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Morphological And Distribution Area Characteristics Of Orchis L. Taxa Naturally Distributed In Isparta Region

Ebru Hatice TIĞLI KAYTANLIOĞLU[1*], Hüseyin FAKİR[2]

[1] Isparta University of Applied Sciences,
Faculty of Forestry, Department of Forestry Engineering
Isparta, Türkiye

[2] Isparta University of Applied Sciences,
Faculty of Forestry, Department of Forestry Engineering
Isparta, Türkiye

*Corresponding author: Ebru Hatice TIĞLI KAYTANLIOĞLU; huseyinfakir@isparta.edu.tr

Absract – In the field studies carried out between 2019-2022 in the Isparta region, Orchis anatolica, O. spitzelii, O. mascula subsp pinetorum, O. purpurea subsp purpurea, O. simia and O. pallens taxa were identified. In the study, 132 sample areas were visited and var data of orchid species were recorded in 68 sample areas. O. anatolica 30, O. spitzelii 8, O. mascula subsp pinetorum 22, O. purpurea subsp purpurea 4, O. simia and O. pallens were identified in 2 sample areas. Plant height, number of flowers, tuber number, tuber width, tuber length and tuber weight characteristics of these taxa were determined. The highest plant heights were determined as O. mascula subsp pinetorum (70 cm) and O. spitzelii (60 cm), the highest number of flowers as O. mascula subsp pinetorum (68 pieces) and O. purpurea subsp purpurea (68 pieces), the highest tuber weight as O. purpurea subsp purpurea (17.82 g), the lowest tuber weight as O. mascula subsp pinetorum (0.12 g), the highest tuber width as O. purpurea subsp purpurea (31.12 cm), the lowest tuber width as O. anatolica (0.24 cm), the highest tuber length as O. purpurea subsp purpurea (49.12 cm), and the lowest tuber length as O. anatolica (1.18 cm). Variance and correlation analyses were carried out in order to evaluate the obtained data. Information on the distribution areas of these taxa (slope, altitude, closure, stony, dominant species, etc.) has been determined. In addition, plant illustrations have been made to correctly identify the Orchis sp taxa collected in the field and to provide a source for scientific studies to be conducted later.

Keywords – Orchis, morphology, distribution area characteristics, plant illustration, Isparta.

I. INTRODUCTION

Turkey has an important place in the world in terms of plant diversity due to its location at the intersection of three phytogeographic regions (Europe-Siberian, Mediterranean and Iran-Turan). There are approximately 12,000 plant taxa in our country and, 3649 of them are endemic plants (Güner et al., 2012). Plant species diversity is increasing day by day in our country (Torlak et al., 2010; Güner et al., 2012). In terms of plant diversity, Turkey has the same amount of plant species spread throughout the European continent (Erik and Tarıkahya, 2004). Turkey's geographical factors, being surrounded by seas on three sides, have increased this diversity and have ensured a gradual increase in plant species diversity with increasing elevation from the north and south coasts to the inside. This situation is similar in the Taurus Mountains, located behind the Mediterranean coast in the south (Avcı, 2005). The geological structure of the Mediterranean region and karst shapes have formed many climate zones. Therefore, the Mediterranean region is rich in terms of species diversity and endemic species (Avcı, 2005; Fakir, 2007; Özkan and Gülsoy, 2010).

Geophyte plants have an important place in our country's plant species diversity. Although geophyte plants are distributed in a large part of the world, the majority of them originate from the Mediterranean Basin (Kısa, 2009; Avcu, 2011). Compared to neighboring countries, Turkey is quite rich in terms of geophytes. There are around 100 seedless geophytes, 1000-1200 dicots, 200-250 non-petaloid monocots and 1000 petaloid

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Vol. 48 No. 1 December 2024, pp. 83-96

monocots in our country (Demir and Eker, 2015). The endemism rate of geophyte plant taxa in the flora of Turkey is around 35% (Ekim et al., 1991; Sargın et al., 2013).

The Orchidaceae family has a special place among these rich geophyte plants and grows widely in the provinces of Muğla, Milas, Isparta, Antalya, Kahramanmaraş, Van and Kastamonu in our country (Baytop, 1999). It has been reported that a total of 204 orchid species belonging to 24 genera grow in our country (Arabacı et al., 2017). The *Orchis* L. genus, a genus of the Ochidaceae family, is thought to have over 60 species based on floral and vegetative morphology. However, as a result of molecular phylogenetics, karyology, micromorphology and reproductive biology, it has been determined that some species were removed and shifted to different genera (Bateman et al., 1997; Pridgeon et al., 1997; Aceto et al., 1999; Bateman et al., 2003). According to recent studies, the Orchis genus has been reported to have 50 taxa (Güler, 2012).

