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## A NEW CONTRIBUTION TO THE FLORA OF THE POŽEGA VALLEY AND THE SURROUNDING MOUNTAINS

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**Tomašević, M.: A new contribution to the flora of the Požega Valley and the surrounding mountains. Nat. Croat., Vol. 15, No. 1–2, 43–60, 2006, Zagreb.**

121 taxa of vascular plants are reported as having been discovered in the area of the Požega Valley and the surrounding mountains, the total number of taxa in the area now coming to 1588. The chorological spectrum shows 25% of Eurasian elements, 15.74% consist of widespread plants, 14.74% South European and 3.72% of the Mediterranean element, 7.19% of the European and 4.59% of the Central European element, and 3.65% of the East European-Pontic floral element. According to life forms, vascular plants were represented in the following numbers: Hemicryptophyta (H) – 711, Therophyta (T) – 383, Geophyta (G) – 162, Phanerophyta (P) – 220, Chamaephyta (CH) – 77 and Hydrophyta (Hy) – 35. The most common families: *Asteraceae* – 146 taxa, *Poaceae* – 125, *Fabaceae* – 102, *Rosaceae* – 76 plant taxa. Some rare and interesting taxa are: *Orlaya grandiflora* (L.) Hoffm., *Senecio thapsoides* DC. subsp. *visianianus* (Papaf ex Vis.) Vandas, *Dianthus giganteus* D'Urv subsp. *croaticus* (Borb.) Tutin, *Scorzonera austriaca* Willd., *Trifolium glomeratum* L., *Cotoneaster integerrimus* Medik, *Spiraea cana* Walld. et Kit., *Iris croatica* I. Horvat et M. Horvat, *Iris variegata* L.

**Key words:** flora, the Požega Valley, Croatia

**Tomašević, M.: Novi prilog flori Požeške kotline i okolnoga gorja. Nat. Croat., Vol. 15, No. 1–2, 43–60, 2006, Zagreb.**

Na području Požeške kotline i okolnoga gorja otkrivena je 121 nova svojta vaskularne flore čiji broj sada iznosi 1588 biljnih svojti. Korološki spektar pokazuje 25% euroazijskog elementa, 15,74% biljaka široke rasprostranjenosti, 14,74% južноеuropskog i 3,72% mediteranskog elementa, 7,19% europskog i 4,59% srednjoeuropskog elementa, te 3,65% istočноеuropsko-pontskog elementa. Prema životnom obliku vaskularne biljke su zastupljene u sljedećem broju: Hemicryptophyta (H) – 711, Therophyta (T) – 383, Geophyta (G) – 162, Phanerophyta (P) – 220, Chamaephyta (CH) – 77 i Hydrophyta (Hy) – 35. Najzastupljenije biljne porodice su: *Asteraceae* – 146 svojti, *Poaceae* – 125, *Fabaceae* – 102, *Rosaceae* – 76 biljnih svojti. Neke nove rijetke i interesantne svojte su: *Orlaya grandiflora* (L.) Hoffm., *Senecio thapsoides* DC. subsp. *visianianus* (Papaf ex Vis.) Vandas, *Dianthus giganteus* D'Urv subsp. *croaticus* (Borb.) Tutin, *Scorzonera austriaca* Willd., *Trifolium glomeratum* L., *Cotoneaster integerrimus* Medik, *Spiraea cana* Walld. et Kit., *Iris croatica* I. Horvat i M. Horvat, *Iris variegata* L.

**Ključne riječi:** flora, Požeška kotlina, Hrvatska

## INTRODUCTION

The Požega Valley and the surrounding mountains represent the western border region of East Croatia (Slavonia) towards Central Croatia. The survey region is located in the meso-region of the meso-mountains of the Slavonian river basin, the east Pannonian macroregion in Croatia. (NIKOLIĆ *et al.*, 1998:30, Fig.6), in UTM network, quadrant XL, YL and BR (100 x 100 km).

In the north, the valley is bordered by the mountains Papuk (952 m) and Krndija (790 m), Mt Psunj (984 m) in the west, higher and separate from the south-eastern part of Požeška gora (618 m) and Dilj gora (495 m). The valley itself is mildly undulating for 40 km in the east-west direction and 15–20 km long in south-north direction (SIĆ, 1975).

Mt Psunj, Mt Papuk and Mt Krndija are mostly formed of magmatic and metamorphic rocks, somewhat less of Mesozoic limestone and dolomite, while the bordering parts are formed of tertiary sediments. Požeška gora is formed to a lesser degree of magmatic and metamorphic cliffs, mostly of Mesozoic and Tertiary sediments, while Dilj gora is formed of only Tertiary sediments. The bottom of the valley is formed of Quaternary layers (TAKŠIĆ, 1977).

The western parts of the valley are characterized by a milder and wetter climate while the eastern parts have less precipitation, much warmer summers and colder winters. The average annual temperature in the period 1951–1980 was 10.4° C. The coldest month is January (–1° C) and the warmest July (20.4° C). The annual quantity of precipitation is 794 mm. The southwest part of the valley has 900 mm and Psunj, Papuk and Krndija about 1000 mm of precipitation. On average there are 62 frosty days. The relief structure of the region accounts for the climatic characteristics changing from Eastern Croatia to Central Croatian regimes (THE METEOROLOGICAL AND HYDROLOGICAL SERVICE, 1990).

Research into the flora and vegetation of the Požega Valley and the surrounding mountains has discussed the phytogeographical position of Slavonia. In this small area the influences of three different floristic regions can be found. The area of the Požega Valley, according to its ground cover, has the characteristics primarily of the Euro-Siberian-North American region, as has the greatest part of Croatia. The low-lying part of the Valley includes the climatic zones of forests of the alliance *Carpinion – betuli illyricum* Ht. 1956. The mountainous areas are regions of the climatic zones of the forest alliance *Aremonio – Fagion* /Ht. 1938/ Török *et al.* 1989, including mixed forests of the association *Abieti – Fagetum »pannonicum«*, Rauš, 1969, prov.

