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Vascular plants in the suburban area of Thessaloniki (N Greece). I. The Industrial Park of Sindos

Abstract

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An inventory of 318 taxa of vascular plants growing in the suburban-industrial area of Thessaloniki is presented, based on own collections. Therophytes and hemicryptophytes are the most abundant life forms (85% of the total number). In respect to chorology, Mediterranean (c. 33%) and the widespread Eurasiatic/Paleotemperate and (sub-) Cosmopolitan/Circumboreal taxa (c. 45% in total) prevail. The flora also includes some spontaneously growing xenophytes (c. 10%) and cultivation escapes (4%). *Euphorbia maculata* is firstly reported for Greece, whereas the occurrence of *Conyza albida*, *Diplotaxis tenuifolia*, *Bifora radians* and *Sporobolus indicus* has been confirmed for the area of Thessaloniki.

Introduction

The scientific interest on the flora and vegetation of settlement areas is continuously increasing over several years, especially in C Europe (Pyšek 1995 and references therein), while in Greece it has recently started to develop, concerning two major cities, Patras (Chronopoulos & Christodoulakis 1996) and Thessaloniki (Krigas & al. 1999). This study is part of a research project concerning the urban and suburban flora of the latter city. The study area lies 14 km west of the city center, near the village Sindos (Fig. 1). In the past, before urbanization and industrial development, the study area was mainly used as a pastureland and was often flooded. After the construction of a drainage system it was given to cultivation (Zaganiaris 1939b). With the expansion of Thessaloniki, which took place during the last decades, the area was gradually transformed into a suburban-industrial one and in 1965 it was defined as the Industrial Park of Thessaloniki (approx. 10.000 ha). The first building was constructed in 1969 and during the following years rush industrialization took place. Today more than 300 mostly small factories have been built in the area, but among buildings some pieces of fallow and cultivated land still remain uncovered (Fig. 1).

According to climatic data from the Meteorological Station of Thessaloniki (40°03'N, 22°58'E) the mean annual temperature is 15.8°C and the mean annual precipitation is

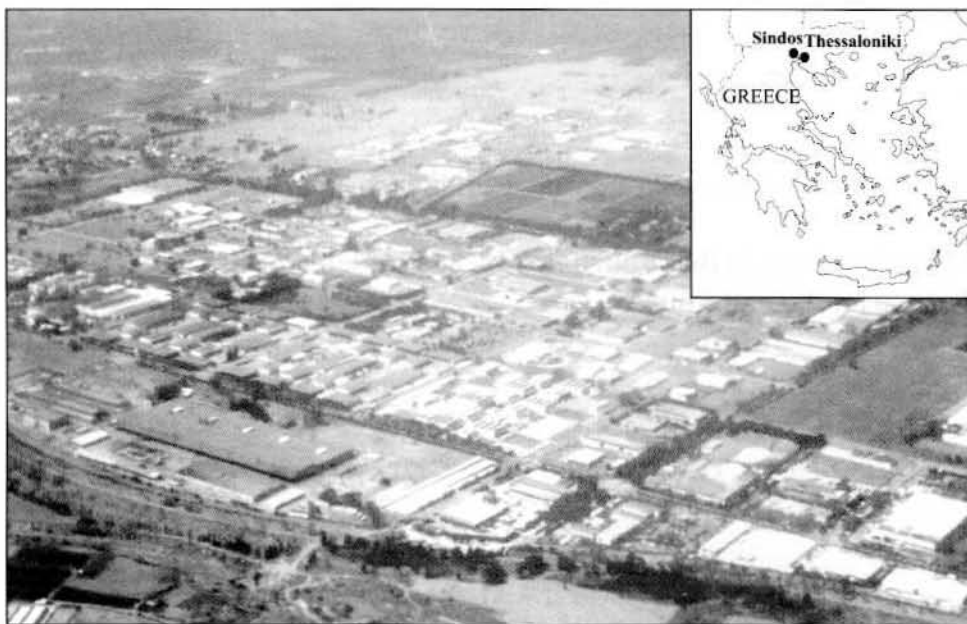


Fig. 1. Panoramic view of the Industrial Park of Sindos, west of the city of Thessaloniki (photograph by courtesy of the Hellenic Bank for Industrial Development).

451.7 mm. The mean month temperature ranges from 5.2°C (observed in January) to 26.6°C (July). The area belongs to the northern, Continental – Mediterranean climatic zone of Greece (Kotini-Zambaka 1983).

Material and Methods

Only plants spontaneously growing in the studied area are included in the floristic catalogue. Families, genera and species are presented in alphabetical order within the major classification units, viz. *Gymnospermae*, *Dicotyledonae* and *Monocotyledonae*.

The different habitats occurring in the investigated area are: **1.** Fallow fields and vacant land among buildings. **2.** Roadsides and pavements. **3.** Heaps of materials deriving from construction activities, e.g. sand, bricks, rubble and fine earth. **4.** Small sized green areas planted with lawn and/or ornamental plants. **5.** Ditches.

The plants were collected from 11 sites (a-k) and 9 (a-i) of them are scattered within the Industrial Park. For polygonal sites the coordinates concern the center of the site, whereas for linear sites two coordinates, corresponding to the edges of the site, are given. The coordinates of the collection sites and the main habitat types occurring in each site are:

- a: 40°42'00" N, 22°49'22" E; habitats 1, 2 and 3
- b: from 40°41'53" N, 22°49'10" E to 40°41'55" N, 22°48'41" E; habitats 2 and 3
- c: 40°41'56" N, 22°48'34" E; habitats 1, 2 and 5 (small irrigation ditch, temporarily flooded with water)
- d: 40°41'21" N, 22°49'05" E; habitats 1, 2 and 4

- e: 40°41'07"N, 22°48'51"E; habitats 2 and 4
 f: 40°40'47"N, 22°49'00"E; habitats 1 and 3
 g: 40°41'19"N, 22°48'12"E; habitat 1
 h: 40°41'31"N, 22°47'55"E; habitat 1
 i: from 40°41'31"N, 22°48'29"E to 40°40'35"N, 22°48'13"E; habitats 3 and 4
 j: 40°39'59"N, 22°47'22"E; habitat 5 (a large drainage ditch)
 k: 40°39'43"N, 22°48'17"E; habitat 1

