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**REVIEW OF THE WEED SPECIES PRESENTED
ON NATURAL GRASSLANDS OF SERBIA**

Momčilo KOJIĆ¹, Sava VRBNIČANIN¹,
Zora DAJIĆ¹ and Slavica MRFAT-VUKELIĆ²

¹Faculty of Agriculture, Belgrade

²Institute for Agricultural research "Serbia",
Center for forage crops, Kruševac, Serbia

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In the present paper 48 grassland communities in Serbia have been analyzed. Marshy and wet meadow, sub-mountainous, mountainous and alpine grassland phytocoenoses have been included.

The sum of 549 species was determined in grassland weed habitats. Those weed species were classified in 231 genera from 52 families. The following families are especially rich regarding the number of weed species within: *Asteraceae* (85 weed species), *Poaceae* (44), *Scrophulariaceae* (37), *Caryophyllaceae* (36), *Lamiaceae* (34), *Rosaceae* (24), *Cyperaceae* (22) and *Fabaceae* (19).

Weed species exhibit great infraspecies diversity, they envelope 249 subspecies, 347 varieties and 349 forms. In biological spectrum the most dominant are chemicryptophytes (50.57%), followed by geophytes (15.46%), *therophytes* (14.91) and *thero-chemicryptophytes* (7.73%). Chorological analysis showed that in weed's flora of grasslands of Serbia there are 25 different geoelements, where among them more than 50%

Corresponding author: Momčilo Kojić, Faculty of Agriculture, Nemanjina 6, 11080 Zemun-Belgrade, Serbia.

belong to the floral elements of huge areas of distribution: european-asian, subeurope-asian, middle european and cosmopolitan.

Percent of occurrence of the weed species ranged from 50.7% (in class *Festuco-Brometea*) to 91.3% (in class *Phragmitetea*).

Key words: weed, natural grasslands, diversity, infraspecies diversity, biological spectrum, chorological analysis

INTRODUCTION

Flora and vegetation of natural grasslands in Serbia may be considered as very rich and multifarious. This is a result of the great diversity of influence of different ecological factors (climate, relief, soil, etc.) causing appearance of various habitats characteristic for swamp, lowland, hilly, mountainous and alpine areas where natural meadows and pastures are widespread. From phytocoenological aspect, all plant species have equal participation in building of herbaceous type of vegetation. However, from point of view of natural grasslands utilization, all coenobionts could be divided into the two following groups:

1. Favorable (useful) species – plants of high fodder value readily taken by cattle in grazing.

2. Unfavorable (useless, harmful) species – plants of low fodder value, prickly and poisonous ones, which are almost avoided by cattle in grazing (MRFAT-VUKELIĆ *et al*, 1991, KOJIĆ *et al*, 1993). Actually, this second category of grassland inhabitants may be designated as weed component in meadows and pastures or an unfavorable element of grassland phytocoenoses. Such plant species, including the lower taxa, as well, participate with more than 50 % in floristic composition of natural grasslands (KOJIĆ *et al*, 2000).

Problem of weeds on meadows and pastures in Serbia has been currently investigated from different aspects, such as: floristic, phytocoenological, ecophysiological and practical (MRFAT-VUKELIĆ *et al*, 1991, 1996, KOJIĆ *et al*, 1993, 1994, KOJIĆ and VRBNIČANIN, 1998).

Concerning great importance of weed category is having in natural grasslands both from phytocoenological and semantic and the aspect of utilization of meadows and pastures and their quality value, the aim of this study was to consider the grassland's weed problem through the floristic analysis.

MATERIAL AND METHODS

For the purpose of the analyzing of weed flora of natural meadows and pastures in Serbia it was envisaged the 48 widespread grassland communities classified into several classes, such as: *Phragmitetea* (3 associations), *Molinio-Arrhenatheretea* (12), *Festuco-Brometea* (24), *Festucetea vaginateae* (1), *Nardo-Callunetea* (4) and *Juncetea trifidi* (4), previously described by different authors. Analyzed communities are developed in range of altitudes, from lowest to the highest area in Serbia, including swamp habitats, as well.

