

Vascular flora of the central and western parts of Yeşilirmak Delta (Çarşamba / Samsun / Turkey)

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Abstract: The vascular flora of Yeşilirmak Delta (Çarşamba/Samsun/Turkey), second in size among the other deltas in Turkey, was investigated. According to phytogeographical regions, distribution of the 568 species and infraspecific taxa of 340 genera belonging to 91 families instead of "is": identified in the study area are as follows: 22.4 % Euro-Siberian, 9.8 % Mediterranean, 1 % Irano-Turanian, and 0.5 % Cosmopolitan. The phytogeographic regions of 66.3 % of the species are unknown.

Key words: vascular flora, wetland

Introduction

Bordering on three different phytogeographical regions (Euro-Siberian, Mediterranean, Irano-Turanian), which present their various topographical and ecological conditions, lying in the transition zone between Northwest Asia and Northeast Europe, Turkey has a rich flora and vegetation types. According to the latest studies, a total of 11 707 vascular plant taxa are distributed in Turkey's flora (Güner & al. 2012).

Delta plains have rich biodiversity, owing to the habitat diversity both of terrestrial and aquatic realms (Tockner & al. 2010). There are sandy habitat types and wetlands, such as floodplain forests, swamps, wet meadows, lakes in the delta plains beside the meadows, and bushes and forest formations that are not inundated (Hillier & al. 2011; Humphries 2011; Kavgacı & al. 2011; Korkmaz & al. 2012; Syvitski & al. 2012).

Besides providing habitats and food for diverse species and supporting the groundwater recharge and water retention and detention, wetlands in the delta

plains allow for maintenance of high water tables and reduce flooding in adjacent ecosystems. Their other critical functions, for example, improvement of water quality by filtering sediments and metals from groundwater, and cycling nutrients to terrestrial and aqueous environments are important not only for the wetlands themselves, but also for the surrounding ecosystems (Greb & al. 2006).

These productive and sensitive areas of the world (van der Maarel 2005) have undergone change and even have disappeared, both owing to natural processes and human-induced impacts since the early ages of history (Matthews & Fung 1987; Mitsch & Gosselink 2007). Stanley & Warne (1997) suggested that the resource-rich environments of the delta plains encouraged prehistoric people to move from the Late Pleistocene terraces and fluvial plains so as to develop sedentary cultures on coastal deltaic lowlands. Changes in sediment input, climatic variations and, more recently, human activities, have played a major role in the delta development during the highstand stage.

The threats to natural ecosystems balance of Yeşilirmak Delta are on the increase, because 65.4 % of the area consists of agricultural lands, where plantations of *Pinus pinaster* subsp. *pinaster* on the sandy shore and of *Populus x canadensis* and *Fraxinus angustifolia* subsp. *oxycarpa* destroy the natural vegetation (Korkmaz & al. 2011), reed is subject to uncontrolled cutting (Mumcu 2010) in the wetlands, and human settlements are widespread.

The floristic and phytosociological characteristics of the eastern part of the Delta were studied by Korkmaz & al. (2011, 2012), while the central and western parts of the Delta were investigated in this study. Our purpose was to analyse the floristic properties of the Yeşilirmak Delta plain by determining the distributed vascular plant species in the area.

Material and methods

Yeşilirmak Delta (Samsun / Turkey), located in the second largest area in the country (Şahin & Bağcı 2016), is one of the 135 wetlands in Turkey defined according to international criteria (Koyuncu & al. 2008). It is formed by Turkey's second largest river, Yeşilirmak, which flows to the Black Sea. (36°23'–37°14' E and 41°05'–41°23' N). The Delta plain consists of Quaternary alluvial deposits on a total area of 1042.4 km² (approximately 22 km long and 88 km wide). The elevation of the plain is only about 0–15 m. The Delta is covered by periodically flooded meadows, some lagoons and numerous drainage channels. The soils in the research area are alluvial, fed by Yeşilirmak and Terme rivers. They are composed of fine silt and clay grains in the surface and subsurface layer, and sand grains deeper down (Erdaş & al. 1992).

The study area is exposed to the rainy Mediterranean climate (Q = 113,3) and is subject to the West Mediterranean precipitation regime (Au, Wi, Sp, Su) (Akman 1990). The mean annual temperature is 14.4°C and the average total annual precipitation is 848 mm.

The plant samples were gathered weekly during three vegetation cycles (2013, 2014, 2015). Most samples were identified according to the *Flora of Turkey and East Aegean Islands* (Davis 1965-1985), and by means of relevant publications (Tutin & al. 1964-1993; Irwin & Barneby 1982a, b; Nesom 1994;

Mutlu 2004; Aslan & al. 2009; Baldwin & al. 2012; Verloove & Gullón 2012; URL-1) for the taxa that are not included in it. The plant list is arranged alphabetically after checking the plants systematically, chorologically and for endemism according to Güner & al. (2012). The samples are stored in the Herbarium of Ondokuz Mayıs University, Faculty of Arts and Sciences, Department of Biology (OMUB).

The Plant List is preceded by a list of plant collection stations under the name of Station List. After specific and infraspecific taxon names, the Plant List features the station number, date, phytogeographical region, endemism, and collection number related to the taxon. The taxa, which represent a cultured form, are marked with "*", and the taxon names of alien origin are marked with "***". Conservation status of the taxa has been evaluated according to the *Red Data Book of Turkish Plants* (2000) and IUCN (URL-2).

Station List

- (1) Tekkeköy, Ovabaşı village, *Sambuco-Carpinetum* community, 15m., 41°12'30.59"N 36°29'42.93"E;
- (2) Çarşamba, Taşdemir village, *Sambuco-Carpinetum* community, 18m., 41°12'07.59"N 36°34'30.98"E;
- (3) Çarşamba, Çaltı village, *Platanthero-Fraxinetum* community, 4m., 41°15'21.51"N 36°34'38.35"E;
- (4) Çarşamba, Irmaksırtı village, *Platanthero-Fraxinetum* community, 8m., 41°15'21.51"N 36°34'38.35"E;
- (5) Çarşamba, Hürriyet village, *Sambuco-Alnetum* community, 4m., 41°19'26.37"N 36°36'36.40"E;
- (6) Çarşamba, Hürriyet village, *Sambuco-Alnetum* community, 5m., 41°19'08.36"N 36°36'17.60"E;
- (7) Çarşamba, Çaltı village, *Verbasco-Elaeagnatum* community, 1m., 41°17'15.22"N 36°34'01.64"E;
- (8) Çarşamba, Irmaksırtı village, *Verbasco-Elaeagnatum* community, 3m., 41°16'37.97"N 36°33'00.88"E;
- (9) Çarşamba, Hürriyet village, *Salicornio-Junceum* community, 3m., 41°20'44.53"N 36°37'02.28"E;
- (10) Çarşamba, Fener District, *Salicornio-Junceum* community, 2m., 41°21'17.94"N 36°37'30.62"E;
- (11) Çarşamba, Hürriyet village, *Junco-Tamaricetum* community, 2m., 41°20'49.86"N 36°37'26.39"E;
- (12) Çarşamba, Fener District, *Junco-Tamaricetum* community, 2m., 41°22'08.37"N 36°39'03.68"E;
- (13) Çarşamba, Hürriyet village, *Eryngio-Pancretietum* community, 1m., 41°21'01.14"N 36°36'42.09"E;
- (14) Çarşamba, Çaltı village, *Eryngio-Pancretietum* community, 0,5m., 41°17'41.65"N 36°34'22.02"E;
- (15)

Çarşamba, Durusu village, *Eryngio-Pancreatietum* community, 0.5m., 41°21'49.78"N 36°42'56.38"E; (16) Çarşamba, Sahilköy village, *Eryngio-Pancreatietum* community, 0.5m., 41°21'49.78"N 36°42'56.44"E; (17) Tekkeköy, Çiftlik village, *Eryngio-Pancreatietum* community, 1m., 41°14'52.18"N 36°29'24.01"E; (18) Terme, Taşlık village, Kargalı Lake environs, *Eryngio-Pancreatietum* community, 1m., 41°20'52.93"N 36°49'52.74"E; (19) Çarşamba, Hürriyet village, *Jasmino-Crataegetum* community, 4m., 41°20'35.52"N 36°37'25.72"E; (20) Çarşamba, Kumtepe village, *Tamaricetum tetrandrae-smyrnen-sis* community, 3m., 41°20'00.60"N 36°39'51.30"E; (21) Çarşamba, Kumtepe village, islands in Yeşilirmak, *Tamaricetum tetrandrae-smyrnen-sis* community, 2m., 41°19'52.95"N 36°40'02.16"E; (22) Çarşamba, Ahubaba Village, *Rumici-Sparganietum* community, 12m., 41°14'49.34"N 36°39'34.33"E; (23) Çarşamba, Denizler village, *Trifolio-Cynodontetum* community, 4m., 41°20'24.72"N 36°47'16.44"E; (24) Terme, Taşlık village, Kargalı Lake environs, *Trifolio-Cynodontetum* community, 1m., 41°20'51.63"N 36°49'16.86"E; (25) Çarşamba, Karakulak village, *Trifolio-Cynodontetum* community, 10m., 41°14'22.32"N 36°37'01.54"E; (26) Terme, Etyemezli village, *Trifolio-Cynodontetum* community, 15m. 41°15'49.50"N 36°48'14.69"E; (27) Çarşamba, Fener District, *Trifolio-Cynodontetum* community, 3m. 41°21'17.48"N 36°37'45.25"E; (28) Çarşamba, İrmaksırtı village, *Trifolio-Cynodontetum* community, 3m. 41°16'12.92"N 36°33'15.19"E; (29) Çarşamba, Taşlık village, Kargalı Lake environs, *Samolo-Juncetum* community, 2m. 41°20'46.37"N 36°50'23.03"E; (30) Çarşamba, Aşıklı District, streamside, 20m.; (31) Çarşamba, Şeyhüven village, *Carpinus betulus* forest, 40m.; (32) Çarşamba, Sahilköy, roadsides, 2m.; (33) Çarşamba, Çaltı, roadsides, 4m.; (34) Çarşamba, İrmaksırtı, roadsides, 5m.; (35) Çarşamba, Hürriyet, roadsides, 5m.; (36) Çarşamba, Kumköy coast, 1m.; (37) Çarşamba, Fener District, salt marshes, 3m.; (38) Çarşamba, Karamustafalı, meadow, 7m.; (39) Çarşamba, Cemetery of Yukarıkavacık, 15m.; (40) Çarşamba, Kumtepe, streamside, 3m.; (41) Çarşamba, Durusu, roadside, 3m.; (42) Çarşamba, Durusu, *Fraxinus angustifolia* forest, 5m.; (43) Çarşamba, Cemetery of Paşayazı, 10m.; (44) Tekkeköy, Hamzalı, *Fraxinus angustifolia* forest, 13m.; (45) Tekkeköy, Ovabaşı, roadsides, 15m.; (46) Terme, Kargalı coast, 3m.