The proximity of the Middle European vegetation province – Pannonian sector and the Mediterranean vegetation region are reflected in the composition of the flora in this region. The eastern parts of the Valley and the whole of Eastern Slavonia are considered a transitional area towards Aralo-Caspian zones of the alliance *Aceri tatarici-Quercion* Zolyomi *et* Jakucs 1957, in the northeast, or a transitional area towards south-east that is to say towards the zone of submediterranean thermophilic flora and vegetation (the order *Quercetalia pubescentis* Br. – Bl. /1931/ 1937.), and the forest association *Orno – quercetum pubescentis* Klika 38, and the forest association *Quercetum frainetto-cerris* Rudski 1949 (ILJANIĆ, 1977).

Due to the heterogeneousness of the geomorphological, geological and climatic conditions and the specific phytogeographical location, the region is characterized by the richness and heterogeneousness of the vascular flora plant taxa.

Several authors have written on the flora of this region, as well as those quoted in papers by the present author (1998a, b) to which the following names should be added: FRANJIĆ (1993), ŠEGULJA (1998), TOMAŠEVIĆ (1999).

Past floristic surveys of the Požega Valley and the surrounding mountains were not systematic so it is impossible to estimate the exact number of plant taxa from this period, for example PILLER & MITTERPACHER (1783) noted about 140 species, KOMLANEC (1872/73) 661 species, while ILIJANIĆ (1977) brings the list of plant taxa up to 1030, of which 102 taxa have not been confirmed. So far this is the most complete survey of the vascular flora of this region. All earlier floristic data have been included.

A floristic survey during 1972–1998 in the area of the Požega Valley and the surrounding mountains confirmed 1467 vascular flora plant taxa. The flora was also analyzed with respect to its floral elements and life forms (TOMAŠEVIĆ, 1972; 1998a: 1998b).

The specific phytogeographic position and the incompleteness of previous surveys led to the need for additional floristic surveys of the region. My intention has been to integrate all these floristic data and from this new synopsis to provide a definition of the phytogeographical characteristics of the flora of the Požega valley and surrounding mountains.

Further surveys of the flora in the Požega Valley and the surrounding mountains demonstrated the existence of 121 more plant taxa vascular flora that had never before been noted in this area. A list of them is to be found below.

## MATERIAL AND METHODS

Floristic research was done in the period 1998–2004 in different plant communities and different habitats throughout the area of the Požega Valley.

The area investigated and the localities from which rooted species originate are shown on the map (Fig. 1).

Along with each species name, the localities are specified according to geographical position and marked by numbers 1– 36 (UTM grid, 10 x 10 km, in brackets).

All plant species defined in these researches can be found in the herbarium which has been deposited in the Town Museum in Požega in 1995.

As well as indigenous plant taxa the paper also records also adventitious and cultivated plants. This register also includes plant species *Datura innoxia* Miller recorded by FRANJIĆ in 1993.

Taxa are determined according to standard keys for determination (TUTIN *et al.*, 1964–1980; JOSIFOVIĆ *et al.*, 1971–1976; DOMAC, 1973; TRINAJSTIĆ, 1974–1986, HORVATIĆ & TRINAJSTIĆ, 1973).

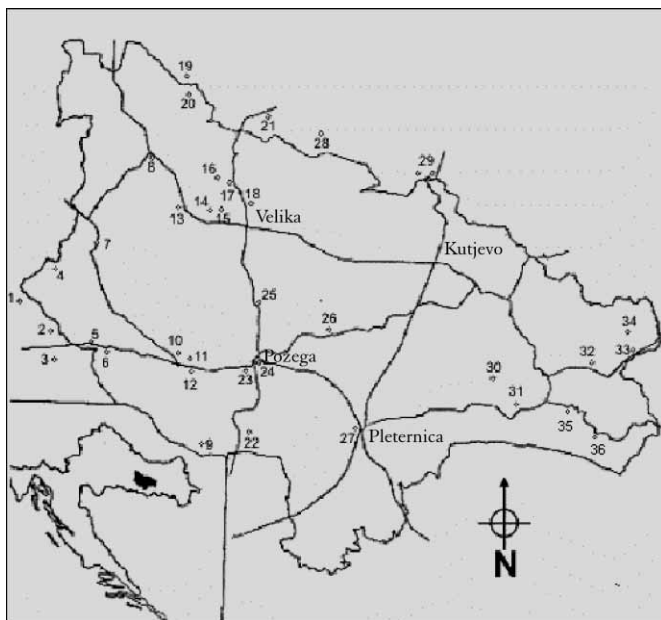


Fig. 1. Area investigated

Localities: 1 – Podvrško XL92; 2 – Sinlije XL92; 3 – Banićevac XL92; 4 – Rudina XL 92, 5 – Oblakovac XL92; 6 – Busnovi XL92; 7 – Orljavac XL93; 8 – Vučjak Kamenski XL94; 9 – Škrabutnik YL01; 10 – Jaguplije YL02; 11 – Stara Lipa YL02; 12 – Nurkovac YL02; 13 – Poljanska YL03; 14 – Stražeman YL03; 15 – Potočani YL03; 16 – Turjak-Mališćak YL03; 17 – Pliš YL03; 18 – Velika, Lapjak, Tisica-Dubočanka YL03; 19 – vrh Papuka YL04; 20 – Zapadni Papuk II, odjel 80a YL04; 21 Jankovac YL 04, 22 – Vrhovci Crkveni YL12; 23 – Drškovci YL12; 24 – Požega YL12; 25 – Mihaljevci YL12; 26 – Jakšić YL12; 27 – Pleternica YL11; 28 – Pušina YL14; 29 – Krndija-Duzlučka planina; kota – »Stari grad«; Kapavac YL24; 30 – Veliki Bilač YL32; 31 – Djedina Rijeka YL32; 32 – Kneževac BR63; 33 – Stari Zdenkovac BR63; 34 – Mokreš BR63; 35 – Sovski dol BR62; 36 – Paka BR 62

The nomenclature of species and families is coordinated with the *Flora Croatica, Index Florae Croaticae* (NIKOLIĆ (ed.) 1994; 1997; 2000) and *Flora Europaea* (TUTIN *et al.*, 1964–1980).

