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Determination of Landscapable Plants That Can Be Used For Recreation in Pasture Areas of Şenyurt Village of Tortum District of Erzurum Province

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A R T I C L E I N F O

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A B S T R A C T

Pastures are important natural resources in terms of hosting different plant communities, animal feeding, erosion control and providing many benefits to human beings in different areas, especially in terms of being the gene source of many plants in natural balance. As a result of the developing world and the policies implemented, these resources have reached the point of rapid depletion. In order to preserve, develop and, above all, manage these natural resources and the characteristics of the plant species they contain must be identified. For this purpose, the field studies make it possible to identify the plant species that can be used for recreation. With this project, data of different plant species were collected and determined whether they carry landscape value or not. This study was conducted in 2019. During the project, a field survey was conducted in the designated area and a database was created for the plants with annual, biennial or perennial with landscape value at least once a month for five months (April-August) during the season. In this study, a total 80 different plant species were found and 41 of them could be used in the landscaping and their usage in the landscape planning were determined.

1. Introduction

Pasture areas reach 3.5 billion ha on the earth's surface. Pasture areas in the world correspond to 27% of the world's land and 72% of the total agricultural land (Anonymous 2006). Although pastures are natural resources that provide benefits to humanity in many different areas from feeding livestock to erosion control, they also have the characteristic of being the gene source of many different plants (Çomaklı and Menteşe 1999; Çomaklı 2001; Dumlu 2010). Pastures are not only cost-effective roughage resources, but also a strategic area in terms of recreation, biological wealth, erosion control, protection of wildlife, development and protection of water resources (Gökkuş and Koç 2001).

Planting works constitute an important part of landscape architecture studies. In the article published Dönmez et al., (2016) stated that the environmental demands of the plant material to be used in landscape planning should also be taken into account. Likewise, the natural style landscape design approach, in which the diversity of species, uniform arrangements are minimized, natural

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elements and species are used in high proportions and exotic species and artificial elements are used in minimum amounts, are brought to the fore by many modern landscape designers and planners (Özgüner 2001).

In landscaping studies, it is desirable that the plant material used should be at high quality and should have high adaptability to the ecological conditions of the region in order to make the facility and maintenance costs economical (Korkut et al., 2017). Yazgan et al., (2005) stated that all plants in nature could be used as ornamental plants. With this understanding, many plant species expected to be used as ornamental plants in our country.

With the increasing interest in solving ecological problems and the increasing interest in environmental issues, the importance of the use of natural plant species in landscaping works gradually increases, and the use of natural plants that do not require much care in modern landscape works gains importance (Deniz and Şirin 2005). In design studies, especially in landscaping where the use of water is essential due to vegetative plantation, the current that regulates the design rules that minimizes the use of water was defined as "Xeriscape" (Welsh 2000; Wilson and Feucht 2007).

Yılmaz (2009), in his study on the aesthetic and functional examination of the plant species that grow spontaneously (native) on the slopes on the Erzurum-Uzundere highway, emphasized the need for culture and reproduction of the determined plant species in provinces with similar environmental conditions. As a result, in this study, it was determined as the main target to determine the naturally growing single or perennial plants that are thought to represent Erzurum province due to their different altitude values, which are found in the pasture areas of Şenyurt village and have landscape value.

2. Materials and Methods

Turkey is located between the northern latitudes (northern hemisphere 260 – 450 east longitude 360 – 420). Our country, which is geographically divided into seven regions, Erzurum province, which is our study area, is located in the Eastern Anatolia Region of Turkey. The city of Erzurum in the northeast of the Eastern Anatolia Region is located between 39°54′35″ north latitudes and 41°16′32″ east longitudes. Tortum District and Şenyurt Village, on the other hand, are located in the "Georgian Strait" area with its historical name, which connects Erzurum to Artvin and Rize in the north of the province. The city of Erzurum covers an area of approximately 25 066 km² and the city center is 1959 m above sea level. More than 60% of the urban land consists of meadows and pastures. Although some parts of this natural vegetation have become unproductive with rattleweed (wild liquor ice) communities, there are fertile pastures suitable for pasture livestock in large areas (Figure 1).