Orchis taxa are seen to be distributed in temperate zones and sub-tropical zones. The genus *Orchis* is distributed in Europe, the Middle East and Central Asia, the coasts of North Africa, and the southern coasts of Africa and America (Dressler, 1993). In our country, it is seen in large numbers in the entire Black Sea region, on the coasts of the Aegean, Marmara and Mediterranean, and in the areas where the Hakkari and Tigris sections meet in the Southeast. *Orchises* prefer different ecological conditions and habitats. Traditionally, the tubers of *Orchis* taxa are used as a constipation and bloating reliever, digestive system regulator, sexual potency enhancer, mental enhancer, cough and bronchitis preventer, and chest and hemorrhoid diseases treatr (Sezik, 2002). Studies on orchid chemicals have shown that the main compounds are carbohydrates, alkaloids, flavonoids, glycosides, bibenzyl derivatives, alkaloids and terpenoids (Bulpitt et al., 2007; Jalal et al., 2008). Pharmacologically, orchids have diuretic, anti-inflammatory, anti-cancer, hypoglycemic, anti-rheumatic and neuroprotective effects (Gutiérrez, 2010). Orchids used for industrial food, perfume and medical purposes in our country are in danger. Salep tubers are obtained from 85% of orchid species (Yaman, 2012). Salep plant is generally consumed as ice cream or hot drink. Saleps, which have economic value, are destroyed in two ways; due to severe uprooting and uprooting during the flowering stage, it prevents its survival. Germination of seeds in nature is difficult and requires time. In order for the seeds of salep to germinate, in addition to factors such as heat, oxygen, light, humidity, and temperature, they also need to establish a relationship with mycorrhizal fungi (Hudson, 1993). The orchids from which salep is obtained produce a baby tuber every year. Therefore, low production and unconscious uprooting endanger the salep species (Gönülsen et al., 1996).

In this study, the morphological and distribution area characteristics of *Orchis* L. taxa naturally distributed in the Isparta Region were determined. In addition, plant illustrations were made to correctly identify the Isparta Region Orchis spp taxa and to provide a source for subsequent scientific studies.

II. METHOD

The study material consists of samples collected from Isparta province between 2019-2022 (Figure 1). Orchis collected and identified from Isparta province are; (Orchis spp.) *Orchis anatolica, Orchis mascula* susbp *pinetorum, Orchis purpurea* subsp *purpurea, Orchis simia, Orchis spitzelii, Orchis pallens*.

Method of field studies

The studies conducted in the study area were examined, interviews were conducted with the local people and preliminary survey work was started. Field trips were made and a work plan was put forward. First of all, a plan was created to conduct field studies in the places where the distribution area was determined (Figure 1). The research material consists of the general Isparta region. The collected orchids were recorded in the inventory cards created in the field. After the collected plant samples were turned into herbarium samples, their identifications were made at the Forestry Faculty of Isparta University of Applied Sciences. Samples of external morphological characteristics were collected in 5 repetitions.

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Vol. 48 No. 1 December 2024, pp. 83-96

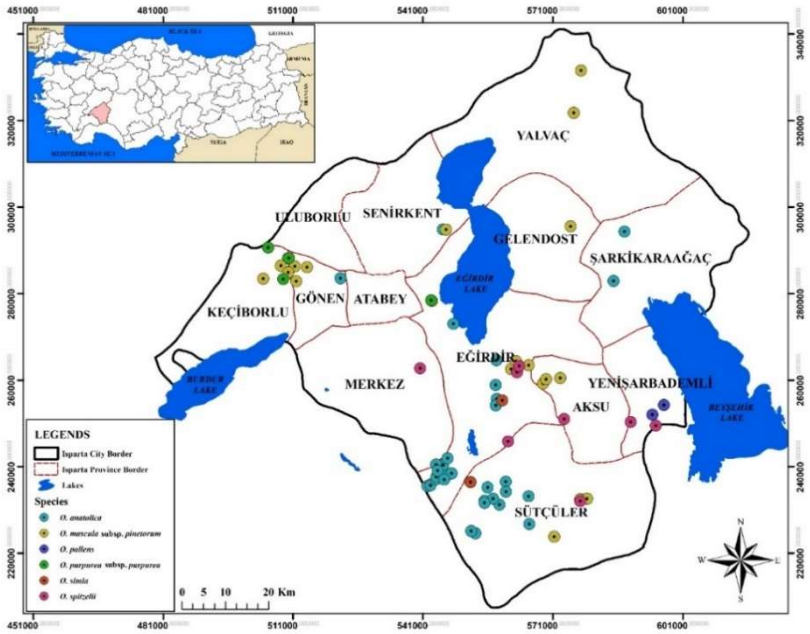

Figure 1. Map showing the distribution areas of Orchis spp taxa

Morphological measurements and methods of statistical data

For morphological measurements were tuber weight, tuber width, tuber length, tuber weight, number of flowers and plant height of each species and sample area recorded of the taxa. As a result of the measurements made in the laboratory, variance and correlation analyses were performed for the data analysis. One-way analysis of variance was performed to compare the origins in terms of the characters measured for each experimental area and to reveal the homogeneous groups among the origins with Tukey test. In order to determine the relationship between the studied characters, correlation analysis was performed (Özdamar, 1999).