Results and discussion

Plant List

PTERIDOPHYTA EQUISETIDAE

Equisetaceae: *Equisetum arvense* L., "30", 20.04.2013, 8918; 10067. *E. palustre* L., "36", 13.04.2013, 8860.

POLYPODIIDAE

Aspleniaceae: *Asplenium adiantum-nigrum* L., "31", 20.04.2013, 8898. *A. scolopendrium* L., "44", 22.02.2014, 9653. **Polypodiaceae:** *Polypodium vulgare* L. var. *vulgare*, "2", 21.06.2013, 9242. **Salviniaceae:** *Azolla filiculoides* Lam., "32", 08.03.2014, 9684. *Salvinia natans* (L.) All., "33", 29.09.2013, 9600.

MAGNOLIOPHYTA PINOPHYTINA PINIDAE

Cupressaceae: *Juniperus oxycedrus* L. subsp. *oxycedrus* var. *oxycedrus* f. *oxycedrus*, "34", 18.05.2014, 9879.

Pinaceae: ***Pinus pinaster* Aiton subsp. *pinaster*, "46", 09.05.2015, 10364.

MAGNOLIOPHYTINA

Adoxaceae: *Sambucus ebulus* L., "35", 12.08.2015, 10451; *S. nigra* L., "4", 20.07.2013, 9394; *Viburnum opulus* L., "6", 02.08.2013, 9440. **Alismataceae:** *Alisma plantago-aquatica* L. subsp. *plantago-aquatica*, "45", 21.06.2013, 9263; Euro-Sib. El. **Amaranthaceae:** *Amaranthus albus* L., "45", 27.09.2014, 10295; *A. deflexus* L., "19", 19.10.2014, 10347; *A. hybridus* L., "45", 27.09.2014, 10297; *A. viridis* L., "17", 27.09.2014, 10317; *Atriplex hastata* L., "10", 19.10.2014, 10335; *A. patula* L., "29", 06.09.2014, 10229; *Chenopodium album* L. subsp. *album* var. *album*, "45", 27.09.2014, 10296; *C. album* L. subsp. *album* var. *microphyllum* Boenn., "19", 27.09.2014, 10330; *C. botrys* L., "45", 27.09.2014, 10300; *Corispermum filifolium* C.A.Mey., "17", 27.09.2014, 10313; *Salicornia perennans* Wild., "10", 10.09.2015, 10456; *Salsola kali* L., "7", 22.07.2014, 10146; *S. tragus* L. subsp. *pontica* (Pall.) Rilke, "17", 27.09.2014, 10314; *Suaeda prostrata* Pall., "37", 03.07.2014, 10098. **Amaryllidaceae:** *Allium scorodoprasum* L. subsp. *jajlae* (Vved.) Stearn, "26", 12.06.2014, 9978, Eux. El.; *A. scorodoprasum* L. subsp. *rotundum* (L.) Stearn, "23", 19.10.2014, 10354; *Galanthus rizehensis* Stern, "6", 20.07.2013, Eux. El.; *Leucojum aestivum* L. subsp. *aestivum*, "1", 22.02.2014, 9630, Euro-Sib. El.;

- Pancreaticum maritimum* L., "17", 12.08.2015, 10450, *Medit. El.* **Apiaceae:** *Anthriscus caucalis* M.Bieb., "35", 04.05.2013, 9029; **Apium graveolens* L., "9", 22.07.2014, 10134; *A. nodiflorum* (L.) Lag., "11", 30.08.2013, 9515; *Bupleurum setaceum* Fenzl, "25", 21.09.2014, 10286, *Medit. El.*, Endemic. *Chaerophyllum byzantinum* Boiss., "4", 29.09.2013, 9552; *Daucus carota* L., "19", 06.09.2014, 10246; *D. guttatus* Sibth. & Sm., "39", 12.10.2013, 9618; *Eryngium creticum* Lam., "26", 11.07.2014, 10109; *E. maritimum* L., "17", 12.08.2015, 10449. *Oenanthe fistulosa* L., "29", 09.05.2015, 10373; *O. pimpinelloides* L., "25", 25.05.2013, 9169; *O. silaifolia* M.Bieb., "45", 26.04.2014, 9760; *Pseudorlaya pumila* (L.) Grande, "32", 20.06.2014, 10010, *Medit. El.*; *Sanicula europaea* L., "26", 26.04.2014, 9802; *Sison amomum* L., "4", 29.09.2013, 9553, Euro-Sib. El.; *Sium sisarum* L. var. *lancifolium* (M.Bieb.) Thell., "5", 10.05.2014, 9859; *Torilis arvensis* (Huds.) Link subsp. *arvensis*, "41", 06.08.2014, 10185; *T. nodosa* (L.) Gaertn., "23", 20.06.2014, 10024. **Apocynaceae:** *Apocynum venetum* L. subsp. *sarmatiense* (Woodson) ined., "32", 30.05.2014, 9949; *Cionura erecta* (L.) Griseb., "7", 22.07.2014, 10151; East *Medit. El.*; *Cynanchum acutum* L. subsp. *acutum*, "8", 27.09.2014, 10324; *Nerium oleander* L., "33", 05.04.2014, 9728; *Periploca graeca* L. var. *vestita* Rohlena, "11", 07.09.2013, 9517, East *Medit. El.*; *Vinca major* L. subsp. *hirsuta* (Boiss.) Stearn, "1", 29.09.2013, 9539, Eux. El.; *Vincetoxicum scandens* Sommier & Levier, "1", 21.06.2013, 9255. **Aquifoliaceae:** *Ilex colchica* Pojark., "31", 20.04.2013, 8908, Eux. El. **Araceae:** *Arum maculatum* L., "42", 26.04.2014, 9738; *Lemna minor* L., "34", 26.06.2013, 9295. **Araliaceae:** *Hedera colchica* (K.Koch) K.Koch, "3", 28.06.2013, 9288, Eux. El.; *H. helix* L. f. *helix*, "4", 09.03.2013, 8782; *Hydrocotyle vulgaris* L., "5", 28.06.2013, 9270. **Aristolochiaceae:** *Aristolochia clematitis* L., "4", 06.09.2014, 10259, Euro-Sib. El. **Asparagaceae:** *Muscari neglectum* Guss. ex Ten., "46", 08.03.2014, 9678; *Ornithogalum sigmoideum* Freyn & Sint., "35", 05.04.2014, 9718, Euro-Sib. El.; *O. wiedemannii* Boiss. var. *wiedemannii*, "1", 08.03.2014, 9667; *Ruscus aculeatus* L., "2", 22.02.2014, 9640; *R. hypoglossum* L., "2", 21.06.2013, 9243, Euro-Sib. El. **Asteraceae:** *Achillea maritima* (L.) Ehrend. & Y.P.Guo subsp. *maritima*, "32", 10.09.2015, 10461, *Medit. El.*; *Ambrosia maritima* L., "33", 07.09.2013, 9525; "37", 21.09.2014, 10260, *Medit. El.*; *Anthemis cotula* L., "44", 25.05.2013, 9095. *Arctium minus* (Hill) Bernh., "44", 21.06.2013, 9264, Euro-Sib. El.; *Artemisia scoparia* Walsdt.&Kit., "45", 29.09.2013, 9559. *Bellis perennis* L., "34", 09.03.2013, 8775; Euro-Sib. El.; ***Bidens tripartita* L., "33", 07.09.2013, 9526. *Calendula arvensis* (Vaill.) L., "39", 04.05.2013, 9027. *Carduus pycnocephala* L. subsp. *albidus* (M. Bieb.) Kazmi, "44", 25.05.2013, 9139. *Carthamus lanatus* L., "35", 12.07.2013, 9355. *Centaurea iberica* Trev. ex Seppengel, "38", 12.10.2013, 9623. *Chondrilla juncea* L., "34", 29.09.2013, 9577. *Cichorium intybus* L., "45", 29.09.2013, 9550. *Cirsium creticum* d'Urv. subsp. *creticum*, "8", 27.09.2014, 10328, *Medit. El.*; *C. vulgare* (Savi) Ten., "27", 21.09.2014, 10276. ***Coryza bonariensis* (L.) Cronquist, "35", 12.08.2013, 9454. ***C. canadensis* (L.) Cronquist, "33", 07.09.2013, 9536. **Cosmos bipinnatus* Cav., "43", 12.10.2013, 9604. *Cota tinctoria* (L.) J. Gay ex Guss. var. *tinctoria*, "33", 07.09.2013, 9534. *Crepis foetida* L. subsp. *foetida*, "9", 22.07.2014, 10137. *C. foetida* L. subsp. *rhoeadifolia* (M.Bieb.) Čelak., "32", 11.07.2014, 10131. *C. macropus* Boiss.&Heldr., "35", 08.06.2013, 9207, Ir-Tur. El., Endemic. *C. micrantha* Czerep., "35", 28.06.2013, 9311. *C. reuteriana* Boiss. & Heldr. subsp. *reuteriana*, "20", 01.06.2015, 10425; East *Medit. El.*; *C. vesicaria* L. subsp. *vesicaria*, "19", 01.06.2015, 10411, *Medit. El.*; *Echinops spinosissimus* Turra subsp. *bithynicus* (Boiss.) Greuter, "35", 12.07.2013, 9356, Ir-Tur. El.; *Eclipta prostrata* (L.) L., "22", 30.08.2013, 9483. *Eupatorium cannabinum* L., "35", 02.08.2013, 9418, Euro-Sib. El.; *Filago germanica* (L.) L., "23", 12.06.2014, 9993. *Helichrysum arenarium* (L.) Moench subsp. *aucheri* (Boiss.) P. H. Davis & Kupicha, "35", 02.08.2013, 9452, Ir-Tur. El., Endemic. *Helminthotheca echioides* (L.) Holub, "33", 29.09.2013, 9597. *Hypochaeris glabra* L., "37", 04.05.2013, 8993. *Inula graveolens* (L.) Desf., "38", 12.10.2013, 9627, *Medit. El.*; *I. helenium* L. subsp. *orgyalis* (Boiss.) Grierson, "34", 18.08.2014, 10202, Eux. El., Endemic. *Lactuca georgica* Grossh., "45", 29.09.2013, 9561; Hyr.-Eux. El. *L. saligna* L., "45", 27.09.2014, 10307. *L. tatarica* (L.) C.A.Mey., "9", 22.07.2014, 10168. *Lapsana communis* L. subsp. *intermedia* (M. Bieb.) Hayek var. *intermedia*, "1", 25.05.2013, 9154. *Picris hieracioides* L. subsp. *hieracioides*, "45", 27.09.2014, 10306; Euro-Sib. El.; *Pulicaria dysenterica* (L.) Bernh. subsp. *dysenterica*, "11", 07.09.2013, 9518. *Scolymus hispanicus* L. subsp. *hispanicus*, "32", 12.08.2013, 9463, *Medit. El.*; *Senecio aquaticus* Hill subsp. *erraticus* (Bertol.) V.A. Matthews, "2", 01.06.2015, 10430; Euro-Sib. El.; *S. vulgaris* L., "4", 09.03.2013, 8784. *S. vernalis* Waldst.&Kit., "35", 04.05.2013, 9006. *Sonchus asper* (L.) Hill. subsp. *glaucescens* (Jord.) Ball., "7", 22.07.2014, 10148. S.

