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FLORA OF THE ISLAND OF VRGADA AND THE SURROUNDING ISLETS

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475 vascular plant taxa (441 species and 34 subspecies; 300 genera and 73 families) were recorded in the flora of the island of Vrgada and the three nearby islets (Artina, Obrovanj and Rakita), as well as two reefs, according to the literature data and our research during 2003–04.

In the crops, 108 taxa have been registered which have been included in the analyses. A taxonomical analysis was made, as well as an analysis of life forms and floral elements.

Key words: the island of Vrgada, the islets Artina, Obrovanj and Rakita, flora, taxonomy, Croatia

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Za floru otoka Vrgade te tri otočića (Artina, Obrovanj i Rakita) i dvije hridi na osnovi vlastitih istraživanja (2003.–2004.) i literaturnih podataka utvrđeno je 475 taksona vaskularnih biljaka (441 vrsta i 34 podvrste) u okviru 300 rodova i 73 porodice.

U kulturi je zabilježeno 108 taksona koji nisu uključeni u analize. Izvršena je taksonomska analiza te analiza životnih oblika i flornih elemenata.

Ključne riječi: otok Vrgada, otočići Artina, Obrovanj i Rakita, flora, taksonomija, Hrvatska

INTRODUCTION

The above research included two reefs along the Vrgada island: Kamičić (north of Vrgada), Kamičić (south of Vrgada) and three islets – Artina, Obrovanj and Rakita (Fig. 1). The island of Vrgada belongs to the Zadar archipelago. It covers 2,3 km^2 (DUPLANČIĆ-LEDER, 2004) and had a population of 242 people in 2001 (FELDBAUER, 2004). The island is low, with no exceptions. The highest peak is the 112 m high Strabinovac.

The islets of Kozina and Artina and the Kamičić reef lie north of the island; Mali and Veliki Školjić, Oblik, Obrovanj, Rakita and Šipnata islets and the other Kamičić reef lie westward, along the south coast. This group of islands consists of 10 islets and reefs, altogether.

Their direction is parallel to that of the Dinara Mt., northwest to southeast. The geological structure of the island varies from limestone to dolomites (MAMUŽIĆ *et al.*, 1975).

There are no climatological data for the island of Vrgada so those referring to the nearest climatological stations in Biograd and Sestrice Tajerske (Kornati) were used. The 1981–2000 period was studied (data given by The Hydrometeorological Institute of the Republic of Croatia). According to the Köppen classification, the island of Vrgada belongs to the C_{sa} climate zone. This climate is referred to as »the olive climate« (ŠEGOTA, 1963). The average monthly temperatures for July and August, the hottest months, are above 24 °C whereas the average temperatures of the coldest months, January and February, vary from 6,6 °C (Biograd) to 8,8 °C (Sestrica Tajerska).

For plants the minimum temperatures are the important ones. An absolute minimum was recorded in December: –8,0 °C for Biograd and –4,2 °C for Sestrica Tajerska. The average yearly temperature for the above period is 15 °C for Biograd and 16.3 °C for Sestrica Tajerska. The average yearly precipitation quantity amounts to 814 mm in Biograd and 571 mm in Sestrica Tajerska.

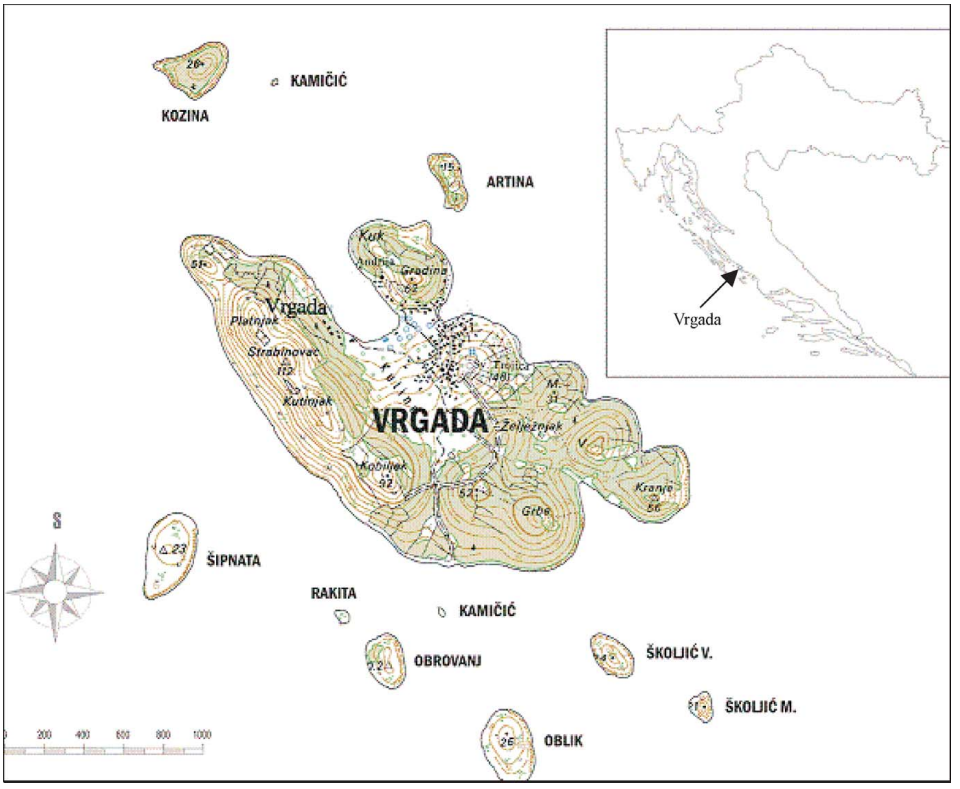

Fig. 1. The area investigated

If there had not been any human activities through centuries, this area would have been covered with the evergreen holm-oak forests (alliance *Quercion ilicis*), following the prevailing climate changes. Unfortunately all that can be seen on this island and the surrounding islets is a variety of secondary antropogenous degrading stages of vegetation (such as macchia, garigue or rocky pasture and bare rocky terrain as final stages of degradation), instead of the primary forest vegetation. Planted groups of Aleppo pine (*Pinus halepensis*) trees can also be seen on large areas of the island.

In his work »Viaggio botanico« HOST (1802) recorded 38 plant species. After Host, a long void followed, as there were no explorers of the flora of this island. For the 2nd Congress of Croatian Botanists, some orchids were dot-marked on Vrgada island (PANDŽA & PILJAC-KOSOVIĆ, 2007) and 8 species were recorded. Considering the above mentioned, the total number of plant species for the island of Vrgada amounts to 46.

Field research of the flora on Vrgada was carried out during the vegetational seasons of 2003–2004.

METHODS

The list of families, genera, species and lower system units is given in alphabetical order and is organised within higher system units.

To determine and identify plants, we used the following floral literature: BONNIER (1911–1935), FIORI (1923–1929, 1933), HAYEK (1924–1933), HEGI (1936–1987), TUTIN *et al*. (1964–1980, 1993), HORVATIĆ & TRINAJSTIĆ (1967–1981), TRINAJSTIĆ (1975–1986), JAVORKA & CSAPODY (1975), PIGNATTI (1982), DOMAC (1994), DELFORGE (1995, 2006).

Nomenclature matches that of PIGNATTI (1982) with the exception of only a few species for which HAYEK (1924–1933), TUTIN *et al.* (1964–1980, 1993), HORVATIĆ & TRINAJSTIĆ (1967–1981), TRINAJSTIĆ (1975–1986) and NIKOLIĆ (1994–2000) are used.

Abbreviations for the islands (**V** – Vrgada, **A –** Artina, **O** – Obrovanj, **R** – Rakita, **HS** – Kamičić – reef north of Vrgada, **HJ** – Kamičić – reef south of Vrgada) are given after the names of the species.

The analyses do not include cultivated plants. Previously recorded species are specially marked in the list of flora. These species are followed by brackets where the authors names are stated, as well as the name by which the particular species is recorded, if the name does not correspond to the one in the list of flora. The authors are abbreviated as follows in the flora: Host, P.P. – Piljac-Kosović and Pandža.

