UDC 632.5:633.11
Original scientific paper

PRELIMINARY INVESTIGATION OF WEED VEGETATION IN SMALL GRAIN FIELDS IN THE AREA OF MT. STOL NEAR BOR

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Vrbničanin Sava and Svetlana Aćić (2004): *Preliminary investigation of weed vegetation in small grain fields in the area of Mt. Stol near Bor.* - Acta herbologica, Vol. 13, No. 1, 53-58, Beograd.

Weed vegetation in wheat crop in the area of Mt. Stol near Bor was analysed. Based on floristic and phytocoenological surveys of the fields under investigation, 113 taxa were determined, 20 of which are monocotyledonous and 93 dicotyledonous. High diversity regarding the taxa, life-forms and floristic elements is the result of specific climatic (arid region), geological, edaphic (porous soil) and anthropogenic influences in the region. The most frequent weed species within the analysed phytocoenoses were: *Chenopodium album, Plantago major, Polygonum persicaria, Bilderdykia convolvulus, Capsella bursa-pastoris, Chenopodium hybridum, Lactuca serriola, Anagallis arvensis, Convolvulus arvensis, Sonchus arvensis, Achillea millefolium,Viola arvensis, Sonchus oleraceus, Consolida regalis* and *Veronica persica.*

Key words: weed vegetation, wheat, life-forms, floristic elements, ecological indices

INTRODUCTION

Weeds are responsible for up to 25% yield reduction on arable lands across the temperate zone of the northern hemisphere (TAMADO and MILBERG, 2000). The level of crop weediness depends on the soil type, climatic and

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meteorological conditions (GRUNDY *et al.*, 1999), technology of crop cultivation (MALECKA and BLECHARCZYK, 2002), practices of weed control applied over any particular year and the preceeding years (HYVÖNEN and SALONEN, 2002). Weed species such as *Agrostemma githago* and *Secale cereale*, whose seeds are disseminated with the seeding material from year to year, can still be found in some areas of extensive agriculture, or measures of intensive weed control are not being implemented to prevent their occurrence (ULUDAG *et al.*, 1999).

In hilly and mountainous regions of Serbia, where the technology of plant production lags behind lowlands, a considerable difference has been observed regarding the diversity of their weed flora and vegetation. Lowland regions (with intensive agriculture) do not have a marked floristic diversity, but the weed species represented are found in large numbers, thus exerting strong competitive pressure on crops. On the other hand, the weed flora of hilly and mountainous regions of Serbia is characterised by high diversity, which results in equally strong competitive pressure on crops (VRBNIČANIN *et al.*, 2001, 2002; VRBNIČANIN and JANJIĆ, 2003). The most frequent reasons for high weediness of arable lands in the hilly and mountainous regions are: the sowing of unpurified seeds originating from a preceeding harvest, missing crop rotation, fields occasionally laying fallow for one or two seasons, inadequate top dressing and lack of intensive weed control. A similar situation was observed in the area of Mt. Stol, where our biological and ecological analysis of the weed vegetation in small grain crops was conducted. As MILIJIĆ (1980) has provided the only floristic and phytocoenological survey of the weed communities in small grain crops in Timocka krajina, these preliminary investigations require a follow-up in the future so as to provide concrete answers relevant to developing a proper strategy of weed control in this and similar regions of this country.

MATERIALS AND METHODS

Floristic and phytocoenological surveys of weed vegetation in wheat crops were carried out in hilly and mountainous regions around Bor, i.e. in the direction of Mt. Stol (N=44° 10' E=22° 6'; N=44° 09' E=22° 06') at 725 m altitude. Wheat was sown in the previous autumn, maize had been the preceding crop, herbicides had not been used, and the crop received farm manure top dressing. The local soil has slightly acid pH, calcerous sub-soil, low potential fertility, and is porous. The area has continental climate with elements of mountainous climate and pronounced droughty periods during the vegetation season. Total annual precipitation is 600-700 mm.

Quality and quantity evaluation of the weed distribution was done at wheat tillering and flowering stages. A combined abundance and cover scale was used, as proposed by WESTHOFF and van der MAAREL (1973). The data on cultivation technology, application of top dressing and weed control was collected from local farmers.

The processing and interpretation of data collected was done using the FLORA software (KARADŽIĆ *et al.*, 1998). To classify the sites we used optimal

grouping by applying the General Euclidean Distance. Habitat evaluation was done using ecological indices (KOJIĆ *et al.*, 1999). Life-forms were analysed according to Ellenberg.

