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PHYTOCENOLOGICAL RESEARCH INTO THE MEADOW ASSOCIATIONS ON FOREST HUNTING GROUNDS OF SERBIA

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Abstract – The floristic composition of meadow associations within the fenced areas of forest hunting grounds was investigated in the spring of 2008 at three sites: Karakuša (Srem), Miloševa voda (Mt. Sokolovica) and Lomnička reka (Mt. Veliki Jastrebac), Serbia. At the first location three associations were determined (*Agrostio-Juncetum effusi* Cinc.1959., *Trifolio-Agrostietum stoloniferae* L. Mark.1973., and *Agrostietum vulgaris*. Z. Pavl. 1955 sensu lato.); at the second location *Festuco-Agrostietum* Horv. (1952) 1982. em Trinajest. 1972., and at the third location *Agrostio-Festucetum valesiacae* Gajić 1961. Hemicryptophytes were the dominant life form in all the sites (ranging from 61.1 to 72.9%). Also, the presence of 24 floral elements was recorded. The largest number of floral elements was determined at the site of Mt. Sokolovica (17), and the lowest at the third site, Mt. Veliki Jastrebac (9).

Keywords: Meadow, forest, damage, red deer, *Cervus elaphus*, Serbia

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INTRODUCTION

The damage caused by large herbivorous animals in forestry and agriculture, and especially that caused by species of the deer family (Cervidae), represent a constant and very serious problem in many European countries (Gill, 1992; Putman and Moore, 1998; Čermák and Strejček, 2007; Trdan and Vidrih, 2008; Schley et al., 2008). In spite of this, there is no collective data on the amount and frequency of damage caused by wild game in the forest eco-systems of Serbia (Medarević et al., 2008). Recently, damage caused by red deer (Cervus elaphus) was established in several hunting grounds of Serbia, such as the fenced part of the hunting grounds "Podunavsko lovište Plavna" (Bačka) and "Posavsko lovište Karakuša" (Srem), but also in the fenced breeding ground "Lomnička reka" on Mt Veliki Jastrebac (Gačić et al., 2006; Gačić and Danilović, 2009). These authors have stated that the main causes of damage are the high numbers and disturbed population structure (sex and age), lack of coordination between forest management and hunters, and the lack of natural food, especially pasture surfaces. Therefore, recommended measures to eliminate or significantly reduce the damage include the emergency establishing of areas of green food (pastures and meadows), and improvement of the quality of existing pasture surfaces.

Natural meadows and pastures are eco-systems whose plant cover is made up of herbaceous associations of a more or less closed composition consisting mainly of herbaceous mesophytes. A large number of plant species grow in these areas, and their values range from very harmful and poisonous species to those of high quality (Mrfat-Vukelić et al., 2003). It is well known that grasses are a very important component of red deer nutrition throughout the year, and this importance is especially apparent in the vegetation period (Adamič, 1988). The author stated that grasses in the red deer nutrition samples from the region of Kočevje (Slovenia) represented 50% of their total nutrition during the period from April to October. This indicates that pasture is even more important within smaller fen-

Fig. 1. Geographic position of studied locations in Serbia.

ced areas where red deer and wild boar are reared together intensively (sections of hunting ground or breeding locations), because the natural production of food for wild game is inadequate on such terrains in regard to quantity and quality.

The first detailed research into meadow associations in forest hunting grounds of Serbia, according to our knowledge, was carried out within the project "Investigation of damage caused by large wild game and their effect on forest the eco-systems of Republic of Serbia (pilot project)", requested and financed by the Ministry of Agriculture, Forestry and Water Management – Forest Directorate. The obtained results showed that meadow plants have almost double the energy value of tree bark (beech and hornbeam), and revealed distinct differences between hunting grounds with regard to production and quality of meadow associations (Tomić et al., 2009). For the purpose of their revitalization, these authors suggested the application of certain meliorative agro-technical measures such as draining, fertilization with mineral fertilizers and the sowing of the seeds of suitable species and cultivars for the preparation of hay and pasture. Also, for their proper utilization, timely cutting in the phenol-phase of ear-forming in grasses, and the beginning of blooming in leguminous plants, will contribute to increase the yield and quality of the hay.

