

***Geo rivali-Caricetum paniculatae* ass. nova from the West Carpathians**

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ABSTRACT: By searching hydromorphic habitats throughout Upper Liptov (1996-2000), we focused vegetation types with *Carex paniculata*, not belonging to the association *Caricetum paniculatae*. The study resulted in the description of a new association *Geo rivali-Caricetum paniculatae* and subassociations *typicum* and *valerianetosum simplicifoliae* (*Calthion*, *Molinio-Arrhenatheretea*). All the relevés published from the West Carpathians were revalued from the point of view of the new association. The new association is characterized from ecological and coenological points of view. The differences compared to other communities dominated by *Carex paniculata* and *C. appropinquata* are discussed.

KEYWORDS: *Geo rivali-Caricetum paniculatae* ass. nova, phytosociology, Liptov, Slovakia.

Introduction

Having searched hydromorphic habitats throughout Upper Liptov (Fig. 1), we often met, especially on sloping mires, vegetation types dominated by *Carex paniculata*. RUŽIČKOVÁ (1980, 1986) described similar sedge stands not belonging to the well known association *Caricetum paniculatae* WANGERIN 1916 (cf. OBERDORFER 1977), alliance *Magnocaricion elatae* KOCH 1926. The vegetation types of similar floristical composition are lacking in the Liptov region, since the characteristic species of the tall-sedge growth of the alliance *Magnocaricion* are nearly absents, while entering the species of the minerotrophic fens. This is the reason why the author placed this vegetation type