The collectors, collection numbers and collecting dates are abbreviated and summarized as follows:

M. Pateli (= *P*): 1020-1036: 8.7.1997; 1045-1057: 11.7.1997; 1066-1100: 14.7.1997; 1107-1139: 15.7.1997; 1151-1170: 16.7.1997; 1178-1264: 17.7.1997; 1272-1311: 21.7.1997; 1316-1352: 26.7.1997; 1355-1420: 25.9.1997; 1426-1462: 2.10.1997; 1467-1538: 10.10.1997; 1544-1604: 12.10.1997; 1612-1663: 16.10.1997; 1711-1764: 21.3.1998; 1768-1786: 25.3.1998; 1792-1833: 29.3.1998; 1835-1893: 6.4.1998; 1929-1974: 22.4.1998; 1981-2052: 26.4.1998; 2054-2124: 28.4.1998; 2190-2338: 4.5.1998; 2339-2377: 3.7.1998; 2379-2482: 7.7.1998; 2484-2618: 10.7.1998; 2619: 3.8.1998; 2621: 6.8.1998; 2622: 8.8.1998.

M. Pateli & *N. Krigas* (= *P* & *K*): 1001-1009: 5.7.1997; 1060-1063: 10.7.1997; 1670-1701: 2.3.1998; 1899-1926: 11.4.1998; 1960-1979: 23.4.1998; 2125-2189: 1.5.1998; 2351: 3.7.1998.

R. Karousou, *E. Hanlidou*, *M. Pateli* & *N. Krigas* (= *Ka* & *al.*): 2000-2006: 14.11.2000.

obs.: seen in field (not collected).

Specimens are deposited in the Herbarium of the Institute of Systematic Botany and Phytogeography of the University of Thessaloniki (TAU). Unless otherwise stated, taxonomy and nomenclature follow Flora Hellenica (Strid & Tan 1997) for the taxa therein included and Flora Europaea (Tutin & al. 1968-93). Information concerning the distribution and life form of the taxa is taken from the above literature and additionally from Pignatti (1982) and Davis (1965-85).

Tab. 1. Life form and chorological spectra of the studied area.

Life form	%	Chorological element	%
Therophytes	57.5	(Sub-) Balkan	3.5
Hemicryptophytes	27.7	Mediterranean	33.4
Chamaephytes	1.9	European/European-Caucasic	4.4
Geophytes	7.9	Eurasiatic/Paleotemperate	30.2
Nanophanerophytes	0.6	(Sub-)Cosmopolitan / Circumboreal	14.6
Phanerophytes	4.1	Cultivation escapes	4.1
Hydrophytes	0.3	Xenophytes	9.8

Results and discussion

A total number of 318 taxa (species and subspecies) were recorded in the studied area. Therophytes are the most abundant life form in the area (57.5% of the taxa recorded), followed by hemicryptophytes (27.7%), geophytes (7.9%) and phanerophytes (4.1%). Chamaephytes, nanophanerophytes and hydrophytes are minor components of the spectrum (less than 2%, Tab. 1).

Mediterranean is the prevailing chorological element (Tab. 1), accounting for 33.4% of the taxa recorded, followed by the widespread Eurasiatic/Paleotemperate (30.2%) and (sub-) Cosmopolitan/Circumboreal (14.6%). The (sub-) Balkan element is represented by 11 taxa (3.5%), i.e. *Dianthus monadelphus* subsp. *pallens*, *Achillea coarctata*, *Anthemis segetalis*, *Ballota nigra* subsp. *sericea*, *Mentha spicata*, *Hypochaeris pseudograndiflora*, *Delphinium balcanicum*, *Verbascum undulatum*, *Malabaila aurea*, *Juncus heldreichianus* subsp. *heldreichianus* and *Ornithogalum nutans*.

Of the total number of taxa found in the studied area 31 are spontaneously growing xenophytes. Most of them are of American origin, e.g. *Amaranthus* spp., *Chenopodium multifidum*, *Aster squamatus*, *Conyza albida*, *C. canadensis*, *C. bonariensis*, *Euphorbia prostrata*, *E. maculata*, *Robinia pseudacacia*, *Datura stramonium*, *Solanum cornutum*, *S. elaeagnifolium*, *Paspalum paspalodes*, *Sporobolus indicus*, etc. *Solanum elaeagnifolium* appeared in Europe some 45-50 years ago and there is evidence that Thessaloniki is the locality where it was first introduced, probably directly from America (Economidou & Yannitsaros 1975; Browicz 1993). *Sporobolus indicus* and *Euphorbia maculata*, both N American taxa introduced and established in parts of S Europe, are not reported in Flora Europaea (Tutin & al. 1968-1993) from Greece, thus they may have been more recently introduced in the country. These two taxa were also not recorded by Zaganianis (1938, 1939a, b, 1940), who collected in the studied area c. 60 years ago. *Conyza albida*, not recorded by Flora Europaea in the European territory, was observed since 1975 in S & C Greece (Danin 1976). *S. indicus* and *Conyza albida* have been recorded recently from the center of Thessaloniki (Krigas et al. 1999). On the other hand, six taxa are xenophytes of Asiatic origin i.e. *Isatis tinctoria*, *Abutilon theophrasti*, *Alcea setosa*, *Veronica persica*, *Ailanthus altissima* and *Arundo donax*.

Two taxa, *Bifora radians* and *Diplotaxis tenuifolia*, are not reported in Flora Europaea from Greece. *B. radians* occurs in waste and cultivated areas in S Europe and SW Asia and is rather rare in the studied area. However it has been also recorded by Nadji (L. Charrel) (1892) from the surroundings of Thessaloniki. *D. tenuifolia*, a species occurring in waste and ruderal places, roadsides and rocky slopes in W, C and S Europe, is abundantly growing in the studied area, as well as in several places in the city center (Krigas et al. 1999). Zaganianis (1939b) reported it as a common species found in cultivations around Thessaloniki.

