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Dedicated to Prof. dr. LJUDEVIT ILIJANIĆ on the occasion of his 70th birthday.

Floristic and ecological characteristics of the southernmost part of Istria (Croatia)

JASENKA TOPIĆ*, NEDELJKA ŠEGULJA

University of Zagreb, Faculty of Science, Department of Botany, Marulićev trg 20, 10000 Zagreb, Croatia

The flora of the wider area of Rt Kamenjak, the southernmost part of Istria, has been investigated. Some unique plant species in the Croatian flora as well as other plants more distributed along the southern Mediterranean coast indicate something of the specific ecological position of the investigated area.

Key words: flora, Rt Kamenjak, Istria, Croatia

Introduction

Since the investigations of South Istrian flora in previous century (FREYN 1877, 1881, TOMMASINI 1873) there have been no detailed flora investigations, especially in the southernmost part of Istria, which is from the floristic and ecological standpoint a very distinct area. However, the recent findings of some rare plant species, such as *Convolvulus lineatus* (TOPIĆ 1994), *Anthemis tomentosa* (TOPIĆ et al. 1997) and *Erodium acaule* (TOPIĆ et al. 1998), have stimulated more detailed floristic investigations in the very narrow peninsula between the cape of Rt Kamenjak and Premantura village. Also, we started our own measurements of monthly and annual precipitation, considering this ecological factor decisive for floristic peculiarities.

Area of investigation

The area of investigation spreads from the village of Premantura to the southernmost cape, Rt Kamenjak (44° 46' 25" N, 13° 54' 39" E), across the narrow (about 1 km) and long tongue (about 5 km) of the peninsula (Fig. 1). The altitude of the area is between 0 and 40 m a. s. with slightly rolling relief along the peninsula, gradually sloping toward the rocky shore with small bays and pebble beaches (except only one, small, sandy beach).

* Corresponding author: Fax: 385 1 482 8306, e-mail: jtopic@yahoo.com

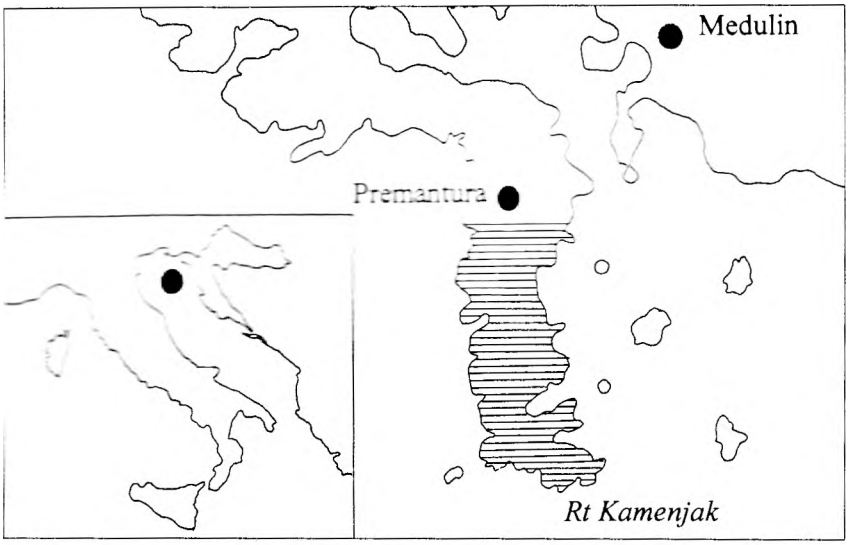

Fig. 1. Area of investigation

Over the territory of Premantura and the neighbourhood the prevalent soil is eutric cambisol on Eolian deposits and relict terra rossa, typical and anthropogenized (60%) followed by luvisol, on Eolian deposits, typical and anthropogenized (20%), and rigosol (20%). On the area of the southernmost part, toward Rt Kamenjak, the following combination of soil types occurs: calcocambisol typical, shallow (60%), eutric cambisols of funnel-shaped cavities, colluvial, calcareous (20%), terra rossa typical, shallow (10%) and rocks (limestone) (10%) (VIDAČEK 1979, ŠKORIĆ and BOGUNOVIĆ 1987). A few decades ago there were village fields in the central part with deeper soil, while on the edges with shallow soil there prevailed stony grasslands and garigue where sheep were pastured.

Step by step, the eastern coast was planted with *Pinus halepensis*, sheep grazing was abandoned and vegetation succession took place. The garigue development was slow, due to shallow skeletal soil, and probably to arid climate. Accordingly, recent anthropogenic influence is rather small, excluding the spring/autumn areas for troop training, and beaches in summer.

The long and narrow wedge of land is surrounded by sea and climatically functions as an island. Unfortunately, the two nearest pluviometric stations are both about ten kilometres away, one to the northwest, in the city of Pula, and one to the northeast, in Medulin village. Since the flora and vegetation of the investigated area are rather different from those of Pula and Medulin, and since all the other factors (such as relief, soil types and anthropogenic influence) are equal, one can suppose that there must be climatological reasons for such peculiarities. We finally got an opportunity to start precipitation measurements in the Rt Kamenjak area in 1993.

Recently, the investigated area has been protected as a valuable landscape, and thus the first stage of management started.

Material and methods

The investigations were carried out in the period of 1995–1997 in different seasons (from February to October). After this period several other excursions were made to the area to collect plant specimens. The taxa were determined by standard flora keys (TUTIN et al. 1964–1980, PIGNATTI 1982). With only a few exceptions, plant names, as well as the chorological types were given after PIGNATTI (1982).

The precipitation was measured monthly from September 1997. onward.

Results and discussion

So far, 433 plant species have been found in the southernmost part of Istria (Tab. 1). Some of them (94) were noted previously, but most of them are reported there for the first time.

Tab. 1. Flora of the southernmost part of Istria (Croatia). The previously noted taxa are marked by bold letters (**F**=FREYN 1877, **G&P**=GOTTSCHLICH and PERICIN 1999, **T**=TOMMASINI 1873, **TO**=TOPIĆ 1994, **TO&al.**=TOPIĆ et al. 1997. 1998, **S1**=STARMÜHLER 1998, **S2**=STARMÜHLER 1999). Previous, unconfirmed findings, are marked by*.

PTERIDOPHYTA	
ADIANTACEAE	
Adiantum capillus-veneris L.	Palaeotemp.
OPHIOGLOSSACEAE	
Ophioglossum lusitanicum* L. **F	
GYMNOSPERMAE	
CUPRESSACEAE	
Juniperus oxycedrus L. subsp. *oxycedrus*	Euri-Medit
Juniperus oxycedrus L. subsp. *macrocarpa* (S.et S.) Ball	E-Medit (Steno-)
PINACEAE	
Pinus halepensis Miller	Steno-Medit.
Pinus pinaster Aiton	W-Medit. (Steno-)
ANGIOSPERMAE	
DICOTYLEDONES	
ACERACEAE	
Acer campestre L.	Caucas. (Subpont.)
ANACARDIACEAE	
Pistacia lentiscus L.	Steno-Medit.
Pistacia terebinthus L.	Euri-Medit.

