Ecological and Agronomical Value of *Festuca rupicola* - *Bothriochloa ischaemum* Grasslands

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ABSTRACT

The purpose of this research is to assess the state of the biodiversity and pastoral value for *Festuca rupicola*-*Bothriochloa ischaemum* grasslands from the hill area. Also, there has been analyzed the floristic composition and a series of ecological indexes, respectively humidity, soil reaction, temperature and nitrogen. Other aspects taken in account were the agronomical and anthropogenic specters. The analyzed grasslands are placed in the perimeter of the localities: Gilău, Aiton. Jucu and Frata, all from Cluj County.

Keywords: *biodiversity, Cluj County, Festuca rupicola-Bothriochloa ischaemum, hill area.*

INTRODUCTION

Traditional upland livestock grazing is declining worldwide, leading to concerns about possible impacts on biodiversity (Pollock *et al.* 2013). Upland livestock farming is an integral part of the culture and history of many pastoral areas worldwide.

The diverse rangelands created by these farming systems are an important complex resource for the rural economy (Gordon *et al.* 2004). The problem they will face is the growing number of small animals that grazed the grasslands, which will become slowly abandoned.

Reductions in overall grazing pressure are also likely to lead to a buildup of rank swards with an increased likelihood of resulting wildfires (Pollock *et al.* 2013). If there is an overall reduction in grazing pressure, grassland is expected to decline and heathland to increase in abundance, with eventual increases expected in woodland and scrub (Miles 1988) or mire vegetation (Fenton 2008).

In Romania important plain and hill grassland areas are grazed. In some areas overgrazing is

installed while in other areas there is a undergrazing phenomenon. In Transylvania Plain undergrazing is usually present (Păcurar *et al.*, 2015; Rotar *et al.*, 2016) especially in areas with different degrees of tilt and with fried vegetation. One example of grassland in this regard used for grazing is *Festuca rupicola* - *Bothriochloa ischaemum*. The purpose of this research is to assess the state of the biodiversity and pastoral value for *Festuca rupicola* - *Bothriochloa ischaemum* grasslands fitocoenosis.

MATERIALS AND METHODS

Study site

Our studies were conducted in 4 different area from The Transylvanian Plain, Romania. The study was performed in 2015 in Gilău, Aiton, Jucu and Frata commune, Cluj County. The area shows a typical plain until hillside climate, the landscape is undulating, with altitudes between 250 and 750 m above sea level. It is characterized by a high variation of land use and topoclimatic conditions in the area and fine-grained mosaic of different land uses, including substantial amounts of semi

natural vegetation. The vegetation observations were made on 22 plots.

Data analysis

The floristic composition was interpreted using an improved Braun-Blanquet scale with subdivisions (Păcurar and Rotar, 2014). Sward fodder value was calculated based on species quality score on a scale from 1 (poor) to 9 (excellent), after Dierschke and Briemle (2002), as modified by Păcurar and Rotar (2014). Sward fodder value was performed on a scale from 1 (poor sward, quality dominated by toxic species) to 9 (excellent) after Păcurar and Rotar (2014).

Data regarding the share of economic groups (*Poaceae*, *Cyperaceae-Juncaceae*, *Fabaceae* and other botanical families- AFB), species number were processed by analysis of variance. Plant resistance against interference mechanical, such as mowing, grazing and crushed materialized by value indicator (from 1-9) after Dierschke and Briemle (2002), and the names of appropriate species depending on the category disturbance were taken after Păcurar and Rotar (2014).

Based on data from spectrum it can be calculate the average indicator of a phytocenosis. This may be unweighted or weighted. Assigning a phytocenosis feed is achieved at the expense calculated weighted average indicator value.

Using descriptive statistics (Cristea *et al.* 2004) analyzes were performed which are divided into two categories: central tendency parameters and indicators of scattering data. In the central tendency parameters included those processes provide a representative value (central) measured for the data stream. There are three estimators that can be used for this purpose: the mean, median and module (<http://statisticasociala.tripod.com/parametri.htm>).

RESULTS AND DISCUSSION

In this descriptive plot has been identified the *Festuca rupicola-Bothriochloa ischaemum* grassland type, which is part of *Festuca rupicola* series, feature areas habitats meso-xerophile, thermophilic, with inclined slopes exposed to the south and southwest (Țucra *et al.*, 1987).

