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FLORISTIC COMPOSITION IN THE RUDERAL AREAS OF SOUTHEAST ANATOLIA, TURKEY

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Abstract

Survey on the floral diversity is an important activity to evaluate the existing flora. This study was carried out from 2018 to 2020 to investigate the flora existing in the roadside and ruderal areas between Şanlıurfa and Bozova, nearby Euphrates river. A total of 200 taxa belonging to 138 genera and 41 families were determined. 9 of these taxa are endemic to Turkey. Among the plants identified, there are 5 geophytes, 1 parasite and 14 cultivated plants. The families with the most taxa are Fabaceae (47), Asteraceae (30), Lamiaceae (15), Poaceae (13) and Brassicaceae (7). The genera with the dominant taxa are; *Astragalus* (7), *Medicago* (7), *Trigonella* (7), *Vicia* (5) and *Trifolium* (5). In distribution of plants in the study area, the Irano-Turanian elements (38%, 75 taxa) ranks first, Mediterranean elements second (15%, 30 taxa) and Euro-Siberian elements third (1%, 3). The botanical- and vernacular names and habit categories of the recorded plant taxa are cited systematically. Threats to these plants and possible conservation strategies are also discussed briefly.

Introduction

Flora is the list of plant species that have a certain boundary and cover an area. In fact, although the term 'flora' includes the whole plant community, it is generally used for ferns (Pteridophyta) and seed plants (Spermatophyta), i.e. the vascular plants (Güner *et al*., 2012).

Flora of Turkey, refers to all plant species growing naturally in Turkey. Turkey is one of the very rich and interesting country in the world in terms of its flora due to the facts that it belongs to three different phytogeographical regions, it is rich in geological structure and location and climate diversity, and it houses 9996 plant species of 1320 genera under 167 families, including 3649 endemic taxa (Ekim, 2000; Güner *et al*., 2012). Peter Hadland Davis, visited Turkey many times, collected a lot of plant samples, and publised the nine volumes of "Flora of Turkey and the East Aegean Islands" in 1965-1985 (Davis, 1965-1985). The 10th volume was published by Davis *et al*. (1988) and the 11th by Turkish Botanists (Güner *et al*., 2000). Davis (1965) stated that Turkey serves as a gateway for the spread of Southwest Asian plants to Southern Europe, differentiation area for many species and breeds, it is very rich in terms of endemic species and it is the homeland of many cultivated plants.

Though Turkey is very rich in plant diversity and a gene center of many plant taxa, however, as a result of increasing anthropogenic interactions, many identified and unidentified plant species are rapidly disappearing. Therefore, the importance of floristic studies for collection of updated data on the plant species of this country is increasing day by day for sustainable use and conservation of its plant resources.

South-east Anatolia is a "little known" or "unknown" region of Turkey, with regard to floristic studies (Davis, 1975; Çırpıcı, 1987). The research area falls within this "little known"

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region of Turkey. Floristic surveys in Anatolia region were previously done by different researchers, *viz.* Adıgüzel and Aytaç (2001), Aydoğdu and Akan (2005), Akan *et al.* (2005), Türkmen *et al.* (2005), Aslan and Atamov (2006), Parmaksız *et al.* (2006), Atamov *et al.* (2007a), Atamov *et al.* (2007b), Balos and Akan (2008), Eker *et al.* (2008), Korkut *et al.* (2008), Akan and Balos (2008), Doğan (2009), Kaya and Ertekin (2009), Atamov *et al.* (2009), Cevheri (2011), Abak and Akan (2014), Akan and Ayaz (2016), Şafak (2016), Altay and Karahan (2017), Aslan and Akan (2019), and Yalçınalp and Meral (2019). However, no regular floristic study has been performed in our research area.

"Ruderal plant" is a general name given to plant species that grow in colonies in areas that are not suitable for the life of plants, such as waste areas (Şafak, 2015). Roadside vegetation has various species of different life-forms and origins. Road construction destroys some parts of the natural habitats and as a result, new man-made habitats are formed (Pourrezaei *et al.*, 2017). The structure of the roadside habitat is basically formed by roads and road margins (Frenkel, 1977; Dogan *et al.*, 2004). Roadside habitats differ from surrounding natural areas and support various species with different ecological needs. Roads and roadsides are also included in the 'ruderal habitat' group (Hamel and Dansereau, 1949), which is an exceptional type of habitat category. Ruderal coenoses develop on walls, ruins, dumps along roadsides and slopes (Poldini, 1992).

Since no study on the floristic composition in the ruderal areas between Şanlıurfa and Bozova of southeast Anatolia was known from the literatures, it was thought to be valuable to identity the plant taxa of roadsides ruderals of this area of Turkey, and as the concept of ruderal area is wide, this study has focused on the roadside ruderals only. The objectives of this study were to explore the floristic composition and recognize the endemic and threatened plant species of the roadsides and ruderal areas of the region between Şanlıurfa and Bozova road, nearby Euphrates river, South-east Anatolia. The data obtained as a result of this study will contribute to the floral diversity of roadsides and ruderal areas of Turkey.

Materials and Methods

This research was carried out between 2018 and 2020. Our research area belongs to the region between Bozova town and Şanlıurfa province, nearby Euphrates river (Fig. 1). This region is located in C7 square according to Davis's grid system (Davis, 1965) and in the Middle Euphrates section according to Güner *et al.* (2012). The distance between the two towns is about 50 km. The altitude varies between 500 and 700 m. The settlements around the study area include Kızlar, Günışık, Korukezen, Tülmen, Küçük Tülmen, Kestaş and Avlak. The area is consisted of 18584 km² (Güzel, 2020). Şanlıurfa province is located in between 37'09'35' N and 38'47'23' E, on the south side of the Southeastern Anatolia Region. Bozova is located in the western part of the province of Şanlıurfa, the east and north of the district is mountainous, the south is flat and lower. General vegetation of Bozova district consists of ruderal plants in steppe and flat areas. Şanlıurfa has a typical semiarid Mediterranean climate character as it is close to the Euphrates River. Summers are dry and hot, winters are rainy and warm. The average annual temperature of Şanlıurfa is 18.7°C. Annual rainfall is about 457.8 mm (Güzel, 2020).