- oleraceus* L., "19", 09.05.2015, 10375. *S. palustris* L., "32", 01.06.2015, 10408. ***Symphytotrichum squamatum* (Spreng.) G. L. Nesom, "33", 29.09.2013, 9598. ***Tagetes minuta* L., "38", 12.10.2013, 9614. **T. patula* L., "35", 30.08.2013, 9498. *Tanacetum parthenium* (L.) Sch.Bip., "21", 14.05.2016, 10468. *Taraxacum buttleri* Soest, "38", 12.10.2013, 9611. *T. macrolepium* Schischk., "25", 01.06.2015, 10417. *T. scaturiginosum* G.E.Haglund, "10", 06.09.2014, 10237. *Tripleurospermum oreades* (Boiss.) Rech. f. var. *tchihatchewii* (Boiss.) E. Hossain, "30", 20.04.2013, 8923. *Tripolium pannonicum* (Jacq.) Dobrocz. subsp. *tripolium* (L.) Greuter, "12", 18.08.2014, 10211, Euro-Sib. El.; *Tussilago farfara* L., "22", 18.08.2014, 10223, Euro-Sib. El.; *Xanthium strumarium* L. subsp. *strumarium*, "33", 07.09.2013, 9531. *X. spinosum* L., "33", 07.09.2013, 9532. **Berberidaceae:** *Berberis vulgaris* L., "46", 26.04.2014, 9770. *Epimedium pubigerum* (DC.) C. Morren & Decne., "1", 21.06.2013, 9256, Eux. El. **Betulaceae:** *Alnus glutinosa* (L.) Gaertn. subsp. *barbata* (C.A.Mey.) Yalt., "5", 28.06.2013, 9285, Eux. El.; *Carpinus betulus* L., "1", 25.05.2013, 9146. *Corylus avellana* L. var. *avellana*, "42", 26.04.2014, 9735, Euro-Sib. El. ***Bignoniaceae:** **Campsis radicans* (L.) Seem., "35", 10.09.2015, 10464. **Boraginaceae:** *Anchusa azurea* Mill. var. *azurea*, "6", 18.05.2014, 9927. *A. hybrida* Ten., "19", 17.05.2015, 10401, Medit. El.; *Cynoglossum creticum* Mill., "44", 26.04.2014, 9744. *C. officinale* L. subsp. *officinale*, "22", 03.07.2014, 10044, Euro-Sib. El.; *Echium angustifolium* Mill., "17", 27.09.2014, 10319, East Medit. El.; *E. plantagineum* L., "44", 26.04.2014, 9752, Medit. El.; *Heliotropium europaeum* L., "32", 11.07.2014, 10127, Ir.-Tur. El.; *Lithospermum arvense* L., "25", 01.06.2015, 10422, Euro-Sib. El.; *Myosotis laxa* Lehm. subsp. *caespitosa* (Schultz) Hyl. ex Nordh., "20", 17.05.2015, 10393. *M. lithospermifolia* Hornem., "19", 09.05.2015, 10380. *M. sparsiflora* Pohl, "43", 26.04.2014, 9803, Euro-Sib. El.; *Solenanthes stamineus* (Desf.) Wettst., "42", 26.04.2014, 9737. *Tournefortia sibirica* L. var. *sibirica*, "35", 20.07.2013, 9398, Euro-Sib. El.; *Trachystemon orientalis* (L.) G. Don, "32", 08.03.2014, 9685, Eux. El. **Brassicaceae:** *Alliaria petiolata* (M. Bieb.) Cavara & Grande, "42", 08.03.2014, 9660. *Alyssum strigosum* Banks & Sol. subsp. *strigosum*, "17", 18.05.2014, 9910. *Barbarea vulgaris* R. Br. subsp. *vulgaris*, "44", 26.04.2014, 9745. *Capsella bursa-pastoris* (L.) Medik., "35", 09.03.2013, 8802. *Cakile maritima* Scop., "33", 18.05.2014, 9936. *Cardamine hirsuta* L., "44", 22.02.2014, 9654. *C. quinquefolia* (M. Bieb.) Schmalh., "2", 22.02.2014, 9641, Euro-Sib. El.; *C. tenera* S. G. Gmel. ex C. A. Mey., "6", 18.05.2014, 9931, Hyr.-Eux. El.; *Clypeola jonthlaspi* L., "17", 18.05.2014, 9911. *Draba verna* L., "33", 22.02.2014, 9652. *Lepidium campestre* (L.) Aiton, "2", 20.04.2013, 8938. *Maresia nana* (DC.) Batt., "35", 06.05.2013, 9004. *Nasturtium officinale* R. Br., "44", 26.04.2014, 9743. *Raphanus raphanistrum* L. subsp. *landra* (DC.) Bonnier & Layens, "17", 18.05.2014, 9896. *R. sativus* L., "44", 25.05.2013, 9098. *Rorippa sylvestris* (L.) Besser subsp. *sylvestris*, "22", 30.08.2013, 9496. *Sisymbrium officinale* (L.) Scop., "22", 03.07.2014, 10054. *Thlaspi alliaceum* L., "42", 22.03.2014, 9691. **Butomaceae:** *Butomus umbellatus* L., "40", 12.08.2015, 10444, Euro-Sib. El. ***Cactaceae:** ***Opuntia ficus-barbarica* A. Berger, "35", 22.02.2014, 9647. **Campanulaceae:** *Campanula glomerata* L. subsp. *hispida* (Witasek) Hayek, "42", 11.07.2014, 10115. **Cannabaceae:** *Humulus lupulus* L., "6", 20.07.2013, 9357. **Caprifoliaceae:** *Valerianella pumila* (L.) DC., "33", 05.04.2014, 9723. **Caryophyllaceae:** *Agrostemma githago* L., "35", 04.05.2013, 9038. *Arenaria serpyllifolia* L. subsp. *leptocladus* (Rchb.) Nyman, "17", 18.05.2014, 9902. *Cerastium glomeratum* Thuill., "35", 22.02.2014, 9648. *C. semidecandrum* L., "41", 22.03.2014, 9699. *Dianthus armeria* L. subsp. *armeria*, "26", 12.06.2014, 9979, Euro-Sib. El.; *Holosteum umbellatum* L. var. *glutinatum* (M. Bieb.) Gay, "41", 22.03.2014, 9696. *Minuartia hybrida* (Vill.) Schischk. subsp. *hybrida*, "35", 04.05.2013, 9002. *Myosoton aquaticum* (L.) Moench, "26", 19.10.2014, 10351. *Petrorhagia prolifera* (L.) P.W. Ball & Heywood, "34", 29.09.2013, 9576. *P. saxifraga* (L.) Link, "19", 06.09.2014, 10245, Euro-Sib. El.; *Polycarpon tetraphyllum* (L.) L., "23", 20.06.2014, 10022. *Saponaria officinalis* L., "39", 12.10.2013, 9615. *Scleranthus annuus* L. subsp. *annuus*, "35", 04.05.2013, 8974. *Silene conica* L., "33", 07.09.2013, 9522. *S. dichotoma* Ehrh. subsp. *racemosa* (Othth) Graebn. & P. Graebn., "17", 18.05.2014, 9900. *S. latifolia* Poir. subsp. *ericalycinae* (Boiss.) Greuter & Burdet, "19", 06.09.2014, 10252. *S. nocturna* L., "35", 08.06.2013, 9177, Medit. El.; *S. subconica* Friv., "17", 18.05.2014, 9898. *Spergularia marina* (L.), "37", 31.05.2014, 9963. *Stellaria media* (L.) Vill., "46", 2m., 26.04.2014, 9772. **Celastraceae:** *Euonymus latifolius* Mill. subsp. *latifolius*, "4", 12.07.2013, 9315, Euro-Sib. El. **Ceratophyllaceae:** *Ceratophyllum demersum* L., "33", 29.09.2013, 9599. *C. submersum* L., "22", 03.07.2014, 10066, Euro-Sib. El.; **Convolvulaceae:** *Calystegia sepium* (L.) R.Br. subsp. *sepium*, "37", 03.07.2014, 10087. *C. silvatica* (Kit.)