In our case, the type *Festuca rupicola-Bothriochloa ischaemum* was described in nemoral area, at altitudes between 350 and 750, generally starting on exhibitions east until the south (90° - 180°), land with an average slope of around 26.47°,

sometimes reaching up to a maximum inclination of 40° (Tab. 1). There have been studied 22 grassland plots in the Transylvanian Plain.

Festuca rupicola-Bothriochloa ischaemum type is mostly used by grazing. In this type, woody vegetation cover has an average of 12% (Tab. 1), the amplitude data is high (max = 22.25% and minimum = 5%), and the most common cover being 2% (Module = 12.5%). The stub presence in most cases is lacking entirely.

The situation is similar in the case of rocks and stones. Fallow molehills have a presence, generally about 1.80%. In this grassland type are anthills, but with a small participation 3% (Tab. 1).

Overall, the herbaceous vegetation coverage is averaging 68.41% and data distribution is one relatively normal.

The floristic nucleus of this type of grassland is given for edifying species and frequent species. Thus, edifying species (K = V), for *Festuca rupicola-Bothriochloa ischaemum* grassland type are: *Achillea millefolium* (1.81%), *Eryngium campestre* (1.72%), *Euphorbia cyparissias* (2.32%), *Fragaria vesca* (7.53%) and *Plantago media* (3.0%; Tab. 1). The frequent (common) species (K = IV) are just three: *Trifolium repens* (1.25%), *Plantago lanceolata* (1.83%) and *Salvia pratensis* (2.64%, Tab. 1).

Potential indicator species (K=III) for this studied type of grassland are: *Agrimonia eupatoria* (1.33%), *Carduus acanthoides* (0.70%), *Hieracium pilosella* (3.09%) and *Thymus glabrescens* (3.68%).

In this phytocenosis are 14 accompanying species (K = II), and 35 random species (K = I). The Phytodiversity of this grassland type is given by a 64 species (Tab. 1).

Poaceae family makes its presence felt in the sward with an average participation of 54.31% (Tab. 1), the data having high amplitude (minimum = 2.18% and maximum = 7.34%; Annex 1).

From *Poaceae* family, besides of the dominant species (*Festuca rupicola-Bothriochloa ischaemum*) with a big mean abundance (5.71%) is present *Stipa capillata* followed by *Brachipodium pinnatum* (3.5% coverage), then the species *Elymus elongatus* 3.10% (Tab. 1). Regarding the distribution of data only the last two species are normal and symmetric (obliquity = 0.61 and -0.25), other species of *Poaceae* having a smaller presence (Annex 1).

Regarding the participation of *Cyperaceae* and

Tab. 1. Floristic composition of the type of grassland *Festuca rupicola* and specific requirement on ecological, agronomic and anthropogenic (B - BioForm, T - temperature, U - humidity, R - soil reaction, N - nutrition, C - tolerance of mowing, P - tolerance of grazing, S - tolerance of crushed, VF- fodder value, H - hemerobie, UR - urbanophile, SO - sozological category, $\bar{x}$ -Average, ADm- mean abundance - dominance, K- Constancy)