Brown soils constitute a large part of our study area between Şanlıurfa and Bozova road. It is the most common soil group. Alluvial soils in the areas carried by the Euphrates River and located along the banks of the Euphrates River (Güzel, 2020). It is suitable for cultivation of various cultivated Plants. In our research area, there are mostly habitats such as roadside, field edge and steppe.

Plant samples (300) were collected during the field studies conducted in the months when the plants coincided with different vegetation periods. These samples were numbered and pressed,

then dried according to the standard herbarium method and adhered regularly to the cartons (Thiers, 2019). Plant identification were done from Flora of Turkey (Davis, 1965-1985; Davis *et al.*, 1988; Güner *et al.*, 2000). Plant specimens are stored in Harran University Faculty of Arts and Sciences herbarium (HARRAN), Şanlıurfa, Turkey.

Endemic, rare and under more threat to the threat categories of taxa "Turkey Plant Red Data Book" (Ekim, 2000) and is http://www.tehditaltindabitkiler.org.tr/v2/ benefited from the site. The nomenclatural information are given according to The Plant List (2013). Turkish names of plant taxa is given according to List of Vascular Plants of Turkey (Güner *et al.*, 2012).

Fig. 1. Geographical map of the research area (Müdürlüğü, 2020).

Results and Discussion

During this study, a total of 200 taxa belonging to 138 genera and 41 families were found in the roadside ruderals of the area between Şanlıurfa and Bozova of Southeast Anatolıa (Table 1). The Gymnospermae of this area is represented by only one species, whereas the Angiospermae by 199 taxa. The dicotyledons of this area consist of **172** under 32 families, and the monocotyledons of under nine families. Most of these taxa belong to the families Fabaceae (47), Asteraceae (30), Lamiaceae (15), Poaceae (13) and Brassicaceae (7). *Astragalus*, *Medicago* and *Trigonella*, with seven species each, and *Vicia* and *Trifolium*, with five species each, are are found as the major genera. Each taxon is enlisted with botanical name, vernacular name, family name, habit, citing literature and respective voucher specimen (Table 1).

Total 14 plant species of the area, *viz*. *Pistaci avera*, *Robinia pseudocacia*, *Morus alba*, *M. nigra*, *Ficus carica*, *Olea europaea*, *Pinus nigra*, *Punica granatum*, *Persica vulgaris*, *Amygdalus communis*, *Amygdalus moriantalis*, *Rosmarinus officinalis*, *Pyracantha coccinea* and *Vitis vinifera*, are recognized as cultivated (Table 1).

Table 1. List of plant taxa recorded from the roadside ruderals of the area between Şanlıurfa and Bozova of Southeast Anatolıa.

Sl. no	Family	Botanical name	Habit	Vernacular name	Literature cited	Voucher no
1	Amaryllidaceae	*Allium scorodoprasum* L. subsp. *rotundum* (L.) Steam	H	Delipırasa	Doğan *et al.* (2004), Babacan *et al.* (2017)	Zİ 1117
2	Amaranthaceae	*Amaranthus albus* L.	H	Kömüşmancarı	Davis (1965–1988), Polunin (1997), Doğan *et al.* (2004)	Zİ 1145
3	Anacardiaceae	**Pistacia vera* L.	T	Antepfıstığı	-	Zİ 1207
4	Anacardiaceae	*Rhus coriaria* L.	S	Sumak	Doğan *et al*, (2004)	Zİ 1205
5	Apiaceae	*Artedia squamata* L.	H	Karabenek	Babacan *et al.* (2017)	ZI 1066 ZI 1101 ZI 1182
6	Apiaceae	*Coriandrum sativum* L.	H	Kişniş	Doğan *et al*, (2004)	ZI 1170
7	Apiaceae	*Pimpinella corymbosa* Boiss.	H	Salkımanason	Yeşil *et al.* (2018)	ZI 1234
8	Apiaceae	*Pimpinella eriocarpos* Banks & Sol	H	Meyane	Yeşil *et al.* (2018)	ZI 1095
9	Apiaceae	*Scandix iberica* M. Bieb	H	Atkişnekotu	Kerar & Akan (2019)	ZI 1244
10	Apiaceae	*Tordylium hasselquistiae* DC.	H	Ekindavulotu	-	ZI 1103
11	Apiaceae	*Torilis leptophylla* (L.) Rchb. F.	H	İncedercikotu	Ertekin (2002), Babacan *et al.* (2017)	ZI 1051
12	Araceae	*Biarum carduchorum* (Schott) Engl.	H	Kardi	-	ZI 1142
13	Asparagaceae	*Hyacinthella nervosa* (Bertol.) Chouard	H	Arapkopçası	-	ZI 1000
14	Asparagaceae	*Muscari comosum* (L.) Mill.	H	Morbaş	-	ZI 1012
15	Asparagaceae	*Muscari neglectum* Guss. ex Ten	H	Arapüzümü	-	ZI1001
16	Asparagaceae	*Ornithogalum narbonense* L.	H	Akbaldır	Davis (1965–1988)	ZI 1118
17	Asteraceae	*Achillea aleppica* DC. subsp. *aleppica*	H	Tatarcıotu	Abak & Akan (2014)	ZI 1004
18	Asteraceae	*Anthemis hyalina* DC.	H	Dermanpapatyası	Abak & Akan (2014)	ZI 1107
19	Asteraceae	*Anthemis pungens* Yavin	H	Geyikpapatyası	Abak & Akan (2014)	ZI 1038
20	Asteraceae	*Calendula arvensis* (Vaill.) L.	H	Portakalnergisi	Davis (1965–1988), Doğan *et al.* (2004)	ZI 1025
21	Asteraceae	*Carduus nutans* L. subsp. *nutans*	H	Eşekdikeni	Abak & Akan (2014)	ZI 1108
22	Asteraceae	*Carduus pycnocephalus* L. subsp. *breviphyllarius* P.H. Davis	H	Kilindor	Abak & Akan (2014)	ZI 1048
23	Asteraceae	*Carthamus lanatus* L.	H	Sarıdiken	Abak & Akan (2014)	ZI 1153
24	Asteraceae	*Centaurea iberica* Trev. ex Sprengel	H	Deligözdikeni	Davis (1965–1988), Akan *et al.* (2005), Abak & Akan (2014)	ZI 1138
25	Asteraceae	*Centaurea rigida* Banks & Sol.	H	Gürbüzdikeni	Abak & Akan (2014)	ZI 1219

