Preslia, Praha, 47 : 31—57, 1975

Two new segetal associations: *Misopateto-Galeopsietum ladani* and *Consolido regalis-Misopatetum*

Dvě nové segetální asociace: *Misopateto-Galeopsietum ladani* a *Consolido regalis-Misopatetum*

Zdeněk Kropáč and Slavomil Hejný

Kropáč Z. et S. Hejný (1975): Two new segetal associations: *Misopateto-Galeopsietum ladani* and *Consolido regalis-Misopatetum*. — Preslia, Praha, 47 : 31—57.

Research of segetal communities (class *Secalietea*, order *Secalietalia*) in Czechoslovakia has resulted, so far, in the establishment of two new associations, and of a provisional alliance. The *Misopateto-Galeopsietum ladani* is described from cereals and stubbles in the foothills of the Ondava Mountains, E. Slovakia, with *Galeopsis ladanum*, *Misopates orontium*, *Kickxia elatine*, *Euphorbia exigua*, *Ranunculus repens*, *Stachys palustris*, *Mentha arvensis*, and *Agrostis stolonifera* as diagnostically significant species. The *Consolido regalis-Misopatetum* occurs in the colline belt of Central and S. Slovakia, and its diagnostically significant species are represented by *Misopates orontium*, *Consolida regalis*, *Kickxia elatine*, *Euphorbia exigua*, *Avena fatua*, *Stachys annua*, *Papaver rhoeas*, *Melandrium noctiflorum*, and *Valerianella rimosa*. The both associations are marked by a high mean number od species per relevé (44 and 40 species, respectively) and differ in participation of annual weeds (56.8 and 74.5%, respectively). While the former contains species indicating a higher humidity of the habitat, the latter suggests closer relationships with relatively dry and warm sites. Both the floristic composition and ecology of the new associations mark their intermediate position between the *Caucalion* and *Aphanion* which resulted in the proposal of a new provisional alliance — the *Sherardion*. The paper describes the basic concepts and methods used in the research of segetal communities, including a comparative table of 12 syntaxa which are related to the newly described associations.

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INTRODUCTION

Segetal plant communities of the Czechoslovak territory have been thoroughly studied in the past 15 years. General survey of these communities is still under preparation. In this paper two new associations are presented, growing in Slovakia, the eastern republic of the Č.S.S.R. An outline of segetal communities of this country has been submitted to the symposium on the synanthropic vegetation held by the Botanical Institute, Slovak Academy of Sciences, in March 1973 (Kropáč 1973, msc.). This outline also contained a new provisional association called *Kickxio elatine-Misopatetum orontium*. After the completion of our phytosociological materials by S. Hejný's relevés from the Ondava Mountains, the eastern part of Slovakia, the above name was found rather inconvenient, and the respective syntaxon renamed as *Consolido regalis-Misopatetum*; Hejný's relevés represent a separate association, *Misopateto-Galeopsietum ladani*. Either of these new associations is characterized by a high constancy (often accompanied by a high abundance and dominance in individual stands) of *Misopates orontium*, *Kickxia elatine* and *Euphorbia exigua*, and, in the case of the latter association, by prominent

representation of *Galeopsis ladanum*, too. Besides, the absence of typical species belonging to the alliance *Caucalion lappulae* Tx. 50, and fairly numerous occurrence of species of the *Aphanion arvensis* J. Tx. et Tx. 60 is very significant for the newly established syntaxa.

METHODS

Theoretical conception concerning segetal communities has been explained in an earlier paper (Kropáč et al. 1971) which serves as theoretical basis even for the present contribution. According to this notion a certain association should not comprise (1) relevés of the winter agro-ecophase, and (2) relevés of the other two agro-ecophases, i.e. spring-summer agro-ecophase and autumn agro-ecophase. In the present paper, relevés recorded only in the two last-mentioned agro--ecophase were available; there was no substantial difference between the two sets of relevés which justified their synthetizing within the same syntaxonomic units. In agreement with earlier observations, the kind of the crop accompanying the segetal community was of little impact on the floristic composition.

Stands of segetal communities have been assessed by the Domin—Hadač 11-grade scale (for exact values see e.g., Hadač et Hadačová 1971 : 370) over a sample plot of at least 100 m². Only stands sufficiently homogeneous, and those lying in a safe distance from the margin of the field were taken into account. In the establishment of syntaxonomic units we have followed the procedure recommended by Ellenberg (1956 : 45—63): by successive re-arrangement of floristic tables appropriate groupings of species have been selected and used as a basis for the delimitation of the associations. In our conception, the association is characterized by the so-called indicative group of species (for the principle see Holub et al. 1967 : 10). In synthetic tables, we distinguish (1) the diagnostically significant species, and (2) the species of high constancy (class IV and V) and high abundance value. The diagnostically significant species (arranged according to the decreasing constancy value) cannot be identified with "character species" sensu Braun-Blanquet; they mostly represent only differentiating species of varied cenological amplitude, and only in few optimum cases involve even the species of the middle degree of fidelity.

In order to facilitate phytosociological and economic features of individual species the so-called mean abundance-dominance value (A-value) has been used in the synthetic tables; it can readily be calculated as the arithmetical mean of the respective individual values, while the grade "+" equals 0.5 (Kropáč et al. 1971). Species possessing values higher than 3 are considered as dominants of the segetal community; those with the value between 2 and 3 have been empirically determined as subdominants.

In the present work we follow the published survey of higher syntaxa of segetal vegetation (Hejný in Holub et al. 1967), however, the new results made some alterations necessary. The nomenclature of the plants follows the list of Ehrendorfer et al. (1973). In species involving several subspecies or varieties, if not otherwise stated, the autonymous infraspecific taxon is assumed. "Small" species have been recognized as far as possible. In *Polygonum aviculare* agg. all specimens collected could not be unambiguously identified. However, the identified specimens suggest that *Polygonum rurivagum* Jordan ex Boreau prevails in southern Slovakia, while in the Ondava Mountains the same species is partly accompanied by *P. arenastrum* Boreau (= *P. aequale* Lindman).

Misopateto-Galeopsietum ladani Hejný ass. nova hoc loco

Species composition and synmorphology. — According to the synthetic Table 1 following species can be regarded as diagnostically significant: *Galeopsis ladanum* (which can be considered even as a local "character species"), *Misopates orontium*, *Kickxia elatine*, and *Euphorbia exigua*. Besides, the diagnostically significant species must be completed by the following companions: *Ranunculus repens*, *Stachys palustris*, *Mentha arvensis*, and *Agrostis stolonifera*, all of them indicating generally higher degree of humidity of the biotope, and serving as differentiating species against the other new segetal association. All eight diagnostically significant species belong to the V or IV constancy class; *Galeopsis ladanum* and *Ranunculus repens* represent the category of the dominants, while *Kickxia elatine*, *Stachys palustris*,

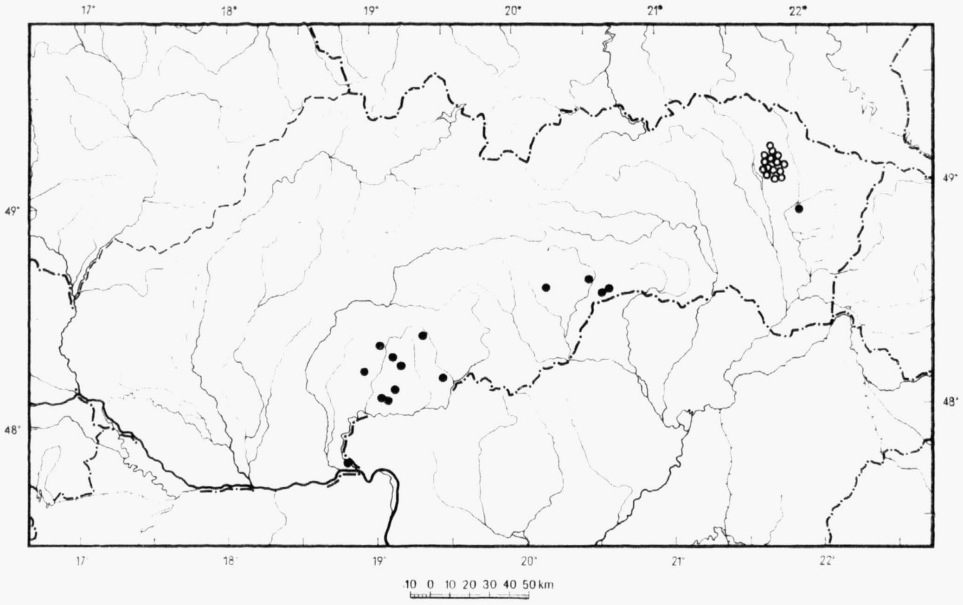


Fig. 1. — Distribution of relevés recorded over the territory of Slovakia; ○ — *Misopateto-Galeopsietum ladani*, ● — *Consolido regalis-Misopatetum*.

Mentha arvensis, and *Agrostis stolonifera* belong to the subdominants. Moreover, the following species belong to the indicative group of species (dominants designated by asterisks): *Sherardia arvensis*, **Aethusa cynapium* subsp.

Explanatory note to Tables 1 and 2. — Following symbols have been used for the crops:

Ww — winter wheat
Ws — spring wheat
R — rye (here winter r. only)
O — oats
B — barley (here spring b. only)
B (c) — the same with underseed of red clover
s (w) — stubble (after winter cereals)
s (s) — the same (after spring cereals)
ss (c) — stubble stand of red clover

Location of the relevés of the *Misopateto-Galeopsietum ladani* recorded in the area SE. of the town Stropkov in the Ondava Mts.:

1. Ruská Poruba, about 0.5 km to the SW of the village, on a slope of the Kopanica Hill, August 30, 1956
2. Závada, about 0.8 km to SSW, slope of the Lipovica Hill, July 16, 1957
3. Ruská Poruba, about 0.7 km to SSE, slope of the Skaliané Hill, September 9, 1956
4. Prituľany, about 0.8 km to N, slope of the Kopanica Hill, July 17, 1957
5. Ruská Poruba, about 0.6 km to SSW, slope of the Kopanica Hill, September 6, 1956
6. Ruská Poruba, about 0.6 km to SW, slope of the Kopanica Hill, August 30, 1956
7. Prituľany, about 1.7 km to WNW, September 3, 1956
8. Ruská Poruba, about 0.7 km to SSW, slope of the Kopanica Hill, September 6, 1956
9. Ruská Poruba, about 1 km to SW, upper part of the Kopanica Hill, September 6, 1956
10. Piskorovce, about 0.8 km to WSW, August 19, 1957
11. Nižná Sitnica, to E of the village, not far from the elevation point "320 m", August 21, 1957
12. Ruská Poruba, about 0.8 km to WSW, slope of the Kopanica Hill, July 15, 1957
13. Ruská Poruba, about 0.9 km to WSW, July 15, 1957
14. Ruská Poruba, about 1 km to WSW, July 15, 1957
15. Ruská Poruba, about 1 km to NE, July 15, 1957

