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## Studies on Samsun sahlelep orchid varieties

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### Abstract

With the different climates and geography, Turkey had a quite rich in flora in different regions. Samsun province with different climate patterns has also very rich flora. Within this great diversity, the Orchidaceae family has a distinct place. Orchidaceae family has the richest diversity among medicinal and aromatic plant species. Previous studies revealed the existence of 44 orchid taxa in the province. It was observed that about 1/3 of orchids were able to produce sahlelep. Depending on species, it was estimated that annually 25-30 tons sahlelep tubers were collected illegally in Samsun. Such illicit collections result in serious destruction of natural flora. The species that produce tubers and used to obtain sahlelep have not been studied in Samsun. In this study, site visits were made in Samsun province with sahlelep collectors and purchasers and the types of sahlelep collected for tuber were determined. Various measures to be taken in order to reduce the collection pressure have been emphasized.

**Keywords:** Orchids variety, tuber, ecology

### Introduction

*Orchidaceae* is among the richest plant family worldwide. The family has more than 25 thousand species known worldwide. Such a number is still increasing and may reach to 40 thousand species and sub-species. In another perspective, one in every ten plant belongs to this family. The orchids used in sahlelep production usually adapted to terrestrial and mild-climate regions. Turkey is located at intersection of three phto-geographical regions (Europe-Siberia, Iran-Turan, Mediterranean) and rich biodiversity of the country is also reflected onto sahlelep orchids. Turkey is the richest country of Europe and Middle East in mid-generation orchids (Sezik, 1984) [1]. Diversity of *Orchidaceae* family in Turkey is expressed with different numbers in different references. It was indicated in a study that there were 150 taxa in Turkey and 13% of them were endemic (Kreutz, 2002) [2]. It was reported in another study that there were 170 taxa in Turkey belonging to 23 species and 30 of them were endemic (Kreutz and Colak, 2009) [3]. According to Arslankaya (2012) [4], there are 146 species, 32 sub-species, 10 varieties and 170 taxa in Turkey. Sezik (2002) [5] in a paper entitled as "Turkish Orchids and Salep" indicated that there were 148 orchid taxa belonging to 24 species in Turkey. In Turkish plants data system, 187 species of *Orchidaceae* family are mentioned.

Some species of the family do not produce sahlelep tubers. In Turkey, around 120 tuber orchid varieties belonging to *Aceras*, *Anacamptis*, *Barlia*, *Comperia*, *Dactylorhiza*, *Himantoglossum*, *Neotinea*, *Ophrys*, *Orchis* and *Serapias* species are used in sahlelep production (Sezik, 2002) [5].

Sahlelep tubers are not cultured in Turkey and they are mostly collected from the nature in illegal ways. Salelep culture is practices only over a small area around Burdur province. Since it is an illicit product, it is quite hard to get statistics about the collected tubers. However, some resources provide estimated numbers about collected amounts. For instance, it was indicated in a study that annually 45 tons sahlelep were collected in Turkey (Hagsater and Dumont, 1996) [6]. However, it was observed in present site visits that about 25-30 tons were collected only from Samsun province. Therefore, the amount collected nationwide is estimated to be around 500 tons.

Samsun province has cool and precipitated Black Sea climate over the northern slopes facing to Black Sea. However, terrestrial climate becomes dominant in inner sections. Such climatic differences also influence floristic structure and species diversity. While sea-originated influences on climate are high along the coastal sections and over the slopes facing to the sea, such influences disappear in Kavak, Ladik, Havza and Vezirköprü towns in inner sections far from the sea and with an altitudes of between 1000-1500 m. As it was throughout the country, such climatic differentiations bring about a great diversity in plant species of the region.

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Altitude is the most effective environmental factor for the distribution of orchid species (Sandal, 2009) [7]. Just based on differences in altitude, temperature, precipitation and relative humidity, Samsun province had a rich diversity in orchid species.

In present study, initially the previous floristic studies carried out in Samsun were reviewed and the species of *Orchidaceae* family were listed. Then with the site visits to all towns between April-June, salep species collected for tubers were determined. The primary target of the present study was to assess the current status of natural salep species and then to provide data for further agronomic studies and present measures to be taken for the preservation of such natural resources.