RESULTS AND DISCUSSION

A total of 113 weed species were found in the crops of winter small grains in the area of Mt. Stol, including 20 monocotyledones and 93 dicotyledones. The exceptionally high floristic diversity of this comparatively small area is the result of a laggard cultivation technology, lack of intensive weed control, and specific climatic and edaphic conditions. Rich autochthonous flora and vegetation of the surrounding meadows and pastures has additional effect on the diversity of the agrestal flora in the region. Table 1 shows highly frequent weed species (27), whose morphology and biological potential determine the character of the vegetation developed.

Table 1. - Weed vegetation in small grain fields in the area of Mt. Stol near Bor

Species	Sites							
	1	2	3	4	5	6	7	8
Chenopodium album L.	5	8	7	7	3	3	2	2
Plantago major L.	2	3	3	2	.	.	2	.
Polygonum persicaria L.	3	5	5	3	2	.	.	.
Bilderdykia convolvulus L.	2	3	3	3	2	2	.	.
Capsella bursa-pastoris (L.) Med.	2	3	3	2	2	2	.	.
Chenopodium hybridum L.	3	3	3	5	3	5	.	.
Lactuca serriola Torn.	2	3	3	2	.	.	2	2
Anagallis arvensis L.	5	3	3	5	3	5	3	.
Convolvulus arvensis L.	3	5	3	3	3	2	3	3
Sonchus arvensis L.	3	5	3	3	2	3	5	.
Achillea millefolium L.	3	2	2	3	2	2	2	2
Viola arvensis Murr.	2	2	2	2	3	3	.	2
Sonchus oleraceus L.	.	7	7	.	3	3	5	3
Medicago lupulina L.	2	.	.	3	2	2	.	2
Crepis biennis L.	2	1	.	2	.	.	2	3
Trifolium aureum Poll.	2	.	.	3	2	2	3	2
Veronica persica Poir.	1	5	5	1	5	3	5	5
Galium aparine L.	.	3	3	.	3	3	5	.
Arrhenatherum elatius (L.) Mert. et K.	2	.	.	2	2	2	2	2
Vicia striata M.B.	2	.	.	3	5	3	3	2
Avena fatua L.	2	2	2	2	2	3	5	7
Thlaspi arvense L.	.	3	3	.	3	5	5	5
Consolida regalis S. F. Gray	.	3	5	.	3	5	7	7
Agropyrum repens (L.) P. B.	2	.	.	2	2	3	5	5
Cirsium arvense (L.) Scop.	2	.	.	2	3	2	5	3
Salvia amplexicaulis Lam.	2	.	.	2	2	3	5	5
Caucalis platycarpos L.	2	.	.	2	3	2	5	7

The arrangement of sites in relation to habitat conditions, i.e. the light, water and trophic status and soil acidity, is presented at ordination level by canonic correspondence analysis (CCA) (Figure 1). The results of the numerical classification, processed by the General Eucledean Distance for floristic similarity/difference between the analysed sites, show two distinctive

agglomerative groupings linked into a whole, meaning that there is no floristic discontinuity between the analysed sites (Figure 2).

The spectrum of life-forms (Figure 3) is dominated by hemicryptopytes, which constitute chief coenobionts in meadow vegetation (e.g. *Achillea millefolium, Agrostis alba, A. vulgaris, Alyssum markgrafii, Crepis biennis, Festuca pratensis, Leucanthemum vulgare, Poa pratensis, Thalictrum lucidum, Veronica jacquinii*).

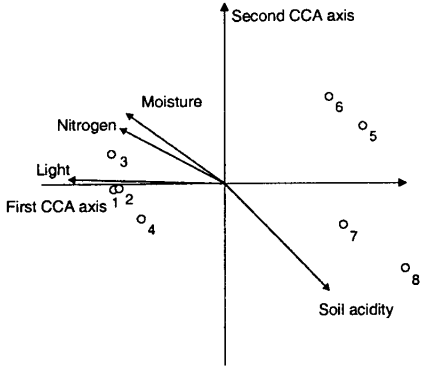

Fig. 1. - CCA ordination of weed vegetation sites in small grain crops

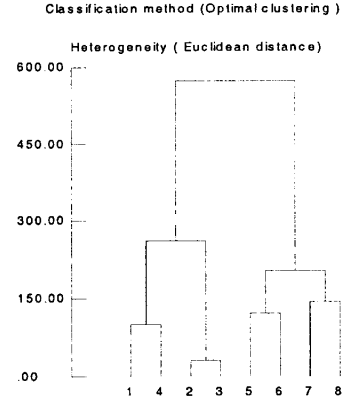

Fig. 2. - Spectrum of life-forms on the analysed sites of weed vegetation in wheat