Species included in the Red book of plant species of the Republic of Croatia (NIKOLIĆ & TOPIĆ, 2005) are marked by appropriate letters, pointing out how endangered they are (EN – Endangered and VU – Vulnerable). These marks are preceded by habitat marks in the list of species.

Life forms are interpreted after Horvat (1949), according to RAUNKIAER (1934) and marked by the letters T, G, H, Ch, P and Hy preceding the names of the species:

T – *Therophyta*

G – *Geophyta*

H – *Hemicryptophyta*
Ch – *Chamaephyta*
P – *Phanerophyta*
Hy – *Hydrophyta*

In order to clearly point out general particularities of the flora of the island of Vrgada and its islets, a phytogeographical analysis of floral elements was made, sorting them out according to specific phytogeographical areas. The division of the plants into floral elements and lower categories is done according to HORVATIĆ (1963) and supplemented according to HORVATIĆ *et al.* (1967–1968). An analysis of endemic species was made according to ŠILIĆ (1984) and TRINAJSTIĆ (1991, 1992, 1992a). Floral element abbreviations within the species list are given after the names of the islands (marked by numbers in the list of flora):

1. MEDITERRANEAN FLORAL ELEMENT
- A. Circum-Mediterranean plants – 1
- B. West Mediterranean plants – 2
- C. East Mediterranean plants – 3
- D. Illyrian-Mediterranean plants
  - a) Illyrian South European plants – 4
  - b) Illyrian Adriatic plants:
  - 1. Illyrian Adriatic endemic plants – 5
  - 2. Illyrian Apennine plants – 6
- E. Mediterranean Atlantic plants – 7
- F. European Mediterranean plants – 8
- G. Mediteranean Pontic plants – 9

2. SOUTH EUROPEAN FLORAL ELEMENT
- A. South European Mediterranean plants – 11
- B. South European Pontic plants – 12
- C. South European Atlantic plants – 13

3. EAST EUROPEAN-PONTIC FLORAL ELEMENT – 14

4. SOUTH-EAST EUROPEAN-PONTIC FLORAL ELEMENT –15

5. EUROPEAN FLORAL ELEMENT – 16

6. EURO-ASIATIC FLORAL ELEMENT – 17

7. CIRCUM-HOLARCTIC PLANTS – 18

8. WIDESPREAD PLANTS – 19

9. NATURALIZED PLANTS – 20

Cultivated species and those that rarely grow wild are included in the Cultivated Plants Group. Species already domesticated within the autochthonous flora or those that have recently appeared are included in the Adventive Plants Group.

The habitats are marked with letters (put after the floral elements in the following manner):

a – in macchia
b – in forests of Aleppo pine
c – in garigue
e – rocks, walls, old houses
f – lawns and rocky pastures
g – muddy sea bottom
h – muddy, sandy and pebbled coastline
k – horizontal rocks by the sea
m – along roads, paths and fences
n – in grain fields
o – gardens and flower gardens
p – around animal housings
r – building material waste-heaps
s – junkyards
t – vineyards and olive-groves
u – uncultivated, neglected fields, olive groves
z – fild borders
x – hedges
y – in the culture

RESULTS

Floristic list

PTERIDOPHYTA

ASPLENIACEAE

H *Asplenium onopteris* L.; V; **1**, a
H *A. ruta-muraria* L.; V; **18**; e
H *A. trichomanes* L.; V; **19**; e
H *Ceterach officinarum* DC.; V; **11**; e

SPERMATOPHYTA-CONIFEROPHYTINA

CUPRESSACEAE

P *Juniperus oxycedrus* L. ssp. *macrocarpa* (Sibth. et Sm.) Ball; V; **3**; a
P *J. oxycedrus* L. ssp. *oxycedrus*; V; A; O; **1**; a, b,
P *J. phoenicea* L.; V; A; O; R; **1**; a, b, c

PINACEAE

P *Pinus halepensis* Miller; V; A; O; R; **1**; a, b, c
P *P. pinaster* Aiton (Host, 1802 as *P. maritima* Lam.); V; **7**

SPERMATOPHYTA-CYCADOPHYTINA

EPHEDRACEAE

Ch *Ephedra fragilis* Desf. (= *E. fragilis* Desf. ssp. *campylopoda* (C. A. Mey.) Asch. et Graebn.); V; A; **3**; m

SPERMATOPHYTA-MAGNOLIOPHYTINA

MAGNOLIATAE

AMARANTHACEAE

T *Amaranthus deflexus* L.; V; **19**; o, t

T *A. graecizans* L.; V; **19**; o, t

T *A. retroflexux* L.; V; **19**; o, r, s

ANACARDIACEAE

P *Pistacia lentiscus* L.; V; A; HS; O; R; **1**; a, b, c, u, z

P *P. terebitnhus* L. (Host, 1802); V; **1**; a, m

APIACEAE

T *Bifora testiculata* (L.) Roth.; V; **1**; o

T *Bupleurum baldense* Turra ssp. *gussonei* (Arcang.) Tutin (= *B. veronense* Turra); V; **4**; f, u

Ch *Crithmum maritimum* L.; V; A; HS; HJ; O; R; **7**; k

H *Daucus carota* L. ssp. *major* (Vis.) Arcang.; V; **11**; f, u

H *D. carota* L. ssp. *maritimus* (Lam.) Batt.; A; **2**; m

H *D. gingidium* L. ssp. *gingidium*; A; **11**; k

H *Eryngium amethystinum* L.; V; A; **4**; f

H *E. campestre* L.; V; **11**; f

H *Foeniculum vulgare* Miller; V; **1**; m, r, u

H *Pimpinella peregrina* L.; V, **11**; u

T *Scandix pecten-veneris* L.; V; **19**; f, u

H ***Seseli tomentosum* Vis.; V; **5**; f

T *Tordylium apulum* L.; V; **1**; f

T *T. officinale* L.; V; **3**; f, m, u

T *Torilis nodosa* (L.) Gaertner; V; **7**; f

APOCYNACEAE

Ch *Vinca major* L.; V; **1**; m, o

ARALIACEAE

P *Hedera helix* L.; V; A; **16**; b, m

ASCLEPIADACEAE

H ***Vincetoxicum hirundinaria* Medik. ssp. *adriaticum* (Beck) Markgr. (= *V. adriaticum* Beck); A; R; **5**; f, k

ASTERACEAE

Ch *Artemisia coerulescens* L.; V; **6**; h
H *Aster linosyris* (L.) Bernh.; V; **12**; f
T *A. squamatus* (Sprengel) Hieron.; V; **20**; m
H *Bellis sylvestris* Cyr.; V; **1**; f
T **Bidens subalternans* DC.; V; **20**; m
T *Calendula arvensis* L.; V; **11**; o, r, t, u
H *Carduus micropterus* (Borb.) Teyber; V; **5**; f
H *C. pycnocephalus* L.; V; **1**; m, p, r, s, u
H *Carlina corymbosa* L.; V; A; **1**; f
H *Carthamus lanatus* L.; V; **1**; f
T *Cirsium arvense* (L.) Scop.; V; **17**; o
H *C. vulgare* (Savi) Ten. (= *C. lanceolatum* (L.) Scop.); V; **17**; u
T *Conyza bonariensis* (L.) Cronq. (= *Erigeron crispus* Pourr.); V; **20**; m, r, s, u
T *C. canadensis* (L.) Cronq.; V; **20**; r, u
T *Cosmos bipinnatus* Cav; V; **20**; f, y
T *Crupina crupinastrum* (Moris.) Vis.; V; **11**; f
T *Evax pygmaea* (L.) Brot; V; **1**; m
T *Filago pyramidata* L. (= *F. spathulata* Presl); V; **11**; f
G *Helianthus tuberosus* L.; V; **20**; m, o, x
Ch *Helichrysum italicum* (Roth) Don; V; A; O; R; **1**; a, c, f, k, t, u
H *Inula conyza* DC.; V; **12**; f, r
Ch *I. crithmoides* L.; V; A; **7**; h
H *I. viscosa* (L.) Aiton (= *Dittrichia viscosa* (L.) Greuter); V; A; HJ; **1**; k, t, u
T *Matricaria chamomilla* L.; V; **19**; o, m
T *Micropus erectus* L.; V; **12**; f, u
H *Onopordum illyricum* L.; V; **1**; u
T *Pallenis spinosa* (L.) Cass.; V; **1**; f, m
H *Picnomon acarna* (L.) Cass.; V; **1**; f, u
Ch *Senecio cineraria* DC. (= *Cineraria maritima* L.); V; **2**; m
H *S. erucifolius* L.; V; **17**; o, r, s
T *S. vulgaris* L.; V; **19**; m, o, s
Ch *Tanacetum cinerariifolium* (Trevir.) Sch.-Bip.; V; **5**; b
T *Tyrimnus leucographus* (L.) Cass.; V; **1**; f