The objective of this paper was to determine (1) the phytocenological composition, (2) number of species and covering, and (3) life forms and floristic elements, which influence the productivity and quality of natural meadow associations within smaller fenced areas of hunting grounds and breeding locations for large wild game (red deer and wild boar).

MATERIAL AND METHODS

Research was carried out in the spring of 2008 on three locations: (1) the fenced part of the hunting ground "Posavsko lovište Karakuša" (Forest estate "Sremska Mitrovica"), (2) the fenced breeding center "Miloševa voda" (Forest estate "Toplica" - Kuršumlija), and (3) the fenced breeding center "Lomnička reka" (Forest estate "Rasina" - Kruševac). The geographical position of these locations is presented in Fig. 1.

The first location (2257 ha) is located in the south-east of Srem (region Vojvodina) along the left bank of the Sava river. The relief of the study area is lowland (75-80 m a.s.l.). The second location (ca. 600 ha) is on Mt. Sokolovica (municipality of Kuršumlija). The relief of the study area is mountainous (600-1000 m a.s.l.). The third location (381 ha) is in the central part of Mt. Veliki Jastrebac (municipality of Kruševac). The relief of the study area is mountainous (530-890 m a.s.l.). The species of reared wild game on all three locations are red deer and wild boar.

Meadow and pasture associations are described according to the principles and methodology of the Swiss-French phytocenological school (Braun-Blanquet, 1964). In all phytocenological recordings/screenings a scale for number and covering was used (Braun-Blanquet, 1928) with the following numerical marks: + (rare species), 1, 2, 3, 4, and 5. (the highest mark shows the greatest domination of species in regard to both traits). Plant species are grouped in three categories: grasses, leguminous plants and other plant species.

Meadow associations are determined on the basis of results obtained in previous phytocenological researches carried out on the territory of Serbia (Kojić et al., 2004). The determination of life forms was done according to criteria of Raunkiaer (1934) and Kojić et al., (1997), and the determination of floristic elements was done according to the phytogeographical classification of Gajić (1984), Stevanović (1992) and Jovanović (1994).

RESULTS AND DISCUSION

Using phytocenological analysis of the collected samples, species were determined according to the plant associations to which they belong. The number and covering of the species evaluated in the field are presented in Table 1.

On the location Karakuša the following three plant associations were determined: (I) *ass. Argostio-Juncetum effusi* Cinc. 1959; (II) *ass. Trifolio-Agrostietum stoloniferae* Lj. Mark. 1973; and (III) *ass. Agrostietum vulgaris* Z. Pavl. 1955 sensu lato. The first plant association (I) is described in two recordings/screenings.

The first recording/screening contains 36 species of which 8 are from the family Poaceae, 7 from the family Fabaceae and 21 from other families. The second recording/screening contains 33 species of which 8 are from the family Poaceae, 7 from the family Fabaceae and 18 from other families. The highest numerical presence and covering was established for *Agrostis capillaris* L. (5.4 and 3.3), *Poa pratensis* L. (3.3 and 3.3), *Juncus effusus* L. (3.3 and 3.2) and *Agropyrum repens* L (3.3 and 2.2). The most present legume species were *Medicago falcata* L. (3.2 and 3.2), *Trifolium repens* L. (2.2 and 2.2) and *Vicia cracca* L. (2.1 and 2.1).

The second plant association (II) is described in two recordings/screenings. The first contained 43 species of which 7 are from family Poaceae, 7 from the family Fabaceae and 29 from other families. The second contains 38 species of which 6 are from the family Fabaceae and 26 from other families. The highest numerical presence and covering was established for *Trifolium repens* L. (4.3 and 3.3) and *Agrostis stolonifera* L. (3.3 and 3.3), after which the name of this association was defined.

