A survey of the alien vascular flora of the urban and suburban area of Thessaloniki, N Greece

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Abstract


In the frame of a wider research project, an inventory of 147 alien vascular plant taxa of the urban and suburban area of the city of Thessaloniki, N Greece is presented. The floristic checklist is based on extensive recent field work in 26 selected collection sites of four development sectors of the metropolitan area of the city. Each taxon recorded is given with information concerning its life-form and chorology (critically compiled as origin and current total distribution, given separately when possible), previously reported occurrence in the area, biotopes (semi-natural, anthropogenic), distribution in the investigated area and quantitative estimation of its presence per collection site. The most abundantly found taxon is *Solanum elaeagnifolium*, followed by *Ailanthus altissima, Cynodon dactylon, Crepis sancta, Diplotaxis tenuifolia, Amaranthus retroflexus* and *Sporobolus indicus*. The annotated checklist includes earlier reports for 62 taxa and furnishes at least 85 new records for the flora of Thessaloniki. Among them are 37 taxa not given for Greece in Flora Europaea and 16 taxa not given for Greece in the Med-Checklist.

Introduction

Plant taxa can be alien to continents, islands, bio- or ecoregions, states or countries (Richardson & al. 2000). Aliens (synonyms: exotics, adventives, allochthonous, non-natives or non-indigenous plants) are those plant taxa whose presence is due to intentional or accidental introduction as a result of the activities of neolithic or post-neolithic man or of his domestic animals (Webb 1985, Pyšek 1995, Richardson & al. 2000). According to their invasion ecology in a certain territory, alien plants can be “invasive” (reproducing in large numbers, at a considerable distance from parental plants, with potential to spread over a considerable area), “naturalized” (reproducing consistency, sustaining populations for many life cycles without direct intervention by man, not necessarily invading) or “casual” (not forming self-replacing populations, relying on repeated introductions for persistence). Even casual aliens may represent potential future invaders, thus deserving close attention (Kowarik 1995, Williamson 1996, Wade 1997, Starfinger 1998, Celestí-Grapow & al. 2001).
Settlements (including harbours, railway stations, parks and gardens) are distribution centres of intentionally or unintentionally introduced aliens. Understanding the behaviour of alien species in cities is of crucial importance since cities serve as migration sources (Sukopp & Werner 1983, Kowarik 1990) from which aliens can spread further into the landscape (Pyšek 1998).

Although many cities have been surveyed in Europe (for a review see Mucina 1990, Pyšek 1993, 1998), only a single study exists hitherto for a Greek city. Chronopoulos & Christodoulakis (2000) reported the occurrence of 93 alien taxa in the city of Patras, NW Greece. Apart from various and scattered reports in several floristic studies or studies of particular alien species (e.g. Economidou & Yannitsaros 1975), research on the alien flora of Greece has been limited up to date mainly to a review of the alien flora of Greece (including 77 taxa) and a study of the alien flora of Crete, both carried out by Yannitsaros (1982, 1991).

In this paper, an attempt is made for the first time to present the alien flora of the urban and suburban area of Thessaloniki (from sea level up to c. 300 m at Platanakia, Panorama). An inventory of 147 taxa is provided based on extensive recent field work (specimens deposited in TAU). The annotated checklist also includes critically compiled published information from scattered sources (Charrel 1891-92, Charrel alias Nadji 1892, Halácsy 1906, Turrill 1918, 1920, Zaganiaris 1938, 1939a, 1939b, 1940, Oberdorfer 1954) for 62 taxa and furnishes at least 85 new records, thus updating any previous floristic knowledge for the investigated area.

Material and methods

Following Sukopp & al. (1980) and Wittig & al. (1993), four urban development sectors were designated for the metropolitan area of the city of Thessaloniki (A, B, C and D, Fig. 1). The investigated area is designated approximately by the suburban satellite municipalities and settlements adjacent and functionally connected to the city of Thessaloniki (Thermi, Panorama, Pefka, Sindos and Calochori), with the major urban agglomeration (sectors A, B, C) almost delimited by the peripheral Ring-Road. An approach with 26 specific and delimited collection sites was adopted (Fig. 1).

Only alien taxa are included in the present study. The term “alien” is used here broadly defined (Richardson & al. 2000), covering naturalized and/or invasive plants, casual ephemeral introductions and occasional escapes and/or cultivation relics. Alien taxa exclusively cultivated in the investigated area were omitted. Alien taxa from own earlier publications (Krigas & al. 1999, Pateli & al. 2002) are included in the catalogue without specimen citation, but provided additionally with a quantitative presence estimation per collection site.

A plant was included in the list of alien taxa of the investigated area, when the two following conditions were fulfilled (Pyšek & al. 2002):

(a) There is no evidence that it has any area in Greece where it is native. A strictly geographical approach to plant invasions was adopted (a taxon was considered as alien to the whole Greek territory). When the origin of a taxon was specifically denoted in basic floras as “uncertain” or “unknown”, or as “doubtfully native” in Greece, this also qualified the specific taxon for inclusion in the list. In every other case, the taxon was treated as indigenous (sensu Webb 1985, Pyšek 1995a, Schwartz 1997) and was excluded. Similarly, no consideration of the so-called “apophytes” (native species occurring in secondary habitats, see e.g. Holub & Jirásek 1967) was given.

(b) It is reproduced of its own at least once outside the space where it was found, sown or planted (e.g. outside the flower bed or garden). In plants reproducing by seed, germination outside such space was considered as “escape from cultivation”. For a plant reproducing clonally, as “escape from cultivation” was considered only if it survived winter and summer drought, persisting in a given site until the following growing period.