### Materials and Methods

The orchid species collected for tuber constituted the plant material of the present study. Before the site visits, previous studies carried out about diversity were reviewed. In this way, species diversity of the province was put forth. Site visits were performed in spring of 2016. Before the site visits in winter, the individuals dealing with salep collection and purchase were contacted and site visits were planned. Since climate is warm along the coastal sections and plants ripen earlier in these sections, initial visits were made to Yakakent, Alaçam, Bafra, Ondokuzmayıs, Samsun central towns, Çarşamba and Terme towns. The second tour of visits were performed to Kavak, Ladik, Vezirköprü Salıpazarı and Ayvacık towns with higher altitudes. Site visits were performed in two months in April and May. With the site visits made with collectors, commonly collected species were determined. The species observed in site visits were removed from the soil with their flowers and they were identified and imaged at Biology Department of Ondokuz Mayıs University.

### Result and Discussion

Initially previous studies about the flora of the province were reviewed. However, there were not any studies carried out about the production of salep orchids in Samsun. Previous studies mostly focused on identification of species. The *Orchidaceae* species identified in previous floristic studies and research and their localities were provided below.

**a. Kızılırmak valley flora:** (Korkmaz and Engin, 2001) [8]; *Neottianidus-avis*, *Cephalanthera rubra* in Alan village of Vezirköprü town and *Epipactis condensata* in Aşağısusuz village.

**b. Terme-Gölyazı nature reserve area:** (Korkmaz *et al.*, 2011) [9]; *Listera ovata*, *Epipactis pontica*, *Platanthera chlorantha*, *Ophrys apifera*, *Anacamptis pyramidalis*, *Orchis papilionacea* var. *Papilionacea*.

**c. Kızılırmak delta flora:** (Korkmaz, 2010) [10]; *Ophrys mammosa*, *Orchis coriophora*, *Orchis laxiflora*, *Orchis palustris*.

**d. Orchide species widespread in Nebyan Mountain (Samsun):** (Kutbay *et al.*, 1995) [11]; *Neottia nidus-avis*, *Cephalanthera rubra*, *Cephalanthera longifolia*, *Platanthera chlorantha*, *Ophrys holoserica*, *Ophrys oestriifera* subsp. *oestriifera*, *Anacamptis pyramidalis*, *Orchis tridentata*, *Orchis*

*purpurea*, *Orchis provincialis*, *Dactylorhiza romana* subsp. *romana*, *Dactylorhiza urvilleana*.

**e. Orchide species in flora of Kunduz Mountain (Vezirköprü/Samsun):** (Ozen and Kilinc, 2002) [12]; *Neottianidus-avis*, *Cephalanthera rubra*, *Cephalanthera damasonium*, *Epipactis pontica*, *Epipogium aphyllum*, *Platanthera chlorantha*.

**f.** In a three-year study entitled as “Medicinal and Aromatic Plants in Natural Flora of Central and Eastern Black Sea Region”, pharmaceutical and aromatic plant species of 26 families were identified (Kevseroglu *et al.*, 2014) [13]. In that study, Samsun province with 8 species and 21 varieties of *Orchidaceae* family had the first place in diversity of pharmaceutical-aromatic plants. Of *Orchis* species, 10 of them were quite remarkable. The species of *Orchidaceae* family identified in Samsun and surroundings (21 species) were as follows: *Anacamptis pyramidalis*, *Comperia comperiana*, *Dactylorhiza romana*, *Dactylorhiza osmanica*, *Himantoglossum affine*, *Ophrys spheggodes*, *Ophrys mammosa*, *Ophrys apifera*, *Orchis punctulata*, *Orchis purpurea*, *Orchis simia*, *Orchis morio*, *Orchis spitzelii*, *Orchis mascula*, *Orchis pallens*, *Orchis provincialis*, *Orchis palustris*, *Orchis laxiflora*, *Serapias vomeracea*, *Serapias feldwegiana* and *Stenisiella satyrioides*.

**g.** The species identified in another study about Black Sea orchids (Seker *et al.*, 2016) [14]: *Anacamptis pyramidalis*, *Cephalanthera kotschyana*, *Himantoglossum caprinum*, *Limodorum abortivum*, *Neottia nidus-avis*, *Platanthera chlorantha*, *Ophrys oestriifera* subsp. *oestriifera*, *Orchis papilionacea* var. *papilionacea*, *Serapias bergonii*, *Spiranthes spiralis*, *Stenisiella satyrioides*.

