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The Vascular Plants Diversity of the Batı Akdeniz Agricultural Research Institute Aksu Campus

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Abstract

This floristic research was carried out to determine the floristic composition of the Batı Akdeniz Agricultural Research Institute campus located in Aksu district of Antalya (Türkiye). As a result of the field studies, total 225 plant taxa belonging to 61 families and 182 genera, of which 32 are cultivars, were identified. Only one endemic species was documented in the present study. The families which have the largest number of taxa in the research area are Fabaceae 31 (13.8%), Asteraceae 26 (11.6%), and Poaceae 18 (8.0%). In terms of phytogeographic region, taxa with Mediterranean (25.5%) and multi-regional elements or phytogeographically unknown (72.6%) are abundant. The biological spectrum of the flora according to Raunkiaer life forms shows that Theropyhtes (49.8%) are predominant.

Keywords: Flora, life form, Batı Akdeniz Agricultural Research Institute, Antalya, Aksu

Batı Akdeniz Tarımsal Araştırma Enstitüsü Aksu Yerleşkesinin Damarlı Bitkileri

Özet

Bu floristik araştırma, Antalya (Türkiye) Aksu ilçesinde bulunan Batı Akdeniz Tarımsal Araştırma Enstitüsü'ne ait yerleşkenin floristik kompozisyonunu tespit etmek amacıyla gerçekleştirilmiştir. Arazi çalışmaları sonucunda 32'si kültür bitkisi olan, 61 familya ve 182 cinse ait toplam 225 bitki taksonu tespit edilmiştir. Tespit edilen taksonlardan sadece bir tanesi endemiktir. Araştırma alanında en fazla taksona sahip familyalar Fabaceae 31 (%13.8), Asteraceae 26 (%11.6) ve Poaceae 18 (%8.0)'dir. Fitocoğrafik bölge açısından, Akdeniz (%25.4) ve çok bölgeli veya fitocoğrafik bölgesi bilinmeyen (%72.6) taksonlar sayıca çoktur. Raunkiaer yaşam formlarına göre floranın biyolojik spektrumu, terofitlerin (%49.8) baskın olduğunu göstermektedir.

Anahtar kelimeler: Flora, hayat formu, Batı Akdeniz Tarımsal Araştırma Enstitüsü, Antalya, Aksu

INTRODUCTION

Batı Akdeniz Agricultural Research Institute is a public agricultural research institution located in the Antalya province of Türkiye. It operates under the General Directorate of Agricultural Research and Policies within the Ministry of Agriculture and Forestry of the Republic of Türkiye.

The institute was formed by the merger of five research institutions (the Mediterranean Agricultural Research Institute, the Biological Control Research Institute, the Citrus Research Institute, the Greenhouse Research Institute, and the Regional Cotton Research Institute) in Antalya that worked on different topics related to plant production at different times between 1933 and

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2004. In 2004, a new institute emerged that encompassed all of the research areas of the five merged research institutions. This institute was renamed the Batı Akdeniz Agricultural Research Institute (BAARI) and has been operating under this name ever since (BATEM 2022).

The study area has a typical Mediterranean climate, which dominates the coastal part of the Antalya basin, with hot and dry summers and mild and rainy winters. The annual mean temperature in the area is 18.6ºC. The highest temperature, which is 28.7ºC, occurs in July, while the lowest temperature, 9.9ºC, occurs in January. The highest amount of precipitation, with an average of 225 mm, occurs in December. The mean annual precipitation is 1064 mm, and precipitation falls mainly in the form of rain during the spring and winter seasons (Anonymous 2002; Sarı et al. 2009).

The research area, BAARI Aksu Campus, is situated on the Mersin-Antalya highway, on the border of the Aksu district, which is located to the east of the Antalya province. The research site is located in the C3 square according to Davis' grid system (Davis 1965−1985) and has coordinates of 36°56' north latitude and 30°53' east longitude, with an altitude of approximately 40 meters (Figure 1).

Terra Rossa is a typical soil of the Antalya province and is rich in iron, as noted by Sayan (1990). This soil type has a clay-loam texture and contains a significant amount of lime due to the lime bedrock. The coastal lowlands of Antalya are characterized by gentle slopes due to the mountains moving away from the sea and the streams flowing down from the mountains. These plains are typically comprised of newly deposited alluvial soils from Quaternary deposits. The Aksu plain is also an example of a plain formed in this manner. The Aksu Basin's alluvial fill, characterized by marine detritus, exceeds a thickness of 1 km and spans from the Middle Miocene to the Quaternary (Wasoo & Koç 2021).

