

Ecological and Phytogeographical Characteristics of the Weed Flora in the Lijevče Plain

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Abstract

In this paper it is given review and basic characteristics of the weed flora in the Lijevče plain: ecological index values, biological spectrum and spectrum of areal types. Floristic researches of the weed flora in the Lijevčepain were conducted on 61 localities in crops and perennial planting. The researches were conducted during the two vegetation seasons (2013. and 2014.) It is determined that there are 163 types of the vascular flora, classified in 122 genus and 39 families. According to the ecological indicator values for some ecological factors, the habitat can be characterized as medium moist, neutral to light acid stock, soil that is medium rich in minerals and favorable light and temperature regime of that habitat. Seven life forms make the biological spectrum in which the most dominant ones are: hemicryptophytes (37,42%), therophytes (22,09%), therophytes–chamaephytic (19,63%), and geophytes (15,95%). Regardless the fact that Geophytes species are less present; because of the biological characteristics they are very important and represent the big issue in the weed control. By phytogeographical analysis 23 floral elements are constituted and among them the most present are: Eurasian (19,2%), sub Central European (17,79%), sub Eurasian (17,18%), Cosmopolitan (11,64%), and Adventitious (9,20%), and together they make 122 species. Among the Adventitious especially significant are the invasive ones: *Ambrosia artemisiifolia* L., *Helianthus tuberosus* L. and *Abutilon theophrasti* Medic. which suppress the autochthonous species with their aggression, and they spread out even more, and even form monodominant communities. In regard to the previous researches the large floristic, ecological and phytogeographical wealth of the weed flora is expressed which indicates the need of finding the proper measures of the weed control which were not

adequate according to the obtained results. Detailed overview of the weed flora represents the start point for taking the measures of the weed control.

Key words: weed flora, ecological index values, life forms, floral elements, Lijevče plain

Introduction

Weeds represent a highly complex category of plants which grow along with the cultivated plants against man's will. They cause damage by decreasing yield, making production more expensive, occupying underground and aboveground area, spending vast quantity of water and mineral substances and making tillage more difficult. They can be hosts of transmission of plant diseases and vermin. According to Štefanac (1988), weeds are potential sources of virus infections for cultivated plants. Weed plants have certain biological and ecological characteristics, which are consequences of long-term adjustment to the life conditions. It is assumed that weeds are durable and resistant. This comes from their characteristics, such as: capability of adjustment, high level of plasticity, wide ecological atomicity, production of huge amount of seed, cosmopolitism, etc. (Kojić & Šinžar, 1985).

Weed flora, as a significant component of agro phytocoenoses and agro ecosystems in whole, represent exceptional interest in science and expertise. Agro ecosystems are dominated by complex relations caused by strong action of anthropogenic factor with a significant influence of abiotic factors. In this complex, weed plant communities make a strong link for scientific interpretation of rules in complex relations of life communities. On the other side, knowing of floristic system of other important specificities of weed communities represent the only secure and reliable basis for finding and applying adequate control measures, especially for application of herbicides (Kojić et al., 1992). Weeds enter competitive relations with agro edificatory species, causing them harm. Bad action of weeds is manifested especially in land drainage and adverse action on the cultivated plant due to the lack of water (Kovačević, 2008). Precondition for successful control of weeds is a good knowledge of weed flora. It is also an important precondition for the selection and application of suitable measures of weed control (Kojić & Šinžar, 1985).

Significant problems can be caused by invasive weed species, especially from *Asteraceae* family, i.e. *Ambrosia artemisifolia* L., *Erigeron canadensis* (L) Cronq., *Xanthium strumarium* L., *Helianthus tuberosus* L. and many others because they spread and suppress indigenous weed species

(Vrbničanin et al., 2004). Prevalence of invasive and economically harmful weeds is explored by Kovačević et al., 2008. First publication in Bosnia and Herzegovina with detail biology, ecology, damage and influence on people's health by *Ambrosia artemisifolia* L. was published by Trkulja et al. (2010). Kovačević and Mitrić (2011) made a very detailed monographic study as a result of long-standing field research. They described 22 invasive and economically harmful species in the northern parts of the Republika Srpska territory and expressed detailed non-herbicidal and herbicidal control measures in certain crops and plants.