Among the taxa recorded in the area, 13 are escapes from or remnants of cultivations and they are either ornamentals (e.g. *Albizia julibrissin*, *Portulaca grandiflora*) or crop plants (e.g. *Oryza sativa*, *Triticum durum*, *Raphanus sativus* and *Daucus carota* subsp. *sativa*).

Twenty-two taxa are the most widespread in the studied area. They are mainly synanthropic, growing almost exclusively in waste, ruderal or cultivated places, roadsides, pave-

ments etc. and frequently found in urban and other anthropogenic habitats in Europe and adjacent areas (cf. Wittig & al. 1985; Dafni & Heller 1990; Kowarik 1990; Krunika 1990; Le Floch & al. 1990; Hruska 1992; Brandes 1995; Celesti Grapow & al. 1996). Three of them, i.e. *Senecio vulgaris*, *Solanum elaeagnifolium* and *Cynodon dactylon* are found in all 11 sites, whereas the rest (i.e. *Stellaria media*, *Chenopodium multifidum*, *Carduus acanthoides*, *C. pycnocephalus* subsp. *albidus*, *Centaurea diffusa*, *Cichorium intybus*, *Xanthium spinosum*, *Convolvulus arvensis*, *Capsella bursa-pastoris*, *Cardaria draba*, *Sisymbrium irio*, *Malva sylvestris*, *Lamium amplexicaule* subsp. *amplexicaule*, *Melilotus indicus*, *Vicia villosa*, *Fumaria officinalis*, *Papaver rhoeas*, *Hordeum murinum* subsp. *leporinum*, *Sorghum halepense*) are found in at least 8 sites. They are mostly widespread Eurasian-Paleotemperate and (sub-) Cosmopolitan taxa or xenophytes.

Taxa found only in one to two collection sites, account for c. 60% of the total number recorded. Among them are: (a) Typical weeds of cultivation (e.g. *Agrostema githago*, *Centaurea cyanus*, *Papaver hybridum*, *Adonis annua*), whose habitat has been restricted, due to the alteration of land use; (b) Elements of the vegetation of the less disturbed habitats found outside the Industrial Park (scrub and grassland), e.g. *Cardopatum corymbosum*, *Hypochaeris glabra*, *Picnemon acarna*, *Sedum caespitosum*, *Elymus elongatus*, *Phleum subulatum*; (c) Elements of natural vegetation units existing in the area, e.g. *Lycopus europaeus*, *Lemna minor*, *Typha angustifolia*, *T. domingensis*, *T. latifolia* (standing water and water-fringe vegetation, found in sites c and j).

Floristic catalogue

PTERIDOPHYTA

Equisetaceae

Equisetum fluviatile L. - P & K 1008: a.

DICOTYLEDONEAE

Amaranthaceae

Amaranthus albus L. - P 1156: a, P 2586: c, P 1110: d, P 1472: f, P 1404: g, P 2601: i.

A. blitoides S. Watson - P 1552: a.

A. deflexus L. - P 1028: e, P 1341: j.

A. hybridus L. - P 1550: a, P 1538: j.

A. retroflexus L. - P 1046: a, P 1617: b, P 1483: f, P 1387: g, P 1455: k.

Berberidaceae

Leontice leontopetalum L. - P 2082: a.

Boraginaceae

Anchusa officinalis L. - P 1191: b, P 2320: e, P & K 2180: f.

A. stylosa M. Bieb. - P & K 1061: a, P 2197: b.

A. undulata L. subsp. *hybrida* (Ten.) Coutinho - P 1717: a, P 1742: b, P 1764: c, P 1821: d, P 1792: e, P 1782: f.

Asperugo procumbens L. - P 2003: g, P & K 1678: k.

Buglossoides arvensis (L.) I. M. Johnst. subsp. *arvensis* - P 1716: a, P 1738: b, P 2288: c, P 1832: d, P 1854: h, P 1835: i.

Echium italicum L. - P 1184: b.

E. plantagineum L. - P 2240: b.

Heliotropium europaeum L. - P 1162: a, P 2537: b, P 2568: c, P 2428: d, P 2501: f, P 1229: g, P 2589: i.

Myosotis ramosissima Rochel subsp. *ramosissima* - P & K 1698: g.

M. stricta Link ex Roem. & Schult. - P & K 2153: f.

Campanulaceae

Legousia speculum-veneris (L.) Chaix in Vill. - P 2079: a.

Caprifoliaceae

Sambucus ebulus L. - P 2516: f.

Caryophyllaceae

Agrostemma githago L. subsp. *githago* - P 2098: a.

Cerastium pumilum Curtis subsp. *glutinosum* (Fries) Corb. - P & K 2133: f.

Dianthus monadelphus Vent. subsp. *pallens* (Sm.) Greuter & Burdet - P 2548: b.

Herniaria hirsuta L. - P 1113: d, P & K 2126: f.

H. incana Lam. - P 1381: g.

Petrorhagia dubia (Raf.) G. Lopez & Romo - P 2276: d, P 2303: e, P & K 2157: f.

P. prolifera (L.) P. W. Ball & Heywood - P 1169: a, P 1119: d, P & K 1002: e, P 1295: f, P 2450: k.

Sagina apetala Ard. - P & K 2129: f.

Silene conica L. - P & K 2158: f.

S. vulgaris (Moench) Garcke subsp. *macrocarpa* Turrill - P 2342: a, P 2204: b.

Spergularia bocconeii (Scheele) Graebn. - P 1036: e.

S. rubra (L.) J. Presl & C. Presl - P 2318: e, P & K 2128: f.

Stellaria media (L.) Vill. - P 1753: b, P 2298: c, P 1812: e, P & K 2132: f, P & K 1701: g, P & K 1911: i, P 2109: j, P & K 1682: k.

Chenopodiaceae

Atriplex rosea L. - P 1217: b, P 1411: g, P 1594: h, P 1453: k.