The research area is an agroecosystem where a significant portion is covered by tilled (arable) land. The flora of the area is constantly exposed to changes caused by agricultural activities and intense construction. Warm-climate cereals (corn, sorghum, etc.), cool-climate cereals, industrial plants (soybean, sesame, peanut, cotton, etc.), meadow-pasture and forage, and some medicinal aromatic plants (sage, herba origani, etc.) are mainly grown in the area. At the institute, research projects are continuously conducted for the breeding and cultivation of these plants. This study aims to determine the floristic composition of the campus area, which covers an open field area of approximately 1753 decares and has not been studied in detail before.

MATERIAL AND METHOD

The materials of this floristic investigation were collected from the agricultural campus area in 2014–2019. They were randomly surveyed from different parts (settlements, citrus orchards, edge of greenhouses, crop field margins and watercourse margins) of the area (Figure 1). At least one voucher specimen, for each taxon, if considered necessary, was deposited in the Herbarium of Batı Akdeniz Agricultural Research Institute. However, well-known plant specimens, such as common trees, shrub species, ornamental plants and weeds, were not collected during the fieldwork.

The identification of the collected plants was made according to "*Flora of Turkey and the East Aegean Islands*" (Davis 1965−1985; Davis et al. 1988; Güner et al. 2000) and its appendices, as well as other floristic books (Tuzlacı 2007; Anonymous 2008; Akkemik 2014; Güner et al. 2012; 2018). The taxon names were also written by checking the current websites such as the *International Plant Name Index* (IPNI 2020), *Plants of the World Online* (POWO 2020) and *The*

World Flora Online (WFO 2020). The biological spectrum of the flora was determined by the life forms, according to Raunkiaer (1934).

Taxonomic data were arranged using the APG IV (2016) system and presented in alphabetical order. Abbreviations used in the text are as follows: Ir.-Tur.: Irano-Turanian element, Medit.: Mediterranean element (inc. E. Medit.: East Mediterranean), Euro.-Sib.: Euro-Siberian element, cos. & oth.: cosmopolitan and other (multiple regions or unknown), cv: cultivated, P: Phanerophytes, Ch: Chamaephytes, H: Hemicryptophytes, C: Cryptophytes, T: Therophytes and Vp: Vascular parasites.