Families, genera, species and subspecies appear alphabetically within the two major groups of angiosperms, viz. *Dicotyledoneae* and *Monocotyledoneae*. Nomenclature follows Strid & Tan (1997, 2002) and for taxa not included Greuter & al. (1984-1989) and finally Tutin & al. (1968-1980, 1993) for taxa not covered by the previous. Nomenclature in the genus *Taraxacum* follows...
Fig. 1. Collection sites (1-8) per development sector in the urban (A: Byzantine Walls (black line); A2: Tsinari, Ano Poli; A3: Roman Forum archaeological site) and suburban area (B: Park of Municipal Refreshment Stand and the 3rd Army Force; B2: Park of the Aristotle University Campus and the Tellogleio Institution; B3: Watercourse of 40 Ekklisies area; B4: Archaeological site of Toumba; B5-iii: Eastern Regional Ditch (i-Foinikas, ii-Harilaou and iii-Pylea-Ano Toumba-Kryoneri); B6: “Makedonomachou Kodra” abandoned Army Camp and archaeological site, Kalamaria; B7: British Cemetery and Ag. Ioannis Cemetery, Kalamaria; B8: Allatini pantile factory area; C1: Port Authority of Thessaloniki; C2: Commercial Railway Station of Thessaloniki; C3: Zeintelik Allied Cemeteries; C4: Around “Ziaka Army Camp”, Dendropotamos area; C5: Dendropotamos stream, Anthokipoi area; D1: Platanakia Recreational Area, NE of Panorama; D2: N751 “Macedonia” Settlement, SE of Panorama; D3-ii: Suburban Seih-Sou planted pine forest (i-SW and ii-NE of the ring-road); D4: Byzantine Watermills Park, Polichni area; D5: watercourse of Filiro, Pefka area; D6: De la Salle College, Rentziki area; D7: Industrial Park of Sindos. For description of biotope types and subcategories, see Material and methods.
the opinion of Richards (pers. com.). In every other case the relevant source is provided specifically.

In the floristic catalogue presented below, the name of a taxon is followed by different categories of abbreviated information separated by slashes (/):

1. **Life forms** of the plant taxa collected are identified according to the system of Raunkiaer (1934), Ellenberg (1956) and Ellenberg & Müller-Dombois (1967). The following abbreviations apply: P = phanerophyte, NP = nano-phanerophyte, C = chamaephyte, H = hemiepiphyte, G = geophyte, T = therophyte; scap = scapose, caesp = caespitose, lian = lianose, par = parasite, bulb = bulbous, rhiz = rhizomatose, bienn = biennial, rept = reptant, suffr = suffruticose, succ = succulent.


The biotopes (sensu Lincoln & al. 1982) where a taxon is currently found in the investigated area are differentiated in semi-natural and anthropogenic (Wittig 1989, 1991, Pyšek & al. 2000).

The following abbreviations apply to semi-natural biotope types (in capital) and their subcategories (in small): WC = watercourses PF = suburban planted pine forest, FR = forest roads and pathways, roads with compact ground, M-o = meadows in openings of the planted suburban pine forest, M-bu = meadows in the burned area of the suburban planted pine forest, M-rr = meadows in ring-road embankments crossing the suburban pine forest, M-s = meadows with relics of evergreen and/or deciduous shrubs, M-ap = meadows in areas previously used for agriculture or pasture and fallow fields, GCD = Natural Garden of De la Salle College, rp = rocky places.

The following abbreviations apply to anthropogenic biotope types (in capital) and their subcategories (in small): BW = Byzantine Walls, GA = public lawns and small private gardens, VL = vacant-lots, RS = roadsides, RT = railway tracks, tb = tree bases, ru = rubble, gr = gravel, pc = pavement cracks.

The quantitative estimation of the presence of a taxon per collection site is given in a four scale gradient (Wittig & al. 1993): (I) Presence in small, scattered spots, located with certainty only by searching extensively the collection site. (II) Presence in a few rather large spots or in more medium sized or in many small spots, easily overlooked at a rapid passage through the collection site. (III) Presence locally dominant in parts of the site that cannot be overlooked at a rapid passage through the collection site. (IV) Presence impossible to be overlooked, appearing almost all over the collection site (covering at least 30 % of its surface).

Fig. 3. Pavement sealed with asphalt in the urban area of Thessaloniki and young individuals of Solanum elaeagnifolium breaking the cover (a: rhizomes, b: leaves, c: flowers and d: fruits of the plant).


**Floristic catalogue**

**Dicotyledoneae**

**Aceraceae**

\textit{Acer negundo} L. / Pscap; N Amer \rightarrow N Amer + Europ / RS, VL / B5ii (I) \textit{K3840}; B6 (I) \textit{K3218}, \textit{K6182}. – Cultivation escape.

**Amaranthaceae**


\textit{A. quitensis} Kunth / Tscap; S Amer /c117 Subcosmopol / GCD / D6 (II) \textit{K4263}.


Apocynaceae

Vinca major L. subsp. major / Crept; Eurymedit / [1], [2] / FR, GCD, RS, GA, ru / A3 (II) K685; B3 (II) K4648; B5iii (II) K977; B7 (II) K5051; C5 (I) K1138; D2 (II) K703, K3055; D6 (III) K & al. 3580, K3705, K4733. – Doubtfully native in Greece according to MC, most probably appearing only as a cultivation escape from gardens and/or relic in the area, nowadays in natural regeneration in site D6.