ARACEAE	
Arum italicum Miller	Steno-Medit.
ARALIACEAE	
Hedera helix L.	Submedit.-Subatl.
ASCLEPIADACEAE	
Vincetoxicum hirundinaria Medicus subsp. *adriaticum* (G. Beck) Markgraf	Endem
BORAGINACEAE	
Myosotis arvensis (L.) Hill	W-Asian
Neatostema apulum (L.) Johnston **F, T** (as *Lithospermum apulum* Vahl.)	Steno-Medit.
Onosma helveticum Boiss. em. Teppner	SE-Europ.
CAMPANULACEAE	
Campanula rapunculus L. f. *verruculosa* Freyn. **F**	Steno-Medit.
CAPRIFOLIACEAE	
Lonicera etrusca Santi	Euri-Medit.
Lonicera implexa Aiton	Steno-Medit.
Lonicera xylosteum L.	Europ.-W-Asian
CARYOPHYLLACEAE	
Arenaria serpyllifolia L.	Subcosm.
Cerastium glutinosum Fries	Euri-Medit (Subpont.)
Cerastium holosteoides Fries ampl. Hylander	Subcosm.
Dianthus ciliatus* Guss. **F	Amfiadriatic
Dianthus sylvestris Wulfen subsp. *tergestinus* (Rchb.) Hayek	Medit.-Mont.
Herniaria glabra L.	Paleotemp.
Minuartia verna (L.) Hiern	Eurasian
Petrorhagia prolifera (L.) P.W.Ball et Heywood	Euri-Medit.
Petrorhagia saxifraga (L.) Link.	Euri-Medit
Polycarpon tetraphyllum L.	Euri-Medit.
Scleranthus annuus* L. **F	Palaeotemp.
Silene alba (Miller) Krause	Paleotemp.
Silene dioica (L.) Clairv.	Paleotemp.
Silene gallica L. **F, T**	Subcosm.
Silene nutans L.	Paleotemp.
Silene vulgaris (Moench) Garcke subsp. *angustifolia* (Miller) Hayek	E-Medit.
Spergularia marina* (L.) Griseb. **F	Subcosm.
Stellaria media (L.) Vill.	Cosm.
CHENOPODIACEAE	
Arthrocnemum fruticosum (L.) Moq. **F, T**	Euri-Medit.
Arthrocnemum glaucum (Delile) Ung.-Sternb.	Medit. Macarones. Mexico
Atriplex latifolia Wahlenb. **F** (as *A. hastata* L.)	Circumbor.
Atriplex patula L.	Circumbor.

Beta vulgaris L. subsp. *maritima* (L.) Arcang.	Euri-Medit.
Camphorosma monspeliaca L. **F, T**	Centralasian-Medit.
Halimione portulacoides (L.) Aellen	Circumbor.
CISTACEAE	
Cistus incanus L.	Steno-Medit.
Cistus monspeliensis L.	Steno-Medit.-Macarones.
Fumana ericoides (Cav.) Gandog.	Steno-Medit.
Fumana thymifolia (L.) Spach	Steno-Medit.
Helianthemum nummularium (L.) Miller	Europ.-Caucas.
Helianthemum salicifolium (L.) Miller	Euri-Medit.
Tuberaria guttata (L.) Fourr. **F, T** (as *Helianthemum guttatum* Mill.)	Euri-Medit.
COMPOSITAE	
Achillea virescens (Fenzl) Heimerl	Illyric
Aetheorrhiza bulbosa (L.) Cass. F (as. *Crepis bulbosa* Cass.)	Steno-Medit.
Ambrosia artemisiifolia L.	Adv.
Anthemis arvensis L.	Subcosm.
Anthemis tomentosa L. **TO & al.**	NE-Medit.
Artemisia absinthium L.	Subcosm.
Artemisa alba* Turra **F	S-Europ.
Artemisia annua L.	Eurasian
Artemisia coerulescens L.	Euri-Medit.
Artemisia vulgaris L.	Circumbor.
Bellis annua L.	Steno-Medit.-Macarones.
Bellis sylvestris Cyr.	Steno-Medit.
Carduus nutans L.	W-Europ.
Carduus pycnocephalus L.	(Euri-) Medit.-Turan.
Carlina corymbosa L.	Steno-Medit.
Carthamus lanatus L.	Euri-Medit.
Centaurea bracteata Scop.	SE-Europ.
Centaurea cristata* Bartl **F	Illyric-Adriatic
Centaurea tommasinii Kern.	Endem
Cichorium intybus L.	Cosm.
Cirsium arvense (L.) Scop.	Subcosm.
Conyza canadensis (L.) Cronq. **F**	Cosm.
Crepis sancta (L.) Babc. **F**	Euri-Medit.
Crepis zacintha (L.) Babc.	Steno-Medit.
Crupina vulgaris Cass. **F**	Euri-Medit.
Evax pygmaea (L.) Brot. **F, T**	Steno-Medit
Filago pyramidata L.	Euri-Medit.
Helichrysum italicum (Roth) Don **T**	S-Europ.
Hieracium visiani (F.W. et C.H. Schultz) Schinz et Thellung **G & P**	
Hieracium pilosella L.	Europ.-Caucas.
Hyoseris scabra L.	Steno-Medit.

Hypochoeris glabra L. **F**	Euri-Medit.
Inula crithmoides L.	Alof.-SW-Europ.
Inula graveolens* (L.) Desf. **F	Medit.-Turan.
Inula viscosa (L.) Aiton	Euri-Medit.
Leontodon autumnalis L.	Palaeotemp.
Leontodon crispus Vill.	S-Europ.
Marrubium incanum Desr.	NE-Medit.
Micropus erectus L.	S-Europ.-S-Siber.
Oglifa gallica (L.) Chrtek et Holub (=*Filago gallica* L.)	Euri-Medit.
Onopordum illyricum L.	Steno-Medit.
Pallenis spinosa (L.) Cass.	Euri-Medit.
Picris echioides L.	Euri-Medit.
Picris hieracioides L.	Eurosiber.
Reichardia picroides (L.) Roth	Steno-Medit.
Scolymus hispanicus L.	Euri-Medit.
Scorzonera villosa Scop.	Illyric-Appennin (Amphiadriatic)
Sonchus asper (L.) Hill	Subcosm.
Sonchus oleraceus L.	Subcosm.
Tanacetum cinerariaefolium (Vis.) Schultz.-Bip.	Euri-Medit.
Taraxacum officinale Weber	Circumbor.
Tragopogon dubius Scop.	S-Europ.-Caucas.
Urospermum dalechampi (L.) Schmidt **F, T**	Euri-Medit.
Urospermum picroides (L.) Schmidt	Euri-Medit.
CONVOLVULACEAE	
Convolvulus arvensis L.	Cosm.
Convolvulus cantabrica L.	Euri-Medit.
Convolvulus elegantissimus Miller	Steno-Medit.-Or.
Convolvulus lineatus L. **TO**	Steno-Medit.
CRASSULACEAE	
Sedum acre L.	Europ.-Caucas.
Sedum anopetalum DC.	N-Medit.-Mont.
Sedum sexangulare L.	Centraleurop.
Umbilicus horizontalis (Guss.) DC.	Steno-Medit.
CRUCIFERAE	
Arabis hirsuta (L.) Scop.	Europ.
Cakile maritima Scop.	Medit.-Atl.
Calepina irregularis (Asso) Thel.	Medit.-Turan.
Capsella bursa-pastoris (L.) Med.	Cosm.
Capsella rubella Reuter	Euri-Medit.
Cardamine hirsuta L.	Cosm.
Cardaria draba (L.) Desv.	Medit.-Turan.
Descurainia sophia* (L.) Webb. **F	Subcosm.
Diplotaxis tenuifolia (L.) DC.	Submedit.-Subatl.
Erophila verna (L.) Cheval	Circumbor.