Table 1 contd.

Sl. no.	Family	Botanical name	Habit	Vernacular name	Literature cited	Voucher no.
26	Asteraceae	Centaurea solstitialis L. subsp. solstitialis	H	Çakırdikeni	Davis (1965–1988), Poldini (1992), Doğan et al. (2004), Abak & Akan (2014), Babacan et al. (2017)	ZI 1204
27	Asteraceae	Chardinia orientalis (L.) Kuntze.	H	Çağlaotu	Davis (1965–1988), Abak & Akan (2014)	ZI 1052
28	Asteraceae	Cichorium intybus L.	H	Hindiba	Davis (1965–1988), Ozturk et al. (1990), Ozturk & Ozcelik (1991), Ertekin (2002), Doğan et al, (2004), Abak & Akan (2014)	ZI 1221
29	Asteraceae	Conyza canadensis (L.) Cronquist	H	Selviotu	Abak & Akan (2014), Ertekin (2002)	ZI 1143
30	Asteraceae	Cota altissima (L.) J. Gay	H	Köpekpapatyası	Abak & Akan (2014), Babacan et al. (2017)	ZI 1083
31	Asteraceae	Crepis sancta (L.) Bornm.	H	Yabankıskısı	Abak & Akan (2014)	ZI 1041 ZI 1140
32	Asteraceae	Crupina crupinastrum (Moris) Vis.	H	Gelindöndüren	Babacan et al. (2017)	ZI 1080 ZI 1049
33	Asteraceae	Cyanus depressus (M. Bieb.) Sojak.	H	Gökbaş	Babacan et al. (2017)	ZI 1096 ZI 1192
34	Asteraceae	Echinops spinosissimus Turra subsp. spinosissimus	H	Eşekköftesi	Davis (1965–1988)	ZI 1132
35	Asteraceae	Filago pyramidata L.	H	Ateşpamuğu	Davis (1965–1988), Doğan et al. (2004), Abak & Akan (2014)	ZI 1199
36	Asteraceae	Geropogon hybridus (L.) SchultzBip.	H	Melezyemlik	-	ZI 1026 ZI 1036
37	Asteraceae	Gundelia armata (Freyn & Sint.) Fırat	H	Haskenger	Abak & Akan (2014)	ZI 1109
38	Asteraceae	Notobasis syriaca (L.) Cass.	H	Yavan kenger	Davis (1965–1988),	ZI 1187 ZI 1185
39	Asteraceae	Onopordum carduchorum Bornm&Beauverd	H	Kavdikeni	Balos & Akan (2008)	ZI 1136
40	Asteraceae	Senecio vernalis Waldst. & Kit.	H	Kanarya otu	Davis (1965–1988), Ozturk et al.(1990), Ertekin (2002), Doğan et al. (2004), Aydoğdu & Akan (2005), Abak & Akan (2014)	ZI 1039 ZI 1164 ZI 1165 ZI 1208
41	Asteraceae	*Siebera nana* (DC.) Bornm	H	Bodurfezaçiçeği	Tugay & Öztürk (2003)	ZI 1127
42	Asteraceae	*Scorzonera kotschyi* Boiss.	H	Nurteke sakalı	-	ZI 1056

Table 1 contd.