The list of the flora is formed in the context of higher systematic categories according to the alphabetic order of families, genera and within them the alphabetic order of species and subspecies. The names of the species are followed by habitat and list of localities of surveyed area, life forms are printed bold, and floral elements are marked by numbers. Life forms have been analysed according to HORVAT (1949) and ŠEGULJA (1977) and are marked as follows:

Ch – Chamaephyta,  
G – Geophyta,  
H – Hemicryptophyta,

P – Phanerophyta  
T – Therophyta  
Hy – Hydrophyta.

Chorological classification (classification by floral elements) is after HORVATIĆ *et al.* (1967–1968), and ŠEGULJA (1977), and those species not listed here after TUTIN *et al.* (1964–1980), HORVATIĆ & TRINAJSTIĆ (1973), TRINAJSTIĆ (1974–1986), JOSIFOVIĆ *et al.* (1971–1976), and floral elements are determined. The analysis of the floral elements and life forms has given a certain picture of the phytogeographic characteristics of the flora of the Požega Valley. Numbers printed in bold stand for the following floristic elements:

- |  |  |
|--|--|
| 1. Mediterranean floral element        | 8. European floral element             |
| 2. Illyrian-Balkan floral element      | 9. Pannonian floral element            |
| 3. South European floral element       | 10. Eurasian floral element            |
| 4. Atlantic floral element             | 11. Circum-Holarctic floral element    |
| 5. East European-Pontic floral element | 12. Widespread plants                  |
| 6. Southeast European floral element   | 13. Cultivated and adventitious plants |
| 7. Central European floral element     |  |

To make the phytogeographic analysis more complete floral element and life form analysis figures were taken from the article (TOMAŠEVIĆ, 1998 b) and complemented with facts from the register of plant taxa.

The analysis of the life forms was compared with results of the analysis of the life forms of some adjacent areas.

The analysis took into consideration endangered plant taxa according to the Red Book of the Vascular Flora of Croatia (NIKOLIĆ & TOPIĆ, 2005).

The register of plants indicates the threat status if a certain plant taxa is in one of these categories.

The following species were formerly noted incorrectly as *Pulsatilla vulgaris* and *Himanthoglossum hircinum*, and should be *Pulsatilla grandis* Wender (NIKOLIĆ, 1994) and *Himanthoglossum adriaticum* H. Baumann (HRŠAK, 2000).

## RESULTS OF SURVEY

### New species in the flora of the Požega Valley and the surrounding mountains

#### S P E R M A T O P H Y T A

##### GYMNOSPERMAE

###### *T a x o d i a c e a e*

*Taxodium dictichum* (L.) Rich-cult., Stari Zdenkovac, **P, 13**

##### ANGIOSPERMAE

##### DICOTYLEDONES

###### *A p i a c e a e*

*Anthriscus nitida* (Wahlenb) Garcke, along the Vučjak Kamenski road, wet habitat, by the lake Jankovac, forest edge – Papuk peak, **H, 1**.

*Chaerophyllum aureum* L., wet habitat by the Dubočanka brook; forest edge – Papuk peak, **H, 3**.

*Chaerophyllum temulentum* L., forest edge, Krndija – »Stari grad« elevation; **H, 11**.

*Foeniculum vulgare* Mill. subsp. *vulgare*, cult., garden, Pleternica, **H, 13**.

*Levisticum officinale* Koch, cult. – garden, Nurkovac, **H, 13**.

*Orlaya grandiflora* (L.) Hoff., rocky grassland, Papuk peak, **T, 3**.

*Peucedanum austriacum* (Jacq.) Koch var. *montanum* Koch, rocky grassland, Papuk peak, **H, 3**.

#### A s c l e p i a d a c e a e

*Asclepias syriaca* L., wet habitat by the Dubočanka brook, grassland – eastern slopes of Psunj-Rudina, **H, 13**.

#### A s t e r a c e a e

*Achillea distans* Wald. et Kit. ex Willd. subsp. *distans*, grassland – Požeška gora, Škrabutnik, **H, 10**.

*Achillea distans* Wald. et Kit. ex Willd. subsp. *tanacetifolia* Janchen, forest edge, Krndija – Duzlučka planina, **H, 10**.

*Artemisia abrotanum* L., cult. – garden, Velika, Požega, **Ch, 13**.

*Artemisia dracunculus* L., cult. – garden, Mokreš, **H, 13**.

*Carlina acanthifolia* All. (= *Carlina utzka* Hacq), dry grassland, Busnovi, Banićevac, Nurkovac, Podvrško, **H, 3**.

*Carlina vulgaris* L. subsp. *intermedia* (Schur) Hayek, dry grassland, Veliki Bilač; Banićevac, **H, 6**.

*Centaurea banatica* Rochel ex Rchb. (= *C. jacea* L. subsp. *banatica* (Rochel) Hayek), dry grassland, Vrhovci Crkveni, **H, 5**.

*Cirsium pannonicum* (L.) Link, rocky ground, Turjak, Mališćak, **H, 5**.

*Erigeron annuus* (L.) Pers. subsp. *strigosus* (H.L.Mühl. ex Willd.) Wagenitz, grassland, Nurkovac, Požega, Podvrško, **H, 13**.

*Logfia arvensis* (L.) Holub (= *Filago arvensis* L.), dry grassland, sandy ground, Potočani, **T, 10**.

*Logfia gallica* (L.) Coss. et Germ. (= *Filago gallica* L.), dry grassland, Potočani, **T, 1**.

*Senecio erucifolius* L. subsp. *tenuifolius* Schübl. et G. Martens, dry grassland, Drškovci, Banićevac, Veliki Bilač, Rudina, **H, 10**.

