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NATURAL PLANT DIVERSITY OF THREE FARMS OF ANKARA UNIVERSITY

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ABSTRACT. Natural flora of cultivated or agricultural areas are generally under estimated or accepted as weeds because they compete with agricultural plants and repress their growth. Ankara University has three research and application farms/stations especially for educational purposes. Between the agricultural patches at these farms there are small natural patches possessing important plant diversity but there is not any information about the natural flora of these farms. The aim of this study is to find out the natural plant diversity of these three farms. The field studies conducted between 2016-2018 and 927 specimens were collected totally, and the number of taxa and the farm that were collected from are as follows respectively; 118 taxa from Ayaş Horticulture Reasearch and Application Station, 64 taxa from both Kalecik Viticulture Research and Application Station, and Haymana Research and Application Farm. The families with the highest number of taxa are Asteraceae and Brassicaceae. 4 of these taxa are endemic. Most of the species are cosmopolitan with the ratio of 70% and the distribution of the rest of the taxa in phytogeographical regions are as follows; 15% Irano-Turanian, 8% Euxin and 7% Mediterranean.

1. INTRODUCTION

Natural patches between agricultural areas are refuge for wild life and very important for biodiversity. One of the reason for the increase in attention to biodiversity is its contribution to plant breeding and agricultural processes. The increase in human population together with the expansion of agricultural areas result in loss of natural habitats, and especially in developed countries natural plant cover is stacked in between agricultural areas [1-5]. The biodiversity inside these agricultural areas are generally under estimated grouped the relation of functions of biodiversity with agricultural activities. The biodiversity inside these agricultural areas are generally under estimated and grouped according to the relation of functions of biodiversity with agricultural activities. According to their grouping biodiversity is considered in three main headlines, agricultural biodiversity, para-agricultural biodiversity and extra-agricultural biodiversity [6]. Agricultural biodiversity covers the animal and plant species, subspecies and varieties used in agricultural activities. Para agricultural diversity which is also known as functional biodiversity covers the soil fauna, pollinators, natural plants except for the ones that are not used directly in agricultural activities and in general meaning the ecosystem services. Extra-agricultural diversity is all the

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diversity in production area that are not contributed to the agricultural production. These are generally specific species like the endangered ones [7]. Gurr et al. [8] draw attention to the beneficial effects of biodiversity to agricultural production especially the pest management. These studies reveal the importance of the natural areas between agricultural areas, and also their biodiversity.

In last few decades, the ecosystem services of both agricultural and natural areas draw more attention, other than primary production like the influence of agricultural changes over biodiversity and the abundance of native taxa [5, 9-12]. There are many direct and indirect interaction with weeds and agricultural plants, as crop-weed competition [13], food source for pollinators [14,15], earthworms [16], beetles [17-19], ants [20], birds [14,21], and mammals [22].

Turkey draws attention with both its biological diversity and large agricultural areas. The studies about the function and importance of natural diversity at agricultural areas are under estimated in Turkey, and mainly researches at agricultural areas concentrated on weeds which are the plants competing with agricultural products for all the resources. With this study, it was aimed to determine the natural plant diversity within the borders of research and application farms and stations of Ankara University; Haymana Research and Application Farm, Ayaş Horticulture Research and Application Station and Kalecik Viticulture Research and Application Station.

2. MATERIALS AND METHODS

During the vegetation periods between 2016 and 2018 plant specimens were collected and prepared as herbarium specimen. All the plant material was kept at - 20 °C for three days to avoid for disinfestation. “Flora of Turkey and East Aegean Islands I-XI” [23-25] and “Resimli Türkiye Florası” volumes 1, 2 and 3a [26-28] used for plant identification. All the specimens were prepared as herbarium material and deposited in herbarium ANK.

The valid names of the plant species and their Turkish names were checked from the “Türkiye Bitkileri Listesi-Damarlı Bitkiler” [29] and listed according to the flora order of Turkey and the East Aegean Islands. For each research area a code is produced according to the initials of their names and together with the information about collector number, date of collection, endemism status and chorology were given.

ABBAUİ: Ayaş Horticulture Research and Application Station

It covers an area of 406 decares with an altitude of 685 m within the borders of Ayaş district. The farm produces saplings, vegetables (tomatoes, aubergine, cabagge, bean, pumpkin, corn, lettuce et.), fruits (melon, watermelon, cherry, apricot etc.) and alfalfa and also spices and medicinal plants.

HAUÇ: Haymana Research and Application Farm

Located within the borders of Haymana district, the farm covers an area of 4200 decares at an altitude of 1055 m. Field crops and horticultural crops are cultivated, and it provides seeds to the surrounding farmers, especially with wheat improvement studies. Cherry, plum, apple and apricot trees cover about 100 decares of the area. In addition, herd cattle, beef cattle, ovine breeding, beekeeping and feed production are carried out.

KBAUİ: Kalecik Viticulture Research and Application Station

It was established on an area of 175 decares at an altitude of 700 m in Kalecik district. Viticulture activities are carried out within the scope of the area.

The locations of the studied farms and stations in Ankara province can be seen from Figure 1.

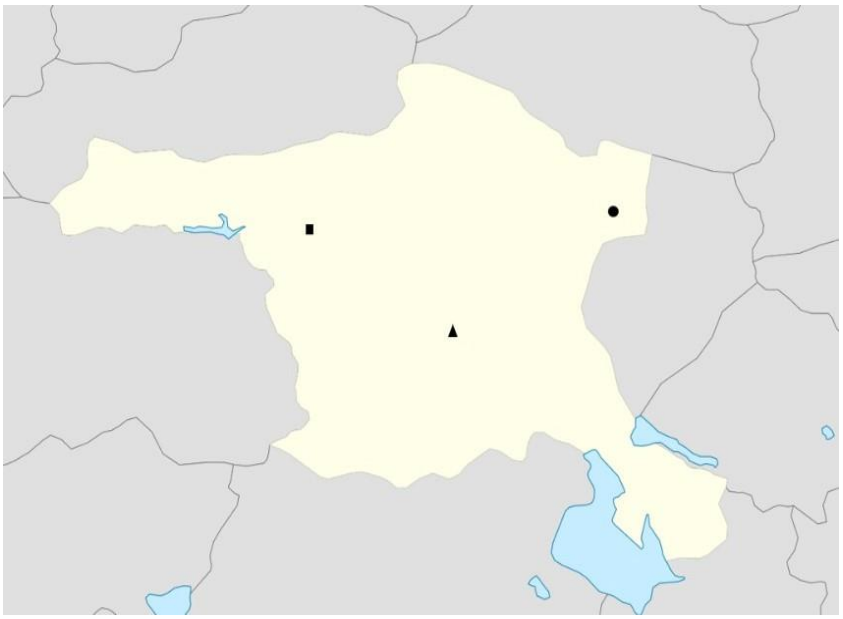

FIGURE 1. The locations of the studied farms and application stations in Ankara. ■: Ayaş Horticulture Research and Application Station ●: Kalecik Viticulture Research and Application Station ▲: Haymana Research and Application Farm

The biometeorological analysis of the study area is done by using 94 years data of Ankara station taken from Turkish State Meteorological Service, and evaluated according to Emberger [30]. The meteorological stations at Ayaş, Kalecik and Haymana are very newly established and their data are not cover the 30 years of observations which is the minimum duration for suitable climatic evaluation.