The third plant association (III) is described in two recordings/screenings. Both contain 33 species of which 8 are from the family Poaceae, 3 from the family Fabaceae and 22 from other families. The highest numerical presence and covering was established for *Agrostis capillaris* L. (4.4 and 5.4), *Bromus inermis* Leyess. (2.3 and 2.3), *Ambrosia maritima* L. (3.3 and 1.1), *Agropyrum repens* L. (3.3 and +.1), *Ranunculus repens* L. (3.3 and +.1), *Trifolium repens* L. (2.2 and 1.1) and *Convolvulus arvensis* L. (2.2 and 1.1).

In the phytocenological study of 20 locations in Serbia, where the numerical presence and covering of species were analyzed (Cincović, 1959), the association *Argostio-Juncetum effusi* Cinc. 1959 was determined, among others. The characteristic species in this association were *Juncus effusus* L., *Juncus articulatus* L. and *Agrostis alba* L., but the highest numerical presence and covering was established for the species *Juncus effusus* L. (from 1.1 to 5.4).

On four locations of *ass. Agrostietum vulgaris* Z. Pavl. 1955. on the territory of Stara Planina mountain, the share of useful grasses, legumes and other species varied in the interval of 70.1 - 85.8% (Tomić et al., 2005). The share of useful grasses was 47.8 - 62.8%, whereas the share of useful legumes was 12.4 - 30.8%. Kojić et al., (1993) reported that in the same association on the Rudnjan plateau, the highest numerical presence and covering for the

Table 1. Numerical presence and coverage by species in meadow associations of the hunting grounds of Serbia: fenced part of hunting ground "Posavsko lovište Karakuša" (I, II, III); fenced breeding center "Miloševa voda" - Mt. Sokolovica (IV); and fenced breeding center "Lomnička reka" - Mt. Veliki Jastrebac (V).

Species	I		II		III		IV		V
Agropyrum repens L.	3.3	2.2	2.1	2.1	3.3	+.1		+.1	
Agrostis canina L.									2.3
Agrostis capillaris L.	5.4	3.3	3.2	2.1	4.4	5.4	3.3	3.3	4.5
Agrostis stolonifera L.			3.3	3.3					
Alopecurus myosuroides Huds.	+.1	+.1							
Alopecurus pratensis L.							1.1	2.2	
Anthoxanthum odoratum L.	1.1	1.1	+.1				2.1		+.1
Bromus commutatus Schreder									+.1
Bromus erectus Huds.			2.2	2.2				+.1	
Bromus inermis Leyess.	2.2	2.2	2.3	2.1	2.3	2.3	1.2		
Cynodon dactylon (L) Press.					+.1	+.1			1.1
Cynosurus cristatus L.							1.1		+.1
Dactylis glomerata L.					+.1	1.1	1.2	1.1	
Festuca arundinacea Schreb.					1.1	+.1			
Festuca ovina L.							1.1		
Festuca pratensis Huds.	+.1	+.1					1.2	4.5	1.1
Festuca rubra L.							4.4	4.5	3.3
Festuca valesiaca Schl.									2.2
Lolium perenne L.					1.1	+.1			
Nardus stricta L.							+.1		
Phalaris arundinaceae L.	+.1	+.1	1.2	2.2					
Poa annua L.					+.1	1.1			
Poa pratensis L.	3.3	3.3					2.3	2.2	1.2
Σ (*Poaceae*)	8	8	7	6	8	8	11	8	10
Lathyrus nissolia L.	+.1	+.1	+.1						
Lathyrus pratensis L.							1.2		
Lathyrus sylvestris L.			3.3	+.1					
Lathyrus vernus L.								+.1	
Lotus corniculatus L.					+.1	+.1	1.2	+.1	
Medicago falcata L.	3.2	3.2	1.1	+.1					
Medicago lupulina L.			+.1	+.1					+.1
Ononis spinosa L.									+.1
Trifolium campestre Schreb.									+.1
Trifolium medium L.							2.3		
Trifolium montanum L.								+.1	
Trifolium panonicum L.	+.1	4.3							
Trifolium pratense L.	+.1	+.1	1.1	+.1	+.1	+.1		+.1	+.1
Trifolium repens L.	2.2	2.2	4.3	3.3	2.2	1.1		1.1	1.2
Vicia alba L.	+.1	2.2							
Vicia cracca L.	2.1	2.1	+.1	+.1				+.1	
Vicia sativa L.							+.1		
Σ (*Fabaceae*)	7	7	7	6	3	3	4	6	5
Achillea millefolium L.	+.1	+.1	3.3	2.2	1.1	+.1	1.1	+.1	+.1
Ajuga reptans L.			+.1	1.1					
Ambrosia maritima L.	1.1	2.1	+.1	3.2	3.3	1.1			
Bellis perennis L.								+.1	
Campanula patula L.	1.1						+.1		+.1
Capsella bursa- pastoris L.			+.1						
Carex caryophyllea L.							+.1		+.1