Raphanus raphanistrum L.	Circumbor.
Rorippa lippizensis* Wulfen **F	Balcan.
Thlaspi perfoliatum L.	Palaeotemp.
CUCURBITACEAE	
Bryonia dioica Jacq.	Euri-Medit.
DIPSACACEAE	
Cephalaria leucantha* (L.) Schrader **F	S-Europ.
Scabiosa maritima L.	Steno-Medit.
ERICACEAE	
Erica arborea L. **T**	Steno-Medit.
EUPHORBIACEAE	
Euphorbia cyparissias L.	Centraleurop.
Euphorbia exigua L.	Euri-Medit.
Euphorbia falcata L.	Euri-Medit.-Turan.
Euphorbia fragifera Jan. **F** (as *E. epithymoides* L.)	Endem Illyr.
Euphorbia helioscopia L.	Cosm.
Euphorbia nicaeensis All.	W et Central -Medit.
Euphorbia peploides Gouan **T**	Steno-Medit.
Euphorbia peplus* L. **F	Cosm.
Euphorbia pinea L. **T**	W-Medit.
Mercurialis annua L.	Palaeotemp.
FAGACEAE	
Quercus ilex L.	Steno-Medit.
Quercus pubescens Willd.	SE-Europ.
GENTIANACEAE	
Blackstonia perfoliata (L.) Hudson	Euri-Medit.
Centaurium erythraea Rafn **T**	Palaeotemp.
Centaurium maritimum (L.) Fritsch **F, T** (as *Erythraea maritima* Pers.)	Steno-Medit
Centaurium pulchellum (Sw.) Druce **F** (as *Erythraea pulchella* Hornem.)	Palaeotemp.
Centaurium tenuiflorum (Hoffmgg. et Link) Fritsch **F**(as. *Erythraea tenuiflora* Lk. Hg.)	S-Europ.
Cicendia filiformis* (L.) Delarbre **F	
GERANIACEAE	
Erodium acaule (L.) Becherer et Th. **TO & al.**	Medit.-Mont.
Erodium cicutarium (L.) L'Her.	Subcosm.
Erodium malacoides (L.) L'Her.	Medit.-Macarones.
Geranium columbinum L.	Europ.-S-Siber.
Geranium dissectum L.	Subcosm.
Geranium lucidum L.	Euri-Medit.
Geranium molle L.	Subcosm.
Geranium purpureum Vill.	Euri-Medit.

GLOBULARIACEAE	
Globularia punctata Lapeyr.	S-Europ.
HYPERICACEAE	
Hypericum perforatum L.	
subsp. *veronense* (Schrank) Froelich	Subcosm.
LABIATAE	
Acinos arvensis (Lam.) Dandy	Euri-Medit.
Ajuga chamaepitys (L.) Schreber	Euri-Medit.
Calamintha nepeta (L.) Savi	Medit.-Mont. (Euri-)
Lamium amplexicaule L.	Palaeotemp.
Lamium purpureum L.	Eurasian
Mentha spicata L.	Euri-Medit.
Micromeria juliana (L.) Bentham **F, T**	Steno-Medit.
Prunella laciniata (L.) L.	Euri-Medit.
Prunella vulgaris L.	Circumbor.
Salvia pratensis L. subsp. *bertolonii* (Vis.) Briq.	Euri-Medit.
Salvia officinalis L.	Steno-Medit.
Salvia verbenaca L. **T**	Medit.-Atl.
Salvia verticillata L.	S-Europ.-S-Caucas.
Satureja montana L. ssp. *variegata* (Host) Ball	Orof-W-Medit.
Sideritis romana L.	Steno-Medit.
Stachys recta L.	Orof.-W-Medit
Stachys officinalis (L.) Trevisan	
subsp. *serotina* (Host) Murb. **T**	
Teucrium chamaedrys L.	Euri-Medit.
Teucrium flavum* L. **F	Steno-Medit.
Teucrium polium L.	Steno-Medit.
Thymus longicaulis Presl	Euri-Medit.
LEGUMINOSAE	
Anthyllis vulneraria L.	
subsp. *praepropera* (Kerner) Bornm.	Euri-Medit.
Argyrolobium zanonii (Turra) P.W. Ball	W-Medit.
Astragalus hamosus L.	Medit.-Turan.
Coronilla cretica L.	Pontic
Coronilla emerus L.	
subsp. *emeroides* (Boiss et Spruner) Hayek **F**	Medit.-Pontic
Coronilla scorpioides (L.) Kock	Euri-Medit.
Dorycnium hirsutum (L.) Ser. **T**	Euri-Medit.
Dorycnium pentaphyllum Scop.	
subsp. *herbaceum* (Vill.) Rouy **F**	S-Europ.
Genista tinctoria L.	Eurasian
Hippocrepis comosa L.	C&S-Europ.
Hymenocarpus circinatus* (L.) Savi **F	Steno-Medit.
Lathyrus aphaca L.	Euri-Medit.
Lathyrus clymenum L.	Steno-Medit.
Lathyrus nissolia* L. **F	Steno-Medit.

Lathyrus ochrus (L.) DC. **F**	Steno-Medit.
Lathyrus sphaericus Retz.	Euri-Medit.
Lotus angustissimus L.	Euri-Medit.
Lotus corniculatus L.	Cosm.
Lotus cytisoides L.	Steno-Medit.
Lotus ornithopodioides* L. **F	Steno-Medit
Lupinus micranthus Guss.	Steno-Medit.
Medicago arabica (L.) Hudson	Euri-Medit.
Medicago lupulina L.	Palaeotemp.
Medicago minima (L.) Bartal. **T**	Euri-Medit.-Centralasian
Medicago prostrata Jacq.	S-Europ.
Medicago sativa L.	Cosm.
Medicago sativa L. subsp. *falcata* (L.) Arcang.	Eurasian
Medicago truncatula Gaertn.	Steno-Medit.
Melilotus officinalis (L.) Pallas	Subcosm.
Ononis arvensis L.	Palaeotemp.
Ononis reclinata L.	S-Medit.-Turan.
Ononis spinosa L. subsp. *antiquorum* (L.) Arcang.	Euri-Medit.
Psoralea bituminosa L.	W-Medit.
Rhagadiolus stellatus (L.) Willd.	Euri-Medit.
Scorpiurus muricatus L. **T** (as. *S. subvillosus* L.)	Euri-Medit.
Securigera securidaca (L.) Deg. et Doerfl.	Euri-Medit.
Spartium junceum L. **T**	Euri-Medit.
Trifolium angustifolium L.	Euri-Medit.
Trifolium arvense L.	Palaeotemp.
Trifolium bocconei* Savi **F	(W-) Palaeotemp.
Trifolium campestre Schreber	Palaeotemp.
Trifolium cherleri L. **F, T**	Euri-Medit.
Trifolium fragiferum L.	Palaeotemp.
Trifolium glomeratum L.	Euri-Medit.
Trifolium incarnatum L.	Euri-Medit.
Trifolium lappaceum L.	Euri-Medit.
Trifolium nigrescens Viv.	Euri-Medit.
Trifolium pallidum L.	Euri-Medit.
Trifolium pratense L.	Subcosm.
Trifolium scabrum L.	Euri-Medit.
Trifolium stellatum L.	Euri-Medit.
Trifolium striatum L.	Palaeotemp.
Trifolium subterraneum L.	Euri-Medit.
Vicia bithynica (L.) L.	Euri-Medit.
Vicia cracca L.	Subcosm.
Vicia hirsuta (L.) S.F.Gray	Subcosm.
Vicia lutea L.	Euri-Medit.
Vicia sativa L. subsp. *angustifolia* (Grufb.) Gaudin	Subcosm.
Vicia villosa Roth	Euri-Medit.