The study was conducted in Erzurum province Tortum district Şenyurt village pasture areas, where such a study was not conducted before, at approximately 31,259 da. Depending on the development period of the plants in the area, a pasture scan was carried out during April - August in 2019.

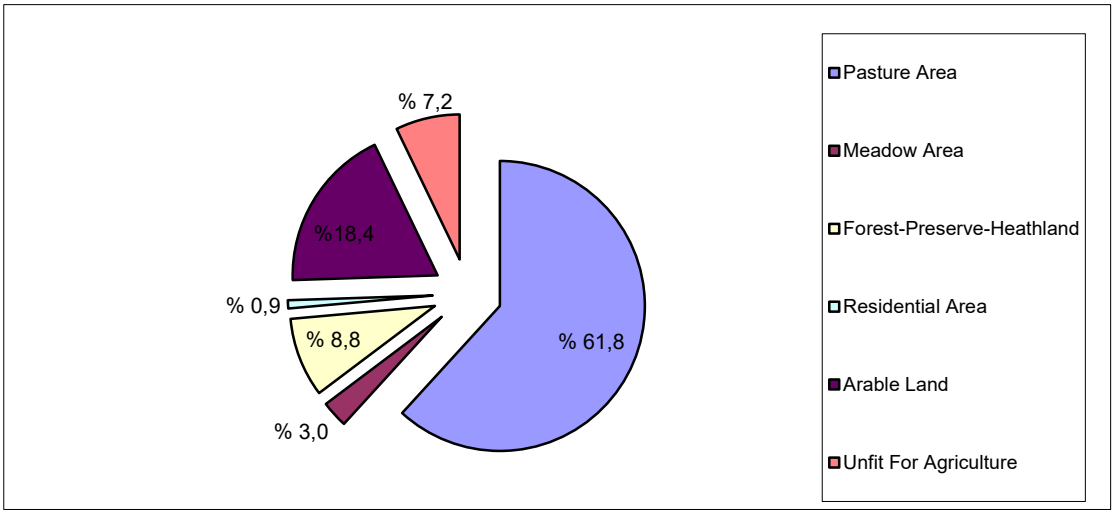

Figure 1. Erzurum Province land distribution.

The research area is located at an altitude ranging from 1250 meters to 2100 meters (Figure 2). In this area, tree formation is formed in places where ecological conditions and vegetation period are suitable, while grass formation has developed densely in places where there is less rainfall and high evaporation with temperature. On the other hand, due to the misuse and excessive use of vegetation over time (cutting, burning, grazing and cultivation) and climate factors, forest areas have been replaced by bush communities and invasive species. Rattleweeds, which have become dominant in this deteriorating structure, are known to be drought-resistant with deep root systems and as the last plants and soil holders of vegetation.

Plants with landscape value that can be used in urban spaces were determined and recorded. In the selection of plants to be used in landscape studies, the criteria should consist some features such as plant form, leaf beauty, flower beauty, fruit beauty (Irmak 2008; Özhatay 2009). The photographs of the plants that may have landscape value were taken and the coordinates of the points they were determined and recorded via GPS. Marking was made on the map with the help of the coordinates taken in the field studies. Information was given on the life span (single-perennial), habitus (vertical-leaning, herbaceous-woody), natural habitat and landscape characteristics of the identified landscape plants (Irmak and Yılmaz 2016a).