Determination and categorization of weed species was made according to ŠOŠTARIĆ-PISAČIĆ and KOVAČEVIĆ (1968), KLAPP (1986) and KOJIĆ *et al.* (2000). Life forms of plant species were determined on the basis of different literature sources (Raunkiaer, 1934, Ellenberg, 1979 and Braun-Blanquet, 1964). Floral elements were estimated according to HORVAT *et al.*, 1974 and GAJIĆ, 1984. Ecological indices (as indicators of habitat features) for humidity (F), soil pH (R), soil nutritive elements, i.e. nitrogen content (N), light (L) and warmth (T) have cited according to Landolt (1977) and KOJIĆ *et al.*, 1997.

RESULTS AND DISCUSSION

This investigation study points out that the total of 549 weed species have been found in 48 widespread natural grassland communities in Serbia (Table 1). Such high number of unfavorable plants grown on meadows and pastures could be explained as consequence of: a) soil over-wetting, causing insufficient air content in soil pores, b) the lack of nutritive elements leading to an increase of soil acidity, c) damages of soil structure often caused by erosion and frosts, d) overgrazing and uncontrolled mowing (STAHLIN, 1977, CAPUTA, 1984, KLAPP, 1986). It is that aggravating of habitat conditions favors the expansion of species with higher competitive capabilities, such as weeds are.

Weed species identified in analyzed plant communities are classified into the 231 genera belonging to the 52 plant families (Tab. 1). Regarding the number of determined weed species the following families were especially prominent: *Asteraceae* (85 weed species), *Poaceae* (44), *Scrophulariaceae* (37), *Caryophyllaceae* (36), *Lamiaceae* (34), *Rosaceae* (24), *Cyperaceae* (22) and *Fabaceae* (19).

Diversity of weeds of natural grasslands increases with adding of the infra-species diversity into the calculation. The total number of infra-species taxa was 945, comprising 249 subspecies, 347 varieties and 349 forms.

Besides high taxonomical variety of meadow-pasture weeds, the ecological diversity has been expressed as well, according to the considerable number of its life forms. It was determined the total of following eight life forms: *hemicriptophytes*, *geophytes*, *therophytes*, *thero-chemicriptophytes*, *herbaceous chamephytes*, *woody chamephytes* and *phanerophytes* (Tab. 2).

The highest participation of hemicriptophytes (282 species, i.e. 50.57 %) in meadow-pasture weed flora designates the significant stability level of these coenobionts in analyzed associations, which is otherwise typical for grassland vegetation type.

The high variability of grassland's weeds has been estimated from floristic-geographical point of view as well. So, in weed flora of natural grasslands there are even 25 geo-elements determined. The highest participation and significance are having the following geo-elements: eurasian, sub-middle-european, sub-mediterranean, circumpolar, subpontic and middle-european (Tab. 3).

Such phytogeographical structure of weeds of grasslands designates the certain increase of inland influence, which is in agreement with the general character of entire herbaceous flora and vegetation of wider Serbian region (Jankovi?, 1985). The highest number of weed species has been registered in swampy herbaceous communities of the class *Phragmitetea* (72.2 %), while the lowest weed number was found in associations belonging to the classes *Festuco-Brometea* and *Nardo-Callunetea* (60.3). The participation of particular weed categories in analyzed plant communities (very poisonous, weekly poisonous and useless) is pretty variable (Tab. 4). Especially interesting group is made of very poisonous weeds, with total of 23 species (4.1 %). The highest number of such species belongs to the family *Euphorbiaceae* and to the genus *Euphorbia*, respectively. The second and the third place, relating the abundance of poisonous weeds, have had three species from families *Equisetaceae* (of the genus *Equisetum*) and three species from Liliaceae family. Furthermore, the two harmful weed representatives were registered from families Ranunculaceae and Scrophulariaceae and one from families Polypodiaceae and Aristolochiaceae. Among the most harmful (the most poisonous) weeds grown on natural grasslands of Serbia could be mentioned the following ones: *Aristolochia clematitis*, *Equisetum* sp., *Euphorbia* sp., *Colchicum autumnale*, *Veratrum album*, *Digitalis lanata*, *Ranunculus* sp., *Pteridium aquilinum*, *Rhinanthus* sp., and others.