V. minor L. / Crept; / Europ-Caucas / [1] / GCD / D6 (III) K4449, K4732. – Most probably appearing only as a cultivation escape from gardens and/or relic in the area, nowadays in natural regeneration in site D6. According to Stearn in FE 3: 69, it has been cultivated for centuries and occurs as a relic of cultivation or of deliberate naturalization so often that the limits of its natural distribution are rather uncertain (Stearn in FT 6: 163 considers it as naturalized in Greece, although in MC 1: 51 it is treated as indigenous).

Bignoniaceae

Campsis radicans (L.) Seem. / Plian; N Amer / N Amer + Italy / RS, GA, BW, pc / A1 (I); B3 (I) Obs; B4 (I) K4184; C2 (I) K4091; D4 (I) K2807; D6 (I) Obs. – Cultivation escape from gardens.

Cactaceae

Opuntia ficus-barbarica A. Berger / Psucc; Neotrop / Neotrop + Medit / WC, M-ap, RS, VL, BW / A1 (II); B3 (I) K2476; B4 (I) K5971; B5iii (II) K2695; B8 (II) K2128; C5 (I) Obs; D2 (I) Obs; D3i (I) Obs. – Most probably as a cultivation relic from hedges.

Campanulaceae

Campanula medium L. / Hbienn; NW Medit-Mont / Europ / VL / B4 (I) K5940. – Cultivation escape from gardens.

Cannabaceae

Cannabis sativa L. / Tscap; S & W Asiat / Subcosmopol / RS / C2 (I) K2828. – Not cultivated, probably dispersed with seeds for domestic birds.

Caprifoliaceae

Lonicera japonica Thunb. / Plian; E Asiat / E Asiat + W Medit / VL / B4 (I) K5967; B6 (I) K5134, K2094. – Cultivation escape from gardens. Greece not given by Browicz in FE 4: 47.

Caryophyllaceae


Chenopodiaceae

Atriplex hortensis L. / Tscap; C Asiat / Circumbor / [1], [2] / RS, ru / B3 (I) Obs; B4 (II) K2878, K4216; B8 (II) K3916. – According to Tan in FH 1: 123 there is also a record of A. sagittata Borkh. from the Thessaloniki area that is very similar to A. hortensis.


Compositae

Anacyclus radiatus Loisel. / Tscap; W Medit (Dafni & Heller 1990) ▶ Eurymedit / RS, VL / B3 (3I) Par&K727b.

Artemisia arborescens L. / Tscap; C Asiat / Subcosmopol / WC, GCD, VL, GA / A2 (III).

Aster squamatus (Spreng.) Hieron. / Hscap; Neotrop ▶ Subcosmopol / WC, PF, FR, RS, GA, BW, ru, pc / A1 (II) K2978; B1 (II) Par1636, Par1673; B2 (II) Pat3468; B3 (II) Obs; B4 (II) K4198; B5i (II) Obs; B8 (II) Obs; D1 (I) K4401i; D3i (II) K2898; D3ii (I) Obs; D7 (II).

Calendula officinalis L. / Tscap; RS, GA, ru, pc / A1 (I); A2 (I) K846; K2894; B2 (I) Obs; B4 (I) K5941; B7 (II) K536, K5018, K5019; C3 (II) Obs; D5 (I) K&H3242. – Most probably as a cultivation escape from gardens. Not given for Greece in FE.


Conyza albida Willd. ex Spreng. / Tscap; Neotrop ▶ Cosmopol / RS, VL, GA, RT, ru, pc, gr / A1 (II); B1 (II) K5792a; B2 (II) Pat3120; B3 (II) K4646; B6 (II) K5133; C2 (II) Obs; D1 (II) K4687, K4688, K4909, K6036; D6 (II) K4284, K4774; D7 (II). – Probably two flowering periods, appearing mostly as a sterile rosette in very disturbed habitats. Not given for Greece in FE. Taxonomy and nomenclature according to Pignatti (1982).

C. bonariensis (L.) Cronq. / Tscap; S Amer ▶ Cosmopol / [5], [6] / WC, PF, M-bu, RS, VL, GA, BW, RT, ru, tb, pc, gr / A1 (II); A3 (II) K4120; B1 (II) K2499, K5791, K5795, K5815; B3 (II) K3826; B4 (II) K4229b, K5951; C1 (II) K2785; C2 (II) K4116; C3 (II) Obs; C4 (II) K4170; D2 (II) Obs; D3ii (II) Obs; D7 (II).

C. canadensis (L.) Cronq. / Tscap; N Amer ▶ Cosmopol / [1], [5], [6] / M-bu, RS, VL, GA, RT, ru, pc / A2 (II) K1758; B1 (II) K5792b; B2 (II) Pat3198; B3 (II) K2474; B4 (I) K4299a; B5ii (II) K2685; B8 (I) Obs; C2 (II) Obs; C5 (II) Obs; D2 (II) Obs; D3ii (II) Par1526; D6 (II) Obs; D7 (II).

Crepis sancta (L.) Babc. / Tscap; Turan (Pignatti 1982) ▶ Eurymedit / [1], [2], [5], [6] / WC, M-o, PF, M-s, M-ap, M-rr, FR, rp, RS, VL, GA, RT, ru, tb, pc / A3 (II) K644; B2 (III) Pat3575; B4 (II) K1655; B5ii (II) K4797, K4811, K4993; soli (II) K886, K4613, K4620; B5ii (II) K939, K957, K958; B6 (III) K1240, K3220, K4823, K4835; B7 (II) K537, K5054; B8 (II) K3094; C2 (II) K1463; C3 (III) K544, 5760, K763, K797, K1502; C5 (II) K1109, K4717; D1 (II) K4674, K4882; D2 (II) K711; D3ii (II) K621, K1051, K3147; D3ii (I) Obs; D5 (II) K4565, K4573; D6 (III) K4763; D7 (II). – First appearance in Europe in 1763 (Gouan in Thellung, after Le Floc’h 1991). If origin is not adopted according to Pignatti (1982), it should be considered as native from S Europe to Iraq.

