

# CONTRIBUTION TO THE KNOWLEDGE OF SEGETAL VEGETATION FROM CROATIA

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## Izveček

Prispevek k poznavanju segetalne vegetacije na Hrvaškem

Prispevek obravnava plevelno vegetacijo posevkov v kontinentalnom delu Hrvaške. Ugotovljene so bile tri združbe, in sicer: *Kickxietum spuriae* Krus et Vlieg. 1939, *Papaveretum argemone* (Libb. 32) Krus. et Vlieg. 1939 in *Aphano-Matricarietum chamomillae* Tx 1937. em Pass. 57.

## Abstract

The paper deals with the weed communities of cereals in the continental part of Croatia. Three associations were established. They are: *Kickxietum (Linarietum) spuriae* Krus et Vlieg. 1939, *Papaveretum argemone* (Libb. 32) Krus. et Vlieg. 1939., and *Aphano-Matricarietum chamomillae* Tx 1937. em Pass. 57.

**Gljučne besede:** žitni pleveli, plevelne združbe žit, *Secalietea*, *Secalietalia*, *Aperetalia spica-venti*, *Caucalion lappulae*, *Aperion spica-venti*, *Kickxietum spuriae*, *Papaveretum argemone*, *Aphano-Matricarietum chamomillae*, Hrvaška

**Key words:** segetal weeds, weed associations of cereals, *Secalietea*, *Secalietalia*, *Aperetalia spica-venti*, *Caucalion lappulae*, *Aperion spica-venti*, *Kickxietum spuriae*, *Papaveretum argemone*, *Aphano-Matricarietum chamomillae*, Croatia

## 1. INTRODUCTION

Cereals (winter wheat, oat, barley, rye) are annual cultures with no cultivation after sowing. Weeds in cereals are adapted to the germination conditions and to the season rhythm of the cereals species. Just these weeds are very sensitive on the intensified agriculture and they have become extinct in many parts of Europe (Holzner 1978). The weed stands on the stubble fields show often very distinctive block species. Moreover, the problem is to determine the weed association, because in the contemporary phytosociological weed communities system there are different concepts to describe these communities and to fit them into the system.

It is possible, that these facts are main reasons for the difficulties in the phytosociological classification and for relatively a few papers (Kovačević 1962, 1969, 1971) subjected on the

weed communities of cereals, generally and in Croatia, too.

The aim of the present article is to give the contribution about the segetal vegetation in Croatia.

## 2. METHODS

A phytosociological analysis of the weed communities of the cereals was made using the method from Braun-Blanquet (1964). The field observations were carried out in the last twenty years. Syntaxa were named according to Oberdorfer (1983).

## 3. DESCRIPTION OF THE STUDY AREA

The investigated area is the continental part of Croatia between rivers Sava and Drava. This area

belongs to the Pannonia Plain which is characterized by alluvial and diluvial valleys with different zonal and azonal soil types. The climate is a moderate continental (type) with moderately cold winters, warm summers and favorable annual distribution of precipitation. Due to orographic and soil properties and meteorological conditions this area is particularly favorable for agriculture.

There is about 3,300,000 ha of arable land in Croatia, but cereals cover an area of about 300,000-400,000 ha and it is predominantly in continental part of Croatia. In the current Croatian agriculture the private sector prevails with about 78% of cultivated land. It is characterized by the peasant small sized farms with conventional or extensive crop production.

#### 4. RESULTS AND DISCUSSION

The species richness in weed communities of cereals in Croatia is rather high. It counts 122 plant species, from 6 to 29 species on the relevé.

On the basis of the phytosociological relevés it is established, that this weed vegetation belongs to the class *Secalietea* (syn. *Stellarietea mediae*, Oberdorfer, 1983), and alliances *Caucalidion lappulae* within the *Secalietalia* order and *Aperion spica-venti* (suball. *Aphanenion*) within the *Aperetalia spica-venti*

order. Taking into consideration the floristic composition, the following associations may be distinguished: *Kickxietum spuriae* Krus et Vlieg. 1939, *Papaveretum argemone* (Libb.32) Krus. et Vlieg. 1939 and *Aphano-Matricarietum chamomillae* Tx 1937. em Pass. 57.

The diagnostic key for syntaxa of this class and their survey in Croatia were made and it presents on the Table 1.