LINACEAE	
Linum bienne Miller	Euri-Medit.-Subatl.
Linum catharticum L.	Euri-Medit.-Europ.
Linum maritimum L.	W-Medit.
Linum tenuifolium L. **T**	Submedit.-Pontic
Linum tryginum L.	Euri-Medit.
Radiola linoides Roth	Palaeotemp.
MALVACEAE	
Malva sylvestris L.	Subcosm.
MORACEAE	
Ficus carica L.	Medit.-Turan.
MYRTACEAE	
Myrtus communis L. **F**	Steno-Medit.
OLEACEAE	
Fraxinus ornus L.	Euri-N-Medit.-Pontic
Olea europaea L.	Steno-Medit.
Phillyrea latifolia L. **T**	Steno-Medit.
OROBANCHACEAE	
Orobanche minor Sm. **F** (as *O. livida* Sendt.)	Subcosm.
PAPAVERACEAE	
Fumaria officinalis L.	Subcosm.
Papaver apulum Ten.	NE-Medit.
Papaver rhoeas L.	Cosm.
PLANTAGINACEAE	
Plantago bellardi All. **T**	S-Europ.-S.-Siber.
Plantago coronopus L. **F, T**	Euri-Medit.
Plantago holosteum Scop.	SE-Europ.
Plantago lanceolata L.	Cosm.
Plantago lanceolata L. var. *sphaerostachya* Mert. et Koch	
Plantago major L.	Subcosm.
PLUMBAGINACEAE	
Limonium cancellatum (Bernh.) O.Kuntze **T**	Amphiadriatic
Plumbago europaea L.	Steno-Medit.
POLYGALACEAE	
Polygala nicaeensis Risso	Euri-Medit.
POLYGONACEAE	
Rumex acetosella L.	Subcosm.
PORTULACACEAE	
Portulaca oleracea L.	Subcosm.

PRIMULACEAE	
Anagallis arvensis L.	Subcosm.
Anagallis foemina Miller	Subcosm.
Asterolinon linum-stellatum (L.) Duby	Steno-Medit.
RANUNCULACEAE	
Anemone hortensis L.	N-Medit.
Clematis flammula L.	Euri-Medit.
Clematis vitalba L.	Europ.-Caucas.
Clematis viticella L.	S-Europ.-Centralasian
Nigella damascaena L.	Euri-Medit.
Ranunculus bulbosus L.	Eurasian
Ranunculus ficariiformis F.W. Schultz.	Euri-Medit.
Ranunculus flabellatus Desf.	Steno-Medit.-Turan.
Ranunculus neapolitanus Ten.	NE-Medit.
Ranunculus repens L.	Subcosm.
RESEDACEAE	
Reseda alba L.	Steno-Medit.
Reseda lutea L.	Europ.
RHAMNACEAE	
Paliurus spina-christi Miller	SE-Europ.-Pontic
Rhamnus saxatilis Jacq. L. **F**	SE-Europ.
ROSACEAE	
Crataegus monogyna Jacq.	Palaeotemp.
Crataegus oxyacantha L.	Centraleurop. (Subatl.)
Filipendula vulgaris Moench.	Centraleurop.-S-Siber.
Pyrus amygdaliformis Vill.	Steno-Medit.
Potentilla recta L.	NE-Medit.-Pontic
Prunus spinosa L.	Circumbor.
Pyracantha coccinea L.	Steno-Medit.
Rosa arvensis Hudson	Submedit.-Subatl.
Rosa gallica L. **F**	C-Europ.-Pontic
Rosa sempervirens L.	Steno-Medit.
Rubus ulmifolius Schott	Euri-Medit.
Sanguisorba minor Scop. subsp. *muricata* (Gremli) Briq.	Subcosm.
Sorbus domestica L.	Euri-Medit.
RUBIACEAE	
Asperula cynanchica L.	Euri-Medit.
Cruciata glabra (L.) Ehrend.	Eurasian
Galium aparine L.	Eurasian
Galium lucidum L.	Euri-Medit.
Galium divaricatum Lam. **T**	Steno-Medit.
Galium mollugo L.	Euri-Medit.
Rubia peregrina L.	Steno-Medit.-Macarones.
Sherardia arvensis L. **T**	Subcosm.

Valantia muralis L.	Steno-Medit.
SANTALACEAE	
Osyris alba L. **F**	Euri-Medit.
Thesium divaricatum Jan **F**	Euri-Medit.
SCROPHULARIACEAE	
Bellardia trixago (L.) All. **F, T**	Euri-Medit.
Chaenorrhinum minus (L.) Lange	Euri-Medit.
Cymbalaria muralis Gaertn., Mey. et Sch.	Subcosm.
Kickxia commutata (Bernh.) Fritsch **F** (as *Linaria commutata* Bernh.)	Steno-Medit.
Linaria pelisseriana (L.) Miller **F, T**	Medit.-Atl.
Parentucellia latifolia (L.) Caruel	Euri-Medit.
Veronica arvensis L.	Subcosm.
Veronica cymbalaria Jordan et Four.	Euri-Medit.
Veronica hederifolia L.	Eurasian
Veronica serpyllifolia L.	Subcosm.
SIMARUBACEAE	
Ailanthus altissima (Miller) Swingle	Adv.
SOLANACEAE	
Solanum nigrum L.	Cosm.
ULMACEAE	
Ulmus minor Miller	Europ.-Caucas.
UMBELLIFERAE	
Ammoides pusilla (Brot.) Breitstr.	Steno-Medit.
Bupleurum baldense Turra **T**	Euri-Medit.
Bupleurum praealtum* L. **F	SE-Europ.
Bupleurum tenuissimum* L. **F	Euri-Medit.
Crithmum maritimum L.	Euri-Medit.
Daucus carota L.	Subcosm.
Eryngium amethystinum L.	NE-Medit.
Eryngium maritimum L. **F**	Medit.-Atl.
Ferulago campestris (Besser) Grec.	SE-Europ.-Pontic
Oenanthe pimpinelloides L.	Medit.-Atl.
Orlaya grandiflora (L.) Hoffm.	S&C-Europ.
Pimpinella saxifraga L.	Europ.-Caucas.
Scandix pecten-veneris L.	Subcosm.
Seseli tortuosum L. **F, T**	Steno-Medit.
Tordylium apulum L.	Steno-Medit.
URTICACEAE	
Parietaria lusitanica L.	Steno-Medit.
Urtica dioica L.	Subcosm.
VALERIANACEAE	
Valerianella echinata (L.) Lam. et DC.	Steno-Medit.