*Senecio thapsoides* DC. subsp. *visianianus* (Papaf ex Vis.) Vandas, dry grassland, underbush, Mališćak **H, 6**.

*Thephroseris tenuifolia* (Gaudin) Holub (= *Senecio ovirensis* (Koch) DC.), wet habitat, by the forest edge, West Papuk II, section 80a, **H, 7**.

#### B r a s s i c a c e a e

*Arabis planisiliqua* (Pers.) Rchb., rocky ground, Krndija – Duzlučka planina, **H, 11**.

*Conringia austriaca* (Jacq.) Sw., dry grassland, Rudina, **T, 2**.

*Hesperis sylvestris* Crantz subsp. *sylvestris*, rocky ground towards Papuk peak, **H, 2**.

*Erophila verna* (L.) Chevall subsp. *praecox* (Stern) Walters, grassland, quartz ground, Papuk slopes, Orljavac – Vranić, sands, Potočani, **T, 12**

*Lepidium virginicum* L., along roads and paths, Nurkovac, **T, 13**.

*Thlaspi praecox* Wulfen, forest edge, carbonate ground, Krndija – Duzlučka planina and »Stari grad« elevation, **H, 1**.

#### *C a m p a n u l a c e a e*

*Campanula glomerata* L. subsp. *farinosa* (Andr.) Kirschl., dry grassland, Drškovci, Banićevac, **H, 10**.

*Campanula glomerata* L. subsp. *hispida* (Witasek) Hayek, underbrush edge, Pliš, Velika, **H, 10**.

#### *C a r y o p h y l a c e a e*

*Arenaria leptoclados* (Reichenb.) Guss., sandy grassland, Potočani **T, 10**.

*Cerastium fontanum* Baumg. subsp. *vulgare* (Hartm.) Greuter et Burdet, underbrush edge, Požega **T, 12**.

*Dianthus giganteus* D'Urv subsp. *croaticus* (Borb.) Tutin, dry grassland, Stražeman, Poljanska, Potočani, **H, 6, VU**.

*Silene armeria* L., forest edge, sandy ground, Dilj gora, Sovski Dol, **T, 10**.

*Silene italica* (L.) Pers. subsp. *nemoralis* (Wald. et Kit.) Nyman, rocky grassland, towards the Papuk peak, **H, 3**.

*Silene vulgaris* (Moench) Garcke subsp. *bosniaca* (G. Beck) Janchen, rocky grassland, towards Papuk peak, **H, 3**.

*Stellaria neglecta* Weihe, underbrush, forest, Stara Lipa, Mihaljevci, **T, 10**.

#### *C h e n o p o d i a c e a e*

*Bassia scoparia* (L.) A. J. Scott, along roads and paths, Nurkovac, Požega, **T, 10**.

*Chenopodium botrys* L., along roads and paths (former brickworks), Požega, **T, 12**.

*Chenopodium ficifolium* Sm., along roads and paths, Stara Lipa, **T, 13**.

#### *C h i c h o r i a c e a e*

*Hieracium x brachiatum* Bertol. ex Lam., dry grassland, Potočani, **H, 7**.

*Hieracium cymosum* L. subsp. *cymosum*, rocky ground, Turjak, Mališćak, **H, 10**.

*Hieracium hoppeanum* Schult. subsp. *testimoniale* Nägeli ex Peter, dry grassland, Potočani, **H, 3**.

*Hieracium praealtum* Vill. ex Gochnat subsp. *bauchini* (Bess.), Petun. rocky ground, Turjak, Mališćak, **H, 10**.

*Leontodon crispus* Vill. subsp. *asperrimus* (Willd.) Finch et D.P. Sell, meadow, Vučjak Kamenski, **H, 3**.

*Scorzonera austriaca* Willd., rocky ground, Turjak, Mališćak, **H, 3**.

#### *C i s t a c e a e*

*Helianthemum nummularium* (L.) Mill. subsp. *glabrum* (Koch) Wilczek, rocky grassland, Turjak – Mališćak, **Ch, 3**.

*Helianthemum nummularium* (L.) Mill. subsp. *grandiflorum* (Scop.) Schinz et Thell., rocky grassland, Turjak, Lapjak, **Ch, 3**.



*Cucurbitaceae*

*Citrullus colocynthis* (L.) Schrad., cult., Požega, Nurkovac, **T, 13.**

*Euphorbiaceae*

*Euphorbia angulata* Jacq., forest, Turjak – Mališćak, **H, 3.**

*Fabaceae*

*Anthyllis vulneraria* L. subsp. *carpatica* (Pant.) Nyman, dry grassland, Stražeman, Banićevac, Rudina, **H, 1.**

*Anthyllis vulneraria* L. subsp. *polyphylla* (DC.) Nyman, forest, dry grassland, Lapjak, Rudina, **H, 7.**

*Lotus corniculatus* L. subsp. *hirsutus*, Roth., sandy ground, Orljavac – Vranić, **H, 11**

*Lotus glaber* Mill., wet habitat, Požega, Velika, close to Pliš, **H, 8.**

*Trifolium glomeratum* L., mountain meadow, Stražeman, **T, 3.**

*Trifolium nigrescens* Viv. dry grassland – sandy ground, Orljavac – Vranić, **T, 1**

*Fumariaceae*

*Corydalis solida* (L.) Sw. subsp. *oligantha* (Trinajstić) Greuter et Burdet, forest edge, Southern Papuk, Stražeman, **G, 1**

*Haloragaceae*

*Myriophyllum verticillatum* L., river Orljava, Veličanka, Požega, **Hy, 11.**

*Hippuridaceae*

*Hippuris vulgaris* L., lake, Jankovac, **Hy, 11, EN.**

*Lamiaceae*

*Stachys lanata* Jacq., cult and nat., Potočani, **H, 13.**

*Thymus longicaulis* C. Presl., dry grassland, Stražeman, **Ch, 1.**

*Thymus pulegioides* L. subsp. *chamaedrys* (Fr.) Gusul, dry grassland, Stražeman, **Ch, 3.**