Helianthus annuus L. / Tscap; N Amer ▶ N Amer + EC & SE Europ / RS / A1 (I) Obs; C4 (I) Obs; D7 (I) Obs. – Certainly a cultivation escape from gardens.


Senecio bicolor subsp. cineraria (DC.) Chater / Cufffr; W Medit / GA / A2 (III) K1549. – Cultivation escape from gardens.
Tagetes patula L. / Tscap; S Amer / RS / B4 (I) K4213; D2 (I) K4407. – Cultivation escape from gardens.

Xanthium spinosum L. / Tscap; S Amer ▶Cosmopol / [1], [4], [5], [6] / RS, VL, ru / B3 (I) Obs; B5ii (I) Obs; B5iii (II) K2048, K2416, K2451; B6 (II) Obs; B7 (II) Obs; B8 (II) Obs; C4 (II) Obs; C5 (II) Obs; D1 (II) K6031; D2 (II) Obs; D4 (II) Obs; D7 (II).

X. strumarium subsp. cavanillesii (Schouw) D. Lőve & P. Dansereau / Tscap; Amer? ▶Cosmopol / [1], [2], [5], [6] / WC, PF, M-bu, FR, RS, VL, ru / B3 (II) Obs; B4 (II) K4207; B5ii (II) K2682; B8 (II) Obs; C2 (II) K2820; C4 (II) Obs; C5 (II) K2728; D1 (II) K4500, K5885, K6049; D2 (II) K4228; D3i (II) Obs; D3ii (II) Obs; D4 (III) K2786, K2846; D7 (II). – Nomenclature according to Kupicha in FT 5: 47. Toorill (1929) mentions that Nadji firstly reported this taxon from Europe in 1891 (as X. saccharatum subsp. aciculare Widder), collected at “about seven miles from Salonica” (‘marais de Tekelü’= site D7).

Convolvulaceae

Cuscuta campestris Yuncker / Tpar; N Amer ◀Convolvulaceae / Cosmopol / RS, VL, GA / A1 (II); B3 (II) K1814, K2492; B4 (II) K2948; B7 (II) Obs; B8 (II) K2122, K2234; C1 (I) K2561; C2 (II) K1451, K4092; C4 (II) K4161; C5 (II) K3979; D1 (I) K4492; D2 (I) K2017, K4426; D7 (II). – According to Feinbrun (1970) it was introduced to Europe at about 1900 and spread mainly with agricultural seed especially after the First World War.


Cruciferae

Brassica napus L. / Hbienn; ? ▶Medit / RS, VL, RT / B5iii (I) K2378; C2 (II) K1380, K1488, K5075, K5074; C5 (II) K4727. – Alien or naturalized in the Mediterranean region, not given for Greece in MC.


B. rapa L. / Hbienn; Europe (Pyšek & al. 2002) ▶Cosmopol / [2] / M-ap, RS, VL, GA, pc / B3 (I) K5227; B5ii (II) K891; B6 (II) K1271, K3234, K4847; B7 (I) K5012; C4 (I) K1118; C5 (I) K1119, K1135; D5 (I) K&H3293. – According to MC it is doubtfully naturalized in Greece.

Calepina irregularis (Asso) Thell. / Tscap; Turan (Quélèz & al. 1990) ▶Medit-Turan / [5] / WC, M-ap, RS, VL, ru / A3 (I) K655b; B3 (II) Par1672b; B5i (III) K1196, K4786, K6077; B5ii (II) K889, K929; B5iii (I) K4602; B6 (III) K3227, K4848; B8 (II) K682, K4815; C5 (II) K1145, K4722; D2 (II) K3076; D3i (I) K622; D5 (I) K4779; D6 (II) K4738; D7 (II). – According to Tan in FH 2: 294-295 no origin is provided, considering it as probably introduced to Crete but native to the rest of Greece.

Diplotaxis tenuifolia (L.) DC. / Hspc; Submedit-Subatl / [5], [6] / M-o, M-ap, M-rr, FR, RS, VL, GA, BW, RT, ru, pc, gr / A1 (III); A2 (II) Obs; A3 (II) Obs; B1 (II) K2515, K5826; B2 (II) Obs; B3 (III) K6060; B4 (III) K502, K1702, K5954; B5ii (II) K969, K1206; B5ii (II) K2664; B5iiii (III) K3200; B6 (II) K1243; B7 (II) K5032; B8 (III) K857, K2112, K5150; C2 (III) K1374, K1402; C3 (II) Obs; C4 (II) K807; C5 (II) Obs; D3i (II) K2173; D4 (II) Obs; D6 (II) K4477; D7 (II). – Not given for Greece in MC. Flowering somewhat earlier in the urbanized area of Thessaloniki, it appears probably with a bimodal flowering pattern (April to mid July and mid September to November), showing a break during the summer dry season.

Erysimum cheiri (L.) Grantz / Csuffr; ? ▶Eurymedit. / [2] / BW, VL, GA / A1 (I); B4 (II) K5937; B7 (II) K5020; C3 (I) Obs. – Naturalized xenophyte (sensu Greuter 1971) in Greece according to MC. Most probably only as a cultivation escape from gardens in the area.
Isatis tinctoria L. subsp. tinctoria / Hbienn; SW Asiat (Zohary & Hopf 1994) ▶Eurasiat? (uncertain limits according to Davis in FT 1: 301) / [1], [2], [5] / M-ap, M-rr / B5i (II) Obs; B6 (II) Obs; D2 (II) K1367, K2039; D3i (I) K1562; D7 (II).

Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lunaria annua L. subsp. annua / Hbienn; SE Europ /c117 Eurasiat? (uncertain limits according to Davis in FT 1: 301) / [1], [2], [5] / M-ap, M-rr / B5i (II)

Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.


Lepidium graminifolium L. / Hscap; Eurymedit / [4], [5], [6] / RS, VL, GA / A1 (I); B2 (I) Pat3116; B4 (II) K2875, K4190, K5963; B5i (II) K2467; C5 (II) K2705, K3961; D7 (II). – It is considered as doubtfully native in Greece according to Snogerup in FH 2: 275.
**Leguminosae**

*Albizia julibrissin* Durazz. / Pscap; C & E Asiat ▶C & E Asiat + Italy, Cyprus / VL, RS, tb, pc / A3 (I) K4132; B3 (I); B4 (I) K5953; B5ii (I) Obs; B6 (I) K3625; C2 (I) Obs; C5 (I) Obs; D6 (I) Obs; D7 (I) Obs. – All specimens and observations represent seedlings escaped from cultivation. Greece not given in MC.

*Gleditsia triacanthos* L. / Pcaesp; N Amer ▶N Amer + Argentina, Bulgaria / M-ap, M-rr, VL, GA, RS / A1 (I); B3 (I) K2542; B4 (I) Obs; B5i (I) K1173; B5ii (I) K2691; B6 (I) K1225; B8 (I) K2130; C2 (I) Obs; D3i (I) Obs; D3ii (I) Obs; D6 (I) Obs. – All specimens and observations represent seedlings escaped from cultivation. Mainland of Greece not given in MC.


*Robinia pseudoacacia* L. / Pcaesp; N Amer ▶N Amer + Europ, Black Sea / WC, M-rr, RS, VL, GA, BW, ru, tb / A1 (II); A2 (II) Obs; A3 (II) Obs; B1 (II) K5809; B3 (II) K2429; B4 (II) Obs; B5i (I) Obs; B5ii (I) Obs; B5iii (II) K2421; B6 (II) K5140; B7 (II) Obs; B8 (II) Obs; C2 (II) K1389; C3 (II) Obs; C4 (II) Obs; C5 (II) Obs; D2 (I) K1307; D3i (II) Obs; D3ii (I) Obs; D4 (II) Obs; D6 (II) Obs; D7 (II). – Cultivation escape.

*Trifolium resupinatum* L. / Tscap; Asiat (Pyšek & al. 2002) ▶Eurasiat / [4], [5], [6] / WC, M-s, RS, VL, GA, BW / A1 (II); B1 (II) Par534; B5i (II) K1159; B6 (III) K1251, K3208, K4851; B8 (II) K1004; D1 (II) K5694; D7 (II). – Probably a cultivation relic.


**Linaceae**

*Linum usitatissimum* L. / Tscap; ? ▶Europ / [1], [2] / M-ap, FR, RS / B3 (I) Obs; B7 (I) K5008; D3i (I) K2179; D3ii (I) Obs. – Xenophyte (sensu Greuter 1971) naturalized in Crete, but mainland of Greece not given in MC.

**Malvaceae**


*Hibiscus syriacus* L. / Pcaesp; E Asiat / [1], [2] / B3 (I) Obs; B6 (I) Obs. – Cultivation escape.

**Meliaceae**

*Melia azedarach* L. / Pscap; India & China ▶India & China + Medit / RS, VL / B3 (I) K6014; B4 (I) K2880, K2958; B5i (I) Obs; B6 (I) K3626; B8 (I) Obs; C4 (I) K4134; D2 (I) K1623. – All specimens and observations refer to seedlings escaped from cultivation. According to MC it is doubtfully naturalized in Crete, but not given for mainland Greece.

**Moraceae**

*Broussonetia papyrifera* (L.) Vent. / Pcaesp; E Asiat ▶E Asiat + Italy, Greece / GCD, RS, VL, GA, RT, tb / A1 (II); A2 (II) Obs; B4 (II) K5949; B5iii (I) K985; B7 (II) K2842; C2 (II) K1427, K2829, K4098; C3 (II) K2853; D3i (II) K5127; D5 (II) K4060; D6 (II) K&al. 3486.
Morus alba L. / Pscap; E Asiat / [1], [2] / GCD, RS, VL, GA / A1 (I); B4 (I) Obs; C2 (II) K1420, K1778; D6 (I) K3670, K&al. 3576; D7 (I). – Most probably only as a cultivation escape and/or relic in the area.

M. nigra L. / Pscap; Asiat / WC, RS, tb / B3 (I) K2431; C2 (II) K4094; C5 (II) K2696; D3i (I) K4342; D7 (I). – Most probably only as a cultivation escape and/or relic in the area.

Nyctaginaceae

Mirabilis jalapa L. / Gbulb; S Amer / N Amer + S Europ / RS, VL, ru / A2 (II) Obs; B3 (II) K2357, K2493; B4 (II) K4176; B5iii (II) K2403; C2 (II) Obs; C5 (II) Obs; D3i (I) Obs; D6 (II) Obs. – Doubtfully naturalised xenophyte (sensu Greuter 1971) in Greece according to MC. Cultivation escape from gardens in the area.

Onagraceae

Oenothera sp. / Hbienn; N Amer (Pyšek & al. 2002) / Subcosmopol / RS / D2 (II) K4405, K4275. – Cultivation escape from gardens. Greece not given in FE.