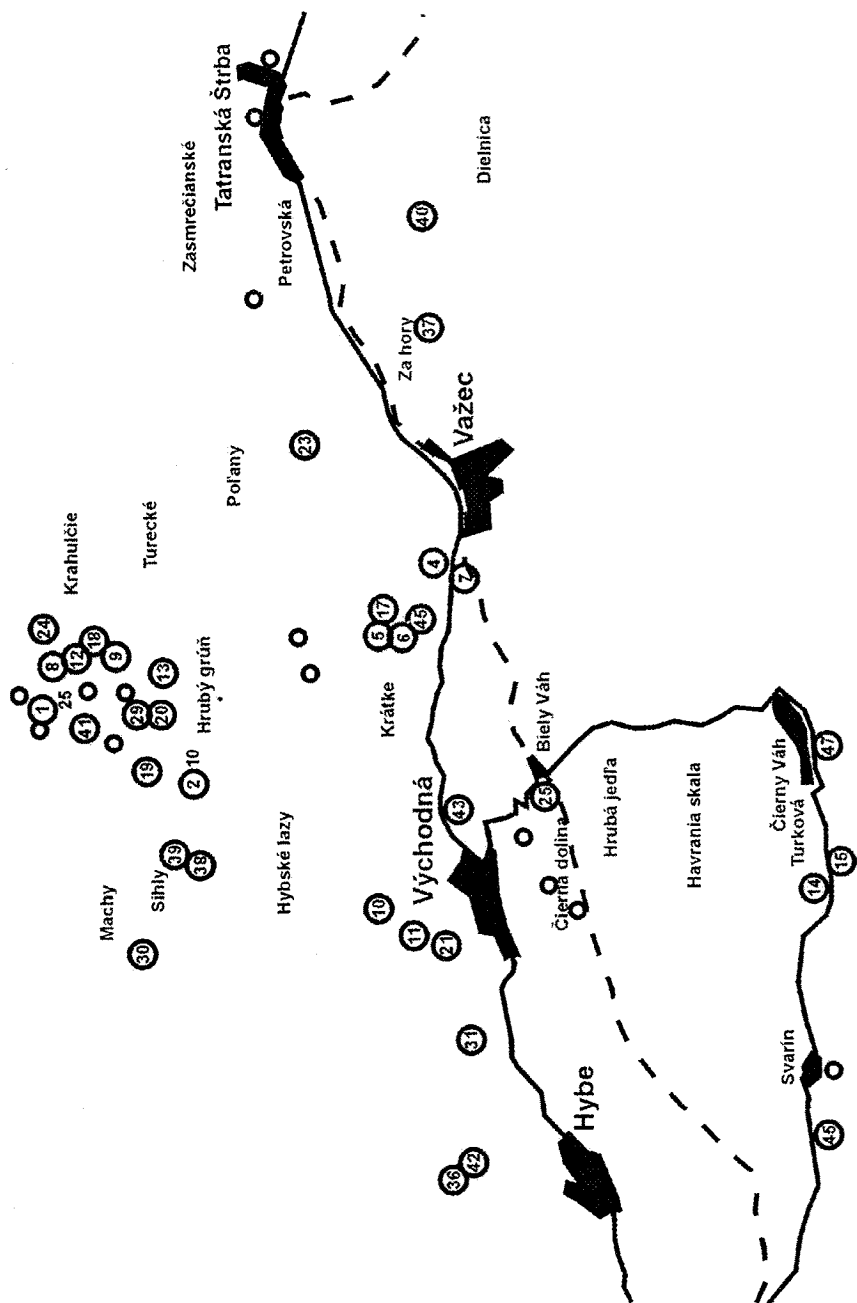


Fig. 1. Distribution of the association *Geo rivali-Caricetum paniculatae* in upper Liptov. The numbers corresponding with the locality list in table 1. Circles without numbers occurrence without relevé.

into the alliance *Caricion davallianae* KLIKA 1934, as a community with *Carex paniculata*.

Having elaborated own relevés I found that these do not match with the alliance *Magnocaricion* because of a large number of the species of the alliances *Caricion davallianae* and *Calthion* R. Tx. 1937 em. BAL.-TUL. 1978. This is the reason why we have decided to describe a new association reflecting the real floristical features of the tall-sedge stands with *Carex paniculata* in Liptov region and to stress differences between the old association *Caricetum paniculatae* and the related association *Caricetum paradoxae* R. Tx. ex VON ROCHOW 1951 (= *Caricetum appropinquatae* ASZÓD 1938) and to others associations and subassociations having integrated stands with *Carex paniculata*.

Similar to Liptov's tall-sedge vegetation types occur in other parts of the Slovak Carpathians (see Distribution and Fig. 2).

Methods

In the years 1996, 1997 and 2000, we recorded 30 relevés. The BRAUN-BLANQUET approach (MORAVEC et al. 1994) has been used in the field and during the synthetic phase of the work. All the available published and unpublished phytocoenological relevés were included into the synthesis (FAJMONOVÁ 1991, HÁBEROVÁ & FAJMONOVÁ 1995, KYSELOVÁ 1976, LESKOVJANSKÁ ined., ONDREJOVÁ & HRIVNÁK 1994, RUŽIČKOVÁ 1980, 1986, RYBNÍČEK ined., ŠMARDÁ 1960, ŠPÁNIKOVÁ 1985, ŠPÁNIKOVÁ & ZALIBEROVÁ 1982, ŠUCHOVÁ 1970).

To stress the differences, the following published and unpublished relevés were compared: BOSÁČKOVÁ (1975), MALOVCOVÁ (ined.), OBERDORFER (1977), OŤAHELOVÁ et al. (2001), HÁJEK (1999) and HÁJKOVÁ et al. (2001).

To compare the community with *Carex appropinquata*, not growing in the Liptov region, we have used published and unpublished relevés recorded out of the Liptov region by BOSÁČKOVÁ (1970, 1974), KLIKA (1958), ŠKOVÍROVÁ (ined.), ŠOLTÉS (2000). Some relevés showed features of the both old and new communities.

Nomenclature of the taxa follows MARHOLD & HINDÁK (1998) and that of syntaxa is in accordance with MUCINA & MAGLOCKÝ (1985).

Temperature, pH level and conductivity of the ground water were measured in October 17, 2001 using device CyperScan PC 300.

The bryophytes were determined by Dr. R. ŠOLTÉS, PhD., Research Station of the Tatra National Park.

The description of the new association

Since the floristical composition of the *Carex paniculata* community growing in the Liptov region, as well as in some other territories of Slovakia, differs from the *Caricetum paniculatae* described by OBERDORFER (1977) in Germany, we have decided to describe the new association *Geo rivali-Caricetum paniculatae ass. nova*.

We were conducted by the following arguments:

- a) missing species of the alliance *Magnocaricion elatae* or *Caricion rostratae* BAL.-TUL. 1963 in our stands, but abundant in Germany,
- b) high frequency of the species of the alliance *Calthion* (50%) in our communities (Tab. 3),
- c) high frequency of the species of the alliance *Caricion davallianae* in our communities, but missing in the *Caricetum paniculatae* WANGERIN 1915,
- d) missing species of the order *Magnocaricetalia* (KOCH 1926) PIGNATTI 1953, except for *Galium palustre* but with a low frequency (Tab. 1, 4),
- e) high frequency of the species of the order *Molinietalia* KOCH 1926 (50%) in our communities (Tab. 3).

