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Cereal stubble communities in the East Slovakia

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Abstract: In this contribution are presented partial results of phytocoenological study of segetal communities of stubbles within agrocoenoses of eastern Slovakia region. In the first synthesis fellowing syntaxa were distinguished: *Hibisco–Eragrostetium* SOÓ et TIMÁR 1957, *Panico–Chenopodietum polyspermi* R. TX. 1937, *Echinochloo–Setarietum pumilae* FELFÖLDY 1942 corr. MUCINA 1993, *Consolido –Arthemidetum austriaci* KROPÁČ et MOCHNACKÝ 1990, community *Linaria vulgaris– Reseda lutea*, community *Stachys annua–Ambrosia artemisiifolia*.

Keywords: stubbles, segetal communities, Slovakia.

Stubbles represent specific biotope in the agroecosystem due to their specific ecological and biotic properties (OPLUŠTILOVÁ 1953). The most important factors, which significantly affecting relationships within agrophytocoenosis are light intensity, humidity and temperature. Changes of ecological attributes lead to changes of biotic properties as well as plant community structure. The most important are changes in competition, floristic diversity and chorology. Phytocoenological data collecting requires, together with own phytocoenological entries collected in the field, to get a wide range of other information, e.g. geological composition of studied area (calcites, andesites, sandstones, flysch), pedological characteristic of area (soil reaction, mineral composition ...), geographical location of area (plains, downs, mountains), climatic conditions of area (temperature, precipitation), florogenesis (vegetation history), floristic composition of area, agrotechnical procedures (soil preparation, sowing process), agrotechnical treatment (herbicides, pesticides ...), type of plant

culture (cereals, special cultures), animals (ants, micromammalia ...) and intensity of human activities.

In 2003 we started with phytocoenological study of dense cereal stubbles (*Triticum aestivum*, *Avena sativa*, *Secale cereale*, *Hordeum distichon*) on the selected localities within area of eastern Slovakia. Historic information from Slovakia is almost lacking. Within years 1947-1964 studied stubble communities (KRIPPELOVÁ). In 1984 year studied stubble communities (MOCHNACKÝ) includes also stubble coenosis from eastern Slovakia. JURKO (1972) characterized vegetation of stubbles. Although from these studies did not arise complex scientific works, results are still available in the form of phytocoenological relevés and text information which can be important due to possible synthesis of syntaxonomic classification of stubble vegetation. Stubble communities were more intensively studied in some European countries, e.g. Poland (JEDRUSZAK 1992, PAWLOWSKI et JENDRUSZAK 1986, PAWLOWSKI et al.1994, KACKI et al., 1999), Hungary (PINKE 2000), Spain (ELORZA 2001) and Croatia (HULINA 2002).

By use of software SYNTAX 2000 (PODANY 2000) and FYTOPACK 2004 (JAROLÍMEK et SCHLOSSER 1997), 159 phytocoenological relevés from 45 localities were analyzed (Fig. 1). From results obtained from eastern Slovakia (within 2003-2004 years) partial synthesis was performed. Stubble communities of eastern Slovakia can be characterized as ephemere phytocoenoses in the individual agrophases within agroecosystem of dense cereals. In the synoptic table (Tab. 1) are included: *Hibisco –Eragrostetium* SOÓ et TIMÁR 1957, *Panico–Chenopodietum polyspermi* R. TX. 1937, *Echinochloo– Setarietum pumilae* FELFÖLDY 1942 corr. MUCINA 1993, *Consolido–rthemidetum austriaci* KROPÁČ et MOCHNACKÝ 1990. Phytocenological characteristics of the communities elaborated MOCHNACKÝ (2000) and KROPÁČ & MOCHNACKÝ (1990). Communities *Linaria vulgaris–Reseda lutea* and *Stachys annua– Ambrosia artemisifolia* were not syntaxonomical classifield.