- Griseb., "44", 25.05.2013, 9109. *C. soldanella* (L.) R.Br., "41", 12.08.2013, 9457. *Convolvulus arvensis* L., "23", 20.06.2014, 10032. *Cuscuta campestris* Yunck., "33", 07.09.2013, 9537. **Ipomoea purpurea* (L.) Roth, "33", 18.08.2014, 10200. **Cornaceae:** *Cornus sanguinea* L. subsp. *australis* (C.A.Mey.) Jáv., "3", 28.06.2013, 9292, Euro-Sib. El. **Crassulaceae:** *Sedum pallidum* M.Bieb., "20", 01.06.2015, 10424, Eux. El.; **Cucurbitaceae:** *Cucurbita pepo* L., "34", 21.09.2014, 10275. **Cyperaceae:** *Bolboschoenus maritimus* (L.) Palla subsp. *maritimus*, "12", 22.07.2014, 10143. *Carex cuprina* (Sándor ex Heuff.) Nendtv. ex A. Kern., "28", 18.05.2014, 9918. *C. distans* L. subsp. *distans*, "1", 08.03.2014, 9666, Euro-Sib. El.; *C. divisa* Huds., "37", 31.05.2014, 9967. *C. divulsa* Stokes, "26", 26.04.2014, 9786. *C. extensa* Gooden., "37", 25.05.2013, 9114, Euro-Sib. El.; *C. filiformis* L., "25", 10.05.2014, 9831, Euro-Sib. El.; *C. flacca* Schreb. subsp. *erythrostachys* (Hoppe) Holub, "23", 20.06.2014, 10029, Medit. El.; *C. hirta* L., "28", 18.05.2014, 9919, Euro-Sib. El.; *C. leporina* L., "40", 10469, Euro-Sib. El.; *C. pallescens* L., "12", 01.06.2015, 10409, Eux. El.; *C. pendula* Huds., "44", 21.06.2013, 9267, Euro-Sib. El.; *C. pseudocyperus* L. var. *pseudocyperus*, "5", 10.05.2014, 9853, Euro-Sib. El.; *C. remota* L. subsp. *remota*, "4", 20.07.2013, 9393, Euro-Sib. El.; *C. riparia* Curtis subsp. *riparia*, "6", 02.08.2013, 9431, Euro-Sib. El.; *C. sylvatica* Huds. subsp. *sylvatica*, "1", 22.03.2014, 9701, Euro-Sib. El.; *Cladium mariscus* (L.) Pohl subsp. *mariscus*, "46", 26.04.2014, 9765. *Cyperus capitatus* Vand., "35", 08.06.2013, 9202. *C. difformis* L., "40", 10.09.2015, 10458. *C. longus* L. subsp. *longus*, "5", 28.06.2013, 9274. *C. rotundus* L., "17", 27.09.2014, 10320. *Eleocharis palustris* (L.) Roem. & Schult. subsp. *palustris*, "25", 10.05.2014, 9835. *Fimbristylis bisumbellata* (Forsskål) Bubani, "33", 20.07.2013, 9374. *Isolepis cernua* (Vahl) Roem. & Schult. var. *cernua*, "29", 09.05.2015, 10372. *Kyllinga brevifolia* Rottb., "22", 29.09.2013, 9591. *Pycnus flavescens* (L.) P.Beauv.& Rchb. subsp. *flavescens*, "40", 10.09.2015, 10457. *Schoenoplectus lacustris* (L.) Palla, "40", 14.05.2016, 10471. *S. litoralis* (Schrad.) Palla subsp. *litoralis*, "37", 03.07.2014, 10070. **Dioscoreaceae:** *Dioscorea communis* (L.) Caddick & Wilkin, "34", 12.07.2013, 9330. **Ebenaceae:** *Diospyros lotus* L., "4", 20.07.2013, 9388. **Elaeagnaceae:** *Elaeagnus rhamnoides* (L.) A.Nelson, "33", 12.07.2013, 9347. **Ericaceae:** *Rhododendron luteum* Sweet, "1", 26.04.2014, 9753, Eux. El. **Euphorbiaceae:** *Euphorbia amygdaloides* L. subsp. *amygdaloides*, "2", 22.02.2014, 9639, Euro-Sib. El.; *E. falcata* L. subsp. *falcata* var. *galilaea* (Boiss.) Boiss., "22", 03.07.2014, 10043. *E. helioscopia* L., "25", 05.04.2014, 9710. *E. hirsuta* L., "28", 21.09.2014, 10266, Medit. El.; *E. lucida* Waldst. & Kit. "25", 01.06.2015, 10420, Euro-Sib. El.; ***E. maculata* L., "20", 12.08.2015, 10446. *E. microsphaera* Boiss., "26", 11.07.2014, 10100, Ir-Tur. El.; *E. palustris* L., "5", 04.05.2013, 8952, Euro-Sib. El.; *E. paralias* L., "18", 11.07.2014, 10112, Medit. El.; *E. peplis* L., "33", 29.09.2013, 9581, Medit. El.; *E. peplus* L. var. *minima* DC., "20", 12.08.2015, 10447. *E. peplus* L. var. *peplus*, "39", 13.04.2013, 8878. *E. stricta* L., "22", 03.07.2014, 10042, Euro-Sib. El.; *Mercurialis annua* L., "43", 12.10.2013, 9603. **Fabaceae:** *Galega officinalis* L., "44", 10.05.2014, 9874, Euro-Sib. El.; ***Gleditsia triacanthos* L., "35", 01.06.2015, 10438. *Glycyrrhiza echinata* L., "35", 12.07.2013, 9354. *Lathyrus aphaca* L. var. *biflorus* Post, "26", 26.04.2014, 9798, Medit. El.; *L. hirsutus* L., "26", 12.06.2014, 9980, Medit. El.; *L. laxiflorus* (Desf.) O.Kuntze subsp. *laxiflorus*, "1", 26.04.2014, 9756. *L. sphaericus* Retz., "37", 04.05.2013, 8987, Medit. El.; *Lotus angustissimus* L., "25", 11.07.2014, 10102. *L. corniculatus* L. var. *corniculatus*, "23", 21.09.2014, 10289. *Medicago arabica* (L.) Huds., "26", 26.04.2014, 9791. *M. littoralis* Rohde ex Lois var. *littoralis*, "17", 18.05.2014, 9892. *M. lupulina* L., "12", 22.07.2014, 10140. *M. marina* L., "37", 04.05.2013, 8990; *M. minima* (L.) Bartal. var. *minima*, "17", 18.05.2014, 9909. *M. polymorpha* L. var. *vulgaris* (Benth.) Shinnars, "38", 06.08.2014, 10191. *M. truncatula* Gaertn. var. *truncatula*, "19", 01.06.2015, 10412, Medit. El.; *Melilotus albus* Desr., "37", 31.05.2014, 9956. *M. indicus* (L.) All., "35", 10.05.2014, 9814. *M. sulcatus* Desf., "27", 10.05.2014, 9865. *Ononis spinosa* L. subsp. *hircina* (Jacq.) Gams, "25", 21.09.2014, 10284, Euro-Sib. El.; ***Robinia pseudoacacia* L., "35", 10.05.2014, 9813. *Securigera cretica* (L.) Lassen, "35", 08.06.2013, 9178, Medit. El.; ***Senna corymbosa* (Lamarck) Irwin & Barneby, "37", 19.10.2014, 10345 (natural samples recorded for the flora of Turkey first time). *Sophora alopecuroides* L. var. *alopecuroides*, "40", 25.05.2013, 9159, Medit. El.; *Trifolium campestre* Schreb. subsp. *campestre* var. *campestre*, "5", 08.06.2013, 9213. *T. fragiferum* L. var. *pulchellum* Lange, "27", 21.09.2014, 10277. *T. lappaceum* L., "37", 31.05.2014, 9971. *T. nigrescens* Viv. subsp. *nigrescens*, "3", 08.06.2013, 9192. *T. pratense* L. var. *pratense*, "45", 27.09.2014, 10301. *T. repens* L. var. *repens*, "23", 21.09.2014, 10290. *T. resupinatum* L. var. *majus* Boiss., "4", 18.05.2013, 9086. *T. scutatum* Boiss., "25",

