

## VASCULAR FLORA OF THE ISLAND OF VELA KLUDA

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**Vladović, D., Šunjara, V., Pavlov, M. & Bačić, T.: Vascular flora of the island of Vela Kluda. Nat. Croat., Vol. 10, No. 1, 19–31, 2001, Zagreb.**

According to botanical research carried out in 1997/1998, it has been established that the flora of the island of Vela Kluda numbers 137 species of vascular plants classified into 107 genera and 42 families. According to all the data checked, no systemic botanical research has been carried out on the island previous, so this analysis of the living forms and floral elements of the registered taxa of vascular plants has been performed.

**Key words:** island of Vela Kluda, flora, Croatia

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Na temelju botaničkih istraživanja (1997/1998) utvrđeno je da flora otoka Vela Kluda broji 137 vrsta vaskularnih biljaka koje su svrstane u 107 rodova i 42 porodice. Prema dostupnim literaturnim podacima prethodno na otoku nisu vršena sustavna botanička istraživanja. Za registrirane svojte vaskularnih biljaka izvršena je analiza životnih oblika i flornih elemenata.

**Ključne riječi:** otok Vela Kluda, flora, Hrvatska

### INTRODUCTION

Vela Kluda (Fig. 1) is the largest island of the Kluda group of islands, situated between the island of Veli Drvenik, the peninsula of Čiovo and the mainland. The area of the island is cca 0.12 km<sup>2</sup>, and the highest altitude of the island is 50 m. In comparison with the island of Veli Drvenik which is floristically well researched (BEDALOV, 1976), according to our knowledge from the available bibliography, there are no data for the flora of the island of Vela Kluda except for a brief report (VLADOVIĆ, PAVLOV & ŠUNJARA, 1998) in which, along with *Corydalis acaulis* (Wulfen) Pers., 6 other species are mentioned.



Fig. 1. Geographical position of the island of Vela Kluda

## MATERIALS AND METHODS

The standard methods of floristic investigation have been used in this research: the collection and preparation of floristic material; its determination; phytogeographic analysis and analysis of living forms according to appropriate floristic works. The names of most taxa correspond with the work *Flora d'Italia* (PIGNATTI, 1982). In the frame of the higher systematic groups, the families are listed in alphabetical order (within families there are genera; and within genera there are species). For each taxon, a mark of the floral element according to HORVATIĆ (1963) and HORVATIĆ, ILIJANIĆ & GOSPODARIĆ-MARKOVIĆ (1967–1968) is stated at the end:

1. Circum – Mediterranean plants
2. West Mediterranean plants
3. Illyrian – Adriatic endemic plants
4. Mediterranean – Atlantic plants
5. European – Mediterranean plants
6. Mediterranean – Pontic plants
7. South European – Mediterranean plants

8. South European – Pontic plants
9. European floral element
10. Eurasian floral element
11. Widespread plants
12. Cultivated plants

After each denotation of a floral element there is a common abbreviation for the living form (according to PIGNATTI, 1982):

- P (*Phanerophyta*)  
 Ch (*Chamaephyta*)  
 H (*Hemicryptophyta*)  
 G (*Geophyta*)  
 T (*Terophyta*)

At the end of this work an analysis of the floral elements is given and the spectrum of the living forms of the vascular plants of the island of Vela Kluda is described.

## RESULTS

### FLORISTIC LIST

#### **Pteridophyta**

##### *Filicales*

##### *Aspleniaceae*

<i>Asplenium trichomanes</i> L.	11 H
<i>Ceterach officinarum</i> DC.	7 H

#### **Spermatophyta**

##### *Gymnospermae*

##### *Cupressaceae*

<i>Juniperus oxycedrus</i> L. ssp. <i>oxycedrus</i>	1 P
<i>J. phoenicea</i> L.	1 P

##### *Ephedraceae*

<i>Ephedra fragilis</i> Desf.	2 P
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**Angiospermae****Dicotyledones***Anacardiaceae*