In former Yugoslavia weed flora and vegetation is very well studied, and it is mostly related to areas in Serbia (Kojić et al., 1988, 1992, 1998, 2001, Stepić, 1995; Šinžar & Živanović, 1993; Nestorović, 2003, 2005; Vrbničanin et al., 2009; Ilić et al., 2010; Šarić et al., 2011; Konstantinović et al., 2011; Knežević et al., 2012; Nikolić et al., 2012; Milošević et al., 2012, 2015), Croatia (Topić, 1998; Vrbek, 2000; Hulina, 2005), Kosovo (Pejčinović & Kojić, 1988), Montenegro (Hadžiablahović et al., 2011; Stešević & Jovović, 2011), Macedonia (Lozanovski & Piperovska, 1992) and Slovenia (Šilc, 2005).

Material and Methods

Floristic research of weed flora in Lijeveč plain is made during two vegetation seasons (2013-2014) by: direct observations, collecting herbal material, determination of weed species and collecting preserved plant specimens for herbarium. This research covers 61 localities in four municipalities (Gradiška, Laktaši, Srbac and Kozarska Dubica). Determination of herbal species is based on publications: *Flora SR Srbije I-IX* (Josipović et al., 1970–1977), *Flora Hrvatske* (Domac, 1994), *Ilustrovana korovska flora Jugoslavije* (Čanak et al., 1977) and *Ikonographie der Flora des Südöstlichen Mitteleuropa* (Javorka & Csapody, 1979). Taxonomy and nomenclature in marking herbal species are adjusted according to *Flora SR Srbije I–X* (Josipović et al., 1970–1992). Ecological indicator values and life forms of certain species are shown according to Kojic et al., (1997). Elements of flora are given by Oberdofer (2001).

Results and Discussion

During two-year long research of weed flora in Lijeveč Polje, 163 species of vascular plants has been enumerated (Table 1). Since the last research of weed flora in Lijeveč plain is made by Kovačević in 1956, significant floristic treasure of weed flora is noted. It is also significant to point

Tab. 1. Taxonomic, ecologic and phytogeographical analysis of weed flora in Lijevče plain