A. tatarica L. - P 1506: j.

Beta vulgaris L. subsp. *maritima* (L.) Arcang. - P 1501: j.

Chenopodium album L. - P 1151: a, P 2580: c, P 1430: d, P 1661: e, P 2520: f, P 1401: g, P 1456: k.

C. multifidum L. - P 1210: b, P 1362: c, P 1435: d, P 1650: e, P 1485: f, P 1231: g, P 2394: h, P 2444: k.

C. opulifolium Schrader ex W. D. J. Koch & Ziz - P 1054: a

Salsola kali L. - P 1047: a, P 1613: b, P 1368: c, P 2431: d, P 1300: f, P 1409: g, P 1592: h.

Compositae

Achillea coarctata Poir. in Lam. - P 1573: a, P 1361: c, P 2508: f.

- A. collina* J. Becker ex Reichenb. - P 2190: b, P 1357: c.
Anthemis altissima L. - P 1571: a.
A. arvensis L. subsp. *incrassata* (Loisel.) Nyman - P 2376: a, P 1182: b.
A. segetalis Ten. - P 2095: a, P 2280: c, P 1998: g, P 2020: h, P 1947: i.
Artemisia vulgaris L. - P & K 1009: a, P 2560: b, P 2614: i.
Aster squamatus (Spreng.) Hieron. - P 1568: a, P 1372: c, P 1384: g, P 1517: j.
Cardopatum corymbosum (L.) Pers. - P 2480: j.
Carduus acanthoides L. - P 2375: a, P 2550: b, P 2576: c, P 1107: d, P 1471: f, P 1392: g, P 2379: h, P 1334: j, P 2462: k.
C. pycnocephalus L. subsp. *albidus* (M. Bieb.) Kazmi - P 2060: a, P 2257: d, P & K 2147: f, P 1989: g, P 1841: h, P 2192: i, P 2119: j, P 2033: k.
C. thoermeri Weinm. - P 2061: a, P 2195: b.
Carthamus lanatus L. subsp. *lanatus* - P 2346: a, P 2552: b, P 2507: f, P 2477: j, P 2456: k.
Centaurea calcitrapa L. - P 2476: j, P 1445: k.
C. cyanus L. - P 2091: a.
C. diffusa Lam. - P 2366: a, P 1186: b, P 2567: c, P 2419: d, P 2486: e, P 1272: f, P 2385: h, P 1083: i.
C. solstitialis L. subsp. *solstitialis* - P 2353: a, P 2553: b, P 2425: d, P 2407: g, P 2390: h, P 2615: i.
Chamomilla recutita (L.) Rauschert - P 2273: d, P 2305: e, P & K 2151: f, P 1999: g, P 2021: h, P 1950: i.
Chondrilla juncea L. - P 1635: b, P 2436: d, P 1491: f, P 1398: g, P 2396: h, P 2606: i, P 1330: j.
Chrysanthemum segetum L. - P 2223: b, P 2116: j.
Cichorium intybus L. - P 2368: a, P 2531: b, P 2577: c, P 1124: d, P 1494: f, P 2411: g, P 2395: h, P 2590: i, P 1328: j, P 2449: k.
Cirsium arvense (L.) Scop. - P 1202: b, P 2293: c, P & K 1004: e, P 1342: j.
C. vulgare (Savi) Ten. - P 1180: b, P 1374: c, P 1535: j, P 1458: k.
Cnicus benedictus L. - P 2065: a, P 2261: d, P & K 2181: f, P & K 1967: i.
Conyza albida Spreng. - P 1183: b, P 2505: f, P 1397: g, P 1604: h, P 1081: i, P 1340: j, P 1451: k.
C. bonariensis (L.) Cronq. - P 1557: a, P 1612: b, P 1366: c, P 2435: d, P 1027: e, P 1481a: f, P 1413: g.
C. canadensis (L.) Cronq. - P 1045: a, P 1426: d, P 1481b: f, P 1224: g, P 1511: j, P 1131: k.
Crepis foetida L. subsp. *rhoeafolia* (M. Bieb.) Celak - P 2352: a, P 2432: d, P 2489: e.
C. sancta (L.) Bab. - P 1818: d, P 2337: e, P & K 2138: f, P 1994: g, P 1843: h, P 1881: i, P 2049: k.
Dittrichia graveolens (L.) W. Greuter - P 1629: b.
D. viscosa (L.) W. Greuter subsp. *viscosa* - P 1631: b.
Helianthus tuberosus L. - P & K 1063: h.
Hypochaeris cretensis (L.) Bory & Chaub. - P 2090: a - Correct spelling (vs. 'Hypochoeris') according to Greuter & al. (1993: 557).
H. glabra L. - P 2618: f.
Lactuca saligna L. - P 1516: j.
L. serriola L. - P 1168: a, P 1262: g, P 2455: k.

- L. virosa* L. - P 2558: b, P 1121: d, P & K 2169: f.
Matricaria perforata Mérat - P 2619: i, P 2042: k.
Onopordum acanthium L. subsp. *acanthium* - P 2347: a, P 1246: g, P 2454: k.
O. illyricum L. subsp. *cardunculus* (Boiss.) Franco - P 2345: a, P 2384: h.
Pallenis spinosa (L.) Cass. subsp. *spinosa* - P 2514: f.
Picnemon acarna (L.) Cass. - P & K 1968: i.
Picris echioides L. - P 1534: j.
Pulicaria vulgaris Gaertn. - P 1032: e, P 1346: j.
Scolymus hispanicus L. - P 2356: a, P 1194: b, P 2581: c, P 2423: d, P 1240: g, P 2393: h.
Scorzonera laciniata L. - P 2196: b, P 2334: e, P & K 2136: f, P 2002: g, P 1855: h, P & K 1963: i.
Senecio vulgaris L. - P & K 1060: a, P 2217: b, P 1757: c, P 1819: d, P 1799: e, P & K 2149: f, P & K 1691: g, P 1836: h, P 2593: i, P & K 1684: j, P & K 1671: k.
Silybum marianum (L.) Gaertn. - P 2085: a, P 2255: d, P & K 2135: f, P 1988: g, P 2010: h, P & K 1969: i, P 2120: j.
Sonchus asper (L.) Hill - P 2081: a, P 2336: e, P 2471: j. - Uncertain with respect to sub-species.
S. oleraceus L. - P 1718: a, Ka et al. 2006: c, P 2265: d, P & K 2139: f, P 1589: h, P 2596: i, P 1528: j.
Taraxacum bithynicum aggr. - P 1747: b, P 1806: e, P 1774: f, P 2004: g.
T. erythrospermum aggr. - P 1828: d, P 1888: i, P & K 1690: j.
Tragopogon dubius Scop. - P 2064: a, P 2294: c, P 2269: d, P 2335: e, P 2014: h.
T. porrifolius L. subsp. *porrifolius* - P 2018: h.
T. cfr. pratensis L. - P & K 1965: i.
Tyrimnus leucographus (L.) Cass. - P & K 1960: i.
Xanthium spinosum L. - P 1155: a, P 2533: b, P 1363: c, P 2427: d, P 2518: f, P 1408: g, P 1335: j, P 2464: k.
X. strumarium L. subsp. *italicum* (Moretti) D. Löve - P 1567: a, P 1178: b, P 1370: c, P 1428: d.