Ecological indexes				Agronomical indexes				Anthropogenic indexes				Stand conditions		$\overline{x}$
												Altitude (m)	350	
												Slope (°)	26.47	
												Exposition	S, N-V	
												Land use	pasture	
												Grassland type	<i>Festuca rupicola</i> - <i>Bothriochloa ischaemum</i>	
												General cover (%)	68.41	
												Wooden vegetation cover (%)	12	
												Stubs (%)	1	
												Rocks (%)	0	
												Stones (%)	1.5	
												Fallow molehills (%)	1.80	
												Fresh molehills (%)	3	
												Landslides (%)	22.5	
												Erosion (%)	10.27	
												Swamps (%)	0	
												B	T	U
HT	x	x	x	4	6	5	5	6	n	2 - 4	3	<i>Agrostis capillaris</i>	0.90	II
H	7	3	x	3	-	-	-	3	n	3 - 4	2	<i>Bothriochloa ischaemum</i>	13.79	V
GRs	5	4	7	4	3	6	6	5	n	2 - 3	2	<i>Brachipodium pinnatum</i>	3.50	II
H	7	3	x	5	-	-	-	5	n	3 - 6	4	<i>Cynodon dactylon</i>	0.50	I
HT	5	5	x	4	7	7	7	7	n	2 - 3	2	<i>Cynosurus cristatus</i>	0.50	I
-	-	-	-	-	-	-	-	-	-	-	-	<i>Elymus elongatus</i>	3.10	II
H	7	3	8	2	7	7	7	4	n	2 - 3	2	<i>Festuca rupicola</i>	21.81	V
H	7	2	8	2	7	7	7	4	n	2 - 3	1	<i>Festuca valesiaca</i>	1.25	II
HT	x	5	x	6	8	6	6	9	n	-	-	<i>Phleum pratense</i>	2.75	I
HT	x	5	x	x	9	8	8	8	n	3 - 5	3	<i>Poa pratensis</i>	0.50	I
H	7	2	8	2	2	3	3	3	n	2 - 4	1	<i>Stipa capillata</i>	5.71	II
-	-	-	-	-	-	-	-	-	-	-	-	POACEAE	54.31	
-	-	-	-	-	-	-	-	-	-	-	-	CYPERACEAE- JUNCACEAE	0.00	
H	7	2	7	2	4	7	4	4	n	1 - 2	1	<i>Astragalus monspessulanus</i>	0.50	II
H	3	6	7	7	-	-	-	1	n	2 - 4	2	<i>Dorychnium herbaceum</i>	1.17	I
HT	x	4	7	4	6	4	4	7	n	2 - 4	3	<i>Lotus corniculatus</i>	0.50	II
HS	5	4	8	x	7	4	6	8	n	3 - 5	3	<i>Medicago lupulina</i>	1.17	I
H	7	4	6	3	4	4	4	6	n	2 - 3	1	<i>Trifolium medium</i>	0.50	I
HT	x	x	x	6	7	4	4	8	n	3 - 4	2	<i>Trifolium pratense</i>	0.50	I
ChRs	x	x	x	6	8	8	8	8	n	3 - 5	3	<i>Trifolium repens</i>	1.25	IV