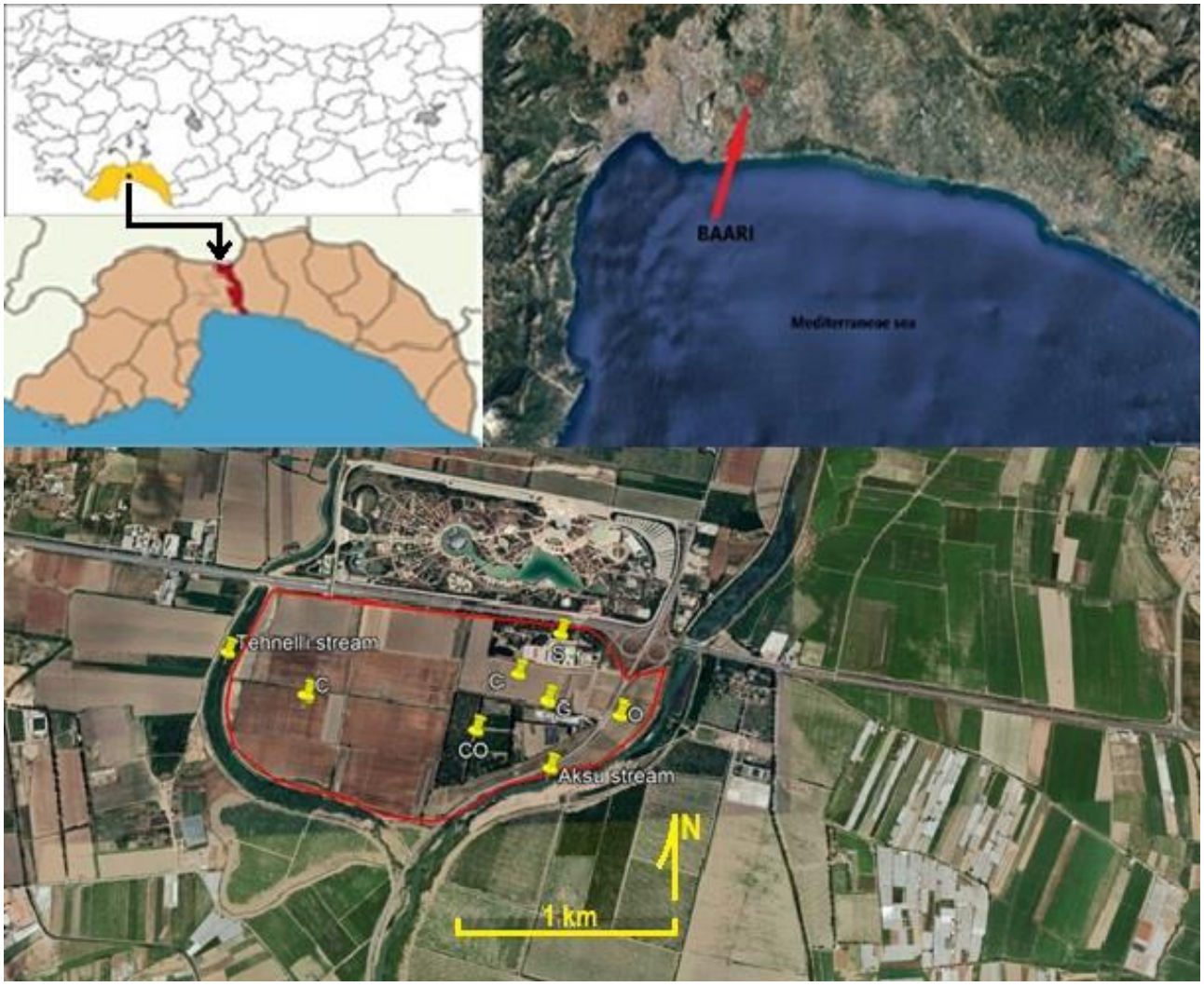

Figure 1. The research area's geographical location and the parts that were surveyed during the study.

RESULTS AND DISCUSSION

As a result of this research, 225 taxa belonging to 61 families and to 182 genera were identified and represented in Appendix 1. In this investigation, the aim was to assess the floristic composition of the research area under semi-natural conditions in Antalya. The floristic composition of the area is summarised in Table 1. A total of 225 taxa were identified and classified of which 224 belong to Magnoliophyta and 1 to Pteridophyta. Thirty-two of these are cultivated in the area. The most

common families are Fabaceae (31 species.), Asteraceae (26 sp.), and Poaceae (18 sp.), in comparison to the other families (Table 2).

Table 1. Batı Akdeniz Agricultural Research Institute floristic composition.

Systematic Unit	Families	Genera	Species	Subsp.	Varieties	Taxa
Pteridophyta	1	1	1	-	-	1
Magnoliophyta	60	181	186	-	-	-
Pinophytina	2	2	2	-	1	3
Magnoliophytina	58	179	184	25	12	221
Magnoliopsida	48	148	157	21	9	187
Liliopsida	10	31	27	4	3	34
Total						**225**

Table 2. The families containing the most taxa in the research area.

Family	Number of Taxa	Percentage (%)
Fabaceae	31	13.8
Asteraceae	26	11.6
Poaceae	18	8.0

The richest genus is *Trifolium* L. which has six taxa in the area. The genera *Vicia* L., *Medicago* L., *Euphorbia* L., *Malva* L., *Plantago* L., and *Veronica* L. come in second place with three taxa each (Table 3). The rest of the genera contain fewer taxa.

Table 3. The genus containing the most taxa in the research area.

Genus	Number of Taxa	Percentage (%)
Trifolium	6	2.7
Vicia	3	1.3
Medicago	3	1.3
Euphorbia	3	1.3
Malva	3	1.3
Plantago	3	1.3
Veronica	3	1.3

An evaluation of the taxa based on phytogeographic regions is presented in Table 4. It is seen that the cosmopolitan and other are represented with very high numbers (140 taxa) and ratios (72.6%) in the chorological spectrum of the study area. The fact that the phytogeographic regions of the plants distributed in the area are not clearly known, and that they are generally cosmopolitan and widely distributed, indicates their high ecological tolerance, and non-selectivity in terms of soil and climate. This abundance of ubiquitous plant species also suggests intense anthropogenic pressure in the area. Additionally, plants from the Mediterranean phytogeographic region are secondly present, which is an expected result given that the research area is located within the

Mediterranean region. The pantropical plants are alien species in the area. The cultivated plants are not included in these phytogeographic regions.

Table 4. Distribution of the taxa in the research area according to phytogeographic regions.

Phytogeographic region	Number of Taxa	Percentage (%)
Cosmopolitan and other	140	72.6
Mediterranean	38	19.7
East Mediterranean	11	5.7
Irano-Turanian	2	1.0
Pantropical	2	1.0

When the plant taxa are classified according to their Raunkiaer life forms**,** the biological spectrum shows that therophytes (49.8%) are the dominant life form in the area. They comprise approximately 50% of the total flora and are followed by hemicryptophytes (24.0%), phanerophytes (19.6%) and cryptophytes (4.9%), respectively (Table 5). Our biological spectrum study results are supported by many previous studies. It is known that the combination of the high percentages of therophytes and hemicryptophytes reflects common Raunkiaer life forms in the areas dominated by the Mediterranean climate (Akman & Ketenoğlu 1987). The Mediterranean climate-type regions' biological spectra are characterized by high therophytes percentages that survive the dry summer in the form of seeds (Raunkiaer 1934). Therophytes are annual and particularly abundant in semi-arid climates and weed communities that develop where native vegetation is disturbed (Neffar et al. 2018).