Taksonomska, ekološka i fitogeografska analiza korovske flore Lijevča polja

Weed species <i>Korovska vrsta</i>	Ecological indicatory values <i>Ekološke indikatorske vrijednosti</i>					Life forms <i>Živome forme</i>	Floral elements <i>Florni elementi</i>
	F	N	R	L	T		
Family <i>Amarantaceae</i>							
<i>Amarantus retroflexus</i> L.	2	3	4	4	4	t	adv. (N. Am.)
Familija <i>Aristolochiaceae</i>							
<i>Aristolochia clematitis</i> L.	2	4	4	3	4	g	smed.
Familija <i>Asclepiadaceae</i>							
<i>Asclepias syriaca</i> L.	2	4	2	3	3	g	adv. (N. Am.)
Family <i>Apiaceae</i>							
<i>Anthriscus sylvestris</i> L.	3	3	4	3	3	t	boreal.euroasian.subocean.
<i>Daucus carota</i> L.	2	3	2	4	3	th	euroasian.subocean-smed
<i>Heracleum sphondylium</i> L.	3	3	4	3	2	h	subatl.
<i>Pastinaca sativa</i> L.	3	4	3	4	3	th	cosm (euroasian-smed)
<i>Torilis arvensis</i> (Huds.) Link.	2	4	3	4	4	t	smed-med
Family <i>Asteraceae</i>							
<i>Achillea millefolium</i> L.	2	3	3	4	3	h	boreal-euroasian.subocean
<i>Ambrosia artemisiifolia</i> L.	2	3	3	4	4	t	adv. (N. Am.)
<i>Ambrosia psiloctachya</i> DC.	2	3	3	4	4	t	adv. (N. Am.)
<i>Arctium lappa</i> L.	3	3	5	4	4	h	euroasian (smed)
<i>Arctium minus</i> (Hill.) Bernh.	3	3	5	4	3	h	subatl-smed (med)
<i>Artemisia vulgaris</i> L.	3	3	4	4	3	h	euroasian-subocean
<i>Bellis perennis</i> L.	3	3	3	4	3	h	subatl-smed
<i>Bidens tripartitus</i> L.	4	3	4	4	3	t	euroasian-smed
<i>Centaurea cyanus</i> L.	2	3	3	4	4	th	N. Asian-smed
<i>Centaurea jacea</i> L.	3	3	3	4	3	g	euroasian-subocean-smed
<i>Cychorium intybus</i> L.	2	4	3	5	4	h	cosm (euroasian.subocean-smed)
<i>Cirsium arvense</i> (L) Scop.	2	4	2	4	2	h	boreal-euroasian-smed.
<i>Cirsium eriophorum</i> (L.) Scop.	2	4	3	4	3	h	smed-prealp
<i>Crepis capillaris</i> (L) Wallr.	2	3	2	4	4	th	subatl (-smed)
<i>Crepis setosa</i> Mall.	2	3	3	4	5	t	smed
<i>Erigeron canadensis</i> L.	2	3	3	4	4	th	adv. (N. Am.)
<i>Galinsoga parviflora</i> Cav.	2	3	3	4	4	t	adv. (S. Am.)
<i>Helianthus tuberosus</i> L.	3	3	3	5	4	g	adv. (N. Am)
<i>Inula britannica</i> L.	4	4	3	3	4	h	euroasian.cont-smed
<i>Inula germanica</i> L.	2	4	2	4	4	h	euroasian-cont
<i>Lactuca serriola</i> L.	2	3	3	5	4	th	smed (moderate) cont
<i>Leontodon hispidus</i> L.	3	3	3	4	3	h	euroasian.subocean-smed
<i>Leucanthemum vulgare</i> Lam.	3	3	3	4	4	h	east.smed
<i>Matricaria inodora</i> L.	3	3	3	3	3	th	N. subocean
<i>Picris hieracioides</i> L.	2	4	3	4	3	h	euroasian (cont)-smed
<i>Solidago serotina</i> Ait.	3	3	3	4	3	h	adv (N. Am)
<i>Senecio vulgaris</i> L.	3	3	4	4	3	th	cosm (med-euroasian)
<i>Sonchus arvensis</i> L.	3	3	4	3	3	h	N. euroasian.subocean
<i>Sonchus asper</i> (L) Hill.	3	3	4	4	3	th	euroasian.subocean (smed)
<i>Sonchus oleraceus</i> L.	3	4	4	4	4	th	cosm (euroasian-smed-med)
<i>Stenactis annua</i> (L.) Ness.	3	3	3	4	4	th	adv (N. Am)