Tab. 1. — *Misopateto-Galeopsietum ladani* HEJNÝ ass. nova

Association	*Misopateto-Galeopsietum ladani*																	
Subassociation	*typicum*			*trifolietosum arvensis*														
Variant	—			typical						with *Viola tricolor*								
Relevé, no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Altitude, m	310	390	270	370	280	330	430	290	400	325	300	350	360	390	430			
Slope °	20	20	15	25	15	20	25	15	5	5	15	20	20	5	25			
Aspect	E	E	NW	WSW	E	E	E	E	E	E	NW	NE	NE	NE	W			
Crop	s (s)	Ww	s (s)	Ww	s (w)	s (w)	s (s)	s (w)	s (s)	s (s)	s (w)	Ws	Ws	Ww	Ww	⌀		
Cover (%) — total	95	95	90	100	90	85	75	85	85	85	100	100	100	90	100	92		
— weeds	95	70	90	65	90	85	75	85	85	85	100	75	70	75	70	81		
Number of species	40	40	38	54	40	54	42	46	37	41	48	40	38	50	53	44	C	A
Diagnostically significant species of the association:																		
Galeopsis ladanum L.	2	.	5	6	3	1	4	3	4	3	4	5	4	5	5		V	3.60
Misopates orontium (L.) RAFIN.	2	3	1	3	2	2	2	2	4	.	3	+	3	2	.		V	1.96
Kickxia elatine (L.) DUM.	+	.	3	1	3	4	3	3	5	3	4	1	1	+	3		V	2.33
Euphorbia exigua L.	.	2	5	3	.	4	1	1	3	1	2	.	.	.	4		IV	1.73
Ranunculus repens L.	6	4	5	2	4	3	.	4	3	3	.	5	.	5	3		IV	3.13
Stachys palustris L.	5	5	2	.	4	.	4	4	5	.	1	4	.	1	4		IV	2.60
Mentha arvensis L.	5	3	5	2	2	.	3	4	5	1	.	.	.	4	2		IV	2.40
Agrostis stolonifera L.	.	4	+	2	.	4	.	4	.	.	2	2	2	5	5		IV	2.03
Differentiating species of the subassociations:																		
Trifolium arvense L.	.	.	.	2	3	2	.	3	4	3	4	2	2	.	3		IV	1.86
Gypsophila muralis L.	.	.	+	.	2	5	3	.	.	6	5	.	.	1	+		III	1.53
Setaria viridis (L.) P. B.	.	.	.	1	3	3	.	.	2	.	.	.	.	2	.		II	0.73
Digitaria ischaemum (SCHREB.) MÜHLENB.	.	.	.	.	.	3	4	5	.	.	.	.	.	.	.		I	0.80
Differentiating species of the variants:																		
Viola tricolor L.	.	.	.	.	.	.	.	.	.	2	1	4	4	6	.		II	1.13
Galeopsis tetrahit L.	.	.	+	+	.	.	.	.	.	+	.	4	+	1	1		III	0.53
Lepidium campestre (L.) R. BR.	.	.	.	.	.	.	.	+	.	1	2	1	2	4	3		III	0.90

Species of the *Sherardion:*																	
Sherardia arvensis L.	3	2	2	1	3	3	6	2	3	1	+	+	.	.	2	V	1.93
Aethusa cynapium L. subsp. *agrestis* (WALLR.) DOSTÁL	.	6	.	4	5	3	2	4	5	4	.	6	6	.	.	IV	3.00
Valerianella dentata (L.) POLLICH	4	4	.	.	.	4	2	.	.	.	+	.	1	.	1	III	1.10
Galium spurium L.	.	.	.	1	.	.	.	.	.	.	.	4	3	2	.	II	0.66
Geranium dissectum L.	.	.	+	.	4	1	.	.	.	.	.	.	.	.	2	II	0.60
Medicago lupulina L.	.	.	.	1	.	.	.	.	.	.	.	2	3	.	.	I	0.40
Ranunculus arvensis L.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	I	0.13
Species of the *Aphanion:*																	
Scleranthus annuus L.	3	6	5	3	4	5	2	4	3	2	2	4	5	7	5	V	4.00
Anthemis arvensis L.	2	.	.	2	.	4	3	3	3	2	4	1	.	2	3	IV	1.93
Raphanus raphanistrum L.	+	+	.	.	3	1	4	3	3	.	.	.	1	2	1	IV	1.26
Vicia hirsuta (L.) S. F. GRAY	1	3	.	4	.	.	.	.	.	.	.	5	5	.	4	II	1.46
Veronica arvensis L.	.	2	.	•	.	.	+	.	.	.	3	.	.	.	.	I	0.36
Aphanes arvensis L.	.	.	.	.	.	.	+	.	.	.	2	.	.	.	+	I	0.20
Species of the higher syntaxa:																	
a) *Secalietea*																	
Anagallis arvensis L.	1	5	2	5	5	4	5	2	.	3	3	1	2	5	4	V	3.13
Fallopia convolvulus (L.) Á. LÖVE	.	4	2	3	.	4	.	2	.	2	1	4	4	3	3	IV	2.13
Myosotis arvensis (L.) HILL	1	5	.	2	4	+	.	1	.	2	4	3	2	.	4	IV	1.90
Viola arvensis MURRAY	2	3	4	3	3	2	3	.	4	.	.	.	.	.	2	III	1.73
Centaurea cyanus L.	.	+	.	.	2	1	.	+	.	.	+	.	.	1	.	II	0.36
Vicia tetrasperma (L.) SCHREB.	.	.	.	.	.	.	.	.	+	.	+	2	.	.	+	II	0.23
Agrostemma githago L.	.	2	.	.	.	.	.	.	.	.	.	.	.	2	1	I	0.33
b) *Polygono-Chenopodietalia*																	
Setaria glauca (L.) P. B.	5	.	3	+	4	6	6	6	3	5	5	.	.	2	.	IV	3.03
Veronica persica POIR.	4	3	.	1	.	.	.	1	2	2	.	4	2	+	1	IV	1.36
Oxalis fontana BUNGE	4	.	.	.	.	.	.	.	2	.	1	.	4	+	.	II	0.76
Polygonum persicaria L.	.	.	+	+	.	.	+	.	.	2	.	.	.	.	+	II	0.26
Euphorbia helioscopia L.	.	2	.	.	.	+	+	.	.	.	.	.	.	+	.	II	0.23
Chenopodium polyspermum L.	.	+	.	.	.	.	2	.	.	.	.	.	.	.	+	I	0.20

Tab. 1 (contd.)

Association	*Misopateto-Galeopsietum ladani*																	
Subassociation	*typicum*			*trifolietosum arvensis*														
Variant	—			typical						with *Viola tricolor*								
Relevé, no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	∅		
Altitude, m	310	390	270	370	280	330	430	290	400	325	300	350	360	390	430			
Slope °	20	20	15	25	15	20	25	15	5	5	15	20	20	5	25			
Aspect	E	E	NW	WSW	E	E	E	E	E	E	NW	NE	NE	NE	W			
Crop	s (s)	Ww	s (s)	Ww	s (w)	s (w)	s (s)	s (w)	s (s)	s (s)	s (w)	Ws	Ws	Ww	Ww			
Cover (%) — total	95	95	90	100	90	85	75	85	85	85	100	100	100	90	100	92		
— weeds	95	70	90	65	90	85	75	85	85	85	100	75	70	75	70	81		
Number of species	40	40	38	54	40	54	42	46	37	41	48	40	38	50	53	44	C	A
Companions																		
a) with constancy >60%																		
Convolvulus arvensis L.	2	6	5	3	6	5	5	.	6	4	4	5	2	4	6		V	4.20
Cirsium arvense (L.) Scop.	4	5	.	3	.	4	4	5	4	2	2	5	4	2	5		V	3.26
Polygonum aviculare agg.	3	4	7	2	7	5	.	5	7	3	3	.	.	5	4		IV	3.66
Sonchus arvensis L.	5	4	.	.	2	5	4	3	4	.	+	5	4	.	4		IV	2.70
Agropyron repens (L.) P. B.	5	2	.	.	5	7	4	6	5	.	2	.	.	1	2		IV	2.60
Daucus carota (L.)	3	4	3	5	4	2	3	5	.	5	.	.	.	.	1		IV	2.33
Achillea millefolium L.	4	2	.	.	.	5	1	1	.	+	1	2	.	5	4		IV	1.70
Linaria vulgaris Mill.	4	1	1	1	3	4	+	4	4	.	1	.	.	.	.		IV	1.56
Trifolium campestre Schreb.	1	.	.	2	.	1	.	2	3	1	2	5	2	.	2		IV	1.40
b) with constancy <60%																		
Trifolium pratense L.	+	.	1	2	2	.	+	.	2	7	5	.	.	.	1		III	1.40
Tripleurospermum inodorum (L.) C. H. Schultz	.	.	.	.	4	.	1	.	3	.	2	1	2	2	+		III	1.03
Trifolium repens L.	3	.	2	5	.	2	.	1	.	2	.	6	6	.	.		III	1.80
Plantago major subsp. *intermedia* (Godr.) Arc.	2	.	4	1	2	3	3	.	.	4	4	.	.	.	.		III	1.53
Plantago lanceolata L.	.	.	+	1	2	3	2	2	.	6	.	.	.	2	.		III	1.23
Atriplex patula L.	+	.	3	+	6	.	4	.	5	1	.	.	.	.	.		III	1.33
Chenopodium album L.	2	.	+	+	.	2	.	.	.	.	.	+	1	+	.		III	0.46
Vicia angustifolia L.	.	3	.	+	.	.	.	.	+	.	1	3	2	.	2		III	0.80

Cichorium intybus L.	.	.	+	1	.	.	3	3	.	.	.	.	3	2	+	III	0.86
Taraxacum officinale WEB. s.l.	2	.	1	2	3	2	1	3	.	.	.	.	.	.	.	III	0.93
Tussilago farfara L.	.	4	3	.	.	.	.	.	5	.	.	3	2	.	2	II	1.26
Glechoma hederacea L.	5	.	.	1	.	.	.	3	2	2	.	2	.	.	.	II	1.00
Rumex acetosella L.	.	1	1	.	.	4	.	3	.	.	.	.	.	4	1	II	0.93
Conyza canadensis (L.) CRONQ.	.	.	.	.	2	2	3	.	.	2	5	.	.	1	.	II	1.00
Stellaria graminea L.	.	2	2	3	.	.	.	+	.	.	.	2	.	.	3	II	0.83
Gnaphalium uliginosum L.	.	.	2	.	2	2	3	.	.	3	5	.	.	.	.	II	1.13
Secale cereale L.	.	1	.	3	.	.	.	.	.	.	.	3	4	.	2	II	0.86
Knautia arvensis (L.) COULT.	1	.	.	.	.	.	.	2	1	.	.	.	3	3	.	II	0.66
Lotus corniculatus L.	+	.	.	5	.	.	+	.	2	.	.	.	.	.	+	II	0.56
Sonchus oleraceus L.	.	.	.	1	.	.	2	.	.	.	.	.	1	.	2	II	0.40
Rubus caesius L.	+	.	.	.	.	.	.	4	2	.	.	.	4	.	.	II	0.70
Hypericum perforatum L.	.	.	.	.	.	+	.	2	.	+	.	.	.	+	.	II	0.23
Campanula rapunculoides L.	.	+	.	3	.	.	.	.	.	.	.	.	4	1	.	II	0.56
Poa compressa L.	5	.	.	.	.	.	.	.	.	.	.	.	.	3	3	I	0.75
Filago arvensis L.	.	.	.	.	.	+	.	.	.	1	1	.	.	.	.	I	0.16
Cerastium holosteoides FRIES emend. HYL.	+	.	.	.	+	.	.	.	.	.	.	.	+	.	.	I	0.10
Pimpinella saxifraga L.	.	.	.	+	.	+	.	.	.	.	.	.	.	+	.	I	0.10
Equisetum arvense L.	.	3	.	.	1	.	.	.	.	.	.	.	.	.	5	I	0.60
Echium vulgare L.	.	.	3	.	.	3	.	.	.	.	.	.	.	1	.	I	0.46
Rorippa sylvestris (L.) BESS.	2	.	.	.	.	.	.	.	.	.	1	1	.	.	.	I	0.26