- 25.05.2013, 9170; East Medit. El.; *T. subterraneum* L., "26", 26.04.2014, 9789. *T. striatum* L., "40" 14.05.2016, 10472. *T. tumens* Steven & M. Bieb. var. *tumens*, "23", 20.06.2014, 10030, Hyr.-Eux. El.; *Vicia bithynica* (L.) L., "43", 26.04.2014, 9800. *V. hirsuta* (L.) Gray, "35", 09.05.2015, 10368. *V. sativa* L. subsp. *nigra* (L.) Ehrh. var. *nigra*, "25", 10.05.2014, 9842. *V. sativa* L. subsp. *nigra* (L.) Ehrh. var. *segetalis* (Thuill.) Ser. ex DC., "44", 25.05.2013, 9097. *V. villosa* Roth subsp. *eriocarpa* (Hauskn.) P.W.Ball, "26", 12.06.2014, 9982. **Fagaceae:** *Fagus orientalis* Lipsky, "35", 02.08.2013, 9416, Euro-Sib. El.; *Quercus hartwissiana* Steven, "45", 10.11.2015, 10466. *Q. petraea* (Matt.) Liebl. subsp. *iberica* (Steven ex M.Bieb.) Krassiln., "4", 12.07.2013, 9318. *Q. robur* L. subsp. *robur*, "1", 25.05.2013, 9147, Euro-Sib. El. **Gentianaceae:** *Blackstonia perfoliata* (L.) Huds. subsp. *perfoliata*, "33", 20.07.2013, 9378. *B. perfoliata* (L.) Huds. subsp. *serotina* (Rchb.) Vollm., 31.05.2014, 9974; "22", 03.07.2014, 10057. *Centaurium erythraea* Rafn. subsp. *erythraea*, "28", 21.09.2014, 10264, Euro-Sib. El.; *C. pulchellum* (Sw.) Druce, "20", 01.06.2015, 10428. *C. tenuiflorum* (Hoffmanns. & Link) Fritsch subsp. *acutiflorum* (Schott) Zeltner, "37", 06.08.2014, 10196. *C. tenuiflorum* (Hoffmanns. & Link) Fritsch subsp. *tenuiflorum*, "29", 06.09.2014, 10236. **Geraniaceae:** *Erodium acaule* (L.) Becherer & Thell., "23", 20.06.2014, 10031, Medit. El.; *Geranium asphodeloides* Burm.f. subsp. *asphodeloides*, "43", 13.04.2013, 8879, Euro-Sib. El.; *G. collinum* Stephan ex Willd., "39", 04.05.2013, 9023. *G. dissectum* L., "25", 10.05.2014, 9845. *G. molle* L., "26", 26.04.2014, 9794. *G. purpureum* Vill., "4", 20.07.2013, 9397. **Hypericaceae:** *Hypericum androsaemum*, "42", 08.03.2014, 9662. *H. perforatum* L. subsp. *veronense* (Schrank) H.Linb., "43", 06.08.2014, 10174. *H. tetrapterum* Fr. var. *tetrapterum*, "22", 18.08.2014, 10215. **Iridaceae:** *Iris pseudacorus* L., "5", 04.05.2013, 8951. *Romulea ramiflora* Ten. subsp. *ramiflora*, "25", 05.04.2014, 9706, Medit. El. **Juglandaceae:** *Juglans regia* L., "35", 10.09.2015, 10462. **Juncaceae:** *Juncus acutus* L. subsp. *acutus*, "11", 31.05.2014, 9950. *J. articulatus* L. subsp. *articulatus*, "28", 20.06.2014, 10037, Euro-Sib. El.; *J. bufonius* L., "37", 31.05.2014, 9945. *J. compressus* Jacq., "37", 03.07.2014, 10089. *J. conglomeratus* L., "45", 27.09.2014, 10299, Euro-Sib. El.; *J. effusus* L. subsp. *effusus*, "9", 02.08.2013, 9447. *J. inflexus* L. subsp. *inflexus*, "34", 22.07.2014, 10158. *J. littoralis* C.A.Mey., "33", 18.05.2014, 9938, Medit. El.; *J. maritimus* Lam., "29", 19.10.2014, 10340. *J. rigidus* Desf., "9", 06.09.2014, 10242. *Luzula forsteri* (Sm.) DC. subsp. *caspica* Novikov, "1", 22.02.2014, 9635, Euro-Sib. El. **Lamiaceae:** *Ajuga reptans* L., "42", 22.03.2014, 9689, Euro-Sib. El.; *Chaiturus marrubiastrum* (L.) Ehrh. ex Rchb., "45", 10.11.2015, 10465, Euro-Sib. El.; *Clerodendrum bungei* Steud., "35", 08.06.2013, 9241. *Clinopodium nepeta* (L.) Kuntze subsp. *glandulosum* (Req.) Govaerts, "22", 06.09.2014, 10257, Euro-Sib. El.; *C. vulgare* L. subsp. *vulgare*, "38", 12.10.2013, 9619. *Glechoma hederacea* L., "44", 16.03.2013, 8813, Euro-Sib. El.; *Lamium amplexicaule* L. var. *amplexicaule*, "33", 05.04.2014, 9725. *L. purpureum* L. var. *purpureum*, "44", 22.02.2014, 9655, Euro-Sib. El.; *Lycopus europaeus* L., "22", 18.08.2014, 10222. *Melissa officinalis* L. subsp. *officinalis*, "34", 12.07.2013, 9328, Eux. El.; *Mentha aquatica* L., "20", 01.06.2015, 10434. *M. longifolia* (L.) L. subsp. *typhoides* (Briq.) Harley, "28", 21.09.2014, 10265. *M. × piperita* L., "8", 27.09.2014, 10325. *M. pulegium* L., "29", 06.09.2014, 10234. *Nepeta cataria* L., "19", 12.08.2015, 10441, Euro-Sib. El.; *Prunella laciniata* (L.) L., "23", 20.06.2014, 10028, Euro-Sib. El.; *P. orientalis* Bornm., "25", 12.06.2014, 9990, Medit. El.; *P. vulgaris* L., "29", 06.09.2014, 10235, Euro-Sib. El.; *Salvia verbenaca* L., "23", 19.10.2014, 10355, Medit. El.; *S. viridis* L., "35", 08.06.2013, 9198, Medit. El.; *Satureja hortensis* L., "7", 22.07.2014, 10154. *Scutellaria galericulata* L., "5", 02.08.2013, 9410. *Stachys maritima* Gouan, "32", 12.08.2013, 9464, Medit. El.; *S. palustris* L., "29", 19.10.2014, 10338, Euro-Sib. El.; *S. sylvatica* L., "42", 11.07.2014, 10117, Euro-Sib. El.; *Teucrium chamaedrys* L. subsp. *chamaedrys*, "19", 12.08.2015, 10442. *T. polium* L. subsp. *polium*, "35", 09.03.2013, 8761. *T. scordium* L. subsp. *scordioides* (Schreb.) Arcang., "22", 18.08.2014, 10218, Euro-Sib. El.; *Vitex agnus-castus* L., "35", 20.07.2013, 9383, Medit. El. **Lauraceae:** *Laurus nobilis* L., "19", 06.09.2014, 10248, Medit. El. **Linaceae:** *Linum bienne* Mill., "25", 10.05.2014, 9833. **Lythraceae:** *Lythrum maritimum* Kunth, "37", 31.05.2014, 9962. *L. salicaria* L., "22", 03.07.2014, 10053, Euro-Sib. El. **Malvaceae:** *Abutilon theophrastii* Medik., "34", 29.09.2013, 9556. *Althaea officinalis* L., "9", 22.07.2014, 10136. *Lavatera punctata* All., "3", 08.06.2013, 9194. *Malva parviflora* L., "35", 10.05.2014, 9816. **Moraceae:** *Ficus carica* L. subsp. *carica*, "4", 8m., 22.02.2014, 9644. *Morus alba* L., "1", 22.03.2014, 9703. **Nymphaeaceae:** *Nuphar lutea* (L.) Sm., Karakulak, in channels, 7m., 10.05.2014, 9851. *Nymphaea alba* L., "35", 08.06.2013, 9217. **Oleaceae:** *Fraxinus angustifolia* Vahl subsp. *oxycarpa* (Willd.)

Franco & Rocha Afonso, "1", 21.06.2013, 9262, Euro-Sib. El.; *Jasminum fruticans* L., "19", 06.09.2014, 10247, Medit. El.; *Ligustrum vulgare* L., "34", 28.06.2013, 9306, Euro-Sib. El. **Onagraceae:** *Circaea lutetiana* L., "37", 22.07.2014, 10142. *Epilobium parviflorum* Schreb., "8", 27.09.2014, 10323. *E. tetragonum* L. subsp. *tetragonum*, "34", 12.07.2013, 9329. **Orchidaceae:** *Anacamptis pyramidalis* (L.) Rich., "25", 10.05.2014, 9828. *Listera ovata* (L.) R. Br., "42", 26.04.2014, 9736, Euro-Sib. El.; *Ophrys apifera* Huds., "28", 18.05.2014, 9877. *O. mammosa* Desf. subsp. *leucophthalma* (Devillers-Tersch.&Devillers) Kreutz, "42", 22.03.2014, 9688. *Orchis coriophora* L. subsp. *coriophora*, "25", 01.06.2015, 10414. *O. laxiflora* Lam. subsp. *laxiflora*, "5", 10.05.2014, 9856, Medit. El.; *O. palustris* Jacq. subsp. *palustris*, "28", 18.05.2014, 9880. *Serapias orientalis* (Greuter) H. Baumann & Künkele subsp. *orientalis*, "26", 26.04.2014, 9788, Medit. El.; *Spiranthes spiralis* (L.) Chevall, "25", 21.09.2014, 10283, Medit. El. **Orobanchaceae:** *Bartsia trixago* L., "37", 25.05.2013, 9116. *Odontites vulgaris* Moench, "7", 29.09.2013, 9585, Euro-Sib. El.; *Orobanche minor* Sm., "34", 18.05.2014, 9916. *O. ramosa* L., "23", 17.05.2015, 10386. *Parentucellia latifolia* (L.) Caruel subsp. *latifolia*, "35", 05.04.2014, 9722, Medit. El.; *P. viscosa* (L.) Caruel, "28", 20.06.2014, 9999, Medit. El. **Oxalidaceae:** *Oxalis articulata* Savigny, "43", 13.04.2013, 8888. *O. corniculata* L., "38", 13.04.2013, 8859; Cosmopolitan. **Papaveraceae:** *Chelidonium majus* L., "44", 08.03.2014, 9657, Euro-Sib. El.; *Glaucium flavum* Crantz, "33", 18.05.2013, 9092. *Papaver rhoeas* L., "44", 26.04.2014, 9740. **Phytolaccaceae:** *Phytolacca americana* L., "35", 10.09.2015, 10455. **Plantaginaceae:** *Kickxia elatine* (L.) Dumort. subsp. *crinata* (Mabille) Greuter, "29", 19.10.2014, 10343, Medit. El.; *Linaria simplex* DC., "19", 09.05.2015, Medit. El.; *Plantago coronopus* L. subsp. *communata* Pilg., "23", 17.05.2015, 10385; East Medit. El.; *P. lanceolata* L., "25", 25.05.2013, 9174. *P. major* L. subsp. *major*, "35", 28.06.2013, 9314. *Veronica anagallis-aquatica* L., "20", 17.05.2015, 10392. *V. arvensis* L., "20", 01.06.2015, 10433, Euro-Sib. El.; *V. beccabunga* L. subsp. *beccabunga*, "44", 26.04.2014, 9750. *V. chamaedrys* L., "42", 11.07.2014, 10121, Euro-Sib. El.; *V. cymbalaria* Bodard, "34", 09.03.2013, 8807, Medit. El.; *V. filiformis* Sm., "26", 26.04.2014, 9779, Hyr.-Eux. El.; *V. hederifolia* L., Aşağıçinik, 40m., 16.03.2013, 8810. *V. persica* Poir., "20", 17.05.2015, 10391. *V. polita* Fr., "1", 22.02.2014, 9633. *V. verna* L., "44", 26.04.2014, 9749, Euro-Sib. El. **Platanaceae:**