A clear, distinctive block of species, which are characteristics for the class, order and alliances is good presented (Table 1). Some character species occur frequently and with high abundance. Such are: *Fallopia convolvulus*, *Myosotis arvensis*, *Veronica agrestis*, *Bromus secalinus* and *Apera spica-venti*. Some of them, such as *Bromus secalinus* and *Apera spica-venti* determine the floristic aspect of their stands. The species *Agrostemma githago*, *Legousia speculum veneris*, *Ajuga chamaeptytis*, *Consolida regalis* and *Stachys annua* were rarely noted.

The character species of associations are presented in different number, but clear indicate on the appointed associations (Table 1).

The diagnostic markers of *Kickxietum spuriae* are the species *Kickxia spuria* and *K. elatine*, *Stachys annua* and *Chenorrhinum minus*. Locally, on stubble fields *Stachys annua* was predominant species.

Among the characteristic species of *Papaveretum*

Table 1. Diagnostic key for syntaxa of *Secalietea* and their survey in Croatia

Tabela 1. Dijagnostični ključ za sintaksone razreda *Secalietea* in njihov pregled na Hrvaškem.

<i>Secalietea</i> Br.-Bl. 52 (syn. <i>Stellarietea mediae</i> )	
D. s.: <i>Fallopia convolvulus</i> , <i>Myosotis arvensis</i> , <i>Viola arvensis</i> , <i>Veronica arvensis</i> , <i>Stellaria media</i> , <i>Anagallis arvensis</i> , <i>Rapistrum rugosum</i> , <i>Lamium purpureum</i> , <i>Capsella bursa-pastoris</i> , <i>Tripleurospermum inodorum</i> , <i>Sonchus asper</i> , <i>Valerianella locusta</i> and <i>Agrostemma githago</i>	
<i>Secalietalia</i> Br.-Bl. 31 em. Br.-Bl. 36	<i>Aperetalia spica-venti</i> (Tx. 53) J. et R. Tx.
<i>Caucalidion lappulae</i> Tx. 50	<i>Aperion spica-venti</i> Tx. in Oberd. 49
D. s.: <i>Papaver rhoeas</i> , <i>Ranunculus arvensis</i> , <i>Sinapis arvensis</i> , <i>Thlaspi arvense</i> , <i>Euphorbia helioscopia</i> , <i>Fumaria officinalis</i> , <i>Ajuga chamaeptytis</i> , <i>Consolida regalis</i> , <i>Legousia speculum-veneris</i> , <i>Lathyrus tuberosus</i>	D. s.: <i>Bromus secalinus</i> , <i>Apera spica-venti</i> , <i>Centaurea cyanus</i> , <i>Vicia tetrasperma</i> , <i>V. angustifolia</i> , <i>Veronica hederifolia</i> , <i>Vaccaria pyramidata</i> , <i>Vicia hirsuta</i> , <i>Erophila verna</i>
1. Ass. <i>Kickxietum (Linarietum) spuriae</i> Krus. et Vlieg. 39	1. Ass. <i>Papaveretum argemone</i> (Libb.32) Krus. et Vlieg. 39
D.s.: <i>Kickxia spuria</i> , <i>K. elatine</i> , <i>Chaenorrhinum minus</i> , <i>Lathyrus aphaca</i> , <i>Adonis aestivalis</i>	D.s.: <i>Papaver dubium</i> , <i>P. argemone</i> , <i>Veronica triphyllos</i>
	2. Ass. <i>Aphano-Matricarietum</i> Meis. 67
	D.s.: <i>Aphanes arvensis</i> , <i>Matricaria chamomilla</i>

The most frequent companions: *Galium aparine*, *Cirsium arvense*, *Convolvulus arvensis*, *Ambrosia artemisiifolia*, *Conyza canadensis*, *Polygonum aviculare*, *Chenopodium album*, *Equisetum arvense*.

*argemone* (Table 1). *Veronica triphyllos* was noted with high values for frequency and abundance.

