



Contribution to the knowledge of the flora of Prusac and its environs (*Pteridophyta* and *Spermatophyta*)

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Scientific article

UDK: 581.961 (497.6 Prusac) "2008/2013"

This paper sets out the results of floristic research in central Bosnia, where small areas, such as the old village of Prusac, remain little or entirely uninvestigated.

Taxonomic analysis revealed a high degree of biodiversity (73 families, 224 genera, 310 species, 23 subspecies and 2 forms), characterised by registered endemic species and those of different conservation status. The greater number of species in the spectrum are of the sub-Mediterranean group of floral elements, with hemicryptophytes the majority of life forms.

Key words: central Bosnia, taxonomy, flora, list, *Pteridophyta*, *Spermatophyta*, threatened species, endemics, floral element, life form.

INTRODUCTION

Prusac, a village with a rich history set in a unique landscape, lies upstream from the River Vrbas gorge, between Bugojno and Donji Vakuf. Founded in 1463, it is one of the oldest villages in the Skopaljska valley, to which Donji Vakuf, Gornji Vakuf and Bugojno also belonged. It is also known as Prusena, Biograd or Bijeli Grad, probably on account of the geology of the entire area, consisting of sedimentary carbonate rocks (limestone and dolomite). In medieval times, the kings of Bosnia often resided here, for the whole area was rich in broadleaf and coniferous forests and in indigenous game.

The German botanist Otto Sendtner was one of the first scientists whose studies of the flora of Bosnia and Herzegovina in 1849 were purely botanical. Travelling around central Bosnia and Herzegovina, he observed and recorded the distribution of black pine around Prusac; these records constitute the first floristic data on the area. Gunther Beck-Mannagetta also published important information in his *Flora Bosne i Hercegovine i Novopazarskog Sandžaka* (1903-27), in which he listed 52 species in 23 families, collected in Prusac. Studies from 1927 to 1958 (Fukarek, Stefanović et al., 1955), were based more on forestry, dendrological and phytosocial research. Further investigations proved impossible given the lack of good-quality maps of the terrain and topography of Prusac and its eponymous river. Subsequently, a phytocoenological study of the whole of ex-Yugoslavia (Stefanović, 1986) was conducted, with brief reference to Prusac.

Since no study of the flora of Prusac and its wider environs has previously been conducted, let alone published, in addition which the majority of its plant species (*Pteridophyta* and *Spermatophyta*) have not been recorded or deposited in the herbarium collection of the National Museum of Bosnia and Herzegovina (SARA), this paper should contribute to our knowledge of the biodiversity and vegetation of the area, including its endemic and threatened plant species, and provide new details of the area.

GENERAL CHARACTERISTICS OF THE AREA SURVEYED

Prusac belongs to the continental Dinaric Alps, and is located at 44° 09' N and 17° 38' E. The area studied is bounded to the north-east and east by the Vrbas canyon, and to the south and south-west by the River Poričnica and Mt. Mala Šuljaga. To the west, it is bounded by the Lom Forest Reserve, a virgin forest area.

The area may be approached from Donji Vakuf, where a road branches off along the River Prusac valley. Prusac fort and the village of Prusac lie mainly south-west/north-east along the right bank of the river, at an approximate altitude of 941 m. The valley-sides rise to 1197 m on the left bank

and to 1100 on the right. The study extended westwards (Prusac – Smrdalj – Ivica – Livopoljci – Koščani – Koščanski plateau [691-949m]), north-east and south-west upstream of the Prusac River (Prusac – Skandar – Podovi – Han Čardak – Pišala – Crveni glibovi – Ajvatovica – Šipin most – Mala and Velika Luka – foothills of Mala Šuljaga [691-1253m]), and eastwards (Prusac – Barjaci – Potkraj [691-657m]).

The weather is determined by the temperate continental climate of the central and lower reaches of the River Vrbas. Summers are warm, with average temperatures in the hottest month (July) between 20°C and 22°C (absolute summer temperature to 40°C). Winters are mainly quite cold: the average temperature of the coldest month (January) ranges from -1°C to -2°C (absolute winter temperature to -35°C). The average annual air temperature is above 10°C. Autumn and spring temperatures are the same. Average annual precipitation ranges from 700 mm to the east to up to 1500 mm to the west. The occasional light winds are mainly from the north or north-west.

The geology of the area ranges from limestone and dolomitised carbonate substrate to pure dolomites, suggesting a high degree of relict and endemic plant species. Prusac and its environs in fact lie in one of the few areas with complex dolomites in Bosnia and Herzegovina, encompassing the Koprivnica area between Bugojno, Donji Vakuf, Prusac and Kupres, including Mala Plazenica.

MATERIALS AND METHODS

The main source of information on the floristic composition (*Pteridophyta* and *Spermatophyta*) of the area studied was the findings of field work in 2008/2009 and 2013 (11 field-work outings). The studies covered three phenological aspects, but most of the material was collected on site in the spring and summer vegetation periods. Since this is a high risk area for minefields, some sites could not be included in the field work.

The material was herbarised and identified in the National Museum of Bosnia and Herzegovina by referring to the standard floristic works (Beck 1903-1927; Beck, Maly & Bjelčić 1967, 1974, 1983; Šilić 1990a, 1990b, 2002, 2005; Lakušić 1990; Lakušić & Mišić 1990; Domac 2002; Bucalo et al. 2008) and the herbarium of Bosnia and Herzegovina (SARA). The nomenclature of the taxa conforms with that of *Flora Europaea* (Tutin, I-V, 1964-1980).

Life forms are classified after Oberdorfer (1970): P, Pn (phanerophyta), Ch (chamaephyta), H (hemicriptophyta), G (geophyta), T (terophyta), W (hydrophyta), E (epiphyta) and the phytogeographic affiliation of the species in the area studied, in the systematic sequence of family, genus, species and infraspecific taxa in the list.