VERBENACEAE	
Verbena officinalis L.	Cosm.
VIOLACEAE	
Viola hirta L.	Europ.
MONOCOTYLEDONES	
AMARYLLIDACEAE	
Crocus reticulatus Steven	NE-Medit.
CYPERACEAE	
Carex caryophyllea La Tourr.	Euriasian
Carex distans L.	Euri-Medit.
Carex flacca Schreber	
subsp. *serrulata* (Biv.) Greuter	Euri-Medit.
Carex hallerana Asso **F**	Euri-Medit.
Schoenus nigricans L. **T**	Subcosm.
GRAMINACEAE	
Agropyron intermedium* (Host) Beauv. **F	
(as A. glaucum R. et S.)	S-Europ.-S-Siber.
Agropyron litorale (Host) Dum.	Euri-Medit.
Agropyron repens (L.) Beauv.	Circumbor.
Agropyron pungens (Pers.) R.et S.	Euri-Medit.
Aegilops geniculata Roth.	Steno-Medit.-Turan.
Aegilops triuncialis L.	Euri-Medit.
Agrostis stolonifera L.	Circumbor.
Aira elegans Willd. **T**	Euri-Medit.
Anthoxanthum odoratum L.	Eurasian
Avena barbata Potter	Euri-Medit.-Turan.
Avena sterilis L.	Euri-Medit.-Turan.
Bothriochloa ischaemon (L.) Keng	Thermo-Cosm.
Brachypodium distachyum (L.) Beauv.	Steno-Medit.-Turan.
Brachypodium pinnatum (L.) Beauv.	Eurasian
Brachypodium ramosum (L.) R. et S.	Steno-Medit. Occid.
Brachypodium sylvaticum (Hudson) Beauv.	Palaeotemp.
Briza maxima L. **T**	Palaeosubtrop.
Bromus condensatus Hackel	Endem E-Alp.
Bromus erectus Hudson	Palaeotemp.
Bromus madritensis L.	Euri-Medit.
Bromus hordaceus L. subsp. *hordaceus*	Subcosm.
Bromus stenophyllus* Link. **S1	SE-Europ.-steppic
Bromus tectorum L	Palaeotemp.
Calamagrostis arundinacea (L.) Roth	Euras.-Temp.
Catapodium marinum (L.) Hubbard	Medit.-Atl.
Catapodium rigidum (L.) Hubbard	Euri-Medit.
Chrysopogon gryllus (L.) Trin.	S-Europ.-S-Siber.
Cleistogenes serotina (L.) Keng.	N-Medit.-Subsiber.

Cynodon dactylon (L.) Pers.	Thermo-Cosm.
Cynosurus echinatus L.	Euri-Medit.
Dactylis glomerata L.	Palaeotemp.
Dactylis hispanica (Roth) Nyman	Steno-Medit.
Dasypyrum villosum (L.) Borbas	Euri-Medit.-Turan.
Eragrostis pilosa (L.) Beauv.	Thermo-Cosm.
Festuca lapidosa (Degen) Markgr.-Dannenb.	Endem Illyr.
Festuca valesiaca Schleicher	SE-Europ.-S-Siber.
Gastridium ventricosum (Gouan) Sch. et Th.	Medit.-Atl.
Hainardia cylindrica (Willd.) Greuter	Euri-Medit.
Holcus lanatus L.	Circumbor.
Hordeum bulbosum L.	Palaeo.-Subtrop.
Hordeum leporinum Link	Euri-Medit.
Hordeum maritimum With.	Euri.-Medit.-Occid.
Koeleria splendens Presl.	Medit.-Mont.
Lagurus ovatus L. **F, T**	Euri-Medit.
Lolium loliaceum (Bory et Chaub.) Hand.-Mazz	Steno-Medit.
Lophochloa cristata (L.) Hyl. **T**	Subcosm.
Melica ciliata L.	Euri-Medit.-Turan.
Oryzopsis miliacea (L.) Asch. et Shweinf.	Steno-Medit.-Turan.
Panicum dichotomiflorum Michx	Amer.
Parapholis incurva (L.) Hubbard	Medit.-Atl.
Phleum pratense L.	Centraleurop.
Phleum subulatum (Savi) Asch. et Gr.	Steno-Medit.
Poa annua L. **T**	Cosm.
Poa bulbosa L.	Palaeotemp.
Poa compressa L.	Circumbor.
Poa pratensis L.	Circumbor.
Sesleria autumnalis (Scop.) Schultz	SE-Europ.
Tragus racemosus* (L.) All. **F	Thermo-Cosm.
Vulpia ciliata (Danth.) Link	Euri-Medit.
Vulpia myuros (L.) Gmelin	Subcosm.
IRIDACEAE	
Romulea bulbocodium (L.) Seb. et Mauri **T**	Steno-Medit.
JUNCACEAE	
Juncus capitatus* Weigel **F (as *J. triandrus* Gouan)	Euri-Medit.
LILIACEAE	
Allium ampeloprasum L.	Euri-Medit.
Allium chamaemoly L.	Steno-Medit.
Allium neapolitanum Cyr.	Steno-Medit.
Allium roseum L. **F, T**	Steno-Medit.
Allium sphaerocephalon L.	Palaeotemp.
Allium tenuiflorum Ten.	Steno-Medit.
Asparagus acutifolius L. **T**	Steno-Medit.

***Colchicum neapolitanum* (Ten.) Ten.**	
F (as C. *arenarium* Koch non W.K.)	Euri-Medit.
Leopoldia comosa (L.) Parl.	Euri-Medit.
Muscari atlanticum Boiss. et Reuter	Euri-Medit.-Turan.
Ornithogalum comosum L.	Medit.-Mont.
Ornithogalum umbellatum L.	Euri-Medit.
Ruscus aculeatus L.	Euri-Medit.
Scilla autumnalis L. **T**	Euri-Medit.
Smilax aspera L. **T**	Palaeosubtrop.
ORCHIDACEAE	
Ophrys fuciflora (Crantz) Moench.	Euri-Medit.
Ophrys bertolonii Mor.	Steno-Medit.
Ophrys sphegodes Miller	Euri-Medit.
Orchis morio L.	Europ.-Caucas.
Orchis papilionacea L.	Euri-Medit.
***Orchis provincialis* Balb. F**	Steno-Medit.
Serapias lingua L. **F**	Steno-Medit.
Serapias cordigera L. **S2**	Steno-Medit.
Serapias vomeracea (Burm.) Briq.	Euri-Medit.
Spiranthes spiralis (L.) Koch	Europ.-Caucas.