*Pistacia lentiscus* L. 1 P

*Boraginaceae*

*Myosotis ramosissima* Rochel 10 T

*Campanulaceae*

*Campanula pyramidalis* L. 3 H

*Legousia speculum – veneris* (L.) Chaix 7 T

*Caryophyllaceae*

*Cerastium brachypetalum* Desportes et Pers. 7 T

*Minuartia mediterranea* (Link) Maly 1 T

*Petrohragia saxifraga* (L.) Link 7 H

*Silene alba* (Miller) Krause 10 H

*S. vulgaris* (Moench) Garcke ssp. *angustifolia*  
(Miller) Hayek 7 H

*Chenopodiaceae*

*Salicornia europaea* L. 2 T

*Compositae*

*Bellis sylvestris* Cyr. 1 H

*Calendula arvensis* L. 7 T

*Hedypnois cretica* (L.) Willd. 1 T

*Helichrysum italicum* (Roth.) Don 1 Ch

*Inula crithmoides* L. 4 Ch

*I. viscosa* (L.) Aiton 1 H

*Leontodon tuberosus* L. 1 H

*Matricaria chamomilla* L. 1 T

*Pallenis spinosa* (L.) Cass. 1 T

*Reichardia picroides* (L.) Roth 1 Ch

*Senecio vulgaris* L. 11 T

<i>Sonchus asper</i> (L.) Hill. ssp. <i>nymani</i> (Tineo et Guss.) Hegi (= <i>S. glaucesceus</i> Jordan)	1 T
<i>S. oleraceus</i> L.	11 T
<i>Convolvulaceae</i>	
<i>Convolvulus elegantissimus</i> Miller	2 H
<i>Crassulaceae</i>	
<i>Umbilicus horizontalis</i> (Guss.) DC.	1 G
<i>Cruciferae</i>	
<i>Alyssoides sinuata</i> (L.) Medicus	3 Ch
<i>Alyssum alyssoides</i> (L.) L.	7 T
<i>Capsella rubella</i> Reuter	1 T
<i>Cardamine hirsuta</i> L.	11 T
<i>Euphorbiaceae</i>	
<i>Euphorbia helioscopia</i> L.	11 T
<i>E. wulfenii</i> Hoppe	3 Ch
<i>Mercurialis annua</i> L.	11 T
<i>Fagaceae</i>	
<i>Quercus ilex</i> L.	1 P
<i>Gentianaceae</i>	
<i>Blackstonia perfoliata</i> (L.) Hudson	4 T
<i>Geraniaceae</i>	
<i>Geranium molle</i> L.	11 T
<i>G. purpureum</i> Vill.	7 T
<i>G. rotundifolium</i> L.	11 T
<i>Labiatae</i>	
<i>Calamintha nepetoides</i> Hal.	7 T
<i>Micromeria juliana</i> (L.) Bentham	1 Ch
<i>Prasium majus</i> L.	1 Ch
<i>Salvia officinalis</i> L.	5 Ch
<i>S. verbenaca</i> L.	4 H
<i>Teucrium polium</i> L. ssp. <i>capitatum</i> (L.) Arcang	6 Ch