Storkey et al. (2010) also reported that weeds are mainly characterized by therophytes. Thus, their high proportion suggests hyperdegradation due to human activities (Barbero et al. 1990; Pettit et al. 1995; Brofas et al. 2001). This is because annual species are more tolerant to disturbances, owing to their fast growth rate and early and abundant seed production, compared to perennial species that are relatively slow-growing and usually require several years to reach reproductive maturity (Grime 1974). The presence of chamaephytes (1.3%) and vascular parasites (0.4%) is negligible (Table 5).

Table 5. Distribution of the taxa in the research area according to Raunkiaer life forms.

Life forms	Number of Taxa	Percentage (%)
Therophytes	112	49.8
Hemicryptophytes	54	24.0
Phanerophytes	44	19.6
Cryptophytes	11	4.9
Chamaephytes	3	1.3
Vascular parasites	1	0.4

The study results were compared with four other studies conducted in similar areas with regard to the phytogeographic regions, endemism and the taxa richness, as presented in Table 6. Similar findings were reported across all of the compared studies. The number of cosmopolitan and other phytogeographic region elements has been found to be higher than the other phytogeographic regions in all the studies. This was followed by Mediterranean and Irano-Turanian phytogeographic

region elements, respectively**.** Additionally, considering that our study area is smaller than the others and subject to numerous human-induced factors that put pressure on plant species, the diversity in our area cannot be considered low.

Among the taxa determined in this study, there is only one endemic species (0.5%), represented by *Stachys cretica* L. subsp. *mersinaea* (Boiss.) Rech.f. This can be attributed to the study area low altitude, not being isolated geographically and lacking habitat diversity.

Numbers of Studies Compared

1. The Vascular Plants Diversity of the Batı Akdeniz Agricultural Research Institute Aksu Campus (this study).
2. A Research on the Flora of Antalya City (Göktürk 1994).
3. The Flora of Akdeniz University Campus (Antalya-Turkey) (Ünal & Gökçeoğlu 2003).
4. Natural Plant Species of Süleyman Demirel University Campus (Fakir et al. 2009).
5. Grassland Flora of Manisa Celal Bayar University Campus (Güler et al. 2017).

Table 6. Comparisons of the floristic studies carried out in similar areas concerning the phytogeographic regions, endemism and taxa.

Phytogeographic region	**Compared Studies**				
	1	2	3	4	5
Cosmopolitan and others (%)	72.6	58	54.53	42.24	38
Mediterranean (%)	25.4	36.8	40.93	18.63	33.1
Irano-Turanian (%)	1.0	2.65	2.65	15.53	3.9
Euro.-Sib. (%)	-	2.55	1.55	3.73	2
Endemism (%)	0.5	7.4	6.64	20.50	-
Total taxa	225	1065	452	161	51

In floristic studies conducted in the research area and its surroundings, the Fabaceae Asteraceae and Poaceae families have the most taxa (Table 7). It is not unusual for the Fabaceae and Asteraceae families to be among the most commonly observed taxa in floristic studies, given that they are some of the largest families in the Turkish flora.

The distribution of genera with the highest number of taxa in the research area and its surrounding regions is provided in Table 8. The top three genera with the highest number of taxa varied, possibly due to differences in habitat, elevation, soil characteristics, and anthropogenic effects.

Table 7. Comparison of families with the most taxa in the compared studies

	Compared Studies				
Families	1	2	3	4	5
Fabaceae (%)	13.8	11.58	10.60	14.91	39.2
Asteraceae (%)	11.6	10.50	15.23	13.04	3.9
Poaceae (%)	8.0	6.67	6.62	9.32	43.1
Lamiaceae (%)	4.0	5.50	6.62	6.21	-
Apiaceae (%)	3.5	3.24	3.09	-	2.0

Most of the natural plants in the study area are considered weeds on arable lands. There is little information on weed species. Weeds can reveal information about the soil properties such as pH, the presence of a hardpan, and particularly their nutritional status (EAP 1997). Clements (1920) suggested that each plant can serve as an indicator and is a product of the conditions under which it grows, thereby reflecting those conditions. Therefore, it is important to identify these weed species in our soil accurately.

Table 8. Comparison of genera with the most taxa in the study areas.