Convolvulaceae

- Convolvulus althaeoides* L. subsp. *althaeoides* - P 2083: a.
C. althaeoides subsp. *tenuissimus* (Sm.) Stace - P 1627: b.
C. arvensis L. - P 2365: a, P 2535: b, P 2584: c, P 2438: d, P 2495: e, P 2513: f, P 2400: g, P 2599: i, P 2482: j, P 1139: k.
Cuscuta campestris Yunck. - P 1583: a, P 1207: b, P 1437: d, P 1487: f, P 2397: h, P 1127: k.

Crassulaceae

- Sedum caespitosum* (Cav.) DC. - P & K 2171: f.

Cruciferae

- Alyssum minutum* Schlecht. ex DC. - P & K 2146: f.
Arabidopsis thaliana (L.) Heynh. - P 1823: d, P & K 1905: i.
Brassica oleracea L. - P & K 1926: i.
Calepina irregularis (Asso) Thell. - P & K 1909: i, P 2051: k.

Camelina rumelica Velen. - P 2232: b.

Capsella bursa-pastoris (L.) Medik. subsp. *bursa-pastoris* - P 2089: a, P 2229: b, P 2291: c, P 2275: d, P 2326: e, P & K 2177: f, P & K 1693: g, P 1938: i, P & K 1688: j, P & K 1673: k.

Cardamine hirsuta L. - P 1776: f, P & K 1692: g, P & K 1689: j.

Cardaria draba (L.) Desv. subsp. *draba* - P 2067: a, P 2219: b, P 2569: c, P 2262: d, P 2312: e, P & K 2186: f, P 2404: g, P 2023: h, P & K 1916: i, P 2112: j.

Descurainia sophia (L.) Webb ex Prantl - P 2086: a, P 2274: d, P & K 2187: f, P 2000: g, P 2050: k.

Diplotaxis tenuifolia (L.) DC. - P 1098: a, P 1634: b, P 1371: c.

Erophila verna (L.) Chevall. subsp. *praecox* (Steven) Walters - P 1822: d.

Eruca vesicaria (L.) Cav. subsp. *sativa* (Mill.) Thell. - P 1952: i.

Erysimum repandum L. - P 1731: a, P 2199: b, P 1761: c, P 1846: h.

Hirschfeldia incana (L.) Lagr.-Foss. - P & K 2351: a, P & K 2184: f, P 1852: h.

Isatis tinctoria L. - P 1954: i. - Uncertain with respect to subspecies.

Lepidium graminifolium L. subsp. *graminifolium* - P 2561: b, P 1359: c, P 1416: g.

L. ruderales L. - P 2193: b.

Myagrum perfoliatum L. - P 1724: a.

Raphanus raphanistrum L. subsp. *landra* (Moretti ex DC) Bonnier & Layens - P 2230: b.

R. sativus L. - P & K 1974: a, P & K 1978: i.

Rapistrum rugosum (L.) All. - P 1222: b, P 2286: c, P 1951: i, P 2104: j.

Sinapis alba L. subsp. *alba* - P & K 1970: i.

S. arvensis L. - Ka et al. 2000: b.

Sisymbrium irio L. - P 2096: a, P 2234: b, P 2300: c, P 1827: d, P 1810: e, P & K 2162: f, P 2001: g, P 1868: i, P 2103: j.

S. officinale (L.) Scop. - P & K 2188: f.

S. orientale L. - P 2097: a, P & K 2183: f, P 2022: h, P & K 1920: i.

Cucurbitaceae

Echallium elaterium (L.) A. Rich. - P 1586: a, P 2509: f.

Dipsacaceae

Scabiosa atropurpurea L. - P 2343: a.

Euphorbiaceae

Euphorbia falcata L. - P 2362: a.

E. helioscopia L. - P 2072: a, P 1796: e, P & K 2143: f, P 1985: g, P 1842: h, P 1940: i, P & K 1677: k.

E. maculata L. - P 2442: d.

E. prostrata Aiton - P 2526: b, P 1031: e, P 1066: h.

Geraniaceae

Erodium ciconium (L.) L' Her. - P 2202: b.

E. cicutarium (L.) L' Her. subsp. *cicutarium* - P 1721: a, P 2268: d, P 2311: e, P & K 2145: f, P 2044: k.

Geranium dissectum L. - P 2045: k.

G. molle L. - P 1715: a, P 1755: b, P 2328: e, P 1778: f, P 1849: h, P 1866: i, P 2113: j.

G. pusillum L. - P & K 2144: f.

G. rotundifolium L. - P 1946: i.

Guttiferae

Hypericum triquetrifolium Turra - P 2348: a, P 1196: b.

Labiatae

Ballota nigra L. subsp. *sericea* (Vandas) Patzak - P 1582: a, P 2542: b, P 2405: g, P 2598: i, P 1523: j, P 2461: k.

