flora of Turkey and The East Aegean Islands” were used in the identification of the samples (DAVIS, 1965-85; DAVIS et al., 1988; GUNER et al., 2000). The study areas are located in the Euro-Siberian flora region.

RESULTS - *Rezultati*

In the investigations conducted on six different locations (Bartın, Kastamonu, Sinop, Samsun, Ordu and Trabzon) within the natural distribution areas of *Arbutus* species, it was determined that both species (*A. unedo* and *A. andrachne*) generally grow in northern slopes facing the Black Sea, but they can be located in the northwest and west slopes. Although their main distribution area is Mediterranean climate, they are naturally spread in small areas called pseudomaquis in local areas where Black Sea

climate is dominant. Both species are located between 0-500 m elevations as discrete parts. In these areas, the main rock is close to the surface and the soil is shallow and stony. While *A. andrachne* was not located in Ordu, *A. unedo* was distributed in very small groups. In other research areas, *A. unedo* and *A. andrachne* species had a mixed structure.

A total of 47 woody plant taxa were identified in the study areas. The numbers of the taxa in the research areas were determined as 29 taxa in Bartın, 19 taxa in Kastamonu, 30 taxa in Sinop, 30 taxa in Samsun, 20 taxa in Ordu and 19 taxa in Trabzon. A graphical representation of plant taxa in study areas is given in Graph 1.



Graph 1. Distribution of plant taxa to study areas

Grafikon 1. Distribucija vrsta drveća i grmlja u području istraživanja

The distribution of the taxa accompanying *A. unedo* and *A. andrachne* in the research areas is given in Table 1. Looking at the distribution of species, the species accompanying the species *A. unedo* and *A. andrachne* in all locations were as follows; *Carpinus betulus*, *Cornus sanguinea*, *Hedera helix*, *Laurus nobilis*, *Rosa canina*, *Rubus* sp. and *Smilax excelsa*. However, some species were accompanied by these species in a single location. These species were *Ailanthus altissima* (Sinop), *Cerasus avium* (Samsun), *Ficus carica* (Samsun), *Ilex aquifolium* (Bartın), *Pinus nigra* (Kastamonu), *Pinus sylvestris* (Sinop), *Platanus orientalis* (Samsun), *Sorbus aucuparia* (Sinop) and *Vitis sylvestris* (Samsun).

Table 1. Plant taxa according to locations

Tabela 1. Zastupljenost biljnih vrsta po lokalitetima

Location Plant Species	Bartın	Kastamonu	Sinop	Samsun	Ordu	Trabzon
<i>Acer</i> sp.			x	x		
<i>Ailanthus altissima</i>			x			
<i>Carpinus betulus</i>	x	x	x	x	x	x
<i>Carpinus orientalis</i>	x		x		x	x
<i>Castanea sativa</i>	x		x		x	x
<i>Cerasus avium</i>				x		
<i>Cistus</i> sp.	x	x	x			x
<i>Clematis vitalba</i>		x	x	x	x	x
<i>Cornus sanguinea</i>	x	x	x	x	x	x
<i>Cotinus coggygria</i>	x	x				
<i>Crataegus</i> sp.	x		x			
<i>Daphne pontica</i>		x	x	x	x	
<i>Erica arborea</i>			x	x	x	x
<i>Fagus orientalis</i>	x		x	x	x	
<i>Ficus carica</i>				x		
<i>Frangula alnus</i>	x			x	x	x
<i>Hedera helix</i>	x	x	x	x	x	x
<i>Ilex aquifolium</i>	x					
<i>Juniperus</i> sp.	x	x				
<i>Laurus nobilis</i>	x	x	x	x	x	x
<i>Mespilus germanica</i>	x		x			x
<i>Myrtus communis</i>	x			x		
<i>Phillyrea latifolia</i>	x	x		x		
<i>Pinus brutia</i>	x	x	x	x		
<i>Pinus nigra</i>		x				
<i>Pinus sylvestris</i>			x			
<i>Pistacia terebinthus</i>	x	x				
<i>Platanus orientalis</i>				x		
<i>Populus tremula</i>	x		x		x	
<i>Prunus</i> sp.				x		x
<i>Pyracantha coccinea</i>	x		x		x	x
<i>Quercus cerris</i>	x		x	x		
<i>Quercus petraea</i>	x	x	x		x	x
<i>Rhododendron luteum</i>			x	x		
<i>Rhododendron ponticum</i>			x	x	x	x
<i>Rhus coriaria</i>	x	x		x		x
<i>Rosa canina</i>	x	x	x	x	x	x
<i>Rubus</i> sp.	x	x	x	x	x	x
<i>Ruscus aculeatus</i>	x	x		x	x	x
<i>Ruscus colchicus</i>				x	x	x
<i>Smilax excelsa</i>	x	x	x	x	x	x
<i>Sorbus torminalis</i>				x	x	
<i>Sorbus aucuparia</i>			x			
<i>Spartium junceum</i>	x	x	x	x		
<i>Ulmus</i> sp.	x		x			
<i>Vaccinium arctostaphylos</i>	x		x	x	x	x
<i>Vitis sylvestris</i>				x		

When the stand structure of the species in the table is examined, these species were spread as intermediate and understory tree with leafy species dominated by oak in Trabzon and Ordu, but they can be in open areas in some places and their status was degraded forest. In Samsun, these species were located in areas where are dominated by *Pinus brutia* Ten. in completely understory. It was determined that, in general, they grew as intermediate and understory tree with leafy species such as chestnut, oak in Sinop. *A. unedo* and *A. andrachne* were in areas having a mixture of small tree and shrub species outside the forest boundary, and they can be seen as individual tree in located areas of pine (*Pinus brutia* and *P. nigra*) and oak species in overstory in Kastamonu and Bartın.