Ecological indexes				Agronomical indexes				Anthropogenic indexes				Stand conditions	$\bar{x}$
-	-	-	-	-	-	-	-	-	-	-	-	FABACEAE	5.58
ChRs	x	4	x	5	7	4	5	6	n	2 - 4	3	<i>Achillea millefolium</i>	1.81 V
HT	6	3	7	1	5	8	8	1	n	2 - 3	1	<i>Adonis vernalis</i>	5.25 I
HRs	6	4	8	4	3	4	3	3	n	2 - 3	2	<i>Agrimonia eupatoria</i>	1.33 III
HRs	x	x	x	2	4	4	4	4	n	2 - 3	2	<i>Campanula serpyllifolia</i>	0.50 I
TT	5	3	x	8	3	7	3	2	n	3 - 5	3	<i>Carduus acanthoides</i>	0.70 III
HRs	x	x	x	x	5	4	4	4	n	3 - 4	2	<i>Centaurea jacea</i>	1.50 I
HRs	6	4	6	6	4	2	2	4	n	2 - 4	1	<i>Centaurea nigrescens</i>	0.50 I
H	x	4	7	3	-	-	-	4	n	2 - 3	1	<i>Clinopodium vulgare</i>	0.50 I
GRs	5	6	7	x	5	9	3	1	n	2 - 3	1	<i>Colchium autumnale</i>	0.50 I
HRs	6	4	8	5	4	5	5	5	n	3 - 5	3	<i>Cichorium intybus</i>	0.79 II
HRs	5	5	6	5	6	2	2	4	n	3 - 4	3	<i>Crepis biennis</i>	0.50 I
HRs	6	4	x	4	6	3	4	5	n	3 - 5	3	<i>Daucus carota</i>	0.50 I
H	6	6	8	7	5	7	3	2	n	4 - 6	3	<i>Dipsacus fullonum</i>	1.50 I
-	-	-	-	-	-	-	-	-	-	-	-	<i>Erodium hoefftianum</i>	0.00 I
H	7	3	8	4	2	4	3	2	n	2 - 4	2	<i>Eryngium campestre</i>	1.72 V
H	x	4	8	x	4	8	7	1	n	2 - 4	2	<i>Euphorbia cyparissias</i>	2.32 V
HRs	7	4	x	3	4	2	2	5	n	2 - 3	1	<i>Filipendula hexapetala</i>	1.50 II
H	x	5	x	6	3	4	4	4	n	2 - 3	2	<i>Fragaria vesca</i>	7.53 V
HT	5	4	7	3	5	4	4	5	n	2 - 3	2	<i>Galium verum</i>	0.50 I
HS	x	4	x	2	4	7	7	4	n	2 - 4	2	<i>Hieracium pilosella</i>	3.09 III
HRs	x	4	x	x	3	4	4	1	n	2 - 6	3	<i>Hypericum perforatum</i>	0.50 I
HRs	6	6	x	5	4	3	3	4	n	2 - 3	1	<i>Inula britannica</i>	0.50 I
HR	x	5	x	5	7	7	7	5	n	3 - 4	3	<i>Leontodon autumnalis</i>	1.17 I
H	7	3	8	2	4	4	3	4	n	3 - 4	1	<i>Linum austriacum</i>	0.50 I
TRs	6	5	7	5	6	5	7	3	n	3 - 5	1	<i>Odontites lutea</i>	0.50 I
HRs	x	4	8	4	5	4	2	4	n	2 - 5	2	<i>Picris hieracioides</i>	0.50 I
HRs	x	3	x	2	6	5	5	5	n	2 - 3	1	<i>Pimpinella saxifraga</i>	1.25 II
HR	x	x	x	x	7	6	6	6	n	2 - 4	3	<i>Plantago lanceolata</i>	1.83 IV
HR	x	4	8	3	4	8	8	5	n	2 - 4	2	<i>Plantago media</i>	3.00 V
H	x	2	5	1	3	4	4	4	n	2 - 4	2	<i>Potentilla argentea</i>	2.50 I
H	7	1	8	1	3	4	5	4	n	2 - 3	2	<i>Potentilla incana</i>	5.71 V
HS	x	x	4	x	9	8	8	4	n	3 - 4	2	<i>Prunella vulgaris</i>	0.94 II
HRs	-	8	7	6	3	2	2	4	n	2 - 3	1	<i>Pseudolysimachion longifolium</i>	0.50 I
H	6	3	7	3	5	3	3	4	n	3 - 4	1	<i>Salvia nemorosa</i>	1.00 I
HRs	6	4	8	4	5	3	3	4	n	2 - 3	2	<i>Salvia pratensis</i>	2.64 IV
H	6	4	7	5	5	3	3	4	n	3 - 4	2	<i>Salvia verticillata</i>	1.17 II
HRs	6	4	8	3	4	4	5	5	n	-	-	<i>Sanguisorba minor</i>	1.00 I
-	-	-	-	-	-	-	-	-	-	-	-	<i>Scabiosa argentea</i>	0.50 II
T	5	5	3	6	-	-	-	4	n	4 - 5	3	<i>Spergula arvensis</i>	0.50 I
GRs	5	7	7	6	4	2	2	3	n	3 - 5	2	<i>Stachis germanica</i>	0.50 I
HR	x	5	x	6	8	7	7	7	n	3 - 5	3	<i>Taraxacum officinale</i>	0.50 I
-	-	-	-	-	-	-	-	-	-	-	-	<i>Thymus glabrescens</i>	3.68 III
ChL	x	4	5	6	4	4	4	3	n	2 - 3	2	<i>Thymus pulegioides</i>	2.64 II
HRs	5	4	x	6	3	3	7	4	n	3 - 4	4	<i>Verbena officinalis</i>	0.50 I
HS	x	3	5	6	8	7	7	4	n	3 - 5	2	<i>Veronica serpyllifolia</i>	2.50 I
TT	7	5	7	6	2	-	8	2	n	5 - 6	-	<i>Xanthium strumarium</i>	0.50 I
-	-	-	-	-	-	-	-	-	-	-	-	OBF	69.57
Number of species													64

Juncaceae families in this type of grassland, we find that they are lacking.

Fabaceae family participates in the floristic composition, an average of only 5.58%, registering a maximum of 1.71% (Annex 1).