Tuber width and length were measured with a digital diameter meter to measure botanical characteristics and digital scales were used to determine tuber weights. A ruler was used to measure plant height and the number of flowers and tubers were counted (Figure 2).

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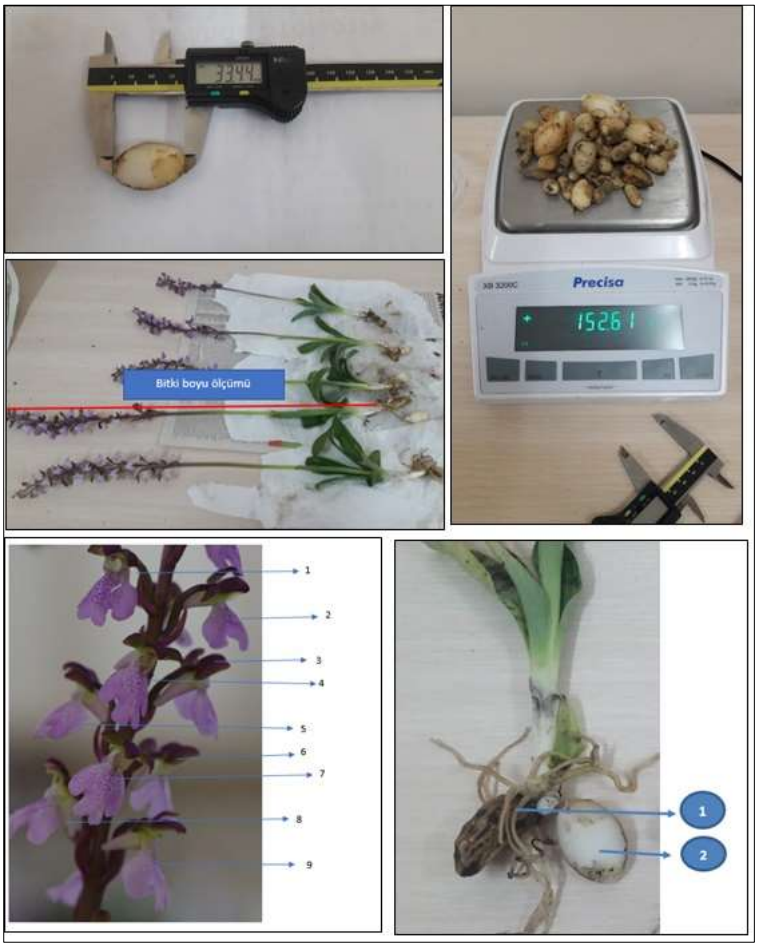

Figure 2. Morphological measurements (tuber width, plant height, tuber weights, flower number, tuber number)

Method of illustration studies

Plant illustration is of great importance in the branch of botany, as it is a source for the correct identification of plants and subsequent scientific studies. The aim of plant illustration is to study live, dried or frozen examples of endangered species through illustration. In the study, 3H-2B pencil, 0.2-0.3 fine-tipped pencil, non-marking soft eraser, double-tipped compass, caliper, ruler, sketchbook, tracing paper sketch, technical drawing paper, soft-surface watercolor paper, watercolor set, and high-quality sable brushes were used for plant illustration.

Live plants were first drawn with important points to be considered (branch and leaf connections, arrangement on the branch, flower structure, leaf stem and leaf length) quickly transferred to the sketchbook and then toned with soft-hard, thick-thin tipped pencils and a staining technique and given three-dimensionality. After this stage, the painting process started with light tones and then the color tones were applied in layers to the required areas and the color was processed (Figure 3).

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https://ijpsat.org/
Vol. 48 No. 1 December 2024, pp. 83-96

Figure 3. Stages of transferring plant drawing to illustration

III. RESULTS

Results regarding the distribution area characteristics

As a result of the field study, 132 sample areas were determined and var data of orchid species were recorded in 68 sample areas. *O. anatolica* (Anatolian Orchid) was determined in 30 sample areas, *O. spitzelii* (Mountain Salebi) in 8 sample areas, *O. mascula* subsp *pinetorum* (Pine Salebi) in 22 sample areas, *O. purpurea* subsp *purpurea* (Hasancık) in 4 sample areas, *O. simia* (Salep Tassel) in 2 sample areas, *O. pallens* L. (Solgun Salep) in 2 sample areas. Some distribution area characteristics of the determined orchid species are given in Table 3.