3. RESULTS

Bioclimate: All the values used for bioclimatological evaluation of Ankara can be seen from Table 1. According to the s value, which is below 5, Ankara is under the influence of Mediterranean climate. With the evaluation of m, Q and P values the bioclimate of the area is very cold sub-arid Mediterranean bioclimate and the precipitation regime is included in east Mediterranean precipitation regime type 2. The hottest and coldest months are august and january respectively. The duration of arid period is about 4 to 5 months between june and october. (Figure 2). All the values about bioclimate can be seen from Table 1.

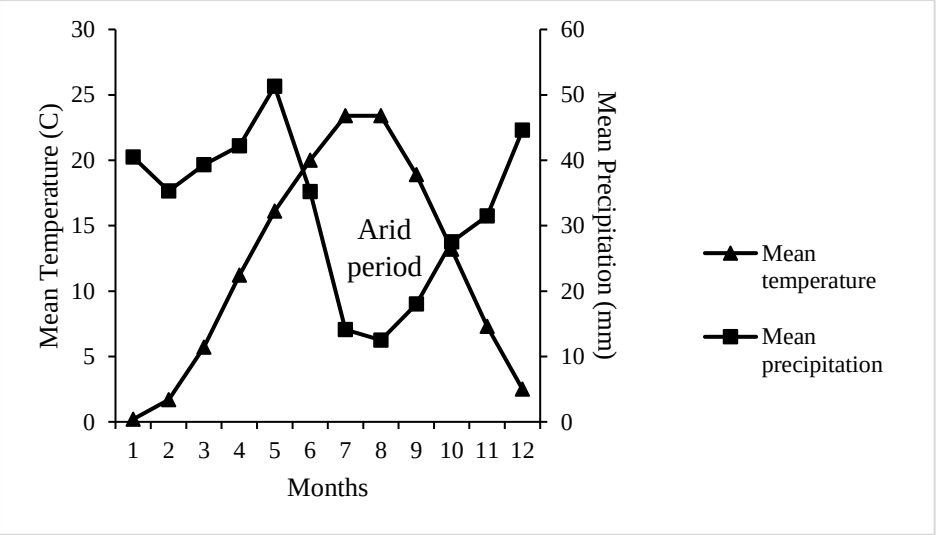

FIGURE 2. Ombrothermical Climate Diagram of Ankara Meteorological Station

TABLE 1. Bioclimatological synthesis of Ankara

S: aridity index, PE=summer precipitation, Q=Precipitation-Temperature index, M=max temperature of the hottest month, m=min temperature of the coldest month, P=mean annual total precipitation, Sp= Spring, W= Winter, F= Fall, Su=Summer.

Station	s	PE	Q	M (°C)	m (°C)	P (mm)	Precipitaton regime	Bioclimatology
Ankara	2,02	61,8	41	30,5	-3,2	392	SpWFSu-East mediterranean precipitation regime type 2.	Very cold sub-arid Mediterranean bioclimate

During the field works between 2016 and 2018 totally 927 plant specimen were collected. Identified specimens were belong to 40 different families. The highest number of taxa was collected from Ayaş Horticulture Research and Application Station with 118 taxa from 35 families. The number of taxa from Kalecik Viticulture Research and Application Station and Haymana Research and Application Farm were 64 taxa from 24 families and 64 taxa from 23 families respectively (Table 2).

TABLE 2. The number of families, genera and species from each station

Station	Number of families	Number of genera	Number of taxa
Haymana	23	56	64
Ayaş	35	89	118
Kalecik	24	57	64

According to our results the highest plant diversity was determined at Ayaş Horticulture Research and Application Station with 118 species which can be related with the different types of agricultural products grown at this station. The distribution of number of taxa within the families from each farm can be seen from Figures 3,4 and 5.

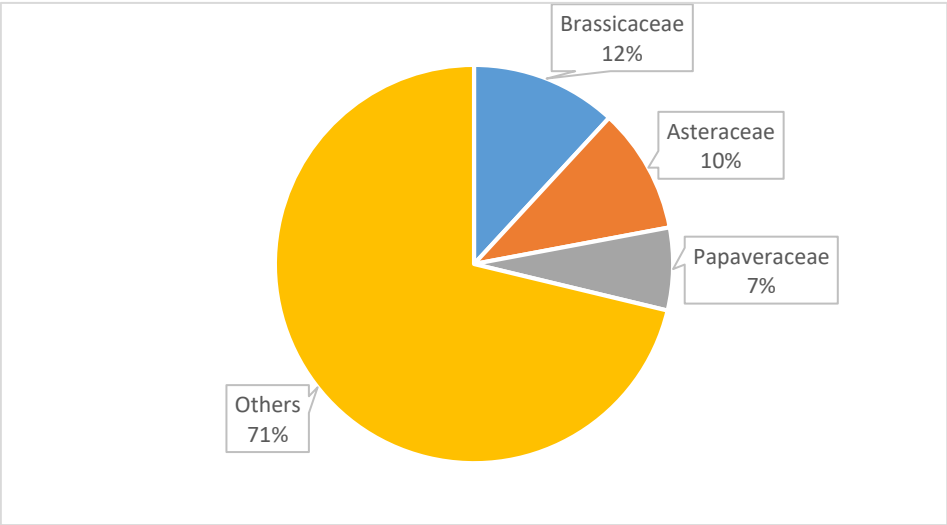

FIGURE 3. The families with the highest number of taxa at Ayaş Horticulture Research and Application Station

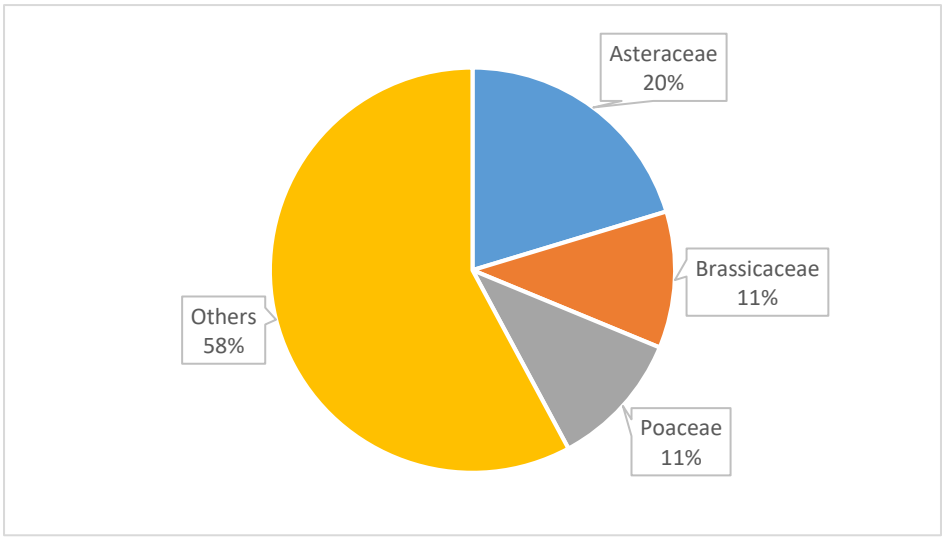

FIGURE 4. The families with the highest number of taxa at Haymana Research and Application Farm