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Weed species <i>Korovska vrsta</i>	Ecological indicatory values <i>Ekološke indikatorske vrijednosti</i>					Life forms <i>Životne forme</i>	Floral elements <i>Florni elementi</i>
	F	N	R	L	T		
<i>Tanacetum vulgare</i> L.	3	3	3	4	3	h	euroasian–subocean
<i>Taraxacum officinale</i> Web.	3	3	4	4	3	h	cosm (boreal–euroasian (subocean))
<i>Xanthium strumarium</i> L.	3	3	4	4	5	t	east.med-cont
<i>Family Boraginaceae</i>							
<i>Echium vulgare</i> L.	1	3	3	5	4	g	euroasian–smed.
<i>Myosotis arvensis</i> (L.) Hill.	2	3	3	3	2	th	boreal–euroasian
<i>Symphytum officinale</i> L.	4	3	4	3	2	h	euroasian.subocean
<i>Family Brassicaceae</i>							
<i>Capsella–bursa pastoris</i> (L) Medic.	2	3	3	4	3	th	cosm (med (cont))
<i>Cardamine hirsuta</i> L.	3	2	3	3	3	th	subatl–smed
<i>Raphanus raphanistrum</i> L.	3	2	3	4	4	t	med–smed
<i>Roripa sylvestris</i> L.	4	4	3	4	4	h	euroasian.subocean–smed
<i>Sinapis arvensis</i> L.	3	4	3	4	3	t	euroasian.subocean–smed
<i>Family Campanulaceae</i>							
<i>Campanula patula</i> L.	3	3	2	4	3	th	euroasian (cont) (smed)
<i>Family Cannabaceae</i>							
<i>Humulus lupulus</i> L.	4	3	4	3	3	h	N. euroasian. med,circ
<i>Family Caryophyllaceae</i>							
<i>Dianthus armeria</i> L.	2	3	2	4	4	th	subatl–smed
<i>Silene alba</i> (Mill.) E. Krause	2	3	4	4	3	th	euroasian–subm
<i>Stellaria media</i> (L.) Vill.	3	3	4	3	3	th	cosm (boreal–euroasian–med)
<i>Family Chenopodiaceae</i>							
<i>Atriplex patula</i> L.	3	4	4	3	3	t	euroasian (subocean) –(smed), circ
<i>Chenopodium album</i> L.	2	3	4	3	3	t	boreal–euroasian (med)
<i>Chenopodium polyspermum</i> L.	3	3	4	3	3	t	euroasian.subocean (smed)
<i>Family Convolvulaceae</i>							
<i>Calystegia sepium</i> (L.) R. BR.	4	4	4	3	3	h	cosm (euroasian (subocean) –smed)
<i>Convolvulus arvensis</i> L.	2	4	3	4	3	g	cosm (med–smed–euroasian)
<i>Family Dipsacaceae</i>							
<i>Dipsacus sylvestris</i> Huds.	3	4	3	4	4	th	smed–med
<i>Knautia arvensis</i> (L.) Coult.	2	3	2	4	3	h	(N) euroasian.subocean
<i>Family Equisetaceae</i>							
<i>Equisetum arvense</i> L.	3	3	3	3	3	g	boreal–euroasian, circ
<i>Equisetum telmateia</i> Ehrhart	4	3	2	3	3	g	subatl–subm
<i>Family Euphorbiaceae</i>							
<i>Euphorbia amygdaloides</i> L.	3	4	3	2	3	zc	subatl–smed
<i>Euphorbia helioscopia</i> L.	3	3	4	4	4	t	cosm
<i>Family Fabaceae</i>							
<i>Amorpha fruticosa</i> L.	4	3	3	3	4	np	adv (N. Am)
<i>Coronilla varia</i> L.	2	4	2	3	3	h	moderate cont (ist.med)
<i>Dorycnium herbaceum</i> Vill.	1	4	2	3	4	dc	east boreal–ist.med-smed
<i>Lathyrus palustris</i> L.	4	4	2	4	3	g	(N.) evroz. – (cont), circ
<i>Lathyrus pratensis</i> L.	3	3	3	3	3	g	euroasian (subocean)–smed