The analysis of the flora shows a great share of steno-Mediterranean (18.2%), and euri-Mediterranean plants (35.1%). The flora and the vegetation of a given area indicate ecological conditions in this spot of land, considering the meso- and microclimate peculiarities.

Since rainfall data for Medulin and Rt Kamenjak have been obtained for the last two years, we used them, as well as those for Pula, to compare climatic aridity. Although the total annual precipitation for each of these sites, some ten kilometres distant from each other, is different, the summer drought was very severe for the area of Rt Kamenjak (Fig. 2). Many times during forty summers spent there, we witnessed the rain ranging from the North to near Premantura, but mostly avoiding the area southward to Rt Kamenjak. Sometimes there was no rain in July and August at all. According to the rain factor after Lang (GRAČANIN 1950) the climate of Rt Kamenjak in the period 1997–1999 could be defined as arid, and that of Pula and Medulin as semiarid (close to semihumid). The tiny piece of land investigated surrounded by water functions as an island, so it is to be expected that the temperature amplitude is smaller than it is deeper inland. GEIGER (1966) showed that the daily temperature amplitude of the air layer very close to the seawater surface amounted to 0.1°C regardless of the latitude. Annual amplitude is also relatively small, in comparison to the mainland. These facts could be used in the interpretation of the microclimate features of the investigated area, particularly along the narrow coastline abundant with bays.

Table 2 shows some climatological data along the eastern Adriatic coast where evergreen forest vegetation occurs. Between Pula and island of M. Lošinj there is a sharp decline in frosts and cold days. The plant cover of the southern-

most part of Istria shows that this borderline probably lies between Pula and Rt Kamenjak.

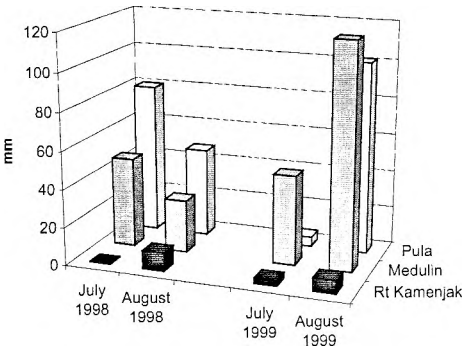

Fig. 2. Monthly precipitation in July and August (1998, 1999) at Rt Kamenjak, Medulin and Pula.

Tab. 2. Climatological data for some meteorological stations in the Eumediterranean zone (KIRIGIN et al. 1971)

	The average number of cold days (mean temp. < 0 °C)	The average number of very cold days (min. temp. ≤ –10 °C)	The average number of days with frost	The average number of days with a warm night (min. temp. ≥ 20 °C)	Mean year temperature
Rovinj	29.1	0.2	26.0	16.1	13 8
Pula	22.2	0.1	21.6	22.1	14.0
Rt Kamenjak	.	.	.	.	.
M. Lošinj	4.6	.	0.5	52.0	15.3
Hvar	4.3	.	2.7	61 4	16 5
Palagruža	0.8	.	.	78 2	16 3

The warming effect of seawater is most important in winter, allowing no frost on the very coast, thus enabling some very thermophilous plants to grow there. One of them is certainly very interesting: *Anthemis tomentosa* L. (= *A. peregrina* L., PIGNATTI 1982). So far this is the only known locality of this plant in Croatia. TOMMASINI (1873), according to the rather indeterminable herbarium specimen collected by SENDTNER, presumed this plant to be *Anthemis tomentosa,* but FREYN (1881) inspected the locality noted and found none. He concluded that there was no such plant in the Rt Kamenjak area, or more precisely at the cited locality of »Pa Chersina«. But a few years ago we found *Anthemis tomentosa*, growing vigorously and blooming abundantly in a rather large population on a stony beach, within the halophytic vegetation but at a locality about 1 km eastward from Rt Kršine (Pa Chersina). It is interesting to note that *A. tomenosa* is distributed much more in South Italy and Greece, and the area of Rt Kamenjak is so far the northernmost site in this part of Mediterranean where it has been found. *Convolvulus lineatus* was also recently found there (TOPIĆ 1994). Although this species was previously recorded for one of the many Kornati islands, Purara, the most recent investigations (PANDŽA and STANČIĆ 1995) could not confirm it any-

more for this site. On the other hand, the population at Rt Kamenjak seems to be constant, both in quantity as well as in vigour.

There are some other interesting plants in this area. The finding of *Erodium acaule* in the investigated area as a new species of Croatian flora and the analysis of its distribution over the Apennine peninsula (PIGNATTI 1982) inspired further investigation of this species. So far it has been found on the island of Krk, and will certainly be found on more sites along the Croatian Adriatic coast.

So far, the adventitious species *Panicum dichotomiflorum* Michaux was noted in the continental part (ILIJANIĆ and MARKOVIĆ 1986) and the finding in the area of Rt Kamenjak is the first one in the Mediterranean part of Croatia.

We would like to refer to the unsolved status of the taxon *Campanula rapunculus* L. f. *verruculosa* Freyn. The whole population of the southernmost part of Istria belongs without exception to this taxon. Morphological characteristics are constant, and population seems to be geographically defined. FREYN (1877) described this taxon for South Istria in the localities of V. Briuni, Veruda, Trombuja, S. Marina and Levan; HAYEK (1927–1933) does not mention this taxon, but HEGI (1918) does. Perhaps this taxon should be investigated in more detail, citotaxonomically, ecologically and phytogeographically.

Neither is the taxonomical status of *Euphorbia peploides* Gouan. quite certain. PIGNATTI (1982) as well as SMITH and TUTIN (1978) noted that it seems possible that the described taxon is represented only by the dwarf population of *E. peplus* L. Since the former population has red-brown glands and the latter has yellow glands we have chosen to distinguish them separately.

All the specimens of *Satureja montana* L. in the investigated area belong to the subspecies *variegata* (Host) Ball, while outside the investigated area, several kilometres to the North all the specimens belong to the *Satureja montana* L. subsp. *montana*.

Distribution of the several other steno-Mediterranean plants along the Croatian coast is presented in Table 3. We have analysed the distribution of nine species that are rather rare in the North Adriatic area. All of them grow in the investigated area, some of them abundantly, for example *Fumana thymifolia, Lupinus micranthus, Allium chamaemoly, Bellardia trixago* and *Evax pygmaea*. They are rather rare in phytosociological tables (comp. HORVATIĆ 1958, HORVAT et al. 1974, TRINAJSTIĆ 1985), some of them never occurring there, but they were noted in floras of different sites along the Adriatic sea, including both the islands and the coast. Certainly they are more frequent in the South Adriatic, or even more toward the South. For example, *Fumana thymifolia* grows in the Dalmatian garrigue of the associations *Erico-Calycotometum villosae* and *Erico-Rosmarinetum*, as the characteristic species of the alliance and of the order (*Cisto-Ericion, Cisto-Ericetalia*) (HORVATIĆ 1958), or even more toward south, in Greece, where it grows within the communities of the alliances *Corydothymion* and *Cistion orientale* (*Cisto-Micromeretalia, Cisto-Micromeretea* (HORVAT et al. 1974).