Creating the name, the following facts were accepted: the first species, *Geum rivale*, is of a high constancy, in connection with *Carex paniculata* considered as the main floristical feature of the community. The ecological features of *Geum rivale* are mostly similar to the ones of *Carex paniculata*, compared to the other species of the characteristic species composition, like *Galium uliginosum*, *Cirsium rivulare*, *Equisetum palustre*, *Lathyrus pratensis* and others. The second, most important (BARKMANN et al. 1988) in the syntaxon name, belongs to *Carex paniculata*, one dominant species of high constancy.

Ordination of the new association is as follows:

Molinio-Arrhenatheretea R. TX. 1937 em. 1970

Molinietalia KOCH 1926

Calthion R. TX. em. BAL.-TUL. 1978

Calthenion (R. TX. 1937) BAL.-TUL. 1978

Geo rivali-*Caricetum paniculatae* **ass. nova**

typicum **subass. nova**

valerianetosum simplicifoliae **subass. nova**

The characteristics of the association *Geo rivali*-*Caricetum paniculatae* ass. nova

(synonymums are *Caricetum paniculatae* WANGERIN 1916 reported in the articles of ŠMARDÁ 1960, KYSELOVÁ 1976, ŠPÁNIKOVÁ 1985 and HÁBEROVÁ & FAJMONOVÁ 1995, *Valeriano simplicifoliae*-*Caricetum davallianae caricetosum paniculatae* reported in the paper of ŠUCHOVÁ 1970).

Nomenclatoric type: Tab. 1, relevé 5, holotypus.

Diagnostical taxa of the association E₁: *Carex paniculata* (dom.), *Geum rivale* (subdom., dif.), *Cirsium rivulare*, *Caltha palustris* subsp. *laeta*, *Lathyrus pratensis*, *Filipendula ulmaria*, *Myosotis scorpioides*, *Angelica sylvestris*, *Crepis paludosa*, *Equisetum palustre*, *Galium uliginosum*.

E₀ (Tab. 2): *Tomenthophnum nitens* (dom.), *Drepanocladus revolvens*, *Plagiomnium elatum*, *Bryum pseudotriquetrum*, *Palustriella commutata*, *Bryum scheicheri*.