Table 1. (continued)

Species	I		II		III		IV		V
Chenopodium album L.					+.1	+.1			
Convallaria majalis L.			+.1	+.1					
Convolvulus arvensis L.	+.1	1.1			2.2	2.1			
Crepis vesicularia L.					1.1	1.1			
Daucus carota L.							+.1		
Epilobium nutans L.	+.1								
Erigeron canadiensis L.	2.2		1.2	1.1	1.1	1.1			
Euphorbia amygdaloides L.								1.2	
Filipendula hexapetala L.								2.3	+.1
Fragaria vesca L.	1.1	1.1					1.2	2.2	+.1
Galium mollugo L.							+.1		
Galium verum L.							1.2		
Geum urbanum L.	2.1	+.1			+.1	1.1			
Glechoma hederaceum L.			+.1	+.1	1.1	+.1			
Helleborus odorus W. et K.								+.1	
Hypericum perforatum L.								+.1	+.1
Juncus effusus L.	3.3	3.2	2.2	+.1	1.1	+.1	+.1		1.2
Juncus inflexus L.	1.2	1.2							
Lamium maculatum L.			+.1	+.1					
Leontodon autumnalis L.			+.1	+.1					
Leucanthemum vulgare L.									+.1
Lysimachia nummularia L.	+.1	+.1			+.1				
Mentha aquatica L.	2.3	2.1							
Mentha longifolia (L.) Nath.			3.3	2.2	1.1	+.1	2.4		+.1
Plantago lanceolata L.	1.1	+.1	1.1	1.1	1.1	+.1	+.1		
Plantago media L.					+.1	+.1			+.1
Polygonum aviculare L.			+.1	+.1	1.1	1.1			
Polygonum lapathifolium L.					1.1	1.1			
Potentilla recta L.			+.1	+.1				+.1	
Potentilla reptans L.	2.1	2.1	1.1	+.1	+.1	+.1			
Primula veris Huds.									+.1
Prunella vulgaris L.	2.3	1.1	+.1		1.1	+.1			1.1
Ranunculus repens L.	2.1	1.0	+.1	+.1	3.3	+.1	+.1	+.1	
Rhinanthus minor Ehrh.									+.1
Roripa sylvestris (L.) Bess.	2.1	3.2	1.1	3.3	1.1	1.1		+.1	
Rubus caesius L.			+.1	1.1					+.1
Rubus fruticosus L.			+.1	1.1					
Rumex acetosella L.			+.1	1.1			+.1	+.1	
Rumex crispus L.	1.1	1.1			+.1	1.1			+.1
Salvia pratensis L.			2.1	+.1			+.1		
Selinum carvifolia L.			1.1	+.1					
Selinum sp.			+.1	+.1					
Silene alba L.					+.1	+.1			
Stellaria graminea L.	1.1	1.1	2.3	1.1			1.1		
Stellaria media (L.) Vill.							+.1		1.1
Symphytum officinale L.	+.1	+.1							
Taraxacum officinale Web.	+.1	+.1	+.1		+.1	+.1	+.1		+.1
Thymus serpyllum L.								+.1	+.1
Urtica dioica L.			+.1	+.1			+.1		
Verbena officinalis (L.) Bess.						1.1			
Veronica chamaedrys L.			1.1	2.2			+.1	+.1	+.1
Veronica officinalis L.			+.1	2.2					
Viola tricolor L.								+.1	
Σ (Other families)	**21**	**18**	**29**	**26**	**22**	**22**	**18**	**14**	**19**
Σ (Total)	**36**	**33**	**43**	**38**	**33**	**33**	**33**	**28**	**34**