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	F	N	R	L	T		
<i>Lathyrus tuberosus</i> L.	2	4	2	4	4	g	euroasian. cont
<i>Lotus corniculatus</i> L.	2	4	3	4	3	h	euroasian.subocean–smed
<i>Medicago lupulina</i> L.	2	4	3	3	4	th	euroasian–smed
<i>Ononis spinosa</i> L.	2	3	2	4	5	zc	euroasian.cont
<i>Trifolium arvense</i> L.	1	1	1	4	3	th	euroasian.subocean–smed
<i>Trifolium campestre</i> Schreb.	2	3	2	4	3	th	smed–subatl
<i>Trifolium pratense</i> L.	3	3	3	3	3	h	euroasian.subocean (smed)
<i>Trifolium ochroleucum</i> Huds.	2	4	2	4	3	h	smed–subatl
<i>Trifolium repens</i> L.	3	3	2	4	5	th	cosm (euroasian.subocean–smed)
<i>Vicia cracca</i> L.	3	3	3	4	3	h	boreal–euroasian
<i>Family Geraniaceae</i>							
<i>Erodium cicutarium</i> (L.) L'Herit	2	3	3	4	3	h	med–euroasian
<i>Geranium dissectum</i> L.	2	3	3	4	3	t	(med) smed–subatl
<i>Family Hypericaceae</i>							
<i>Hypericum perforatum</i> L.	2	3	3	3	3	h	euroasian–subocean–smed
<i>Family Lamiaceae</i>							
<i>Ajuga reptans</i> L.	3	3	3	3	3	h	subatl.smed
<i>Lamium purpureum</i> L.	3	4	4	4	3	th	(boreal) euroasian.smed
<i>Lycopus europeus</i> L.	5	3	3	3	3	g	euroasian–smed
<i>Mentha arvensis</i> L.	4	3	3	4	4	g	boreal–euroasian (subocean)
<i>Mentha longifolia</i> (L.) Huds	4	4	4	3	3	g	smed (euroasian)
<i>Mentha pascuorum</i> Top.	4	3	3	3	3	g	smed boreal–euroasian (subocean) –euroasian
<i>Origanum vulgare</i> L.	2	3	2	3	3	g	euroasian–smed
<i>Prunella laciniata</i> (L.) L.	2	3	2	4	4	h	smed
<i>Prunella vulgaris</i> L.	3	3	3	4	3	h	boreal–euroasian
<i>Scutellaria galericulata</i> L.	4	3	3	3	3	g	N. euroasian, circ
<i>Scutellaria hastifolia</i> L.	4	3	3	3	4	g	moderate cont (ist. med)
<i>Stachys annua</i> L.	2	4	2	4	3	g	east. med
<i>Stachys officinalis</i> (L.) Trev.	3	3	2	4	3	h	euroasian.subocean–smed
<i>Stachys palustris</i> L.	2	4	2	4	3	h	(boreal) euroasian (smed)
<i>Family Lythraceae</i>							
<i>Lythrum salicaria</i> L.	4	3	3	3	3	h	euroasian.subocean, circ
<i>Family Malvaceae</i>							
<i>Abutilon theophrasti</i> Medic.	2	3	3	4	5	t	adv. (east. med)
<i>Hibiscus trionum</i> L.	3	3	3	4	4	t	east.smed
<i>Malva moschata</i> L.	2	4	3	4	3	h	subatl–smed
<i>Malva sylvestris</i> L.	2	3	4	4	4	th	cosm (smed–euroasian)
<i>Family Oenotheraceae</i>							
<i>Epilobium adnatum</i> Gris.	3	2	4	4	3	h	smed–euroasian (subocean)
<i>Epilobium hirsutum</i> L.	4	4	4	3	4	h	euroasian.subocean–smed
<i>Epilobium palustre</i> L.	5	2	2	4	3	h	N. (euroasian), circ
<i>Family Oxalidaceae</i>							