A few decades ago, when most of the villagers were engaged in agriculture, there were a lot of nitrophilous stands in Premantura and all around it. More recently, agriculture has been almost abandoned and the villagers turned to tourism. The habitats of ruderal and weed plants have been destroyed and some of

Tab. 3. Data on distribution of some steno-Mediterranean plants along the Croatian coast (N: northern, M: middle, S: southern Adriatic)

Localities		*Fumana thymifolia*	*Allium neapolitanum*	*Lupinus micranthus*	*Bellardia trixago*	*Vicia bithynica*	*Allium chamaemoly*	*Evax pygmaea*	*Lithospermum apulum*	*Scabiosa maritima*	Authors
Rt Kamenjak	N	+	+	+	+	+	+	+	+	+	
South Istria	N	+	.	+	+	+	+	+	+	.	FREYN (1877, 1881)
Krk	N	.	.	+	.	.	.	.	.	.	TRINAJSTIĆ (1964)
Košljun	N	.	+	.	.	+	.	.	.	.	BARČIĆ (1996)
Lišinj, Unije	N	.	+	.	+	+	+	.	+	.	HARAČIĆ (1905)
Kornati	M	.	.	.	+	.	.	.	.	+	GAŽI-BASKOVA and BEDALOV (1983)
Kornati	M	.	.	.	.	.	.	+	.	.	PANDŽA and STANIĆ (1995)
Murter	M	+	.	.	.	.	.	.	.	.	PANDŽA (1998)
Krapanj	M	+	.	.	.	.	.	.	.	.	PANDŽA (1998)
Mosor	M	+	.	.	.	.	.	.	.	.	VLADOVIĆ and ILIJANIĆ (1995)
Makarska	M	.	+	.	.	.	.	.	.	.	RADIĆ (1974)
Šolta	M	+	.	.	.	.	.	.	.	.	HORVATIĆ (1958)
Šćedro	M	+	.	.	.	.	.	.	.	.	HORVATIĆ (1958)
Hvar	M	+	.	.	.	.	.	.	.	.	HORVATIĆ (1958)
Hvar	M	+	+	+	+	+	+	+	+	.	TRINAJSTIĆ (1993)
Klek	M/S	.	.	.	.	.	.	.	.	+	KUTLEŠA and LAKUŠIĆ (1964)
Pelješac	M/S	+	.	+	.	.	.	.	.	.	JASPRICA & KOVAČIĆ (1997)
Korčula	S	+	.	.	+	.	.	.	.	.	TRINAJSTIĆ (1985)
Mljet	S	+	.	+	.	.	.	.	.	.	REGULA-BEVILACQUA and ILIJANIĆ (1984)
Lastovo	S	+	.	.	.	+	+	+	+	.	TRINAJSTIĆ (1966, 1979)
Šipan	S	.	+	.	.	.	.	.	.	.	HEĆIMOVIĆ, M. (1981)
Lopud	S	+	+	+	.	.	.	.	.	.	HEĆIMOVIĆ, M. and S. (1986)
Koločep	S	+	.	+	.	.	.	.	.	.	HEĆIMOVIĆ, M. and S. (1987)
Lokrum	S	.	+	.	.	.	.	.	.	.	HEĆIMOVIĆ, S. (1982)
Lokrum	S	+	.	.	.	.	.	.	.	.	HORVATIĆ (1958)

them, such as *Ecballium elaterium* or *Calendula arvensis,* could no longer be found in the area.

Although it does grow all around in South Istria (Pomer, Pula, Medulin), for a reason unknown to us not one specimen of *Cistus salvifolius* was found or even recorded in the investigated area, while *C. incanus* and *C. monspeliensis* are very abundant.

Unfortunately, we have not yet found *Ophioglossum lusitanicum*. It was noted by FREYN (1877) and confirmed later by MAYER in 1975 (Herbarium ZA). The very site where it was found has partially been destroyed by a new road and partially overgrown with grass and bushes in a progressive vegetation succession. In the checklist of Croatian flora, this species is marked as extinct (HRŠAK 1994).

The total number of plant taxa registered for the investigated area amounts to 433, some of them being recorded previously (94). We have confirmed 410 out of 433, and failed to confirm 23. Data from localities outside the investigated area are ommitted. One such case is the finding of *Calystegia soldanella* (PERICIN

1998), which is one of the most peculiar, considering the stony and pebbled shore of the cited locality and thus, so far, the only one on the Croatian coast outside a sandy beach.

Nevertheless, the richness of the flora of the investigated area is obvious, in comparison to several islands, islets and reefs along the Croatian Adriatic (Tab. 4), especially considering the size of the areas.

Tab. 4. Number of plant species in the southernmost part of Istria (**Rt Kamenjak**) and on some Adriatic islands (1–12: REGULA-BEVILACQUA and ILIJANIĆ 1984; 13–14, 16–19: PAVLETIĆ 1983)

	Island	Area (km²)	Number of species
1	Krk	409.93	1170
2	Cres	404.33	1250
3	Brač	394.57	750
4	Hvar	299.60	860
5	Pag	284.60	650
6	Korčula	276.00	850
7	Dugi	124.00	540
8	Mljet	100.41	716
9	Rab	93.60	800
10	Vis	90.30	800
11	Lošinj	76.68	1300
12	Lastovo	50.00	700
13	Biševo	5.80	398
14	Svetac	5.10	344
15	**Rt Kamenjak**	5.00	433
16	Palagruža	-	220
17	Brusnik	-	41
18	Jabuka	-	35
19	Kamik	-	17

Due to its specific climatological position and other influences it is to be expected that the investigated area will contain even more species, particularly if the surrounding islets are included.

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References

BARČIĆ, B., 1996: Flora i vegetacija otočića Košljuna. Drugo dopunjeno izdanje, Košljun.

BEDALOV, M., GAŽI-BASKOVA, V., 1969: Rasprostranjenje vrste *Convolvulus lineatus* u Jugoslaviji. Acta Bot. Croat. 28, 417–418.

BEDALOV, M., GAŽI, V., 1987: Analiza flore Kornatskog otočja. Acta Bot. Croat. 46, 173–184.

FREYN, J., 1877: Die Flora von Süd-Istrien. Verh. Zool. -Bot. Ges. Wien 27, 241–490.

FREYN, J., 1881: Nachträge zur Flora von Süd-Istrien, zugleich Beiträge zur Flora Gesammt-Istriens enthaltend. Verh. Zool.-Bot. Ges. 31, 359–392.

GAŽI-BASKOVA, V., BEDALOV, M., 1983: Flora Kornatskog otočja. Proc. Symp. Robert Visiani Šibenčanin, Šibenik, 443–454.

GEIGER, R., 1966: The climate near the ground. Harvard University Press, Cambridge.

GOTTSCHLICH, G., PERICIN, C., 1999: Das Artenspektrum der Gattung *Hieracium* L. (*Compositae*) in Istrien. Bauhinia 13, 29–40.

GRAČANIN, M., 1950: Mjesečni kišni faktori i njihovo značenje u pedološkim istraživanjima. Poljopriv. znanstv. smotra, 12, 51–67.