Oxalidaceae

Oxalis debilis Kunth / Gbulb; S Amer / S Amer + W Europ, Mediterr (Turland & al. 1995) / PF, FR, GCD, GA, tb, pc / A1 (I); B3 (I) Obs; B4 (II) K678, K2993, K4193; B7 (I) K5011; C2 (I) Obs; D3i (I) Obs; D6 (II) K&al. 3464, K&al. K3707. – Cultivation escape from gardens. Greece not given in FE or MC.


Papaveraceae

Eschscholzia californica Cham. / Tscap; N Amer / N Amer + France, Corsica, Balearic Isles / RS / D2 (I) K1617. – Cultivation escape from gardens. Not given for Greece in FE.

Papaver somniferum L. subsp. somniferum / Tscap; SW Asiat? / [1], [2] / GCD, GA, RS / A2 (I) K1824; C2 (III) K1470, K5078. – Most probably only a cultivation relic in the area. Not given for Greece in FE.

Passifloraceae

Passiflora caerulea L. / Plian; S Amer / S Amer + Açores / GCD, pc / D6 (I) K4460, K&al. 3557. – Cultivation escape from gardens in the area. Not given for Greece in FE.

Phytolaccaceae


Polygonaceae

Fallopia aubertii (L. Henry) Holub / Plian; C Asiat / C Asiat + Italy, Greece / GCD, RS, VL, GA, ru / A1 (II) K1829; A2 (II) K1545; B1 (I) K5778, K5779; B3 (III) K2435; B4 (II) K1678, K4176, K5948; B5ii (I) Obs; B5iii (I) K2244; B6 (I) Obs; B8 (II) K2124; C2 (II) Obs; D4 (II) Obs; D6 (II) Obs. – Cultivation escape from gardens.


Portulacaceae

Portulaca oleracea L. / Tscap; SW Asiat? / Subcosmopol / [5], [6] / M-o, PF, FR, RS, VL, GA, BW, RT, ru, tb, pc / A1 (II); A2 (II) Obs; B1 (III) K2500; B2 (III) K2444; B3 (II) K2486; B4...
Punicaceae

Punica granatum L. / Pscap; SW Asiat ▶ Constantly expanding westwards (Quézel & al. 1990) / GCD, RS, VL, BW / A1 (I); B3 (I) Obs; B4 (I) Obs; B5ii (I) K2260; B6 (I) K1790, K2095, K5148; C2 (I) Obs; D6 (I) K3673. – Cultivation escape and/or relic in the area. According to MC it is a xenophyte (sensu Greuter 1971) naturalized in Crete but doubtfully naturalized in mainland Greece.

Rhamnaceae


Rosaceae

Eriobotrya japonica (Thunb.) Lindl. / Pscap; E Asiat / WC / B3 (I) K3805. – Cultivation escape from gardens.

Malus domestica Borkh. / Pscap; ? ▶ Eurasiat / WC, RS, VL / B3 (I) K3084; B6 (I) K1770, K3223, K4854, K6190. – Cultivation escape and/or relic.

Prunus dulcis (Mill.) D. A. Webb / Pscap; E Medit (Zohary & Hopf 1994) ▶ Medit / [4] / PF, M-ap, M-rr, RS, VL, BW / A1 (I); B3 (I) K4652; B4 (I) Obs; B5i (I) Obs; B5ii (I) Obs; B6 (I) K5138, K3624; B8 (I) Obs; C2 (II) Obs; D2 (II) Obs; D3i (II) Obs; D4 (III) Obs; D6 (II) K&al.3570. – Probably a cultivation relic in the area (nowadays cultivated only close to site D4).

Sapindaceae


Scrophulariaceae

Antirrhinum majus L. / Cfrut; W Medit ▶ Medit / WC, RS, VL / A1 (II); A2 (I) K844; B3 (II) Obs; B4 (II) K1766, K5916; B5ii (II) Obs; B7 (II) K5057; B8 (II) K3603, K3604; C3 (II) Obs; C4 (II) Obs; C5 (II) K2710; D2 (II) K1999; D5 (I) K&H3279; D7 (II). – Probably a very old cultivation escape from gardens.

Cymbalaria muralis P. Gaertn. & al. subsp. muralis / Hscap; S Europ ▶ Subcosmopol / RS, BW, pc / A1 (I) Obs; B3 (3) Obs.


V. persica Poir. / Tscap; W Asiat? ▶ Cosmopol / [5], [6] / WC, M-ap, RS, VL, GA, ru, tb, pc / A1 (I); A3 (II) K5271; B1 (III) K571; B2 (III) P&3274; B3 (II) Obs; B5ii (II) K986, K4630; B6 (II) K4826; B7 (III) Obs; C3 (III) Obs; C5 (II) K4724; D4 (II) K3162; D5 (II) K&H3244; D7 (II). – According to Walters & Webb in FE 3: 250 it was firstly recorded in Europe at c. 1800.