following species was determined: *Agrostis vulgaris* L. (5.5), *Agropyrum repens* L. (3.3), *Poa nemoralis* L. (2.2) and *Festuca rubra* L. (1.1). Of the leguminous species with a somewhat higher presence and covering the following were established: *Trifolium repens* L. and *Trifolium campestre* Schreb. (1.1). According to some authors (Đorđević and Mijatović, 1965) the total number of species in *ass. Agrostietum vulgaris* Z. Pavl. 1955. on the locations of Ljig, Suvobor, Gorski Kotar, Kopaonik and Golija varied from 56 to 116 species. The highest number of grass and leguminous species was determined on the location Golija (13 and 10). A review of the meadow vegetation of Radočelo (Mrfat-Vukelić et al., 1988) showed that the largest areas were occupied by *ass. Agrostietum vulgaris* Z. Pavl. 1955. with 62 species.

On the other location ("Miloševa voda" - Mt. Sokolovica) two meadows were studied and described with one recording/screening, and it was established that both meadows belonged to the same plant association, (IV) *ass. Festuco-Agrostietum* Horv. (1952) 1982. em Trinajest. 1972. The first recording/screening contains 33 species of which 11 are from the family Poaceae, 4 from the family Fabaceae and 18 from other families. The highest numerical presence and covering were established for *Festuca rubra* L. (4.4), *Agrostis capillaris* L. (3.3), *Mentha longifolia* (L.) Nath. (2.4), *Poa pratensis* L. (2.3) and *Trifolium medium* L. (2.3).

The second recording/screening contains 28 species of which 8 are from the family Poaceae, 6 from the family Fabaceae and 14 from other families. The highest numerical presence and covering were established for *Festuca pratensis* Huds. (4.5), *Festuca rubra* L. (4.5), *Agrostis capillaris* L. (3.3) and *Filipendula hexapetala* L. (2.3).

On the third location ("Lomnička reka" - Mt. Veliki Jastrebac) one meadow was studied and *ass. Agrostio-Festucetum valesiacae* Gajić 1961. (V) was determined. This recording/screening contains 34 species of which 10 are from the family Poaceae, 5 from the family Fabaceae and 19 from other families. The highest numerical presence and covering was established for *Agrostis capillaris* L. (4.5), *Festuca rubra* L. (3.3), *Agrostis canina* L. (2.3) and *Festuca valesiaca* Schl. (2.2). Of the leguminous species of high quality there were *Trifolium repens* L. (1.2), *Medicago lupulina* L. (+.1) and *Trifolium pratense* L. (+.1).

In previous studies of meadow eco-systems on the territory of Mt. Veliki Jastrebac (Jovanović-Dunić et al., 1986) eight associations were determined, of which *Festuco-Hordeestum secalini* and *Agrostio-Chrysopogonetum grylli* were present. Because of the influence of an anthropogenic factor (their utilization) a change in the floristic composition occurred, which is the reason why on the meadow studied on the third location (former forest nursery) *ass. Agrostieto-Festucetum valesiacae* is dominant with 34 species, whereas previously stated associations had 31 and 45 species.