*Leguminosae*

<i>Anagyris foetida</i> L.	1 P
<i>Anthyllis vulneraria</i> L. subsp. <i>adriatica</i> Beck	3 H
<i>Astragalus muelleri</i> Steudel et Hochst	3 H
<i>Ceratonia siliqua</i> L.	12 P
<i>Colutea arborescens</i> L.	1 P
<i>Coronilla cretica</i> L.	2 T
<i>C. emerus</i> L. ssp. <i>emeroides</i> (Boiss. et Spr.) Hayek	2 P
<i>C. scorpioides</i> (L.) Koch.	1 T
<i>Hippocrepis unisiliquosa</i> L.	1 T
<i>Lathyrus aphaca</i> L.	7 T
<i>Lotus cytisoides</i> L. (= <i>L. allionii</i> Desv.)	1 T
<i>L. edulis</i> L.	1 T
<i>L. ornithopodioides</i> L.	1 T
<i>Medicago arabica</i> (L.) Hudson	11 T
<i>M. coronata</i> (L.) Bartal	1 T
<i>M. minima</i> (L.) Bartal	11 T
<i>M. orbicularis</i> (L.) Bartal	1 T
<i>M. rigidula</i> (L.) All.	6 T
<i>M. sativa</i> L. subsp. <i>sativa</i>	12 H
<i>M. truncatula</i> Gaertner var. <i>tribuloides</i> (Sesr.) Burnat.	1 T
<i>Pisum sativum</i> L. subsp. <i>elatius</i> (Bieb.) Asch. et Gr.	1 T
<i>Psoralea bituminosa</i> L.	1 Ch
<i>Scorpiurus muricatus</i> L.(= <i>S. subvillosus</i> L.)	1 T
<i>Trifolium angustifolium</i> L.	1 T
<i>T. scabrum</i> L. ssp. <i>lucanicum</i> (Gasparr.) Pign.	1 T
<i>T. stellatum</i> L.	1 T
<i>Vicia sativa</i> L.	10 T
<i>V. tenuissima</i> (Bieb.) Sch. et Th.	1 T

*Linaceae*

<i>Linum tenuifolium</i> L.	8 Ch
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*Malvaceae**Malva sylvestris* L. 11 H*Moraceae**Ficus carica* L. 1 P*Oleaceae**Olea europaea* L. 1 P*Phillyrea latifolia* L. 1 P*Papaveraceae**Corydalis acaulis* (Wulfen) Pers. 3 H*Fumaria flabellata* Gasparr. 1 T*Plantaginaceae**Plantago lanceolata* L. 11 H*Plumbaginaceae**Limonium serotinum* (Rchb.) Pign. 1 H*Polygonaceae**Rumex acetosella* L. 11 H*R. pulcher* L. subsp. *pulcher* 8 H*Primulaceae**Anagallis arvensis* L. 11 T*A. gentiana* (Beck) Domac 7 T*Asterolinum linum – stellatum* (L.) Duby 1 T*Cyclamen hederifolium* Aiton 7 G*C. repandum* S. et S. 5 G*Ranunculaceae**Clematis flammula* L. 1 P*C. vitalba* L. 9 P*Rosaceae**Prunus mahaleb* L. 8 P*Sanguisorba minor* Scop. ssp. *muricata* (Gremli) Briq. 8 H

*Rubiaceae*

<i>Galium aparine</i> L.	11 T
<i>G. corrudifolium</i> Vill.	1 H
<i>Rubia peregrina</i> L.	1 P
<i>Sherardia arvensis</i> L.	11 T
<i>Valantia muralis</i> L.	1 T

*Santalaceae*

<i>Osyris alba</i> L.	1 P
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*Saxifragaceae*

<i>Saxifraga tridactylites</i> L.	11 T
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*Scrophulariaceae*

<i>Veronica arvensis</i> L.	10 T
<i>V. cymbalaria</i> Bodard	7 T

*Umbelliferae*

<i>Crithmum maritimum</i> L.	4 Ch
<i>Foeniculum vulgare</i> Miller	1 H
<i>Opoponax chironium</i> (L.) Koch.	1 H
<i>Scandix pecten – veneris</i> L.	11 T
<i>Torilis nodosa</i> (L.) Gaertner	4 T

*Urticaceae*

<i>Parietaria diffusa</i> M. et K.	7 H
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**Monocotyledones***Amaryllidaceae*

<i>Narcis tazetta</i> L.	1 G
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*Araceae*

<i>Arisarum vulgare</i> Targ. – Tozz.	1 G
<i>Arum italicum</i> Miller	4 G

*Cyperaceae*

<i>Carex divulsa</i> Stokes	11 H
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*Dioscoridaceae*