V. polita Fries / Tscap; SW Asiat? ▶ Cosmopol / [5], [6] / WC, M-o, M-ap, FR, RS, VL, GA, BW, ru, pc / A1 (I); A3 (II) K649, K5272; B1 (II) K587, K5273; B3 (II) K604; B4 (II) K505; B5i (II) K4808; B5ii (II) K4626, K4627; B6 (I) K4829; B7 (II) K547; C3 (II) K759; C5 (II) K4726; D2 (II) K3054; D3i (II) K3171; D3ii (II) Obs; D4 (II) K3007; D5 (II) K&H3355, K4576; D7 (II).
**Simaroubaceae**

*Ailanthus altissima* (Mill.) Swingle / Pscap; E Asiat / Circumbor (Kowarik & Böcker 1984) / WC, PF, FR, M-rr, rp, RS, VL, GA, BW, RT, ru, tb, pc / A1 (III); A2 (II) Obs; A3 (II) Obs; B1 (III) K2517, K5788, K5789; B2 (III) Obs; B3 (II) K1749, K2523; B4 (II) Obs; B5i (II) K1203; B5ii (II) Obs; B6 (II) K1254; B7 (II) Obs; B8 (II) Obs; C1 (II) K2568; C2 (III) K1394; C4 (II) Obs; C5 (II) Obs; D1 (I) Obs; D2 (II) Obs; D3i (II) Obs; D3ii (I) Obs; D4 (II) Obs; D5 (III) Obs; D6 (II) Obs; D7 (II). – Photographic evidence suggests that it has been cultivated in the area as ornamental from the beginning of the last century (Krigas & al. 1999).

**Solanaceae**

*Datura innoxia* Mill. / Tscap; C Amer ▶ C Amer + Medit + C Asiat / GA, RS, pc / A2 (I) K1750, K2339, K2340, K2888; B4 (I) K4191; B5iii (I) K2420; D6 (II) K4282. – Cultivation escape from gardens. Not given for Greece in FE.  

*D. stramonium* L. / Tscap; N Amer ▶ Cosmopol / [5], [6] / WC, M-rr, RS, VL, ru / A1 (I); A2 (I) K2887; B2 (I) Obs; B3 (II) Obs; B5iii (II) K992, K2415; C2 (II) K4082; C4 (II) K823; C5 (II) Obs; D2 (II) K&H1347; D3i (III) Obs; D4 (III) Obs; D7 (III).

*Lycium chinense* Mill. / NP; E Asiat / Tscap; Medit W Asiat? (Zohary & Hopf 1994) / A1 (I) K2868; B3 (II) Obs; B4 (II) K2860; B6 (II) K3229; D4 (II) K2809. – Cultivation escape from gardens and hedges. Greece not given in FE.

*Lycopersicon esculentum* Mill. / Tscap; C & S Amer / [2], [6] / RS, VL, ru / A2 (I) K2893; B4 (I) K2869; B6 (I) K2951; D4 (I) Obs. – Cultivation escape from orchards. Not given for Greece in FE.

*Nicotiana glauca* R. C. Graham / NP; S Amer ▶ S Amer + Medit / VL, ru / A1 (II) Obs; A3 (II) K6051; C2 (II) Obs.

*Solanum cornutum* Lam. / Tscap; Amer ▶ Cosmopol / RS, VL, ru / B5iii (II) K2417; B8 (II) K2231; D7 (II).

*S. elaeagnifolium* Cav. / Cfrut & Hscap & Grhiz; S Amer ▶ Subcosmopol / WC, PF, M-o, M-s, M-rr, M-ap, FR, rp, RS, VL, GA, BW, RT, ru, tb, pc, gr / A1 (II); A2 (II) Obs; A3 (II) Obs; B1 (IV) K5797, K2521; B2 (IV) Obs; B3 (IV) K1812, K1813, K2535; B4 (IV) K1688; B5i (III) Obs; B5ii (III) Obs; B5iii (III) K2289; B6 (III) K1223, K2088; B7 (III) Obs; B8 (III) K2104, K2105; C1 (II) K2256; C2 (III) K1419, K1469; C3 (II) K1521; C4 (III) Obs; C5 (III) Obs; D1 (I) Obs; D2 (II) K1361, K2156; D3ii (III) K1558, K1794, K1795, K1796; D3ii (I) Obs; D4 (III) K2790; D5 (II) Obs; D6 (II) Obs; D7 (III). – Appearing both with white and violet flowers (Fig. 2), with the latter being more common. It was firstly introduced in the area of Thessaloniki before 1927, probably directly from America (Yannitsaros & Economidou 1974, Browicz 1993). Dominant in all collection sites during late summer as chamaephyte, hemicryptophyte and/or geophyte (see also Economidou & Yannitsaros 1975). It can be considered by far the most aggressive alien in the urban and suburban area of Thessaloniki, invading almost every biotope type (Fig. 2, 3). For earlier occurrence in the area of Thessaloniki in the 1970s see Economidou & Yannitsaros (1975).

**Umbelliferae**

*Anethum graveolens* L. / Tscap; Medit W Asiat? (Zohary & Hopf 1994) ▶ Eurasiat / RS / B5iii (I) K2418. – Cultivation escape from orchards.

*A. graveolens* L. / Hscap; ? ▶ Subcosmopol / RS / A1 (I); B3 (I) K3833; B4 (I) K4196; C4 (I) K5249; D4 (I) K2773, K3027. – Certainly a cultivation escape from orchards.


Verbenaceae
Lippia canescens Kunth / Csuffr; S Amer ▶ S Amer + Europ, Egypt, Lebanon / GA, pc / B2 (II) Pat3793, Pat3851, Pat3805. – Not given for Greece in FE.

Vitaceae
Parthenocissus inserta (A. Kern.) Fritsch / Plian; N Amer ▶ N Amer / RS, GA, BW, ru / A1 (I); B1 (I) K5823; B2 (I) Pat3169; B8 (I) K3927; C4 (I) K5240; D2 (I) K4403. – Cultivation escape from gardens.

Vitis vinifera L. subsp. vinifera / Plian; ? ▶ Cosmopol / WC, M-rp, GCD, RS, VL, BW, tb / A1 (I); A2 (I) Obs; B4 (II) K1714, K5953; B6 (II) K1190, K1778; B8 (I) K5178; C2 (II) K1426, K1464, K4097, K5086; D2 (II) K4268, K4269, K4427; D3ii (II) K1168; D3ii (I) Obs; D4 (II) K2806; D6 (I) Obs. – Cultivation escape and/or relic.