Lamium amplexicaule L. subsp. *amplexicaule* - P 1712: a, P 1736: b, P 2260: d, P 1800: e, P & K 2185: f, P & K 1695: g, P 1847: h, P & K 1685: j, P & K 1676: k.

L. purpureum L. - P 1983: g, P & K 1907: i, P & K 1675: k.

Lycopus europaeus L. subsp. *menthifolius* (Mabille) Skalicky - P 1347: j.

Marrubium peregrinum L. - P 2359: a, P 2557: b, P 1358: c, P 2521: f.

Mentha spicata L. - P 1587: a, P 1200: b, P 2579: c.

Stachys germanica group - P 1364: c.

Leguminosae

Albizia julibrissin Durazz. - b (obs.), d (obs.).

Astragalus hamosus L. - P 2227: b, P & K 2166: f.

Lotus tenuis Waldst. & Kit. ex Willd. - P 2491: e, P 1376: g.

Medicago arabica (L.) Hudson - P 2315: e, P 2017: h. - Infrageneric taxonomy according to Small & Jompe (1989).

M. minima (L.) Bartal. - P 2246: b, P & K 2168: f.

M. orbicularis (L.) Bartal. - P 2226: b.

M. polymorpha L. - P 2247: b.

M. sativa L. subsp. *sativa* - P 1569: a, P 2523: b, P 1434: d, P 2604: i, P 1327: j, P 1133: k.

Melilotus albus Medik. - P 1100: a, P 2536: b, c (obs.), P 2426: d, P 1415: g, P 1593: h, P 2478: j.

M. indicus (L.) All. - P 2054: a, P 2284: c, P 2267: d, P 2304: e, P & K 2176: f, P 1996: g, P 2015: h, P & K 1961: i, P 2040: k.

Robinia pseudacacia L. - b (obs.).

Trifolium arvense L. - P & K 2148: f. - Infrageneric taxonomy according to Zohary & Heller (1984).

T. campestre Schreb. - P 2237: b, P 2307: e, P & K 2173: f, P & K 1964: i.

T. echinatum M. Bieb. - P 2210: b.

T. fragiferum L. subsp. *bonannii* (C. Presl) Soják - P 2602: i, P 2458: k.

T. pratense L. - P 2437: d.

T. repens L. subsp. *repens* - P 2256: d, P & K 2134: f, P 1997: g, P & K 1902: i, P 2041: k.

T. resupinatum L. - P 2338a: e, P 2016: h, P 2034: k.

Vicia bithynica (L.) L. - P 2006: h.

V. hirsuta (L.) S. F. Gray - P 2075: a, P & K 1972: i.

V. hybrida L. - P 1944: i.

- V. lutea* L. subsp. *lutea* - P 2209: b, P 2287: c, P 2259: d, P 1982: g, P & K 1973: i.
V. narbonensis L. - P 2073: a, P 2250: b, P 1844: h.
V. sativa L. subsp. *cordata* (Wulfen ex Hoppe) Ascherson & Graebn. - P 2077: a.
V. sativa L. subsp. *nigra* (L.) Ehrh. - P 2258: d, P & K 1976: i, P 2117: j, P 2031: k.
V. villosa Roth - P 2078: a, P 2203: b, P 2282: c, P & K 2165: f, P 1981: g, P 2005: h, P 1956: i, P 2111: j. - Uncertain with respect to subspecies.

Malvaceae

- Abutilon theophrasti* Medik. - P 2545: b, P 1418: g, Ka et al. 2003: i, P 1462: k.
Alcea setosa (Boiss.) Alef. - P 2386: h.
Malva nicaeensis All. - P 1647: e, P 2048: k.
M. sylvestris L. - P 2357: a, P 2525: b, P 2430: d, P 2484: e, P 1236: g, P 2013: h, P 2588: i, P 2101: j.

Moraceae

- Ficus carica* L. - P 2564: b, P 1380: g.
Morus alba L. - P & K 2170: f.
M. nigra L. - P 1473: f, P 1598: h, Ka et al. 2005: i.

Oxalidaceae

- Oxalis corniculata* L. - P 1813: e.

Papaveraceae

- Fumaria densiflora* DC. - P 2026: k.
F. kralikii Jordan - P & K 2174: f.
F. officinalis L. - P 2208: b, P 2290: c, P 2266: d, P 1804: e, P 1768: f, P & K 1696: g, P & K 1899: i, P & K 1670: k.
F. parviflora Lam. - P 2084: a.
F. rostellata Knaf - P 1839: h.
Hypocoum imberbe Sm. in Sibth. & Sm. - P 2063: a, P 2228: b, P 1820: d, P 2333: e.
H. procumbens L. subsp. *procumbens* - P 1720: a, P 1805: e, P 1786: f, P 2032: k.
H. pseudograndiflorum Petrovic - P & K 2163: f, P & K 1906: i.
Papaver dubium L. subsp. *lecoqii* (Lamotte) Syme - P 2251: b, P 2296: c, P & K 2154: f, P 1942: i.
P. hybridum L. - P 2621: f.
P. rhoeas L. - P 2057: a, P 2233: b, P 2277: d, P & K 2160: f, P 1992: g, P 2012: h, P & K 1901: i, P 2107: j, P 2027: k.

Plantaginaceae

- Plantago coronopus* L. subsp. *coronopus* - P 2583: c, P 1840: h, P 1519: j, P 2457: k.
P. lagopus L. - P 2220: b, P & K 2161: f, P 2605: i.
P. lanceolata L. - P 1620: b.
P. major L. subsp. *major* - P 1187: b.

Platanaceae

- Platanus orientalis* L. - i (obs.)

Plumbaginaceae

Plumbago europaea L. - P 1355: c.

Polygonaceae

Fallopia convolvulus (L.) A. Löve - P 1261: g.

Persicaria lapathifolia (L.) S.F. Gray subsp. *lapathifolia* - P 1344: j.

P. lapathifolia (L.) S.F. Gray subsp. *pallida* (With.) Ekman & Knutsson - P 2534: b.

Polygonum arenarium Waldst. & Kit. - P 2363: a, P 1396: g.