BORAGINACEAE

T *Borago officinalis* L.; V; **1**; u
T *Buglossoides arvensis* (L.) Johnston (= *Lithospermum arvense* L.); V; **17**; u
H *B. purpurocaerulea* (L.) Johnston; V; **12**; f
T *Echium plantagineum* L.; V; **7**, r
T *Heliotropium europaeum* L.; V; **9**; o, r, t
T *Myosotis ramosissima* Rochel (= *M. collina* Ehrh.); V; **17**; t, u

BRASSICACEAE

Ch *Aethionema saxatile* (L.) R. Br.; V; A; R; **11**; a, c
Ch *Alyssoides sinuata* (L.) Medik (= *Alyssanthus sinuatus* (L.) Trinajstić; *Alyssum sinuatum* L.; *Aurinia sinuata* (L.) Griseb.); V; **6**; e
T *Alyssum minus* (L.) Rothm.; V; **1**; m
T *Arabidopsis thaliana* (L.) Heynh.; V; **19**; t
H *Arabis hirsuta* (L.) Scop.; V; **19**; m, x
H *A. turrita* L.; V; **11**; t, f
T *Cakile maritima* Scop.; R; **19**; h
T *Capsella rubella* Reuter; V; **1**; m, u
T *Cardamine hirsuta* L.; V; **19**; f
H *Cardaria draba* (L.) Desv. (= *Lepidium draba* L.); V; **19**; r, s, u
T *Clypeola jonthlaspi* L.; V; **1**; f
T *Diplotaxis tenuifolia* (L.) DC.; V; **19**; o, t
T *Erophilla verna* (L) Chevall. ssp. *praecox* (Steven) Fourn. (=*Draba praecox* Steven); V; **19**; f
T *Eruca sativa* Miller; V; **11**; o, m
H *Lepidium graminifolium* L.; V; **12**; m, o, r, u
Ch *Matthiola incana* (L.) R. Br.; V; **1**; m, o, y
T *Raphanus sativus* L.; V; **20**; m, o, r
T *Sinapis arvensis* L.; V; **19**; m, u
T *Sisymbrium officinale* (L.) Scop.; V; **19**; m, o, s
T *Thlaspi perfoliatum* L.; V; **17**; e

CAMPANULACEAE

T *Campanula erinus* L.; V; **1**; e
T *Legousia hybrida* (L.) Delarbre; V; **13**; o, t, u

CAPRIFOLIACEAE

P *Lonicera implexa* Aiton; V; A; R; **1**; a, b
P *Viburnum tinus* L.; V; A; **1**; a

CARYOPHYLLACEAE

T *Agrostema githago* L.; V; **19**; n
T *Arenaria leptoclados* Guss.; V; **17**; e, f, m, u
T *A. serpyllifolia* L.; V; **19**; e, f, m
T *Cerastium brachypetalum* Desp. et Pers.; V; **11**, u
T *C. glomeratum* Thuill.; V; **19**; u
T *C. semidecandrum* L.; V; **12**; u
T *Herniaria glabra* L.; V; A; **17**; h
H *H. incana* Lam.; V; **11**; m
H *Lychnis coronaria* (L.) Desr. (Host, 1802 as *Agrostema coronaria*); V; **15**
H **Melandrium divaricatum* (Rchb.) Fenzl (=*Silene latifolia* Poiret); V; **2**; r, u
T *Minuartia hybrida* (Vill.) Schischkin; V; **17**; f

H *Petrorhagia saxifraga* (L.) Link; V; A; **11**; f, m, u, z
T *Polycarpon tetraphyllum* L.; V; **11**; h
T *Sagina maritima* Don; V; **7**; h
H *Saponaria officinalis* L.; V; **17**; m, y
H **Silene angustifolia* (Miller) Guss. ssp. *reiseri* (K. Maly) Trinajstić; V; A; HJ; O; R; **11**; k
H *S. vulgaris* (Moench) Garcke ssp. *angustifolia* (Miller) Hayek; V; **11**; b, f, m, u
T *Spergularia marina* (L.) Griseb. (= *S. salina* J. Presl et C. Presl); V; **11**; h
T *Stellaria media* (L.) Vill.; V; **19**; u

CHENOPODIACEAE

Ch *Arthrocnemum fruticosum* (L.) Moq. (= *Salicornia fruticosa* L.); V; **11**; h
Ch *A. glaucum* (Delile) Ung.-Stbg. (= *A. macrostachyum* (Moric.) Koch); V; A; R; **11**; h, k
T *Atriplex latifolia* Wohlenb. (= *A. hastata* L.); V; HS; **19**; h, k
H *Beta vulgaris* L. ssp. *maritima* (L.) Arcang.; V; **7**; k
Ch *Camphorosma monspeliaca* L.; V; **1**; k, m
T *Chenopodium album* L.; V; **19**; m, o, p, r, s, t
T *Ch. murale* L.; V; **19**; o, p, r, s
T *Ch. vulvaria* L.; V; **11**; o, s, t
Ch *Halimione portulacoides* (L.) Aellen (= *Atriplex portulacoides* L.); V; **19**; h
T *Polycnemum majus* A. Braun; V; **12**; t
T *Salsola kali* L.; V; **19**; h – **VU**
T *S. soda* L.; V; **12**; h – **VU**
T *Suaeda maritima* (L.) Dumort.; V; **19**; h – **VU**

CICHORIACEAE

G *Aetheorrhiza bulbosa* (L.) Cass. (= *Crepis bulbosa* L.); V; **1**; b, h
H *Chondrilla juncea* L.; V; **17**; m, o, r, u, z
H *Cichorium intybus* L.; V; A; **19**; u
T *Crepis dioscoridis* L; V; **3**; f, u
T *C. pulchra* L.; V; **11**; u
T *C. rhoeadifolia* Bieb.; V; **14**; f
T *C. rubra* L.; V; **3**; f
T *C. sancta* (L.) Babc. (= *Lagoseris sancta* Maly); V; **3**; f, m, u
T *C. zacintha* (L.) Babc. (= *Zacintha verrucosa* Gaertn.); V; **1**; f
T *Hedypnois cretica* (L.) Willd.; V; **1**; f
T *H. rhagadioloides* (L.) Willd.; V; **1**; f
H *Hieracium bauhinii* Besser (= *H. praealtum* Vill. ssp. *bauhinii* (Besser) Petunn.); V; 17; f
T *Hyoseris scabra* L.; V; **1**; f, u
T *Lactuca saligna* L.; V; **12**; e, m, o, r, s, t, u
H *L. serriola* L.; V; **19**; m, r, s, z

H *L. viminea* (L.) Presl; V; **12**; m
H *Leontodon crispus* Vill.; V; **11**; f
G *L. tuberosus* L.; V; **1**; f, m, u, z
T *Picris echioides* L. (= *Helminthia echioides* (L.) Gaertn.); V; **1**; r, u
H *P. hieracioides* L.; V; **17**; m, o, r, t, u, z
H *Podospermum laciniatum* (L.) DC.; V; **19**; f
H *Reichardia picroides* (L.) Roth; V; A; O; R; **1**; k
T *Rhagadiolus stellatus* (L.) Willd.; V; **1**; u
H *Scolymus hispanicus* L.; V; **1**; p, r, s, u
H *Scorzonera villosa* Scop. ssp. *villosa*; V; **4**; f
T *Sonchus glaucescens* Jordan; V; A; HS; **1**; m, o, r, t, u
T *S. oleraceus* L.; V; **19**; o, t
T *S. tenerrimus* L.; V; **1**; o, t
H *Taraxacum megalorhizon* (Forsskal) Hand.-Mazz.; V; **1**; m
H *T. officinale* Weber, agg.; V; **19**; m
H *Tragopogon porrifolius* L.; V; **1**; f
T *Urospermum picroides* (L.) Schmidt; V; **1**; u