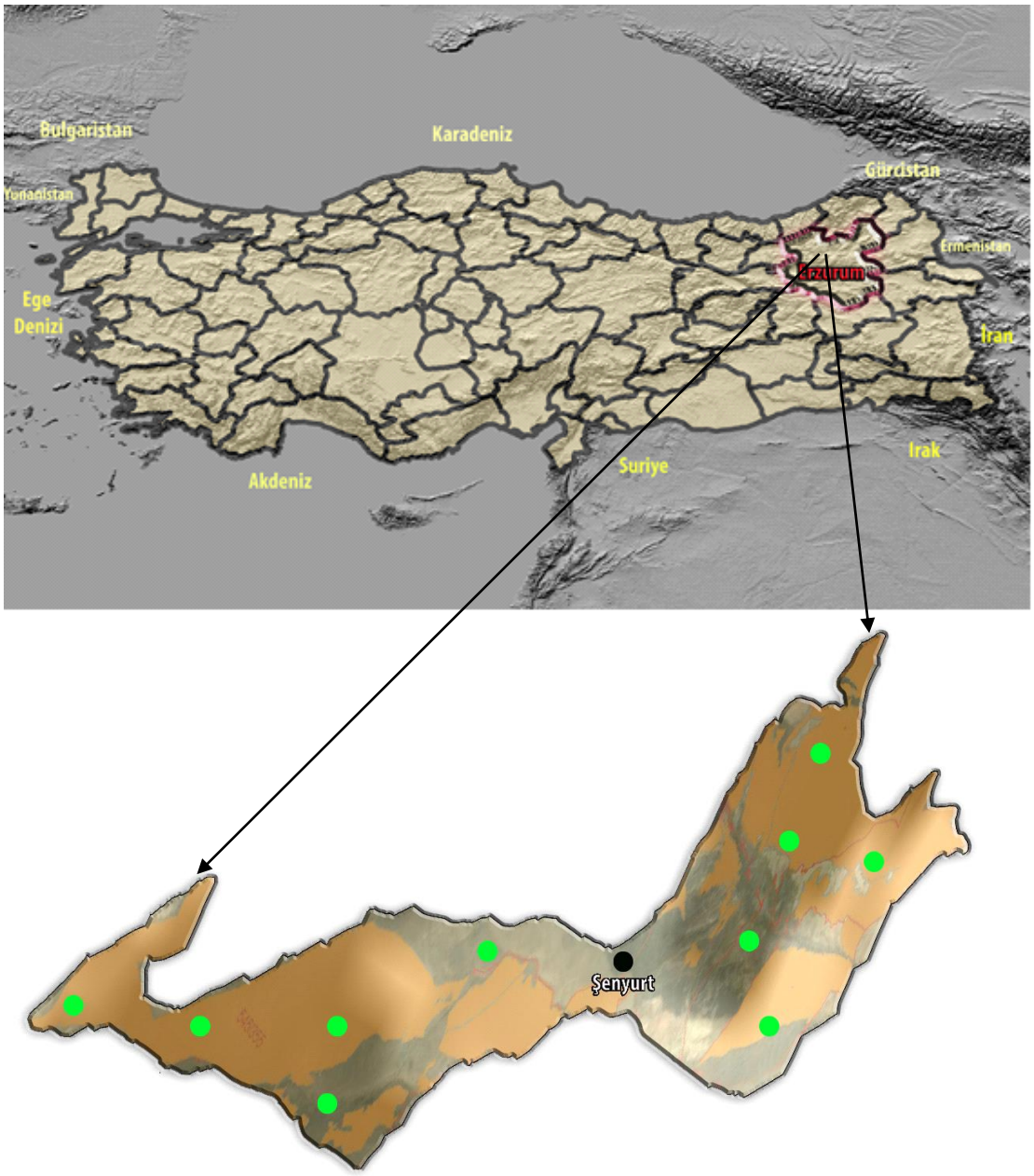

Figure 2. Şenyurt village satellite view and operating points

Study Area

Field work started in April 2019. At least once a month during the year, a field survey was conducted in the area and the necessary information was collected. Village pasture area is 31,259.5 da. and expressed as 18 different parcels in the records of the Provincial Directorate of Agriculture and Forestry (Figure 3). Our field studies have been carried out in this area and plants that can be used in landscaping have been identified in ten (10) different pasture plots of eighteen (18) studied.

The pasture area consists of wide plains and it is surrounded by the mountains (Figure 4). The farmers are using this area to graze their animals.