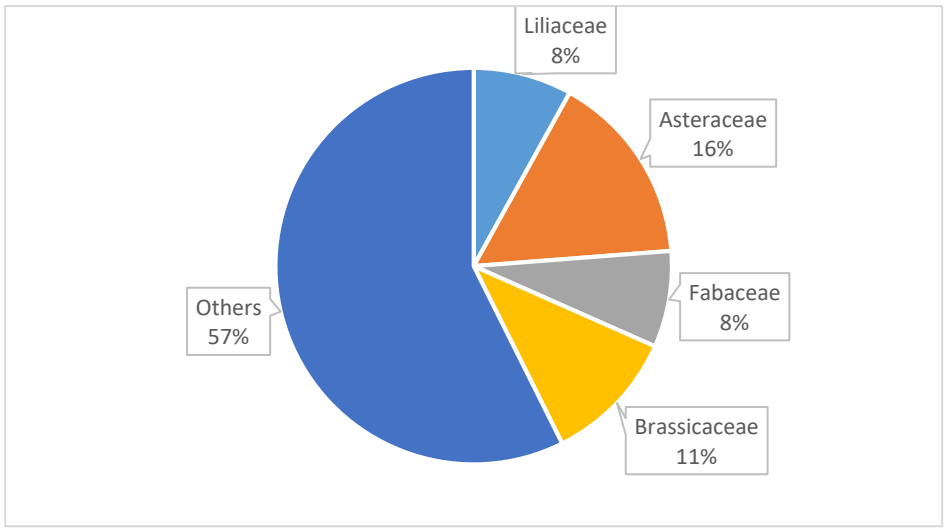

FIGURE 5. The families with the highest number of taxa at Kalecik Viticulture Research and Application Station

All the stations are surrounded by Central Anatolian steppe vegetation but because of agricultural activities for long period of time, they lost their natural structure. The endemism ratio is very low and only 4 endemic taxa determined from these three farmlands; *Delphinium venulosum* Boiss., *Verbascum ancyritanum* Bornm., *Stachys cretica* L. subsp. *anatolica* Rech. Fil. and *Crocus danfordiae* subsp. *danfordiae* Maw.

Phytogeograhically the area belongs to Irano Turanian phytogeogrephical region but cosmopolitan species dominates the area. The phytogeographic distribution of the recorded taxa from the area is as follows; Irano Turanian 15,25%, Mediterranean 6,68%, Euxine 8,48% and Cosmopolitan and unknown 69,49% (Figure 6).

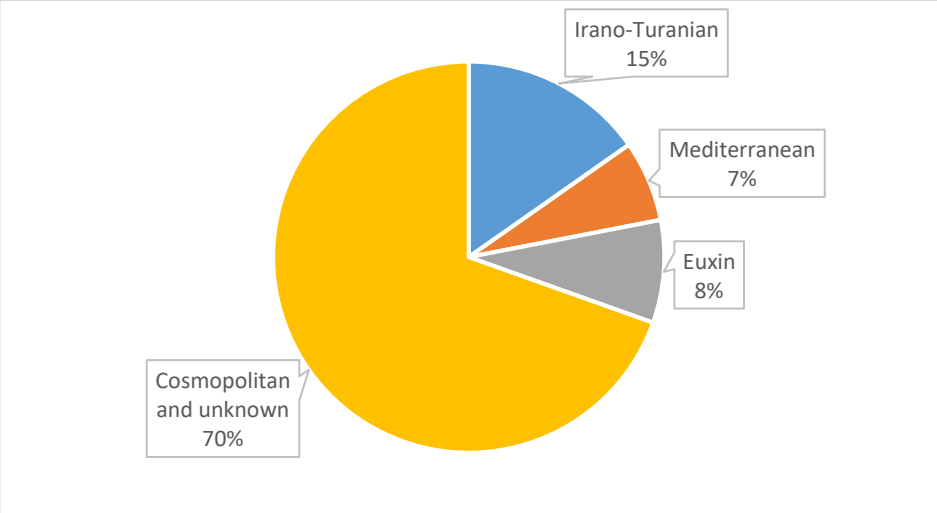

FIGURE 6. The distribution of plant taxa in phytogeographical regions

The life span of the species collected from each farmland were determined from the Flora of Turkey and East Aegean Islands and related publication and can be seen from table 3. According to the table 8 it can be seen that mainly annuals dominate all the agricultural areas which may be the result of grazing and the harvesting processes that do not let the perennials to settle.

TABLE 3. The distribution of taxa in study areas with respect to life span.

Code of the farm	Annual	Biennual	Perennial	Annual or biennual	Biennual or perennial	Annual to perennial	Annual or biennual or perennial	Unknown
ABBAUI	60	2	40	6	5	1	1	1
HAUÇ	25	3	27	2	5	1	1	-
KBAUI	31	-	22	5	2	1	2	-

Natural flora at or around agricultural areas are generally accepted as field weeds and agricultural pests and some methods are used to combust them. Weeds have the ability to grow faster and produce more seeds so they retard the growth of agricultural plants [31,32]. Also they increase the fire risk especially at arid season [33]. But even though they are accepted as weed they are important genetic resources for agricultural plants [34]. They have many other benefits like production of animal feed, medicinal and industrial usage and also, they are important for integrity of soil structure and combating erosion [35].

Most of the studies about natural flora of agricultural areas concentrated on the detrimental effects of natural flora over agricultural plants or trees, because they compete with agricultural plants and repress their growth [36]. The species that are defined as pest at orchards and collected from study area are as follows; *Alopecurus myosuroides* Huds., *Setaria viridis* L., *Artemisia vulgaris* L., *Cichorium intybus* L., *Cirsium arvense* (L.) Scop., *Convolvulus arvensis* L., *Geranium tuberosum* L., *Oxalis pes-caprae* L., *Plantago lanceolata* L., *P. major* L., *Rumex crispus* L., *Taraxacum officinale* Wiggers, *Phragmites australis* Steudal, *Ornithogalum umbellatum* L., *Amaranthus retroflexus* L., *Capsella bursa-pastoris* (L.) Medik., *Carduus pycnocephalus* L., *Chenopodium album* L., *Datura stramonium* L., *Erodium cicutarium* (L.) L'Herit, *Euphorbia helioscopia* L., *E. falcata* L., *Fumaria asepala* Boiss., *F. officinalis* L., *Geranium tuberosum* L., *Heliotropium europaeum* L., *Hibiscus trionum* L., *Lactuca serriola* L., *Lamium amplexicaule* L., *L. orientale* (Fisch. & C.A.Mey.) E.H.L.Krause, *Papaver rhoeas* L., *Polygonum bellardii* All., *Senecio vernalis* Walds & Kit, *S. vulgaris* L., *Sinapis arvensis* L., *Sonchus asper* (L.) Hill., *Stellaria media* (L.) Vill., *Xanthium spinosum* L., *X. strumarium* L.