*Oleaceae*

*Fraxinus angustifolia* Vahl. subsp. *oxycarpa* (M. Bieb. ex Willd.) Franco et Rocha Afonso, along meadow canal, Jakšić, **P, 3.**

*Onagraceae*

*Epilobium tetragonum* L. subsp. *lamy* (F. W. Schultz) Nyman, dry grassland, Potočani, Rudina, **H, 8.**

*Orobanchaceae*

*Orobanche caryophyllacea* Sm., dry grassland, Banićevac, **G, 3.**

*Plantaginaceae*

*Plantago media* L. subsp. *stepposa* (Kuprin) Soó, grassland, Vrhovci Crkveni, **H, 10.**

*Polygalaceae*

*Polygala vulgaris* L. subsp. *vulgaris* f. *albida* Chodat, mountain grassland, Stražeman, **H, 10.**

*Polygonaceae*

*Polygonum arenaria* Wald. et Kit, sandy ground, Potočani, **T, 5.**

*Rumex optusifolius* L. subsp. *sylvestris* Čelak, meadow, Nurkovac, **H, 10.**



*R a n u n c u l a c e a e*

*Helleborus multifidus* Vis. subsp. *multifidus*, small forest, Kneževac, **H, 1**.

*Pulsatilla grandis* Wender, rocky ground, Mališćak, Lapjak, **H, 5**.

*R o s a c e a e*

*Cotoneaster integerrimus* Medik, rocky ground, carbonate ground, Krndija – Duzlučka planina, section 27; Krndija – »Stari grad« elevation, **P, 10**.

*Duchesnea indica* (Andrews) Focke, cult. & nat., Požega, Nurkovac, **H, 13**.

*Geum rivale* L., wet meadow – underbush, Jakšić, **H, 11**.

*Potentilla inclinata* Will. dry grassland, sandy grounds, Orljavac – Vranić, **H, 10**.

*Potentilla pusilla* Host (= *P. glandulifera* Kraš.), dry grassland, Turjak – Mališćak, **H, 1**.

*Prunus cerasifera* Ehrh., cult., orchard, Nurkovac, **P, 13**.

*Prunus domestica* L. subsp. *insititia* (L.) C. K. Schneider, cult., orchards, **P, 13**.

*Rosa agrestis* Savi, dry grassland, Potočani, **P, 3**.

*Rosa obtusifolia* Desv, dry grassland, Potočani, **P, 8**.

*Rosa pendulina* L., forest edge, Krndija toward elevation Kapavac, **P, 3**.

*Rosa tomentosa* Sm., dry grassland, Potočani, **P, 7**.

*Sanguisorba minor* Scop. subsp. *muricata* Briq., dry grassland, Rudina, Potočani, **H, 3**.

*Spiraea cana* Wald. et Kit., rocky ground, Papuk peak, **P, 2**.

*Spiraea media* Schmidt, rocky ground, Krndija, »Stari grad« elevation, Duzlučka planina, sections 73 and 27, **P, 5**.

*R u b i a c e a e*

*Asperula tinctoria* L., mountain grassland, Stražeman, **H, 8**.

*Galium divaricatum* Pourr. ex Lam., dry grassland, Potočani, **T, 3**.

*Galium glaucum* L., underbush edge, dry grassland, Potočani, **H, 1**.

*R u t a c e a e*

*Ruta graveolens* L., cult., garden, Požega, **Ch, 1**.

*S a n t a l a c e a e*

*Thesium arvense* Horv. (= *Thesium ramosum* Hayne), dry grassland, Sinlije, Banićevac, **H, 10**.

*Thesium divaricatum* Jan. ex Mert. et Koch, dry grassland, Banićevac, eastern slopes of Psunj – near Oblakovac, **H, 1**.

*S a x i f r a g a c e a e*

*Saxifraga adscendens* L., railway embankment, Požega, rocky ground, Stražeman, Turjak, Mališćak, Krndija – elevation »Stari grad«, **T, 12**.

*Saxifraga tridactylites* L., sandy grassland, Rudina, **T, 12**.

*S c r o p h u l a r i a c e a e*

*Veronica teucrium* L. ssp. *pseudochamaedrys* (Jacq.) Nym, meadow, Orljavac – Vranić, Paka, **Ch, 10**.

*Veronica triphyllos* L., railway embankment, Jakšić, Požega, sandy grassland, Potočani, **T, 7**.

## S o l a n a c e a e

*Datura innoxia* Miller – cult, Požega, Jakšić, **T, 13.**

## V a l e r i a n a c e a e

*Valerianella coronata* (L.) DC., mountain grassland, Stražeman, **T, 1.**

## V i o l a c e a e

*Viola canina* L. subsp. *montana* (L.) Hartm., forest, Psunj, near Orljavac, **H, 3.**

*Viola tricolor* L. subsp. *subalpina* Gaudin, rocky ground, dry grassland, Papuk peak, **T, 10.**

## MONOCOTYLEDONES

## C y p e r a c e a e

*Carex divisa* Huds., wet meadow, Stara Lipa, **G, 3, EN.**

*Carex liparocarpos* Gaudin, dry grassland sandy ground, Potočani, **G, 10.**

*Carex michelii* Host, forest *Quercus pubescens*, Turjak, Mališćak, **G, 1.**

## I r i d a c e a e

*Crocus vernus* (L.) Hill. subsp. *albiflorus* (Kit.) Asch. et Graebn., forest, Mališćak, meadow, Stari Zdenkovac, **G, 3.**

*Iris croatica* I. Horvat et M. Horvat, rocky ground,

Krndija – »Stari grad« elevation, **G, 7, VU.**

*Iris sibirica* L., wet habitat, Pušina, **G, 10, VU.**

*Iris variegata* L., rocky grassland, towards Papuk peak, Mali Papuk, **G, 5, NT.**