Data collected on *Fabaceae* participation are symmetric (obliquity = 0.43) and a distribution curvedflat (kurt = 0.49, Annex 1). From *Fabaceae* species the *Trifolium repens* has good participation (1.25%), followed by species *Dorychnium herbaceum* (1.17%) and *Medicago lupulina* (1.17%), other species are with lower covered.

Plants from other botanical families (OBF) are present in *Festuca rupicola* -*Bothriochloa ischaemum* phytocoenosis type on average by 69.57%, reaching a minimum of 0.61% and a maximum of 3.02% (Annex 1). Data obtained on the participation of plants from other botanical families are symmetrical, positive (obliquity = 0.43) and platycurtic arching = - 0.91, Annex 1).

Some species in this group have a significant mean abundance such as: *Fragaria vesca* (7.53%), *Potentilla incana* with 5.71% coverage, *Adonis vernalis* (5.25%), *Thymus glabrescens* with 3.68%,

Hieracium pilosella with 3.09%, and *Plantago media* with 3.00% (Tab. 1).

Some species have a lower participation on average of 2%, as species: *Euphorbia cyparissias*, *Potentilla argentea*, *Salvia pratensis*, *Thymus pulegioides* and *Veronica serpyllifolia*. Many species have a low participation on average 0.5-1%.

From an environmental (ecological spectrum) phytocoenosis is of a meso-xerofil (Up = 3.5), neutrophil (Rp = 7.2) and have a character oligomezotrophic (Np = 3.5; Tab. 2).

From agronomical point of view (agronomic spectrum), the phytocoenosis is medium tolerant of mowing (Cp = 5.0), is medium grazing tolerant (Pp = 5.6) and medium crushed tolerant (Sp = 5.3, Tab. 2).

Thus, the fodder value of *Festuca rupicola* -*Bothriochloa ischaemum* type is 3.9 (VFP = 3.9, Tab. 2), so the grassland falling within Class III, category of degraded pasture and supports 0.21 to 0.40 LU / ha.

From agronomical point of view, in studied phytocoenosis, 5 species have toxic value with a total coverage of 9.7% (*Dorychnium herbaceum*,

Tab. 2. Ecological and agronomical spectrum of *Festuca rupicola* -*Bothriochloa ischaemum* grassland type

Eclog. indexes	Ecological spectrum										VIMnp
	1	2	3	4	5	6	7	8	9	x	VIMp
Unp	1.0	5.0	12.0	29.0	12.0	4.0	1.0	1.0	0.0	14	4.0
Up	5.7	10.5	50.3	36.4	15.9	3.7	0.5	0.5	0.0	19.87	3.5
Rnp	0.0	3.0	1.0	2.0	5.0	3.0	18.0	16.0	0.0	31.00	6.5
Rp	0.0	1.5	0.5	1.7	8.9	1.5	18.6	51.7	0.0	59.01	7.2
Nnp	4.0	9.0	11.0	9.0	8.0	24.0	2.0	1.0	0.0	11.00	4.4
Np	14.0	35.4	32.2	12.1	6.9	28.5	2.7	0.7	0.0	11.01	3.5
Agron. indexes	Agronomic spectrum										VIMnp
	1	2	3	4	5	6	7	8	9	x	VIMp
Cnp	0.0	4.0	10.0	20.0	12.0	9.0	9.0	6.0	2.0	0.00	4.9
Cp	1.0	8.4	25.3	21.1	25.2	5.7	30.5	8.3	1.4	0.00	5.0
Pnp	0.0	9.0	9.0	21.0	6.0	5.0	12.0	8.0	2.0	0.00	4.9
Pp	0.0	5.5	15.3	32.4	4.7	9.1	34.8	23.2	1.0	0.00	5.6
Snp	0.0	11.0	12.0	15.0	7.0	7.0	13.0	7.0	2.0	0.00	4.9
Sp	0.0	6.5	26.7	19.9	12.2	10.8	37.9	11.9	1.0	0.00	5.3
FVnp	5.0	4.0	6.0	25.0	10.0	4.0	3.0	3.0	1.0	0	4.2
FVp	9.7	4.9	24.49	60.4	13.7	5.0	1.5	2.3	2.8	0	3.9

Legend

U humidity
R soil reaction
N nutrition

C mowing
P grazing
S crushed

VF fodder value
np unweighted (depending on the number of species)
p weighted (depending on species coverage)

Adonis vernalis, *Colchium autumnale*, *Euphorbia cyparissias* and *Hypericum perforatum*; Tab. 1) and 4 species are harmful of animal products: *Carduus acanthoides* (0.70%), *Dipsacus fullonum* (1.50%), *Eryngium campestre* (1.72%) and *Xanthium strumarium* (0.50%, Tab. 1).