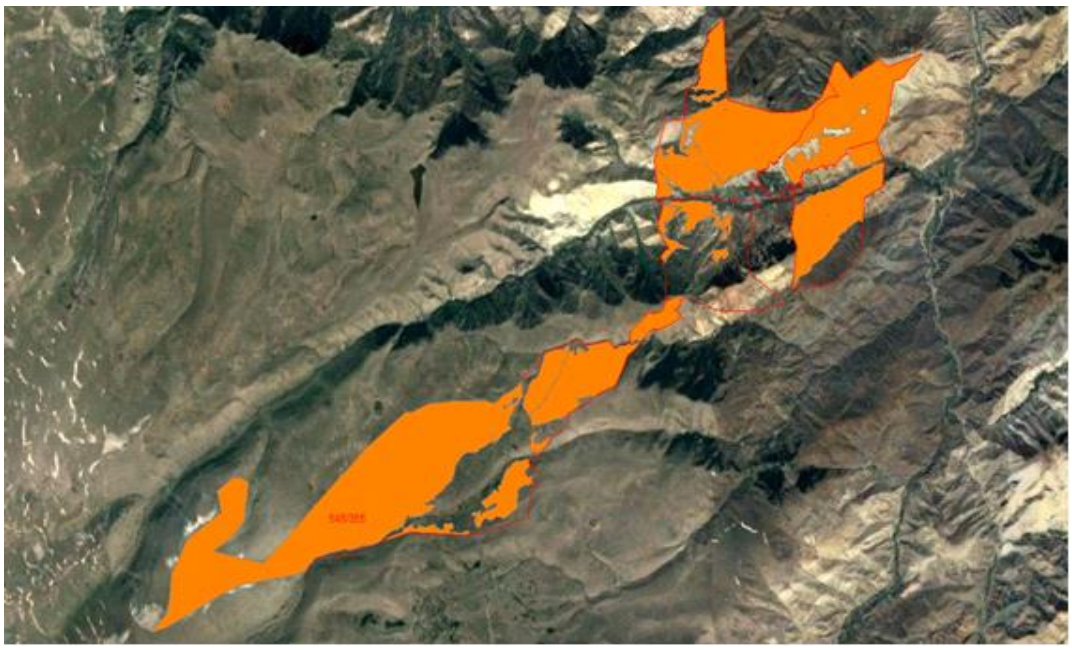

Figure 3. Şenyurt village pasture plots

Figure 4. Wide plains and mountain ranges in the plateau area.

Livestock grazing were identified in the plateau part of the pasture area. Plants considered to have landscape value were found and identified in these areas (Figure 5).

During these studies, dialogue with the farmers was initiated and information was obtained on their daily lives, how they make use of pasture and how they evaluate the plants that are not consumed by animals but have landscape value.

Viola altaica

Hypericum hyssopifolium

Ajuga orientalis

Juniperus communis

Coronilla orientalis

Erigeron caucasicus

Figure 5. Some landscape plants found in field work

3. Results

As a result of the studies, the plants that can be used in landscape planning have been identified (Table 1).

Table 1. Species identified in the study and their families

Sequence No	Plant Species Name	Family Name
1	*Ajuga orientalis*	Lamiaceae
2	*Alcea calverti*	Malvaceae
3	*Alchemilla caucasica*	Rosaceae
4	*Anthemis tinctoria*	Asteraceae (Compositae)
5	*Arabis caucasica*	Brassicaceae (Cruciferae)
6	*Artemisia splendes*	Asteraceae (Compositae)
7	*Astragalus fragrans*	Fabaceae (Leguminosae)
8	*Caltha polypetala*	Ranunculaceae
9	*Campanula strica*	Campanulaceae