Study areas	**Genus**
1	*Trifolium* (6), *Euphorbia* (3), *Medicago* (3), *Malva* (3), *Vicia* (3), *Plantago* (3), *Veronica* (3)
2	*Euphorbia* (20), *Silene* (17), *Ranunculus* (16), *Medicago* (14), *Trifolium* (13), *Allium* (12), *Vicia* (9), *Hypericum* (9), *Astragalus* (8), *Trigonella* (8)
3	*Trifolium* (9), *Euphorbia* (8), *Erodium* (7), *Hypericum* (7), *Plantago* (6)
4	*Astragalus* (7), *Vicia* (4), *Adonis* (3), *Anthemis* (3), *Cerastium* (3), *Consolida* (3), *Verbascum* (3)
5	*Trifolium* (12), *Bromus* (8), *Medicago* (3)

Abutilon theophrasti Medik., collected from the edge of the cotton plantation in the area, is one of the most important weeds in the Mediterranean, Aegean, Marmara, Central, and Western Black Sea regions. It is not known when it was introduced to Türkiye, but it is believed to have been transported along with imported corn and soybean grains as seed contaminants, which are used for animal feed (Işık 2015). It has been found that two species, *Ipomoea hederacea* Jacq. and *I. triloba* L., are not recorded in the "*Flora of Turkey and the East Aegean Islands*" or its supplement in the area. These species were reported as new weed species records in Türkiye and spread around cotton, soybean, groundnut, and sunflower cultivation areas. One of these, *Ipomoea hederacea* was recorded for the first time in the Çukurova region (Adana), and *I. triloba* was first recorded in Antalya (Gönen 1999; Yazlık et al. 2014). They are known as invasive weeds and grow gregariously, primarily in shady and wet conditions in the area. On the other hand, the species designated as cultivated plants are mostly used as ornamental plants in the landscape of the area.

This study is significant in that it shows the changes in the flora caused by agricultural activities in semi-natural habitats. The findings reveal that not only native plant species but also naturalized alien plants contribute to the vascular plant species richness in agricultural areas. These results will contribute to both floristic studies and the current literature on weed flora (segetal) in agricultural areas.

AUTHOR CONTRIBUTION STATEMENT

In this study; the study idea and design, data collection, analysis and interpretation of the results, and drafting of the article were made by the authors.

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Appendix 1. The Floristic List of Aksu Campus.

PTERIDOPHYTA			
Family	**Species**	**Life form**	**Floristic region**
Equisetaceae	*Equisetum ramosissimum* Desf.	H	cos. & oth.
MAGNOLIOPHYTA **Pinophytina**			
Cupressaceae	*Cupressus sempervirens* L.	P	cv.
Pinaceae	*Pinus pinea* L.	P	cv.
	Pinus brutia Ten. var. *brutia*	P	cv.

MAGNOLIOPHYTA			
Magnoliophytina			
Magnoliopsida			
Amaranthaceae	*Amaranthus albus* L.	T	cos. & oth.
	Amaranthus viridis L.	T	cos. & oth.
	Chenopodium album L.	T	cos. & oth.
	Dysphania ambrosioides (L.) Mosyakin & Clemants	T	cos. & oth.
Apiaceae	*Ammi majus* L.	H	Medit.
	Anethum graveolens L.	T	cos. & oth.
	Daucus carota L.	H	cos. & oth.
	Foeniculum vulgare Mill.	H	cos. & oth.
	Scandix pecten- veneris L.	T	cos. & oth.
	Torilis nodosa (L.) Gaertn.	T	cos. & oth.
	Torilis arvensis (Huds.) Link subsp. *arvensis*	H	cos. & oth.
	Tordylium apulum L.	T	Medit.
Apocynaceae	*Cynanchum acutum* L. subsp. *acutum*	H	cos. & oth.
	Cascabela thevetia (L.) Lippold	P	cv.
	Nerium oleander L.	P	cos. & oth.
Aristolochiaceae	*Aristolochia paecilantha* Boiss.	H	Medit.
Asteraceae	*Calendula arvensis* (Vaill.) L.	T	cos. & oth.
	Carduus argentatus L.	T	Medit.
	Centaurea solstitialis L. subsp. *solstitialis*	T	cos. & oth.
	Cichorium intybus L.	H	cos. & oth.
	Cirsium vulgare (Savi) Ten.	H	cos. & oth.
	Cota altissima (L.) J.Gay	H	cos. & oth.
	Crepis micrantha Czerep.	T	cos. & oth.
	Dittrichia graveolens (L.) Greuter	T	Medit.
	Dittrichia viscosa (L.) Greuter	Ch	Medit.
	Echinops ritro L.	H	cos. & oth.
	Erigeron bonariensis L.	T	cos. & oth.
	Erigeron canadensis L.	T	cos. & oth.
	Glebionis segetum (L.) Fourr	T	cos. & oth.
	Helminthotheca echioides (L.) Holub	T	cos. & oth.
	Lactuca serriola L.	T	cos. & oth.
	Leontodon tuberosus L.	H	Medit.
	Matricaria chamomilla L.	T	cos. & oth.
	Notobasis syriaca (L.) Cass.	T	Medit.