Phytocoenosis is composed of 6 species damaging the grassland vegetation: *Bothriochloa ischaemum* (13.79%), *Stipa capillata* (5.71%), *Agrimonia eupatoria* (1.33%), *Odontites lutea* (0.52%), *Stachis germanica* (0.50%) and *Thymus pulegioides* (2.64%, Tab. 1).

Phytocoenosis shows high coverage with poor forage species (ballast) with a share of 60.4%. The species of medium fodder have a participation of 18.7% and the best feed species are in number of 4 and have a cumulative 5.10% coverage (Tab. 2). There are no species of excellent fodder.

CONCLUSION

Festuca rupicola-Bothriochloa ischaemum appears on downhill, dry land with a neutral reaction and poor trophicity.

Maintenance work is hardly and seldom implemented, the proof being the presence of molehills and woody vegetation.

Agronomic value of the pasture of *Festuca rupicola- Bothriochloa ischaemum* is mediocre, being predominant by ballast species with reduced grazing capacity.

Grasslands are used in a semi-extensive system, plants being trampled frequently in grazing period.

We recommend a management pastoral developing plan which should contain adequate maintenance and a system of sustainable use.

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Annex 1. Statistic processing of data regarding stand conditions, species composition of *Festuca rupicola* - *Bothriochloa ischaemum* type and the species' frequency constancy in relevees

Species	$\bar{x}$	Median	Stdev	VC	Mode	Skew	Kurt	Min	Max	Count
<i>Agrostis capillaris</i>	0.90	0.50	0.89	0.99	0.50	2.24	5.00	0.50	2.50	5
<i>Bothriochloa ischaemum</i>	13.79	12.50	3.79	0.27	12.50	0.67	2.03	5.00	22.25	22
<i>Brachipodium pinnatum</i>	3.50	2.50	1.37	0.39	2.50	0.61	-3.33	2.50	5.00	5
<i>Cynodon dactylon</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Cynosurus cristatus</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
<i>Elymus elongatus</i>	3.10	2.50	1.92	0.62	5.00	-0.25	-1.33	0.50	5.00	5
<i>Festuca rupicola</i>	21.81	22.25	4.88	0.22	22.25	0.23	-0.74	12.50	29.00	22
<i>Festuca valesiaca</i>	1.25	0.50	1.04	0.83	0.50	0.64	-2.24	0.50	2.50	8
<i>Phleum pratense</i>	2.75	2.75	3.18	1.16	0.00	0.00	0.00	0.50	5.00	2
<i>Poa pratensis</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Stipa capillata</i>	5.71	8.00	3.13	0.55	8.00	-0.97	-0.78	0.50	8.00	8
POACEAE	4.94	1.84	0.46	4.82	4.70	0.29	-0.13	2.18	7.34	7.36
CYPERACEAE-JUNCACEAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<i>Astragalus monspessulanus</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	5
<i>Dorycnium herbaceum</i>	1.17	0.50	1.15	0.99	0.50	1.73	0.00	0.50	2.50	3
<i>Lotus corniculatus</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	5
<i>Medicago lupulina</i>	1.17	0.50	1.15	0.99	0.50	1.73	0.00	0.50	2.50	3
<i>Trifolium medium</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	3
<i>Trifolium pratense</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	3
<i>Trifolium repens</i>	1.25	0.50	1.37	1.10	0.50	1.90	3.41	0.50	5.00	15
FABACEAE	0.80	0.53	0.44	0.50	0.50	0.77	0.49	0.50	1.71	5.29
<i>Achillea millefolium</i>	1.81	1.50	1.84	1.02	0.50	2.34	7.35	0.50	8.00	19
<i>Adonis vernalis</i>	5.25	5.25	3.89	0.74	0.00	0.00	0.00	2.50	8.00	2
<i>Agrimonia eupatoria</i>	1.33	0.50	1.03	0.77	0.50	0.39	-2.26	0.50	2.50	13
<i>Campanula serpilifolia</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Carduus acanthoides</i>	0.70	0.50	0.63	0.90	0.50	3.16	10.00	0.50	2.50	10
<i>Centaurea jacea</i>	1.50	1.50	1.41	0.94	0.00	0.00	0.00	0.50	2.50	2
<i>Centaurea nigrescens</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	2
<i>Clinopodium vulgare</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
<i>Colchium autumnale</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Cichorium intybus</i>	0.79	0.50	0.76	0.96	0.50	2.65	7.00	0.50	2.50	7
<i>Crepis biennis</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Daucus carota</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	3
<i>Dipsacus fullonum</i>	1.50	1.50	1.41	0.94	0.00	0.00	0.00	0.50	2.50	2
<i>Erodium hoefftianum</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
<i>Eryngium campestre</i>	1.72	2.50	1.00	0.58	2.50	-0.50	-1.99	0.50	2.50	19
<i>Euphorbia cyparissias</i>	2.32	2.50	1.32	0.57	2.50	0.43	0.72	0.50	5.00	18
<i>Filipendula hexapetala</i>	1.50	1.50	1.10	0.73	2.50	0.00	-3.33	0.50	2.50	7
<i>Fragaria vesca</i>	7.53	6.50	5.16	0.69	5.00	0.56	-0.55	0.50	17.50	21
<i>Galium verum</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
<i>Hieracium pilosella</i>	3.09	2.50	2.17	0.70	2.50	1.16	1.65	0.50	8.00	11