The conservation status of the plant taxa in line with the 1994 IUCN criteria, from which the List of Plant Species (Pteridophyta and Spermatophyta) was compiled for the Red List of Bosnia and Herzegovina by Č. Šilić (1996), has been amended and updated. In determining the conservation status of the species recorded in Prusac, this paper uses the Red List of the flora of the Federation of Bosnia and Herzegovina, vol 2 (2013), which confirms to the IUCN Red List categories version 3.1 with the following categories: EX (extinct), EW (extinct in the wild), CR (critically endangered), EN (endangered), VU (vulnerable), NT (near threatened), LC (least concern) and DD (data deficient).

RESULTS AND DISCUSSION

REGISTER OF PLANT SPECIES

In the list of plant species, the name of the taxon is preceded by its life form and followed by its phytogeographic affiliation, using the standard abbreviations.

PTERIDOPHYTA

Fam. Pteridaceae

G *Pteridium aquilinum* (L.) Kuhn - (no-) eurassubozean, circ

Fam. Aspleniaceae

H *Phyllitis scolopendrium* (L.) Newm. – subatl-smed

H *Asplenium trichomanes* L. – eurassubozean

H *Asplenium viride* Huds. – no-pralp, circ

H *Ceterach officinarum* DC. – med-smed (-subatl)

Fam. Athyriaceae

H *Athyrium filix-femina* (L.) Roth – no-euras(subozean), circ

Fam. Aspidiaceae

H *Dryopteris filix-mas* (L.) Schott. – eurassubozean (-smed), circ

H *Poystichum aculeatum* (L.) Roth – no-euras(subozean), circ

Fam. Polypodiaceae

Ch *Polypodium vulgare* L. – eurassubozen-smed, circ

SPERMATOPHYTA

Fam. Pinaceae

P *Abies alba* Mill – pralp (-smed)

P *Picea abies* (L.) Karsten ssp. *abies* – nokont (-pralp)

P *Pinus nigra* Arnold – SO-Europas

P *Pinus silvestris* L. – no-euraskont (-smed)

Fam. Cupressaceae

P *Juniperus communis* L. – no-euras (-smed), circ

Fam. Typhaceae

W *Typha latifolia* L. – euras, circ

Fam. Lemnaceae

W *Lemna minor* L. – (no-)euras-med

Fam. Liliaceae

H *Veratrum album* L. – pralp

G *Colchicum autumnale* L. – subatl-smed

H *Anthericum ramosum* L. – gemaßkont (-smed)

G *Allium ursinum* L. – subatl (-smed)

G *Allium montanum* Schmidt. – kont

G *Lilium martagon* L. – euras(kont) (-smed)

G *Chouardia litardierei* (Breistr.) Speta

(Syn. *Scilla litardierei* Breistr.) – med

G *Polygonatum multiflorum* (L.) All. – eurassubozean (-smed)

G *Polygonatum odoratum* (Mill.) Druce – euras (kont)

G *Polygonatum verticillatum* (L.) All. – pralp (-nosubatl)

G *Convallaria majalis* L. – eurassubozean (-no)

G *Paris quadrifolia* L. – euras(subozean), circ

G *Erythronium dens-canis* L.

Fam. Amaryllidaceae

G *Galanthus nivalis* L. – smed (gemaßkont)

Fam. Iridaceae

G *Crocus neapolitanus* (Ker.-Gawl.) Mord. et Lois. – opralp (-smed)

Fam. Juncaceae

H *Juncus effusus* L. – euras (subozean), circ

H *Luzula sylvatica* (Huds.) Gaud. ssp. *sylvatica* – subatl (-smed)

Fam. Cyperaceae

H *Carex verna* Chaix (Syn. *C. caryophyllea* Latour.) – eurassubozean-smed (circ)

H *Carex sylvatica* Huds. – subatl-smed

Fam. Poaceae (Gramineae)

H *Bromus erectus* Huds. – smed

H *Festuca amethystina* L. ssp. *amethystina* – opralp (-gemaßkont)

H,Ch *Brachypodium pinnatum* (L.) P.B. – euras (kont)

H *Brachypodium sylvaticum* (Huds.) P.B. – euras(subozean)-smed

H *Poa alpina* L. – alp-arkt(subozean), circ

H *Poa nemoralis* L. – no-euras (circ)

H *Dactylis glomerata* L. – eurassubozean-smed

H *Sesleria autumnalis* (Scop.) Schultz – balc

H *Lolium perenne* L. – subatl-smed

Fam. Orchidaceae

G *Cephalathera rubra* (L.) Rich.

(Syn. *Epipactis rubra* (L.) Schmidt.) – smed-gemaßkont

G *Neottia cordata* (L.) Rich.

(Syn. *Listera cordata* (L.) R.Br.) – nosubozean-pralp, circ

G *Neottia nidus-avis* (L.) Rich – euras(subozean)-smed

G *Orchis morio* L.

Syn. *Anacamptis morio* (L.) R.M. Bateman) – smed(subatl)