There are similar studies also at grain production fields to define the pest plants. According to Taştan ve Erciş [37] the pest plants determined at our study area are; *Adonis aestivalis* L., *ajuga chamaepitys* L., *Alhagi maurorum*, *Alopecurus myosuroides* Hudson, *Amaranthus retroflexus* L., *anagallis arvensis* L., *Bifora radians* Bieb., *Bromus tectorum* L., *Buglossoides arvense* (L.) Johnst., *Capsella burs-pastoris* (L.) Medik., *Carduus pycnocephalus* L., *Cerastium perfoliatum* L., *Ceratocephalus falcatus* (L.) Pers., *Chondrilla juncea* L., *Cirsium arvense*

(L.) Scop., *Cichorium inthybus* L., *Consolida regalis* S.F.Gray, *Convolvulus arvensis* L., *C. galaticus* Rotsan ex Choisy, *Crepis foetida, Cyanus depressus (*Bieb.) Sojak, *Daucus carota* L., *Descurainia Sophia* (L.) Webb., *Echinophora tenuifolia* L., *Echium italicum* L., *Fumaria officinalis* L., *Galium aparine* L., *Geranium tuberosum* L., *Gladiolus atroviolaceus* Boiss., *Gypsophila pilosa* Hudson, *Hordeum murinum* L., *Hypecoum procumbens* L., *Isatis tinctoria* L., *Lactuca serriola* L., *Lamium amplexicaule* L., *L. orientale* (Fisch. & C.A.Mey.) E.H.L.Krause, *Malva neglecta* Wallr., *Medicago sativa* L., *Melilotus officinalis* (L.) Desr., *Ornithogalum* narbonense L., *Papaver rhoeas* L., *Phragmites autralis, Plantago lanceolate* L., *Polygonum bellardii* All., *Reseda lutea* L., *Senecio vernalis* Waldst & Kitt, *S. vulgaris* L., *Setaria viridis* (L.) P. Beauv, *Sinapis arvensis* L., *Stellaria media* (L.) Vill., *Turgenia latifolia* (L.) Hoffm., *Xanthium strumarium, Vaccaria pyrimidata* Medik, *Veronica hederifolia* L.

As a result of this study the natural flora of three farms and application centers of Ankara University were determined with their influences over agricultural areas and their functions in natural vegetation.

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Author Contribution Statements CD-specimen collection and identification, data analysis and manuscript writing. GNT-specimen collection, data analysis and manuscript writing.

Declaration of Competing Interests The authors declare no conflict of interest.

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Plant List

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Ordo: FILICALES
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1. EQUISETUM L.
E. ramosissimum Desf. (Kırkboğum)
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2. CUPRESSACEAE
***1. JUNIPERUS** L.*
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Classis: DICOTYLEDONES
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***2. DELPHINIUM** L.*
D. venulosum Boiss. (Hezaren)
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***3. CONSOLIDA** Gray*
C. orientalis (J.Gay) Schrödinger. (Morçiçek)
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C. regalis S. F. Gray subsp. paniculata (Host) Soó var. paniculata (Horozkuyruğu)
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A. flammea Jacq. (Cinlalesi)
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KBAUİ, 02.06.2016, C. Doğar 1057.
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R. argyreus Boiss. (Çitemik)
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***6. CERATOCEPHALUS** Moench.*
C. falcatus (L.) Pers. (Düğünotu)
HAUÇ, 24.02.2018, C. Doğar 1291.
ABBAUİ, 11.03.2018, C. Doğar 1318.
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***1. GLAUCIUM** Adans.*
G. corniculatum (L.) Rudolph subsp. refractum (Náb.) Cullen (Çömlekçatlatan)
KBAUİ, 02.06.2016, C. Doğar 1154.
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G. leiocarpum Boiss. (Gavurhaşhaşı)
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***2. PAPAVER** L.*
P. rhoeas L. (Gelincik)
ABBAUİ, 29.04.2016, C. Doğar 1069.
ABBAUİ, 12.05.2016, C. Doğar 1112.
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P. dubium L. (Köpekyağı)
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ABBAUİ, 18.05.2018, C. Doğar 1372, 1373.
P.argemone L. subsp. argemone (Kumhaşhaşı)
ABBAUİ, 18.05.2018, C. Doğar 1395.
P. hybridum L. (Melezgelincik)
ABBAUİ, 18.05.2018, C. Doğar 1383.
***3. HYPECOUM** L.*
1. H. procumbens L. (Yavruağzı)
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ABBAUİ, 29.04.2017, C. Doğar 1270.
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***4. FUMARIA** L.*
F. officinalis L. (Şahtere)
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ABBAUİ, 12.05.2016, C. Doğar 1099.
ABBAUİ, 29.04.2017, C. Doğar 1251.
ABBAUİ, 11.03.2018, C. Doğar 1309.
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3. CRUCIFERAE (BRASSICACEAE)
***1. SINAPIS** L.*
S. arvensis L. (Yabanihardal)
HAUÇ, 27.04.2016, C. Doğar 1001, 1022.
KBAUİ, 28.04.2016, C. Doğar 1063.
ABBAUİ, 29.04.2016, C. Doğar 1074.
ABBAUİ, 12.05.2016, C. Doğar 1117, 1118 and 1120.
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***2. DIPLOTAXIS** DC.*
D. tenuifolia (L.) DC. (Türpenk)
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***3. LEPIDIUM** L.*
L. draba L. (Diğnik)
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KBAUİ, 02.06.2016, C. Doğar 1149.
ABBAUİ, 29.04.2017, C. Doğar 1259.
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***4. ISATIS** L.*
I. glauca Aucher ex Boiss. subsp. glauca (Soğutot)
HAUÇ, 25.06.2016, C. Doğar 1164. Irano-Turanian
I. tinctoria L. (Çiviotu)
ABBAUİ, 29.04.2017, C. Doğar 1255.
***5. THLASPI** L.*
T. perfoliatum L. (Giyle)
KBAUİ, 28.04.2016, C. Doğar 1062.
ABBAUİ, 29.04.2016, C. Doğar 1089.
ABBAUİ, 29.04.2017, C. Doğar 1273.
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ABBAUİ, 11.03.2018, C. Doğar 1308.
***6. CAPSELLA** Medik.*
C. bursa-pastoris (L.) Medik. (Çobançantası)
HAUÇ, 27.04.2016, C. Doğar 1030.
ABBAUİ, 12.05.2016, C. Doğar 1092.
ABBAUİ, 29.04.2017, C. Doğar 1257, 1274 and 1281.
ABBAUİ, 11.03.2018, C. Doğar 1325, 1350.
***7. ALYSSUM** L.*
A. desertorum Stapf. var. desertorum (Dumonotu)
ABBAUİ, 11.03.2018, C. Doğar 1317, 1321.
A. strigosum Banks & Sol subsp. strigosum (Dökükkuduzotu)
ABBAUİ, 18.05.2018, C. Doğar 1384.
A. murale Waldst. & Kit var. murale (Sekikkuduzotu)
ABBAUİ, 18.05.2018, C. Doğar 1376.
***8. BARBAREA** R. BR.*
B. brachycarpa subsp. minor var. minor (K.Koch) Parolly & Eren (Nicarcık)
ABBAUİ, 29.04.2016, C. Doğar 1076.
***9. SISYMBRIUM** L.*
S. officinale (L.) Scop. (Ergelenhardalı)
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ABBAUİ, 29.04.2016, C. Doğar 1068.
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ABBAUİ, 18.05.2018, C. Doğar 1337.
S. altissimum L. (Ergelenotu)
KBAUİ, 02.06.2016, C. Doğar 1138.
ABBAUİ, 29.04.2017, C. Doğar 1252.
S. loeselii L. (Bülbülotu)
ABBAUİ, 12.05.2016, C. Doğar 1100, 1101 and 1102.
KBAUİ, 03.09.2016, C. Doğar 1226.
ABBAUİ, 11.03.2018, C. Doğar 1324.
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***10. DESCURAINIA** Webb & Berth.*
D. sophia (L.) Webb ex Prantl (Sadırotu)
HAUÇ, 27.04.2016, C. Doğar 1035.