## J u n c a c e a e

*Juncus filiformis* L., wet habitat, Stražeman, Orljavac – Vranić, **H, 11.**

## L i l i a c e a e

*Ornithogalum sphaerocarpon* A. Kern., forest edge, Požega – Jagodnjak, Jaguplije, **G, 1.**

## O r c h i d a c e a e

*Dactylorhiza fuchsii* (Druce) Soó subsp. *transsilvanica* (Schur) S. E., Fröhner f. *alba* (= *D. maculata* (L.) Soó subsp. *transsilvanica* (Schur) Soó), forest edge by the Dubočanka, Velika, **G, 10.**

*Epipactis microphylla* (Ehrh.) Soó, rocky ground, Turjak, Mališćak, **G, 10.**

*Himanthoglossum adriaticum* H Baumann, grassland, Požega – Sokolovac, Nurkovac, **G, 3.**

*Ophrys apifera* Huds., forest edge, Dilj – gora – Djedina Rijeka, **G, 3.**

## P o a c e a e

*Bromus benekenii* (Lange) Trimen, rocky ground, Papuk peak, Krndija **H, 7.**

*Bromus inermis* Leyss., along roads and paths and the Orljava embankment, Požega, **H, 10.**

*Calamagrostis pseudophragmites* (Haller) Koeler, sandy ground, Orljavac – Vranić, **H, 10**

*Digitaria ciliaris* (Retz.) Koeler, sandy ground, Požega, **T, 12.**

*Melica ciliata* L. subsp. *magnolii* (Gren. et Godr.) Husn., rocky ground, Papuk peak, **H, 1.**

*Melica altissima* L., rocky ground, carbonate ground, Papuk peak, **H, 3.**

*Poa bulbosa* L. subsp. *bulbosa* f. *vivipara* Koel. underbush edge, Turjak, Southern Papuk, **T, 12.**

*Vulpia bromoides* (L.) Gray, dry, sandy grassland, Potočani, **T, 10.**

## FLORAL ANALYSIS

This register of plant taxa is an addition to floristic research in the area of the Požega Valley and present plant taxa that have not previously been recorded in this area.

Taxonomic analysis of the recorded plant taxa records altogether 38 families, 87 genera and 121 vascular plant taxa. Complete figures from this register and from the article (TOMAŠEVIĆ, 1998b), when 1467 taxa were recorded, now show that there are 1588 vascular plant taxa in the region of the Požega Valley (Tab. 2.).

As can be seen from Tab. 2 most families, genera and species are dicotyledons, then monocotyledons while gymnosperms and pteridophytes are less numerous.

**Tab. 1.** Taxonomic analysis of the flora

	Family	Genus	Species	Subsp.	Variety	
PTERIDOPHYTA	–	–	–	–	–	
SPERMATOPHYTA						
<i>Gymnospermae</i>	1	1	1			
<i>Angiospermae</i>						
– <i>Dicotyledones</i>	31	71	60	38	1	
– <i>Monocotyledones</i>	6	15	17	4		
Total	38	87	78	42	1	121

**Tab. 2.** Taxonomic analysis of the total flora of the Požega Valley

	Family	Genus	Species	Subsp.	Variety	
PTERIDOPHYTA	10	11	20	–	–	
SPERMATOPHYTA						
<i>Gymnospermae</i>	5	11	16	–	6	
<i>Angiospermae</i>						
– <i>Dicotyledones</i>	100	476	1154	69	20	
– <i>Monocotyledones</i>	17	102	299	4	–	
Total	132	600	1489	73	26	1588

**Tab. 3.** A list of families with more than 20 species from the total flora of the Požega Valley

Family	Number of species and subspecies	% of total taxa 1588
1. <i>Asteraceae</i>	146	9,19
2. <i>Poaceae</i>	125	7,87
3. <i>Fabaceae</i>	102	6,42
4. <i>Rosaceae</i>	76	4,76
5. <i>Lamiaceae</i>	69	4,35
6. <i>Brassicaceae</i>	65	4,09
7. <i>Scrophulariaceae</i>	64	4,03
7. <i>Apiaceae</i>	60	3,78
8. <i>Caryophyllaceae</i>	59	3,72
9. <i>Cichoriaceae</i>	52	3,27
10. <i>Liliaceae</i>	50	3,15
11. <i>Ranunculaceae</i>	49	3,09
12. <i>Cyperaceae</i>	46	2,89
13. <i>Orchidaceae</i>	37	2,33
14. <i>Rubiaceae</i>	26	1,64
15. <i>Boraginaceae</i>	23	1,45

Out of 16 families with 20 and more taxa the most numerous are *Asteraceae* (146 or 9.19 %), *Poaceae* (125 or 7.87 %), *Fabaceae* (102 or 6.42 %) and *Rosaceae* (76 or 4.76 %).

Compared to the register of the flora of Slavonia and Baranya, with 1904 plant taxa (RAUŠ & ŠEGULJA, 1983), the complete register and analysis of flora of Požega Valley account for more than 80% of the total flora of Slavonija and Baranja, or about one third of complete vascular flora of Croatia, which is 5347 (species and subspecies) (NIKOLIĆ & TOPIĆ, 2005). *Asteraceae* families with 157 taxa (8.25%) *Poaceae* (142 or 7.40%), *Fabaceae* (126 or 6.62%), *Rosaceae* (88 or 4.62%) are listed in the flora of Slavonia and Baranya (RAUŠ & ŠEGULJA, 1983).

This figures show, according to family analysis, that the flora of the Požega Valley is similar to the flora of Slavonia and Baranya, which is accounted for by the phytogeographical position of Slavonia.

#### ANALYSIS OF FLORAL ELEMENTS

Combining figures from the article (TOMAŠEVIĆ, 1998b) and this list an analysis of floral elements and life form has been prepared.

Floral elements of plant species in the region of the Požega Valley and the surrounding mountains are shown in Tab. 4.