G *Dactylorhiza sambucina* (L.) Soo

(Syn. *Orchis sambucina* L.) – smed-pralp

G *Dactylorhiza maculata* (L.) Soo ssp. *maculata*

(Syn. *Orchis maculata* L.) – no-eurassubozean

Fam. Salicaceae

P *Populus tremula* E.H.L.Krause – no-euras

P *Salix caprea* L. – no-euras

Fam. JuglandaceaeP *Juglans regia* L. – osmed(-euras)**Fam. Betulaceae**P *Ostrya carpinifolia* Scop. - osmed**Fam. Corylaceae**P *Corylus avellana* L.- subatl(-smed)**Fam. Fagaceae**P *Fagus sylvatica* L. – subatl(-smed)P *Quercus petraea* (Matt.) Liebl. – subatl-smed**Fam. Ulmaceae**P *Ulmus glabra* Huds.(Syn. *U. montana* With.) – eurassubozean(-smed)**Fam. Urticaceae**H *Urtica dioica* L. – no-euras**Fam. Loranthaceae**E (Pn) *Viscum album* L. – eurassubozean-smed**Fam. Aristolochiaceae**H, G *Asarum europaeum* L. - euraskont**Fam. Polygonaceae**H *Polygonum viviparum* L. – arkt-alp, circ**Fam. Caryophyllaceae**H(Ch) *Silene vulgaris* (Moench) Garcke(Syn. *S. cucubalus* Wibel) – no-euras-smedCh *Tunica saxifraga* (L.) Scop.(Syn. *Petrorhagia saxifraga* (L.) Link) – (o)smedCh *Dianthus sanguineus* Vis.(Syn. *D. carthusianorum* L.) – smedCh *Dianthus sylvestris* Wulf. (Syn. *D. boissieri* Wilk.) – opralp(-smed)Ch *Stellaria holostea* L. – eurassubozean(-smed)H *Stellaria graminea* L. – no-eurassubozenT(H) *Minuartia fastigiata* (Sm.) Rchb. - smedT *Arenaria serpyllifolia* L. ssp. *serpyllifolia* – euras-smed, circH *Moehringia muscosa* L. – pralpT(H) *Moehringia trinervia* (L.) Clairv. – euras(subozean)-smed**Fam. Ranunculaceae**H *Caltha palustris* L. – (arct-) no-euras, circG (H) *Helleborus odoratus* W.K. - balcG *Actea spicata* L. (Syn. *A. nigra* Gaert.) - eurassubozeanH *Aquilegia vulgaris* L. – genaßkont-smedH *Aconitium lycoctonum* L. ssp. *vulparia* (Reichb.) Nyman - pralpH *Clematis recta* L. – genaßkont (-smed)P *Clematis vitalba* L. – smed-subatl, circG *Anemone nemorosa* L. – eurassubozean-subatlH *Hepatica nobilis* Mill. – genaßkont (-smed)G (H) *Ficaria verna* Huds. (Syn. *Ranunculus ficaria* L.) – eurassubozean-smedH *Ranunculus acris* L. (Syn. *R. acer* L.) – no-eurassubozeanH *Ranunculus lanuginosus* L – genaßkont-osmedH *Ranunculus repens* L. – no-euras-smedH *Thalictrum aquilegifolium* L. – genaßkont (-pralp)**Fam. Berberidaceae**G *Epimedium alpinum* L. - opralp**Fam. Papaveraceae**H *Chelidonium majus* L. – euras(subozean)**Fam. Brassicaceae (Cruciferae)**H *Biscutella laevigata* L. – opralp-alp(-smed)T,H *Capsella bursa-pastoris* (L.) Med. – med(-kont)T(H) *Erophila verna* (L.) Bess. – euras-medG *Cardamine enneaphylos* (L.) Cr. - opralpT(H) *Cardamine impatiens* L. – euras(kont)G *Dentaria bulbifera* L. – genaßkont-osmed(-pralp)H(T) *Arabis hirsuta* (L.) Scop. – euras-smed, circH *Alliaria officinalis* Andr. – eurassubozean-smed**Fam. Resedaceae**H *Reseda lutea* L. – smed-med**Fam. Crassulaceae**Ch *Sedum acre* L. (Syn. *S. neglectum* Ten.) – (no-)eurassubozean(-smed)Ch *Sedum ochroleucum* Chaix (Syn. *S. anopetalum* DC.)**Fam. Saxifragaceae**H *Saxifraga rotundifolia* L. - pralpH *Chrysosplenium alternifolium* L. – (no-)euras(kont)**Fam. Grossulariaceae**P *Ribes alpinum* L. (Syn. *R. lucidum* Kit.) – pralp(-genaßkont)**Fam. Rosaceae**H *Aruncus dioicus* (Walt.) Fernald - pralpP *Pyrus pyraeaster* Burgsd. – smed(-genaßkont)P *Malus sylvestris* (L.) Mill. – euras(-smed)P *Sorbus aucuparia* L. ssp. *aucuparia* – no-eurassubozeanP *Sorbus aria* (L.) Crantz. ssp. *aria* – smed(-pralp)P *Crataegus monogyna* Jacqu. – smed(-subatl)P *Rubus idaeus* L. – euras-noP *Rubus discolor* Weihe&Nees – smed-subatlP *Rubus hirtus* W.K. – pralp-smedH *Potentilla micrantha* Ram. - smedH *Potentilla recta* L. var. *obscura* Willd. – omed-kontH *Fragaria vesca* L. – no-eueas(subozean)H *Geum rivale* L. – no-eurassubozean, circH *Geum urbanum* L. – eurassubozean-smedH *Agrimonia agrimonoides* (L.) DC. ssp. *agrimonioides* - osmedH *Agrimonia eupatoria* L. ssp. *eupatoria* – eurassubozean-smedH *Sanguisorba minor* Scop. - smedH *Sanguisorba muricata* Greml. – med(-kont)H *Alchemilla vulgaris* L. – no(-euras)-pralpH *Filipendula ulmaria* (L.) Maxim. (Syn. *Spiraea ulmaria* L.) – no-eurasP *Rosa arvensis* Huds. – subatl-smedP *Rosa canina* L. smed-subatlP(G) *Rosa spinosissima* L. (Syn. *R. pimpinellifolia* L.) – euras-kont-smedP *Rosa pendulina* L.- pralpP *Prunus spinosa* L. – eurassubozean-smedP *Prunus avium* L. – subatl-smed**Fam. Fabaceae (Papilionaceae, Leguminosae)**P *Chamaecytisus hirsutus* (L.) Link(Syn. *Cytisus hirsutus* L.) - osmedH *Chamaespartium sagittale* (L.) P.Gibbs.(Syn. *Genista sagittalis* L.) – subatl-smed(-pralp)