Table 3. Some distribution area characteristics of the identified orchid species

	Orchis anatolica		***Orchis mascula* subsp. *pinetorum***		***Orchis purpurea* subsp. *purpurea***		***Orchis spitzelii***		***Orchis simia***		***Orchis pallens***	
	Min.	Mak.	Min.	Mak.	Min.	Mak.	Min.	Mak.	Min.	Mak.	Min.	Mak.
Slope (%)	2	50	2	58	2	10	10	60	10	50	15	20
Dominant species lower branch height (m)	1	25	0,50	30	1	5	1	20	5	6	3	3
Dominant species shrub height (m)	1	6	0,50	3	-	-	-	-	-	-	-	-
Altitude	325	1320	1012	1930	1025	1426	1122	1743	929	1080	1215	1357
Tree cover rate (%)	5	80	5	80	5	60	60	100	50	80	55	60
Shrub cover rate (%)	10	90	10	80	10	50	30	40	20	40	10	20
Stone presence rate in sample area (%)	3	70	10	50	10	30	10	50	10	50	10	30
Rock presence rate in sample area (%)	5	50	10	20	5	20	5	30	5	40	5	10
Soil presence rate in sample area (%)	10	85	10	90	65	90	30	90	10	85	50	60
Dominant species average diameter (cm)	2	75	12	43	13	43	22	57	37	43	35	45
Closure (%)	10	95	10	85	10	50	50	90	40	50	40	50

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Orchis anatolica distribution was determined in 30 sample areas within the borders of Isparta Province (Figure 3). 18 sample areas were determined from Eğirdir District, 11 sample areas from Sütçüler District, and 1 sample area from Gönen District. *O. anatolica* was seen in the North and South aspects. Distribution was determined under each age (Age a: youth and culture age; b: density age; c: pole-pole and wooded age, d: rejuvenation age, e: thick wooded). In the sample areas, *Pinus brutia* Ten., *Quercus coccifera* L., *Arbutus andrachne* L., *Pinus nigra*, *Rosa canina* L., *Phillyrea latifolia* L, *Fontanesia phillyreoides* Labill., *Berberis vulgaris* L., *Euphorbia arvalis* subsp. *arvalis* Boiss. & Heldr., *Juniperus communis* L., *Sorbus umbellata* Fritsch. were observed, while the dominant species was *Quercus coccifera*.

Orchis spitzelii distribution was determined in 8 sample areas (Figure 3). 3 sample areas were determined from Eğirdir District, 1 sample area from Sütçüler District, 2 sample areas from Yenişarbademli District, 1 sample area from Aksu District, 1 sample area from Davraz Mountain. *O. spitzelii* was seen in North and South aspects. Areas where it was found were determined from c: pole-pole and wooded age, d: rejuvenation age, e: thick wooded areas. *P. brutia*, *P. nigra*, *R. canina*, *P. latifolia* were identified in the sample areas. The dominant species of these areas was *P. brutia*.

The distribution of *Orchis mascula subsp pinetorum* was determined in 22 sample areas (Figure 3). 5 sample areas were identified in Eğirdir district, 3 sample areas in Sütçüler district, 2 sample areas in Yenişarbademli, 3 sample areas in Aksu, 6 sample areas in Gönen, 1 sample area in Keçiborlu, 1 sample area in Gelendost, and 1 sample area in Yalvaç. *Orchis mascula subsp pinetorum* was seen in north and south aspects. Areas where it was found were identified from c: pole-pole and wooded age, d: rejuvenation age, e: thick wooded areas areas. There were *P. brutia*, *P. nigra*, *Juniperus communis* L., *J. excelsa* M.Bieb., *Q. cerris* L., *Berberis vulgaris* L., *Cistus laurifolius* L., *C. creticus* L. in the sample areas. The dominant species was *P. brutia* of *O. mascula* subsp. *pinetorum*.

Figure 3. View from the distribution areas of *Orchis anatolica, Orchis spitzelii, Orchis mascula* subsp. *pinetorum*

Orchis purpurea subsp *purpurea* distribution was detected in 4 sample areas (Figure 4). 3 sample areas were detected from Keçiborlu District, 1 sample area was detected from Eğirdir District. *O. purpurea* subsp *purpurea* was seen in North and South aspects. Areas where it is found were detected from c: pole-pole and wooded age areas. *Q. coccifera*, *P. brutia* were found in the sample areas. The dominant species was *Q. coccifera*.

Orchis simia distribution was detected in 2 sample areas (Figure 4). 1 sample area was detected from Sütçüler District, 1 sample area was detected from Eğirdir District. *O. simia* was seen in southern aspects. Areas where it was found were detected from d: rejuvenation period, e: thick wooded areas. *Q. coccifera*, *P. brutia*, *Q. cerris*, *J. communis* were found in the sample areas. The dominant species was *Q. coccifera* of *O. simia*.