Species recorded in one or two (exceptionally three) relevés only (pertinent Nos. of the relevés shown in the brackets):
Allium vineale L. + (14, 15), *Anthyllis vulneraria* L. + (4), 6 (11), *Arabidopsis thaliana* (L.) HEYNH. 1 (14), *Avena fatua* L. + (14), *Barbarea vulgaris* R. BR. 1 (11), *Brassica rapa* L. + (6, 11), 2 (14), *Bromus secalinus* L. + (14), 2 (11), *Campanula patula* L. + (10), *Capsella bursa-pastoris* (L. MED. 2 (5), *Centaurea scabiosa* L. 2 (11), *Cerastium arvense* L. 4 (3), *Cuscuta trifolii* BAB. et GIBSON + (4), 1 (6), 4 (10), *Diplotaxis muralis* (L.) DC. 3 (7), *Erodium cicutarium* (L.) L'HÉR. 2 (6), *Erysimum cheiranthoides* L. 3 (12), 5 (13), *Euphorbia cyparissias* L. 1 (11), *E. platyphyllos* L. + (4), 1 (15), *E. stricta* L. + (4), *Fagopyrum esculentum* MOENCH + (3, 4), *Galeopsis bifida* BOENN. 4 (2), *G. pubescens* BESS. 2 (8), *Galium mollugo* L. 3 (6), 5 (10), *Geranium pusillum* BURM. f. 2 (9), *Hieracium pilosella* L. 2 (6), *Lapsana communis* L. + (4), 2 (12), *Leontodon autumnalis* L. 2 (6), 4 (3), *Leucanthemum vulgare* LAM. 2 (8), 3 (10), 4 (6), *Medicago varia* MARTYN + (13), *Melandrium album* (MILL.) GARCKE 1 (6), *Phleum pratense* L. + (14), 1 (2), 2 (11), *Poa angustifolia* L. 4 (8) *P. pratensis* L. 5 (14), *Prunus spinosa* L. (juv.) 2 (5), *Ranunculus polyanthemos* L. + (8), *Sedum maximum* (L.) HOFFM. + (8), 2 (9), *Silene gallica* L. 1 (2), *Sonchus asper* (L.) HILL 1 (11), 2 (7), *Spergula arvensis* L. 4 (14), *Stellaria media* (L.) VILL. + (6), 1 (5), *Symphytum officinale* L. 4 (5), *Thlaspi arvense* L. + (12), *Trifolium dubium* SIBTH. + (15), *T. hybridum* L. + (15), *T. medium* L. + (4), 1 (15), *Veronica serpyllifolia* L. 1 (10, 11), *Vicia cracca* L. 2 (4), *V. villosa* ROTH 1 (5, 14), 2 (8).

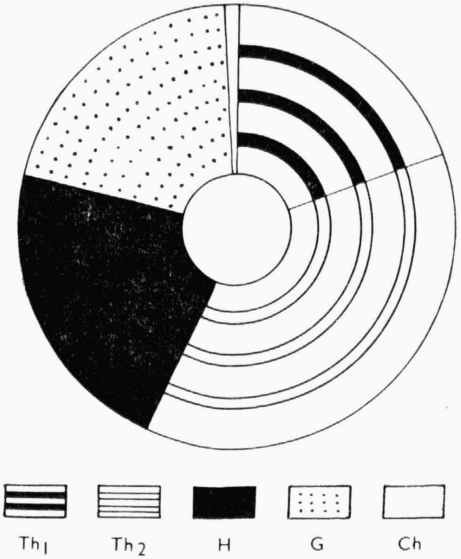


Fig. 2. — The life-form spectrum of the *Misopateto-Galeopsietum*. — Th_1 — winter forms of the therophytes, Th_2 — vernal forms of the therophytes, H — hemicryptophytes, G — geophytes, Ch — chamaephytes.

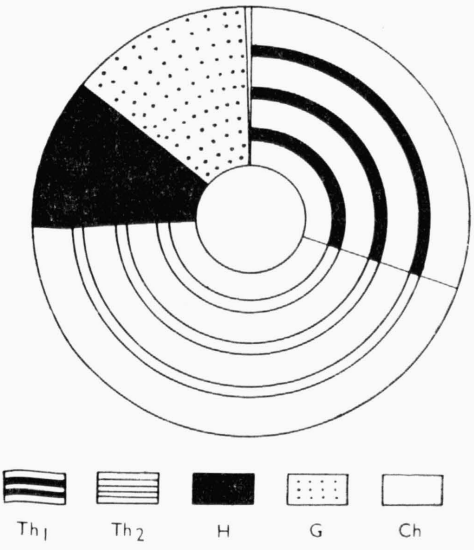


Fig. 3. — The life-form spectrum of the *Consolido-Misopatetum*; for other explanation see Fig. 2.

agrestis, **Scleranthus annuus*, *Anthemis arvensis*, *Raphanus raphanistrum*, **Anagallis arvensis*, **Fallopia convolvulus*, *Myosotis arvensis*, *Veronica persica*, **Setaria glauca*, **Convolvulus arvensis*, **Cirsium arvense*, **Polygonum aviculare* agg., **Sonchus arvensis*, **Agropyrum repens*, **Daucus carota*, *Achillea millefolium*, *Linaria vulgaris*, and *Trifolium campestre*.

The high number of species seems to be an essential feature of the association: some of the relevés contained more than 50 species, the average number of species per relevé was 44, and there were altogether 127 species in 15 relevés. As to the life-form, annual weeds (therophytes) prevail: 56.8%. The perennials, however, participate quite markedly: 43.2%. Among the therophytes, vernal forms (Th_2) are more abundant. Among the perennial components the major part is represented by the hemicryptophytes. The spectrum of life-forms (expressed as percentage corrected by the A-values) shows the following representation (see also Fig. 2):

Th_1	Th_2	H	G	CH
19.4	37.4	22.2	20.3	0.7

High participation of perennials is also evident from the high cover, i.e. percentage of the total area covered by the aerial parts of the plants. In few cases 100% cover was reached, with 92% cover as the average of the whole community, of which weeds represented 81%. This association achieves its typical development in the autumn agro-ecophase, and partly also in the final period of the spring-summer agro-ecophase. Winter or spring varieties of wheat or stubbles after the harvest of these cereals frame this segetal association.

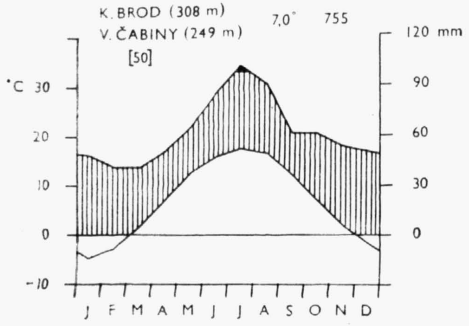
Synchorology, synecology and variability of the association. — The association has been classified on the basis of segetal stands recorded in the area SE. of the town Stropkov, Ondava Mountains, eastern Slovakia (see the list of localities and Fig. 1). According to the KONČEK's climatic classification of Czechoslovakia (KONČEK et al. 1958), the respective territory lies

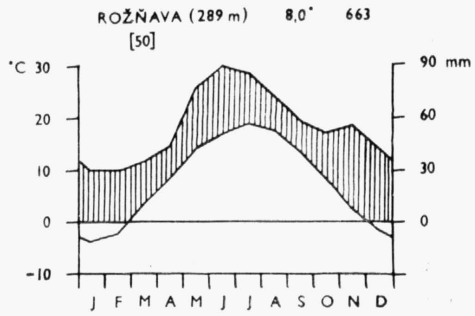
in the "moderately warm region" ("moderately warm and moderately wet district" with transitions to the "wet district"). Mean annual rainfall mostly exceeds 700 mm, in higher elevation amounts to more than 900 mm; mean annual temperature ranges between 6 and 7°C. An illustration of the relatively warm area involved in our study provides the climatic diagram (Fig. 4) constructed for the values recorded by meteorological stations near Medzilaborce (Krásny Brod 308 m alt., and Vyšné Čabiny 249 m alt.); the summer rainfall maximum can be regarded as an important character of the local climate.

A major part of the territory is covered by forests (more than 50%); in the period of our field work (1956 and 1957), causal burning of the forest was common practice in some places (mostly in the beech forest zone). In the oak-hornbeam forests, where the new association would preferably grow as a substitute community, fallowing was generally in operation. The natural forest community of the area occupied by the described association was most likely the *Carici pilosae-Carpinetum* NEUHÄUSL et NEUHÄUSLOVÁ 64. The *Misopateto-Galeopsietum* would optimally grow in the colline belt of between 250 and 500 m altitude. The inclination of the slopes is locally very steep, and the arable land is frequently situated just over these slopes. A major part of the parent material is represented by slates or sandstones of the Carpathian flysch, containing usually no calcium carbonate. As to the soil type of the arable land, various brown and gley soils prevail, the texture of which range from clayey-loamy to sandy-loamy, with high content of gravel and stones (approx. 50%); only in the foothills the leached brown soil (lessivé) with distinct gley soil forming process may occur. The brown gleyed soils are normally not fully saturated with bases, their soil reaction (exchangeable pH) values being comparatively low (4.1 to 5.9 pH) and the gley process of different rate.

The variability of the association is affected mainly by the soil features. For the time being, we could distinguish the typical subassociation, bound to the clayey-loamy soils, and the subassociation with *Trifolium arvense* growing on sandy-loamy or loamy-sandy soils with high content of coarse parent material (see Table 1). Within the last-mentioned subassociation a separate variant with *Viola tricolor* could be outlined, the ecological interpretation of which, however, is not quite clear; it possibly, represents, the very acidophilous part of the association. As the nomenclatural type of the new association the relevé No. 1 has been designated.