KBAUİ, 28.04.2016, C. Doğar 1038.
ABBAUİ, 29.04.2016, C. Doğar 1075.
ABBAUİ, 12.05.2016, C. Doğar 1116, 1119.
ABBAUİ, 29.04.2017, C. Doğar 1258, 1278.
KBAUİ, 10.03.2018, C. Doğar 1301.
ABBAUİ, 11.03.2018, C. Doğar 1312.

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R. lutea L. var. lutea (Muhabbetçiçeği)
HAUÇ, 27.04.2016, C. Doğar 1023.
HAUÇ, 25.06.2016, C. Doğar 1175.
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5. VIOLACEAE

1. VIOLA *L.*
V. occulta Lehm. (Saklımenekşe)
KBAUİ, 10.03.2018, C. Doğar 1304.
ABBAUİ, 11.03.2018, C. Doğar 1307.

6. CARYOPHYLLACEAE

1. ARENARIA *L.*
A. serpyllifolia L. (Tarlakumotu)
ABBAUİ, 11.03.2018, C. Doğar 1315.

2. STELLARIA *L.*
S. media (L.) Vill. (Kuşotu)
ABBAUİ, 29.04.2017, C. Doğar 1284.
ABBAUİ, 11.03.2018, C. Doğar 1326.

3. CERASTIUM *L.*
C. perfoliatum L. (Ekinboynuzotu)
ABBAUİ, 29.04.2016, C. Doğar 1078.
ABBAUİ, 29.04.2017, C. Doğar 1282.
HAUÇ, 24.02.2018, C. Doğar 1295.
KBAUİ, 10.03.2018, C. Doğar 1306.

4. HOLOSTEUM *L.*
H. umbellatum L. (Şeytanküpesi)
KBAUİ, 28.04.2016, C. Doğar 1054.
ABBAUİ, 12.05.2016, C. Doğar 1093.

5. GYPSOPHILA *L.*
G. perfoliata L. var. perfoliata (Helvacıçöveni)
ABBAUİ, 16.08.2016, C. Doğar 1207.
G. pilosa Huds.(Tarlaçöveni)
KBAUİ, 02.06.2016, C. Doğar 1125, 1128 and 1158. Irano-Turanian.

6. VACCARIA *N. M. Wolf*
V. hispanica (Mill.) Rauschert (Ekinebesi)
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KBAUİ, 02.06.2016, C. Doğar 1155.

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1. POLYGONUM *L.*
P. persicaria L. (Söğütotu)
ABBAUİ, 18.05.2018, C. Doğar 1392.
P. cognatum Meissn. (Madımak)
ABBAUİ, 18.05.2018, C. Doğar 1374.
P. bellardii All. (Atmercimeleği)
KBAUİ, 02.06.2016, C. Doğar 1124.
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2. RUMEX *L.*
R. crispus L. (Labada)
ABBAUİ, 18.05.2018, C. Doğar 1338.

R. pulcher L.(Ekşilik)
ABBAUİ, 18.05.2018, C. Doğar 1364.
8. CHENOPODIACEAE
***1. CHENOPODIUM** L.*
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ABBAUİ, 01.10.2016, C. Doğar 1242.
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***2. ATRIPLEX** L.*
A. nitens Schkuhr (Dağıspanağı)
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***1. AMARANTHUS** L.*
A. retroflexus L. (Tilkikuyruğu)
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HAUÇ, 28.08.2016, C. Doğar 1216.
ABBAUİ, 01.10.2016, C. Doğar 1237.
ABBAUİ, 18.05.2018, C. Doğar 1348.
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***1. HIBISCUS** L.*
H. trionum L. (Kerkede)
ABBAUİ, 16.08.2016, C. Doğar 1197.
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ABBAUİ, 01.10.2016, C. Doğar 1244.
***2. MALVA** L.*
M. alcea L. (Ebecik)
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M. neglecta Wallr. (Çobançöreği)
HAUÇ, 25.06.2016, C. Doğar 1186.
ABBAUİ, 29.04.2017, C. Doğar 1250.
ABBAUİ, 18.05.2018, C. Doğar 1405.
***3. ALCEA** L.*
A. pallida (Willd.) Waldst. & Kit. (Devegülü)
HAUÇ, 28.08.2016, C. Doğar 1221.
11. LINACEAE
***1. LINUM** L.*
L. nodiflorum L. (Yabanketen)
KBAUİ, 02.06.2016, C. Doğar 1146. Mediterranean.
12. GERANIACEAE
***1. GERANIUM** L.*
G. tuberosum L. (Çakmuz)
ABBAUİ, 29.04.2016, C. Doğar 1081. Irano-Turanian.
G. pyrenaicum Burm. Fil. (Gelinçarşafı)
ABBAUİ, 11.03.2018, C. Doğar 1316.
ABBAUİ, 18.05.2018, C. Doğar 1363.
***2. ERODIUM** L' Herit*
E. ciconium (L.) L'Herit.(Kocakarınığnesi)
ABBAUİ, 18.05.2018, C. Doğar 1343, 1344.
E. cicutarium (L.) L' Herit subsp. Cicutarium (İğnelik)
KBAUİ, 02.06.2016, C. Doğar 1133.
ABBAUİ, 18.05.2018, C. Doğar 1362.
E. acaule (L.) Becherer et Thell. (Leylekgagası)
HAUÇ, 27.04.2016, C. Doğar 1008. Mediterranean.
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***1. OXALIS** L.*
O. pes-caprae L. (Kocaekşiyonca)