10	*Cerastium banaticum*	Caryophyllaceae
11	*Chenopodium foliosum*	Chenopodiaceae
12	*Coronilla orientalis*	Fabaceae (Leguminosae)
13	*Coronilla varia*	Fabaceae (Leguminosae)
14	*Daphne oleides*	Thymeleaceae
15	*Erigeron caucasicus*	Asteraceae (Compositae)
16	*Euphorbia virgata*	Euphorbiaceae
17	*Festuca ovina*	Poaceae
18	*Gagea luteoides*	Liliaceae
19	*Crocus vallicola*	İridaceae
20	*Gentiana flavida*	Gentianaceae
21	*Glaucium leiocarpum*	Papaveraceae
22	*Helichrysum arenarium*	Asteraceae (Compositae)
23	*Hyoschyamus niger*	Solanaceae
24	*Hypericum elongatum*	Clusiaceae (Guttiferae)
25	*Juniperus communis*	Cupressaceae
26	*Malva neglecta*	Malvaceae
27	*Muscari armeniacum*	Liliaceae
28	*Myosotis alpestris*	Boraginaceae
29	*Onobrychis cornuta*	Fabaceae (Leguminosae)
30	*Papaver orientale*	Papaveraceae
31	*Polygala major*	Polygalaceae
32	*Potentilla astracanica*	Rosaceae
33	*Primula veris*	Primulaceae
34	*Rosa canina*	Rosaceae
35	*Scilla siberica*	Liliaceae
36	*Sedum spurium*	Crassulaceae
37	*Stipa pulcherrima*	Poaceae
38	*Thymus praecox*	Lamiaceae (Labiatae)
39	*Tussilago farfara*	Asteraceae (Compositae)
40	*Viola altaica*	Violaceae
41	*Xeranthemum annuum*	Asteraceae (Compositae)

Out of the 80 species 41 species are identified in the field studies belong to 25 different families. 6 species from Asteraceae family, 4 species from Fabaceae family, 3 species from Liliaceae and Rosaceae families were determined (Table 2).

Table 2. Numbers of species in families.

Sequence No	Family Name	Numbers of Species
1	Asteraceae (Compositae)	6
2	Boraginaceae	1
3	Brassicaceae (Cruciferae)	1
4	Campanulaceae	1
5	Caryophyllaceae	1
6	Chenopodiaceae	1
7	Clusiaceae (Guttiferae)	1
8	Crassulaceae	1
9	Cupressaceae	1
10	Euphorbiaceae	1
11	Fabaceae (Leguminosae)	4
12	Gentianaceae	1
13	İridaceae	1
14	Lamiaceae (Labiatae)	2
15	Liliaceae	3
16	Malvaceae	2

17	Papaveraceae	2
18	Poaceae	2
19	Polygalaceae	1
20	Primulaceae	1
21	Ranunculaceae	1
22	Rosaceae	3
23	Solanaceae	1
24	Thymeleaceae	1
25	Violaceae	1

Researchers named Irmak 2008 and Özhatay 2009 have taken into consideration criteria such as leaf beauty, flower beauty, and form beauty in determining the plant species that can be used in the landscape. In this study, the project team scored the plants according to the determined criteria. Landscape values table of the plants that grow naturally in the research area on the basis of species is presented (Table 3).

Table 3. Landscape values of the plants identified over the species.

Plant Name	**Landscape Value**			
	Form Beauty	**Leaf Beauty**	**Fruit Beauty**	**Flower Beauty**
Ajuga orientalis	+	+		+
Alcea calverti	+	+		+
Alchemilla caucasica	+	+		+
Anthemis tinctoria	+			+
Arabis caucasica	+	+		+
Artemisia splendes	+	+		
Astragalus fragrans	+	+		+
Caltha polypetala	+	+		+
Campanula strica	+	+		+
Cerastium banaticum	+	+		+
Chenopodium foliosum	+	+	+	
Coronilla orientalis	+	+		+
Coronilla varia	+	+		+
Daphne oleides	+	+	+	
Erigeron caucasicus	+			+
Euphorbia virgata	+	+		+
Festuca ovina	+	+		
Gagea luteoides	+			+
Crocus vallicola		+		+
Gentiana flavida	+	+		+
Glaucium leiocarpum	+	+	+	+
Helichrysum arenarium	+			+
Hyoschyamus niger	+	+		+
Hypericum elongatum	+			+
Juniperus communis	+	+	+	
Malva neglecta	+	+		
Muscari armeniacum	+	+		+
Myosotis alpestris	+	+		+
Onobrychis cornuta	+	+		+