	Pulicaria dysenterica (L.) Bernh. subsp. *dysenterica*	H	cos. & oth.
	Scolymus maculatus L.	T	Medit.
	Senecio vulgaris L.	T	cos. & oth.
	Silybum marianum (L.) Gaertn.	T	Medit.
	Sonchus asper (L.) Hill. subsp. *glaucescens* (Jord.) Ball	T	cos. & oth.
	Sonchus oleraceus L.	T	cos. & oth.
	Tragopogon porrifolius (Sch.Bip.) Greuter subsp. *longirostris*	T	cos. & oth.
	Xanthium strumarium L.	T	cos. & oth.
Bignoniaceae	*Jacaranda mimosifolia* D.Don	P	cv.
Boraginaceae	*Anchusa azurea* Mill. var. *azurea*	H	cos. & oth.
	Cynoglossum creticum Mill.	H	cos. & oth.
	Echium plantagineum L.	H	Medit.
	Heliotropium hirsutissimum Grauer	T	E. Medit.
Brassicaceae	*Calepina irregularis* (Asso) Thell.	T	cos. & oth.
	Capsella bursa-pastoris (L.) Medik.	T	cos. & oth.
	Lepidium draba L.	T	cos. & oth.
	Raphanus raphanistrum L.	T	cos. & oth.
	Rapistrum rugosum (L.) All.	T	cos. & oth.
	Sinapis arvensis L.	T	cos. & oth.
Capparaceae	*Capparis spinosa* L.	P	cos. & oth.
Caprifoliaceae	*Cephalaria transylvanica* (L.) Roem. & Schult.	T	cos. & oth.
	Pterocephalus plumosus (L.) Coulter	T	cos. & oth.
	Valerianella discoidea (L.) Loise	T	Medit.
Caryophyllaceae	*Polycarpon tetraphyllum* (L.) L.	T	cos. & oth.
	Stellaria media (L.) Vill.	T	Medit.
	Spergularia bocconei (Scheele) Asch. & Graebn.	T	cos. & oth.
Causarinaceae	*Casuarina equisetifolia* L.	P	cv.
Convolvulaceae	*Convolvulus arvensis* L.	H	cos. & oth.
	Cuscuta campestris Yunck.	Vp	cos. & oth.
	Ipomoea triloba L.	T	pantropical
	Ipomoea hederacea Jacq.	T	pantropical
Cucurbitaceae	*Cucumis melo* L.	T	cos. & oth.
	Ecballium elaterium (L.) A.Rich.	H	Medit.
Ebenaceae	*Diospyros lotus* L.	P	cv.
	Diospyros kaki L.	P	cv.
Euphorbiaceae	*Chrozophora tinctoria* (L.) A.Juss.	T	cos. & oth.
	Euphorbia helioscopia L.	T	cos. & oth.

	Euphorbia peplus L.	T	cos. & oth.
	Euphorbia prostrata Aiton	T	cos. & oth.
	Mercurialis annua L.	T	cos. & oth.
	Ricinus communis L.	P	cos. & oth.
Fabaceae	*Acacia saligna* (Labill.) Wendl.	P	cv.
	Albizia julibrissin Durazz.	P	cv.
	Amorpha fruticosa L.	P	cos. & oth.
	Astragalus hamosus L.	T	cos. & oth.
	Erythrina crista-galli L.	P	cv.
	Glycyrrhiza echinata L.	H	cos. & oth.
	Glycyrrhiza glabra L.	H	cos. & oth.
	Lathyrus annuus L.	T	Medit.
	Lathyrus gorgoni Parl. var. *gorgoni*	T	Medit.
	Medicago intertexta (L.) Heyn var. *ciliaris*	T	Medit.
	Medicago orbicularis (L.) Bart.	T	cos. & oth.
	Medicago polymorpha L. var. *polymorpha*	T	cos. & oth.
	Melilotus albus Medik.	H	cos. & oth.
	Melilotus indicus (L.) All.	T	cos. & oth.
	Onobrychis caput-galli (L.) Lam	T	Medit.
	Ononis spinosa L. subsp. *leiosperma* (Boiss.) Širj.	H	cos. & oth.
	Robinia pseudoacacia L.	P	cv.
	Parkinsonia aculeata L.	P	cv.
	Scorpiurus muricatus L.	T	cos. & oth.
	Securigera parviflora (Desv.) Lassen	T	E. Medit.
	Securigera securidaca (L.) Degen & Dorfl.	T	cos. & oth.
	Trifolium angustifolium L.	T	cos. & oth.
	Trifolium nigrescens Viv. subsp. *petrisavi* (Clem.) Holmboe	T	cos. & oth.
	Trifolium repens L.	H	cos. & oth.
	Trifolium resupinatum L. var. *resupinatum*	T	cos. & oth.
	Trifolium spumosum L.	T	Medit.
	Trifolium tomentosum L.	T	cos. & oth.
	Vachellia karroo (Hayne) Banfi & Galasso	P	cv.
	Vicia cracca L.	H	cos. & oth.
	Vicia lutea L. var. *hirta* (Balbis) Lois	T	cos. & oth.
	Vicia sativa L.	T	cos. & oth.