P. aviculare L. - P 1189: b, P 1264: g, P 1135: k.

Rumex cristatus DC. - P 2377: a, P 2546: b, P 1375: c, P 1091: i.

R. patientia L. - P 1345: j.

R. pulcher L. subsp. *pulcher* - P 2361: a, P 2310: e, P 2474: j.

Portulacaceae

Portulaca grandiflora Hooker - P 2594: i.

P. oleracea L. - P 2369: a, P 2544: b, P 1467: f, P 2412: g, P 2592: i, P 1316: j, P 1449: k.

Primulaceae

Anagallis arvensis L. var. *arvensis* - P 2285: c, P 2327: e, P & K 2140: f. - Intraspecific taxonomy according to Leblebici (1978: 140). - Corolla red.

A. arvensis var. *caerulea* (L.) Gouan - P 2062: a, P 2243: b. - Corolla blue.

Ranunculaceae

Adonis annua L. subsp. *annua* - P 1713: a.

Consolida orientalis (Gay) Schrödinger - P 2080: a, P 2201: b.

C. regalis S. F. Gray subsp. *paniculata* (Host) Soo - P 2555: b.

Delphinium balcanicum Pawl. - P 2506: f, P 2595: i.

D. peregrinum L. - P 2354: a.

Nigella arvensis L. subsp. *arvensis* - P 2373: a, P 2597: i.

Ranunculus ficaria L. subsp. *chrysocephalus* P. D. Sell - P 1730: a.

R. sardous Crantz - P 1853: h.

Resedaceae

Reseda alba L. - P 2100: a

R. lutea L. - P 2068: a, P 2194: b.

Rosaceae

Aphanes microcarpa (Boiss. & Reuter) Rothm. - P & K 2127: f.

Prunus domestica L. subsp. *insititia* (L.) C. K. Schneider - P & K 1699: g.

Pyrus communis L. - f (obs.).

Rosa canina L. - P 1427: d, P & K 1971: i. - Taxonomy according to Zielinsky (1990: 30-31).

Rubus ulmifolius Schott - P 1563: a, P 1475: f, P 1407: g, P 1621: i.

Sanguisorba minor Scop. - P 2099: a. - Uncertain with respect to subspecies.

Rubiaceae

Galium aparine L. - P 2205: b, P 2292: c, P 2278: d, P & K 2150: f, P 1987: g, P & K 1904: i, P 2039: k.

G. verum L. subsp. *verum* - P & K 1005: c.

Sherardia arvensis L. - P & K 1001: e, P & K 2125: f.

Salicaceae

Populus alba L. - i (obs.).

Scrophulariaceae

Antirrhinum majus L. - P 2052: a.

Verbascum phlomoides L. - P 2440: d, P & K 1003: e.

V. sinuatum L. - P 1581: a, P 1108: d, P 1026: e, P 2519: f, P 2398: h, P 2468: k.

V. undulatum Lam. - P 1075: h, P 1958: i.

Veronica arvensis L. - P & K 2130: f.

V. hederifolia L. subsp. *hederifolia* - P 1735: a, P 2289: c, P & K 1694: g, P & K 1687: j, P & K 1681: k.

V. persica Poir. - P 1732: a, P 1814: e.

V. polita Fries - P & K 2131: f.

V. triphyllos L. - P 1824: d, P 1780: f, P 1873: i.

Simaroubaceae

Ailanthus altissima (Mill.) Swingle - P & K 2179: f.

Solanaceae

Datura stramonium L. - P 1157: a, P 2547: b, d (obs.), P 1402: g.

Solanum cornutum Lam. - P 2446: k.

S. elaeagnifolium Cav. - P 2371: a, P 1209: b, c (obs.), P 2439: d, e (obs.), P 2515: f, P 2402: g, P 2380: h, i (obs.), P 2472: j, P 2452: k.

S. nigrum L. subsp. *nigrum* - P 1548: a, P 1616: b, P 1390: g, P 1128: k.

Tamaricaceae

Tamarix parviflora DC. - P & K 2182: f, P 1379: g, P 1891: i, P 1444: k.

Ulmaceae

Ulmus minor Mill. subsp. *canescens* (Melville) Browicz & Zielinsky - P 1259: g, P 2381: h, i (obs.).

Umbelliferae

Anthriscus caucalis M. Bieb. - P 2295: c, P & K 2189: f, P & K 1900: i, P 2038: k.

Bifora radians M. Bieb. - P 1935: i.

Conium maculatum L. - P 2566: b, c (obs.), g (obs.), i (obs.), P 1339: j.

Daucus carota L. subsp. *major* (Vis.) Arcang. - P 2358: a, P 2532: b, P 2585: c, P 2441: d, P 1023: e, P 1079: h, P 1529: j.

D. carota L. subsp. *maritimus* (Lam.) Batt. - P 1618: b.

D. carota L. subsp. *sativus* (Hoffm.) Arcang. - P 1057: a
Echinophora tenuifolia L. subsp. *sibthorpiana* (Guss.) Tutin - P 1584: a.
Eryngium campestre L. - P 2355: a, P 2511: f.
E. creticum Lam. - P 1179: b, P 2517: f, P 2388: h, P 2479: j, P 2459: k.
Foeniculum vulgare Mill. subsp. *piperitum* (Ucria) Coutinho - P 1505: j.
F. vulgare Mill. subsp. *vulgare* - P 2092: a.
Malabaila aurea (Sm.) Boiss. - P 2338b: e, P & K 1979: i.
Scandix australis L. subsp. *grandiflora* (L.) Thell. - P 2059: a.
S. pecten-veneris L. subsp. *pecten-veneris* - P 1722: a, P 2216: b, P 2301: c, P 1833: d.
Torilis leptophylla (L.) Reichenb. fil. - P 2239: b, P 1247: g.
T. nodosa (L.) Gaertn. - P 2299: c.

Urticaceae

Urtica pilulifera L. - P 1729: a, P & K 2141: f.
U. urens L. - P & K 2142: f, P 1880: i, P & K 1683: j, P & K 1672: k.