Platanus orientalis L., "30", 20.04.2013, 8920. **Poaceae:** *Aeluropus littoralis* (Gouan) Parl., "10", 06.09.2014, 10240; "10", 19.10.2014, 10334. *Agrostis stolonifera* L., "37", 31.05.2014, 9953, Euro-Sib. El.; *Alopecurus myosuroides* Huds. subsp. *myosuroides*, "44", 25.05.2013, 9110. *A. myosuroides* Huds. subsp. *tonsus* (Blanche ex Boiss.) Doğan, "44", 16.03.2013, 8826, Euro-Sib. El.; *Ammophila arenaria* (L.) Link subsp. *arundinacea* (Husn.) H. Lindb., "34", 27.09.2014, 10312, Medit. El.; *Arundo donax* L., "34", 12.08.2015, 10443. *Avena sativa* L., "3", 18.05.2013, 9076. *Brachypodium sylvaticum* (Huds.) P.Beauv., "25", 12.06.2014, 9985, Euro-Sib. El.; *Briza minor* L., "37", 25.05.2013, 9131. *B. hordeaceus* L. subsp. *hordeaceus*, "28", 18.05.2014, 9923. *B. racemosus* L., "28", 20.06.2014, 10000, Euro-Sib. El.; *B. sterilis* L., "35", 04.05.2013, 9037. *B. tectorum* L., "34", 18.05.2014, 9914. *Calamagrostis pseudophragmites* (Haller) Koeler, "32", 31.05.2014, 9946, Euro-Sib. El.; *Catapodium rigidum* (L.) C.E. Hubb. subsp. *rigidum* var. *rigidum*, "32", 11.07.2014, 10124. *Cenchrus spinifex* Cav., "7", 20.07.2013, 9376. *Crypsis aculeata* (L.) Aiton, "29", 06.09.2014, 10228. *C. schoenoides* (L.) Lam., "29", 06.09.2014, 10227. *Cynodon dactylon* (L.) Pers. var. *dactylon*, "26", 26.04.2014, 9785. *C. dactylon* (L.) Pers. var. *villosus* Regel, "23", 19.10.2014, 10356. *Cynosurus cristatus* L., "25", 12.06.2014, 9988, Euro-Sib. El.; *Digitaria ischaemum* (Schreb.) Muhl. subsp. *asiatica* (Tzvelev) Tzvelev, "43", 12.10.2013, 9606. *Echinochloa crus-galli* (L.) P. Beauv., "28", 21.09.2014, 10273. *E. oryzoides* (Ard.) Fritsch, "28", 21.09.2014, 10274. *Eleusine indica* (L.) Gaertner, "45", 27.09.2014, 10305. *Elymus farctus* (Viv.) Runemark ex Melderis subsp. *farctus*, "7", 22.07.2014, 10156. *Eragrostis minor* Host, "38", 12.10.2013; 9625. *E. pilosa* (L.) P.Beauv., "40", 10.09.2015, 10459. *Festuca arundinacea* Schreb. subsp. *arundinacea*, "35", 17.05.2015, 10404. *F. drymeja* Mert. & W.D.J. Koch, "1", 21.06.2013, 9247, Euro-Sib. El.; *Glyceria fluitans* (L.) R. Br., "28", 20.06.2014, 9998. *Hainardia cylindrica* (Willd.) Greuter, "37", 31.05.2014, 9966. *Holcus lanatus* L., "26", 12.06.2014, 9984, Euro-Sib. El.; *Hordeum bulbosum* L., "43", 06.08.2014, 10184. *H. geniculatum* All., "37", 03.07.2014, 10085, Euro-Sib. El.; *H. murinum* L. subsp. *glaucum* (Steud.) Tzvelev, "32", 20.06.2014, 10005. *Imperata cylindrica* (L.) Raeusch., "35", 18.05.2013, 9044. *Lagurus ovatus* L., "35", 08.06.2013, 9180, Medit. El.; *Leymus racemosus* (Lam.) Tzvelev subsp. *sabulosus* (M. Bieb.) Tzvelev, "7", 20.07.2013, 9364. *Lolium multiflorum* Lam., "35", 08.06.2013, 9218. *L. perenne* L., "35", 31.05.2014, 9939,

- Euro-Sib. El.; *Oplismenus undulatifolius* (Ard.) P. Beauv., “35”, 12.07.2013, 9352. *Parapholis incurva* (L.) C. E. Hubb., “32”, 31.05.2014, 9947. *Paspalum distichum* L., “25”, 05.04.2014, 9707. *Phalaris paradoxa* L., “44”, 25.05.2013, 9103, *Medit. El.*; *Phleum exaratum* Griseb. subsp. *exaratum*, “7”, 20.07.2013, 9365. *Phragmites australis* (Cav.) Trin. ex Steud., “10”, 19.10.2014, 10333, Euro-Sib. El.; *Poa bulbosa* L., “25”, 04.05.2013, 8969. *P. compressa* L., “39”, 04.05.2013, 9011. *P. infirma* Kunth, “25”, 04.05.2013, 8973. *P. pratensis* L., “25”, 10.05.2014, 9830. *P. supina* Schrad., “40”, 04.05.2013, 8944, Euro-Sib. El.; *P. trivialis* L., “6”, 18.05.2014, 9930. *Polypogon maritimus* Willd. subsp. *maritimus*, “37”, 03.07.2014, 10092, Euro-Sib. El.; *P. monspeliensis* (L.) Desf., “7”, 20.07.2013, 9371. *Rostraria cristata* (L.) Tzvelev var. *cristata*, “32”, 12.08.2013, 9471. *R. cristata* (L.) Tzvelev var. *glabriflora* (Trautv.) Doğan, “23”, 20.06.2014, 10026. *Setaria glauca* (L.) P. Beauv., “22”, 18.08.2014, 10214. *Sorghum halepense* (L.) Pers. var. *halepense*, “43”, 12.10.2013, 9602. *Tragus racemosus* (L.) All., “33”, 07.09.2013, 9535. *Trisetum flavescens* (L.) P. Beauv., “32”, 20.06.2014, 10006, Euro-Sib. El.; *Vulpia bromoides* (L.) Gray, “25”, 01.06.2015, 10413, Euro-Sib. El.; *V. fasciculata* (Forssk.) Samp., “17”, 18.05.2014, 9907, *Medit. El.*; *V. ciliata* Dumort. subsp. *ciliata*, “23”, 20.06.2014, 10025. *V. myuros* (L.) C.C.Gmel., “20”, 01.06.2015, 10429. *Zea mays* L. subsp. *mays*, “35”, 10.09.2015, 10463. **Polygonaceae:** *Polygonum aviculare* L. “17”, 27.09.2014, 10315. *P. cognatum* Meissn., “34”, 10.05.2014, 9888. *P. convolvulus* L., “17”, 18.05.2014, 9895. *P. hydropiper* L., “22”, 18.08.2014, 10220. *P. lapathifolium* L., “22”, 18.08.2014, 10225. *P. longipes* Halácsy & Charrel, “10”, 19.10.2014, 10336. *P. maritimum* L., “33”, 12.07.2013, 9342. *P. persicaria* L., “5”, 29.09.2013, 9596. *Rumex conglomeratus* Murray, “26”, 11.07.2014, 10108. *R. crispus* L., “22”, 03.07.2014, 10047. *R. pulcher* L. subsp. *divaricatus* (L.) Murbeck, “35”, 31.05.2014, 9941. *R. sanguineus* L., “38”, 06.08.2014, 10188. **Portulacaceae:** *Portulaca oleracea* L., “34”, 28.06.2013, 9299. **Potamogetonaceae:** *Potamogeton crispus* L., “44”, 26.04.2014, 9741. *P. perfoliatus* L., “34”, 18.05.2014, 9890. **Primulaceae:** *Anagallis arvensis* L. var. *arvensis*, “19”, 19.10.2014, 10348. *Cyclamen coum* Mill. subsp. *coum*, “1”, 29.09.2013, 9540. *Lysimachia dubia* Willd., “20”, 17.05.2015, 10387; East *Medit. El.*; *L. nummularia* L., “40”, 25.05.2013, 9165, Euro-Sib. El.; *L. verticillaris* Spreng., “42”, 11.07.2014, 10118, *Hyr.-Eux. El.*; *L. vulgaris* L., “6”, 02.08.2013, 9430. *Primula acaulis* (L.) L. subsp. *rubra* (Sm.) Greuter&Burdet, “4”, 09.03.2013, 8789, *Eux. El.*; *Samolus valerandi* L., “33”, 20.07.2013, 9375; Cosmopolitan. **Ranunculaceae:** *Clematis vitalba* L., “39”, 12.10.2013, 9616. *C. viticella* L., “4”, 20.07.2013, 9392. *Consolida regalis* Gray subsp. *paniculata* (Host) Soó, “43”, 22.07.2014, 10161. *Helleborus orientalis* Lam., “1”, 22.02.2014, 9631, *Eux. El.*; *Ranunculus arvensis* L., “40”, 04.05.2013, 8946. *R. constantinopolitanus* (DC.) d'Urv., “26”, 26.04.2014, 9784. *R. ficaria* L. subsp. *ficariiformis* Rouy & Foucaud, “1”, 22.02.2014, 9629. *R. marginatus* d'Urv., “7”, 10.05.2014, 9817. *R. ophioglossifolius* Vill., “44”, 26.04.2014, 9748. *R. repens* L., “5”, 10.05.2014, 9860. *R. sceleratus* L., “22”, 03.07.2014, 10063. *R. trichophyllus* Chaix ex Vill., “43”, 28.01.2015, 10361. **Rhamnaceae:** *Frangula dodonei* Ard. subsp. *dodonei*, “33”, 20.07.2013, 9369. *Paliurus spina-christi* P. Mill., “34”, 28.06.2013, 9296. **Rosaceae:** *Agrimonia eupatoria* L. subsp. *asiatica* (Juz.) Skalicky, “43”, 06.08.2014, 10181. *Crataegus microphylla* K.Koch subsp. *microphylla*, “45”, 27.09.2014, 10310, *Eux. El.*; *C. monogyna* Jacq. var. *monogyna*, “19”, 06.09.2014, 10254. *C. pentagyna* Waldst.&Kit. ex Willd., “25”, 01.06.2015, 10437, Euro-Sib. El.; *Geum urbanum* L., “43”, 20.06.2014, 10002, Euro-Sib. El.; *Malus sylvestris* (L.) Mill. subsp. *orientalis* (Uglitzk.) Browicz var. *orientalis*, “1”, 21.06.2013, 9259. *Mespilus germanica* L., “31”, 20.04.2013, 8901, Euro-Sib. El.; *Potentilla reptans* L., “32”, 11.07.2014, 10126. *Prunus × domestica* L., “42”, 08.03.2014, 9664. *P. spinosa* L., “1”, 08.03.2014, 9669, Euro-Sib. El.; *Pyracantha coccinea* M. Roem., “25”, 18.05.2013, 9049, Euro-Sib. El.; *Rosa canina* L., “45”, 26.04.2014, 9759. *Rubus canescens* DC. var. *glabratus* (Godr.) Davis&Meikle, “3”, 18.05.2013, 9059, Euro-Sib. El.; *R. sanctus* Schreb., “33”, 05.04.2014, 9732. *Sanguisorba minor* L. subsp. *balearica* (Bourg. ex Nyman) Muñoz Garm.& C. Navarro, “35”, 01.06.2015, 10440. *Sarcopoterium spinosum* (L.) Spach, “33”, 18.05.2013, 9094; East *Medit. El.* **Rubiaceae:** *Galium aparine* L., “19”, 17.05.2015, 10399. *G. debile* Desv., “22”, 30.08.2013, 9494, *Medit. El.*; *G. elongatum* C.Presl, “20”, 17.05.2015, 10389, Euro-Sib. El.; *G. palustre* L., “28”, 21.09.2014, 10270, Euro-Sib. El.; *G. rivale* (Sibth. & Sm.) Griseb., “19”, 09.11.2014, 10360, Euro-Sib. El.; *G. verum* L. subsp. *verum*, “25”, 01.06.2015, 10418, Euro-Sib. El.; *Sherardia arvensis* L., “35”, 18.05.2013, 9051, *Medit. El.* **Ruppiaceae:** *Ruppia maritima* L., “37”, 31.05.2014, 9960. **Salicaceae:** *Populus nigra* L. subsp. *nigra*, “5”, 28.06.2013, 9276, Euro-Sib. El.; *Salix alba* L. subsp.