Analysis of 156 relevés leads to creation of 6 groups differing in degree of similarity. Study of these groups based on species composition, abundance, dominance, degree of stability, ecological factors (soil, climate, relief), coenological affiliation of species, type of plant culture and agrotechnical procedures allowed separation of stubble phytocoenosis into six syntaxonomic units (Tab. 1). Ecological requirements of stubble communities, mainly light intensity, lead to form heliophil and thermophil coenosis even at stands where their presence is impossible when cereals are not cut down. It is connected mainly with stands within downs and mountains. Other property of stubble phytocoenosis is high level of ruderal species (*Arctium lappa*, *Daucus carota*, *Elytrigia repens*, *Galium aparine*, *Linaria vulgaris*, *Polygonum aviculare*) and other plat species. It is connected with debilitation of competition within agrophytocoenosis and creation of ruderal attributes at stubbles, although only for limited period of time. These attributes are connected with natural succession within coenosis dynamic. When stand is disturbed insufficiently, or succession is continuing freely, succession order stubble, ruderal biotope, start of forest coenosis are changed by time to climax phytocoenosis. These transformations

of stands allow high degree of floristic diversity, which results in internal variability of phytocoenosis within stubbles.

Results presented are first effort including syntaxonomic classification of segetal communities of stubbles within region of eastern Slovakia. Analyses of next phytocoenological relevés 234 will allow more complex knowledge of stubble coenoses.

Acknowledgements

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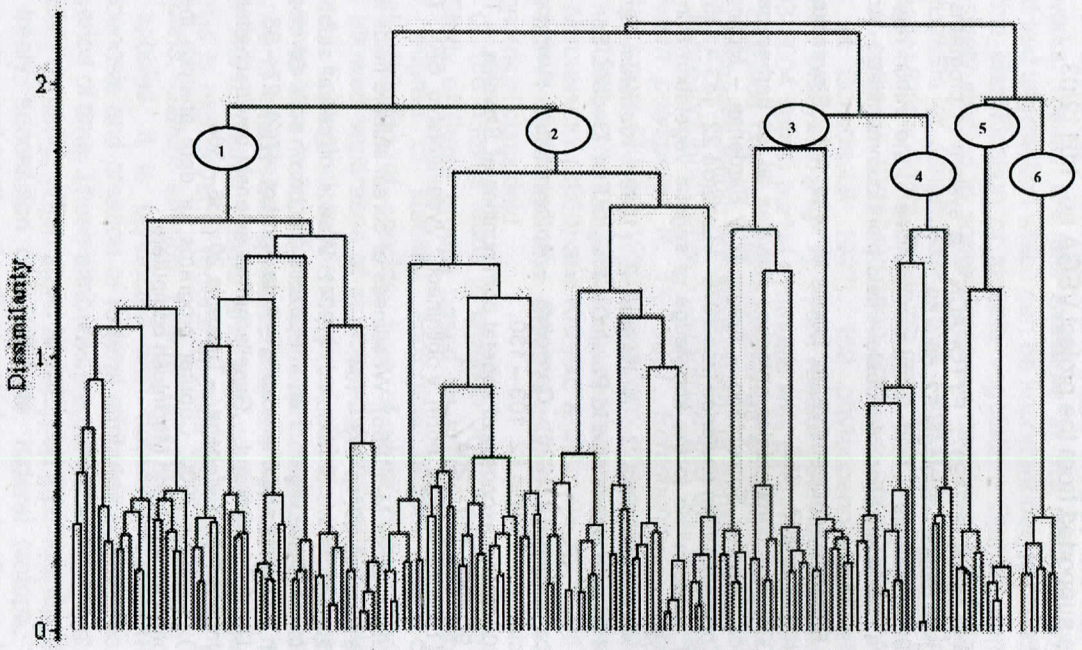
Fig. 1 Dendrogram of numerical classification of the association 1. *Hibisco-Eragrostietum*, 2. *Panico-Chenopodietum polyspermi*, 3. *Echinochloo-Setarietum pumilae*, 4. *Consolido-Anthemidetum austriaci*, 5. community with *Linaria vulgaris-Reseda luteola* and 6. community with *Stachys annua-Ambrosia artemisifolia* (Tab 1., parameters used: ß-flexible method, Ruzicka's coefficient).



Tab. 1. Synoptic table of Stubble plant communities in East Slovakia.