<i>Oxalis stricta</i> L.	3	3	3	4	4	h	adv. (N. Am.)

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	F	N	R	L	T		
Family <i>Papaveraceae</i>							
<i>Papaver rhoeas</i> L.	3	4	3	3	3	th	euroasian–med
Family <i>Phytolaccaeae</i>							
<i>Phytolacca americana</i> L.	3	3	3	4	4	h	adv. (N. Am)
Family <i>Plantaginaceae</i>							
<i>Plantago lanceolata</i> L.	3	3	3	3	3	h	euroasian.subocean
<i>Plantago mayor</i> L.	3	3	3	4	3	h	cosm (boreal–euroasian.subocean)
Family <i>Poaceae</i>							
<i>Agropyrum repens</i> (L.) Beauv.	3	3	4	4	3	g	cosm (boreal–euroasian)
<i>Bromus mollis</i> L.	3	3	3	3	3	t	euroasian–smed
<i>Cynodon dactylon</i> (L.) Pers.	2	3	3	4	5	g	cosm (med)
<i>Dactylis glomerata</i> L.	3	3	4	3	3	h	euroasian.subocean–smed
<i>Digitaria sanguinalis</i> (L.) Scop.	2	3	3	4	4	t	med–smed (euroasian), circ
<i>Festuca arundinacea</i> Schreb.	4	4	3	4	3	h	subatl (smed)
<i>Holcus lanatus</i> L.	3	3	3	4	3	h	subatl–smed
<i>Hordeum murinum</i> L.	2	3	4	4	4	t	cont (smed–med)
<i>Lolium multiflorum</i> Lam.	3	3	4	4	4	g	cosm (smed–subatl)
<i>Panicum crus–galli</i> L.	3	3	4	3	4	t	cosm (med–smed–euroasian)
<i>Phleum pretense</i> L.	3	3	3	3	3	h	cosm (boreal–euroasian)
<i>Poa annua</i> L.	3	3	4	4	3	th	cosm (boreal–euroasian–med)
<i>Setaria glauca</i> (L.) P. B.	2	3	3	4	4	t	cosm (smed–med (cont))
<i>Setaria verticillata</i> (L.) P. B.	2	3	4	4	5	t	cosm (smed–med)
<i>Setaria viridis</i> (L.) P. B.	2	3	4	4	4	t	cosm (euroasian–med)
<i>Sorghum halepense</i> (L.) Pers.	2	2	3	4	5	g	adv (east.med)
Family <i>Polygonaceae</i>							
<i>Fallopia japonica</i> (Schmidt) Ronse Decr.	3	3	3	4	4	g	adv (east.asian.subocean)
<i>Polygonum aviculare</i> Agg. L.	3	3	4	4	3	t	cosm med–euroasian–boreal)
<i>Polygonum hydropiper</i> L.	4	2	3	3	3	th	euroasian–smed
<i>Polygonum lapathifolium</i> L.	3	3	4	3	3	t	euroasian.subocean
<i>Rumex acetosella</i> L.	2	1	1	5	3	h	cosm (N. euroasian (subocean))
<i>Rumex crispus</i> L.	3	3	4	3	3	h	cosm (euroasian.subocean–smed)
<i>Rumex obtusifolius</i> L.	3	3	4	4	3	h	moderate cont.subatl.smed
Family <i>Portulacaceae</i>							
<i>Portulaca oleraceae</i> L.	3	3	4	4	3	t	adv ((east)med–smed))
Family <i>Primulaceae</i>							
<i>Anagalis arvensis</i> L.	3	3	3	3	3	t	cosm (euroasian.subocean–smed)
<i>Lysimachia nummularia</i> L.	4	3	3	2	3	zc	euroasian.subocean–smed (subatl–smed)
<i>Lysimachia vulgaris</i> L.	4	3	3	3	3	h	(N.) euroasian–smed
Family <i>Pteridaceae</i>							
<i>Pteridium aquilinum</i> (L.) Kuhn	3	2	2	3	3	g	cosm ((boreal),euroasian–subocean)