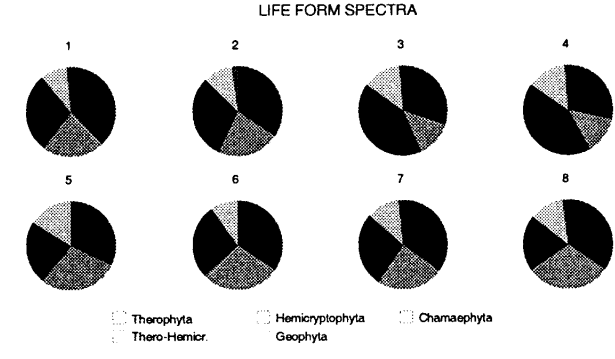

Fig. 3. - Spectrum of life-forms on the analysed sites of weed vegetation in wheat crop

Data for the habitat ecological analysis (Figure 4), done based on the weed species presence in terms of quality and quantity as phytoindicators, shows that the habitat is favourable for cultivation of small grains regarding temperature and light conditions (L=3.40-3.75; T=3.40-3.55), moderately supplied with nutrients (N=3.05-3.45) and with neutral pH reaction of soil (R=3.35-3.50). The values of ecological indices for water regime on the habitat (R=2.40-2.70) indicate a certain xeromorphic quality of the vegetation developed, as evidenced by the numerous xerophytes: *Achillea millefolium, Agropyrum intermedium, Aira capillaris, Artemisia absinthium, Avena fatua, Bromus sterilis, B. tectorum, Carduus*

acanthoides, C. nutans, Echium vulgare, Euphorbia cyparissias, Hordeum murinum, Hypericum perforatum, Orlaya grandiflora, Verbascum speciosa, etc. High frequency of xerophytes is a form of adaptation of the local weed vegetation to arid climate and porous soil that retains little water in the top soil layer.

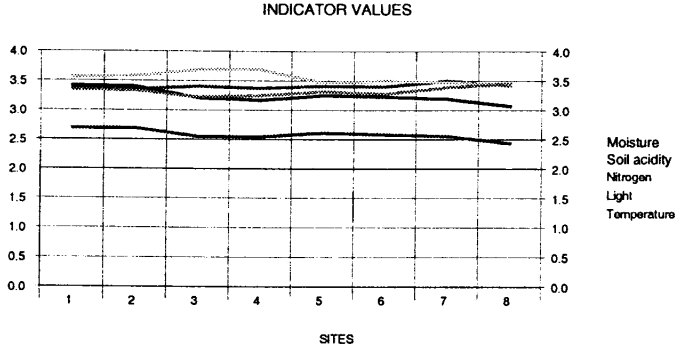

Fig. 4. - The habitat ecological analysis by ecological indices of weed species

CONCLUSION

A total of 113 weed species, including 20 monocotyledones and 93 dicotyledones, were determined in wheat crop in the area of Mt. Stol. The sites marked 1, 4, 2 and 3 are characterised by mutual floristic similarity and form a unity, while the remaining 4 sites make up another floristic unity. The analysed fields were found to be favourable for small grain crop cultivation in terms of light and trophic conditions.

The high participation of meadow coenobionts found (particularly hemicryptophytes) reflects a certain degree of extensive plant production, as well as high proportion of meadow vegetation that gives a specific trait to the agrestal vegetation of the area.

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Recieved March 25, 2004
Accepted April 10, 2004

PRELIMINARNA ISTRAŽIVANJA KOROVSKE VEGETACIJE STRNIH ŽITA NA PODRUČJU PLANINE STOL KOD BORA

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I z v o d

Analizirana je korovska vegetacija ozimih strnih žita na području planine Stol (725 m n.v.; N= 44° 10', E= 22° 6'; N= 44° 09', E= 22° 06'). Na osnovu kvalitativno kvantitativne procene korovskih vrsta utvrđeno je 113 taksona, 20 monokotila i 93 dikotile. Najfrekventnije korovske vrste su: *Chenopodium album, Plantago major, Polygonum persicaria, Bilderdykia convolvulus, Capsella bursa-pastoris, Chenopodium hybridum, Lactuca serriola, Anagallis arvensis, Convolvulus arvensis, Sonchus arvensis, Achillea millefolium, Viola arvensis, Sonchus oleraceus, Consolida regalis* i *Veronica persica.* U analiziranim fitocenozama strnih žita u velikom stepenu su zastupljene hemikriptofite, a to je osnovna životna forma livadske vegetacije (npr. *Achillea millefolium, Agrostis alba, A.vulgaris, Alyssum markgrafii, Crepis biennis, Festuca pratensis, Leucanthemum vulgare, Poa pratensis, Thalictrum lucidum, Veronica jacquinii* itd. To je još jedna potvrda o ekstenzivnosti ovog područja u pogledu biljne proizvodnje. Znači, neophodni su određeni meliorativni i tehnološki zahvati u cilju poboljšanja biljne proizvodnje i smanjenja zakorovljenosti obradivih površina.

Primljeno 25. marta 2004.
Odobreno 10. aprila 2004.