Column	1	2	3	4	5	6
Number of relevé	50	54	22	16	10	7
Number of species	56	57	33	36	17	14
Viola arvensis	20^{3}	72^{3}	$\mathbf{100^{4}}$	.	.	$\mathbf{100^{2}}$
Reseda lutea	.	.	.	.	$\mathbf{100^{7}}$	.
Ambrosia artemisiifolia	8^{2}	.	.	.	.	$\mathbf{100^{6}}$
Stachys annua	28^{4}	20^{3}	.	.	.	$\mathbf{57^{2}}$
Plantago major	20^{2}	30^{2}	9^{2}	.	.	$\mathbf{86^{2}}$
Xanthoxalis stricta	48^{3}	$\mathbf{98^{3}}$	55^{4}	.	.	.
Chenopodium polyspermum	16^{2}	$\mathbf{37^{3}}$	.	12^{3}	.	.
Consolida regalis	44^{2}	17^{2}	64^{3}	$\mathbf{88^{6}}$	$\mathbf{90^{3}}$	.
Galeopsis tetrahit	.	.	$\mathbf{32^{2}}$	.	.	.
Echinochloa crus-galli	$\mathbf{90^{3}}$	26^{3}	36^{3}	.	.	.
Amaranthus retroflexus	$\mathbf{58^{2}}$	30^{3}	.	.	.	.
Hibiscus trionum	$\mathbf{20^{2}}$	.	.	.	.	.
Xanthium strumarium	$\mathbf{14^{4}}$	.	.	.	.	.
Anthemis austriaca	$\mathbf{10^{2}}$	.	.	.	.	.
Tithymalus peplus	.	6^{2}	$\mathbf{27^{2}}$	.	.	.
Stellarietea mediae						
Setaria pumila	98^{6}	98^{6}	100^{4}	25^{2}	100^{7}	100^{8}
Sonchus arvense	34^{2}	$\mathbf{52^{2}}$	5^{2}	.	50^{2}	29^{2}
Equisetum arvensis	22^{2}	33^{2}	14^{2}	$\mathbf{62^{2}}$	50^{2}	.
Capsella bursa-pastoris	26^{2}	31^{2}	27^{2}	$\mathbf{38^{2}}$	.	.
Persicaria maculosa	18^{2}	$\mathbf{44^{2}}$	.	19^{2}	.	$\mathbf{43^{2}}$
Polygonum amphibium	26^{2}	4^{2}	14^{2}	$\mathbf{38^{2}}$	.	.
Anagallis arvensis	30^{2}	$\mathbf{93^{2}}$	23^{2}	6^{2}	.	.
Fallopia convolvulus	62^{2}	85^{3}	55^{2}	75^{3}	50^{3}	.
Tripleurospermum perforatum	60^{2}	65^{2}	$\mathbf{95^{2}}$	81^{2}	20^{2}	57^{2}
Convolvulus arvensis	74^{3}	59^{2}	59^{2}	81^{3}	$\mathbf{100^{2}}$	$\mathbf{100^{2}}$
Chenopodium album	94^{2}	67^{2}	45^{2}	62^{3}	50^{2}	$\mathbf{100^{2}}$
Polygonum persicaria	38^{2}	$\mathbf{72^{2}}$	32^{2}	6^{2}	.	$\mathbf{100^{2}}$
Cirsium arvense	52^{2}	78^{2}	27^{2}	$\mathbf{100^{2}}$	$\mathbf{100^{2}}$	57^{2}
Lathyrus tuberosus	8^{2}	15^{2}	.	$\mathbf{25^{2}}$	20^{2}	.
Centaurea cyanus	.	.	23^{2}	.	$\mathbf{50^{2}}$	.
Crepis biennis	.	.	.	$\mathbf{25^{3}}$	.	.
Conyza canadensis	6^{2}	4^{2}	14^{2}	25^{2}	.	.
Apera spica-venti	.	6^{3}	$\mathbf{55^{3}}$	31^{3}	.	.
Galeopsis speciosa	.	.	$\mathbf{18^{2}}$	.	.	.
Galinsoga parviflora	6^{2}	4^{2}	.	12^{7}	$\mathbf{20^{2}}$	.
Veronica agrestis	6^{2}	$\mathbf{39^{3}}$	.	.	.	.
Veronica hederifolia	6^{2}	28^{3}	.	.	.	.