Orchis pallens distribution was detected in 2 sample areas (Figure 4). It was detected in Yenişarbademli and Aksu districts. *O. pallens* was seen in northern exposures. The area where it is found was detected as e: thick woodland. *Abies cilicica* (Antoine & Kotschy) Carrière, *Cedrus libani* A.Rich., *Muscari caucasicum* (Griseb.) Baker, while the dominant species *was Abies cilicica.*

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Vol. 48 No. 1 December 2024, pp. 83-96

Figure 4. View from the distribution areas of *Orchis purpurea* subsp *purpurea, Orchis simia, Orchis pallens*

Morphological characteristics

The morphological characteristics changed for the characteristics. They were the highest in *O. mascula* subp. *pinetorum* (70 cm) for plant height, *O. mascula* subp. *pinetorum* (68 pieces) and *O. purpurea* subsp. *purpurea* (68 pieces) for number of flowers, *O. purpurea* subsp. *purpurea* (17.82 g) for tuber weight, *O. purpurea* subsp. *purpurea* for tuber width (31.12 mm), and *O. purpurea* subsp. *purpurea* for tuber length (49.12 mm), while they were the lowest in *O. anatolica* (8 cm) for plant height, *O. anatolica* (3 pieces) for number of flowers, *O. mascula* subsp. *pinetorum* (0.12 g) for tuber weight, *O. anatolica* for tuber width (0.24 mm), and *O. anatolica* for tuber length (1.18 mm) (Table 4). However, there were large differences among species and within species for the characteristics. For example, average of plant height was 24.08 cm varied between 8 cm and 42 cm in O. *anatolica* (Table 4). It was 41.6 cm ranged from 38 cm to 46 cm in *O. pallens* as seen from Table 4. Results analysis of variance showed also significant ($p<0.05$) differences among taxa for the characteristics. The taxa were much homogenous for number of flowers and tuber size than other characteristics according to results of Tukey's test (Table 2).

Table 2. Morphology of the species

Example type	PH		NF		TWE		TWI		TS	
	Ranges	Mean	Ranges	Mean	Ranges	Mean	Ranges	Mean	Ranges	Mean
O. anatolica	8-42	24.05^{c}	3-18	8.18^{a}	0.32-8.35	1.85^{d}	0.24-2.45	1.17^{c}	1.18-3.34	1.71^{b}
O. mascula* subsp.*pinetorum	17-70	33.71^{b}	8-68	22.25^{b}	0.12-15.46	3.10^{cd}	0.61-2.17	1.19^{c}	0.97-4.38	2.52^{b}
O. purpurea* subsp.*purpurea	38-51	43.00^{a}	24-68	42.85^{a}	3.13-17.82	10.49^{a}	1.40-3.11	2.29^{a}	2.51-4.91	3.68^{a}
O. simia	18-22	41.60^{c}	16-20	17.5^{b}	4.53-8.17	5.44^{b}	1.21-2.16	1.67^{b}	2.54-3.41	3.00^{a}
O.spitzelii	20-60	35.38^{ab}	7-33	18.65^{b}	0.8-6.04	2.61^{b}	0.61-1.79	1.17^{c}	0.98-3.80	2.17^{b}
O.pallens	38-46	41.60^{ab}	32-57	42.60^{a}	3.10-15.12	7.94^{a}	1.95-2.41	2.14^{a}	2.51-4.57	3.47^{a}

PH: *Planet height (cm)* ***NF:*** *Number of flowers* ***TWE:*** *Tuber weight (grams)* ***TWI:*** *Tuber width (cm)* ***TS:*** *Tuber size (cm)*

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https://ijpsat.org/
Vol. 48 No. 1 December 2024, pp. 83-96

There were mostly positive and significant ($p \leq 0.05$) relations among the characteristics according to the results of the correlation analysis (Table 3). The results could be used for cultivation pactices of *Orchis*.