**h. Turkish plants data system (Tubives):** was investigated and *Orchidaceae* species listed for Samsun province are provided in Table 1 (Tubives, 2016) [15].

**i.** Following the above specified literature review, site visits were made in flowering periods of specified orchid species in April and May. With the site visits made with salep collectors and purchasers, it was identified that 17 species were commonly collected.

The species gathered from the above provided literature and the species observed in site visits are all provided in Table 1. It was observed that 44 orchid species were widespread in Samsun province and 17 of them were commonly collected for tubers.

Entire province was not visited in this study, but still a rich diversity was observed in orchide species. However, there were not any evidences indicating which one of these species were collected for salep production. Although salep is produced from tuber species, all tuber species are not available for salep production and the ones used for salep production is quite limited. It was determined that 38 varieties of 10 species were used for salep production (Ozhatay *et al.*, 1997) [16]. In Samsun province, it was observed that some of 44 species did not produce tubers, some had empty tubers after drying and thus not used in salep production, but still 17 species were commonly collected for salep production.

**Table 1:** *Orchidaceae* species observed in Samsun province

	[8-12]	[13]	[14]	[15]	Site Visits
<i>Anacamptis pyramidalis</i>	x	x	x	x	x
<i>Cephalanthera rubra</i>	x				
<i>Cephalanthera damasonium</i>	x				
<i>Cephalanthera kotschyana</i>			x	x	
<i>Cephalanthera longifolia</i>	x				
<i>Comperia comperiana</i>		x		x	
<i>Dactylorhiza romana</i>	x	x		x	
<i>Dactylorhiza osmanica</i>		x		x	
<i>Dactylorhiza urvilleana</i>	x				
<i>Epipactis pontica</i>	x			x	
<i>Epipactis condensata</i>	x				
<i>Epipogium aphyllum</i>	x			x	
<i>Himantoglossum affine</i>		x		x	
<i>Himantoglossum caprinum</i>			x		x
<i>Himantoglossum comperianum</i>					x
<i>Limodorum abortivum</i>			x		
<i>Listera ovata</i>	x				
<i>Neottia nidus-avis</i>	x	x	x		
<i>Platanthera chlorantha</i>	x		x		x
<i>Ophrys mammosa</i>	x	x		x	x
<i>Ophrys apifera</i>	x	x		x	x
<i>Ophrys spheggodes</i>		x		x	
<i>Ophrys holoserica</i>	x				
<i>Ophrys oestriifera subsp. oestriifera</i>	x		x	x	x
<i>Orchis punctulata</i>		x		x	
<i>Orchis purpurea</i>	x	x		x	x
<i>Orchis simia</i>		x		x	x
<i>Orchis morio</i>		x		x	x
<i>Orchis spitzelii</i>		x		x	
<i>Orchis mascula</i>		x		x	
<i>Orchis pallens</i>		x		x	x
<i>Orchis provincialis</i>	x	x		x	
<i>Orchis palustris</i>	x	x		x	
<i>Orchis laxiflora</i>		x		x	
<i>Orchis papilionacea</i> var. <i>papilionacea</i>	x		x		x
<i>Orchis coriophora</i>	x				x
<i>Orchis laxiflora</i>	x				x
<i>Orchis tridentata</i>	x				x
<i>Serapias vomeracea</i>		x		x	
<i>Serapias orientalis</i> sp. <i>orientalis</i>					x
<i>Serapias bergonii</i>			x		x
<i>Serapias feldwegiana</i>		x		x	
<i>Spiranthes spiralis</i>			x	x	
<i>Stenisiella satyrioides</i>		x	x	x	

## Conclusion

Rich orchid diversity of Samsun province was put forth by previous researchers. However, there were not any studies about production opportunities, agronomic traits and chemical composition of these species. Agronomic studies should focus on salep orchids to provide an alternative product to local economy and to prevent the destruction of natural flora. With the further studies to be carried out;

- All tuber species should be identified,
- Morphological and chemical characteristics of the species used in salep production should be put forth,
- In vitro* studies should be implemented for seedling production and possible use of these seedlings in tuber production should be investigated.
- The species yielding more than one tuber should be identified and vegetable production opportunities should be investigated.
- Unconscious collectors of the region should be trained to prevent destruction of natural flora.
- Cultural practices should be developed.

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