- H (Ch) *Trifolium repens* L. – eurassubozean-smed
 H *Trifolium pratense* L. – eurassubozean(-smed)
 H *Trifolium ochroleucum* Huds. – smed-subatl
 H *Anthyllus vulneraria* L. – smed-subatl
 H *Anthyllus vulgaris* (Koch) Kern
 H *Lotus uliginosus* Schk. – subatl(-wsmed)
 Ch *Dorycnium germanicum* (Gr.) Ron – omed-smed
 H *Coronilla varia* L. – gemäßkont-osmed
 H *Vicia cracca* L. – no-euras
 H *Vicia oroboides* Wulfen – balc
 H *Lathyrus pratensis* L. – euras(subozean)-smed
 G(H) *Lathyrus vernus* (L.) Bernh. – gemäßkont

Fam. Oxalidaceae

- H(G) *Oxalis acetosella* L. – no-euras, circ

Fam. Geraniaceae

- H *Geranium phaeum* L. – (o)pralp
 H(T) *Geranium robertianum* L. – eurassubozean-smed
 H *Geranium sanguineum* L. – gemäßkont-smed

Fam. Euphorbiaceae

- G(H) *Mercurialis perennis* L. – subatl-smed
 T *Euphorbia amygdaloides* L. ssp. *amygdaloides* – smed-gemäßkont
 H *Euphorbia dulcis* L. – gemäßkont-osmed
 H *Euphorbia cyparissias* – smed-(euras)

Fam. Polygalaceae

- H *Polygala comosa* Schk. – euraskont-smed

Fam. Anacardiaceae

- P *Cotinus coggygria* Scop. – osmed

Fam. Aceraceae

- P *Acer obtusatum* Kit. – balc
 P *Acer pseudoplatanus* L. – subatl-smed(-pralp)
 P *Acer campestre* L. – smed-subatl

Fam. Celastraceae

- P *Evonymus latifolius* (L.) Mill. – pralp(-smed)
 P *Evonymus verrucosa* Scop. – s.e.eur

Fam. Rhamnaceae

- P *Rhamnus fallax* Boiss.
 (Syn. *Rh. alpinus* L. ssp. *fallax* (Boiss.) Vent. – balc

Fam. Tiliaceae

- P *Tilia cordata* Mill. – gemäßkont
 P *Tilia platyphyllos* Scop. – subatl-smed

Fam. Thymelaeaceae

- P *Daphne laureola* L. – smed-atl
 P *Daphne mezereum* L. – euras(kont)

Fam. Hypericaceae (Guttiferae)

- H *Hypericum maculatum* Crantz.
 (Syn. *H. quadrangulum* auct., non L.) – no-eurassubozean
 H *Hypericum perforatum* L.
 (Syn. *H. noeianum* Boiss.) – eurassubozean-smed

Fam. Cistaceae

- Ch *Helianthemum canum* (L.) Baumg. – smed
 Ch *Helianthemum nummularium* (L.) Mill.
 (Syn. *H. chamaecistus* Mill.) – smed

Fam. Violaceae

- H *Viola odorata* L. – med-smed
 H *Viola reichenbachiana* Jord. (Syn. *V. sylvatica* Fries) – subatl-smed
 H *Viola rupestris* Schm. – no-euras(kont), circ
 T *Viola tricolor* L. – no-pralp

Fam. Onagraceae (Oenotheraceae)

- H(Ch) *Epilobium montanum* L. – (no-)eurassubozean
 H *Chamaenerion angustifolium* (L.) Scop. – no-euras(subozean), circ
 G *Circaea lutetiana* L. – eurassubozean(-smed), circ

Fam. Araliaceae

- Ch,P *Hedera helix* L. – subatl-smed

Fam. Apiaceae (Umbelliferae)

- H *Sanicula europaea* L. – subatl(-smed)
 H *Chaerophyllum cicutaria* Vill. (Ch. *hirsutum* L.) – pralp(-smed)
 T *Smyrnium perfoliatum* L. – osmed
 H *Bupleurum longifolium* L. – euraskont(-pralp)
 H *Pimpinella saxifraga* L. – (no)eurassubozean-smed
 H(G) *Aegopodium podagraria* L. – euras(kont)
 H *Sium erectum* Huds. – euras-smed, circ
 H *Angelica sylvestris* L. – euras
 H *Peucedanum oreoselinum* (L.) Mch. – gemäßkont-smed(-med)
 H *Heracleum sphondylium* L. – subatl
 H *Laserpitium marginatum* W.K. (Syn. *L. krapfii* Crantz. ssp. *krapfii*)

Fam. Cornaceae

- P *Cornus mas* L. – osmed

Fam. Ericaceae

- Ch *Erica herbacea* L. (Syn. *E. carnea* L.) – opralp

Fam. Primulaceae

- H *Primula veris* L. ssp. *columnae* (Ten.) Ludi
 (Syn. *P. suaveolens* Bertol.) – (o)smed
 H *Primula vulgaris* Huds. (Syn. *P. acaulis* (L.) Hill) – smed-atl
 G *Cyclamen purpurascens* Mill.
 (Syn. *C. europaeum* L. auct.) – opralp
 H *Lysimachia punctata* L. – gemäßkont-osmed
 Ch *Lysimachia nummularia* L. – eurassubozean-smed(subatl-smed)

Fam. Oleaceae

- P *Fraxinus excelsior* L. – subatl-smed
 P *Ligustrum vulgare* L. – smed

Fam. Gentianaceae

- T *Centaurium erythraea* Rafn.
 (Syn. *C. umbellatum* Gilib.; *C. minus* Moench) – smed-subatl(circ)
 H *Gentiana asclepiadea* L. – opralp
 H *Gentiana cruciata* L. – euraskont(-smed)
 H *Gentiana ciliata* (L.) Borkh. – (opralp)smed

Fam. Rubiaceae

- G *Asperula odorata* L.
 (Syn. *Galium odoratum* (L.) Scop.) – eurassubozean-smed
 T *Galium aparine* L. – euras(subozean)
 H *Galium cruciata* (L.) Scop.