Agricultural assessment of the association. — The association is distributed over the so-called potato farming zone which includes a good deal of fodder crops in the crop rotation; at the present time, cereals exceed 50% (TOBRMAN 1970). Arable land occupies only ca. 40% of the whole agricultural land and nearly the same area is taken by pastures. The yields of agricultural crops are relatively low; more than 20% of agricultural land still belongs to the private sector. In the period of our field work, the production was still lower in comparison with the present-day yields. At that time characteristic features of the traditional three-fleld crop rotation governing the old private agriculture could be observed. Individual agro-ecostages succeeded in this sequence: cereals — root crop — fallow lasting for one to three years (in the past many-years fallowing has been practised). After harvesting of cereals the stubble was exploited as a temporary fallow till the early spring when it was ploughed in, and used for a root crop. Stubble stands were usually grazed, which caused specific ecological conditions: with full sunlight and





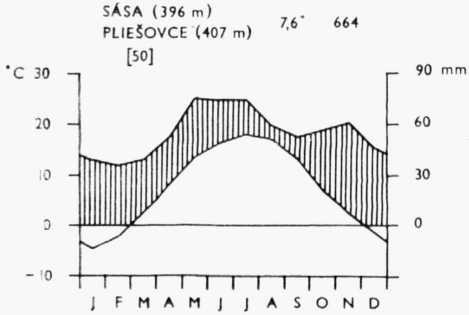


Fig. 4. (top left). — The climatic diagram combined from the data of the meteorological station at Krásny Brod and Vyšné Čabiny, near Medzilaborce.
Fig. 5. (top right). — The climatic diagram for the meteorological station in Rožňava.
Fig. 6. (left).— The climatic diagram combined from the data of the meteorological station at Sása and Pliešovce, near Krupina.

reduced competition of perennials owing to the grazing and treading activities of cattle, the therophytes prospered very well. The following weed species took the role of dominants with high constancy (named in the sequence of the decreasing A-values): *Convolvulus arvensis*, *Scleranthus annuus* (in stubble locally 7!), *Polygonum aviculare* (in stubble frequently 7!), *Galeopsis ladanum* (locally 6, frequently 5), *Cirsium arvense*, *Ranunculus repens*, (locally 6, frequently 5), *Anagallis arvensis* (in stubble frequently 5!), *Setaria glauca* (in stubble frequently 6!),*Aethusa cynapium* subsp. *agrestis* (sporadically 6!). In addition to the just mentioned species, following weeds in the category of the subdominants (higher constancy, locally even higher dominance) can be added: *Sonchus arvensis*, *Agropyrum repens*(7!), *Stachys palustris*, *Mentha arvensis*, *Kickxia elatine*, *Daucus carota*, *Fallopia convolvulus*, *Agrostis stolonifera*. Other species with relatively low A-value, locally reaching high dominance values (frequently 5, sporadically 6) which come into consideration as weeds are: *Sherardia arvensis*, *Misopates orontium*, *Anthemis arvensis*, *Myosotis arvensis*, *Trifolium arvense*, *Euphorbia exigua*, *Achillea millefolium*, *Trifolium campestre*, *Atriplex patula*, *Plantago lanceolata*, *Gypsophila muralis*, *Viola tricolor*, *Tussilago farfara*, *Gnaphalium uliginosum*, *Conyza canadensis*, *Glechoma hederacea*, and *Poa compressa*. An important component of the association were the useful plants *Trifolium repens* and *T. pratense* which often spontaneously spread in segetal communities.

Consolido regalis-Misopatetum KROPÁČ ass. nova hoc loco

Floristic composition and synmorphology. — Diagnostically significant species are contained in the synthetis Table 2, and can briefly be

quoted as follows (dominants and subdominants marked by asterisks): **Misopates orontium*, **Consolida regalis*, **Kickxia elatine*, **Euphorbia exigua*, *Avena fatua*, *Stachys annua* (both last-mentioned species could locally be dominant), *Papaver rhoeas*, *Melandrium noctiflorum* and *Valerianella rimosa* (the three last-mentioned species with relatively low constancy value). In comparison with the preceding association the *Consolido-Misopatetum* comprises relatively greater number of species that belong, according to up-to-date knowledge, to the alliance *Caucalion* Tx. 50; *Stachys annua* is especially typical for the Pannonian region. The whole indicative group consists of the following species (in addition to the preceding ones): **Anthemis arvensis*, **Scleranthus annuus*, *Raphanus raphanistrum*, **Anagallis arvensis*, **Viola arvensis*, **Centaurea cyanus*, *Fallopia convolvulus*, *Myosotis arvensis*, *Sonchus asper*, **Setaria glauca*, **Polygonum aviculare* agg., **Tripleurospermum inodorum*, **Sonchus arvensis*, **Convolvulus arvensis*, **Cirsium arvense*, *Atriplex patula*, *Chenopodium album*, **Plantago major*, **Agropyron repens*.

This association (like the preceding one) is characterized by a high number of species. The average number of species per relevé reaches 40; altogether 148 species have been stated in 15 relevés. The total number of recorded species is higher than that of the preceding association which is evidently caused by numerous accessory species occurring in the constancy class I. As to the life-form, the strongest representation is shown by therophytes (74.5%) among which especially the vernal forms (Th_2) predominate; a relatively great share of the winter forms (Th_1) is, however, typical for this association (Fig. 3 illustrates the difference against the preceding one). The association can be characterized by the following spectrum of life-forms (in % with respect to the A-values):

Th_1	Th_2	H	G	Ch
30.6	43.9	11.7	13.7	0.1

Individual stands of this segetal association have been recorded in fields of cereals (winter as well as spring varieties), in stubbles left after the harvest of cereals, and in some few cases in stubble with young red clover. From the viewpoint of the sequence of individual agro-ecophases, this association may develop in the final stage of the spring-summer agro-ecophase, and in the autumn agro-ecophase. The mean total cover of the whole stand amounts to 82% (only exceptionally the total cover reaches 100%), the mean cover of weeds being 58%. The height of stands depends on the type of crop, ranging from 140 cm (winter rye) over 100 cm (mainly in wheat stands) down to 50 cm (spring barley); only the stubble stands were very low (ca. 20 cm). As to the layering of stands, the main diagnostically significant species were bound to the middle layer, and they could easily regenerate in the succeeding stubbles. The upper layer of the stands was taken by *Avena fatua*, *Tripleurospermum inodorum*, *Cirsium arvense*, *Sonchus arvensis*, and, possibly, by *Convolvulus arvensis* and *Agropyron repens* (in the generative phenophase).

Synchorology, synecology and variability of the association.— The association is represented by a set of relevés originating from a relatively large territory of central southern Slovakia, above all from the southern promontories of the Štiavnica Mountains and Slovenské Rudohorie Mts. The major part of localities, however, is confined to the eruptives of the Krupina Hills, and to the western margin of the Slovakian Karst; only a limited number of localities is situated in the Ipeľ Mountains, and on the western margin of the Vihorlat Mountains (see Fig. 1 and the list of localities attached to Table 2). Climatically the association is bound to the "warm region" ("warm and moderately wet district with cold winter period") with transitions into the "moderately warm region" ("moderately warm and moderately wet and hilly district"), especially in the relatively elevated localities in the Krupina Hills (cf. Končeк et al. 1958). Annual rainfall totals in the territory

Tab. 2. — *Consolido regalis — Misopatetum* KROPÁČ ass. nova

Association	*Consolido regalis-Misopatetum*																	
Subassociation	*typ.*	*trifolietosum arvensis*								*lathyretosum tuberosi*								
Relevé, no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Altitude, m	470	520	365	200	265	270	240	240	490	290	380	375	330	260	350			
Slope °	10	15	—	20	7	25	20	15	5	7	15	—	15	5	10			
Aspect	SW	NE	—	WSW	NE	N	N	NE	SW	NE	S	—	S	W	SE			
Crop	B	R	s (w)	ss (c)	Ww	s (s)	Ww	s (w)	Ww	s (w)	Ww	B	0	s (w)	B (c)	∅		
Cover (%) — total	90	80	60	90	85	60	100	70	95	70	75	90	90	70	100	82		
— weeds	50	60	60	60	50	60	50	70	50	70	60	50	45	70	60	58		
Number of species	45	50	35	33	33	39	39	55	34	48	35	32	34	35	53	40	C	A
Diagnostically significant species of the association:																		
Misopates orontium (L.) RAFIN.	4	3	1	5	4	5	3	5	3	4	1	4	4	.	+		V	3.10
Consolida regalis S. F. GRAY	2	5	3	1	2	2	4	3	2	3	.	.	1	4	1		V	2.20
Kickxia elatine (L.) DUM.	2	1	3	3	3	3	4	3	.	4	.	1	.	3	4		IV	2.26
Euphorbia exigua L.	.	1	3	.	.	4	5	3	.	3	2	2	3	2	4		IV	2.13
Avena fatua L.	2	.	.	.	2	.	1	4	2	.	1	2	4	1	6		IV	1.66
Stachys annua (L.) L.	4	5	.	5	.	.	4	+	1	.	1	.	2	.	.		III	1.50
Papaver rhoeas L.	.	1	.	.	1	.	1	.	1	.	.	.	.	.	.		II	0.26
Melandrium noctiflorum (L.) FRIES	.	.	.	.	.	+	.	2	.	.	.	.	.	.	4		I	0.43
Valerianella rimosa BAST.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	1		I	0.20
Differentiating species of the subassociations:																		
Trifolium arvense L.	.	2	.	2	.	5	1	2	1	.	.	.	.	.	.		II	0.86
Gypsophila muralis L.	.	.	4	3	2	5	+	4	.	.	.	.	.	.	.		II	1.23
Spergularia rubra (L.) J. et K. PRESL	.	.	1	.	.	2	.	+	1	.	.	.	.	.	.		II	0.30
Lathyrus tuberosus L.	.	.	.	.	.	.	.	.	.	1	2	3	2	4	5		II	1.13
Species of the *Sherardion:*																		
Medicago lupulina L.	1	1	1	2	.	3	.	4	.	.	.	.	1	1	4		III	1.20
Aethusa cynapium L. subsp. *agrestis* (WALLR.) DOSTÁL	3	1	.	.	.	4	.	4	.	.	.	.	3	.	3		II	1.20
Sherardia arvensis L.	.	2	.	1	.	.	.	3	.	.	.	.	2	.	5		II	0.86
Galium spurium L.	4	1	.	.	.	.	.	+	.	.	.	2	4	.	.		II	0.76
Valerianella dentata (L.) POLLICH	.	.	.	2	.	.	.	3	.	.	3	.	1	.	1		II	0.66
Ranunculus arvensis L.	.	2	.	.	.	.	.	.	1	.	7	.	.	.	.		I	0.66