HAYEK, A. VON, 1927–1933: Prodromus florae Penninsulae Balcanicae. 1–3, Berlin.

HARAČIĆ, A., 1905: L'isola di Lussin. Il suo Clima e la sua vegetazione. Lussinpiccolo.

HEĆIMOVIĆ, M., 1981: Prikaz i analiza flore otoka Šipana. Acta Bot. Croat 40, 205–207.

HEĆIMOVIĆ, M., HEĆIMOVIĆ, S., 1986: Prikaz i analiza flore otoka Lopuda. Acta Bot. Croat. 45, 119–135.

HEĆIMOVIĆ, M., HEĆIMOVIĆ, S., 1987: Flora otoka Koločepa. Acta Bot. Croat. 46, 173–184.

HEĆIMOVIĆ, S., 1982: Flora otoka Lokruma, Bobare i Mrkana. Acta Bot. Croat. 41, 155–170.

HEGI, G., 1918: Illustrierte Flora von Mittel-Europa. VI/1. Pichler's Witwe und Sohn, Wien.

HORVAT, I., GLAVAČ, V., ELLENBERG, H., 1974: Vegetation Südosteuropas. Gustav Fischer Verl., Jena.

HORVATIĆ, S., 1958: Tipološko raščlanjenje primorske vegetacije gariga i borovih šuma. Acta Bot. Croat. 17, 7–98.

HORVATIĆ, S., ILIJANIĆ, Lj., MARKOVIĆ-GOSPODARIĆ, Lj., 1967–1968: Biljni pokrov okoline Senja. Senjski zbornik 3, 298–322.

HRŠAK, V., 1994: *Ophioglossaceae*. In NIKOLIĆ, T. (Edit.): Flora Croatica. Index Florae Croaticae. Nat. Croat. 3, 32–33.

ILIJANIĆ, Lj., MARKOVIĆ, Lj., 1986: *Panicum dichotomiflorum* Michaux in the surroundings of Zagreb. Acta Bot. Croat. 45, 137–139.

JASPRICA, N., KOVAČIĆ, S., 1997: Vascular flora of the central part of Pelješac peninsula. Nat. Croat 6, 381–407.

KIRIGIN, B., ŠINIK, N., BERTOVIĆ, S., (eds.) 1971: Klimatski podaci SR Hrvatske. Građa za klimu Hrvatske, Ser. 2, Br. 5, Republički hidrometeorološki zavod SR Hrvatske, Zagreb.

KUTLEŠA, Lj., LAKUŠIĆ, R., 1964: Flora i vegetacija poluotoka Kleka. Godišnjak Biol. inst. Univ. Sarajevo 17, 61–115.

PANDŽA, M., 1998: Flora of the island of Murter (Central Adriatic). Acta Bot. Croat 57, 99–122.

PANDŽA, M., 1998: Flora of the island of Zlarin. Nat. Croat 7, 59–78.

PANDŽA, M., 1998: Flora of the islands of Krapanj and Prvić. Nat. Croat. 7, 321–339.

PANDŽA, M., STANČIĆ, Z., 1995: Contribution to the flora of the Kornati islands (Croatia). Nat Croat. 4, 133–142.

PAVLETIĆ, ZI., 1974: Flora otoka Biševa. Acta Bot. Croat. 33, 205–217.

PAVLETIĆ, ZI., 1978: Vaskularna flora otoka Sveca. Acta Bot. Croat. 37, 215–224.

PAVLETIĆ, ZI., 1983: Pregled flore i vegetacije nekih manjih srednjodalmatinskih otoka i otočića. Zbornik Roberta Visianija Šibenčanina 315–329, Šibenik.

PERICIN, C., 1998: Floristische Beiträge aus Istrien II. Bauhinia 12 (1/2), 75–79.

PIGNATTI, S., 1982: Flora d'Italia. 1–3. Edagricole, Bologna.

RADIĆ, J., 1974: Prilog poznavanju flore Biokova. Acta Bot. Croat 33, 219–229.

REGULA-BEVILACQUA, Lj., ILIJANIĆ, Lj., 1984: Analyse der Flora der Insel Mljet. Acta Bot. Croat. 43, 119–142.

SMITH, A. R., TUTIN, T. G., 1978: *Euphorbia.* In TUTIN, T. G. et al. (eds.), Flora Europaea, vol. 2., 222. Cambridge Univ. Press, London.

STARMÜHLER, W., 1998: Vorarbeiten zu einer »Flora von Istrien« Teil I. Carinthia II 188/108, 535–576.

STARMÜHLER, W., 1999: Vorarbeiten zu einer »Flora von Istrien« Teil II. Carinthia II, 189/109, 431–436.

ŠKORIĆ, A., BOGUNOVIĆ, M., 1987: Geografija tala. In ŠKORIĆ, A. (Edit.): Pedosfera Istre (sa pedološkom kartom). Projektni savjet pedološke karte Hrvatske, Posebna izdanja, knjiga 2, Zagreb.

TOMMASINI, M., 1873: Die Flora des Südlichsten Teiles von Istrien bei Promontore und Medolino. Oesterr. Bot. Zeitschr. 23, 169–177, 219–227, 257–260.

TOPIĆ, J., 1994: A new locality of *Convolvulus lineatus* L. in Croatia. Acta Bot. Croat. 53, 141–143.

TOPIĆ, J., ILIJANIĆ, Lj., ŠEGULJA, N., 1998: *Erodium acaule* (L.) Becherer (*Geraniaceae*), a new species in Croatian Flora. Nat. Croat. 7, 359–362.

TOPIĆ, J., ŠEGULJA, N., ILIJANIĆ, Lj., 1997: *Anthemis tomentosa* L. (*Asteraceae*) a new species in Croatian flora. Nat. Croat. 6, 119–123.

TRINAJSTIĆ, I., 1964: Treći prilog flori otoka Krka. Acta Bot. Croat. 23, 151–156.

TRINAJSTIĆ, I., 1966: Dodatak flori otoka Lastova. Acta. Bot. Croat. 25, 181–184.

TRINAJSTIĆ, I., 1979: Pregled flore otoka Lastova. Acta Bot. Croat. 38, 167–186.

TRINAJSTIĆ, I., 1985: Die Vegetation des *Rosmarino-Ericion multiflorae* Br.-Bl. Verbandes auf dem Gebiete des ostadriatischen Küstenlandes der Balkanhalbinsel. Poljopriv. i šumarstvo 31, 51–62.

TRINAJSTIĆ, I., 1985: Flora otočne skupine Korčule. Acta Bot. Croat. 44, 107–130.

TRINAJSTIĆ, I., 1993: Vaskularna flora otoka Hvara. Acta Bot. Croat. 52, 113–143.

TUTIN, T. G. et al. (eds.) 1964–1980: Flora Europaea 1–5, Cambridge Univ. Press.

VIDAČEK, Ž., 1979: Osnovna pedološka karta sekcije Pula 1, mjerila 1:50 000. Projektni savjet za izradu pedološke karte SR Hrvatske, Zagreb.

VLADOVIĆ, D., ILIJANIĆ, Lj., 1995: Treći prilog flori planine Mosor (Hrvatska). Acta Bot. Croat. 54, 41–46.