**Tab. 4.** Chorological spectrum (Analysis of the floral elements)

Floral element	No of taxa			% of total taxa (1588)
	1998	2005	total	
1. Mediterranean floral element	45	14	59	3,72
2. Illyrian-Balkan floral element	13	3	16	1,01
3. South European floral element	207	27	234	14,74
4. Atlantic floral element	8	–	8	0,51
5. East European-Pontic floral element	53	5	58	3,65
6. Southeast European floral element	25	3	28	1,76
7. Central European floral element	66	7	73	4,59
8. European floral element	110	4	114	7,19
9. Pannonian floral element	5	–	5	0,31
10. Eurasian floral element	367	30	397	25,00
11. Circum-Holarctic floral element	85	7	92	5,79
12. Widespread plants	244	6	250	15,74
13. Cultivated and adventitious plants	239	15	254	15,99
Total	1467	121	1588	100,00

Analysis of the complete flora of the region shows that the greatest role among plant life is played by plants of the Eurasian floral element (397 or 25.00 %), then by widespread plant species (250 or 15.74 %) and the plants of the European (114 or 7.18 %) as well as of the Central European floral element (73 or 4.59 %).

These data show that in the phytogeographical aspect the Požega Valley and surrounding mountains belong to the Euro-Siberian – North American region. A rather important share in the flora of this region is taken by plants of the South European floral element (234 or 14,74 %) and Mediterranean plants (59 or 3,72 %). Plant taxa of the South European and Mediterranean floral elements grow mostly in dry grassland, rocky ground, forest edges and hedges on southern slopes and thermophilic habitats and favourable local climatic conditions and protected areas due to articulation of the relief. There are 58 or 3.65 % plant species of the Aralo-Caspian region. Other floral elements are much less represented.

This combination of flora in the area is conditioned not only by present conditions but also by conditions in previous geological eras. That is why plants that are remains from ancient eras can be found here as well as newcomers (neophytes). In the group of cultivated and adventitious plants (254 or 15.99 %) there are numerous neophyte species. Some of them are grown because they are important for nutrition, decoration or for industry for instance *Solanum tuberosum*, *Zea mays*, *Nicotiana tabacum*, originating from South America. Many weeds and ruderal plants have been transferred in the same way, such as, to mention only some of the species transferred from North America;: *Conyza canadensis*, *Erigeron annuus*, *Solidago canadensis*, *Solidago gigantea*, *Ambrosia artemisiifolia*, *Xanthium italicum*, *Helianthus tuberosus*, *Phytolacca americana*, *Panicum capillare*, *Amaranthus retroflexus* while *Galinsoga parvi-*

*flora* and *Amaranthus deflexus* were brought from South America. *Reynoutria japonica* is from East Asia, *Datura innoxia* from Central America and they were both brought in as decorative plants and were over the course of time naturalized (MARKOVIĆ-GOSPODARIĆ, 1965; ILIJANIĆ, 1977; JOSIFOVIĆ *et al.*, 1971–1976; FRANJIĆ, 1993). Bringing new plants is nowadays very common as a consequence of the greater movement of goods and people and the devastation of natural vegetation, creating space for new plants to grow. Many of these new plants have been revealed as being highly invasive and capable of replacing indigenous plants.

#### LIFE FORM ANALYSIS

The spectrum of life forms of plant taxa of this region as currently registered is shown in Tab. 5.

Life form is expressed by the adaptation of a plant to its surrounding according to its way of survival during the unfavourable part of the year.

The domination of Hemicriptophyta (H) 44.77 % in the region of the Požega Valley into the Central European region expresses the adaptation of plant taxa to moderate and wet climates.

The remarkable quantity of Therophytes (T) 24.12 % expresses the dryness of this region and the modification of the climate of the area, which is a reflection of the geomorphological circumstances of the area, and shows remarkable anthropogenic influence.

Comparing the results of the analysis of the life forms (Tab. 6) from the eastern parts of Croatia – Baranya (PANJKOVIĆ, 1990), Slavonia and Baranya (RAUŠ & ŠEGULJA, 1983) – and western parts of Slavonia – the Požega Valley up to Vukomeričke gorice (ŠEGULJA, 1977), Zrinska gora (ŠEGULJA *et al.*, 1998) it can be noticed that the quantity of Hemicryptophytes increases from east to west, whereas the quantity of Therophytes and Geophytes gradually decreases. This indicates that going westwards the climate is more humid.

**Tab. 5.** Analysis of the life forms

Life form	Number of taxa			%
	1998	2005	total	
H	651	60	711	44,77
T	356	27	383	24,12
G	148	14	162	10,21
P	209	11	220	13,85
Ch	70	7	77	4,85
Hy	33	2	35	2,20
Total	1467	121	1588	100

**Tab. 6.** Comparative survey of the spectrum of the life forms in some areas of Croatia

Life form	Baranya (%)	Slavonia and Baranya (%)	Požega Valley (%)	Vukomeričke gorice (%)	Zrinska gora (%)
H	36.09	40.90	44.77	46.27	51.17
T	30.84	25.00	24.12	22.94	18.62
G	17.70	10.00	10.21	11.66	13.50
P	8.16	16.8	13.85	10.88	9.53
Ch	3.18	3.6	4.85	2.21	5.13
Hy	3.73	3.7	2.20	2.28	2.05

Based on the analysis of the threat statuses of plant taxa in the region of the Požega Valley and the surrounding mountains the following can be seen: category CR – critically endangered, taxa with extremely high risk of extinction in natural habitats, in which there are only 4 taxa. In category EN – endangered, taxa with a very high risk of extinction in natural habitats, there are 15 taxa, while in the category VU – vulnerable, taxa with a high risk of extinction in natural habitats, there are 30 taxa. In near threatened taxa – NT – there are 30 taxa, and in deficient data – DD – there are 49 taxa. The analysis indicates the necessity to observe and look after habitats of the quoted categories of plants and improve them or at least keep them unchanged.