Galeopsis ladanum L.	.	.	.	1	.	3	.	.	4	.	.	.	.	.	.	I	0.53
Neslia paniculata (L.) DESV.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	3	I	0.33
Lithospermum arvense L.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	I	0.13
Geranium dissectum L.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	I	0.06
Species of the *Aphanion:*																	
Anthemis arvensis L.	3	2	2	4	2	2	3	5	2	3	.	3	3	.	2	V	2.40
Scleranthus annuus L.	4	.	.	5	2	4	4	1	3	4	2	5	2	4	.	IV	2.66
Raphanus raphanistrum L.	1	.	+	.	1	2	.	.	1	1	.	2	.	1	4	IV	0.90
Vicia hirsuta (L.) S. F. GRAY	2	2	.	1	.	.	.	2	.	.	4	.	3	.	2	III	1.06
Spergula arvensis L.	4	.	2	.	.	.	.	.	.	2	.	4	.	.	.	II	0.80
Species of the higher syntaxa:																	
a) *Secalietea*																	
Anagallis arvensis L.	3	2	+	3	4	4	4	4	3	1	2	3	2	3	.	V	2.56
Viola arvensis MURRAY	2	2	2	.	2	2	3	2	3	3	2	2	.	5	3	V	2.20
Centaurea cyanus L.	3	3	1	3	1	4	3	2	4	.	2	3	2	3	.	V	2.26
Fallopia convolvulus (L.) Á. LÖVE	2	2	.	3	.	.	3	2	.	2	2	2	4	2	4	IV	1.86
Myosotis arvensis (L.) HILL	2	4	.	3	.	2	.	4	.	.	2	1	1	2	1	IV	1.46
Thlaspi arvense L.	.	1	.	.	.	.	.	.	.	1	.	+	.	.	.	I	0.16
Vicia tetrasperma (L.) SCHREB.	.	.	.	.	.	.	.	1	.	.	.	.	2	.	1	I	0.26
b) *Polygono-Chenopodietalia*																	
Sonchus asper (L.) HILL	3	.	.	1	2	2	2	4	2	2	.	3	1	3	+	IV	1.70
Setaria glauca (L.) P. B.	3	.	1	3	4	.	4	3	.	7	3	.	2	.	4	IV	2.26
Veronica persica POIR.	2	2	1	2	.	.	.	4	.	.	.	2	2	2	5	III	1.46
Stellaria media (L.) VILL.	2	.	.	1	.	.	1	4	.	.	.	2	.	3	3	III	1.06
Oxalis fontana BUNGE	.	1	.	3	.	4	.	4	.	.	3	.	.	.	2	II	1.13
Polygonum persicaria L.	3	.	.	1	.	.	3	5	.	.	.	.	3	.	3	II	1.20
Galinsoga parviflora CAV.	1	.	.	.	.	.	.	5	.	+	.	.	.	.	1	II	0.50
Companions:																	
a) with constancy >60%																	
Polygonum aviculare agg.	2	2	6	4	1	5	6	5	4	2	2	3	3	2	4	V	3.40
Tripleurospermum inodorum (L.) C. H. SCHULTZ	5	.	1	.	5	3	4	4	5	1	3	5	4	5	4	V	3.26
Sonchus arvensis L.	3	.	.	3	2	3	.	4	3	2	4	3	3	4	4	IV	2.53
Convolvulus arvensis L.	4	3	4	4	4	.	3	.	4	4	4	4	.	4	4	IV	3.06
Cirsium arvense (L.) SCOP.	.	4	2	4	3	.	2	2	.	.	4	3	.	4	3	IV	2.06
Atriplex patula L.	2	1	2	3	1	1	.	.	3	3	2	3	.	2	.	IV	1.53
Chenopodium album L.	1	+	+	1	.	2	3	.	2	1	.	3	.	3	.	IV	1.13
Plantago major L.	2	.	6	4	2	5	5	3	.	2	.	.	.	4	4	IV	2.46

Tab. 2 (contd.)

Association	*Consolido regalis-Misopatetum*																	
Subassociation	*typ.*	*trifolietosum arvensis*									*lathyretosum tuberosi*							
Relevé, no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Altitude, m	470	520	365	200	265	270	240	240	490	290	380	375	330	260	350			
Slope °	10	15	—	20	7	25	20	15	5	7	15	—	15	5	10			
Aspect	SW	NE	—	WSW	NE	N	N	NE	SW	NE	S	—	S	W	SE			
Crop	B	R	s (w)	ss (c)	Ww	s (s)	Ww	s (w)	Ww	s (w)	Ww	B	0	s (w)	B (c)			
Cover (%) — total	90	80	60	90	85	60	100	70	95	70	75	90	90	70	100	82		
— weeds	50	60	60	60	50	60	50	70	50	70	60	50	45	70	60	58		
Number of species	45	50	35	33	33	39	39	55	34	48	35	32	34	35	53	40	C	A
b) with constancy <60%																		
Agropyron repens (L.)P. B.	4	.	.	3	4	.	.	.	4	3	.	4	4	4	4		III	2.26
Daucus carota L.	.	+	3	4	.	3	.	.	4	2	.	1	.	2	4		III	1.56
Trifolium campestre SCHREB.	.	2	.	.	1	4	.	4	1	.	1	.	3	.	1		III	1.13
Rumex crispus L.	1	.	1	.	.	.	.	1	1	1	4	1	.	2	.		III	0.80
Plantago major subsp. *intermedia* (GODR.) ARC.	.	.	.	.	.	5	5	4	.	.	1	2	.	.	4		II	1.40
Galium aparine L.	.	3	.	.	2	.	.	.	.	.	5	.	2	3	1		II	1.06
Rumex acetosella L.	1	1	1	.	.	.	.	.	2	2	+	.	.	.	.		II	0.50
Conyza canadensis (L.) CRONQ.	.	.	2	.	.	3	2	2	.	+	.	.	.	.	1		II	0.70
Vicia angustifolia L.	3	1	.	.	.	.	.	.	.	+	1	.	1	.	2		II	0.56
Stellaria graminea L.	1	1	2	.	.	.	.	.	.	.	1	1	.	.	3		II	0.60
Plantago lanceolata L.	.	+	3	.	.	.	.	1	.	3	.	.	.	.	1		II	0.56
Cichorium intybus L.	.	.	.	.	2	.	.	+	.	+	.	.	.	1	.		II	0.26
Taraxacum officinale WEB. s.l.	1	.	.	.	.	1	+	.	.	1	.	.	.	.	.		II	0.23
Polygonum lapathifolium L.	.	.	.	.	3	.	1	1	.	.	.	.	.	2	.		II	0.46
Achillea millefolium L.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	4		I	0.53
Linaria vulgaris MILL.	.	+	.	.	2	.	.	.	.	2	.	.	.	.	.		I	0.30
Trifolium pratense L.	.	1	1	.	.	.	.	.	.	+	.	.	.	.	.		I	0.16
Capsella bursa-pastoris (L.) MED.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	3		I	0.33
Erodium cicutarium (L.) L'Hér.	2	.	.	.	.	.	.	.	.	+	.	.	2	.	.		I	0.30
Lapsana communis L.	.	.	.	.	.	2	.	2	.	.	.	.	4	.	.		I	0.53
Poa compressa L.	.	+	.	.	2	.	.	.	4	.	.	.	.	.	.		I	0.43
Arenaria serpyllifolia L.	.	2	.	.	.	3	.	.	.	.	.	.	.	.	2		I	0.46
Filago arvensis L.	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.		I	0.20
Melandrium album (MILL.) GARCKE	1	1	.	.	.	.	+	.	.	.	.	.	.	.	.		I	0.16

Species recorded in one or two relevés only (pertinent Nos. of the relevés shown in the brackets):
Acinos arvensis (LAMK.) DANDY 1 (2), *Agrimonia eupatoria* L. 1 (10), *Agrostis gigantea* ROTH 4 (5, 15), *A. stolonifera* L. 2 (14), *Ajuga chamaepitys* (L.) SCHREB. 1 (7), *Allium vineale* L. + (11), *Anagallis foemina* MILL. 4 (7), *Anthemis cotula* L. 1 (6), *Apera spica-venti* (L.) P. B. 2 (9), *Aphanes arvensis* L. 2 (14), *Artemisia vulgaris* L. + (1), *Atriplex oblongifolia* W. et K. 2 (8), *Bidens tripartitus* (L.) ROUY + (6), *Bifora radians* MB. 1 (13), *Bromus* sp. (juv.) + (2), *Camelina microcarpa* ANDRZ. ex DC. 1 (7), *Campanula rapunculoides* L. 1 (15), *Cerastium holosteoides* FRIES emend. HYL. 1 (14), 2 (15), *Chenopodium polyspermum* L. 2 (6, 12), *Coronilla varia* L. 2 (2), *Crepis capillaris* (L.) WALLR. 2 (5), *C.* sp. (juv.) + (6), *Echinochloa crus-galli* (L.) PB. 2 (14), 3 (5), *Echium vulgare* L. 1 (5), *Epilobium* sp. (juv.) + (7), *Euphorbia cyparissias* L. 2 (10), *E. falcata* L. 1 (7), *E. helioscopia* L. 2 (1), *Falcaria vulgaris* BERNH. 1 (1), *Fumaria vaillantii* LOISEL. 1 (7), *Galeopsis bifida* BOENN. 2 (9), *G. pubescens* BESS. 1 (9), *G. tetrahit* L. 2 (2),*Geranium pusillum* BURM. f. + (10), *Gnaphalium uliginosum* L. 2 (3, 8), *Hypericum perforatum* L. + (3), *Inula britannica* L. 2 (10), *Kickxia spuria* (L.) DUM. 1 (15), *Knautia arvensis* (L.) COULT. + (2), *Lactuca serriola* L. 1 (1), *Lamium amplexicaule* L. 2 (1), *L. purpureum* L. 2 (1), *Lolium perenne* L. + (10), *Lythrum hyssopifolium* W. et K. 1 (8), *Malva pusilla* SM. + (10), *Matricaria discoidea* DC. 2 (8), *Melampyrum barbatum* W. et K. 1 (7), 3 (11), *Melilotus officinalis* (L.) PALL. 1 (2), *Muscari comosum* (L.) MILL. + (9), *Musci* sp. div. 4 (7), *Pimpinella saxifraga* L. + (10), *Poa annua* L. 2 (8), *Potentilla argentea* L. 2 (3), *P. supina* L. 2 (3), *Prunella vulgaris* L. + (10), *Ranunculus sardous* CR. 4 (8), *Robinia pseudoacacia* L. (juv.) + (14), *Rorippa sylvestris* (L.) BESS. 2 (8), *Rubus caesius* L. 1 (11), *Rumex obtusifolius* L. + (8), *Salvia verticillata* L. 1 (2), *Secale cereale* L. 4 (9), *Setaria viridis* (L.) PB. 1 (2), *Silene vulgaris* (MOENCH) GARCKE + (15), *Sinapis arvensis* L. 3 (15), *Sonchus oleraceus* L. 1 (10), 2 (8), *Stachys palustris* L. 2 (9), *Symphytum officinale* L. 1 (10), *Trifolium repens* L. + (10), 1 (3), *Veronica arvensis* L. 4 (15), *V. poita* FRIES 2 (8), *V. serpyllifolia* L. 1 (3), *Vicia cracca* L. + (15), 1 (10), *V. villosa* ROTH 2 (11).