ABBAUİ, 18.05.2018, C. Doğar 1408.
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ABBAUİ, 18.05.2018, C. Doğar 1386.
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2. TRIFOLIUM *L.*
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3. MELILOTUS *L.*
M. officinalis (L.) Desr. (Kokuluyonca)
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KBAUİ, 02.06.2016, C. Doğar 1157.
4. MEDICAGO *L.*
M. sativa L. (Karayonca)
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ABBAUİ, 16.08.2016, C. Doğar 1194, 1202.
HAUÇ, 28.08.2016, C. Doğar 1218.
ABBAUİ, 18.05.2018, C. Doğar 1329.
5. LOTUS *L.*
L. corniculatus L. (Gazalboynuzu)
ABBAUİ, 16.08.2016, C. Doğar 1206
6. ONOBRYCHIS Adans.
O. viciifolia Scop. (Korunga)
HAUÇ, 27.04.2016, C. Doğar 1034.
KBAUİ, 02.06.2016, C. Doğar 1121.
7. ALHAGI *Adans.*
A. maurorum Medik. (Aguldikeni)
ABBAUİ, 18.05.2018, C. Doğar 1416. Irano-Turanian.
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1. POTENTILLA *L.*
P. recta L. (Suparmakotu)
ABBAUİ, 18.05.2018, C. Doğar 1369.
P. reptans L. (Reşatınotu)
HAUÇ, 25.06.2016, C. Doğar 1193.
ABBAUİ, 18.05.2018, C. Doğar 1331.
2. ROSA *L.*
R. canina L. (Kuşburnu)
ABBAUİ, 18.05.2018, C. Doğar 1365.
17. UMBELLIFERAE (APIACEAE)
1. ECHINOPHORA *L.*
E. tournefortii Jaub. & Spach (Dikenliçördük)
KBAUİ, 03.09.2016, C. Doğar 1222. Irano-Turanian.
2. BIFORA *Hoffm.*
B. radians Bieb. (Gısbana)
KBAUİ, 02.06.2016, C. Doğar 1156.
3. HERACLEUM *L.*
H. sphondylium L. (Devesil)
ABBAUİ, 18.05.2018, C. Doğar 1409. Euro-Siberian.
4. TURGENIA *Hoffm.*

T. latifolia (L.) Hoffm. (Karaheci)
KBAUİ, 02.06.2016, C. Doğar 1126.
***5. DAUCUS** L.*
D. guttatus Sm. (Beneklihavuç)
HAUÇ, 25.06.2016, C. Doğar 1166.
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***1. HEDERA** L.*
H. helix L. (Duvarsarmaşığı)
ABBAUİ, 18.05.2018, C. Doğar 1415.
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***1. LONICERA** L.*
L. caucasica Pallas (Çakkana)
KBAUİ, 28.04.2016, C. Doğar 1059.
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***1. SCABIOSA** L.*
S. argentea L. (Yazısüpürgesi)
HAUÇ, 25.06.2016, C. Doğar 1188.
S. rotata Bieb. (Topuyuzotu)
KBAUİ, 02.06.2016, C. Doğar 1141, 1145.
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***1. XANTHIUM** L.*
X. spinosum L. (Pıtrak)
ABBAUİ, 18.05.2018, C. Doğar 1375.
X. strumarium L. subsp. strumarium (Kocapıtrak)
ABBAUİ, 18.05.2018, C. Doğar 1398.
***2. SENECIO** L.*
S. vulgaris L. (Taşakcılotu)
ABBAUİ, 11.03.2018, C. Doğar 1319.
S. vernalis Waldst. & Kit. (Kanaryaotu)
HAUÇ, 27.04.2016, C. Doğar 1005.
ABBAUİ, 29.04.2016, C. Doğar 1087.
ABBAUİ, 29.04.2017, C. Doğar 1260.
S. viscosus L. (Yağlıkanaryaotu)
KBAUİ, 02.06.2016, C. Doğar 1137, 1144 and 1159.
***3. COTA** Gay ex Guss.*
C. tinctoria var. tinctoria (L.) J.Gay (Boyacıpapatyası)
HAUÇ, 25.06.2016, C. Doğar 1191.
C. tinctoria var. pallida (DC.) Özbek & Vural.
KBAUİ, 02.06.2016, C. Doğar 1152.
C. austriaca (Jacq.) Sch.Bip (Babuççа)
KBAUİ, 28.04.2016, C. Doğar 1040.
***4. ACHILLEA** L.*
A. santolinoides subsp. wilhelmsii (K.Koch) Greuter (Kardaşkınası)
KBAUİ, 03.09.2016, C. Doğar 1234. Irano-Turanian.
***5. CIRSIUM** Miller*
C. arvense (L.) Scop. (Köygöçüren)
HAUÇ, 25.06.2016, C. Doğar 1182.
ABBAUİ, 01.10.2016, C. Doğar 1235.
***6. CARDUUS** L.*
C. pycnocephalus L. (Soymaç)
KBAUİ, 28.04.2016, C. Doğar 1044.
KBAUİ, 02.06.2016, C. Doğar 1130.
ABBAUİ, 18.05.2018, C. Doğar 1393.
***7. RHAPONTICUM** Ludwig*

R. repens (L.) Hidalgo (Kekredikeni)
KBAUİ, 02.06.2016, C. Doğar 1142, 1147.
ABBAUİ, 16.08.2016, C. Doğar 1195.
ABBAUİ, 01.10.2016, C. Doğar 1238. Irano-Turanian.
***8. CYANUS** Mill.*
C. depressus (M.Bieb.) Soják (Gökbaş)
KBAUİ, 28.04.2016, C. Doğar 1047.
HAUÇ, 25.06.2016, C. Doğar 1176.
***9. SCOLYMUS** L.*
S. hispanicus L. (Şevketibostan)
HAUÇ, 25.06.2016, C. Doğar 1169. Mediterranean.
***10. CICHORIUM** L.*
C. intybus L. (Hindiba)
HAUÇ, 25.06.2016, C. Doğar 1174, 1183.
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***11. SCORZONERA** L.*
S. cana (C.A. Meyer) Hoffm. var. cana (Tekesakalı)
HAUÇ, 27.04.2016, C. Doğar 1024.
***12. TRAGOPOGON** L.*
T. dubius Scop. (Atyemliği)
HAUÇ, 27.04.2016, C. Doğar 1020.
T. pratensis L. (Salsifin)
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***13. TARAXACUM** Wiggers*
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HAUÇ, 27.04.2016, C. Doğar 1025.
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C. juncea L. var. juncea (Karakavuk)
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C. juncea L. var. acantholepis Boiss.
HAUÇ, 28.08.2016, C. Doğar 1208.
***15. CREPIS** L.*
C. sprengeriana (L.) All.
HAUÇ, 25.06.2016, C. Doğar 1167.
C. alpina L. (Yürekotu)
KBAUİ, 02.06.2016, C. Doğar 1132.
ABBAUİ, 18.05.2018, C. Doğar 1334.
C. foetida L. (Kohum)
HAUÇ, 28.08.2016, C. Doğar 1215.
***16. PICRIS** L.*
P. pauciflora Willd. (Kumşirotu)
HAUÇ, 28.08.2016, C. Doğar 1211. Mediterranean.
***17. SONCHUS** L.*
S. asper L. (Eşekgevreği)
ABBAUİ, 18.05.2018, C. Doğar 1411.
***18. LACTUCA** L.*
L. serriola L. (Eşekhelvası)
ABBAUİ, 18.05.2018, C. Doğar 1413.
22. PRIMULACEAE
***1. ANAGALLIS** L.*
A. arvensis var. caerulea (L.) Gouan (Farekulağı)
KBAUİ, 02.06.2016, C. Doğar 1123.