Sl. no.	Family	Botanical name	Habit	Vernacular name	Literature cited	Voucher no.
43	Asteraceae	*Scorzonera laciniata* L. subsp. *laciniata*	H	Parım	-	ZI 1050 ZI 1186
44	Asteraceae	*Tragopogon porrifolius* L. subsp. *longirostris* (Sch. Bip.) Greuter	H	Helevan	Davis (1965–1988), Doğan *et al.* (2004)	ZI 1097 ZI 1232
45	Asteraceae	*Xanthium strumarium* L. subsp. *strumarium*	H	Kocapıtrak	Ozturk *et al*. (1990), Ertekin (2002), Doğan *et al.* (2004), Abak & Akan (2014)	ZI 1150
46	Asteraceae	*Zoegea leptaurea* L.	H	Sarıdüğme	Doğan (2009)	ZI 1200
47	Brassicaceae	*Alyssum strictum* Willd.	H	Dikkuduzotu	Doğan (2009)	ZI 1023
48	Brassicaceae	*Capsella bursa-pastoris* (L.) Medik.	H	Çoban çantası	Doğan (2009)	ZI 1160
49	Brassicaceae	*Clypeola jonthlaspi* L.	H	Akçeotu	Acar (2001)	ZI1022
50	Brassicaceae	*Eruca vesicaria* (L.) Cav.	H	Roka	-	ZI 1176
51	Brassicaceae	*Lepidium draba* L.	H	Diğnik	Balos & Akan (2008), Babacan *et al.* (2017)	ZI 1236
52	Brassicaceae	*Sinapis alba* L. subsp *alba*	H	Mamalık	Davis (1965–1988), Doğan *et al.* (2004)	ZI 1027
53	Brassicaceae	*Sinapis arvensis* L.	H	Hardal	Davis (1965–1988), Ozturk & Ozcelik (1991), Ertekin (2002), Doğan *et al*, (2004)	ZI 1172
54	Boraginaceae	*Alkanna strigosa* Boiss. &Hohen.	H	Havacivaotu	Yıldırım *et al.* (2016), Aydoğdu & Akan (2005), Babacan *et al*. (2017)	ZI 1044
55	Boraginaceae	*Anchusa azurea* Mill. var. *azurea*	H	Sığırdili	Babacan *et al*. (2017)	ZI 1092 ZI 1058
56	Boraginaceae	*Anchusa azurea* Mill. var. *kurdica* (Guşul.) Chamb.	H		Bozok & Aksoy (2013)	ZI 1146 ZI 1139
57	Boraginaceae	*Heliotropium dolosum* De Not.	H	Balbulotu	Davis (1965–1988)	ZI 1228
58	Boraginaceae	*Rochelia disperma* (L.f.) K. Koch var. *disperma*	H	Kuşçırnağı	-	ZI 1074
59	Capparaceae	*Capparis sicula* Veill. subsp. *sicula*	S	Delikarpuzu	Akan *et al.* (2004), Balos & Akan (2008)	ZI 1148 ZI 1223
60	Caprifoliaceae	*Cephalaria syriaca* (L.) Schrad	H	Pelemir	Ertekin (2002), Babacan *et al*. (2017)	ZI 1099
61	Caprifoliaceae	*Scabiosa calocephala* Boiss.	H	Çayıruyuzotu	Davis (1965–1988), Doğan *et al*, (2004)	ZI 1130
62	Caprifoliaceae	*Scabiosa persica* Boiss.	H	Acemzivanı	-	ZI 1093
63	Caprifoliaceae	*Valerianella vesicaria* (L.) Moench	H	Kuzugevreği	-	ZI 1045 ZI 1065
64	Caprifoliaceae	*Valerianella pumila* (L.) DC.	H	Bağkuzugevreği	-	ZI 1105

Table 1 contd.

Sl. no.	Family	Botanical name	Habit	Vernacular name	Literature cited	Voucher no.
65	Caryophyllaceae	*Arenaria sabulinea* Griseb. ex Fenzl	H	Fıratkumotu	-	ZI 1163
66	Caryophyllaceae	*Dianthus strictus* Bank & Sol.	H	Dimisok	-	ZI 1227
67	Caryophyllaceae	*Minuartia montana* L.	H	Demettıstısı	-	ZI 1239
68	Caryophyllaceae	*Silene coniflora* Nees ex Otth	H	Çölnakılı	Davis (1965–1988)	ZI 1030 ZI 1070
69	Caryophyllaceae	*Silene crassipes* Fenzl	H	Tarlanakılı	-	ZI 1235
70	Caryophyllaceae	*Vaccaria hispanica* (Mill.) Rauschert	H	Ekinebesi	-	ZI 1224
71	Convolvulaceae	*Convolvulus arvensis* L.	Cl	Tarlasarmaşığı	Davis (1965–1988), Polunin (1997), Doğan *et al.*(2004)	ZI 1128 ZI 1217 ZI 1231
72	Convolvulaceae	*Convolvulus dorycnium* L. subsp. *dorycnium*	Cl	Bağarcıkurganı	-	ZI 1125
73	Convolvulaceae	*Convolvulus galaticus* Rost. ex Choisy	Cl	Bozsarmaşık	Ertekin (2002)	ZI 1054 ZI 1230
74	Crassulaceae	*Umbilicus horizontalis* DC.	H	Kalaba	-	ZI 1154
75	Cyperaceae	*Cyperus glaber* L.	H	Küsnüotu	-	ZI 1177
76	Cyperaceae	*Cyperus longus* L. subsp. *longus*	H	Karatopalak	-	ZI 1218
77	Euphorbiaceae	*Euphorbia aleppica* L.	H	Haşul	Davis (1965–1988)	ZI 1071
78	Euphorbiaceae	*Euphorbia cheiradenia* Boiss. & Hohen	H	Şirker	Babacan *et al.* (2017)	ZI 1215 ZI 1157 ZI 1135 ZI 1133
79	Euphorbiaceae	*Euphorbia falcata* L. subsp. *falcata*	H	Eğrisütleğen	Babacan *et al.* (2017)	ZI 1094 ZI 1089
80	Euphorbiaceae	*Euphorbia helioscopia* L. subsp. *helioscopia*	H	Feribanotu	-	ZI 1174
81	Fabaceae	*Astragalus aduncus* Willd.	H	Çengelgeven	Ekici *et al.* (2015)	ZI 1110
82	Fabaceae	*Astragalus aleppicus* Boiss.	H	Halepgeveni	-	ZI 1246
83	Fabaceae	*Astragalus caprinus* L. subsp. *caprinus*	H	Tekegeveni	-	ZI 1002
84	Fabaceae	*Astragalus scabrifolius* Boiss.	H	Gövdesizgeven	-	ZI 1005
85	Fabaceae	*Astragalus suberosus* Banks & Sol.	H	Yemenigeveni	Babacan *et al. (*2017)	ZI 1003
86	Fabaceae	*Astragalus triradiatus* Bunge.	H	Üçgeven	-	ZI 1028
87	Fabaceae	*Astragalus xylobasis* Freyn&Bornm.	H	Kemaliyegeveni	Ekici *et al.* (2015)	ZI 1111
88	Fabaceae	*Coronilla scorpioides* (L.) W.D.J. Koch	H	Akrepburçağı	Babacan *et al. (*2017)	ZI 1031
89	Fabaceae	*Glycyrrhiza glabra* L. var. *glabra*	H	Meyan	Ertekin (2002), Aydoğdu & Akan (2005), Babacan *et al. (*2017), Balos & Akan (2008)	ZI 1061 ZI 1178
90	Fabaceae	*Hedysarum varium* Willd.	H	Batalak	-	ZI 1081

Table 1 contd.