Location of the relevés of the *Consolido regalis-Misopatetum:*

1. Krupina Hills, central part. — About 1 km to the SW of the village Litava, July 24, 1973
2. Krupina Hills, northern part (transitions to the Javorie Mts.). — About 2 km to NW of Horný Tisovník, small field (private sector), July 12, 1967
3. Krupina Hills, SW margin. — About 0.7 km to SSW of Ipeľské Úľany, September 12, 1963
4. Vihorlat Mts., western margin. — About 0.7 km to SE of Jasenov (near Humenné), July 27, 1971
5. Krupina Hills, SE margin. — About 2 km to WSW of Dolná Strehová (not far from Horný Bukovec), July 24, 1973
6. Slovakian Karst, western margin. — About 0.5 km to W of Hrušov, July 27, 1972
7. Kováčov Hills, northern part. — About 0.3 km to SE of Bajtava, July 30, 1972
8. Slovakian Karst, western margin. — SW border of the village Hrušov, July 27, 1972
9. Krupina Hills, central part. — About 3 km to NNW of Čelovce (not far from Dúbrava), July 21, 1973
10. Krupina Hills, SW margin. — About 1 km to WSW of Kleňany, September 12, 1963
11. Štiavnica Mts., SE margin. — About 3 km to NW of the town Krupina (not far from Ficberg), July 7, 1967
12. Krupina Hills, central part. — About 1 km to NE of Bzovík, July 24, 1973
13. Slovenské Rudohorie Mts., SE margin. — About 0.5 km to NNE of Nandraž (near Jelšava), July 23, 1973
14. Štiavnica Mts., SE margin. — About 1.5 km to W of Sebechleby, July 24, 1973
15. Slovakian Karst, NW margin. — About 2 km to W of Rožňava, July 28, 1972

studied fluctuate mostly between 650 and 700 mm, however, they may exceed 700 mm of the annual mean in higher altitude. Mean annual temperature amounts to about +8°C, being rather higher in the hills of the southern promontories and somewhat lower in the more elevated localities. These climatic circumstances are illustrated in the two climatic diagrams, compiled from 50 years mean values for (1) the relatively warm part of the territory studied (Rožňava, see Fig. 5) and (2) the relatively cold part of the territory, i.e. the northern promontories of the Krupina Hills (Sása-Pliešovce, see Fig. 6). Typical stands of this association can be seen in the hilly region of between 200 and 500 m elevation; their ecotope is most frequently situated on slopes, only a minor part belongs to the flat ground. Forests occupy usually about 30%, only in higher elevated hills they reach about 50%. The natural forest community was, most likely, a sub-xerophilous oak forest with dominant *Quercus petraea*, scattered occurrence of *Quercus cerris* and *Carpinus betulus*, and with participation of many mesic plants in the undergrowth. The *Consolido-Misopatetum*, most probably, extends on ecotopes originally taken by the *Festuco heterophyllae-Quercetum* Neuhäusl et Neuhäuslová 64, which can be held for an association on the margin of the alliance *Carpinion betuli* (Mayer 37) Oberd. 53, showing relationship to xerophilous oak forests of the *Quercion pubescenti-petraeae* Br.-Bl. 31. Pyroclastic materials of andesites prevail as the parent rock (in the whole Krupina Hills and the Štiavnica Mountains, as well as in the Kováčov Hills); there are also Mesozoic slates (the majority of the so-called varicoloured Triassic slates on the western margin of the Slovakian Karst, and on the SE. margin of the Slovenské Rudohorie Mts.). Pyroclastic deposits may, in addition, bear shallow layer of loess in lower elevation and basins. As to the soil type typical brown soils can usually be found in arable land; these soils are to some extent saturated with bases, but they are usually acid. Abundance of the gravel and stones in all soils horizons is typical. The brown soils in the Krupina Hills developed over andesitic tuff or tuffisite are usually of loamy texture, the degree of base saturation depending on the content of small fractions of clayey particles and colloids; they show exchangeable pH values in tilth ranging from 4.8 to 5.6 (Hrtánek et Juráni 1969). The brown soils on Mesozoic slates are usually somewhat better saturated with bases, exchangeable pH values ranging from 6.3 to 6.9 (Tobrman 1969). Generally speaking, the saturation percentage depends on the texture of the soil, and, therefore, loamy or clayey-loamy soils are, as a rule, better saturated with bases than sandy-loamy or loamy-sandy soils. The diversity of soils is reflected in the ecological variability of the association: the relatively light soils bear the subassociation *trifolietosum arvensis* Kropáč hoc loco, whereas the heavy soils harbour the subassociation *lathyretosum tuberosi* Kropáč hoc loco (see Table 2). Relevé No 1. can be designated as the nomenclatural type of the association.

Agricultural assessment of the association. — The association will grow in the so-called potato farming zone (preferably in potato-barley sub-zone) with transitions into the sugar beat zone in relatively low altitude. Arable land occupies only ca. 50% of the agricultural land, about 30 to 35% being utilized as pastures and ca. 15—20% as meadows (Torbman 1969, Hrtánek et Juráni 1969). Generally, the more dissected relief and higher altitude, the lower agronomical value of the arable land; therefore extensive

form of management (pastures and meadows with individual scattered farmsteads) prevails in these regions. The crop rotation usually includes more than 50% of cereals, nearly 30% of fodder crops (silo-maize is commonly produced and, as a perennial fodder crop, red clover with different admixture is normally laid down), more than 10% of potatoes, and the remainder goes to technical crops and pulses. A major part of the agricultural land is worked by the state or co-operative sector, only ca. 10% belongs to private farmers (on dissected relief with steep slopes). The management of fields is fairly good, though soils are stony and terrain prevalently difficult. Stubble after harvesting of cereals is left rather tall, which makes skimming difficult or impossible; consequently, the autumn agro-ecophase would be markedly extended.

As to the important weeds, this association contains rather small number of dominants; but sub-dominants prevail, if compared with the preceding association. It is evident that also the mean cover of weeds is rather low (see Table 2). Following four species can be mentioned as dominants with high constancy (named in a sequence of decreasing A-values): *Polygonum aviculare* agg. (sporadically up to 6!), *Tripleurospermum inodorum* (in one third of the relevés up to 5!), *Misopates orontium* (sporadically 5!), *Convolvulus arvensis*. The rather high dominance value of the diagnostically significant *Misopates orontium* is quite interesting, though this species cannot be considered as a serious weed. As important weeds the following sub-dominants with a high constancy, reaching locally high dominance values must also be taken into account: *Scleranthus annuus* (sporadically 5!), *Anagallis arvensis*, *Sonchus arvensis*, *Plantago major* subsp. *major* (locally 6!), *Anthemis arvensis* (locally 5), *Setaria glauca* (locally 7!), *Agropyron repens*, *Centaurea cyanus*, *Kickxia elatine*, *Consolida regalis* (locally 5!), *Viola arvensis* (loc. 5), *Euphorbia exigua* (loc. 5), and *Cirsium arvense*. Among the other species with relatively low A-value, but locally with high dominance (frequently 5, exceptionally even 7!) following plants can be mentioned as weeds: *Avena fatua* (locally 6!), *Stachys annua* (sporadically 5), *Veronica persica*, *Plantago major* subsp. *intermedia* (sporadically 5), *Gypsophila muralis*, *Polygonum persicaria*, *Lathyrus tuberosus*, *Galium aparine*, *Sherardia arvensis*, *Trifolium arvense*, *Ranunculus arvensis* (locally 7!), *Galinsoga parviflora*.

PHYTOSOCIOLOGICAL COMPARISON OF ALLIED SEGETAL COMMUNITIES AND THE POSITION OF THE NEW ASSOCIATIONS IN THE INTEGRAL CLASSIFICATION SYSTEM

A wide range of allied segetal communities, described in the available literature, has been compared with our new syntaxa. A survey is shown in Table 3, containing 12 syntaxa roughly arranged in a sequence from relatively acidophilous communities (left) to basiphilous ones (right). Moreover, communities Nos. 1, 2, 3, 4, 5 in the left part, together with the marginal No. 12 community represent syntaxa from ± sub-continental territories; this fact is well reflected in a high constancy of *Setaria glauca*, and to some extent, also in the representation of the companions grouped under the symbol F, indicating a high presence of pastures, side by side with arable and; the newly described syntaxa take the position in the left middle of the table (Nos. 4 and 5). The dissimilarity of the first two syntaxa in the table is very distinct: they lack the major part of species grouped under the symbols VI and A, i.e., mainly species of the alliance *Caucalion* sensu lato (the group VI contains not only species of the *Caucalion* sensu stricto but also species of higher syntaxa, e.g. *Avena fatua* and *Papaver rhoeas* which represent differentiating species in this case). All the other syntaxa (Nos. 3—12) share the species *Kickxia elatine*, *Euphorbia exigua* and species of the group A (*Sherardia arvensis*, etc.). Only the syntaxa Nos. 9—12 differ markedly by

Tab. 3. — Comparison of allied communities

	1	2	3	4	5	6	7	8	9	10	11	12
	Ass. *Scleranthus annuus-Trifolium arvense* Morariu 43	Ass. *Kickxia elatine-Scutellaria hastifolia* Paucă 41	*Geranio-Silenetum gallicae vicietosum* var. *Kickxia elatine* Kornaś 68	*Misopateto-Galeopsietum ladani* ass. nova	*Consolido regalis-Misopatetum* ass. nova	*Aethuso-Galeopsietum melandrietosum* G. Müller 64	*Vicietum tetraspermae* Krus. et Vlieg. 39 *cichorietosum* var. *Melandrium noctiflorum* Wójcik 65	*Euphorbio-Melandrietum* G. Müller 64	*Kickxio-Aperetum* Oberd. 57	*Kickxietum* Krus. et Vlieg. 39 (nomencl. sec. Oberdorfer et al. 1967)	*Linarietum spuriae* Krusem. et Vlieg. 39	*Kickxio spuriae-Euphorbietum falcatae* Kropáč 73 (ms.)
Syntaxon, no.	1	2	3	4	5	6	7	8	9	10	11	12
Number of relevés	4	6	15	15	15	76 (20)	28	36	5	6	23 (8)	9
Total number of species	41	92	151	127	148	148 (106)	137	98	76	86	74 (83)	103
I *Scutellaria hastifolia*		V										
Lythrum hyssopifolium		V			r		I					
Mentha pulegium		V										
Bidens tripartitus		IV	r		r	r						
II *Geranium dissectum*			V	II	r	(I)			I	I	r	I
Silene gallica			III	r								
Lolium temulentum			I									
Hypochoeris glabra			r									
III *Galeopsis ladanum*			I	V	I	I					r	
Misopates orontium				V	V			I				I
IV *Trifolium arvense*	4	V	r	IV	II	r	r	r		I		
Gypsophila muralis	4	V		III	II	r	r					
Spergularia rubra		III			II		r	r				
Setaria viridis			I	II	r		r			I		II

V	*Ranunculus repens*			V	IV		II	III		V	V	V	
	Mentha arvensis		I	V	IV		II	IV	III	III	V	IV	I
	Stachys palustris			V	IV	r	II	I	V			(I)	
	Agrostis stolonifera		I	III	IV	r	r	III	r	IV	II	III	
VI	*Kickxia elatine*		V	IV	V	IV	r	r	II	III	V	V	IV
	Euphorbia exigua			IV	IV	IV		II	II	IV	V	V	V
	Consolida regalis	2				V	r	IV	V	II	I		IV
	Avena fatua				r	IV	r		III	II		IV	III
	Papaver rhoeas					II	r	IV	r	I	II	II	IV
	Melandrium noctiflorum					I	I	III	I		I	I	V
	Veronica polita					r	(I)	I	II	III		r	V
	Lathyrus tuberosus	1				II		II	III	I		I	V
	Chaenorrhinum minus							III	r	III	I	III	II
	Valerianella rimosa			I		I				I		r	
	Stachys annua					III		r			I		V
	Alopecurus myosuroides							I		III	II	V	
	Legousia speculum-veneris										I	(I)	
	Stachys arvensis											II	
VII	*Kickxia spuria*					r				IV	I	V	IV
	Anagallis foemina					r						I	IV
	Ajuga chamaepitys					r						r	III
	Euphorbia falcata					r							V
	Caucalis platycarpos												II
	Thymelaea passerina												I
A	*Sherardia arvensis*			III	V	II	I	I	r	III	IV	III	IV
	Aethusa cynapium	1		I	IV	II	III	I	II	II	I	V	III
	Valerianella dentata			V	III	II	r	II	r	II	IV	III	
	Medicago lupulina	1		III	I	III	I	II	I	II	I	IV	IV
	Ranunculus arvensis			r	r	I		I	I	II	I	r	I
	Neslia paniculata					I	I	I					I
	Lithospermum arvense					I	r	III	II	I		r	
	Galium spurium				II	II		r					
	Odontites vulgaris						II	IV				r	
B	*Scleranthus annuus*	2	V	V	V	IV	III	I	II	I	I		I
	Anthemis arvensis	3	V	V	IV	V	I	II			III		II
	Raphanus raphanistrum			V	IV	IV	II	r	III	II	IV	I	III
	Vicia hirsuta		III	IV	II	III	III	II	I	II	II		
	Spergula arvensis		I	II	r	II	I		r				

Tab. 3 (contd.)