Pursuant to the Nature Protection Law of the Republic of Croatia 44, plant species are protected in all habitats (OG 54/76). In the region of the Požega Valley 15 plant species are protected: *Daphne cneorum* L. and *Daphne laureola* L. (16. 4. 1952.); *Ilex aquifolium* L. and *Ruscus hypoglossum* L. (9.6. 1953.); *Doronicum orientale* Hoffm, *Eranthis hyemalis* (L.) Salisb. and *Fritillaria meleagris* L. (10. 6. 1958.); *Taxus baccata* L. (9.5.1969.); *Lilium martagon* L. (13.3.1970.); *Anacamptis pyramidalis* (L.) Rich, *Cephalanthera damasonium* (Willd) Druce, *Cephalanthera longifolia* (L.) Fritsch, *Cephalanthera rubra* (L.) Rich, *Platanthera bifolia* (L.) Rich and *Platanthera chlorantha* (Cust) Rchb (6.7.1972.).

In the flora of Požega Valley and surrounding mountains we can very rarely find plant taxa such as: *Aconitum anthora*, *Pulsatilla grandis*, *Cotoneaster integerrimus*, *Spiraea cana*, *S. media*, *S. chamaedryfolia*, *Jovibarba globifera* subsp. *hirta*, *Trifolium pannonicum*, *Taxus baccata*, *Iris croatica*, *Iris variegata*, *Phyteuma orbiculare*, *Doronicum orientale*, *Scorzonera austriaca*.

## CONCLUSION

121 additional taxa of vascular plants were found in the flora of the Požega Valley and the surrounding mountains. These are sorted into 38 families and 87 genera. This paper has given the list of new species with information on habitats and locations, life forms, floral elements and threat status. In conjunction with the for-



merly noted 1467 plant taxa (TOMAŠEVIĆ, 1998a, b) there are now 1588 taxa of vascular plants in the region of the Požega Valley and the surrounding mountains.

Phytogeographic analysis of the complete flora of this region shows 40.74 % of plants are **Eurasian** floral elements (397 species) and widespread plants (250 species). Quite a large proportion are plants of the **South European** (234 species) and **Mediterranean** floral elements (59 species – 18.45 %). Plant taxa of the researched region are **Hemicryptophyta** (711 species), **Therophyta** (383 species), **Geophyta** (162 species), **Phanerophyta** (220 species), **Chamaephyta** (77 species) and **Hydrophyta** (35 species).

The stated analyses of floral elements and life forms indicate this region belongs phytogeographically to the Eurosiberian – North American region. The numerous South European and Mediterranean floral elements and the considerable number of Therophyta indicate that there have been certain modifications of climatic conditions in the researched area mostly as the result of geomorphological diversity.

With respect to the threat status of the complete flora of the Požega Valley, the groups are Vulnerable (VU) – 30 species, Endangered (EN) – 15 species and Critically Endangered (CR) – 4 species.

The flora of this region is also characterised by invaders, either cultivated or weed and ruderal plants.

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## SAŽETAK

### Novi prilog flori Požeške kotline i okolnoga gorja

Mirko Tomašević

U nastavku istraživanja flore Požeške kotline, u razdoblju od 1998. do 2004., zabilježena je 121 biljna svojta koja dosad na tom području nije bila zabilježena.

Florističkim istraživanjima u razdoblju 1972. do 1998. godine, utvrđeno je 1467 biljnih svojti. Objedinjeni podaci pokazuju da flora toga područja za sada broji 1588 svojti vaskularnih biljaka raspoređenih u 132 porodice i 600 rodova. Najbrojnije porodice su *Asteraceae* (146 svojti), *Poaceae* (125 svojti), *Fabaceae* (102 svojte), *Rosaceae* (76 svojti).

Analiza životnih oblika ukazuje da su najzastupljenije svojte iz skupine hemikriptofita (711 svojti), zatim terofiti (383 svojti), geofiti (162 svojte), fanerofiti (220 svojti), hamefiti (77 svojti) i hidrofiti (35 svojti).

Fitogeografska analiza flore pokazuje da su najbrojnije biljke euroazijskog flornog elementa – 397 svojti (25,00%), biljke široke rasprostranjenosti – 251 svojta (15,80%), biljke europskog – 114 svojti (7,18%) i srednjoeuropskog flornog elementa – 73 svojte (4,59%). Dosta veliko učešće imaju biljke južnoeuropskog – 234 svojte (14,73%) i mediteranskog flornog elementa – 59 svojti (3,71%). Biljke aralo-kaspijske regije prisutne su s 58 (3,65%) biljnih svojti.

Dominacija hemikriptofita te biljaka euroazijskog flornog elementa ukazuje da to područje u fitogeografskom pogledu, kao i najveći dio Hrvatske, pripada eurosibirsko-sjevernoameričkoj regiji. Znatno prisustvo južnoeuropskog i mediteranskog flornog elementa te veliki udio terofita ukazuje na modificiranost klimatskih prilika toga područja.

Komparativna analiza spektra životnih oblika u istočnoj i središnjoj Hrvatskoj od istoka prema zapadu (od Baranje preko Požeške kotline do Vukomeričkih gorica i Zrinske gore), pokazuje da se povećava brojnost hemikriptofita, što ukazuje na sve humidniju klimu.

S obzirom na stupanj ugroženosti 49 vrsta je raspoređeno među: kritično ugrožene (CR) – 4 vrste, ugrožene (EN) – 15 vrsta i među osjetljive (VU) – 30 vrsta.

U flori ovog područja značajne su i biljke pridošlice (neofiti), bilo kao kultivirane, korovne ili ruderalne biljke. Posebna pozornost posvećena je biljkama koje su rijetke, a dolaze najčešće na staništima s karbonatnom podlogom.

Značajna zastupljenost biljaka široke rasprostranjenosti (15,74%), kultiviranih i adventivnih biljaka (15,99%), te porodica *Asteraceae* (9,19%), *Cichoriaceae* (3,27%) i *Poaceae* (7,87%) s pretežno antropohornim vrstama ukazuje na dugotrajan i intenzivan utjecaj čovjeka na sastav flore i vegetacije ovoga područja.