The spectrum of life forms and floral elements with their percentages are presented in Table 2. It was established that hemycryptophytes are dominant in all the studied associations: I - *Argostio-Juncetum effusi* Cinc. 1959. (69.4%), II - *Trifolio-Agrostietum stoloniferae* Lj. Mark. 1973 (64.3%), III - *Agrostietum vulgaris* Z. Pavl. 1955 sensu lato. (61.1%), IV - *Festuco-Agrostieutum* Horv. (1952) 1982. em Trinajest. 1972. (72.9%) and V - *Argostio-Festucetum valesiacae* Gajić 1961 (63.3%). Also, the share of geophytes and therophytes/chamaephytes (10.0 - 12.5% and 7.1 - 11.1%) was significant, as it was for therophytes within the third and fifth association (8.3 and 10.0%). According to our results within the study of meadow associations 24 floral elements are present. The highest number of floral elements was recorded in *ass. Festuco-Agrostieutum* Horv.(1952) 1982. em Trinajest 1972 (n=17), and the lowest in *ass. Argostio-Festucetum valesiacae* Gajić 1961 (n=9). Floral elements recorded within all five associations are: European, sub-Central European, Eurasian, sub-Eurasian, sub-Mediterranean and cosmopolitan.

In Serbia, many authors have studied plant associations in different habitats (low land, hilly

Table 2. Life forms and floral elements in studied meadow associations (%)

Characteristic	I	II	III	IV	V
Life forms					
Hemicryptophytes	69,4	64,3	61,1	72,9	63,3
Geophytes	11,1	11,8	11,1	12,5	10,0
Therophytes	5,6	4,8	8,3	2,1	10,0
Chamaephytes	2,8	2,4	2,8	-	-
Therophytes/Chamaephytes	8,3	7,1	11,1	8,3	10,0
Herbaceous chameaphytes	2,8	4,8	5,6	4,2	6,7
Nano-Phanerophytes	-	4,8	-	-	-
Floral elements					
sub-European	-	-	2,8	2,1	-
European	25,7	14,3	11,1	22,9	22,6
Central European	2,9	4,7	5,6	4,2	-
Central European-sub-Mediterranean-Pontic-Siberian	2,9	-	-	-	-
sub-Central European	14,3	9,6	11,1	16,6	29,1
circumpolar	-	4,7	5,6	2,1	3,2
sub-circumpolar	2,9	-	2,8	2,1	3,2
Euroasian	5,6	21,4	11,1	8,3	3,2
sub-Euroasian	8,6	9,6	13,7	14,6	19,4
sub-Mediterranean	5,6	7,1	5,6	6,2	3,2
cosmopolitan	14,3	7,1	22,2	6,2	12,9
boreal-European	-	-	-	2,1	-
sub-boreal	-	-	-	2,1	3,2
Pontic-east-sub-Mediterranean	2,9	2,4	-	-	-
sub-Pontic	-	-	-	2,1	-
sub-Pontic-European	-	2,4	-	-	-
sub-Pontic-Central Asian	2,9	2,4	-	-	-
sub-boreal-circumpolar	-	2,4	-	-	-
Pontic-sub-Mediterranean	-	2,4	-	2,1	-
adventive	5,6	4,7	5,6	-	-
south European-Pontic	-	-	-	2,1	-
sub-Mediterranean-Panonnian-Pontic	2,9	2,4	2,8	2,1	-
sub-boreal-sub-Mediterranean-adventive	2,9	2,4	-	-	-
sub-Atlantic-sub-Mediterranean	-	-	-	2,1	-

I - *Argostio-Juncetum effusi* Cinc. 1959.; II - *Trifolio-Agrostietum stoloniferae* Lj. Mark. 1973; III - *Agrostietum vulgaris* Z. Pavl. 1955. sensu lato.; IV - *Festuco-Agrostieutum* Horv. (1952) 1982. em Trinajest. 1972.; V - *Argostio-Festucetum valesiacae* Gajić 1961.

and mountainous). Mrfat-Vukelić et al., (2000) studied sub-Mediterranean leguminous species in natural grasslands and pasture phytocenoses. These authors stated that the most present species are from genera *Trifolium*, *Medicago*, *Onobrychis* and *Lotus* (approx. 42% of all plants present). In the phytogeographical analysis of flora on Mt. Divčibare (Popović and Obratov-Petković, 2005) 69 families were established, consisting of 10 distribution types and 14 distributional floral groups, among which the most present was Central-European area (31.2%). The results of the study carried out in the gorge of the river Resava (East Serbia) indicated the presence of 297 species and sub-species of vascular plants which were divided into 68 families (Mijatović et al., 2007). Most of the species belonged to the families Poaceae (n=28), Asteraceae (n=21), Fabaceae (n=20) and Lamiaceae (n=19). These authors recorded 49 floral elements among which the most present were sub-Central European (18.9%), Eurasian (14.1%) and sub-Mediterranean (8.7%). In the spectrum of life