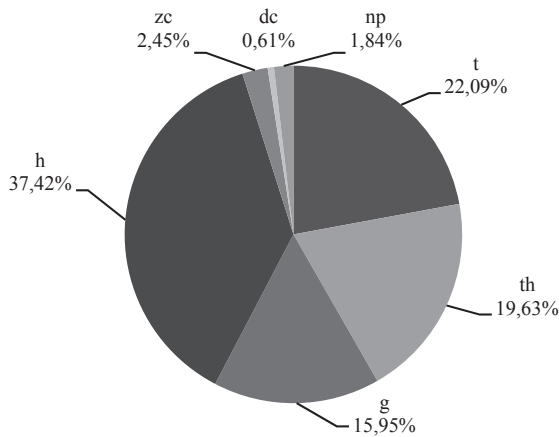
Tab. 1. Taxonomic, ecologic and phytogeographical analysis of weed flora in Lijevče plain – continued

Taksonomska, ekološka i fitogeografska analiza korovske flore Lijevča polja – nastavak

Weed species <i>Korovska vrsta</i>	Ecological indicatory values <i>Ekološke indikatorske vrijednosti</i>					Life forms <i>Životne forme</i>	Floral elements <i>Florni elementi</i>
	F	N	R	L	T		
Family <i>Ranunculaceae</i>							
<i>Nigella arvensis</i> L.	2	4	3	4	4	t	med
<i>Ranunculus arvensis</i> L.	2	4	3	3	4	t	med–euroasian
<i>Ranunculus repens</i> L.	4	3	3	3	3	h	boreal–euroasian (smed)
Family <i>Rosaceae</i>							
<i>Agrimonia eupatoria</i> L.	2	4	3	4	3	h	euroasian.subocean–smed
<i>Geum urbanum</i> L.	3	3	4	2	3	h	euroaz.subocean–smed
<i>Potentilla reptans</i> L.	3	3	2	3	3	h	cosm (euroasian–smed)
<i>Rosa canina</i> L.	3	3	2	3	3	np	euroasian–subocean–smed
<i>Rubus caesius</i> L.	4	3	5	3	4	np	euroasian (subocean)–smed
Family <i>Rubiaceae</i>							
<i>Galium aparinae</i> L.	3	3	5	3	4	t	cosm (euroasian.subocean)
<i>Galium mollugo</i> L.	3	3	3	3	3	h	smed
Family <i>Scrophulariaceae</i>							
<i>Linaria vulgaris</i> Mill.	2	3	3	4	3	h	euroasian (smed)
<i>Melampyrum pretense</i> L.	3	1	2	3	3	t	N. euroasian.subocean
<i>Scrophularia scopolii</i> Hoppe	3	3	3	4	4	h	euroasian.subocean
<i>Verbascum blattaria</i> L.	2	4	3	4	4	th	east med–cont
<i>Verbascum lanatum</i> Schrad.	2	3	4	4	4	h	euroasian–subocean
<i>Veronica baccabunga</i> L.	5	3	4	3	3	h	euroasian–smed–med
<i>Veronica chamaedrys</i> L.	3	3	3	3	3	g	boreal–euroasian.subocean, circ
<i>Veronica hederifolia</i> L.	3	3	4	3	3	th	euroasian.subocean–smed
<i>Veronica polita</i> Fr.	2	4	4	3	3	t	smed–med
Family <i>Solanaceae</i>							
<i>Datura stamonium</i> L.	3	3	4	4	4	t	cosm (Medium, N. Am.–euroasian.subocean)
<i>Solanum nigrum</i> L.	3	3	4	4	3	t	cosm (smed–euroasian)
Family <i>Urticaceae</i>							
<i>Urtica dioica</i> L.	3	3	5	3	3	h	boreal–euroasian
Family <i>Verbenaceae</i>							
<i>Verbena officinalis</i> L.	2	3	4	4	3	th	cosm (euroasian.subocean–smed–med)
Family <i>Violaceae</i>							
<i>Viola arvensis</i> Murr.	3	3	3	3	3	th	euroasian–subocean

out invasive weed species which spread aggressively and represent problem for both agro phytoceanososes and people's health.

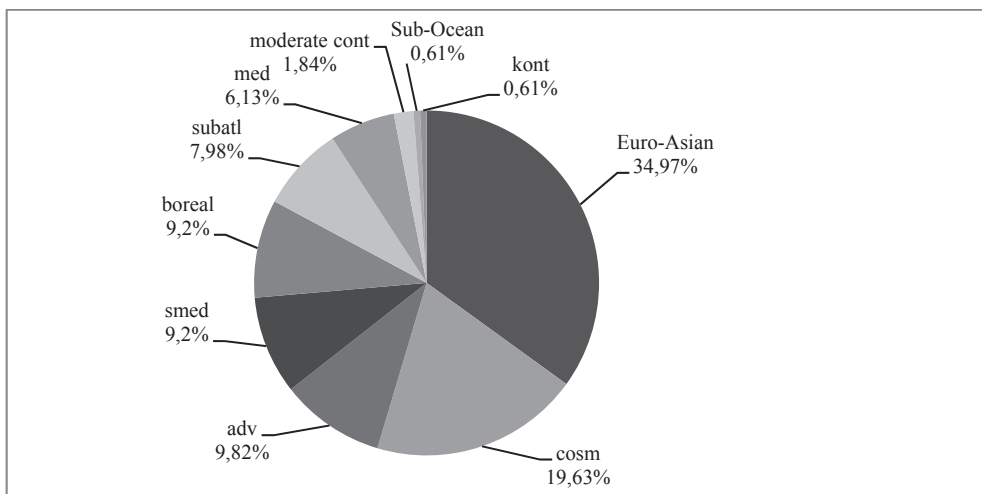
Analysis of biological spectrum of weed flora in Lijevče plain confirmed 7 life forms (Graph. 1). In the biological spectrum of weed flora in Lijevče plain there is obvious domination of life form hemicryptophyte (h) which covers 61 species or 37,42% of the total number.



Graph. 1. Biological spectrum of weed flora in Lijevče plain
Biološki spektar korovske flore Lijevča polja

Second most represented group is therophyte (t) which counts 36 species or 22,09% while third group is therophyte-chamaephyte which counts 32 species or 19,63% of the total number. The fourth group is geophytes (g) with 26 species or 15,95% of the total number. Geophytes are very important due to their biological characteristics and they make a big problem in control of weeds even though they are less represented than other species. Group of green chamaephytes consists of 4 species or 2,45% of the total number, and then there are nanophanerophytes (np) with three species (1,84%). Wooden chamaephytes (dc) are represented with one specie or 0,61% of the total number.