- (Syn. *G. laevipes* Opiz) – smed-eurassubozean
 G *Galium sylvaticum* L. - gemäßkont(-smed)
 H *Galium verum* L. – euras-smed

Fam. Boraginaceae

- Ch(H) *Buglossoides purpureoacerulea* (L.) M. John.
 (Syn. *Lithospermum purpureoaceruleum* L.) - smed
 H *Myosotis silvatica* (Ehrh.) Hoffm. – pralp-no
 H *Echium vulgare* L. – euras-smed
 H *Anchusa officinalis* L. - gemäßkont
 H *Pulmonaria officinalis* L. – gemäßkont(-osmed)
 H *Symphytum officinale* L. – euras-smed
 G *Symphytum tuberosum* ssp. *nodosum* (Schur) Soo – gemäßkont-smed

Fam. Verbenaceae

- H(T) *Verbena officinalis* L. – eurassubozean-smed

Fam. Lamiaceae (Labiatae)

- H *Ajuga reptans* L. – subatl-smed
 Ch *Teucrium chamaedrys* L. – smed-med
 H(Ch) *Nepeta pannonica* L. – osmed-kont
 H(G) *Glechoma hederacea* L. – euras(subozean)
 H(G) *Glechoma hirsuta* W.K. – SO-Europa
 H *Prunella vulgaris* L. – no-euras
 H *Prunella laciniata* L. - smed
 H *Melittis melissophyllum* L. - smed
 T *Galeopsis angustifolia* (Ehrh.) Hoff. – smed-pralp
 T *Galeopsis bifida* Boen. – no-euras(subozean)
 H *Lamium maculatum* L. – euras(kont)-smed
 T,H *Lamium purpureum* L. – (no-)euras-smed
 Ch *Lamium galeobdolon* (L.) Nath.
 (Syn. *Lamiastrum galeobdolon* (L.) Ehrend. et Polatsch.) – subatl-smed
 Ch *Ballota nigra* L. – med-smed
 H *Stachys officinalis* (L.) Trev.
 (Syn. *Betonica officinalis* L.) – eurassubozean-smed
 H *Stachys recta* L. (aggr.) – smed(-gemäßkont)
 H *Salvia glutinosa* L. - pralp
 H *Melissa officinalis* L. - osmed
 H *Calamintha officinalis* Moench – smed(-subatl)
 H *Calamintha sylvatica* Bromf. ssp. *sylvatica* – smed(-subatl)
 H *Clinopodium vulgare* L.
 (Syn. *Calamintha clinopodium* Benth.) – euras-smed
 H,Ch *Origanum vulgare* L. – euras-smed
 Ch *Thymus serpyllum* L. - euraskont
 H *Mentha arvensis* L. – no-euras(subozean)
 H *Mentha longifolia* (L.) Huds. – smed-euras
 H(W) *Mentha aquatica* L. – euras-smed(-med)
 H *Mentha pulegium* L. – med-smed-eurassubozean

Fam. Solanaceae

- H *Atropa belladonna* L. – subatl-smed

Fam. Scrophulariaceae

- H *Verbascum nigrum* L. - eurassubozean
 Ch *Veronica chamaedrys* L. – no-eurassubozean-smed
 Ch *Veronica officinalis* L. – no-eurassubozean
 Ch,H *Veronica urticifolia* Jacqu. - pralp
 Ch *Veronica montana* L. – subatl-smed
 T *Veronica hederifolia* L. – eurassubozean-smed
 W,H *Veronica beccabunga* L. – euras-smed-med

- H *Digitalis grandiflora* Mill. (Syn. *D. ambigua* Murray) - gemäßkont
 T *Melampyrum nemorosum* L. ssp. *nemosum* – gemäßkont(-smed)
 T *Melampyrum sylvaticum* L. ssp. *sylvaticum* – no-pralp
 T *Euphrasia rostkoviana* Hayne - subatl
 T *Rhinanthus minor* L. – no-eurassubozean, circ
 T *Rhinanthus rumelicus* Velen.
 var. *anceps* (Behr.) Bjelčić et Mayer – osmed(-europkont)
 H *Pedicularis brachyodonta* Schloss. et Vuk.

Fam. Orobanchaceae

- G *Orobanche caryophyllacea* Sm. (Syn. *O. vulgaris* Poir) – smed-euras
 G *Orobanche teucris* Holandre - smed

Fam. Globulariaceae

- H *Globularia punctata* Lap.
 (Syn. *G. willkommii* Nyman) – smed(-med)

Fam. Plantaginaceae

- H *Plantago lanceolata* L. - eurassubozean
 H *Plantago maior* L. ssp. *major* – no-eurassubozean
 H *Plantago media* L. – euras(kont)-smed
 Fam. Caprifoliaceae
 P *Viburnum lantana* L. - smed
 P *Lonicera alpigena* L. ssp. *alpigena* - pralp
 P *Lonicera caprifolium* L. - osmed
 P *Lonicera nigra* L - pralp

Fam. Sambucaceae

- P *Sambucus racemosa* L. – (no-)euras-smed
 H *Sambucus ebulus* L. – smed(-subatl)
 P S. *nigra* L. – subatl-smed

Fam. Valerianaceae

- H *Valeriana officinalis* L. ssp. *officinalis* – (no)euraskont(-smed)
 H *Valeriana montana* L. – alp-pralp

Fam. Dipsacaceae

- H *Dipsacus sylvestris* Huds. – smed-med
 H *Succisa pratensis* Mch. – eurassubozean-smed
 H *Knautia arvensis* (L.) Coult. – (no-)eurassubozean
 Ch *Scabiosa leucophylla* Borb. – balc

Fam. Campanulaceae

- H *Campanula persicifolia* L. – euraskont-smed
 H *Campanula rapunculoides* L. – gemäßkont-smed
 H *Campanula trachelium* L. – eurassubozean-smed
 H *Campanula patula* L. – euras(kont)(-smed)

Fam. Asteraceae (Compositae)