Verbenaceae

Verbena officinalis L. - P 1111: d, P 1022: e.

Violaceae

Viola kitaibeliana Schult. - P 1783: f.

Zygophyllaceae

Tribulus terrestris L. - P 2374: a, P 2530: b, P 1431: d, P 1093: h, P 2600: i, P 1129: k.

MONOCOTYLEDONEAE

Cyperaceae

Cyperus rotundus L. - P 1544: a, P 2529: b, P 2502: f, P 1405: g, P 1351: j.
Scirpus holoschoenus L. - P 2332: e.

Graminae

Alopecurus myosuroides Hudson - P & K 1915: i.
Arundo donax L. - P 2087: a, P 1185: b, P 1311: f, P 1074: h, P 1326: j, P 2443: k.
Avena barbata Pott ex Link - P 2541: b, P & K 2172: f, P 2019: h, P 2108: j, P 2028: k. -
 The infraspecific taxonomy, applied to *A. barbata* by Rocha Afonso (in FE 5: 206) and
 Dogan (in Davis 1985: 304), is criticized by Scholz (1991: 108).
A. fatua L. - P 2225: b. - Uncertain with respect to subspecies.
A. sterilis L. subsp. *ludoviciana* (Durieu) Gillet & Magne - P 2071: a, P 1930: i. -
 Taxonomy according to Scholtz (1991: 106-108).
Bromus diandrus Roth - P 2350: a, P 2244: b, P 2281: c, P 1429: d, P 2008: h, P 1320: j.
B. hordeaceus L. subsp. *hordeaceus* - P 2309: e, P 1306: f, P 1848: h, P 1859: i, P 1318:
 j, P 2466: k.
B. sterilis L. - P 2029: k.
B. tectorum L. - P 1204: b, P 2308: e, P 1495: f, P 2124: j.

- Cynodon dactylon* (L.) Pers. - P 1170: a, P 1213: b, P 2573: c, P 1118: d, P 2488: e, P 1493: f, P 1235: g, P 1601: h, P 2611: i, P 1317: j, P 2469: k.
- Dasypyrum villosus* (L.) P. Candargy - P 2498: f.
- Digitaria sanguinalis* (L.) Scop. - P 1654: e.
- Echinochloa crus-galli* (L.) P. Beauv. - P 2578: c, P 2591: i.
- Elymus elongatus* (Host) Runemark subsp. *elongatus* - P 1394: g.
- Eragrostis cilianensis* (All.) F. T. Hubbard - P 2527: b, P 1497: f.
- Festuca arundinacea* Schreb. subsp. *fenas* (Lag.) Arcang. - P 2279: d.
- Hordeum hystrix* Roth - P 1338: j, P 2465: k.
- H. murinum* L. subsp. *leporinum* (Link) Arcang. - P 2349: a, P 2543: b, P 2574: c, P 1122: d, P 2330: e, P & K 2156: f, P 1228: g, P 1838: h, P 1929: i, P 2460: k.
- Lolium rigidum* Gaudin subsp. *rigidum* - P 2224: b, P 2297: c, P & K 2175: f.
- Lophochloa cristata* (L.) Hyl. - P 2241: b, P 2329: e, P & K 2137: f, P 2463: k.
- Oryza sativa* L. - P 1520: j.
- Paspalum paspalodes* (Michaux) Scribn. - P 1352: j.
- Phalaris minor* Retz. - P 2341: a, P 1220: b, P 2575: c, P 1304: f, P 2403: g, P 1067: h.
- P. paradoxa* L. - P 2242: b.
- Phleum subulatum* (Savi) Ascherson & Graebn. subsp. *subulatum* - P 2339: a.
- Phragmites australis* (Cav.) Trin. ex Steud. - P & K 1700: g, P 1893: i, Ka et al. 2002: j.
- Poa annua* L. - P 1719: a, P 2331: e, P 1858: i.
- P. bulbosa* L. - P 1811: e, P & K 2152: f. - Only proliferating individuals are found.
- P. trivialis* L. subsp. *sylvicola* (Guss.) H. Lindb. fil. - P 2512: f, P 1931: i.
- Polypogon monspeliensis* (L.) Desf. - P 2445: k.
- Setaria glauca* (L.) P. Beauv. - P 1639: b, P 1652: e, P 1417a: g, P 1507: j. - Taxonomy according to Scholtz (1985: 600)
- S. verticillata* (L.) P. Beauv. - P 2524: b, P 1369: c, P 2406: g, P 1130: k.
- S. viridis* (L.) P. Beauv. - P 2528: b, P 1020: e, P 1417b: g, P 1457: k.
- Sorghum halepense* (L.) Pers. - P 2367: a, P 2522: b, P 2582: c, P 1226: g, P 2389: h, i (obs.), P 1536: j, P 1459: k.
- Sporobolus indicus* (L.) R. Br. - P 1447: k.
- Triticum durum* Desf. - P 2340: a, P 1203: b, P 2009: h, P 1932: i.
- Vulpia ciliata* Dumort. subsp. *ciliata* - P & K 2178a: f.
- V. myuros* (L.) C. C. Gmel. - P & K 2178b: f.

Iridaceae

- Iris germanica* L. - P & K 1919: i.

Juncaceae

- Juncus heldreichianus* Marsson ex Parl. subsp. *heldreichianus* - P 2046: k.

Lemnaceae

- Lemna minor* L. - j (obs.).

Liliaceae

- Allium guttatum* Steven subsp. *sardoum* (Moris) Stearn - P 1294: f

- A. nigrum* L. - P 2360: a.
Muscari comosum (L.) Mill. - P 2055: a.
M. neglectum Guss. ex Ten. - P 1711: a.
Ornithogalum divergens Boreau - P 1974: e, P & K 1925: i.
O. nutans L. - P & K 1924: i.

Typhaceae

- Typha angustifolia* L. - P 1420: c, P 1537: j.
T. domingensis (Pers.) Steud. - P 2587: c
T. latifolia L. - P 2622: j

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