CISTACEAE

P *Cistus incanus* L.; V; R; **1**; a, c
P *C. salvifolius* L. (Host, 1802); V; **1**; a, c
Ch *Fumana ericoides* (Cav.) Gandog.; V; A; **1**; a, c, u

CONVOLVULACEAE

H *Calystegia sepium* (L.) R. Br.; V; **19**; z, x
G *Convolvulus arvensis* L.; V; **19**; o, r, t, u
H *C. cantabrica* L.; V; **11**; f
H *C. elegantissimus* Miller (= C. *althaeoides* L. ssp. *tenuissimus* (Sibth. et Sm.) Stace), (Host, 1802 as *C. althaeoides*); V; A; **3**; f
T *Ipomoea purpurea* Roth; V; **20**; s

CRASSULACEAE

Ch *Sedum acre* L.; V; A; **17**; e
Ch *S. anopetalum* DC. (= *S. ochroleucum* Chaix); V; **11**; m

CUCURBITACEAE

G *Bryonia alba* L. (Host, 1802); V; **15**
Ch *Ecballium elaterium* (L.) A. Rich.; V; **1**; p, r, s

DIPSACACEAE

H *Scabiosa columbaria* L. (Host, 1802 as *S. banatica*); V; **17**
H *S. maritima* L. (= *S. artropurpurea* L.), V; **11**; t, u
T *Tremastelma palaestinum* (L.) Janchen; V; **3**; f

ERICACEAE

P *Arbutus unedo* L.; V; **1**; a

EUPHORBIACEAE

T *Euphorbia chamaesyce* L.; V; **11**; o
T *E. exigua* L.; V; **11**; f, m
T *E. falcata* L.; V; **11**; o
Ch *E. fragifera* Jan; V; A; **5**; a, b, c, u
T *E. helioscopia* L.; V; **19**; o, r, s, t
Ch *E. paralias* L.; V; **7**, h
T *E. peplus* L.; V; **19**; o, t
Ch *E. pinea* L.; V; O; R; **1**; k
T *E. segetalis* L.; V; **1**; s
T *Mercurialis annua* L.; V; **19**; o, r, s, t

FABACEAE

H *Anthyllis vulneraria* L. ssp. *praepropera* (Kerner) Bornm. (Host, 1802 as A. vulneraria L.); V; **8**; f
T *Astragalus hamosus* L.; V; **1**; f
Ch *Chamaecytisus hirsutus* (L.) Link ((Host, 1802 as *Cytisus hirsutus* L.); V; **17**
Ch *Coronilla coronata* L. (Host, 1802); V; **15**
T *C. cretica* L.; V; **3**; a, c, f
P *C. emerus* L. ssp. *emeroides* (Boiss. et Spruner) Hayek; V; A; R; **3**; a, c
T *C. scorpioides* (L.) Koch; V; **1**; f
Ch *Dorycnium hirsutum* (L.) Ser.; V; A; **1**; k
H *D. pentaphyllum* Scop. ssp. *herbaceum* (Vill.) Rouy (= *D. herbaceum* Vill.); V; **11**; f
T *Hippocrepis ciliata* Willd; V; A; **1**; f
H *H. comosa* L. (Host, 1802); V; **11**
T *H. multisiliquosa* L. (Host, 1802); V; **1**
T *H. unisiliquosa* L.; V; A; **1**; f
T *Lathyrus annuus* L.; V; **1**; o, t, u
T *L. aphaca* L.; V; **11**; f
T *L. cicera* L.; V; **11**; f
T *L. sativus* L.; V; **20**; o, y
T *L. sphaericus* Retz.; V; **11**; a, u
T *Lens nigricans* (Bieb.) Godron; V; **1**; u
H *Lotus corniculatus* L.; V; **19**; f, u
Ch *L. cytisoides* L. (= *L. allionii* Desv.), (Host, 1802); V; A; HS; **1**; k
T *L. edulis* L.; V; **1**; f
T *L. ornithopodioides* L.; V; **1**; f
T *Medicago arabica* (L.) Hudson; V; **19**; f, u
T *M. disciformis* DC.; V; **1**; f
T *M. hispida* Gaertner (= *M. polymorpha* L.); V; **11**; f
T *M. litoralis* Rohde; V; **1**; f

T *M. lupulina* L.; V; A; **19**; f
T *M. minima* (L.) Bartal.; V; A; **19**; f
T *M. orbicularis* (L.) Bartal.; V; **1**; f
T *M. rigidula* (L.) All.; V; **12**; f
H *M. sativa* L. ssp. *sativa*; V; **19**; m
T *Melilotus sulcata* Desf.; V; **1**; f, u
T *Onobrychis caput-galli* (L.) Lam.; V; **1**; f
H *Ononis pusilla* L.; V; **11**; f
T *O. reclinata* L. (Host, 1802 as *Ononis cherlerii*); V; A; **1**, f
T *Scorpiurus muricatus* L. (incl. *S. subvillosus* L.); V; A; **1**; f
T *Securigera securidaca* (L.) Degen et Doerfl.; V; **1**; f
P *Spartium junceum* L.; V; **1**; c
T *Trifolium angustifolium* L.; V; **1**; f
T *T. arvense* L.; V; **17**; f
T *T. campestre* Schreber; V; A; **19**; f
T *T. cherleri* L.; V; **11**; f
T *T. lappaceum* L.; V; A; **1**; f
H *T. repens* L.; V; **19**; u
T *T. scabrum* L.; V; A; **1**; f
T *T. stellatum* L.; V; **1**; f
T *T. subterraneum* L.; V; **7**; f
T *T. suffocatum* L.; V; **19**; m
T *T. tomentosum* L.; V; **1**; f
T *Trigonella corniculata* (L.) L.; V; **8**; f
T *T. gladiata* Steven; V; **1**; f
T *T. monspeliaca* L.; V; A; **9**; f
T *Vicia hirsuta* (L.) S. F. Gray; V; **19**; f
T *V. hybrida* L.; V; **1**; f, u
T *V. narbonensis* L.; V; **1**; o, t, u
T *V. sativa* L. ssp. *sativa*; V; **19**; u, z
T *V. sativa* L. ssp. *angustifolia* (Grufb.) Gaudin (= *V. angustifolia* L.); V; **16**; u
T *V. tenuissima* (Bieb.) Sch. et Th.; V; **11**; f
T *V. villosa* Roth ssp. *varia* (Host) Corb.; V; **14**; f

FAGACEAE

P *Quercus cerris* L. (Host, 1802); V; **12**
P *Q. ilex* L. (Host, 1802); V; A; R; **1**; a, b, c

FUMARIACEAE

T *Fumaria capreolata* L.; V; **7**; m, r
T *F. officinalis* L.; V; **19**; o, t
T *F. parviflora* Lam.; V; **19**; o, t

GENTIANACEAE

T *Blackstonia perfoliata* (L.) Hudson; V; A; **7**; f
T *Centaurium erythraea* Rafn; V; A; **19**; c, f
T *C. spicatum* (L.) Fritsch; V; A; **1**; h

GERANIACEAE

T *Erodium cicutarium* (L.) L.' Her.; V; **19**; m
T *E. malacoides* (L.) L'Her.; V; **1**; m, u
T *Geranium brutium* Gasparr.; V; **3**; o, t, z
T *G. columbinum* L.; V; **17**; c, u
T *G. molle* L.; V; **19**; m, u
T *G. purpureum* Vill.; V; A; **11**; a, b, c, e
T G. *rotundifolium* L.; V; **17**; f
G *G. tuberosum* L.; V; **17**; n, u

HYPERICACEAE

H *Hypericum perforatum* L. ssp. *veronense* (Schrank) Fröhlich (= *H. veronense* Schrank); V; A; **11**; f