<i>Tamus communis</i> L.	7 G
<i>Graminaceae</i>	
<i>Avena barbata</i> Potter	7 T
<i>Brachypodium ramosum</i> (L.) R. et S.	1 H
<i>Briza maxima</i> L.	1 T
<i>Bromus madritensis</i> L.	4 T
<i>Catapodium marinum</i> (L.) Hubbard (= <i>C. loliaceum</i> Link)	4 T
<i>C. rigidum</i> (L.) Hubbard	4 T
<i>Cynosurus echinatus</i> L.	7 T
<i>Dactylis hispanica</i> Roth.	1 H
<i>Lagurus ovatus</i> L.	1 T
<i>Melica ciliata</i> L.	6 H
<i>Parapholis incurva</i> (L.) Hubbard (= <i>Lepturus incurvatus</i> Trin.)	4 T
<i>Iridaceae</i>	
<i>Gladiolus italicum</i> Miller (= <i>G. segetum</i> Ker – Gawl)	7 G
<i>Liliaceae</i>	
<i>Allium neapolitanum</i> Cyr.	1 G
<i>A. roseum</i> L.	1 G
<i>A. subhirsutum</i> L.	1 G
<i>Asparagus acutifolius</i> L.	1 G
<i>Asphodelus microcarpus</i> Salzm. et Viv.	1 G
<i>Leopoldia comosa</i> (L.) Parl. (= <i>Muscari comosum</i> L.)	7 G
<i>Ruscus aculeatus</i> L.	6 G
<i>Smilax aspera</i> L.	1 P

## TAXONOMIC ANALYSIS

Analyzing the systematic positions (Tab. 1) of the registered plant taxa, 42 families have been established, in which 107 genera and 137 species of vascular plants have been registered.

The most dominant groups are *Dicotyledones* with 106 species (77.4 %), followed by *Monocotyledones* with 26 species (19 %), *Gymnospermae* with 3 species (2.2 %) and *Pteridophyta* with 2 species (1.4 %). According to the number of the registered species, the most dominant families are: *Leguminosae* with 28 species (20.4 %), *Compositae* with 13 species (9.5 %), *Graminaceae* with 11 species (8 %) and *Liliaceae* with 9 species (6.6 %).

**Tab. 1.** Taxonomic analysis of the vascular plants from the island of Vela Kluda

	family	genus	species
PTERIDOPHYTA	1	2	2
SPERMATOPHYTA			
Gymnospermae	2	2	3
Angiospermae			
– Dicotyledones	32	80	106
– Monocotyledones	7	23	26
TOTAL	42	107	137

## ANALYSIS OF FLORAL ELEMENTS

Of recorded vascular plants from the island of Vela Kluda, the greatest number of taxa belong to the Mediterranean floral element, which is relatively the most representative (Tab. 2).

For the Mediterranean floral element 87 species have been registered or 63.5 % of the vascular plants registered so far. Then comes the South European floral element with 24 species (17.5 %); widespread plants with 19 species (13.8 %) and other floral elements stated in Tab. 2. Illyrian – Adriatic endemic plants are present within the Mediterranean floral element from the island of Vela Kluda: *Campanula pyramidalis* L., *Alyssoides sinuata* (L.) Medicus, *Euphorbia wulfenii* Hoppe, *Anthyllis vulneraria* L. subsp. *adriatica* Beck, *Astragalus muelleri* Steudel et Hohst and *Corydalis acaulis* (Wulfen) Pers. The habitat of *Corydalis acaulis* (Wulfen) Pers. fills up a deficiency in the so-far known range of this Illyrian – Adriatic endemic plant (VLADOVIĆ, PAVLOV & ŠUNJARA, 1998). It is important that the second habitat in 147 years of the species *Anagyris foetida* L. (Visiani, 1852) of the Circum – Mediterranean group of plants has been found.

