Soil Properties of Some Natural Flower Bulbs Distributed in Rural Area of Antalya

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Abstract

Turkey, the country which is in intersection of the three important gene centres of the world, has huge potential in terms of plant genetic resources. Natural flower bulbs within the plant genetic resources have a significant share. In this study, the characteristics of the soils of 3 different species were determined. Physical and chemical properties of soil samples taken from area of population were analysed. The results obtained are comparatively evaluated. In soil samples taken from areas of *Gladiolus illyricus and Fritillaria acmopetala* species, Ph was found as 7,1 and determined as neutral but soil sample taken from the area in which distributions *Gynandriris sisyrinchium* species, ph was found as 7,6 and determined as slight alkaline. Soil organic matter of the soil samples belonging to *Gladiolus illyricus, Fritillaria acmopetala and Gynandriris sisyrinchium* were determined as 9,6%, 8,5% and 2,7% respectively and as rich in humus and poor in humus respectively.

Keywords: Native Flower Bulbs, Soil Properties, *Gladiolus, Fritillaria, Gynandriris*

INTRODUCTION

Turkey is one of the richest areas in the middle latitudes in terms of plant diversity. The main reasons are variety in climate, geomorphological and soil diversity, and the situation of the area at the junction of three flora region (Euro-Siberian, Mediterranean and Iran-Turanian). When all these factors are combined, it provides many properties for the plants to grow up and discrepant. The flora of Turkey is relatively rich (about 12.000 species) and still a great number of new species are being described. In Turkey, the rate of endemism is relatively high when compared with other European countries. While the rate of endemism is greater than 30 % in Turkey, it is 14,9% (Greece), 2,9% (France), 18,6% (Spain), or 0,1% (Poland) in some other European countries. The number of endemic species in Turkey is greater than 3.000. However, diversity and these endemic plants are under considerable threat. The habitats in mountainous areas and coastal dunes are under the threat of human beings due to the tourism activities. Especially Turkey's mountains are centres for collection of wild bulbs, and during the 1980s wild stocks of particular bulbous species were increasingly targeted by the horticultural trade. Wild harvesting is damaging the bulbous plant populations. The wildlife in Turkey is having hard time in regenerating as the other countries on Earth. That is the reason why it really is significant to protect the diversity of plants (Avcı, 2005).

Bulbous plants (geophytes) have an important place for genetic biodiversity of Turkey and have a great potential in perfume, pharmaceuticals with alkaloids and ornamental with beautiful flowers. The annual income derived from exported bulbous plants has been reached approximately 5 million TL in Turkey. A significant amount of geophytes collected from natural habitat are exported and the risk of disappearance of some geophytes has been increased. These geophytes are classified as in different stages of endangered plant species (Karaoğlu, 2010).

Antalya has an important place in terms of native flower bulbs in genetic biodiversity of Turkey. There are many different species of native flower bulbs in nature of Antalya. Some of these species are species of *Gladiolus, Iris* and *Fritillaria species.*

The *Gladiolus* is a very popular cut flower and garden plant. It is cultivated in almost all countries of the world where spring and summer conditions are favourable. Excellent quality *Gladiolus* cultivars are used as cut flowers by home gardeners and professional growers. The corms are generally produced by specialized bulb growers. The available cultivars offer a

tremendous diversity of colour, size, shape, and flowering times. They arose from complex crosses among several botanical special originating mainly in South Africa. Breeding started in the first part of the 19th century and led to the modern cultivars that are very different from the original species.

Irises have been used for centuries not only as ornamentals but also as a source of perfumes and as a model for adornments (Köhlein, 1987). The shape of the flowers resembles the orchid, and the diversity of the colour makes irises desirable cut flowers, even though the vase life is short. The name of the genus is derived from the female messenger of the Gods, Iris, who brought peace to the human race, and reflects the diversity of the colours of the rainbow.