Analysis of areal spectrum, i.e. detail phytogeographical analysis of weed flora in Lijevče plain, confirmed 68 different elements of flora divided in 10 floristic groups. Phytogeographicala analysis points out the domination of Euro-Asian, cosmopolitan, adventitious, sub-Mediterranean and boreal group of floristic elements which count 148 species or 90,80% of the total number (Graph. 2). Mediterranean group consists of 10 species or 6,13% , while temperate continental group has 3 species or 1,84%. Sub-Ocean and continental group have one specie or 0,61%.



Graph. 2. Areal spectrum of weed flora in Lijevo plain
Areal spektar korovske flore Lijevo polja

Conclusion

Floristic research of weed flora Lijevo plain, during two vegetation seasons (2013-2014), covers 61 localities from the area of four municipalities (Gradiška, Laktaši, Srbac and Kozarska Dubica). On the researched area, 163 species of vascular plants have been found. They belong to 122 genera, 39 families, 4 classes and 2 phyla.

Analysis of biological spectrum of weed flora in Lijevo plain confirmed 7 life forms. In the biological spectrum of weed flora in Lijevo plain there is obvious domination of life form hemicryptophyte.

Analysis of areal spectrum, i.e. detail phytogeographical analysis of weed flora in Lijevo plain, confirmed 68 different elements of flora divided in 10 floristic groups. Phytogeographical analysis points out the domination of Euro-Asian, cosmopolitan, adventitious, sub-Mediterranean and boreal group.

This work represents comprehensive and detailed research of weed flora in Lijevo plain, having in mind that the last research has been made in 1956. Inventory of weed flora, its detailed taxonomic, phytogeographical, ecological analysis, representation of certain types and groups of weeds, as well as detailed analysis of weed vegetation should serve as a basis for successful plan and implementation of weed control measures. Special attention should be given to invasive weed species which spread aggressively and represent a problem for both agro phytoceanoses and people's health.

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Ekološke i fitogeografske karakteristike korovske flore Lijeveča polja

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Sažetak

U radu je dat pregled i osnovne karakteristike korovske flore Lijeveča polja: ekološke indikatorske vrijednosti, biološki spektar i spektar areal tipova. Floristička istraživanja korovske flore Lijeveča polja izvedena su na 61 lokalitetu u usjevima i višegodišnjim zasadima. Istraživanja su vršena u toku dvije vegetacione sezone (2013. i 2014. godine). Konstatovane su 163 vrste vaskularne flore, obuhvaćene sa 122 roda i 39 familija. Na osnovu ekoloških indikatorskih vrijednosti za pojedine ekološke faktore stanište se može okarakterisati kao srednje vlažno, neutralne do slabo kisele hemijske reakcije, srednje bogato mineralnim materijama te povoljnog svjetlosnog i temperaturnog režima. Biološki spektar čini 7 životnih formi među kojima dominiraju: hemikriptofite (37,42%), terofite (22,09%), terofite-hamefite (19,63%) i geofite (15,95%). Geofitske vrste bez obzira što su manje zastupljene, zbog bioloških osobina su veoma značajne i predstavljaju veliki problem u kontroli korova. Fitogeografskom analizom konstatovano je 23 florna elementa među kojima su najzastupljeniji: evroazijski (19,2%), subsrednjeevropski (17,79%), subevroazijski (17,18%), kosmopolitski (11,64%) i adventivni (9,20%), a zajedno obuhvataju 122 vrste. Među adventivnim vrstama posebno su značajne invazivne: *Ambrosia artemisiifolia* L., *Helianthus tuberosus* L. i *Abutilon theophrasti* Medic. koje svojom agresivnošću potiskuju autohtone vrste, te se sve više šire, pa čak formiraju monodominantne zajednice. U odnosu na ranija istraživanja konstatovano je veliko florističko, ekološko i fitogeografsko bogatstvo korovske flore što ukazuje na potrebu iznalaženja adekvatnih mjera kontrole korova koje na osnovu dobijenih rezultata nisu bile adekvatne. Detaljno sagledavanje korovske flore predstavlja polaznu osnovu za preduzimanje mjera kontrole korova.

Ključne riječi: korovska flora, ekološki indeksi, životne forme, florni elementi, Lijeveče polje

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