**Tab. 2.** Analysis of the floral elements of the island of Vela Kluda

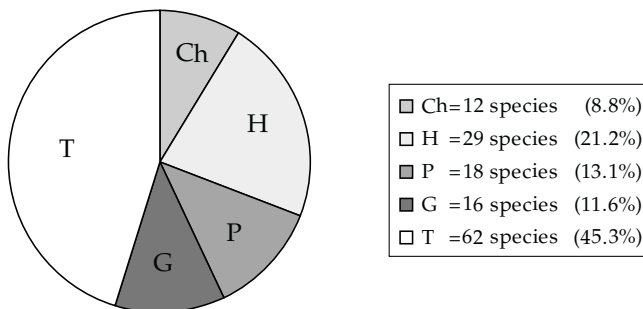
Floral element	Number of species	%
<b>1. MEDITERRANEAN</b>	<b>87</b>	<b>63,5</b>
1. Circum – Mediterranean plants	60	43,7
2. West Mediterranean plants	5	3,6
3. Illyrian – Adriatic endemic plants	6	4,4
4. Mediterranean – Atlantic plants	10	7,3
5. European – Mediterranean plants	2	1,5
6. Mediterranean – Pontic plant	4	3,0
<b>2. SOUTH EUROPEAN</b>	<b>24</b>	<b>17,5</b>
7. South European – Mediterranean plants	20	14,5
8. South European – Pontic plant	4	3,0
<b>3. OTHERS</b>		
9. European	1	0,7
10. Eurasian	4	3,0
11. Widespread plants	19	13,8
12. Cultivated plants	2	1,5

## ANALYSIS OF LIVING FORMS

In the flora of the island of Vela Kluda the following plants prevail: *Terophyta* with 62 species (45.3 %) and *Hemicryptophyta* with 29 species (21.2 %), while the proportion and the relative representations of other living forms are perceptible in the spectrum of living forms (Fig. 2.).

## CONCLUSION

For the investigated area, the island of Vela Kluda, 137 plants have been registered and classified within 107 genera and 42 families. From the total number of

**Fig. 2.** Spectrum of living forms of the vascular plants from the island of Vela Kluda

species, 87 (63.5 %) of them belong to different groups of the Mediterranean floral element, and the most numerous are Circum – Mediterranean plants. The most prevalent group of living forms is *Terophyta* with 62 species (45.3 %).

The greatest number of species is registered within the *Leguminosae*, *Compositae* and *Graminaceae* families.

From the phytogeographic point of view, the finding places of the following species are of extreme importance: *Corydalis acaulis* (Wulfen) Pers. (which fills in the hitherto known range of this Illyrian – Adriatic endemic plants) and *Anagyris foetida* L. (the second locality ever found for this species in the Croatian flora).

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## SAŽETAK

### Vaskularna flora otoka Vela Kluda

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Botanički neistraženo područje otok Vela Kluda površine cca. 0,12 km<sup>2</sup>, nalazi se između otoka Velog Drvenika, poluotoka Čiova i kopna. Na temelju botaničkih istraživanja (1997/1998), utvrđeno je 137 vrsta vaskularnih biljaka, koje su svrstane u 107 rodova i 42 porodice. Najveći broj vrsta registriran je za porodice: *Leguminosae*,

*Compositae* i *Graminaceae*. Od ukupnog broja vrsta njih 87 (63,5 %) pripada različitim skupinama mediteranskog flornog elementa.

Od životnih oblika dominira skupina *Terophyta* sa 62 vrste (45,3 %). Sve navedene činjenice potvrđuju mediteranske značajke flore otoka Vela Kluda. Zasebno, značajni su nalazi: ilirsko – jadransko endemične biljke *Corydalis acaulis* (Wulfen) Pers. i vrste *Anagyris foetida* L., za floru Hrvatske drugo nalazište.