Melandrium noctiflorum	14^{2}	13^{2}	9^{2}	6^{2}	.	.
Chenopodium ficifolium	10^{2}	13^{2}	.	.	.	.
Amaranthus blitoides	8^{2}	7^{2}	.	.	.	.
Sonchus oleraceus	16^{2}	7^{2}	.	.	.	.
Veronica persica	.	13^{2}	.	.	.	.
Tithymalus helioscopia	.	15^{2}	.	6^{2}	.	.
Anthemis arvensis	8^{2}	.	.	.	.	.
Datura stramonium	2^{1}	.	.	.	.	.
Fumaria officinalis	8^{2}	.	.	.	.	.
Solanum nigrum	2^{2}	4^{2}	.	.	.	.
Polygonum lapathifolium	4^{2}	6^{3}	.	.	.	.
Tithymalus esula	8^{2}	.	.	.	.	.
Geranium dissectum	.	.	.	12^{2}	.	.
Trifolium arvense	4^{2}	.	.	.	.	.
Raphanus raphanistrum	2^{2}	2^{1}	.	.	.	.
Artemisietea vulgaris						
Artemisia vulgaris	6^{1}	4^{2}	.	6^{1}	30^{1}	29^{1}
Tanacetum vulgare	.	.	5^{1}	.	.	.
Picris hieracioides	.	2^{1}	.	.	.	.
Iva xanthiifolia	2^{1}	.	.	.	.	.
Medicago lupulina	2^{1}	2^{1}	.	.	.	.
Pastinaca sativa	.	.	.	6^{1}	.	.
Arctium lappa	.	.	.	.	**20^{1}**	.
Linaria vulgaris	.	6^{2}	.	.	**20^{2}**	.
Myosoton aquaticum	.	7^{3}	.	.	.	.
Elytrigia repens	6^{3}	.	.	25^{2}	.	29^{1}
Cichorium intybus	.	.	.	6^{1}	.	.
Marrubium vulgare	4^{2}	.	.	.	.	.
Daucus carota	6^{2}	.	.	12^{2}	**50^{2}**	.
Other taxa						
Polygonum aviculare	16^{2}	17^{2}	**64^{3}**	.	.	.
Galium aparine	.	**46^{2}**	.	.	.	.
Lactuca serriola	4^{2}	6^{2}	.	12^{2}	.	.
Mentha arvensis	.	4^{2}	32^{3}	.	.	.
Gypsophila muralis	.	22^{2}	23^{7}	**25^{3}**	.	.
Acetosa vulgaris	.	.	.	**19^{2}**	.	.
Inula salicina	.	.	.	**19^{2}**	.	.
Lythrum salicaria	.	.	.	**19^{2}**	.	.
Stachys palustris	.	2^{2}	**27^{2}**	.	.	.
Galium mollugo	4^{2}	9^{3}	.	.	.	.
Trifolium repens	4^{1}	.	18^{2}	.	.	.
Lapsana communis	.	4^{2}	9^{2}	.	.	.

Bupleurum rotundifolium	.	7^2	.	.	.	.
Rumex obtusifolius	.	6^2	.	.	.	.
Vicia hirsuta	4^2	.	.	.	.	.
Rubus spec.	.	.	.	12^2	.	.
Rorippa sylvestris	.	4^2	.	.	.	.
Potentilla reptans	.	.	.	12^3	.	.
Achillea millefolium	.	.	9^3	.	.	.
Cerastium arvense	.	4^2	.	.	.	.
Helianthus tuberosus	4^1	.	.	.	.	.
Trifolium hybridum	2^1	.	.	.	.	.
Taraxacum officinale agg.	2^1	7^2	.	12^3	.	.
Symphytum officinale	.	11^2	9^2	6^2	.	.

Hibisco–Eragrostietum SOÓ et TIMÁR 1957
Panico–Chenopodietum polyspermi R. TX. 1937
Echinochloo–Setarietum pumilae FELFÖLDY 1942 cor. MUCINA 1993
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