Table 3. Correlation analysis results for morphological characters

Characteristics	***O. anatolica***				***O. mascula* subsp. *pinetorum***				***O. purpurea* subsp. *purpurea***			
	NF	TWE	TWI	TS	NF	TWE	TWI	TS	NF	TWE	TWI	TS
PH	.55**	.34**	.61**	.56**	.76**	.54**	.63**	.60**	.60**	.52*	.75**	.44ns
NF	-	42**	.54**	.51**	-	.53**	.53**	.52**	-	.20 ns	.51*	.05ns
TWE		-	.79**	.64**		-	.73**	.73**		-	.72**	.86**
TWI			-	.69**			-	.66**			-	.58**
Characteristics	***O. simia***				***O. spitzelii***				***O. pallens***			
	NF	TWE	TWI	TS	NF	TWE	TWI	TS	NF	TWE	TWI	TS
PH	.79**	.61*	.71*	-.15ns	.72**	.55**	.63**	.69**	-.39ns	.11 ns	.61*	.32ns
NF	-	.83**	.81**	.18ns	-	.65**	.62**	.72**	-	-.60*	-.11 s	-.73*
TWE		-	.91**	.09ns		-	.75**	.80**		-	-.22ns	.97**
TWI			-	0.11ns			-	.75**			-	-.12ns

*Correlation significant at p≤0.05**Correlation significant at p≤0.01, ns correlation not significant p>0.05.* ***PH:*** *Plant height,* ***NF:*** *Number of flowers*

Results related to illustration drawings

Plant illustrations were made for the correct identification of species naturally distributed in the Isparta Region, such as *O. anatolica, O. mascula* subsp *pinetorum* (Figure 5), *O. simia, O. pallens, O. purpurea* subsp *purpurea*, *O. spitzelii*, and to serve as a source for scientific studies later on (Figure 6).

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Vol. 48 No. 1 December 2024, pp. 83-96

Figure 5. Illustrations of *O. anatolica, O. mascula* subsp *pinetorum*

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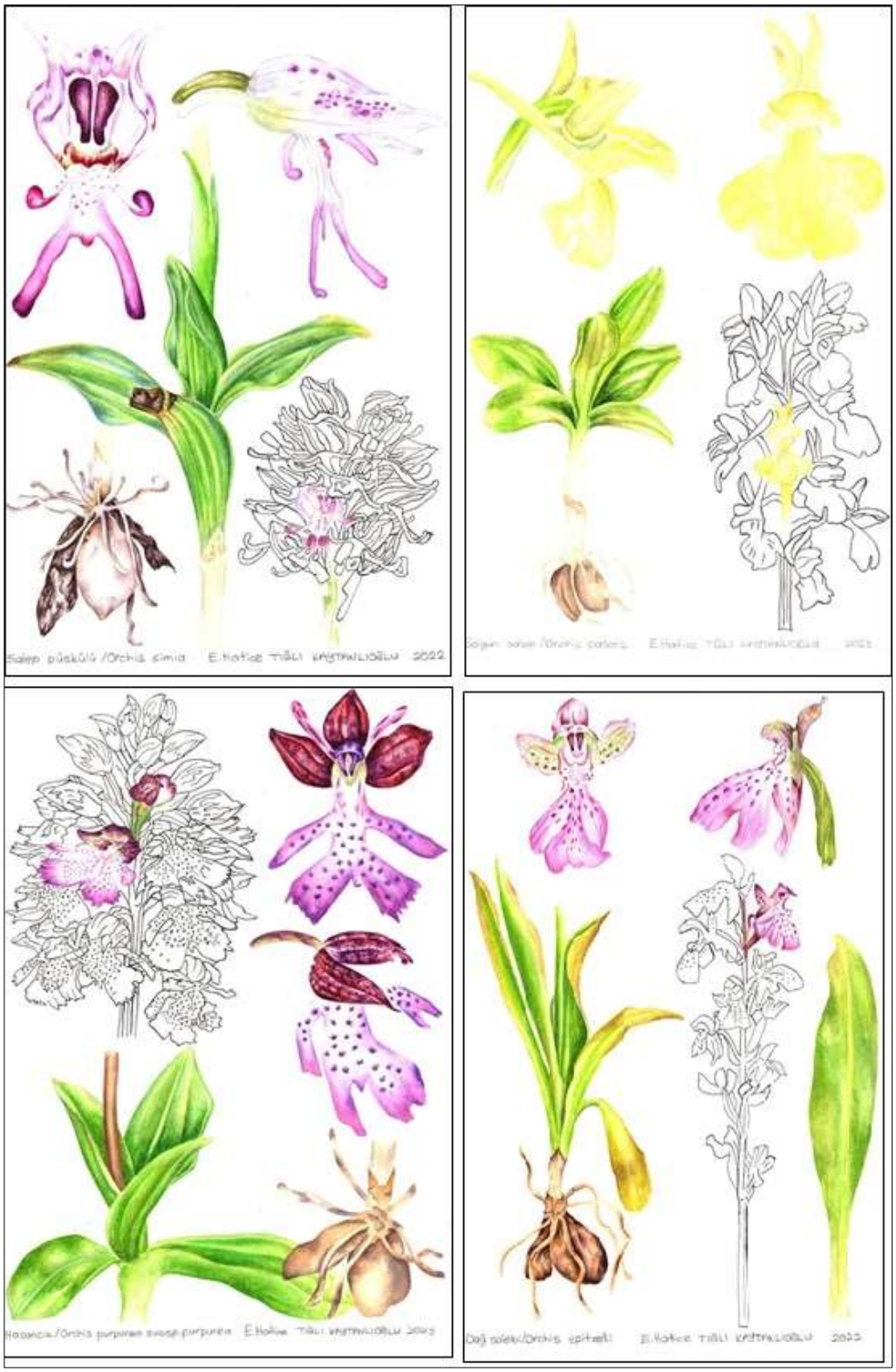