Sl. no.	Family	Botanical name	Habit	Vernacular name	Literature cited	Voucher no.
91	Fabaceae	*Hymenocarpos circinnatus* (L.) Savi	H	Pulluot	-	ZI 1085
92	Fabaceae	*Lathyrus pseudo-cicera* Pamp.	H	Hatunbaklası	-	ZI 1046
93	Fabaceae	*Lens culinaris* Medik.	H	Mercimek	-	ZI 1225
94	Fabaceae	*Lotus gebelia* Vent. var. *gebelia*	H	Gülgazalboynuzu	-	ZI 1114
95	Fabaceae	*Medicago crassipes* (Boiss.) E. Small	H	Hançeryoncası	Akan *et al.* (2009)	ZI 1011
96	Fabaceae	*Medicago fischeriana* (Ser.) Trautv.	H	Mızrakyonca	Akan *et al.* (2009)	ZI 1008
97	Fabaceae	*Medicago monantha* (C.A. Mey.) Trautv	H	Dağgurniği	Akan *et al.* (2009)	ZI 1007 ZI 1195
98	Fabaceae	*Medicago phrygia* (Boiss. & Balansa) E. Small	H	Uşakyoncası	Akan *et al.* (2009)	ZI 1010
99	Fabaceae	*Medicago polymorpha* L. var. *polymorpha*	H	Kırkyonca	Polunin (1997), Doğan *et al.* (2004), Balos & Akan (2008)	ZI 1033
100	Fabaceae	*Medicago radiata* L.	H	Hilalyonca	-	ZI 1040
101	Fabaceae	*Medicago x varia* Martyn	H	Yabanyoncası	-	ZI 1006
102	Fabaceae	*Melilotus indicus* (L.) All.	H	Otuzluyonca	-	ZI 1112
103	Fabaceae	*Melilotus officinalis* (L.) Desr.	H	Kokuluyonca	Balos &Akan (2008), Babacan *et al*. (2017)	ZI 1180
104	Fabaceae	*Onobrychis aequidentata* (Sibth. &Sm.) d Urv	H	Dişlekkorunga	-	ZI 1084
105	Fabaceae	*Onobrychis caput-galli* (L.) Lam.	H	Pıtrakkorunga	Davis (1965–1988), Polunin (1997), Doğan *et al.* (2004)	ZI 1113
106	Fabaceae	*Onobrychis galegifolia* Boiss.	H	Darpkorungası	-	ZI 1216
107	Fabaceae	*Pisum sativum* L. subsp. *sativum* var. *arvense* (L.) Poiret	H	Bezelye	Ertekin (2002), Babacan *et al*. (2017)	ZI 1062
108	Fabaceae	*Prosopis farcta* (Banks& Sol.) J.F. Macbr.	H	Çediotu	-	ZI 1152 ZI 1201
109	Fabaceae	**Robinia pseudocacia* L.	T	Yalancıakasya	Davis (1965–1988)	ZI 1212
110	Fabaceae	*Scorpiurus subvillosus* L. var. *subvillosus*	H	Koyundücüğü	-	ZI 1086
111	Fabaceae	*Trifolium nigrescens* Viv. subsp. *nigrescens*	H	Yanıküçgül	Babacan *et al*. (2017)	ZI 1073
112	Fabaceae	*Trifolium purpureum* Lois.	H	Morüçgül	Davis (1965–1988)	ZI 1102 ZI 1104
113	Fabaceae	*Trifolium resupinatum* L. var. *resupinatum*	H	Anadoluüçgülü	Davis (1965–1988) Doğan *et al*, (2004)	ZI 1079
114	Fabaceae	*Trifolium spumosum* L.	H	Keseyonca	Davis (1965–1988)	ZI 1064
115	Fabaceae	*Trifolium stellatum* L. var. *stellatum*	H	Yıldızyonca	Davis (1965–1988), Doğan *et al*, (2004)	ZI 1019 ZI 1082 ZI 1075

Table 1 contd.