It is necessary to pay more attention to the research of weeds on natural grasslands, considering the problems and damages caused by poisonous plants on cattle (and, thus on humans) health if are consumed in any way. This is why are further investigations are going to be focused on an analysis of very harmful – poisonous weed plants grown on meadows and pastures of Serbia.

CONCLUSION

On the basis of the analysis of 48 meadow-pasture plant communities from whole Serbian region, it may be noted the following:

- weeds grown on natural grasslands significantly participate in floristic composition of meadow and pasture phytocoenoses, ranging between 50.7 and, even, 91.3 % in relation to the total number of present species;
- it was determined the total of 549 weed species from 231 genera belonging to 52 families;
- the presence of infra-species taxa was pretty high, comprising 249 subspecies, 347 varieties and 349 forms;
- among 8 registered weed life forms, the predominant were hemicriptophytes (56.57 %);
- grassland's weeds are characterized by high phyto-geographical diversity – there were 25 floral elements identified with prevail of eurasian, sub-middle-european, sub-mediterranean, circumpolar and sub-eurasian;

- the contribution of poisonous plants, as the most harmful group, has been about 4 %.

Because of great participation of weed species in entire flora of meadows and pastures of Serbia, it is necessary to treat these plants more intensively both from floristic-phytocoenological and practical point of view, in the sense of undertaking the certain means of weed control and suppression.

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KOROVSKA FLORA PRIRODNIH TRAVNJAKA SRBIJE

Momčilo KOJIĆ¹, Sava VRBNIČANIN¹,
Zora DAJIĆ¹ i Slavica MRFAT-VUKELIĆ²

¹Poljoprivredni fakultet, Beograd

²Institut za istraživanja u poljoprivredi Srbije,
Centar za krmno bilje, Kruševac, Srbija

I z v o d

U radu je dat pregled i ekološka analiza korovske flore livada i pašnjaka Srbije. Dobijeni podaci pokazuju da je vrlo visoko učešće korovskih vrsta u biljnom pokrivaču travnjaka. U svim livadskim i pašnjačkim biljnim zajednicama koje su analizirane (ukupno 48), a koje pripadaju klasama *Phragmitetea*, *Molinio-Arrhenatheretea*, *Festuco-Brometea*, *Festucetea vaginateae*, *Nardo-Callunetea* i *Juncetea trifidi*, bez izuzetka, korovi participiraju sa više od 50% u odnosu na sve vrste koje ulaze u njihov floristički sastav. Najmanja zastupljenost korova iznosi 50.7% iz zajednica klase *Festuco-Brometea*, a dostiže čak i do 91.3% iz klase *Phragmitetea*.

Sa fitocenološkog aspekta, korovske biljke na travnjacima su raznovrstan članovi sa ostalim (korisnim) cenobiontima zajednica. Međutim, sa aspekta iskorišćavanja travnjaka oni predstavljaju "nepoželjnu" grupu biljaka: 1. biljke niske krmne vrednosti koje stoka nerado jede (npr. *Nardus stricta*); 2. bodljikave (sa trnovima, kukicama, emergencama), kao što su: *Cardus sp.*, *Cirsium sp.*, *Ononis spinosa*, *Eringium campestre* i dr., a koje mogu dovesti do povredjivanja usne duplje, ždrela i želudačno-crevnog trakta prilikom konzumacije; i 3. otrovne vrste kao što su npr., *Aristolochia clematitis*, *Atropa belladonna*, *Colchicum autumnale*, *Conium maculatum*, *Euphorbia sp.*, *Hyosciamus niger*, *Veratrum album*, i mnoge druge, koje, ne samo da mogu izazvati smetnje kod životinja, već, uzete u većim količinama, mogu imati i letalno dejstvo.

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