		Ass. *Scleranthus annuus-Trifolium arvense* MORARIU 43	Ass. *Kickxia elatine-Scutellaria hastifolia* PAUCĂ 41	*Geranio-Silenetum gallicae vicietosum* var. *Kickxia elatine* KORNAŚ 68	*Misopateto-Galeopsietum ladani* ass. nova	*Consolido regalis-Misopatetum* ass. nova	*Aethuso-Galeopsietum melandrietosum* G. MÜLLER 64	*Vicietum tetraspermae* KRUS. et VLIEG. 39 *cichorietosum* var. *Melandrium noctiflorum* WÓJCIK 65	*Euphorbio-Melandrietum* G. MÜLLER 64	*Kickxio-Aperetum* OBERD. 57	*Kickxietum* KRUS. et VLIEG. 39 (nomencl. sec. OBERDORFER et al. 1967)	*Linarietum spuriae* KRUSEM. et VLIEG. 39	*Kickxio spuriae-Euphorbietum falcatae* KROPÁČ 73 (ms.)
	Syntaxon, no.	1	2	3	4	5	6	7	8	9	10	11	12
	Number of relevés	4	6	15	15	15	76 (20)	28	36	5	6	23 (8)	9
	Total number of species	41	92	151	127	148	148 (106)	137	98	76	86	74 (83)	103
	Aphanes arvensis	1	III	II	I	r	II		r	II	V	r	
	Apera spica-venti		II			r	IV	IV	IV	IV	V	r	
	Veronica arvensis			IV	I	r	III	III	IV	I	IV	II	
	Matricaria chamomilla						r	r	I	I	II	II	
C	*Anagallis arvensis*	1	V	V	V	V	II	III	III	V	V	V	V
	Fallopia convolvulus	2		IV	IV	IV	V	IV	V	IV	V	V	V
	Viola arvensis	3	V	V	III	V	IV	IV	IV	V	V	V	IV
	Myosotis arvensis			III	IV	IV	V	II	V	V	V	V	I
	Centaurea cyanus	3		III	II	V	IV	IV	IV	I	I		II
	Vicia tetrasperma		III	II	II	I	II	IV	I	II	II		I
	Agrostemma githago	1	V	r	I			II					
	Thlaspi arvense			r	r	I	III	I	IV	II	III		II
	Sinapis arvensis			IV		r	II	V	III	IV	I	III	IV
	Bromus secalinus				I			II					

D	*Veronica persica*			IV	IV	III	III	II	r	IV	IV	V	V
	Oxalis fontana	2	I	V	II	II	II		I		I		II
	Polygonum persicaria			V	II	II	I	II	II	IV	V	II	III
	Sonchus asper			V	I	IV	I	II	III		I	II	IV
	Stellaria media			I	I	III	IV	IV	V	I	IV	IV	IV
	Euphorbia helioscopia			III	II	r	III	IV	r	III	II	II	II
	Chenopodium polyspermum			r	I	I	r				I		II
	Erysimum cheiranthoides				I		II		II			(II)	
	Setaria glauca	2	V	II	IV	IV					I		IV
E	*Polygonum aviculare* agg.	4	V	IV	IV	V	IV	IV	V	V	V	V	V
	Cirsium arvense	2	II	V	V	IV	IV	V	V	IV	III	V	IV
	Convolvulus arvensis	2	III	IV	V	IV	III	V	IV	V	IV	V	V
	Sonchus arvensis		I	V	IV	IV	II	IV	III		IV	III	II
	Chenopodium album	1	II	II	III	IV	IV	IV	IV	V	III	r	III
	Agropyron repens	2		III	IV	III	III	III	III		III	IV	III
	Atriplex patula			II	III	IV	IV	II	III	III		IV	III
	Tripleurospermum inodorum			r	III	V	IV	IV	V				IV
	*Plantago *intermedia*			II	III	II	II	III		V	IV	V	III
	Gnaphalium uliginosum		III	IV	II	I	III	I	II		III	(I)	
	Vicia angustifolia		I	I	III	II	II	III	r	IV	III	II	I
	Plantago major		I	I		IV	II	I	II		I	(V)	II
	Rumex crispus			I		III	II	II	III	III	III	I	I
	Cerastium holosteoides		I	IV	I	I	II	IV		I		(II)	
	Tussilago farfara			III	II		r	I				III	
	Polygonum hydropiper	2	IV	II			II				I		
	Lapsana communis			II	I	I	IV			III	III	V	
	Galeopsis tetrahit	2	I	III	III	r	IV	r	III			I	
	Galeopsis bifida			IV	r	r	(II)					r	
	Viola tricolor		?	II	II		I						
F	*Daucus carota*	1	III	V	IV	III	(I)	III	r	I	I	(II)	III
	Achillea millefolium		III	V	IV	I	II	II	r	I	II		
	Plantago lanceolata		V	V	III	II	r	r	r	I		I	III
	Vicia sativa ff.		I	V				I	r				
	Conyza canadensis	3	V		II	II		II	r		I		
	Rumex acetosella	1	III	III	II	II	r					I	III
	Linaria vulgaris		II	II	IV	I	(II)		r				
	Trifolium campestre	1	IV	r	V	III	I	II			I		I
	Cichorium intybus		III	IV	III	II		IV					II
	Prunella vulgaris		V	V		r			r			r	II

Tab. 3 (contd.)

	Ass. *Sclerantho annui-Trifolium arvense* Morariu 43	Ass. *Kickxia elatine-Scutellaria hastifolia* Pauca 41	*Geranio-Silenetum gallicae vicietosum* var. *Kickxia elatine* Kornáš 68	*Misopateto-Galeopsietum ladani* ass. nova	*Consolido regalis-Misopatetum* ass. nova	*Aethuso-Galeopsietum melandrietosum* G. Müller 64	*Vicietum tetraspermae* Krus. et Vlieg. 39 *cichorietosum* var. *Melandrium noctiflorum* Wójcik 65	*Euphorbio-Melandrietum* G. Müller 64	*Kickxio-Aperetum* Oberd. 57	*Kickxietum* Krus. et Vlieg. 39 (nomencl. sec. Oberdorfer et al. 1967)	*Linarietum spuriae* Kruseм. et Vlieg. 39	*Kickxio spuriae-Euphorbietum falcatae* Kropáč 73 (ms.)
Syntaxon, no.	1	2	3	4	5	6	7	8	9	10	11	12
Number of relevés	4	6	15	15	15	76 (20)	28	36	5	6	23 (8)	9
Total number of species	41	92	151	127	148	148 (106)	137	98	76	86	74 (83)	103
Euphorbia cyparissias		I	IV	r	r	r						
Poa compressa		II	II	I	I		II					
Ranunculus sardous	2	II			r		I					I
Stellaria graminea			III	II	II	I				I		
Glechoma hederacea	1	III	II	II								
Filago arvensis	1	I		I	I							
Lepidium campestre		IV		III								
Trifolium medium			V	I								

Notes:

1. The symbol r ("rare") indicates constancy values lower than 10%.
2. In Table 3 idiotaxa of some importance for comparison of allied communities has only been quoted.
3. The syntaxon No. 6 is presented according to the synthesis of Schubert et Mahn (1968), and completed by species (in the brackets) from the original table by G. Müller (1963/64).
4. The syntaxon No. 8 refers only to Schubert's and Mahn's (1968) "Rasse von *Galeopsis tetrahit*, geographische Ausbildungsform von *Erysimum cheiranthoides*, Subass. von *Apera spica-venti*", which deserves comparison in Table 3.
5. The syntaxon No. 10 is derived from Lang (1973).
6. The syntaxon No. 11 is given according to Burrichter (1963) and completed from the original table (see in the brackets) by Kruseman et Vlieger (1939).

the species of the group VII (*Kickxia spuria*, etc.), though the position of the syntaxon No. 10 is actually vague indeed. Transitional syntaxa (Nos. 3—6, possibly 7?) can be observed in the centre; these syntaxa lack not only the group VII, but also the majority of species of the group VI, whereas species of the group B (i.e. species of the *Aphanion*) are represented quite markedly.

The new associations are also placed in this set; both differ from the other communities with *Kickxia elatine*, though this species is diagnostically significant for them, too. It must be emphasized that the high constancy values of *Kickxia elatine* in segetal communities are not as common as could be derived from Table 3, for which syntaxa with this species have been selected intentionally. Weed communities with *Kickxia elatine* have been described in several regions of Europe. KRUSEMAN et VLIEGER (1939 : 354 to 359, see their synthetic table) were first to describe the association *Linarietum spuriae* from Holland, in which *Kickxia spuria* together with *Kickxia elatine* occur as "character" species. Later SISSINGH's (1950) study of this association brought more details from Holland. A further evidence of this community has been presented by BURRICHTER (1963, incl. synthetic table) from Federal German Republic; this paper also contains a useful survey of inaccessible literature on this topic. LANG (1973) has recently published a similar community from the area west of the Bodensee Lake; however, this community shows many transitional features to the *Aphanion*. BRUN-HOOL (1963) in his extensive study demonstrates both *Kickxia* spp. in many syntaxa below the rank of association. Another association similar to the *Linarietum spuriae* has been described by OBERDORFER (1957) on the basis of G. KNAPP's (1946) relevés; it has been called *Kickxio-Aperetum* (originally named the *Delphinietum aperetosum* by G. KNAPP) because it comprises many species of the *Aphanion* and its distribution is also confined to decalcified loamy soils.

The associations Nos. 9—11 (Table 3) have in common some species of sub-mediterranean and sub-atlantic distribution (above all *Alopecurus myosuroides*) that are absent in the association No. 12. The last-mentioned association is typical of the sub-continental territory, and is characterized above all by a high constancy of *Euphorbia falcata*. The available evidence shows that, in Central Europe, the ecology of both *Kickxia* species cannot be considered to be equal; this fact has clearly been expressed in BURRICHTER's (1963 : 111) statement: "*Kickxia spuria* ist in der Regel streng an die Gesellschaft [*Linarietum spuriae*, Z. K. et S. H.] gebunden, während *Kickxia elatine* eine etwas grössere ökologische Amplitude hat und z. T. in die anspruchsvolleren Ausbildungsformen des *Alchemillo-Matricarietum* übergreift." This statement has lately been confirmed by a very extensive study on segetal communities (more than 6300 relevés) from the German Democratic Republic (SCHUBERT et MAHN 1968). In this work *Kickxia spuria* occurs rarely (on basiphilous substrata of warm and mild wet region only) whereas *Kickxia elatine* is also infrequent (reaching constancy class II) and shows distinct preference to *Caucalion*, with some transitions to *Aphanion* (see the syntaxa No. 6 and 8). A similar feature can be observed in the syntaxon No. 7 from the Polish lowland (Mazowsze) around the capital Warszawa (WÓJCIK 1965). The same fact has been confirmed by BRUN-HOOL (1963).