Monocotyledoneae
Amaryllidaceae

Commelinaceae
Commelina communis L. / Gbulb; E Asiat ▶ E Asiat + S & C Europ, N Amer / RS, GA, pc / A2 (I) K1825; B2 (I) Obs; B3 (II) K1757; B4 (II) K4194, K5933; B7 (II) Obs. – Cultivation escape from gardens. Greece not given in FE.

Trandescantia virginiana L. / Grhiz; N Amer / GA, RS, pc / A1 (I); B3 (I) Obs; B7 (I) Obs. – Cultivation escape from gardens.

Gramineae
Arundo donax L. / Grhiz; C Asiat ▶ Subcosmopol / [1], [2], [5] / WC, RS / A1 (I); B8 (II) Obs; C4 (II) K828; C5 (II) Obs; D1 (II) Obs; D2 (II) Obs; D4 (II) Obs; D6 (II) Obs; D7 (II). – Cultivation relic.

Cynodon dactylon (L.) Pers. / Grhiz; Asiat-Afric (Pyšek & al. 2002) ▶ Cosmopol / [4], [5], [6] / WC, M-ap, FR, RS, VL, GA, RT, ru, pc, gr / A1 (IV); A2 (II) Obs; B1 (IV) K2508, K5791; B2 (IV) Obs; B3 (II) Obs; B4 (II) K2868, K5947; B5i (II) Obs; B5ii (II) Obs; B5iii (II) K2326; B6 (III) K1738, K1791, K2970; B7 (II) Obs; B8 (II) K5264; C1 (III) Obs; C2 (III) Obs; C3 (III) K6001; C4 (III) Obs; C5 (II) Obs; D2 (II) Obs; D3ii (II) Obs; D3ii (I) Obs; D4 (II) K2768; D6 (II) Obs; D7 (II).

Echinochloa colona (L.) Link / Tscap; Trop & Subtrop ▶ Trop & Subtrop + Medit, S Europe / M-ap, RS, ru / B4 (II) K4199; B6 (II) K2955; D2 (II) K4285. – Mainland of Greece not given in FE (only Crete).

E. frumentacea (Roxb.) Link / Tscap; Eurasiat (Pyšek & al. 2002) / RS, VL / B4 (II) K4209. – According to Scholz (pers. com.) this taxon evolved in historical times from weedy E. colona and has not been reported previously from Greece.


H. vulgare L. / Tscap; E Afric / BW / A1 (I). – Cultivation escape. Not given for Greece in FE.

Nasella neesiana (Trin. & Rupr.) Bankworth / Hcaesp; S Amer – S Amer + Medit / GA / B2 (II) K6134. – According to Scholz (pers. comm.) it has not been reported previously from Greece.

Oryza sativa L. / Tscap; S & E Asiat / [1], [2] / M-ap, RS / D7 (I) – Nadji (1892) mentions that “croit a Tekeli (= site D7) dans les fosses bien que, d’après le dire des habitants, il n’aît pas été cultivé depuis plus de 15 ans”. Nowadays, cultivation escape and/or relic in the area.


Paspalum paspalodes (Michx.) Scribn. / Grhiz; Pantrop / Subcosmopol / [6] / GA, RS / A1 (II); B5iii (II) Obs; C2 (II) Obs; D7 (II).


Secale cereale L. / Tscap; C Asiat / Subcosmopol / M-ap, GA, RS / C2 (I) K1490; D4 (II) K2781.

Sporobolus indicus (L.) R. Br. / Hcaesp; Neotrop – N Amer + S Europ, Medit / GA, RS, tb, pc / A1 (IV); B1 (IV) K5818; B2 (IV) K2650, K6063; D7 (II). – Observed to be dominant in many public lawns of the urban agglomeration (sectors A, B, C). Not given for Greece in FE.


Triticum aestivum L. / Tscap; SW Asiat / M-rr, RS, VL, RT / B4 (I) K1648; C2 (II) K1385, K1491, K5105; C4 (I) K5255; D3i (I) K1593. – Cultivation escape and/or relic.

T. durum Desf. / Tscap; SW Asiat / M-ap, RS, VL, BW, RT, tb / A1 (I); B6 (II) K1761, K1762; B7 (III) K5027; B8 (II) K2118; C1 (I) K1467; D2 (II) K&H1343, K1616, K4266; D7 (II). – Cultivation escape and/or relic. Not given for Greece in FE.


Zea mays L. / Tscap; Neotrop / M-rr, RS / C2 (I) K2824; D2 (I) Obs; D3i (I) Obs; D4 (I) Obs. – Cultivation escape.

Iridaceae

Iris albicans Lange / Grhiz; Arabia, – Arabia + Medit? / WC, M-rr, FR, GA / B3 (I) Par2288; B7 (I) Obs; D3ii (II) Par884; D3ii (II) Par861; D7 (II). – Cultivation escape from gardens. Not given for Greece in FE.

I. germanica L. / Gbulb; ? – Europ / WC, RS / B3 (I) Obs; D2 (II) K3077; D7 (II). – Cultivation escape from gardens in the area, most probably dispersed vegetatively (MFG 2: 271).

Liliaceae


A. cf. sativum L. / Gbulb; Asiat (Pyšek & al. 2002) / RS / B3 (I) Par2801. – Cultivation escape and/or relic from orchards.

Hyacinthoides hispanica (Mill.) Rothm. / Gbulb; W Medit – Medit / ru / B5iii (I) K923. – Cultivation escape from gardens.

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