LAMIACEAE

T *Acinos arvensis* (Lam.) Dandy (= *Calamintha acinos* (L.) Clairv.); V; **16**; t, u
T *Ajuga chamaepytis* (L.) Schreber; V; **1**; m, o
H *Calamintha nepeta* (L.) Savi ssp. *nepeta*; V; **12**; m, p, u
T *Lamium amplexicaule* L.; V; **17**; o
H *Marrubium incanum* Desr.; V; **6**; p, r, u
Ch *Micromeria juliana* (L.) Benham; V; **1**; c, e, f, m
H *Origanum heracleoticum* L.; V; **3**; f, u, z
Ch *Prasium majus* L.; V; A; R; **1**; a, c
H *Prunella laciniata* (L.) L.; V; **11**; u
Ch *Salvia officinalis* L.; V; A; **8**; a, c, f
H *S. sclarea* L.; V; **11**; m
H *S. verbenaca* L.; V; **7**; m, u
Ch *Satureja montana* L. ssp. *variegata* (Host) Ball; V; **9**; f
T *Sideritis romana* L.; V; **1**; c, f
T *Stachys annua* (L.) L.; V; **16**; o
H *S. salviifolia* Ten. (= *S. cretica* L. ssp. *salviifolia* (Ten.) Rchb.); V; **6**; f
Ch *Teucrium chamaedrys* L.; V; A; **12**; a, c, f
Ch *T. flavum* L.; R; **1**; a, c, f
Ch *T. polium* L.; V; A; R; **9**; a, c, f, u

LINACEAE

T *Linum strictum* L. ssp. *corymbulosum* (Rchb.) Rouy; A; **9**; f
T *L. strictum* L. ssp. *strictum*; A; **1**; f
Ch *L. tenuifolium* L. (Host, 1802); V; **12**; f

MALVACEAE

H *Althaea cannabina* L.; V; **12**; m, u

T *Hibiscus trionum* L.; V; **12**; t, u – **EN**

H *Lavatera arborea* L.; V; **8**; p, m, r, s

T *Malva neglecta* Wallr.; V; **19**; m, u

H *M. sylvestris* L.; V; **19**; m

MORACEAE

P *Ficus carica* L.; V; A; **1**; e, y

MYRTACEAE

P *Myrtus communis* L.; V; A; O; R; **1**; a, c

NYCTAGINACEAE

G *Mirabilis jalapa* L.; V; **19**; m, o, r, s, y

OLEACEAE

P *Fraxinus ornus* L.; V; **11**; a

P *Olea europaea* L.; V; O; **1**; t, u, y

P *Phillyrea latifolia* L.; V; A; O; R; **1**; a

OXALIDACEAE

G *Oxalis articulata* Savigny.; V; **19**; m, r, s, y

PAPAVERACEAE

H *Glaucium flavum* Crantz; V; **7**; h – **EN**

T *Papaver rhoeas* L.; V; **19**; o, r, s, t

PLANTAGINACEAE

H *Plantago altissima* L.; V, **11**; h

H *P. coronopus* L. ssp. *commutata* (Guss.) Pilger; V; A; **9**; h

H ***P. holosteum* Scop. ssp. *scopulorum* (Degen) H-ić; A; **5**; k

H *P. lanceolata* L.; V; **19**; m, u

T *Plantago psyllium* L. (= *P. afra* L.); V; **1**; m

PLUMBAGINACEAE

H *Limonium cancellatum* (Bernh.) Kuntze; V; A; O; R; **6**; k

H *L. serotinum* (Rchb.) Pign. (= *L. vulgare* Miller ssp. *serotinum* (Rchb.) Gams); V; HS; **1**; h

Ch *Plumbago europaea* L.; V; **1**; f, z

POLYGALACEAE

H *Polygala major* Jacq. (Host, 1802); V; **3**

POLYGONACEAE

T *Fallopia convolvulus* (L.) Holub (= *Bilderdykia convolvulus* (L.) Dumort.; *Polygonum convolvulus* L.); V; **19**; o, r, t

T *Polygonum aviculare* L.; V; **19**; o, r, t

H *Rumex conglomeratus* Murray; V; **19**; h

H *R. crispus* L.; V; **19**; m, u

H *R. pulcher* L.; V; **12**; u

PORTULACACEAE

T *Portulaca oleracea* L.; V; **19**; o, r, t

PRIMULACEAE

T *Anagallis arvensis* L.; V; **19**; f, u
T *A. foemina* Miller; V; **19**; f, u
T *Asterolinum linum-stellatum* (L.) Duby; V; **1**; f
G *Cyclamen repandum* Sibth. et Sm.; V; **8**; a

RAFFLESIACEAE

G *Cytinus hypocistis* (L.) L. (Host, 1802); V; **11**

RANUNCULACEAE

T *Adonis flammea* Jacq.; V; **12**; n, o
G *Anemone hortensis* L.; V; **1**; f
P *Clematis flammula* L.; V; A; R; **1**; a, c
T *Consolida regalis* S. F. Gray ssp. *paniculata* (Host) Soo; V; **11**; f
T *Delphinium peregrinum* L.; V; **11**; f – **EN**
T *Nigella damascena* L.; V; **1**; f
T *Ranunculus muricatus* L.; V; **1**; f, u

RESEDACEAE

T *Reseda alba* L.; V; **1**; r, u
H *R. lutea* L.; V; **19**; t, u
T *R. phyteuma* L.; V; **11**; o

RHAMNACEAE

P *Paliurus spina-christi* Miller; V; **4**; a
P *Rhamnus alaternus* L. (Host, 1802); V; A; **1**; a, c
P **R. intermedius* Steud. et Hochst.; V; A; **5**; m, z

ROSACEAE

H *Agrimonia eupatoria* L.; V; **18**; f
T *Aphanes arvensis* L.; V; **19**; f, u
P *Crataegus monogyna* Jacq. ssp. *monogyna*; V; **17**; x
H *Potentilla recta* L.; V; **17**; f
P *Rosa canina* L.; V; **19**; z, x
P *Rubus ulmifolius* Schott; V; A; **7**; u, z, x
H *Sanguisorba minor* Scop. ssp. *muricata* (Gremli) Briq.; V; **11**; f
P *Sorbus domestica* L.; V; **1**; a

RUBIACEAE

H *Asperula aristata* L. ssp. *scabra* (Presl.) Nyman; V; **11**; f, u
T *Crucianella latifolia* L.; V; **1**; o, u
T *Galium aparine* L.; V; **19**; m, r, s, t, u, z, x

H *G. corrudifolium* Vill.; V; A; R; **11**; a, c, u
T *G. murale* (L.) All.; V; **1**; f
T *G. parisiense* L.; V; **11**; c
P *Rubia peregrina* L.; V; A; R; **1**; a, e
T *Sherardia arvensis* L.; V; **19**; f
T *Valantia muralis* L.; V; A; **1**; k

RUTACEAE

Ch *Ruta graveolens* L. (= *R. divaricata* Ten.); V; **6**; f

SANTALACEAE

P *Osyris alba* L.; V; A; **1**; a

SAXIFRAGACEAE

T *Saxifraga tridactylites* L.; V; **19**; e

SCROPHULARIACEAE

Ch *Antirrhinum majus* L.; V; **2**; e, m, o
H *Kickxia commutata* (Bernh.) Fritsch; V; **8**; t, u
T *K. spuria* (L.) Dumort.; V; **17**; o, t
H *Linaria angustissima* (Loisel.) Re; V; **11**; o
T *L. chalepensis* (L.) Miller; V; **11**; u
T *L. simplex* (Willd.) DC.; V; **1**; u
T *Misopates orontium* (L.) Rafin.; V; **17**; o, r, t
H *Scrophularia canina* L. (Host, 1802); V; **11**; s
T *S. peregrina* L.; V; **1**; u
H *S. scopolii* Hoppe (Host, 1802 as *S. scorodonius*); V; **14**
T *Verbascum chaixii* Vill. (= *V. orientale* (L.) All.; *Celsia orientalis* L.); V; **3**; f, m, u
H *V. sinuatum* L.; V; **1**; m, r, u
T *Veronica arvensis* L.; V; **17**; o, r, t, u
T *V. cymbalaria* Bodard; V; **11**; e, f, m, r
T *V. hederifolia* L.; V; **17**; f, m
T *V. persica* Poiret; V; **19**; m, t, u