Geraniaceae	*Erodium cicutarium* (L.) L'Hér. subsp. *cicutarium*	T	cos. & oth.
	Erodium moschatum (L.) L'Hér.	T	Medit.
	Geranium dissectum L.	T	cos. & oth.
Gentianaceae	*Centaurium pulchellum* (Sw.) Druce	T	cos. & oth.
Hypericaceae	*Hypericum triquetrifolium* Turra	H	cos. & oth.
Lamiaceae	*Lamium amplexicaule* L. var. *amplexicaule*	T	cos. & oth.
	Melissa officinalis L.	H	E. Medit.
	Mentha longifolia (L.) L. subsp. *typhoides* (Briq.) Harley	H	cos. & oth.
	Salvia verbenaca L.	H	Medit.
	Stachys cretica L. subsp. *mersinaea* (Boiss.) Rech.f. (endemic)	H	E. Medit.
	Satureja thymbra L.	Ch	E. Medit.
	Origanum onites L**.**	H	cos. & oth.
	Thymbra spicata L. subsp. *spicata*	Ch	Medit.
	Vitex agnus-castus L.	P	Medit.
Lyhtraceae	*Lagerstroemia indica* L.	P	cv.
	Lythrum maritimum Kunth	T	cos. & oth.
Malvaceae	*Abutilon theophrasti* Medik.	T	cos. & oth.
	Alcea biennis Winterl	H	cos. & oth.
	Corchorus olitorius L.	T	cos. & oth.
	Hibiscus rosa-sinensis L.	P	cv.
	Hibiscus syriacus L.	P	cv.
	Hibiscus trionum L.	T	cos. & oth.
	Malva nicaeensis All.	T	cos. & oth.
	Malva punctata (All.) Alef.	T	cos. & oth.
	Malva sylvestris L.	H	cos. & oth.
Meliaceae	*Melia azedarach* L.	P	cv.
Moraceae	*Morus alba* L.	P	cv.
	Ficus carica L. subsp. *carica*	P	cv.
Myrtaceae	*Eucalyptus camaldulensis* Dehnh.	P	cv.
Oleaceae	*Chrysojasminum fruticans* (L.) Banfi	P	Medit.
	Ligustrum vulgare L.	P	cv.
	Olea europaea L. subsp. *europaea*	P	Medit.
Onagraceae	*Epilobium hirsutum* L.	H	cos. & oth.
Oxalidaceae	*Oxalis corniculata* L.	T	cos. & oth.
	Oxalis pes-caprae L.	H	cos. & oth.
Papaveraceae	*Papaver rhoeas* L.	T	cos. & oth.
	Fumaria capreolata L.	T	cos. & oth.
	Fumaria parviflora Lam.	T	cos. & oth.
Plantaginaceae	*Kickxia lanigera* (Desf.) Hand.-Mazz.	T	Medit.
	Plantago lagopus L.	T	Medit.