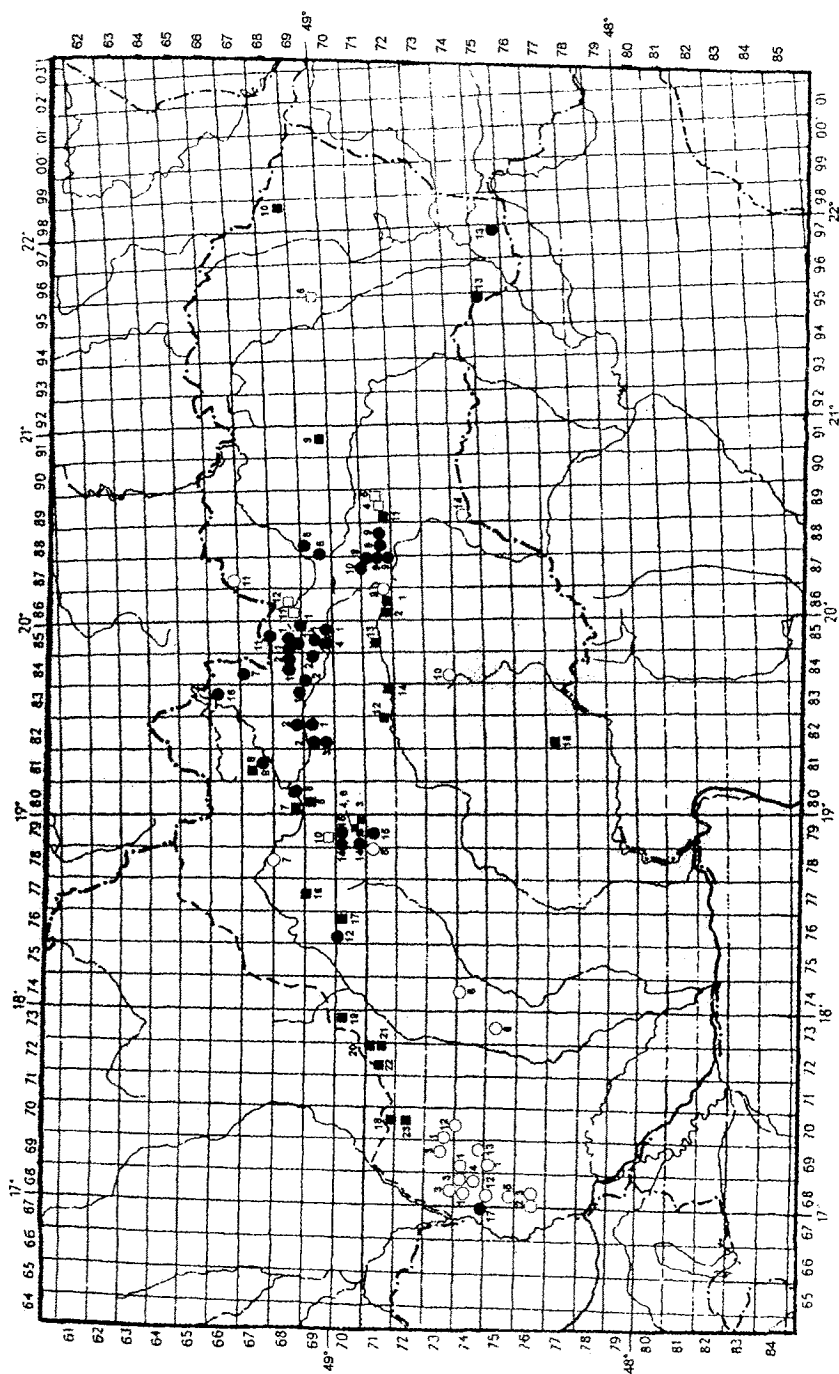


Fig. 2. Distribution of the association *Geo rivali-Caricetum paniculatae* and *Geo rivali-Caricetum appropinquatae* (● - with relevés and ■ - floristical list without relevés) compared to the association *Caricetum paniculatae* and *Caricetum paradoxae* (○ - with relevés, □ - without relevés), numbers corresponding with table 5, 6.

Habitat features

The main ecological feature allowing the community existence is spring water rich in bivalent bases. All over the years the water table has reached the soil surface or just below.

The soils are mild acid or neutral. From a typological point of view they are glue peaty soils and peaty soils or, using morphogenetic classification system (HRAŠKO et al. 1991) Histi-Mollic Gleysols and Eutric Histosols.

The peat layer in Histi-Mollic Gleysols is up to 30 cm thick, placed on glue horizon with permanent water excess, while in Eutric Histosols the peat layer is thicker, reaching 30-50 cm.

The majority of species requires permanent wet habitats rich in bases but poor in nitrogene (RUŽIČKOVÁ 1986), this is supported by the results of our field measurements: temperature 9.5-15.7°C with an average 12.9°C; pH 6.42-7.61 with an average 7.08; conductivity 359-605 μS with an average 506 μS .

The community covers small areas along spring outlets, sometimes larger areas especially on flat terrains or in depressions along brooks or in the ones caused by soil slide. It occurs in the altitudinal span 400-900 m asl, in the Upper Liptov region mostly above 700 m asl.

Development and community structure

Firstly, the association *Geo rivali-Caricetum paniculatae* consists of huge bunches of the sedge *Carex paniculata*. The aspect of the association changes along successional stages, from open stands, consisting of hummocks, 70-100 cm high, to closed stands, without hummocks, 50-70 cm high. In the initial stages, the surface water is running between bunches. The dead plant rests and soil particles are seized in the bunches and around them. Consequently, the isles of peaty soils are created and the number of species increases. In some places, connected stands with the sedge *Carex paniculata* can be seen. The water stream is restricted. The next development come through subassociation *valerianetosum simplicifoliae* to the association *Valeriano simplicifoliae-Caricetum davallianae* MORAVEC 1966.

The upper layer is dominated by the sedge *Carex paniculata* together with *Cirsium rivulare* and *Filipendula ulmaria*. The central layer is composed by *Eriophorum latifolium*, *Geum rivale* and *Ranunculus acris*. The lower layer consists of many species, the most important ones are *Carex davalliana*, *Valeriana simplicifolia*, *Caltha palustris* subsp. *laeta*, *Potentilla erecta* and *Carex panicea*. The moss layer is strongly developed. An important constituent of the community structure is a moss layer. Unfortunately, it has not often been analysed.