Sl. no.	Family	*Botanical name*	Habit	Vernacular name	Literature cited	Voucher no.
116	Fabaceae	*Trigonella caelesyriaca* Boiss.	H	Handekok	Akan *et al.* (2009)	ZI 1016
117	Fabaceae	*Trigonella filipes* Boiss.	H	İnceboyotu	Akan *et al.* (2009)	ZI 1035
118	Fabaceae	*Trigonella kotschyi* Fenzl.	H	Akboyotu	Akan *et al.* (2009)	ZI 1009
119	Fabaceae	*Trigonella mesopotamica* Hub.-Mor.	H	Dicleboyotu	Akan *et al.* (2009)	ZI 1245
120	Fabaceae	*Trigonella monspeliaca* L.	H	Somçemenotu	Akan *et al.* (2009)	ZI 1196
121	Fabaceae	*Trigonella spicata* Sibth. &Sm.	H	Başakboyutu	Akan *et al.* (2009)	ZI 1226
122	Fabaceae	*Trigonella spruneriana* Boiss.	H	Koçboyotu	Akan *et al.* (2009)	ZI 1223 ZI 1018
123	Fabaceae	*Vicia hybrida* L.	H	Melezbakla	-	ZI 1060
124	Fabaceae	*Vicia narbonensis* L. var. *narbonensis*	H	Kocaçığ	-	ZI 1032 ZI 1072
125	Fabaceae	*Vicia palaestina* Boiss.	H	Yabaniküşve	-	ZI 1015
126	Fabaceae	*Vicia peregrina* L.	H	Kavli	Balos & Akan (2008)	ZI 1017
127	Fabaceae	*Vicia sativa* L. subsp. *sativa*	H	Fiğ	Frenkel (1977), Doğan *et al.* (2004), Balos & Akan (2008)	ZI 1043
128	Geraniaceae	*Geranium tuberosum* L.	H	Çakmuz	Eker *et al.* (2008), Babacan *et al. (*2017)	ZI 1068 ZI 1175
129	Geraniaceae	*Erodium cicutarium* (L.) L Hér. subsp. *cicutarium*	H	İğnelik	Frenkel (1977), Polunin (1997), Doğan *et al.* (2004), Aydoğdu & Akan (2005)	ZI 1020 ZI 1169
130	Hyperıcaceae	*Hypericum perforatum* L.	H	Kantaron	-	ZI 1115
131	Hyperıcaceae	*Hypericum triquetrifolium* Turra	H	Pırpırotu	-	ZI 1155
132	Iridaceae	*Crocus cancellatus* Herb. subsp. *damascenus* (Herb.) B. Mathew	H	Pivok	-	ZI 1144
133	Iridaceae	*Iris persica* L.	H	Buzala	-	ZI 1171
134	Iridaceae	*Iris x germanica* L.	H	Göksüsen	-	ZI 1100
135	Ixioliriaceae	*Ixiolirion tataricum* (Pall.) Schult. & Schult. F. var. *tataricum*	H	Köpekotu	-	ZI 1241
136	Juncaceae	*Juncus inflexus* L.	H	Sazak	Davis (1965–1988), Doğan *et al.* (2004), Babacan *et al. (*2017)	ZI 1243
137	Lamiaceae	*Ballota saxatilis* Siebernex C. Presl subsp. *saxatilis*	H	Nemnemotu	Aydoğdu & Akan (2005)	ZI 1149
138	Lamiaceae	*Lamium amplexicaule* L.var.*aleppicum* (Boiss. et Hausskn) Bornm.	H	Baltutan	Davis (1965–1988), Doğan *et al.* (2004)	ZI 1076 ZI 1173 ZI1166
139	Lamiaceae	*Marrubium vulgare* L.	H	Karaderme	Davis (1965–1988), Polunin (1997), Doğan *et al.* (2004)	ZI 1116
140	Lamiaceae	*Moluccella laevis* L.	H	Çanakçiçeği	-	ZI 1222
141	Lamiaceae	*Phlomis bruguieri* Desf.	H	Kabaçalba	Aydoğdu & Akan (2005)	ZI 1124

Table 1 contd.

Sl. no.	Family	*Botanical name*	Habit	Vernacular name	Literature cited	Voucher no.
142	Lamiaceae	*Phlomis kurdica* Rech.f.	H	Gubel	Ertekin (2002), Aydoğdu & Akan (2005)	ZI 1129
143	Lamiaceae	*Phlomis pungens* Willd. var. *pungens*	H	Silvanok	Davis (1965–1988)	ZI 1141
144	Lamiaceae	**Rosmarinus officinalis* L.	S	Biberiye	Davis (1965–1988)	ZI 1078
145	Lamiaceae	*Salvia multicaulis* Vahl	H	Kürtreyhanı	-	ZI 1087
146	Lamiaceae	*Salvia palaestina* Benth.	H	Sürmelişalba	-	ZI 1134
147	Lamiaceae	*Salvia syriaca* L.	H	Çevrikotu	-	ZI 1184
148	Lamiaceae	*Salvia virgata* Jacq.	H	Fatmanaotu	Davis (1965–1988) Doğan *et al.* (2004)	ZI 1088
149	Lamiaceae	*Teucrium polium* L. subsp. *polium*	H	Acıyavşan	Babacan *et al. (*2017)	ZI 1137
150	Lamiaceae	*Ziziphora capitata* L.	H	Anuk	Babacan *et al. (*2017)	ZI 1013
151	Lamiaceae	*Ziziphora tenuior* L.	H	Fareotu	-	ZI 1162
152	Liliaceae	*Gagea reticulata* (Pall.) Schult. &Schult.F.	H	Ağyıldızı	Davis (1965–1988)	ZI 1242
153	Linaceae	*Linum mucronatum* Bertol. subsp. *mucronatum*	H	Sarıketen	Tugay & Öztürk (2003)	ZI 1063 ZI 1229
154	Malvaceae	*Alcea acaulis* (Cav.) Alef.	H	Hiro	-	ZI 1156
155	Malvaceae	*Alcea digitata* (Boiss.) Alef	H	Boyluhatmi	Balos & Akan (2008)	ZI 1126
156	Malvaceae	*Alcea hohenackeri* (Boiss. &Huet) Boiss.	H	Hevur	-	ZI 1098
157	Malvaceae	*Alcea striata* (DC.) Alef. subsp. *striata*	H	Yivlihatmi	Ertekin (2002)	ZI 1151 ZI 1220 ZI 1183
158	Malvaceae	*Malva neglecta* Wallr.	H	Çobançöreği	Davis (1965–1988), Ertekin (2002), Balos & Akan (2008)	ZI 1181
159	Moraceae	**Ficus carica* L. subsp. *carica*	T	İncir	Aydoğdu & Akan (2005), Babacan *et al. (*2017)	ZI 1211
160	Moraceae	**Morus alba* L.	T	Dut	-	ZI 1147
161	Moraceae	**Morus nigra* L.	T	Karadut	-	ZI 1213
162	Oleaceae	**Olea europaea* L.	T	Zeytin	Doğan *et al.* (2004)	ZI 1238
163	Orabanchaceae	*Orobanche egyptiaca* Pers.	H	Dinlendiren	-	ZI 1037 ZI 1069
164	Orabanchaceae	*Parentucellia latifolia* (L.)Caruel subsp. *flaviflora* (Boiss.) Hand.-Mazz	H	Sarıüçdilotu	-	ZI 1042
165	Papaveraceae	*Fumaria parviflora* Lam.	H	Tarlaşahteresi	-	ZI 1067
166	Papaveraceae	*Glaucium grandiflorum* Boiss. & A. Huet	H	Develalesi	Babacan *et al.* (2017)	ZI 1119
167	Papaveraceae	*Roemeria hybrida* (L.) DC. subsp. *hybrida*	H	Pıtpıtotu	-	ZI 1029 ZI 1168
168	Papaveraceae	*Papaver clavatum* Boiss. et Hausskn. ex Boiss.	H	Şıkşıkı	Davis (1965–1988), Balos & Akan (2008)	ZI 1047 ZI 1189

Table 1 contd.