	Plantago lanceolata L.	H	cos. & oth.
	Plantago major L.	H	cos. & oth.
	Veronica anagallis-aquatica L.	T	cos. & oth.
	Veronica cymbalaria Bodard	T	Medit.
	Veronica polita Fr.	T	cos. & oth.
Platanaceae	*Platanus orientalis* L.	P	cv.
Plumbaginaceae	*Limonium echioides* (L.) Mill.	T	Medit.
Polygonaceae	*Polygonum aviculare* L.	T	cos. & oth.
	Rumex crispus L.	H	cos. & oth.
	Rumex pulcher L. subsp. *divaricatus* (L.) Murbeck	H	cos. & oth.
Portulacaceae	*Portulaca oleracea* L.	T	cos. & oth.
Primulaceae	*Lysimachia arvensis* (L.) U.Manns & Anderb. var. *arvensis*	T	cos. & oth.
	Lysimachia arvensis (L.) U.Manns & Anderb. var. *caerulea* (L.) Turland & Bergmeier	T	cos. & oth.
	Lysimachia dubia Willd.	T	E. Medit.
Ranunculaceae	*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouc.	C	cos. & oth.
	Ranunculus neapolitanus Ten.	H	cos. & oth.
Rosaceae	*Potentilla reptans* L.	H	cos. & oth.
	Pyracantha coccinea M.Roem.	P	cv.
	Rubus sanctus Schreb.	P	cos. & oth.
	Sanguisorba verrucosa (G.Don) Ces.	H	cos. & oth.
Rubiaceae	*Crucianella latifolia* L.	T	Medit.
	Galium aparine L.	T	cos. & oth.
	Galium verum L. subsp. *glabrescens* Ehrend	H	Ir.-Tur.
	Sherardia arvensis L.	T	Medit.
	Theligonum cynocrambe L.	T	cos. & oth.
Rutaceae	*Citrus aurantium* L.	P	cv.
Salicaceae	*Populus alba* L.	P	cv.
Sapindaceae	*Acer campestre* L. subsp. *campestre*	P	cv.
	Acer negundo L.	P	cv.
	Koelreuteria paniculata Laxm.	P	cv.
Scrophulariaceae	*Scrophularia canina* L. subsp. *bicolor* (Sm.) Greuter	H	E. Medit.
	Verbascum sinuatum L. subsp. *sinuatum* var. *adenosepalum* Murb.	H	Medit.
Solanaceae	*Datura stramonium* L.	T	cos. & oth.
	Solanum americanum Mill.	T	cos. & oth.

Ulmaceae	*Ulmus minor* Mill. subsp. *canescens* Bartolucci & Galasso	P	E. Medit.
Verbenaceae	*Lantana camara* L.	P	cv.
	Phyla nodiflora (L.) Greene	H	cos. & oth.
	Verbena officinalis L.	H	cos. & oth.
Vitaceae	*Vitis vinifera* L.	P	cos. & oth.
Zygophyllaceae	*Tribulus terrestris* L.	T	cos. & oth.
	Liliopsida		
Amaryllidaceae	*Allium ampeloprasum* L.	C	Medit.
	Allium pallens L. subsp. *pallens*	C	Medit.
	Narcissus tazetta L. subsp. *tazetta*	C	cos. & oth.
Araceae	*Arum dioscoridis* Sm. var. *dioscoridis*	C	E. Medit.
Arecaceae	*Phoenix dactylifera* L.	P	cv.
	Washingtonia filifera (Linden ex André) H.Wendl.	P	cv.
Asparagaceae	*Asparagus acutifolius* L.	C	Medit.
	Muscari neglectum Guss. ex Ten.	C	cos. & oth.
	Muscari parviflorum Desf.	C	Medit.
	Prospero autumnale (L.) Speta	C	Medit.
Cyperaceae	*Carex divulsa* Stokes	H	cos. & oth.
	Cyperus rotundus L.	H	cos. & oth.
Dioscoreaceae	*Dioscorea communis* (L.) Caddick & Wilkin	C	cos. & oth.
Juncaceae	*Juncus bufonius* L.	T	cos. & oth.
Poaceae	*Arundo donax* L.	H	cos. & oth.
	Avena sterilis L.	T	cos. & oth.
	Avena wiesti Steudel	T	cos. & oth.
	Bothriochloa ischaemum (L.) Keng	H	cos. & oth.
	Bromus intermedius Guss.	T	cos. & oth.
	Cornucopiae cucullatum L.	T	E. Medit.
	Cynodon dactylon (L.) Pers var. *dactylon*	H	cos. & oth.
	Digitaria sanguinalis (L.) Scop	T	cos. & oth.
	Echinochloa colona (L.) Link	T	cos. & oth.
	Hordeum murinum L. subsp. *leporinum* (Link) Arcang.	T	Ir.-Tur.
	Imperata cylindrica (L.) Raeusch.	H	cos. & oth.
	Lolium rigidum Gaudin var. *rigidum*	T	cos. & oth.
	Phalaris paradoxa L.	T	Medit.
	Phleum subulatum (Savi) Aschers & Graebn subsp. *subulatum*	T	cos. & oth.
	Piptatherum miliaceum (L.) Coss.	H	cos. & oth.
	Poa annua L.	T	cos. & oth.
	Setaria viridis (L.) P.Beauv.	T	cos. & oth.
	Sorghum halepense (L.) Pers.	H	cos. & oth.

Smilacaceae	*Smilax aspera* L.	P	cos. & oth.
Typhaceae	*Typha domingensis* Pers.	C	cos. & oth.