SOLANACEAE

T *Datura innoxia* Miller; V; **20**; m, y
T *D. stramonium* L.; V; **20**; m, r, s
T *Lycopersicon esculentum* Miller (= *Solanum lycopersicum* L.); V; **20**; m, o, s
T *Solanum nigrum* L.; V; **19**; o, r, s
T *S. villosum* Miller (= *S. luteum* agg.); V; **17**; o, r, s

THELIGONACEAE

T *Theligonum cynocrambe* L.; V; **11**; e

ULMACEAE

P *Celtis australis* L. (Host, 1802); V; **11**; m, u, z
P ** *Ulmus procera* Salisb.; V; **13**; m

URTICACEAE

H *Parietaria diffusa* M. et K. (= *P. judaica* L.); V; HS; **11**; e, m, r
T *Urtica urens* L.; V; **19**; u

VALERIANACEAE

Ch *Centranthus ruber* (L.) DC.; V; **7**; m
T *Valerianella echinata* (L.) Lam. et DC.; V; **1**; t, u, z
T *V. eriocarpa* Desv.; V; **11**; m, u, z
T *V. muricata* (Stev.) Baxter; V; **3**; f, m, u
T *V. pumila* (L.) DC.; V; **1**; m

VERBENACEAE

P *Vitex agnus-castus* L.; V; **1**; h

VIOLACEAE

H *Viola alba* Besser ssp. *denhardtii* (Ten.) W. Becker; V; **11**; a, z, x
T *V. arvensis* Murray; V; **19**; o, t, u, z, x

ZYGOPHYLLACEAE

T *Tribulus terrestris* L.; V; **11**; o, r, s, t

LILIATAE

ARACEAE

G *Arum italicum* Miller; V; **7**; m, u

CYPERACEAE

H *Carex divulsa* Stokes; V; **19**; b, m, s, z – **EN**
H *C. extensa* Good.; V; **19**; h – **EN**
G *C. flacca* Schrebe (Host, 1802); V; A; **19**; f
H *Schoenus nigricans* L.; V; **19**; k

DIOSCOREACEAE

G *Tamus communis* L. (Host, 1802); V; **11**; x

IRIDACEAE

G *Gladiolus communis* L. (Host, 1802); V; **17**
G *Iris germanica* L.; V; **20**; m, u
G *Romulea bulbocodium* (L.) Seb. et Mauri; V; **1**; f

JUNCACEAE

H *Juncus acutus* L.; V; **7**; h
G *J. maritimus* Lam.; V; **19**; h

LILIACEAE

G *Allium commutatum* Guss.; V; A; HS; HJ; R; **1**; k
G *A. flavum* L.; V; **1**; f, u
G *A. paniculatum* L.; V; **11**; u
G *A. roseum* L.; V; **1**; t, u, z

G *A. sphaerocephalon* L.; V; A; **11**; m, u
G *A. subhirsutum* L. (Host, 1802); V; A; **1**; a
G *Asphodeline liburnica* (Scop.) Rchb.; V; **5**; f,
H *Asphodelus fistulosus* L. (Host, 1802); V; **1**; u
G *A. microcarpus* Viv. (= *A. aestivus* Brot.); O; **1**; f
G *Asparagus acutifolius* L.; V; A; HJ; O; R; **1**; a, b, c, k, u, z, x
G *Lilium candidum* L.; V; **20**; m, r
G **Muscari comosum* (L.) Miller; V; **11**; f
G **M. neglectum* Guss. (= *M. racemosum* (L.) Miller); V; **1**; f
G *Ornithogalum comosum* L.; V; **11**; f
G *Ruscus aculeatus* L.; V; A; **9**; a, b, c
P *Smilax aspera* L.; V; A; HJ; O; R; **1**; a, b, c, e, k, u, z, x
G *Scilla autumnalis* L.; V; **9**; c, f

ORCHIDACEAE

G *Limodorum abortivum* (L.) Swartz (P. P., 2007); V; **11**; b; f
G *Ophrys bertolonii* Mor. (P. P., 2007); V; **11**; f – **VU**
G **O. sicula* Tineo (= *O. lutea* (Gouan) Cav. ssp. *murdeckii* (Fleischm.) Soó), (P. P., 2007); V; **1**; f **– EN**
G *O. sphegodes* Miller ssp. *atrata* (Lindl.) E. Mayer (P. P., 2007); V; **8**; f – **VU**
G *Orchis coriophora* L. (Host, 1802); V; **11**
G *O. morio* L. (P. P., 2007); V; **17**; b, c
G *O. tridentata* Scop. (P. P., 2007); V; **14**; f – **VU**
G *Serapias parviflora* Parl. (P. P., 2007); V; **1**; u
G *Spiranthes spiralis* (L.) Koch (P. P., 2007); V; **16**; f

POACEAE

T *Aegilops neglecta* Req.; V; **1**; f
T *Ae. triuncialis* L.; V; **1**; f
G *Arundo donax* L. (Host, 1802); V; A; **1**; z, x
T *Avena barbata* Potter; V; A; **19**; m, u
T *A. sterilis* L.; V; **12**; u
H *Botryochloa ischaemon* (L.) Keng. (=*Dichanthium ischaemum* (L.) Roberty; *Andropogon ischaemum* L.); V; **11**; f, m
T *Brachypodium distachyum* (L.) Beauv.; A; **1**; f
H *B. ramosum* (L.) R. et S. (= *B. retusum* (Pers.) Beauv.); V; A; O; R; **1**; a, b, c, f, k, u
T *Briza maxima* L. (Host, 1802); V; **1**; f
H *Bromus condensatus* Hackel; V, A; **11**; f
H *B. erectus* Hudson; V; **11**; f
T *B. madritensis* L.; V; **7**; f
T *B. molliformis* Lloyd; V; **11**; f, t, u
T *B. rigidus* Roth; V; **13**; f

T *B. squarrosus* L.; V; **12**; f, m, u
T *B. sterilis* L.; V; **19**; f
T *Catapodium marinum* (L.) Hubbard (= *Desmazeria marina* Druce); V; A; **7**; h, k **– VU**
T *C. rigidum* (L.) Hubbard (= *Desmazeria rigida* (L.) Tutin; *Scleropoa rigida* (L.) Griseb.); V; A; **7**; f, u
H *Cleistogenes serotina* (L.) Keng. (Host, 1802 as *Festuca serotina*); V; **12**; f
H *Cynodon dactylon* (L.) Pers.; V; A; **19**; k, m, o, r, t, u
T *Cynosurus echinatus* L. (Host, 1802); V; **11**; f
H *Dactylis glomerata* L.; V; **17**; f
H *D. hispanica* Roth (= *D. glomerata* L. ssp. *hispanica* (Roth) Nyman); V; A; R; **1**; f, k, m, u
T *Dasypyrum villosum* (L.) Borbas (= *Haynaldia villosa* Schur); V; **11**; f, m
T *Digitaria sanguinalis* (L.) Scop.; V; **19**; o, r, u
G **Elymus pycnanthus* (Gordon) Melderis (= *Agropyron litorale* Dumort. nom. illeg.); V; A; HS; HJ; R; **1**; k
T *Eragrostis megastachya* (Koeler) Link; V; **19**; m
T *E. minor* Host; V; **19**; o
T *Gastridium ventricosum* (Gouan) Sch. et Th.; A; **7**; f
H *Helictotrichon convolutum* (Presl) Henrard (= *Avena convoluta* Presl); V; **2**; c, f
T *Hordeum leporinum* Link (= *H. murinum* L. ssp. *leporinum* (Link) Arcang.); V; **1**; m, u
T *Lagurus ovatus* L.; V; A; **1**; f
T *Lolium loliaceum* (Bory et Chaub.) Hand.-Mazz.; V; **3**; h, m
H *L. perenne* L.; V; **16**; f, t
T *L. rigidum* Gaudin (= *L. strictum* Presl); V; **11**; m, u
T *Lophochloa cristata* (L.) Hyl. (= *Koeleria phleoides* Vill.); V; **19**; m, r, s, u, z
H *Melica ciliata* L.; V; A; **17**; f
Ch *Oryzopsis miliacea* (L.) Asch. et Schweinf. (= *Piptatherum miliaceum* (L.) Coss.); V; **11**; m, r, s, u, x
T *Parapholis incurva* (L.) Hubbard (= *Lepturus incurvatus* Trin.); V; A; **19**; h – **VU**
T *Phleum subulatum* (Savi) Asch. et Gr.; V; **1**; f, u
H *Poa bulbosa* L. ssp. *bulbosa*; V; **17**; e, f
T *P. infirma* H. B. K. (= *P. annua* ssp. *exilis* (Tomm.) Murb.); V; **1**; m
T *Psilurus incurvus* (Gouan) Sch. et Th. (= *P. aristatus* (L.) Duval-Jouve); V; **1**; f
T *Setaria verticillata* (L.) Beauv; V; **19**; m, o, r, s, t, u, z
T *S. viridis* (L.) Beauv.; V; **17**; m, o, r, s, t, u, z
G *Sorghum halepense* (L.) Pers.; V; **19**; o, r, t, u, z
H *Stipa bromoides* (L.) Doerfl.; V; **1**; f
T *Tragus racemosus* (L.) All.; V; **11**; h, o
T *Vulpia ciliata* (Danth.) Link (= *V. danthonii* (Asch. et Gr.) Volkart.); V; **11**; c, f, t, u