Sl. no.	Family	*Botanical name*	Habit	Vernacular name	Literature cited	Voucher no.
169	Pinaceae	**Pinus nigra* J.F. Arnoldsubsp. *pallasiana* (Lamb.) Holmboe var. *pallasiana* f. *pallasiana*	T	Karaçam	-	ZI 1194
170	Plantaginaceae	*Plantago lanceolata* L.	H	Damarlıca	Frenkel (1977), Davis (1965–1988), Ertekin (2002), Doğan *et al.* (2004), Babacan *et al.* (2017)	ZI 1191
171	Plantaginaceae	*Veronica persica* Poir.	H	Cırcamık	Davis (1965–1988)	ZI 1161
172	Poaceae	*Aegilops triuncialis* L.	H	Üçkılçık	Doğan *et al.* (2004)	ZI 1091
173	Poaceae	*Alopecurus arundinaceus* Poir.	H	Kamıştilkikuyruğu	Davis (1965–1988)	ZI 1237
174	Poaceae	*Arundo donax* L.	S	Kargı	Doğan *et al.* (2004)	ZI 1214
175	Poaceae	*Avena barbata* Pottex Link subsp. *barbata*	H	Narinyulaf	Frenkel (1977), Poldini (1992), Doğan *et al.* (2004)	ZI 1034 ZI 1206
176	Poaceae	*Echinaria capitata* (L.) Desf.	H	Dikenbaşotu	-	ZI 1090
177	Poaceae	*Hordeum murinum* L. subsp. *glaucum* (Steud.) Tzvelev	H	Duvararpası	Davis (1965–1988), Polunin (1997), Doğan *et al.* (2004)	ZI 1197
178	Poaceae	*Pennisetum orientale* Rich.	H	Fıskiyeotu	-	ZI 1193
179	Poaceae	*Phalaris paradoxa* L.	H	Topuzlukanyaş	Davis (1965–1988)	ZI 1106
180	Poaceae	*Phragmites australis* (Cav.) Trin. ex Steud.	S	Kamış	Doğan *et al.* (2004)	ZI 1179
181	Poaceae	*Poa angustifolia* L.	H	Darsalkımotu	-	ZI 1240
182	Poaceae	*Poa bulbosa* L.	H	Yumrulusalkım	Frenkel (1977), Doğan *et al.* (2004), Aydoğdu & Akan (2005)	ZI 1021
183	Poaceae	*Rostraria berythea* (Boiss. &Blanche) Holub	H	Maraşgagaotu	Davis (1965–1988)	ZI 1053 ZI 1188
184	Poaceae	*Sorghum halepense* (L.) Pers.var. *muticum* (Hack.) Grossh	H	Ekinsüpürgesi	-	ZI 1131
185	Primulaceae	*Androsacea maxima* L.	H	Tavukkursağı	-	ZI 1024
186	Punicaceae	**Punica granatum* L.	T	Nar	-	ZI 1210
187	Resedaceae	*Reseda lutea* L. var. *lutea*	H	Muhabbetçiçeği	Davis (1965–1988), Ozturk *et al.* (1990), Ozturk & Ozcelik (1991), Doğan *et al.* (2004), Babacan *et al.* (2017)	ZI 1158
188	Rosaceae	**Amygdalus communis* L.	T	Badem	Doğan *et al.* (2004), Aydoğdu & Akan (2005)	ZI 1167
189	Rosaceae	**Amygdalus orientalis* Mill.	T	Payam	-	ZI 1202
190	Rosaceae	**Persica vulgaris* Mill.	T	Şeftali	-	ZI 1055
191	Rosaceae	**Pyracantha coccinea* M. Roem.	S	Ateşdikeni	-	ZI 1057
192	Rosaceae	*Rubus sanctus* Schreb.	S	Böğürtlen	Doğan *et al.* (2004)	ZI 1120

Table 1 contd.

Sl. no.	Family	*Botanical name*	Habit	Vernacular name	Literature cited	Voucher no.
193	Rosaceae	*Sanguisorba minor* L. subsp. *minor*	H	Çayırdüğmesi	-	ZI 1014
194	Rubiaceae	*Callipeltis cucullaris* (L.) Stevenv	H	Nermik	-	ZI 1122
195	Rubiaceae	*Galium aparine* L.	H	Çobansüzgeci	Doğan *et al*, (2004), Babacan *et al*. (2017)	ZI 1121
196	Scrophulariaceae	*Scrophularia peyronii* Post.	H	Hilvansıracası	-	ZI 1059
197	Scrophulariaceae	*Verbascum alepense* Benth.	H	Halep sığırkuyruğu	Davis (1965–1988)	ZI 1190
198	Scrophulariaceae	*Verbascum stepporum* Hub.-Mor.	H	Urfasığır kuyruğu	-	ZI 1159 ZI 1123
199	Tamaricaceae	*Tamarix parviflora* DC.	S	Deliılgın	-	ZI 1198
200	Vitaceae	**Vitis vinifera* L.	Cl	Asma	-	ZI 1209

Note: The numbers after 'ZI' indicate the collection number of voucher specimens of the 1st author. '*' sign = The cultivated plants; H = Herb, Cl = Climber, S = Shrub, T = Tree.