Papaver orientale	+	+	+	+
Polygala majör	+			+
Potentilla astracanica	+	+		
Primula veriş	+			+
Rosa canina	+		+	+
Scilla siberica	+	+		+
Sedum spurium	+	+		+
Stipa pulcherrima	+	+		+
Thymus praecox	+	+		+
Tussilago farfara	+			+
Viola altaica	+			+
Xeranthemum annuum	+			+

As a result of the investigations carried out in 2019 in the pasture areas of Şenyurt Village of Tortum District, 41 species belonging to 25 different families were identified. The studies were carried out in the form of field scans made in the aforementioned area during April - August during the year as envisaged in the project. During each visit, land scans were made in different pasture sections and plants thought to have landscape value that could be used for recreational purposes were identified.

During the study, the pasture area was scanned two (2) times a month, and these scans were carried out from low altitude (1714 m.) to high altitude (2366 m.) sections. As a result, in ten (10) of the 18 pasture parcels, 41 species from 25 different families were found to have landscape value. The number of species identified in different pasture sections and different altitudes is given in Table 4.

Table 4. The number of species found in different pasture areas.

Pasture Parcel	Altitude (m)	Number of Species (Pieces)
1	1714	3
2	1801	4
3	1826	5
4	1966	3
5	2075	4
6	2128	4
7	2135	5
8	2241	4
9	2360	5
10	2366	4
TOTAL		41

4. Discussion

Many arrangements are made both indoors and outdoors in the world and in our country, and different plant groups are used in these arrangements. However, the development, maintenance and cost of maintenance labor of the plants used in the arrangements are not sufficiently examined. It is quite common to use mostly foreign origin (exotic) plants with limited adaptation and high annual maintenance costs in landscape arrangements (Irmak and Yılmaz 2016). However, instead of these plants, the use of plants that require less maintenance and are suitable for the ecological conditions of the landscaped area in terms of water and soil requirements will reduce both the project cost and post-project maintenance costs.

The biggest deficiency observed in landscape planning and vegetative plantation studies in urban and rural areas is that the natural vegetation potential is not used sufficiently in the selection of herbaceous and woody plant species (Irmak 2016). With this project, it was aimed to identify naturally grown plant species that can be used in our city and other regions with similar ecological conditions, with relatively low maintenance costs.

According to the results of the research, *Juniperus communis*, *Rosa canina*, *Daphne oleides*, *Onobrychis cornuta* and *Thymus praecox* species in bush form can easily be used for area limitation in landscaping. Again, with these plants, attractive plant curtains can be created. It is possible to create visual effects in herbal application, especially with *Juniperus communis*, which preserves its green appearance in all seasons. Zencirkıran M. (2009) stated in his study of determination of native woody landscape plants in Bursa and Uludağ, that these plants can be used in landscape applications.

Arabis caucasica, Cerastium banaticum, Astragalus fragans, Chenopodium foliosum, Coronilla orientalis, Coronilla varia, Festuca ovina and *Stipa pulcherrima* can be considered as ground cover and soil protector in sloping areas. Among these plants, *Festuca ovina* type, which is relatively resistant to frequent cutting and chewing, can be used in grass mixtures.

In landscape planning, *Crocus vallicola, Gagea luteoides, Muscari armeniacum, Scilla siberica* species can take place in geophyte gardens. On the other hand, *Alchemilla caucasica, Potentilla astracanica, Artemisia splendes, Sedum spurium, Malva neglecta* species can be used both as ground cover plants and in rock gardens. Some work has been carried out by researchers from various regions of Turkey. Especially Tutu et al., (2019), Dönmez et al., (2016), Ekici (2010), Deniz and Uğur (2005), and Eroğlu (2015) found similar results in their studies.

As a result; In the coming years, it will be appropriate to research the possibilities of the plants identified within the scope of this study to be taken into culture and to investigate their usage areas in landscape planning.

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