Figure 6. Illustrations of *O. simia, O. pallens, O. purpurea* subsp *purpurea, O. spitzelii*

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Vol. 48 No. 1 December 2024, pp. 83-96

IV. DISCUSSION AND CONCLUSION

Some ecological characteristics of the identified orchid species are as follows; It was determined that *O. anatolica* spreads between 2-50% slope, 325 m-1320 m altitude, 10-95% closure, *O. pallens* spreads between 20% slope, 1357 m altitude, 50% closure, *O. spitzelii* spreads between 10-60% slope, 1122 m-1743 m altitude, 50-90% closure, *O. purpurea* spreads between 2-10% slope, 1025 m-1426 m altitude, 10-50% closure, *O. simia* spreads between 1-50% slope, 929 m-1080 m altitude, 40-50% closure, *O. mascula* subsp *pinetorum* spreads between 2-58% slope, 1012 m-1930 m altitude, 10-85% closure.

It has been determined that *O. anatolica* is effective in very steep areas larger than 45%. In their study, Altundağ et al. (2012) reported that the distribution areas of *Orchis anatolica* reached up to 1700 m, Tığlı and Fakir (2017) reported that it reached 1860 m, Kayıkçı and Oğur (2012) reported that it reached 1600 m, and this is consistent with the study.

When the determined orchid species were examined in terms of some morphological characteristics, according to the results of the variance analysis, it was concluded that the difference between plant height, flower number, tuber weight, tuber width and tuber length was statistically significant. In terms of plant height, the highest plant height was determined as *O. mascula* subp *pinetorum* (70 cm) and *O. spitzelii* (60 cm), while the lowest plant height was determined as *O. anatolica* (8 cm), *O. mascula* subp *pinetorum* (17 cm), the lowest average plant height was determined as *O. simia* (19.9 cm) and the highest average plant height was determined as *O. purpurea* subsp *purpurea* (43 cm).

In terms of flower numbers, the ones with the highest number of flowers were *O. mascula* subp *pinetorum* (68) and *O. purpurea* subsp *purpurea* (68), while the ones with the lowest number of flowers were *O. spitzelii* (7), *O. anatolica* (3), and in terms of tuber weight, the ones with the highest tuber weight were *O. purpurea* subsp *purpurea* (17.82 gr) and the ones with the lowest tuber weight were O. *mascula* subp *pinetorum* (0.12 gr), in terms of tuber width, the tuber with the longest tuber was *O. purpurea* subsp *purpurea* (31.12 cm), while the tuber with the shortest tuber was *O. anatolica* (0.24 cm). In terms of tuber length, the tuber with the longest tuber was *O. purpurea* subsp *purpurea* (49.12 cm), while the tuber with the shortest tuber was *O. anatolica* (1.18 cm). Although *O. mascula* subp *pinetorum*, *O. purpurea* subsp *purpurea*, *O. anatolica, O. simia, O. pallens*, *O. spitzelii* showed differences in terms of tuber width, tuber length and tuber weight, the number of tubers was determined as 2 in all species.

A positive relationship was found at the significance level of $p \leq 0.05$ in terms of correlation analysis results regarding morphological characters of *Orchis anatolica, Orchis mascula* susbp *pinetorum, Orchis purpurea* subsp *purpurea*, *Orchis simia, Orchis spitzelii, Orchis pallens*.

O.anatolica plant height, height, min 8.00 cm, max 42.00 cm, arithmetic flower number min 3, max 18, tuber weight min 0.32 gr, max 8.35 gr, tuber width min 0.24 mm, max 24.47 mm, tuber length min 1.18 mm, max 33.44 mm were determined; in the study conducted by Tığlı and Fakir (2017), *O. anatolica* showed similar measurements as plant height, height, min 8.50 cm, max 37.00 cm, tuber width min 5.20 mm, max 16.48 mm, tuber length min 7.48 mm, max 23.91 mm, tuber weight min 0.30 gr, max 3.86 gr, flower number min 3, max 12; in the study conducted by Sevgi et al (2012), plant height of *O. anatolica* was found to be min. 16.00 cm, max. 49.00 cm and there are great differences depending on aspect, latitude, altitude and climate characteristics. Tuber length of *O. anatolica* was found to be min. 7.48 mm, max. 23.91 mm. In the study conducted by Sevgi et al (2012), tuber length of *O. anatolica* was found to be min. 9.00 mm, max. 26.00 mm and this is consistent with our study. Tuber width of *O. anatolica* was found to be min. 5.20 mm, max. 16.48 mm. In the study conducted by Sevgi et al (2012), the tuber width of *O. anatolica* species was found to be min 5.00 mm, max 22.00 mm, and in the study conducted by Başaran (2019), the plant height and length were found to be min 9.60 cm, max 27.30 cm, which is similar to our study. In Güler et al, 2022, while the plant heights were similar, there were differences in the number of flowers (3-14 pieces), tuber length (1.00-25.00 mm), tuber width (0.07-15.00 mm).