23. OLEACEAE
1. LIGUSTRUM *L.*
L. vulgare L. (Kurtbağrı)
ABBAUİ, 18.05.2018, C. Doğar 1420. Euro-Siberian.
24. APOCYNACEAE
1. VINCA *L.*
V. herbacea Waldst. & Kit. (Bikirçiçeği)
ABBAUİ, 29.04.2017, C. Doğar 1256.
25. CONVOLVULACEAE
1. CONVOLVULUS *L.*
C. arvensis L. (Tarlasarmaşığı)
KBAUİ, 28.04.2016, C. Doğar 1039, 1042.
ABBAUİ, 12.05.2016, C. Doğar 1113.
KBAUİ, 02.06.2016, C. Doğar 1122, 1143 and 1161.
HAUÇ, 25.06.2016, C. Doğar 1185, 1190.
ABBAUİ, 16.08.2016, C. Doğar 1201.
HAUÇ, 28.08.2016, C. Doğar 1214.
ABBAUİ, 01.10.2016, C. Doğar 1236.
C. galaticus Rotsan ex Choisy (Bozsarmaşık)
ABBAUİ, 12.05.2016, C. Doğar 1110.
ABBAUİ, 16.08.2016, C. Doğar 1203.
ABBAUİ, 18.05.2018, C. Doğar 1399. Irano-Turanian.
26. BORAGINACEAE
1. HELIOTROPIUM *L.*
H. europaeum L. (Akrepotu)
KBAUİ, 02.06.2016, C. Doğar 1160.
ABBAUİ, 18.05.2018, C. Doğar 1340. Irano-Turanian.
H. suaveolens M.Bieb. (Itırlıbambul)
KBAUİ, 03.09.2016, C. Doğar 1223.
ABBAUİ, 16.08.2016, C. Doğar 1205. East Mediterranean.
2. ASPERUGO *L.*
A. procumbens L. (Nevazilotu)
ABBAUİ, 12.05.2016, C. Doğar 1097.
ABBAUİ, 29.04.2017, C. Doğar 1261, 1262. Euro-Siberian.
3. BUGLOSSOIDES *Moench*
B. glandulosa (Velen.) R.Fern. (Sadırlıtaşkeseni)
ABBAUİ, 29.04.2016, C. Doğar 1088. Euxin.
B. arvensis (L.) I. M. Johnston (Tarlataşkeseni)
ABBAUİ, 29.04.2016, C. Doğar 1071.
ABBAUİ, 12.05.2016, C. Doğar 1091.
ABBAUİ, 16.08.2016, C. Doğar 1205.
ABBAUİ, 29.04.2017, C. Doğar 1254.
ABBAUİ, 11.03.2018, C. Doğar 1314.
4. ECHIUM *L.*
E. italicum L. (Kurtkuyruğu)
HAUÇ, 25.06.2016, C. Doğar 1163. Mediterranean.
5. MOLTKIA *Lehm.*
M. coerulea (Willd.) Lehm. (Mavikesen)
KBAUİ, 28.04.2016, C. Doğar 1045. Irano-Turanian.
6. ANCHUSA *L.*
A. leptophylla Roemer & Schultes subsp. Leptophylla (Ballık)
HAUÇ, 27.04.2016, C. Doğar 1029.
HAUÇ, 25.06.2016, C. Doğar 1170.
ABBAUİ, 18.05.2018, C. Doğar 1397.
A. pusilla Guşul. (Kırkgövrek)
KBAUİ, 28.04.2016, C. Doğar 1050.

ABBAUİ, 29.04.2016, C. Doğar 1080.
ABBAUİ, 12.05.2016, C. Doğar 1096.
KBAUİ, 02.06.2016, C. Doğar 1123.
ABBAUİ, 29.04.2017, C. Doğar 1275.
ABBAUİ, 18.05.2018, C. Doğar 1349.

27. SOLANACEAE

1. SOLANUM *L.*
S. americanum Mill. (İtüzümü)
ABBAUİ, 01.10.2016, C. Doğar 1246, 1247.

2. DATURA *L.*
D. stramonium L. (Boruçiçeği)
ABBAUİ, 01.10.2016, C. Doğar 1240, 1243.

3. HYOSCYAMUS *L.*
H. niger L. (Banotu)
KBAUİ, 28.04.2016, C. Doğar 1061.
ABBAUİ, 29.04.2016, C. Doğar 1070.

28. SCROPHULARIACEAE

1. VERBASCUM *L.*
V. lasianthum Boiss. ex Benth. (Yünlüsığırkuyruğu)
HAUÇ, 27.04.2016, C. Doğar 1014.
HAUÇ, 25.06.2016, C. Doğar 1184.
V. ancyritanum Bornm. (Ankarasığırkuyruğu)
ABBAUİ, 18.05.2018, C. Doğar 1351. Irano-Turanian /Endemic.

2. VERONICA *L.*
V. polita Fries (Mavişot)
HAUÇ, 27.04.2016, C. Doğar 1031.
ABBAUİ, 29.04.2017, C. Doğar 1267, 1279.
ABBAUİ, 11.03.2018, C. Doğar 1311.
V. persica Poiret (Cırcamuk)
ABBAUİ, 29.04.2016, C. Doğar 1083.
HAUÇ, 24.02.2018, C. Doğar 1292.
ABBAUİ, 18.05.2018, C. Doğar 1406, 1407.
V. triloba (Opiz) Kerner (Üçmaviş)
ABBAUİ, 29.04.2017, C. Doğar 1263.
HAUÇ, 24.02.2018, C. Doğar 1294.
ABBAUİ, 11.03.2018, C. Doğar 1313.
V. hederifolia L. (Baharmavisi)
ABBAUİ, 29.04.2016, C. Doğar 1079.
ABBAUİ, 12.05.2016, C. Doğar 1209.
HAUÇ, 24.02.2018, C. Doğar 1293.
V. anagallis-aquatica L. (Sugedemesi)
ABBAUİ, 18.05.2018, C. Doğar 1342, 1406 and 1407.

29. OROBANCHACEAE

1. OROBANCHE *L.*
O. ramosa L. (Narincanavarotu)
ABBAUİ, 01.10.2016, C. Doğar 1241.

30. LABIATAE (LAMIACEAE)

1. AJUGA *L.*
A. chamaepitys (L.) Schreber subsp. chia (Schreber) Arcangeli var. Chia (Acıgıcı)
HAUÇ, 27.04.2016, C. Doğar 1011.
KBAUİ, 28.04.2016, C. Doğar 1046.
KBAUİ, 02.06.2016, C. Doğar 1148.
KBAUİ, 03.09.2016, C. Doğar 1228.