- H *Eupatorium cannabinum* L. ssp. *cannabinum* – eurassubozean-smed
 H *Solidago virga-aurea* L. ssp. *virga-aurea* – no-euras, circ
 H *Bellis perennis* L. – subatl-smed
 H *Erigeron annuus* (L.) Less. – N-Am.
 H *Gnaphalium sylvaticum* L. – no-euras(subozean), circ
 (Syn. *Omalotheca sylvatica* (L.) Schultz et F. W. Schultz)
 G,H *Inula salicina* L. – euraskont(-smed)
 H *Buphtalmum salicifolium* L. – pralp(-smed)
 H *Telekia speciosa* (Schreb.) Baumg. – opralp
 H(Ch) *Achillea millefolium* L. – no-eurassubozean

- H *Leucanthemum vulgare* Lam.
(Syn. *Chrysanthemum leucanthemum* L.) - smed-subatl
- H *Tanacetum macrophyllum* (Wild.) Scultz et Bip.
(Syn. *Chrysanthemum macrophyllum* W.K.) - opralp
- Ch(H) *Artemisia absinthium* L. - euraskont(-smed)
- H *Adenostyles alliariae* Kern. - alp-pralp
- G(H) *Tussilago farfara* L. - no-euras-smed
- G *Petasites albus* (L.) Gaertn. - pralp(-smed-subatl)
- H *Doronicum austriacum* L. - pralp
- H *Doronicum columnae* Ten.
(Syn. *D. cordatum* (Wulf.) C.H.Schultz non Lam.) - opralp
- H *Senecio nemorensis* L. ssp. *fuchsii* (Gmel.) Čelak
(Syn. *Senecio fuchsii* Gmel.) - subatl-smed(pralp)
- H *Arctium tomentosum* Mill. - euraskont
- H *Carduus carduelis* (L.) Kern.
- G *Cirsium arvense* (L.) Scop. - no-euras-smed
- H *Centaurea jacea* L. - euras-smed
- H *Centaurea triumfetii* All. - smed-pralp
- H *Cichorium intybus* L. - eurassubozean-smed
- T(H) *Lapsana communis* L. - eurassubozean-smed
- H *Aposeris foetida* (L.) Less. - (o)pralp
- H *Leontodon incanus* (L.) Schr. - pralp
- H *Taraxacum officinale* Web. - no-euras(subozean)
- H *Cicerbita alpina* (L.) Wallr.
(Syn. *Mulgedium alpinum* (L.) Less.) - pralp-no(subozean)
- H *Mycelis muralis* (L.) Dum.
(Syn. *Lactuca muralis* (L.) Gaertn. - subatl-smed)
- H *Crepis biennis* L. - gamaßkont
- H *Prenanthes purpurea* L. - pralp(smed)
- H *Hieracium sylvaticum* (L.) Grubb.
(Syn. *H. murorum* L.) - no-eurassubozean
- H *Hieracium villosum* Jacqu. ssp. *villosum* - alp

Table 1 provides an overview of the number of families, genera, species and infraspecific taxa in Prusac and its environs, showing:

- the total number of registered families (73), genera (224), species (310), subspecies (26 and varieties (2)
- pteridophytes are represented by 5 families, 8 genera and 9 species
- spermatophytes are represented by 68 families, 216 genera, 301 species, 23 subspecies and 2 varieties.

These are preliminary results, and further studies will doubtless yield results that will enhance our knowledge of the floristic biodiversity of the area.

Table 1. Diversity of Pteridophyta and Spermatophyta in and around Prusac

	family	genus	species	subspecies	variety
Pteridophyta	5	8	9	-	-
Spermatophyta	68	216	301	23	2
Total	73	224	310	23	2

Table 2 provides an overview of certain life forms expressed as a percentage (%), representing a spectrum of life forms of indicative value relating to basic climatic characteristics and an evaluation of the state and quality of the living environment of the area studied.

Generally speaking, the high percentage of hemicryptophytes (171 species, 55.16%) and geophytes (40 species, 12.9%) indicates favourable edaphic and habitat conditions. The significant proportion of geophytes (12.9%) also reflects the good degree of preservation of the forest ecosystem and adequate humidity of the habitats. The low percentage of therophytes (21 species, 6.77%) and greater percentage of hemicryptophytes (55.16%) suggest negative changes to the heat regime of the area. The percentage of phanerophytes (50 species, 16.13%) and hamephytes (24 species, 7.74%) in the life form spectrum of the flora of Prusac and its environs is significant higher than the proportion that, according to Walter (1960), corresponds to the average climatic conditions in the moderate zone (phanerophytes 8% and hamephytes 6.5%).

Table 2. Spectrum of life forms

Life form	N	%
P	49	
P(G)	1	16,13
Ch	20	
Ch,P	1	
Ch,H	1	7,74
Ch(H)	2	
H	155	
H,Ch	2	
H(Ch)	5	
H,G	1	55,16
H(G)	4	
H(W)	1	
H(T)	3	
G	34	
G,H	1	12,9
G(H)	5	
T	14	
T,H	2	6,77
T(H)	5	
E(Pn)	1	0,32
W	2	0,96
W,H	1	
Total:	310	100

The results of the analysis of floral-geographical elements reveals 117 floral elements falling into 14 groups. Table 3 shows that the highest proportion of floral elements are of the sub-Mediterranean group (58 species, 18.71%), followed by those of boreal (40 species, 15.81%), central European (43 species, 13.87%), and subalpine (43 species, 13.87%), Euroasian (32 species, 10.32%), and subatlantic (30 species, 9.68%) distribution.