From characteristic species of *Aphano-Matricarietum chamomillae* are found: *Aphanes arvensis*, *Matricaria chamomilla*, *Tripleurospermum inodorum*, *Vicia tetrasperma* and *Vicia hirsuta*. This association was the most widespread. It is distributed on less or more heavy soils with low pH but rich in nutrients in humid areas. It was occurred by two variants which are characterized with the remarkable species group. They are: the *Mentha arvensis*-group (*M. arvensis*, *Stachys palustris*, *Equisetum arvense*, *Ranunculus repens*) and *Gnaphalium uliginosum*-group (*G. uliginosum*, *Hypericum humifussum*).

It is important to emphasize, that the archeophytes like *Agrostemma githago*, *Adonis aestivalis*, *Lolium temulentum* have disappeared under herbicide pressure and seed cleaning. These species are noted only on fields with extensive production. In chemically weeded cereals it was not rare to see infestations of *Veronica hederifolia* some weeks after sowing or of *Galium aparine*, *Vicia spp.*, *Fallopia convolvulus*, *Poa trivialis*, *Convolvulus arvensis* and *Calystegia sepium* in spring. The extremely high abundance and cover of *Ambrosia artemisiifolia* or *Conyza canadensis* is often a characteristic of the stubble fields.

## 5. CONCLUSIONS

Research results show:

1. The species richness in weed communities of cereals in Croatia was rather high. The total number of species was 122, and from 6 to 29 species in the single relevé.
2. The weed vegetation belongs to the class *Secalietea* (syn. *Stellarietea mediae*, Oberdorfer, 1983), and alliances *Caucalidion lappulae* within the *Secalietalia* order and *Aperion spica-venti* (suball. *Aphanion*) within the *Aperetalia spica-venti* order.
3. Three weed associations in cereals on the fields in the continental part of Croatia were distinguished: *Kickxietum (Linarietum) spuriae* Krus et Vlieg. 1939, *Papaveretum argemone* (Libb.32) Krus. et Vlieg. 1939., and *Aphano-Matricarietum chamomillae* Tx 1937. em Pass. 57.
4. The archeophytes like *Agrostemma githago*, *Adonis aestivalis*, *Lolium temulentum* have disappeared under herbicide pressure and seed cleaning. These species are noted only on fields with extensive production.
5. In chemically weeded cereals it was not rare to

see infestations of *Veronica hederifolia* some weeks after sowing or of *Galium aparine*, *Vicia spp.*, *Fallopia convolvulus*, *Poa trivialis*, *Convolvulus arvensis* and *Calystegia sepium* in spring.

6. The extremely high abundance and cover of *Ambrosia artemisiifolia* or *Conyza canadensis* is often a characteristic of the stubble fields.

## 6. POVZETEK

### Prispevek k poznavanju segetalne vegetacije na Hrvaškem

Po standardni srednjeevropski metodi (Braun-Blanquet 1964) smo proučili plevelno vegetacijo žit (pšenice, oves, ječmen, rž) in njihovih strnišč v kontinentalnem delu Hrvaške. Terenske raziskave so potekle zadnjih dvajset let. Ugotovili smo, da plevelno vegetacijo uvrščamo v zvezi *Caucalidion lappulae* (red *Secalietalia*) in *Aperion spica-venti* (red *Aperetalia spica-venti*) znotraj razreda *Secalietea*. Razlikujemo naslednje asociacije: *Kickxietum (Linarietum) spuriae* Krus et Vlieg. 1939, *Papaveretum argemone* (Libb. 32) Krus. et Vlieg. 1939. in *Aphano-Matricarietum chamomillae* Tx 1937. em Pass. 57.

Najbolj razširjena je asociacija *Aphano-Matricarietum chamomillae*. Ločimo lahko nekaj variant, ki jih označujejo pomembne skupine vrst, kot na primer *Mentha arvensis*-skupina in *Gnaphalium uliginosum*-skupina.

Na intenzivno obdelanih njivah se pojavljajo plevelne združbe v osiromašenih oblikah s trajnicami in vrstami, ki so odporne na herbicide. Posebej občutljive na uporabo herbicidov so vrste, značilne za zvezo *Caucalidion*. Na strnišču se pogosto pojavita vrsti: *Ambrosia artemisiifolia* in *Conyza canadensis*.

Zaključimo lahko, da so plevelne združbe žit izredno nestabilne in da se njihova floristična sestava zaradi antropogenega vpliva bistveno in hitro spreminja.

## 7. LITERATURE

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