O. simia plant height and length were determined as min 18.00 cm, max 22.00 cm, flower number min 16, max 20, tuber weight min 4.53 gr, max 8.17 gr, tuber width min 12.11 mm, max 21.64 mm, tuber length min 25.43 mm, max 31.45 mm; in the study conducted by Tığlı and Fakir (2017), the flower stem length of *Orchis simia* was found as min 21 cm, max 26 cm, flower number as min 18, max 28, plant height as min 22 cm, max 36 cm, in the study conducted by Başaran (2019), the plant height and length were found as min 17.6 cm, max 40.50 cm, in the study conducted by Gümüş (2009), the plant height of *Orchis simia* was found as 20-45 cm, and this is consistent with the morphological study we conducted. In the study conducted by Kurt and Çalışkan (2020), the tuber length of *Orchis simia* was found as 0.6 cm, tuber width as 0.38 cm, and tuber weight as 0.14 g, and there are differences with this study. In Güler et al., 2022 while plant height, flower number, tuber width are similar, there are differences with tuber length (17.00-25.00 mm).

O. spitzelii plant height and length were determined as min 20.00 cm, max 60.00 cm, flower number min 7, max 33, tuber width min 6.12 mm, max 17.89 mm, tuber length min 9.80 mm, max 37.95 mm; Dumuşkahya et al. (2013) found *O. spitzelii* plant height and length as min 20.00 cm, max 50.00 cm, flower number min 8, max 30, tuber width min 20.00 mm, max 25.00 mm, tuber length min 20.00 mm, max 45.00 mm, Başaran (2019) found plant height and length as min 19.5 cm, max 34.00 cm, which is consistent with our morphological study. In Güler et al.,

2022, while plant heights are similar, they differ in the number of flowers (5-18 pieces), tuber length (15.00-20.00 mm), and tuber width (10.00-16.00 mm).

O. mascula subsp *pinetorum* plant height, height, min. 17.00 cm, max. 70.00 cm, flower number min. 8, max. 68, tuber weight min. 0.12 gr, max. 15.46 gr, tuber width min. 6.09 mm, max. 21.72 mm, tuber length min. 9.72 mm, max. 57 mm, were determined. In the study conducted by Başaran (2019), plant height, height, min. 17.5 cm, height, max. 52.5 cm, it is consistent with our morphological study. While plant heights are similar in Güler et al., 2022, they show differences in flower number (15-43 pieces), tuber length (20.00-30.00 mm), tuber width (20.00-25.00 mm).

O. purpurea subsp *purpurea* plant height, length and flower number were determined as min 38.00 cm, max 51.00 cm, min 24 flower number, max 68 flower number, min 3.13 gr, max 17.82 gr, min 13.99 mm, max 31.12 mm, min 25.15 mm, max 49.12 mm. In the study conducted by Başaran (2019), plant height and flower number were determined as min 20.00 cm, max 66.50 cm, which is consistent with our morphological study. In Güler et al., 2022, showed similarities in plant height and flower number, but showed differences in tuber length (30.00-35.00 mm) and tuber width (15.00-27.00 mm).

O. pallens plant height, length and width were determined as min 38.00 cm, max 46.00 cm, flower number min 32, max 57, tuber weight min 3.10 gr, max 15.12 gr, tuber width min 19.55 mm, maximum 24.11 mm, tuber length min 25.13 mm, max 45.75 mm. In the study conducted by Başaran (2019), plant height and length were determined as min 18.00 cm, max 49.00 cm, which is consistent with our morphological study. In Güler et al., 2022, plant height and tuber width were similar, while flower number (10-30) and tuber length (15.00-25.00 mm) were different.

As a result, the laws and regulations regarding the controlled collection of orchids, which have an important place in our country in terms of biological diversity, have not been expanded sufficiently. There are deficiencies in the protection of such plants and their use without causing any harm. Activities such as unconscious collection, excessive grazing, and tourism activities are destroying orchid species. The society should be educated on these issues and a public opinion should be created. Therefore, more detailed studies should be carried out to ensure the continuation of natural orchid taxa.

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INFORMATION

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