Fig. 2. Some of the common species recorded from the study area; A) *Alcea striata* subsp. *striata*, B) *Geropogon hybridus*, C) *Alkanna strigosa*, D) *Tragopogon porifolius*, E) *Silene coniflora*, F) *Convolvulus galaticus*, G) *Crocus cancellatus* subsp. *damascenus*, H) *Papaver clavatum*, I) *Granium tuberosum*, K) *Linum mucronatum.*

Five geophytes, *viz. Poa bulbosa*, *Crocus cancellatus* subsp. *damascenus*, *Iris persica*, *Ixiolirion tataricum* and *Biarum carduchorum* belonging to different families were determined from the study area. *Orobanche aegyptiaca*, which belongs to the family Orabanchaceae, has been collected as a parasite species. In the study area, nine endemic taxa have been identified (Table 2), based on which the endemism rate in the study area has been estimated as 4.5%. Since the endemic taxa are generally collected from roadside ruderal areas, they are inevitable under the

threat in the near future. The life forms of plant species collected from the study area according to Raunkiaer (1934) are presented in Fig. 3. Since the terophytes are very common in arid and semi-arid climates, it ranks first in the study area with a rate of 50 %. Comparison with other floristic researches in the close vicinity of our study area is given in Table 3.

Table 2. Endemic taxa of the study area and their estimated threatened categories (Ekim, 2000).

Family name	Endemic plant name	Turkish name	Threat categories
Asteraceae	*Anthemis pungens* Yavin	Yavin	NT
Asteraceae	*Geropogon hybridus* (L.) Sch.Bip.	Melezyemlik	LC
Asteraceae	*Gundelia armata* (Freyn & Sint.) Fırat	Haskenger	EN
Caryophyllaceae	*Arenaria sabulinea* Griseb. ex Fenzl	Fıratkumotu	LC
Convolvulaceae	*Convolvulus galaticus* Rost. ex Choisy	Bozsarmaşığı	LC
Fabaceae	*Astragalus scabrifolius* Boiss.	Gövdesizgeven	CR
Fabaceae	*Trigonella kotschyi* Fenzl	Akboyotu	LC
Papaveraceae	*Papaver clavatum* Boiss.	Şıkşıkı	LC
Scrophulariaceae	*Verbascum stepporum* Hub.-Mor.	Urfasığırkuyruğu	EN

EN: Endangered, NT: Near Threatened, LC: Least Concern, CR:Critically endangered.

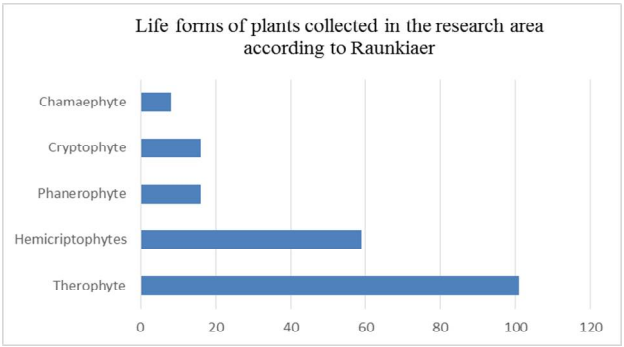

Fig. 3. Raunkiaer (1934)'s life forms spectrum of plant species collected from the study area.

Table 3. Comparison of taxonomic enumeration and endimism rate recorded by this study with those of few previous studies.

	Our study (2020)	(Aydoğdu and Akan, 2005)	(Akan and Ayaz, 2016)	(Akan *et al.*, 2005)	(Atamov *et al.*, 2009)
Family no	41	39	50	47	32
Taxa no	200	238	226	262	192
Endemic	9	13	6	10	2
Endemism rate (%)	4,5	%5,4	%2,6	%3,8	%1,04

The plant species of the study area belonging to different floristic region has been determined. In the study area, the Irano-Turanian elements representing 38% of the flora are in first place, which is followed by Mediterranean elements with 15% and Euro-Siberian elements with 1%. The perecent of multi-region or unknown elements is 46%. In the study area, the Iran-Turan region elements are dominant due to the fact that this area is in arid and semi-arid climates. The high number of multi-region and unknown elenments results from the widespread cosmopolitan species and topographic diversity.

According to Flora of Turkey (Davis, 1965-1985), 672 plant taxa occur in Şanlıurfa province and only three of them, *viz*. *Nigella orientalis*, *Xanthium strumarium* subsp. *strumarium* and *Anthemis altissima* (accepted name is *Cota altissima*) are are ruderal. During this study, *Nigella orientalis* was not found but other two taxa were collected.

As shown in Table 3, the taxonomic enumeration of plant taxa recorded by this study is close to that reported by Akan and Ayaz (2016) and Atamov *et al*. (2009), but lower than that by Aydoğdu and Akan (2005) and Akan *et al*. (2005). The endemism rate recorded in the study area is higher than that reported by Akan and Ayaz (2016), Akan *et al*. (2005) and Atamov *et al*. (2009) (Table 3) and lower than that of Aydoğdu and Akan (2005). In respect to few previous studies (Aydoğdu and Akan, 2005; Akan *et al*., 2005), a relatively lower number of taxa is found in the study area because this study mostly covers the roadside ruderal plants. The reason for the high rate of endemism in Kalecik mountain (Aydoğdu and Akan, 2005) are its larger natural areas, higher elevation variation and diverse habitats. The density of factories, oil stations, quarries and vineyard houses established along the Şanlıurfa-Bozova road have affected the natural vegetation. Due to the formation of more cultivated areas, uncontrolled factory establishment and construction of vineyard houses etc., degradation of the natural habitats in the region is continuing that should be minimized for the conservation of the plant resources of the study area.

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