The major part of the Iris genus belongs to the group of rhizomatous plants, with the bulbous types being fewer in number. The latter species are produced commercially for use as cut flowers both in the greenhouse and outdoors. Some dwarf species are used for gardens and forcing as potted plants. The rhizomatous types are primarily used in the garden.

Fritillaria species are mainly used as garden plants, in borders, rock gardens, beds, under trees and shrubs, or with ground covers. According to the species, they prefer sunny or shady locations, and have to be protected against forest.

Fritillaria belongs to the sub-class Monocotyledon belonging to Liliaceous family. The genus includes about 100 species native from the temperate climatic zones of the Northern Hemisphere. Most of the species come from Europe and Asia, a few from North America and only one, *F.oranensis*, from North Africa. Their classification is not complete.

Turkey has 9 gladiolus, 37 iris and 31 firitelleria species. There were 3 species gladiolus, 4 species iris and 7 species firitelleria determined as distributed along Antalya. The purpose of this study was to determine physical and chemical properties of soil (some ecological feature) in distribution areas of the species *Gladiolus, Iris* and *Fritillaria* species in Countryside of Antalya.

MATERIALS AND METHODS

Coordinates and heights of distribution areas of the *Gladiolus illyricus W. koch.*, *Fritillaria acmopetala* Boiss. subsp. acmopetala and *Gynandriris sisyrinchium* (L) Part. (syn. *Iris sisyrinchium*) species were determined with GPS (Global Positioning System) and soil samples were taken in Antalya Döşemealtı Kovanlik village. Physical and chemical properties of soil samples taken from area of populations were analysed.

Soil samples were taken from 30 cm depth at the each parcel at the end of the experiment. At first, they were prepared with air-dry samples and then became available for analysis after they were passed through 2 mm diameter screen. Afterwards, soil samples were analysed according to following methods. Soil particle size distribution (sand, silt and clay content) was determined by hydrometer method (Day, 1982). Soil textural class was determined by following the USDA textural triangle. Organic matter content by using modified Walkey-Black (Nelson and Sommers, 1982), $CaCO_3$ was determined with calcimeter method of Nelson (1982). Soil pH and EC were determined by using a glass electrode meter in 1:2.5 soil - water ratio (Jackson, 1962). Total N content of soil was measured by the micro-Kjeldahl method (Bremmner, 1996). Exchangeable K, Ca and Mg were determined by atomic absorption spectrometer after soil samples were shaken up with 1 N ammonium acetate (Richards, 1954). The available P levels in soil was extracted by NaHCO3 (Nelson, 1982) and determined by a molibdate colorimetric method (Olsen and Sommers, 1990). Microelements in soils were determined by diethylene triamine penta acetic acid (DTPA) extraction method (Lindsay and Norvell, 1978).

RESULTS AND DISCUSSION

Properties of Distribution Area of Species

While Gladiolus species spreading roadsides, slopes and areas of scrub, *Fritelleria* species spreading rocky and scrub areas and Iris species spread in grasslands and roadsides in the study field. According to Davis (1982), there is *Gladiolus illyricus* also in Antalya as well as in İstanbul, İzmir and Muğla. There is *Fritillaria acmopetala* also in Antalya as well as in Muğla, İçel, Adana, Osmaniye, Hatay. There is *Gynandriris sisyrinchium* also in Antalya as well as in Çanakkale, İstanbul, Balıkesir, İzmir, Muğla, Adana, Hatay, Urfa, Siirt, Şırnak.

The altitude and coordinate information of species has been given in Table 1. As demonstrated, *Gladiolus illyricus* and *Fritillaria acmopetala* and *Gynandriris sisyrinchium* are located at 336 meter, 318 meter and 306 meter respectively.