forms hemicryptophytes were dominant (147 species or 49.5%), followed by phanerophytes and geophytes (19.5% and 11.1%). In the hilly-mountainous region of Mt. Ozren, the gorge of the Uvac river is characterized by diverse vascular flora – 730 species and infraspecific taxa from 87 families (Veljić et al., 2006). The most numerous representatives were from the families Asteraceae (n=81), Fabaceae (n=57), Poaceae (n=55) and Lamiaceae (n=47). In the spectrum of life forms hemicryptophytes were dominant (56.6%), whereas of the floral elements the most present were sub-Central European (16.3%) and Eurasian (11.5%). Finally, the results of floristic studies of Višnjička Kosa in the vicinity of Belgrade (Jakovljević et al., 2008) indicated the presence of 568 species of vascular plants, grouped into 304 genera and 74 families. The most species-rich families were Asteraceae (n=80), Poaceae (n=55) and Fabaceae (n=50). In the spectrum of life forms hemicryptophytes were dominant (47.4%), therophytes (28.6%) and phanerophytes (10.5%).

CONCLUSION

The floristic composition of plant associations on the hunting grounds on the territory of Serbia was analyzed and the following associations determined: (i) on first location Karakuša (Srem) three associations were determined (*Agrostio-Juncetum effusi* Cinc.1959., *Trifolio-Agrostietum stoloniferae* LJ. Mark.1973., and *Agrostietum vulgaris*. Z. Pavl. 1955. sensu lato.); (ii) on the second location Miloševa voda (Mt. Sokolovica) *Festuco-Agrostiutum* Horv. (1952) 1982. em Trinajest. 1972.; (iii) on the third location Lomnička reka (Mt. Veliki Jastrebac) *Agrostio-Festucetum valesiacae* Gajić 1961.

Hemicryptophytes were the dominant life form in all sites (ranging from 61.1 to 72.9%). Also, the presence of 24 floral elements was recorded. The largest number of floral elements was determined on the second site, Mt. Sokolovica (17), and the lowest on the third site, Mt. Veliki Jastrebac (9).

The great number of weed species compared to the total number of species determined on the meadows within the hunting grounds of Serbia shows that insufficient attention is paid to these meadows in sense of application of agro-technical measures and improvement of the quality of a potential forage mass for the nutrition of wild game (cutting, fertilizing, etc.).

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ФИТОЦЕНОЛОШКА ИСТРАЖИВАЊА ЛИВАДСКИХ АСОЦИЈАЦИЈА У ШУМСКИМ ЛОВИШТИМА СРБИЈЕ

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Циљ овог рада је да се утврде (1) фитоценолошки састав, (2) бројност и покровност врста, (3) животни облици и флорни елементи, а који условљавају продуктивност и квалитет природних ливадских асоцијација унутар мањих ограђених делова ловишта и узгајалишта крупне дивљачи (јелен и дивља свиња). Истраживања су спроведена у пролеће 2008 на три локалитета: ограђени део ловишта „Посавско ловиште Каракуша“ (Сремска Митровица), и ограђена узгајалишта „Милошева вода“ (Куршумлија) и „Ломничка река“ (Крушевац). Утврђено је да су хемикриптофите биле доминантан животни облик на свим локалитетима (од 61,1 до 72,9%). Такође, утврђено је присуство 24 флорна елемента - највише на локалитету „Милошева вода“ (17), а најмање на локалитету „Ломничка река“ (9). Велики број коровских врста у односу на укупни број врста показује да се проучаваним ливадама не поклања потребна пажња у смислу примене агротехничких мера и побољшања квалитета потенцијалне крмне масе за исхрану гајене крупне дивљачи.