We can see that *Kickxia elatine* may participate in relatively wide range of combination of species, e.g., in the community No. 2 described as separate association by PAUCĂ (1941). A similar community has recently been described by HOLZNER (1970) from Burgenland (Austria).

KÜHN (1955) published some extreme relevés with *Kickxia elatine* also from the foothills of the Moravsko-slezské Beskydy Mts. (Czechoslovakia) belonging, obviously, to *Aphanion*. Attention should be paid to *Euphorbia exigua* showing distinct sociological relationship with *Kickxia elatine*, and with the species grouped under A (Table 3). *Euphorbia exigua*, however, cannot be considered ecologically equivalent to *Kickxia elatine*, and both species cannot be placed in the group A, because they are confined to relatively warm and basiphilous conditions recorded in other research results from Czechoslovakia; thus, *Euphorbia exigua* and *Kickxia elatine* are classed in the group VI. Besides, *Kickxia elatine* is rather rare in the western part of the Č.S.S.R. (Bohemia, Moravia), whereas *Euphorbia exigua* is a common component of weed communities on the margin of the alliance *Caucalion* over the entire territory of Czechoslovakia. Likewise the species *Misopates orontium* and *Galeopsis ladanum* occur relatively seldom in Bohemia and Moravia, but they may be useful as diagnostically significant species of the both new association from Slovakia. Until recently, the last-mentioned species have been considered as components of *Caucalion* (cf. the survey by HEJNÝ in HOLUB et al. 1967 : 68). In accordance with the synthetic results from the G.D.R. (HILBIG et al. 1962), *Misopates orontium* and *Galeopsis ladanum* have been placed in the group named *Raphanus raphanistrum* and group *Scleranthus annuus*, respectively (i.e. components preferably of the *Aphanion*); this fact is also markedly manifested in the work of SCHUBERT et MAHN (1968). PASSARGE (1964 : 93 et 105) also lists *Misopates orontium* (with *Kickxia elatine*) in the syntaxon *Oxalis stricta-Stachys arvensis* Ges. (the alliance *Spergulo-Erodion* J. Tx. 61) or on the margin of the last syntaxon (relevés from the territory Havelland and SW. Mecklenburg in the G.D.R.). ROTHMALER et al. (1972 : 368) indicate *Misopates orontium* for the alliance *Spergulo-Oxalidion* GÖRS 67.

The available descriptions of segetal communities show that *Misopates orontium* and *Galeopsis ladanum* have never been recorded with such a high constancy as in our new associations. The high constancy and often high abundance of *Misopates orontium* is the most striking difference of the new associations against other syntaxa compared in Table 3. The same table shows that the both associations (Nos. 4 and 5) possess many species in common, but that they also differ in the groups V and VI, from which only *Kickxia elatine* and *Euphorbia exigua* are represented in both the communities. Some differences can be seen also in the companions of the group E and F (e.g. *Plantago major* subsp. *major* and *Rumex crispus* on the one hand, and *Tussilago farfara*, *Lepidium campestre* and *Glechoma hederacea* on the other).

The question of the difference or identity of the new associations has been examined by mutual comparison of the both sets of relevés, as well as by comparison of the most allied syntaxa. Environmental factors, mainly the macro-climate, have also been compared. In this respect, *Misopateto-Galeopsietum* is distributed over an area markedly more humid than *Consolido-Misopatetum* (compare Fig. 4 on the one hand, and Figs. 5 and 6 on the other). This is reflected in the presence of the group V in the former association, and by the presence of the group VI in the latter. Both groups function as fairly good vicariads, and the same could be said of the both associations.

As to the floristic affinity of the new associations with the two or three most related communities, it is also evident that all these syntaxa differ substantially (see Table 4). In the middle of the series of associations (Nos. 3—6) *Misopateto-Galeopsietum* can be considered as being relatively most allied to (1) the syntaxon *Geranio-Silenetum gallicae vicietosum* var. with *Kickxia elatine* KORNAŚ 68 (43.2%) and (2) to the new association *Consolido-Misopatetum* (41.6%). Besides, the *Consolido-Misopatetum* is most allied to the KORNAŚ's syntaxon (32.9%) and nearly to the same extent to *Aethuso-Galeopsietum* G. MÜLLER 64 (31.6%). The association *Kickxia elatine-Scutellaria hastifolia* PAUCĂ 41 is markedly different, since all the values of floristic affinity are lower than 30%, which indicates also another alliance (possibly *Aphanion*). Profound differences would be seen also with regard to the syntaxa Nos. 8 to 12 which are usually placed into the alliance *Caucalion* (the position of the syntaxon No. 7 is not clear).

Classification of the new associations within an integral vegetational system which would take into account floristic composition and hierarchy of

all described syntaxa presents serious difficulties. In our opinion they cannot be placed either in the alliance *Caucalion* or in the alliance *Aphanion*. We suggest to establish a new provisional syntaxon *Sherardion* foed. nova prov. KROPÁČ et HEJNÝ hoc loco that could be characterized by the species of the group A (in Table 3) and by the following species: *Misopates orontium*,

Tab. 4. — Percentage of floristic affinity (according to ČEŠKA's 1966 modification of SÖRENSEN's 1948 coefficient) in closely related segetal communities

Kickxia elatine- *-Scutellaria hastifolia*	*Geranio-Silenetum vicietosum* var. with *Kickxia elatine*	*Misopateto-* *-Galeopsietum ladani*	*Consolido regalis-* *-Misopatetum*	*Aethuso-* *-Galeopsietum*
25.3				
29.5	43.2			
22.5	32.9	41.6		
15.7	28.1	30.2	31.6	

Galeopsis ladanum (see the group III in Table 3), *Geranium dissectum* (group II in the same table) and most probably *Lycopsis arvensis* (not treated in this paper). The *Sherardion* may negatively be delimited by the absence of species of the *Caucalion* s. str., and positively by the simultaneous presence of species of the *Aphanion*. Of course, species of the *Sherardion* would be present, as a rule, in the *Caucalion* as well, but prevalently absent in the *Aphanion*. Communities of the *Sherardion* seem to be bound to loamy or clayey-loamy soils with high content of gravel and stones, over parent materials of neutral or slightly basiphilous (but not calciferous) feature, distributed mainly in the colline belt or over terraces of the great rivers in the lowland. The *Sherardion* comprises, most likely, substitute segetal communities of the *Carpinion betuli* (MAYER 37) OBERD. 53. The problem of the definitive position of the alliance *Sherardion* cannot be solved until a complete synthesis of segetal communities in Czechoslovakia is finished. For the time being, we place into this new alliance all the syntaxa Nos. 3—6 of Table 3. The *Misopateto-Galeopsietum ladani* should provisionally represent the typus of the *Sherardion* belonging to the order *Secalietalia*, class *Secalietea*.

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SOUHRN

Práce přináší popis, synmorfologii, synchorologii, synekologii, variabilitu a agronomické hodnocení dvou nových segetálních asociací z území Slovenska. Asociace je v pojetí autorů charakterizována tzv. indikační druhovou skupinou, obsahující jednak diagnosticky významné druhy (uvedeny na prvním místě) a jednak druhy s vyšší stálostí (třídy IV a V) a hojností.

Misopateto-Galeopsietum ladani HEJNÝ ass. nova hoc loco (viz tab. 1) obsahuje tyto diagnosticky významné druhy: *Galeopsis ladanum*, *Misopates orontium*, *Kickxia elatine*, *Euphorbia exigua*, *Ranunculus repens*, *Stachys palustris*, *Mentha arvensis* a *Agrostis stolonifera*. Je to asociace druhově velmi bohatá (průměrný počet druhů činí 44), jednoleté a víceleté druhy jsou vcelku v rovnováze (významný je podíl hemikryptofyt), celková pokryvnost porostů je vysoká (v průměru 92%). Asociace se vyvíjí typicky v podzimní agro-ekofázi, byla zjištěna v kulturách ozimých i jarních obilnin a ve strništích. Je rozšířena v Ondavské vrchovině, v nadmořských výškách převážně 250—500 m, v klimatické oblasti mírně teplé (podoblasti mírně vlhké až vlhké). Petrografickým substrátem jsou převážně bezkarbonátové horniny karpatského flyše, na nichž jsou vyvinuty hnědé půdy (v různém stupni oglejené); jejich mechanické složení je různé, převládá hlinitý druh, obvykle se značnou příměsí štěrku a kamení. Na půdách lehčích je vyvinuta subasociace s *Trifolium arvense*, kdežto typická subasociace je vázána na půdy relativně těžší.

Consolido regalis-Misopatetum KROPÁČ ass. nova hoc loco (viz tab. 2) obsahuje tyto diagnosticky významné druhy: *Misopates orontium*, *Consolida regalis*, *Kickxia elatine*, *Euphorbia exigua*, *Avena fatua*, *Stachys annua*, *Papaver rhoeas*, *Melandrium noctiflorum*, *Valerianella rimosa*. Tato asociace je druhově rovněž bohatá (průměrný počet je 40 druhů), převládají zřetelně jednoleté druhy (74,5 %), celková pokryvnost porostů činí v průměru 82 %. Asociace se vyvíjí optimálně na konci jarně-letní a v podzimní agro-ekofázi, byla zjištěna v kulturách obilnin (ozimých i jarních) a ve strništích nebo ve strniskových porostech jetele červeného. Je rozšířena v relativně širším území centrální části jižního Slovenska, v kolinním stupni, v oblasti teplé (podoblasti mírně vlhké). Optimálně je vyvinuta na andesitových eruptivech, dále též na mesozoických břidlicích, vesměs bez obsahu karbonátů, půdním typem jsou převážně hnědé půdy typické, různého mechanického složení, avšak se značným podílem štěrku a kamení. Na písčito-hlinitých až hlinito-písčitých půdách je vyvinuta subasociace s *Trifolium arvense*, kdežto na hlinitých až jílovito-hlinitých půdách roste subasociace s *Lathyrus tuberosus*.

Tabelárním porovnáním 12 vybraných syntaxonů (viz tab. 3), do určité míry podobných, byla prokázána opodstatněnost vyčlenění obou nových asociací. Obě se liší nejen fytocenologicky, ale i ekologicky a chorologicky. Kromě toho bylo použito jako jednoho z kriterií vystavení nových asociací výpočtu stupně příbuznosti 5 relativně nejbližších syntaxonů, počítaje v to obě nové asociace (viz tab. 4). Problematickým se ukázalo zařazení obou nových asociací v celkovém fytocenologickém systému, což vyústilo ve vystavení nového provisorního svazu *Sherardion* v rámci řádu *Secalietalia* a třídy *Secalietea*. Do navrženého provisorního svazu zařazují autoři kromě obou nových asociací další 2 asociace popsané jinými autory.

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