2. LAMIUM *L.*
L. amplexicaule L. (Baltutan)
HAUÇ, 27.04.2016, C. Doğar 1036.

ABBAUİ, 29.04.2016, C. Doğar 1067.
ABBAUİ, 12.05.2016, C. Doğar 1095.
ABBAUİ, 29.04.2017, C. Doğar 1271. Euro-Siberian.
L. purpureum L. (Ballıbaba)
ABBAUİ, 12.05.2016, C. Doğar 1094.
ABBAUİ, 29.04.2017, C. Doğar 1272.
ABBAUİ, 11.03.2018, C. Doğar 1322.
ABBAUİ, 18.05.2018, C. Doğar 1404.
L. orientale (Fisch. & C.A.Mey.) E.H.L.Krause (Güzelce)
HAUÇ, 27.04.2016, C. Doğar 1033.
KBAUİ, 28.04.2016, C. Doğar 1055.
ABBAUİ, 12.05.2016, C. Doğar 1106.
KBAUİ, 02.06.2016, C. Doğar 1153. Irano-Turanian
***3. BALLOTA** L.*
B. nigra L. subsp. anatolica P. H. Davis (Gıripotu)
ABBAUİ, 18.05.2018, C. Doğar 1378. Irano-Turanian.
***4. STACHYS** L.*
S. cretica L. subsp. anatolica Rech.fil. (Yağlıkara)
HAUÇ, 25.06.2016, C. Doğar 1162. Endemic.
***5. CLINOPODIUM** L.*
C. graveolens subsp. rotundifolium (Pers.) Govaerts (Filiskin)
KBAUİ, 28.04.2016, C. Doğar 1052.
***6. MENTHA** L.*
M. longifolia (L.) Hudson subsp. typhoides (Briq.) Harley (Derenanesi)
ABBAUİ, 18.05.2018, C. Doğar 1359.
***7. SALVIA** L.*
S. syriaca L. (Çevlikotu)
KBAUİ, 28.04.2016, C. Doğar 1064. Irano-Turanian.
31. PLANTAGINACEAE
***1. PLANTAGO** L.*
P. major L. (Sinirotu)
ABBAUİ, 18.05.2018, C. Doğar 1335.
P. lanceolata L. (Damarlıca)
KBAUİ, 28.04.2016, C. Doğar 1066.
32. ELAEAGNACEAE
***1. ELAEAGNUS** L.*
E. angustifolia L.(İğde)
ABBAUİ, 18.05.2018, C. Doğar 1421.
33. EUPHORBIACEAE
***1. EUPHORBIA** L.*
E helioscopia L. (Feribanotu)
ABBAUİ, 29.04.2016, C. Doğar 1086.
ABBAUİ, 12.05.2016, C. Doğar 1107, 1108.
ABBAUİ, 29.04.2017, C. Doğar 1277.
ABBAUİ, 11.03.2018, C. Doğar 1323.
ABBAUİ, 18.05.2018, C. Doğar 1379.
E. macroclada Boiss. (Neblul)
KBAUİ, 02.06.2016, C. Doğar 1127, 1150.
HAUÇ, 25.06.2016, C. Doğar 1181.
KBAUİ, 03.09.2016, C. Doğar 1230. Irano-Turanian
E. seguieriana Necker (Tasmaotu)
KBAUİ, 28.04.2016, C. Doğar 1060.
34. RUBIACEAE
***1. GALIUM** L.*
G. verum L. subsp. Verum (Boyalık)
HAUÇ, 25.06.2016, C. Doğar 1192. Euro-Siberian.

G. spurium L. subsp. spurium (Arsıziplikçik)
ABBAUİ, 11.03.2018, C. Doğar 1327.
ABBAUİ, 18.05.2018, C. Doğar 1402. Euro-Siberian.
G. aparine L. (Çobansüzgeci)
ABBAUİ, 18.05.2018, C. Doğar 1358, 1402.
***2. RUBIA** L.*
R. tinctorum L. (Kökboyası)
ABBAUİ, 18.05.2018, C. Doğar 1410. Irano-Turanian
Subdivisio: ANGIOSPERMAE
Classis: MONOCOTYLEDONES
1. LILIACEAE
***1. ALLIUM** L.*
A. atroviolaceum Boiss. (Liflikörmen)
HAUÇ, 25.06.2016, C. Doğar 1180.
KBAUİ, 03.09.2016, C. Doğar 1224.
KBAUİ, 10.03.2018, C. Doğar 1296.
***2. ORNITHOGALUM** L.*
O. narbonense L. (Akbaldır)
ABBAUİ, 29.04.2017, C. Doğar 1264. Mediterranean.
O. umbellatum L. (Sunbala)
KBAUİ, 28.04.2016, C. Doğar 1041.
***3. MUSCARI** Miller*
M. neglectum Guss. (Arapüzümü)
KBAUİ, 10.03.2018, C. Doğar 1299, 1300.
***4. GAGEA** Salisb.*
G. villosa (Bieb.) Duby var. villosa (Tüylüyıldız)
KBAUİ, 10.03.2018, C. Doğar 1303.
ABBAUİ, 11.03.2018, C. Doğar 1310. Mediterranean.
***5. COLCHICUM** L.*
C. triphyllum G. Kunze (Öksüzali)
HAUÇ, 24.02.2018, C. Doğar 1287.
KBAUİ, 10.03.2018, C. Doğar 1297, 1298. Mediterranean.
2. IRIDACEAE
***1. CROCUS** L.*
C. danfordiae subsp. danfordiae Maw (İnceçiğdem)
HAUÇ, 24.02.2018, C. Doğar 1286. Endemic.
***2. GLADIOLUS** L.*
G. atroviolaceus Boiss. (Kıraçsüseni)
KBAUİ, 28.04.2016, C. Doğar 1048. Irano-Turanian
3. GRAMINEAE (POACEAE)
***1. ELYMUS** L.*
E. hispidus (Opiz) Melderis subsp. Hispidus (Elimotu)
HAUÇ, 24.02.2018, C. Doğar 1293.
***2. TRITICUM** L.*
T. aestivum L. (Ekmeklikbuğday)
ABBAUİ, 18.05.2018, C. Doğar 1387.
KBAUİ, 02.06.2016, C. Doğar 1134, 1135, 1151.
***3. HORDEUM** L.*
H. murinum L. subsp. glaucum (Steudel) Tzvelev (Duvararpası)
ABBAUİ, 29.04.2016, C. Doğar 1072.
KBAUİ, 02.06.2016, C. Doğar 1131.
HAUÇ, 24.02.2018, C. Doğar 1293.
ABBAUİ, 18.05.2018, C. Doğar 1345.
***4. BROMUS** L.*
B. tectorum L. subsp. tectorum (Kırbromu)
ABBAUİ, 18.05.2018, C. Doğar 1417.

B. sterilis L. (Sağırilcan)
ABBAUİ, 18.05.2018, C. Doğar 1401.
***5. ALOPECURUS** L.*
A. myosuroides Hudson var. myosuroides (Tarlatilkikuyruğu)
HAUÇ, 24.02.2018, C. Doğar 1090.
ABBAUİ, 18.05.2018, C. Doğar 1346. Euro-Siberian.
***6. PHLEUM** L.*
P. bertolonii DC. (Kumulitkuyruğu)
HAUÇ, 27.04.2016, C. Doğar 1028.
ABBAUİ, 29.04.2016, C. Doğar 1073.
***7. POA** L.*
P. angustifolia L. (Darsalkımotu)
HAUÇ, 27.04.2016, C. Doğar 1037.
ABBAUİ, 18.05.2018, C. Doğar 1355.
***8. SCLEROCHLOA P**. Beauv.*
S. dura (L.) P. Beauv. (Mıcırotu)
ABBAUİ, 18.05.2018, C. Doğar 1385. Euro-Siberian.
***9. PHRAGMITES** L.*
P. australis (Cav.) Trin. Ex Steudel (Kamış)
HAUÇ, 27.04.2016, C. Doğar 1027.
HAUÇ, 24.02.2018, C. Doğar 1288.
ABBAUİ, 18.05.2018, C. Doğar 1360. Euro-Siberian.
***10. SETARIA** P.Beauv.*
S. viridis (L.) P.Beauv. (Yeşilsıçansaçı)
HAUÇ, 27.04.2016, C. Doğar 1026.
ABBAUİ, 18.05.2018, C. Doğar 1418.