alba, “35” 09.05.2015, 10366, Euro-Sib. El. **Sapindaceae**: *Acer campestre* L. subsp. *campestre*, “25”, 10.05.2014, 9834, Euro-Sib. El.; *A. negundo* L., “32”, 01.06.2015, 10439. **Saxifragaceae**: *Saxifraga cymbalaria* L., “44”, 25.05.2013, 9107. *S. tridactylites* L., “35”, 13.04.2013, 8896, Medit. El. **Scrophulariaceae**: *Scrophularia scopolii* Hoppe ex Pers. var. *adenocalyx* Sommier & Levier, “45”, 29.09.2013, 9563, Eux. El.; *Verbascum blattaria* L., “45”, 27.09.2014, 10308. *V. gnaphalodes* M. Bieb., “17”, 18.05.2014, 9897, Eux. El.; *V. pyramidatum* M. Bieb., “40”, 14.05.2016, 10470, Hyr.-Eux. El.; *V. sinuatum* L. subsp. *sinuatum* var. *sinuatum*, “33”, 18.05.2014, 9932, Medit. El.; *V. thapsus* L., “12”, 17.05.2015, 10382, Euro-Sib. El. ***Simaroubaceae**: *Ailanthus altissima* (Mill.) Swingle, “33”, 18.05.2013, 9079. **Smilacaceae**: *Smilax excelsa* L., “4”, 09.03.2013, 8786, Eux. El. **Solanaceae**: *Datura stramonium* L., “35”, 12.07.2013, 9351; Cosmopolitan. *Physalis alkekengi* L., “34”, 29.09.2013, 9557. *Solanum americanum* Mill., “45”, 29.09.2013, 9547. *S. dulcamara* L., “11”, 30.08.2013, 9512, Euro-Sib. El. **Tamaricaceae**: *Tamarix smyrnensis* Bunge, “12”, 17.05.2015, 10381. *T. tetrandra* Pall. ex M. Bieb., “20”, 09.05.2015, 10370. **Thymelaeaceae**: *Daphne pontica* L. subsp. *pontica*, “1”, 25.05.2013, 9144, Eux. El. **Typhaceae**: *Sparganium erectum* L. subsp. *neglectum* (Bebby) K. Richt., “22”, 01.06.2015, 10436. *Typha domingensis* Pers., “40”, 14.05.2016, 10467. **557. T. latifolia L. “43”, 28.01.2015, 10362. **Ulmaceae**: *Ulmus laevis* Pall., “1”, 25.05.2013, 9145, Euro-Sib. El.; *U. minor* Mill., “1”, 21.06.2013, 9261. **Urticaceae**: *Parietaria judaica* L., “7”, 20.07.2013, 9367. *Urtica dioica* L. subsp. *dioica*, “25”, 04.05.2013, 8959, Euro-Sib. El. **Verbenaceae**: *Phyla nodiflora* (L.) Greene, “22”, 30.08.2013, 9491. *Verbena officinalis* L. var. *officinalis*, “45”, 27.09.2014, 10309. **Violaceae**: *Viola kitaibeliana* Soem. & Schult., “33”, 05.04.2014, 9724. *V. odorata* L., “35”, 22.02.2014, 9650. *V. sieheana* W. Becker, “42”, 08.03.2014, 9663. **Vitaceae**: *Vitis vinifera* L., “31”, 20.04.2013, 8903. **Zygophyllaceae**: *Tribulus terrestris* L., “23”, 20.06.2014, 10018.**

Floristic analysis

Yeşilirmak Delta is a place, where natural ecosystems are seriously damaged, due to widespread disturbance. Disturbance promotes diversity by delaying the elimination of some species due to competition, because it causes interruptions in the system's balance (Hub-

bell 1979). In the study area, 568 specific and infraspecific taxa of 340 genera, belonging to 91 families have been identified. Of these taxa, seven belong to the Pteridophyta division and the remaining 561 belong to the Magnoliophyta division. Of the taxa in the study area, only two are included in the Pinophytina subdivision, while 559 are in Magnoliophytina subdivision.

The first ten families of these taxa with the greatest number of species are: *Poaceae* (66), *Asteraceae* (59), *Fabaceae* (40), *Lamiaceae* (29), *Cyperaceae* (28), *Caryophyllaceae* (20), *Apiaceae* (18), *Brassicaceae* (18), *Plantaginaceae* (18), and *Amaranthaceae* (16). The genera with the greatest number of species are: *Carex* (15), *Euphorbia* (13), *Trifolium* (11), *Juncus* (10), and *Veronica* (10).

Generally, these families have the largest number of species in Turkey's flora, and similar results are expected for the research area. Besides, the high number of species belonging to *Carex* and *Juncus* genera results from the widespread floodplain areas and wetlands in the study area. The species belonging to these taxa have aeranchymatic tissues and usually prefer moist places or wetlands (Rydin & Jeglum 2013). *Euphorbia* species have become widespread in the study area, because they are disregarded by sheep and cattle and are not affected by grazing (Lym & Kirby 1987; Tanveer & al. 2013). The *Poaceae* family and genus *Trifolium* comprise taxa with the greatest number of species in meadow and pasture habitats in Turkey (Korkmaz & al. 2011; Yalçın & al. 2011; Öztürk & al. 2012; Devenci 2012).

According to distribution in the phytogeographic regions, 127 taxa are Euro-Siberian (22.4%), 56 taxa are Mediterranean (9.8%) and five taxa are Irano-Turanian elements (1%), three taxa are Cosmopolitan (0.5%), and the remaining 377 taxa are pluriregional or phytogeographically unknown (66.3%) (Fig. 1). As the research area is located in the Black Sea region, quite naturally, the elements of the Euro-Siberian floristic region, which prefer cool and rainy climate, are common in that area (Kaya & Raynal 2001). The elements of the Mediterranean floristic region are more prevalent in the coastal dune habitats of the research area, as the species, which belong to the warm and dry Mediterranean climate, prefer the local arid climate conditions there (Kavgacı 2007; Yalçın & al. 2011). The presence of diverse pluriregional taxa could be explained by lack of information about the distribution of some taxa, or by the fact that the areas have suitable conditions for many species (Elmas & Kutbay

2017), because delta areas are generally exposed to anthropogenic effects (agriculture, grazing, settlements, etc.), and diaspore migration, owing to birds, cattle, sheep and transportation means.

Endemic species in the study area are *Bupleurum setaceum* (Mediterranean element), *Crepis macropus* (Irano-Turanian element), *Helichrysum arenarium* subsp. *aucheri* (Irano-Turanian element), and *Inula helenium* subsp. *orgyalis* (Euro-Siberian element), and the endemism rate is quite low (0.7%). Because Yeşilirmak Delta is an alluvial delta, it is a region where topographic and ecological isolation effects are not found (Daubenmire 1978; Nimis & Crovello 1991). Thus, isolations based on endemism have not been noticed in the study area, and due to anthropogenic effects, many alien species are becoming widespread in the area.

According to IUCN (URL-2), when the taxa are evaluated on a global scale, the population of one of the 568 taxa (*Juglans regia*) is decreasing and has NT (Near Threatened) status; four taxa have DD (Data Deficient) status. The population of three out of 124 species with LC (Least Concern) status is also declining. According to the *Red Data Book of Turkish Plants* (2000), two of the taxa are Endangered (*Pancreatium maritimum* and *Ambrosia maritima*), five are Vulnerable (*Salvinia natans*, *Galanthus rizehensis*, *Leucojum aestivum* subsp. *aestivum*, *Sium sisarum* var. *lancifolium* and *Myosotis sparsiflora*), three are LC (*Bupleurum setaceum*, *Crepis macropus* and *Helichrysum arenarium* subsp. *aucheri*), and two are DD (*Medicago truncatula* var. *truncatula* and *Polygonum longipes*). Although the generations of many species spread in the study area are not under great threat, their distribution should be monitored closely as it depends on threatened habitats such as wetlands and sands.