DISCUSSION AND CONCLUSION – *Diskusija i zaključci*

Arbutus andrachne is an important species in maquis vegetation in the Mediterranean ecosystem. The strawberry tree community is always found in moist areas of the Mediterranean Region and the annual average rainfall is not less than 1000 mm. It grows up to 1000 m, but it can reach up to 1200 m in the Çukurova Basin (ATALAY, 1994). According to the results of the research conducted in the Aegean Region (ÖZEL ET AL., 2006), *A. andrachne* is seen mostly on well-developed soils and generally in north slopes with high humidity. With this study, it was determined that the dominant slopes of the areas where *A. unedo* and *A. andrachne* species spread naturally are north-facing slopes in the Black Sea region. In addition, these species are located in the north-west or western slopes in limited areas due to agricultural activities in this region and natural forest vegetation. The species can find a habitat in the region where the humidity rate is high, areas having the shallow and stony soil structure, and in areas that are not suitable for agricultural purpose use. It is seen between 0-500 m as altitudinal zone with the taxa of Mediterranean plant communities.

Arbutus andrachne is generally seen in maquis vegetation, in Turkey's coastal regions, in pine forests, in arid and rocky places. GEMICI (1992) emphasized that *Quercus coccifera*, *Arbutus andrachne*, *Laurus nobilis*, *Ceratonia siliqua* etc. are the most dominant species in maquis vegetation. In the research areas in the north of Turkey, the species are together with species dominated by pseudomaquis elements in small places. The bush and shrub species such as *Ruscus aculeatus*, *Erica arborea*, *Laurus nobilis*, *Myrtus communis*, *Juniperus* sp., *Phillyrea latifolia*, *Cistus* sp., *Cotinus coggygria*, *Pyracantha coccinea*, *Spartium junceum*, *Pistacia terebinthus* (KANTARCI, 2008; KAYA AND ALADAĞ, 2009), which are included in the Mediterranean flora elements, are also seen on the Black Sea coast.

ATALAY (1987) reported that *Arbutus andrachne* L. is widespread in the maquis vegetation under the *Pinus brutia* forests in moist areas. The vegetation of pseudomaquis mainly consists of mixing of some Mediterranean plants in dispersed or small groups into the community consisting of species of Black Sea origin. This plant

community can reach quite far away and elevations from the sea in places inside the valley (ANŞIN, 1981).

As a result, *A. unedo* and *A. andrachne* have an important place in maquis vegetation in Mediterranean ecosystem and have a natural distribution in pseudomaquis vegetation in Black Sea region. Both *A. unedo* and *A. andrachne* species have leaf variations (BAYRAKTAR ET AL., 2018a; BAYRAKTAR ET AL., 2018b). Further research should be carried out in order to protect of these species in limited areas and maintain the genetic existence of the plant communities. In particular, it can be recommended that *A. unedo* should be cultivated as a herbal plant resource in terms of its fruits and made available to the local people.

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SAŽETAK

Jagodnjak ili obična planika (*Arbutus unedo* L.) i pitoma planika *Arbutus andrachne* L. su zimzelene vrste koje pripadaju porodici *Ericaceae* i ekonomski su veoma važni florni elementi Turske. Ove vrste su prirodno rasprostranjene u mediteranskom i egejskom području Turske ali se mogu naći i u enklavama oko Crnog mora. Plod *Arbutus unedo* ima visok sadržaj šećera i najčešće se koristi u prehrambenoj industriji za dobijanje džema, marmelade i drugih proizvoda a širom Evrope se koristi u industriji pića. Pitoma planika (*Arbutus andrachne* L.) se koristi kao ljekovita biljka za poboljšanje cirkulacije a ima i antihemoragično i antiseptičko svojstvo.

U ovom radu istraživana je floristički sastav šumskih zajednica u kojim se javljaju *Arbutus unedo* i *Arbutus Andrachne* u području koje je pod utjecajem Crnog mora. Eksperimentalne plohe su postavljene na sljedećim lokacijama: Bartin, Kastamonu, Sinop, Samsun, Ordu i Trabzon i reprezentuju područje rasprostranjenja ovih vrsta u sjevernoj Anatoliji. Istraživanja su pokazala da se različite vrste drveća javljaju sa običnom i pitomom planikom na različitim lokalitetima. Tako se obična i pitoma planika u području Bartina najčešće javljaju sa *Castanea sativa*. Sa *Quercus sp.* i *Carpinus betulus* u Kastamonu. U Sinopu se susreću zajedno sa *Castanea sativa*, *Pinus silvestris* i *Fagus orientalis*, sa *Pinus brutia* u Samsunu, *Quercus sp* u Ordu i *Quercus sp* i *Carpinus betulus* u Trabzonu. Pored navedenih vrsta drveća, u zajednicama sa *Arbutus unedo* i *Arbutus andrachne*, na svim lokalitetima gdje su provedena istraživanja, javljaju se i sljedeće vrste grmlja: *Erica arborea*, *Laurus nobilis*, *Ruscus aculeatus*, *Smlax excelsa*, *Rubus sp.* i *Cistus sp.*

Rezultati istraživanja pokazuju da *Arbutus unedo* and *Arbutus andrachne* imaju veoma važno mjesto u vegetaciji makija mediteranskog područja i vegetaciji pseudomakija crnomorskog područja. Buduća istraživanja se trebaju fokusirati na zaštitu ovih vrsta u enklavama i planinskim područjima u funkciji očuvanja njihove genetske konstitucije. *Arbutus unedo* treba kultivisati na većim površinama zbog svojih plodova koji imaju široku primjenu te kako bi bio dostupniji lokalnom stanovništvu.

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