Table 1: Altitude and Coordinate Information

Name of species	*Gladiolus illyricus* W. Koch	*Fritillariaacmopetala*Boiss. Subsp. acmopetala	*Gynandririssisyrinchium* (L) Part.
Altitude (meter)	336	318	306
Coordinates	37 07 222 N 030 34 870 E	37 08 321 N 030 34 778 E	37 08 594 N 030 35 509 E

Physicaland Chemical Properties of Soil

In soil samples taken from areas of *Gladiolus illyricus and Fritillaria acmopetala* species, pH was found as 7,1 and determined as neutral but soil sample taken from the area in which distributions *Gynandriris sisyrinchium* species, pH was found as 7,6 and determined as slight alkaline. $CaCO_3$ percentage of the soil samples belong to *Gladiolus illyricus, Fritillaria acmopetala and Gynandriris sisyrinchium* was obtained as 1,1%, 0,5% and 7,3% respectively. According to the results, the classes of salinities of soil samples taken from *Gladiolus illyricus and Fritillaria acmopetala* species were on medium salinity level. In contrast, the classes of soil sample salinity taken from *Gynandriris sisyrinchium* species was on slight salinity level. Sand, clay and silt were sandy loam in soil samples taken from areas of *Gladiolus illyricus and Fritillaria acmopetala* species but soils samples taken from areas of *Gynandriris sisyrinchium* were loam. Ozdemir et al., (2011), in her study about *Gynandriris sisyrinchium* species, concluded that loamy and a little salty soil is preferred similarly our study.

Table 2: Physical Properties of Soil Samples

Name of Species	*Gladiolus illyricus* W. Koch	*Fritillaria acmopetala* Boiss. Subsp. acmopetala	*Gynandriris sisyrinchium* (L) Part.
pH (:2,5)	7,1 Neutral	7,1 Neutral	7,6 slight alkaline
Lime (CaCO3) (%)	1,1 chalky	0,5 slight chalky	7,3 medium chalky
EC Micromhos/cm (25 C)	969 medium salty	1022 medium salty	411 slight salty
Sand (%)	73 Sandy	59 Sandy	49 Sandy
Clay (%)	15 Sandy	13 Sandy	21 Sandy
Silt (%)	12 Sandy	28 Sandy	30 Sandy

Soil organic matter of the soil samples belonging to *Gladiolus illyricus, Fritillaria acmopetala and Gynandriris sisyrinchium* were determined as 9,6%, 8,5% and 2,7% respectively and as rich in humus and poor in humus respectively. According to the results, phosphor and potassium concentration of soil samples taken from *Gladiolus illyricus and Fritillaria acmopetala* species were high. In contrast phosphor and potassium concentration of soil sample taken from *Gynandriris sisyrinchium* species were sufficient in phosphor and insufficient in potassium. Magnesium and calcium concentrations of the soil samples belonging to all species were obtained high in magnesium and sufficient in calcium. Calcium concentrations of the soil samples belonging to all species were determined as high. On the other hand, Magnesium contents of all soil samples were sufficient in all areas. Ozdemir et al., (2011) found those concentrations of P; 1.0892 ppm, K; 120.23 ppm, Ca;3743.0 ppm, and Mg; 656 ppm in soils samples of *Gynandriris sisyrinchium* species in her study.

Table 3: Chemical Properties of Soil Samples

Name of Species	*Gladiolus illyricus* W. Koch	*Fritillaria acmopetala* Boiss. Subsp. acmopetala	*Gynandriris sisyrinchium* (L) Part.
Organic Matter (%)	9,6 rich in humus	8,5 rich in humus	2,7 poor in humus
P (ppm)(Olsen)	100 high	52 high	14 high. sufficient
K (ppm)	842 high	380 high	212 low
Ca (ppm)	7725 high	6490 high	6737 high
Mg (ppm)	789 good	640 good	269 good

CONCLUSIONS

As a conclusion, it is possible to claim that soils belonging to *Gladiolus illyricus* and *Fritillaria acmopetala* species are efficient but soils belonging to *Gynandriris sisyrinchium* species are less efficient than the others species.

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