Phytocoenological features

The characteristic species of the association is *Carex paniculata* combined with *Geum rivale* (differential species to ass. *Caricetum paniculata*, and other associations or subassociations dominated by *Carex paniculata*). *Geum rivale* grows on wet meadows and springs, in floodplains along brooks, in flooded forests, in fen meadows, wet forests and tall-herb mountain floodplains. Enters to more plant communities, more often to the communities of the ordo *Molinietalia* as the characteristic species of the alliance *Calthion* (OBERDORFER 1970). *Carex paniculata* is a semiheliophyllous or heliophyllous, mesotrophic sedge. Occurs on wet, mild acid or neutral, rich in nutrients, slightly humuseous, sandy to gravelly or explicitly loamy soils. The sedge is rooting up to 50 cm.

The association is dominated by some fen species, e. g. (Tab. 1) *Carex davalliana*, *Valeriana simplicifolia*, *Caltha palustris* subsp. *laeta* and others. Some species of mesophileous meadows enter the community, e. g. *Lathyrus pratensis* and *Ranunculus acris*.

The association is separated from ass. *Caricetum paniculatae* (except for *Geum rivale*) mainly by the presence of *Carex davalliana*, *Eriophorum latifolium*, *Valeriana simplicifolia*, *Cirsium rivulare*, *Lathyrus pratensis*, *Filipendula ulmaria*, *Succisa pratensis* (Tab. 2).

The high frequency of the diagnostic species of the alliance *Calthion* (Tab. 1, 2) and *Caricion davallianae* and the absence of the diagnostic species *Magnocaricion elatae* is characteristic for the new association.

The number of species in one relevé varies from 16 to 37, with an average of 26 species. A high constancy (III-V) is typical for 18% of the species, indicating phytocoenological dishomogeneity of the community. The cause of the intra-variability is mainly differences in habitat conditions, which is the base on which two subassociations were set aside (Tab. 1). The distribution of the species according to their constancy is as follows (in %): I-68, II-14, III-6, IV-6, V-6.

The number of fen species can be found in the moss layer, e. g. *Drepanocladus revolvens*, *Campylium stellatum*, *Palustriella commutata*, *Tomenthypnum nitens*, *Paludella squarrosa*, belonging to the alliance *Caricion davallianae*, is an argument to support creation of the new association. They are absent in the association *Caricetum paniculatae* (Tab. 2).

Subassociations

***Geo rivali*-*Caricetum paniculatae valerianetosum simplicifoliae* subass. nova**

Nomenclatoric type: Tab. 1, relevé Nr. 22, holotypus.

Differential species: *Valeriana simplicifolia*, *Carex davalliana*, *C. flava*, *Eriophorum latifolium*, *Primula farinosa*, *Pinguicula vulgaris*, *Epipactis palustris*, *Parnassia palustris*.

The species of minerotrophic fens (alliance *Caricion davallianae*) entering the subassociation, differ this subassociation from the following, typical subassociation. They occur in the sloping mires.

Inside the subassociation is defined a variant with *Primula farinosa*, containing more species of the alliance *Caricion davallianae*: *Pinguicula vulgaris*, *Epipactis palustris* and *Parnassia palustris*. The stands without these species are placed in the typical variant (Tab. 1).

Geo rivali-Caricetum paniculatae typicum subass. nova.

Nomenclatoric type: Tab. 1, relevé 5, holotypus.

Differential species: The negative differentiation against the thirst subassociation. The stands without diagnostic species of the alliance *Caricion davallianae* are placed into the subassociation *typicum*. They often cover bottomlands along the brooks.

Distribution

The association occurs mostly in the span 400-900 m asl. (Tab. 2). Only exceptionally it occurs in lower (100, 170 m asl.) or higher (1240, 1310, 1530 m asl.) elevations.

Below is the list of the stands of *Carex paniculata* in accordance with increasing altitude, placed in the new association:

In Východoslovenská rovina lowland, land register of the settlements Malá Trňa (170 m asl.) and Plešany (100 m asl.), placed into the association *Caricetum paniculatae* (ŠPÁNIKOVÁ 1985). In Hostovické lúky meadows (330 m asl., Laborecká vrchovina hill country) occurs *Carex paniculata* stands (BURAL 2000) belonging to the new association (Tab 6).

FAJMONOVÁ (1991) reported three relevés in the Strážovské vrchy hills, in the altitude of 400-480 m asl., recorded in the spring area of Slatinský potok brook and in the Podhradská dolina valley. The community is signed as „community with *Carex paniculata*“.

The stands with *Carex paniculata* recorded by HÁBEROVÁ & FAJMONOVÁ (1995) in Rojkov fen (610 m asl., Veľká Fatra Mts.) and by ŠPÁNIKOVÁ & ZALIBEROVÁ (1982) in Popradská kotlina basin, placed in the association *Caricetum paniculatae*, are in correspondance with the new association.