Species	$\bar{x}$	Median	Stdev	VC	Mode	Skew	Kurt	Min	Max	Count
<i>Hypericum perforatum</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Inula britannica</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
<i>Leontodon autumnalis</i>	1.17	0.50	1.15	0.99	0.50	1.73	0.00	0.50	2.50	3
<i>Linum austriacum</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Odontites lutea</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Picris hieracioides</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
<i>Pimpinella saxifraga</i>	1.25	0.50	1.04	0.83	0.50	0.64	-2.24	0.50	2.50	8
<i>Plantago lanceolata</i>	1.83	2.50	0.98	0.53	2.50	-0.79	-1.62	0.50	2.50	16
<i>Plantago media</i>	3.00	2.50	2.44	0.81	2.50	0.95	0.20	0.50	8.00	18
<i>Potentilla argentea</i>	2.50	2.50	0.00	0.00	0.00	0.00	0.00	2.50	2.50	1
<i>Potentilla incana</i>	5.71	5.00	3.96	0.69	2.50	0.52	-0.85	0.50	12.50	19
<i>Prunella vulgaris</i>	0.94	0.50	0.98	1.05	0.50	1.29	-0.11	0.00	2.50	8
<i>Pseudolysimachion longifolium</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Salvia nemorosa</i>	1.00	0.50	1.00	1.00	0.50	0.52	4.00	0.50	2.50	4
<i>Salvia pratensis</i>	2.64	2.50	1.77	0.67	2.50	0.21	-1.25	0.50	5.00	14
<i>Salvia verticillata</i>	1.17	0.50	1.03	0.89	0.50	0.97	-1.88	0.50	2.50	7
<i>Sanguisorba minor</i>	1.00	0.50	1.00	1.00	0.50	2.00	4.00	0.50	2.50	4
<i>Scabiosa argentea</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	9
<i>Spergula arvensis</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	3
<i>Stachis germanica</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
<i>Taraxacum officinale</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Thymus glabrescens</i>	3.68	2.50	4.01	1.09	2.50	1.34	0.89	0.50	12.50	11
<i>Thymus pulegioides</i>	2.64	2.50	1.84	0.70	2.50	0.24	-1.19	0.50	5.00	8
<i>Verbena officinalis</i>	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.50	1
<i>Veronica serpyllifolia</i>	2.50	2.50	0.00	0.00	2.50	0.00	0.00	2.50	2.50	2
<i>Xanthium strumarium</i>	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.50	0.50	2
OBF	1.51	0.93	0.43	1.34	0.91	0.43	0.40	0.61	3.02	6.35

Legend: $\bar{x}$ -Average; St.dev. – Standard deviation; VC – variability coefficient; OBF-other botanical families