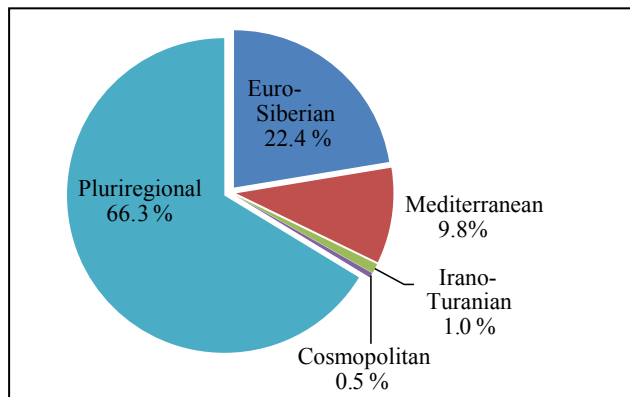


Fig. 1. Phytogeographic distribution of the taxa.

References

- Aslan, S., Şahin, B. & Vural, M. 2009. On the Turkish *Clerodendrum* (L.) (*Verbenaceae*). – *BioDiCon*, **2**(1): 10-13.
- Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., Rosatti, T.J. & Wilken, D.H. (eds) 2012. *The Jepson Manual: Vascular Plant of California*, 2nd ed., Univ. California Press, Berkeley.
- Berberoğlu, S., Yılmaz, K.T. & Özkan, C. 2004. Mapping and monitoring of coastal wetlands of Çukurova Delta in the Eastern Mediterranean region. – *Biodivers. & Conservation.*, **13**(3): 615-633.
- Daubenmire, R. 1978. *Plant Geography*. Academic Press, New York.
- Davis, P.H. (Ed.) 1965–1985. *Flora of Turkey and the East Aegean Islands*, vol. 1-9, Edinburgh Univ. Press, Edinburgh.
- Deveci, M. 2012. The diversity of plant species in rangelands (Ordu region, Turkey). – *J. Animal Veterinary Adv.*, **11**(9): 1498-1511.
- Ekim, T., Koyuncu, M., Vural, M., Duman, H., Aytac, Z. & Adıgüzel, N. 2000. *Türkiye Bitkileri Kırmızı Kitabı* [Red Data Book of Turkish Plants], Nature Protect Institution, Van, Centenary University Press, Ankara, Turkey.
- Elmas, E. & Kutbay, H.G. 2017. Biodiversity in different successional stages of Mediterranean enclaves distributed along Sinop Peninsula (Turkey). – *Pl. Biosyst.*, **151**: 1-13.
- Greb, S.F., DiMichele, W.A. & Gastaldo, R.A. 2006. Evolution and importance of wetlands in earth history. – *Geological Society of America, Special Paper*, **399**: 127-150.
- Güner, A., Aslan, S., Ekim, T., Vural, M. & Babaç, M. T. (eds) 2012. *Turkey Plant List (Vascular Plants)*. Nezahat Gökyiğit Botanic Garden and Flora Researches Association Publication, Istanbul (in Turkish).
- Hillier, R.D., Waters, R.A., Marriott, S.B. & Davies, J.R. 2011. Alluvial fan and wetland interactions: evidence of seasonal slope wetlands from the Silurian of South Central Wales, UK. – *Sedimentology*, **58**: 831-853.
- Hubbell, S.P. 1979. Tree dispersion, abundance, and diversity in a Tropical dry forest. – *Science*, **203**: 1299-1309.
- Humphries, M.S., Kindness, A., Ellery, W.N., Hughes, J.C., Bond, J.K. & Barnes, K.B. 2011. Vegetation influences on groundwater salinity and chemical heterogeneity in a freshwater, recharge floodplain wetland, South Africa. – *J. Hydrol.*, **411**(1-2): 130-139.
- Irwin, H.S. & Barneby, R.C. 1982a. The American *Cassiinae*: A synoptical Revision of *Leguminosae* Tribe *Cassieae* subtribe *Cassiinae* in the New World. Part I. – *Mem. Bot. Gard.*, **35**(17): 1-454.
- Irwin, H.S. & Barneby, R.C. 1982b. The American *Cassiinae*: A synoptical Revision of *Leguminosae* Tribe *Cassieae* subtribe *Cassiinae* in the New World. Part II. – *Mem. Bot. Gard.*, **35**(17): 455-918.
- Karaömerlioğlu, D. 2007. Investigation of Natural Ecosystems in Silky Delta (Silifke) in terms of Plant Ecology, Ph.D Thesis, Çukurova University, Institute of Natural and Applied Sciences, Adana (in Turkish).
- Kavgacı, A. 2007. Sand-dune vegetation of İğneada coast in the Thracian part of Turkey. – *Hacquetia*, **6**(2): 171-182
- Kavgacı, A., Čarni, A., Tecimen, H.B. & Özalp, G. 2011. Diversity of floodplain forests in the İğneada Region (NW Thrace – Turkey). – *Hacquetia*, **10**(1): 73-93.

- Kaya, Z. & Raynal, D.J.** 2001. Biodiversity and conservation of Turkish forest. – *Biol. Conservation*, **97**(2), 131-141.
- Korkmaz, H., Mumcu, Ü., Kutbay, H.G. & Alkan, S.** 2011. Vascular flora of the Gölarđı Wildlife Protection Area and its surroundings (Terme/Samsun, Turkey). – *Phytol. Balcan.*, **17**(3), 315-331.
- Korkmaz, H., Mumcu, Ü., Alkan, S. & Kutbay, H.G.** 2012. A Syntaxonomic Research on Psammophyll, Hygrophyll and Forest Vegetation of Wildlife Conservation Area, Gölarđı (Terme / Samsun), *Ecology*, **21** (85): 64-79. (in Turkish).
- Lym, R.G. & Kirby, D.R.** 1987. Cattle foraging behavior in Leafy Spurge (*Euphorbia esula*)-infested rangeland. – *Weed Technology*, **1**(4): 314-318.
- Matthews, E. & Fung, I.** 1987. Methane emissions from natural wetlands: global distribution and environmental characteristics of source. – *Global Biogeochem. Cycles*, **1**: 61-86.
- Mitsch, W.J. & Gosselink, J.G.** 2000. *Wetlands* (2nd edition). New York, Van Nostrand Reinhold.
- Mumcu, Ü.** 2010. Floristic and Phytosociological Properties of Gölarđı (Terme/Samsun) Wildlife Protection Area, M.Sc. Thesis, Ondokuz Mayıs University, Institute of Natural and Applied Sciences, Samsun. (in Turkish).
- Mutlu, B.** 2004. Additional record of *Raphanus* L. and *Campanula* L. for the flora of Turkey. – *Turk. J. Bot.*, **28**: 603-607.
- Nesom, G.L.** 1994. Review of the taxonomy of *Aster* sensu Lato (*Asteraceae: Astereae*), emphasizing the new world species. – *Phytologia*, **77**(3): 141-297.
- Nimis, P.L. & Crovello, T.J.** 1991. *Quantitative Approaches to Phytogeography*. Kluwer Academic Publishers, Netherlands.
- Özçağlar, A.** 1994. Wednesday Benefit from Plain and its surrounding land, Ankara University, Turkey Geography Research Center Journal, **3**: 93-128. (in Turkish).
- Özen, F.** 2010. Syntaxonomical and Synecological Analysis of Hygrophyll, Forest and Maquis Vegetation of Yeniköy (Bursa). *Ecology*, **19**(76): 50-64. (in Turkish).
- Öztürk, M., Altay, V., Gücel, S. & Aksoy, A.** 2012. Aegean grasslands as endangered ecosystems in Turkey. – *Pakistan J. Bot.*, **44** (Special Issue): 7-17.
- Ryđin, H. & Jeglum, J.K.** 2013. *The Biology of Peatlands* (Second Edition). Oxford Univ. Press, UK.
- Stanley, D.J. & Warne, A.G.** 1997. Holocene sea level change and early human utilization of deltas. – *GSA Today*, **7**(12): 1-10.
- Syvitski, J.P.M., Overeem, I., Brakenridge, G.R. & Hannon, M.** 2012. Floods, floodplains, delta plains. – *Sedimentary Geology*, **267-268**: 1-14.
- Şahin, K. & Bağcı, H.R.** 2016. Evaluation of morphometric characteristics of Turkey's major deltas with GIS and RS techniques. *International Social Research Journal*, **9**(42): 984-990.
- Tanveer, A., Khaliq, A., Javid, M.M., Chaudhry, M.N. & Awan, I.** 2013. Implications of weeds of genus *Euphorbia* for crop production: a review. – *Planta Daninha*, **31**(3): 723-731.
- Tockner, K., Lorang, M.S. & Stanford, J.A.** 2010. River floodplains are model ecosystems to test general hydrogeomorphic and ecological concepts. – *River Research and Applications*, **26**: 76-86. DOI: 10.1002/rra.1328
- Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A.** 1964-1993. *Flora Europaea*, Vol. I-V, Cambridge Univ. Pres, Cambridge.
- Verloove, F. & Gullón, E.S.** 2012. A taxonomic revision of non-native *Cenchrus* s.str (*Panicaceae, Poaceae*) in the Mediterranean area. – *Willdenowia*, **42**: 67-75.
- van der Maarel, E.** 2005. *Vegetation Ecology*. Blackwell Science Ltd, 395, Oxford, UK.
- Yalçın, E., Kılınç, M., Kutbay, H.G., Bilgin, A. & Korkmaz, H.** 2011. Floristic properties of lowland meadows in the Central Black Sea Region of Turkey. – *EurAsian Journal of BioSciences*, **5**: 54-63. DOI: 10.5053/ejobios.2011.5.0.7.
- URL-1: www.environment.gov.au/biodiversity/abrs/online-resources/flora/49/index.html, (accessed 21.03.2014)
- URL-2: The IUCN Red List of Threatened Species. Version 2017-1. <www.iucnredlist.org>. (accessed 23.05.2017).