POTAMOGETONACEAE

Hy *Cymodocea nodosa* (Ucria) Asch.; **7**; g (S^t Andrew Bay)

Hy *Posidonia oceanica* (L.) Delile; V; A; **1**; g (spread in the sea around islands)

The cultivated plants (108 species):

Agave americana L., *Albizzia julibrissin* (Willd.) Durazzo, *Alcea rosea* L. (= *Althaea rosea* Cav.), *Allium cepa* L., *A. sativum* L., *Apium graveolens* L., *Armoracia rusticana* Gaertner, Meyer et Scherb., *Beta vulgaris* L. ssp. *vulgaris*, *Fallopia aubertii* (L. Henry) Holub, *Bougainvillea spectabilis* Willd., *Brassica oleracea* L., *Buxus sempervirens* L., *Calendula officinalis* L., *Canna indica* L., *Capsicum annuum* L., *Carpobrothus edulis* (L.) N. E. Br., *Celosia cristata* L., *Chamaerops humilis* L., *Chrysathemum coronarium* L., *Cicer arietinum* L., *Cichorium endivia* L., *Citrus limon* (L.) Burm., *Cucumis melo* L., *C. sativus* L., *Cupressus sempervirens* L., *Cydonia oblonga* Miller, *Cynara cardunculus* L. ssp. *scolymus* (L.) Hayek, *Dahlia variabilis* (Willd.) Desf., *Dianthus barbatus* L., ****Eryobotrya japonica** (Thunb.) Lindl., *Erysimum cheiri* (L.) Crantz., *Euphorbia marginata* Pursch., *Euonymus japonicus* L. fil., *Fragaria vesca* L., *Gomphrena globosa* L., *Helianthus annuus* L., *Hibiscus syriacus* L., ****Hydrangea hortensis** Sm., *Jasminum nudiflorum* L., *Juglans regia* L., *Kerria japonica* (L.) DC., *Lactuca sativa* L., *Lagenaria siceraria* (Molina) Standley, *Laurus nobilis* L., *Lavandula angustifolia* Miller, *Ligustrum vulgare* L., *Lobularia maritima* (L.) Desv., *Lunaria annua* L., ****Narcissus odoratus** L., *N. pseudonarcissus* L., *Melia azedarach* L., *Mesembryanthemum crystallinum* L., *Morus alba* L., *M. nigra* L., *Nerium oleander* L., *Ocimum basilicum* L., *Opuntia compressa* (Salisb.) Mcbride (= *O. vulgaris* Miller), *Origanum majorana* L. (= *Majorana hortensis* Moench), *Parthenocissus quinquefolia* (L.) Planchon, *Pasiflora coerulea* L., *Pelargonium zonale* (L.) Aiton, *Petroselinum sativum* Hoffm., *Phaseolus vulgaris* L., *Philadelphus coronarius* L., *Phoenix canariensis* Chabaud, *Pisum sativum* L., *Pittosporum tobira* (Thunb.) Aiton, fil., ****Poinciana gilesii** Hooker, *Portulaca grandiflora* Hooker, *Prunus armeniaca* L., *P. avium* L., *P. cerasifera* Ehrh, *P. cerasus* L., *P. domestica* L., *P. dulcis* (Miller) Webb (=*Amygdalus communis* L.), *P. laurocerasus* L., *P. persica* (L.) Batsch, *Punica granatum* L., *Pyrus communis* L., *Ricinus communis* L., *Robinia pseudacacia* L., *Rosmarinus officinalis* L., *Salvia splendens* Sellow, ****Santolina chamaecyparissus** L., ****S. rosmarinifolia** L. (= *S. viridis* Villd.), *Sedum maximum* (L.) Suter, *Sempervivum tectorum* L., *Senecio angulatus* L., *Solanum melongena* L., ****S. pseudocapsicum** L., *S. tuberosum* L., *Sophora japonica* L., *Spinacia oleracea* L., *Syringa vulgaris* L., *Tagetes patula* L., *Tamarix dalmatica* Baum (Host, 1802 as *T. africana* auct. balc., non Poir.), *T. gallica* L. (Host, 1802), *Tanacetum parthenium* (L.) Sch Bip., *Tecoma radicans* (L.) Juss., *Thuja orientalis* L., *Triticum aestivum* L. (= *T. vulgare* Host), *Tropaeolum majus* L., *Vicia faba* L., *Viola* × *wittrockiana* Gams, *Vitis vinifera* L., *Zinnia elegans* Jacq., *Ziziphus jujuba* Miller and *Yucca gloriosa* L.

ANALYSIS OF THE FLORA

1. Taxonomic analysis

The list of flora of the island of Vrgada and its islets includes 583 species and subspecies: 108 cultivated and 475 in the natural and anthropogenous vegetation.

Tab. 1. Taxonomic analysis

TAXON	*Pteridophyta*	*Coniferophytina*	*Cycadophytina*	*Magnoliatae*	*Liliatae*	TOTAL
FAMILY	1	2	1	60	9	73
GENUS	2	2	1	237	58	300
SPECIES	4	3	1	348	85	441
SUBSPECIES	–	2	–	30	2	34
% from 475	0,84	1,05	0,21	79,58	18,32	100,00

Tab. 2. Number of the species by islands

Islands and reefs	Number of species by island	The cultivated plants	Total
Vrgada (V)	462	108	570
Artina (A)	88	–	88
Rakita (R)	31	–	31
Obrovanj (O)	17	–	17
Kamičić – reef north of Vrgada (HS)	9	–	9
Kamičić – reef south of Vrgada (HJ)	7	–	7

In the taxonomic analysis 475 taxa were included. They are presented in Tab. 1. The number of the species by islands are given in Tab. 2.

2. Ecological analysis

A numerical representation of life forms, as well as the percentage share in the 475 taxa, is given in Tab. 3.

Tab. 3. Life forms

Life forms	Number of taxa	%
Phanerophyta (P)	36	7.6
Chamaephyta (Ch)	39	8.2
Hemicryptophyta (H)	117	24.6
Geophyta (G)	45	9.5
Therophyta (T)	236	49.7
Hydrophyta (Hy)	2	0.4
TOTAL	475	100

3. Phytogeographical analysis

An analysis of the floral elements is shown in Fig. 2.

1. Mediterranean floral element (215 species, 45.26 %)
2. South-European floral element (108 species, 22.74 %)
3. Widespread plants (89 species, 18.74 %)
4. Euro-Asiatic floral element (34 species, 7.16 %)
5. Naturalized plants (14 species, 2.95 %)
6. European floral element (6 species, 1.26 %)
7. East European-Pontic floral element (4 species, 0.84 %)
8. South-East European-Pontic floral element (3 species, 0.63 %)
9. Circum-holartic plants (2 plants, 0.42 %).