Table 3. Spectrum of floral-geographical elements in and around Prusac

	Plant life forms	N	%
1	balc	6	1,94
2	pralp pralp-no pralp-smed pralp(-smed) pralp(-smed-subatl) pralp(-nosubatl) pralp(gemaßkont) pralp-no(subozean) (o)pralp no-pralp no-pralp,circ opralp opralp(-smed) (opralp)smed opralp(gemaßkont) opralp-alp(-smed)	14 1 1 5 1 1 1 1 2 2 1 8 2 1 1 1	13,87
3	alp alp-pralp alp-arkt(subozean),circ	1 2 1	1,29
4	arct-alp,circ	1	0,32
5	smed smed-gemaßkont smed(gemaßkont) smed(-gemaßkont) smed-atl smed-subatl smed(subatl) smed(-subatl) smed-subatl(circ) smed-pralp smed(-pralp) smed-euras smed(-euras) smed-eurassubozean smed-med smed(-med) osmed (o)smed osmed(-euras) osmed(-europkont) osmed-kont	13 2 1 2 2 7 1 4 1 1 3 1 2 1 1 3 1 8 2 1 1 1 1 1	18,71
6	med med-smed med-smed-eurassubozan med-smed(-subatl) med(-kont) omed-kont omed-smed	1 2 1 1 2 1 1	2,9
7	subatl subatl-smed subatl(-smed) subatl-smed(-pralp) subatl(-wsmed)	2 19 5 2 1	9,68

8	euras euras,circ euraskont euraskont-smed euraskont(-smed) euraskont(-pralp) euras(kont) euras(kont)(-smed) euras(kont)-smed euras-no euras-smed euras-smed,circ euras-smed-med euras-smed(-med) euras(-smed) euras-med	1 1 3 3 3 1 5 2 2 1 3 3 1 1 1 1	10,32
9	no-euras no-euras,circ no-euras(circ) no-euras-smed no-euras(-smed),circ no-euras(kont),circ no-euraskont(-smed) no-eurassubozean no-eurassubozean,circ no-euras(subozean) no-euras(subozean),circ no(euras)-pralp no-eurassubozean-smed	6 3 1 4 1 1 1 9 2 4 4 1 1	15,81
9	nosubozean-pralp,circ (no-)euras-med (no-)euras-smed (no-)euras(kont) (no)euraskont(-smed) (no-)eurassubozean (no-)eurassubozean,circ (no-)eurassubozean-smed (no-)eurassubozean(-smed)	1 1 2 1 1 2 1 1 1	
10	eurassubozean eurassubozean-smed eurassubozean-smed,circ eurassubozean-smed(circ) eurassubozean(-smed) eurassubozean(-smed),circ eurassubozean-smed(subatl-smed) eurassubozean(-no) eurassubozean-subatl euras(subozean) euras(subozean),circ euras(subozean)-smed	4 19 1 1 4 2 1 1 1 3 2 4	13,87
11	gemaßkont gemaßkont-smed gemaßkont(-smed) gemaßkont-smed(-med) gemaßkont-osmed gemaßkont(-osmed) gemaßkont-osmed(-pralp) gemaßkont(-pralp)	5 5 5 1 3 1 1 1	7,42
12	kont nokont(-pralp)	1 1	0,65

13	SO-Europas s.e.eur	2 1	0,97
14	N-Am.	1	0,32
15	undetermined	6	1,94
	Total:	310	100

As regards the conservation status of the plants in line with IUCN principles, 21 species were registered during the study. The conservation status categories have been amended and improved over time, so that the original six (Šilić, 1996) have been increased to nine (2013), as shown in the comparative analysis of the recorded species in table 4.

Chouardia litardierei (Breistr.) Speta and *Scabiosa leucophylla* Borb. have, in addition to their conservation status, been registered as endemic species.

Table 4. IUCN conservation status

Species	Category according to Šilić (1996, 2002)	Category according to the Red List of flora of the Federation of Bosnia and Herzegovina (2013)
<i>Lilium martagon</i> L.	V	LC
<i>Chouardia litardierei</i> (Breistr.) Speta	V	VU
<i>Convallaria majalis</i> L.	V	NT
<i>Erythronium dens-canis</i> L.	V	LC
<i>Galanthus nivalis</i> L.	V	LC
<i>Crocus neapolitanus</i> (Ker.-Gawl.) Mord. et Lois.	R	-
<i>Cephalathera rubra</i> (L.) Rich.	R	VU
<i>Neottia cordata</i> (L.) Rich.	V	DD
<i>Dactylorhiza maculata</i> (L.) Soo ssp. <i>maculata</i>	V	VU
<i>Dianthus sanguineus</i> Vis.	V	LC
<i>Hepatica nobilis</i> Mill.	V	VU
<i>Vicia oroboides</i> Wulfen	R	LC
<i>Daphne laureola</i> L.	R	EN
<i>Daphne mezereum</i> L.	R	-
<i>Cyclamen purpurascens</i> Mill.	V	LC
<i>Gentianella ciliata</i> (L.) Borkh.	R	DD
<i>Stachys recta</i> L. (aggr.)	-	CR
<i>Pedicularis brachyodonta</i> Schloss. et Vuk.	V	VU
<i>Scabiosa leucophylla</i> Borb.	R	LC
<i>Telekia speciosa</i> (Schreb.) Baumg.	V	VU
<i>Doronicum austriacum</i> L.	R	-
Total: 21	20	18

CONCLUSIONS:

Field work on the carbonate-dolomite area of Prusac has yielded new data on the composition and characteristics of the flora of the area studied. The standard works and the herbarium collection of the National Museum of Bosnia and Herzegovina (SARA) were consulted. The findings are as follows:

- totals registered of families (73), genera (224), species (310), subspecies (26 and varieties (2)
- pteridophytes are represented by 5 families, 8 genera and 9 species
- spermatophytes are represented by 68 families, 216 genera, 301 species, 23 subspecies and 2 varieties
- a high percentage of hemicryptophytes was identified (171 species, 55.16%) in the spectrum of life forms, indicating extremely favourable edaphic and habitat conditions, followed by phanerophytes (50 species, 16.13%), geophytes (40 species, 12.9%), hamephytes (24 species, 7.74%), therophytes (21 species, 6.77%), hydrophytes (3 species, 0.96%), and epiphytes (1 species, 0.32%). The correlative ratios of life forms implies a high degree of preservation of the forest ecosystem, satisfactory humidity of habitats, but a deteriorating heat regime in this altitudinal zone;
- the greatest proportion in the spectrum of the area consists of sub-Mediterranean, boreal, central European and subalpine species in roughly equal proportions, followed by the Euroasian group of floral elements, with other species in smaller proportions;
- based on the criteria of the International Union for the Conservation of Nature, 6.77% (21 taxa) of the plant species identified are endangered. According to Šilić (1996, 2002), 12 taxa fall into the categories of endangered or vulnerable (V) and 8 species are rare or potentially endangered (R). The Red List of the flora of the Federation of Bosnia and Herzegovina (2013) formally recognizes 18 plant species from Prusac and its environs with conservation status **CR** (critically endangered) – 1 species, **EN** (endangered) – 1 species, **VU** (vulnerable) – 6 taxa, **NT** (near threatened) – 1 species, **LC** (least concern) – 7 species and **DD** (data deficient) – 2 taxa;
- the flora of Prusac and environs includes two endemic species, *Chouardia litardierei* (Breistr.) Speta and *Scabiosa leucophylla* Borb..

BIBLIOGRAPHY

- Beck, G. 1903-1927. Flora Bosne i Hercegovine i Novopazarskog sandžaka, 1-3, Sarajevo, Beograd.
- Beck, G., Maly, K. & Bjelčić, Ž. 1967. Flora Bosne i Hercegovine, Sympetalae 2: 1-110, Sarajevo.
- Beck, G., Maly, K. & Bjelčić, Ž. 1974. Flora Bosne i Hercegovine, Sympetalae 3: 1-83, Sarajevo.
- Beck, G., Maly, K. & Bjelčić, Ž. 1983. Flora Bosne i Hercegovine, Sympetalae 4: 1-188, Sarajevo.
- Bucalo V. Bruić J., Travar J., Milanović Đ. 2008. Flora prašumskog rezervata Lom. Banja Luka.
- Domac, R. 2002. Flora Hrvatske. Školska knjiga. II. izdanje. 22-504. Zagreb.
- Fukarek, P. 1957. Radovi na istraživanju i kartiranju šumske vegetacije Bosne i Hercegovine. „Narodni šumar“, Časopis za šumarstvo i drvnu industriju, Posebni otisak – Separatum, sv. 10-12 : 359-379. Sarajevo.
- Fukarek, P. 1958. Prilog poznavanju crnog bora (*Pinus nigra* Arn.). Posebni otisak iz radova Poljoprivredno-šumarskog fakulteta, god. III. br. 3: 63-67. Sarajevo.
- Lakušić, R. 1990. Planinske biljke. III. izdanje: 9-203. Sarajevo, Beograd.
- Mišić, Lj., Lakušić R. 1990. Livadske biljke. I. izdanje: 7-266. Sarajevo, Beograd.
- Oberdorfer E. 1970. Pflanzensoziologische Exursionsflora für Süd-deutschland. Eugen Ulmer, Stuttgart.
- Redžić S., Barudanović S., Radević M., eds. 2008. Bosna i Hercegovina - zemlja bioraznolikosti. Izvješće Bosne i Hercegovine za Konvenciju o biološkoj raznolikosti. Federalno ministarstvo okoliša i turizma.
- Stefanović, V. 1956. Zajednica bijelog bora (*Pinetum silvestris dinaricum* prov.) i neke njene karakteristike na području zapadne Bosne. Posebni otisak iz radova Poljoprivredno-šumarskog fakulteta, god. III. br.3: 201-218. Sarajevo.
- Stefanović, V. 1958. Areal prirodnog rasprostranjenja bijelog bora (*Pinus silvestris* L.) u NR Bosni i Hercegovini. Posebni otisak iz radova Poljoprivredno-šumarskog fakulteta, god. III. Br. 3: 157-195. Sarajevo.
- Stefanović, V. 1986. Fitocenologija sa pregledom šumskih fitocenoza Jugoslavije. II. prošireno i dopunjeno izdanje. 105-269. Sarajevo.
- Tutin, T.G., Heywood, V.H., Burges, N.A., Moor, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. 1964-1980. Flora Europaea. Vol. 1-5. Cambridge.
- Šilić, Č. 1990a. Šumske zeljaste biljke. IV. izdanje: 9-256. Sarajevo, Beograd.
- Šilić, Č. 1990b. Endemične biljke. III izdanje: 9-226. Sarajevo, Beograd.
- Šilić, Č. 1996. Spisak biljnih vrsta (*Pteridophyta* i *Spermatophyta*) za „Crvenu knjigu“ Bosne i Hercegovine. GZMBiH, PN, n. s., sv. 31: 323-367.
- Šilić, Č. 2002. Endemične i rijetke biljke Parka prirode Blidinje. I izdanje: 9-275. Čitluk.
- Šilić, Č. 2005. Atlas dendroflora (drveće i grmlje) Bosne i Hercegovine. I. Izdanje: 13-543. Čitluk.
- Crvena lista flore Federacije Bosne i Hercegovine (2013), www.fmoit.gov.ba

SAŽETAK

U radu su prezentirani rezultati florističkih istraživanja u centralnoj Bosni gdje su ostala skromno ili potpuno neispitana manja područja poput starog mjesta Prusca. Taksonomskom analizom je potvrđen visok nivo biodiverziteta (73 porodice, 224 roda, 310 vrsta, 23 podvrste i 2 forme) kojem osobitost daju registrirane endemične i vrste različitog statusa ugroženosti. U areal spektru najveće učešće ostvaruju vrste submediteranske skupine flornih elemenata, a od životnih formi hemikriptofita.

Ključne riječi: centralna Bosna, taksonomija, flora, popis, Pteridophyta, Spermatophyta, ugrožene vrste, endemi, florni element, životna forma.