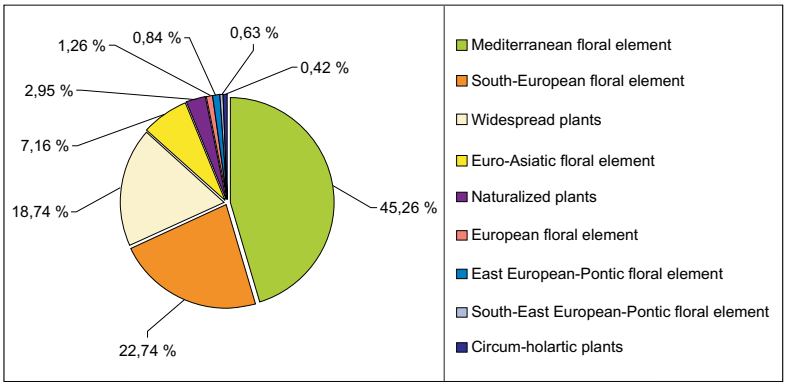

Fig. 2. Spectrum of floral elements in the flora of the islands

DISCUSSION

The vascular flora includes 475 taxa (441 species and 34 subspecies), 300 genera and 73 families (see Tab. 1). With the addition of 108 cultivated species, the flora of the island of Vrgada and its islets consists of 583 taxa.

Out of 475 taxa in the natural vegetation, 462 of them belong to the flora of the island of Vrgada. The remaining 13 are either scattered on the surrounding islets or in the sea (2 species). 88 species were recorded for the islet of Artina, 17 for Obrovanj, 31 for Rakita, 9 for the Kamičić reef north of Vrgada and 7 for the Kamičić reef in the south (see Tab. 2).

The flora of the island of Vrgada is relatively rich which can be explained by the fact that it has diverse habitats on a small area (2.3 km^2) especially anthropogenous ones. This region has been inhabited since ancient times and its vegetation both directly and indirectly affected by human activities.

Out of 46 taxa previously recorded in the literature referring to this area, our research confirmed 29 of them whereas 17 taxa were not found (14 are included in the flora of the island of Vrgada).

Species registered by HOST (1802) that we could not confirm are as follows: *Bryonia alba*, *Chamaecytisus hirsutus*, *Coronilla coronata*, *Cytinus hypocistis*,? *Ervum mo-*

nathos, *Gladiolus communis*, *Hippocrepis comosa*, *H. multisiliquosa*, *Lychnis coronaria*,*? Orchis* n. sp. (Hostii), *Orchis coriophora*,*? Ophrys lingua*, *Pinus pinaster*, *Polygala major*, *Quercus cerris*, *Scabiosa columbaria*, *Scrophularia scopolii*.

The following three species are not included in the list of flora of the Vrgada island (*Ervum monathos*, *Orchis n. sp*. (Hostii), *Ophrys lingua* are marked with a ? sign in the above list) as we could not match them with any appropriate familiar names.

The absence of 17 non-confirmed taxa (HOST, 1802) could be explained by numerous reasons: some of them disappeared during the last 200 years, due to changes caused by human activities (clearing of woods, fires, building settlements etc.).

The largest number of taxa in the natural vegetation belong to the families *Fabaceae* (60 taxa, 12.63%), *Poaceae* (49 taxa, 10.32%), *Asteraceae* (33 taxa, 6.95%) and *Cichoriaceae* (32 taxa, 6. 74%).

As expected, terrophytes are the largest in number within the life-form spectrum (236 species, 49.7%) (Tab. 3). Terrophytes point to the Mediterranean character of the climate of the island of Vrgada. A considerable number of Hemicryptophytes (117 species, 24.6%) is the result of strong anthropogenous influences (fires and grazing affect the development of hemicryptophytes in a favourable way).

Out of 475 taxa, 215 (45.26%) belong to the Mediterranean floral element; amongst them the most numerous ones are the Circum Mediterranean plants (139 taxa, 29.26%).

Plants of the Mediterranean floral element spread over the largest area and are followed by the plants of the South-European floral element (108 taxa, 22.74%) and the widespread ones (89 taxa, 18.74 %) (Fig. 2).

Within the Mediterranean floral element particularly interesting plants are the Illyrian Adriatic endemic plants with 8 taxa (1.68%) as well as Illyrian Apennine endemic plants (6 taxa, 1.26%). Of Illyrian Adriatic endemic plants, in the flora of the Vrgada there are: *Asphodeline liburnica*, *Carduus micropterus*, *Euphorbia fragifera*, *Plantago holosteum* Scop. ssp. *scopulorum*, *Rhamnus intermedius*, *Seseli tomentosum*, *Tanacetum cinerariifolium* and *Vincetoxicum hirundinaria* ssp. *adriaticum.*

The Illyrian-Apennine endemic plants are: *Alyssanthus sinuatus*, *Artemisia caerulescens*, *Limonium cancellatum*, *Marrubium incanum*, *Ruta graveolens* and *Stachys salviifolia*.

The Red Book of the Vascular Flora of Croatia (NIKOLIĆ & TOPIĆ, 2005) had the IUCN Plant Red Data Book as a model. It contains lists of plants already endangered or those that might become extinct in the future. The category of Endangered plants (EN) includes 6 species: *Carex divulsa*, *C. extensa*, *Delphinium peregrinum*, *Glaucium flavum*, *Hibiscus trionum* and *Ophrys sicula* and the category Vulnerable (VU) includes 8 species from the island of Vrgada: *Catapodium marinum*, *Ophrys bertolonii*, *O. sphegodes* ssp. *atrata*, *Orchis tridentata*, *Parapholis incurva*, *Salsola kali*, *S. soda* and *Suaeda maritima*.

The total number of species from this area included in different categories of the Red Book is 14 (2.95%) depending on the degree of their vulnerability. *Orchis coriophora* L. is another species recorded for this island by Host and should be added to the above number, though this study did not confirm the presence of this species.

Spreading of adventive plants (newcomers) within the autochthonous flora has become quite noticeable lately, resulting from different human activities, either deliberate or accidental. Adventive plants group includes the neophytes, particularly interesting species. The neophytes are plants that have been appearing in the European flora since the discovery of America. 15 such species (3.16%) grow in the flora of the island of Vrgada: *Amaranthus deflexus*, *A. graecizans*, *A. retroflexux*, *Aster squamatus*, *Bidens subalternans*, *Conyza bonariensis*, *C. canadensis*, *Cosmos bipinnatus*, *Datura innoxia*, *D. stramonium*, *Helianthus tuberosus*, *Lilium candidum*, *Lycopersicon esculentum*, *Oxalis articulata* and *Veronica persica*.

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SAŽETAK

Flora otoka Vrgade i okolnih otočića

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Tijekom 2003. i 2004. godine obavljena su floristička istraživanja otoka Vrgade, Artine, Obrovanja i Rakite te dviju hridi: Kamičić (hrid sjeverno od Vrgade) i druga hrid Kamičić (južno od Vrgade). U flori istraživanih otoka zabilježena su ukupno 583 taksona. Samonikla flora obuhvaća 475 taksona (441 vrsta i 34 podvrste), 300 rodova i 73 porodice, a u kulturi je zabilježeno 108 svojti. Najviše taksona ima Vrgada (462 u prirodnoj i antropogenoj vegetaciji te 108 u kulturi), a zatim slijede Artina (88), Rakita (31), Obrovanj (17), Kamičić (hrid sjeverno od Vrgade – 9) i Kamičić (hrid južno od Vrgade – 7).

Od 475 taksona mediteranskom flornom elementu pripada 215 (45,26%), među kojima su najbrojnije cirkummediteranske biljke (139 taksona, 29,26%). Unutar mediteranskoga flornog elementa posebnu pozornost zaslužuju ilirsko-jadranske endemične biljke kojih ima 8 taksona (1,68%) i ilirsko-apeninske biljke (6 taksona, 1,26%). Po rasprostranjenosti iza biljaka mediteranskoga flornoga elementa slijede biljke južnoeuropskoga flornog elementa (108 taksona, 22,74%) i biljke široke rasprostranjenosti (89 taksona, 18,74%).

Vrstama su najbogatije porodice *Fabaceae* (60 vrsta, 12,63%) i *Poaceae* (49 vrsta, 10,32%). U spektru životnih oblika dominiraju terofiti sa 236 taksona (49,7%), a zatim slijede hemikriptofiti (117 taksona, 24,6%).

Prema Crvenoj knjizi vaskularne flore Hrvatske ukupno je 14 svojti (2,95%) s istraživanog područja svrstano u različite kategorije prema stupnju njihove ugroženosti. Većina navedenih svojti (8) pripada porodici *Orchidaceae*.