The relevés recorded by RYBNÍČEK (ined.) near the Oravice Settlement (840 m asl., Skorušinské vrchy hills) and LESKOVJANSKÁ et al. (ined.) in Slovenský raj National Park (850 m asl., Kopanické sedlo saddle) belong to the new association. ŠUCHOVÁ (1970), in this orographic unit, made a note of the *Carex paniculata* stands (845-940 m asl), placing them in the subassociation *Valeriano simplicifoliae-Caricetum davallianae caricetosum paniculatae*.

GREBENŠČIKOV et al. (1957) recorded a stands with *Carex paniculata* growing on Kubínska hoľa hill (1310 m asl., Oravská Magura hills) as a fragment of the association *Caricetum elatae*, the floristical composition suggests the relation with the new association.

ŠMARDA (1960) recorded the relevés of the community with *Carex paniculata* in the West Tatra Mts. (Tichá dolina, 1249 m asl. and Tomanová dolina, 1530 m asl., this is the highest placed locality in Slovakia).

The largest and the most luxuriant developed *Carex paniculata* stands are in the upper Liptov region, in the land register Východná. The majority of relevés (Fig. 1) were recorded here. Similarly, the majority of relevés included in the paper of RUŽIČKOVÁ (1986) came from the areas of the settlements Východná and Važec. There are only few isles of *Carex paniculata* stands in the lower and middle Liptov region (Fig. 1), as in the Strážovské vrchy hills, in Orava region and other areas of Slovakia (Fig. 2). A large, continuous *Carex paniculata* stand, is developed in the Tichá dolina valley in the West Tatra Mts., while in the neighbouring Tomanova dolina valley there are only patchy, sloping stands.

Due to the destruction of wetlands by drainage, in the past, there are only few remnants of the previous large, luxuriant *Carex paniculata* stands in many areas of Slovakia, e. g. Turčianska kotlina basin, Kubínska hoľa hill and others. But, when disfunction of drainage equipment, the conditions for *Carex paniculata* may be improved.

According to some sources (SLOBODNÍK & KADLEČÍK 2000, STANOVÁ 2000), there are conditions for other *Carex paniculata* stands in the areas mentioned above (Tab. 5) or in still unmentioned territories: Biele Karpaty hills, Malá Fatra Mts., Krupinská vrchovina, Branisko, Ľubovnianska vrchovina hills and Spišsko-gemerský kras karst (Tab. 6, Fig. 2). A more detailing phytocoenological investigation is needed.

Evaluation of the *Geo rivali*-*Caricetum paniculatae* association and its syntaxonomical features

The new association is sharply distinctive from the *Caricetum paniculatae* (OBERDORFER 1977), this is showed in tables 2 and 4. The *Carex paniculata* stands described by HRIVNÁK (2001) and placed in the ass. *Caricetum paniculatae*, are clearly distinctive from the new association. Likewise, the relevés recorded by MALOVCOVÁ (ined.) in Borská nížina lowland does not correlate with the new association.

Wetland communities with *Carex paniculata* in Biele Karpaty described HÁJEK (1998). He placed them to the ass. *Cirsietum rivularis* and subass. *caricetosum paniculatae* and *Angelico cirsietum oleracei caricetosum paniculatae* BAL.-TUL. et HÁJEK 1998. Our association is sharply distinctive from these communities (Tab. 7). Primarily, the differential species *Geum rivale* is lacking. This species reliably indicates relation the stands with *Carex paniculata* to the association *Geo rivali*-*Caricetum paniculatae*. This opinion is supported by the floristic composition of other stands not included in this contribution. More over, in his associations do not occur some indicator species of the alliances *Calthion*, *Caricion davallianae* and of the ordo *Molinietalia* (Tab. 7), which are abundant in the described association.

Apart from mentioned communities, the author introduces some other ones, but illustrated only by few relevés. Based on the presence of the species of the classis *Phragmito-Magnocaricetea*, two relevés are placed to the ass. *Caricetum paniculatae*, a dissimilarity from our association is clearly showed. One relevé is placed to the subass. *Junco inflexi-Menthetum longifoliae caricetosum*

paniculatae HAJEK 1998 and one relevé to the subass *Scirpo-Cirsietum caricetosum paniculatae* BAL.-TUL. et HAJEK 1998, the floristic composition is quite different from our association. It is important to stress, that never ever occurs *Geum rivale* in mentioned relevés!

In Strážovské vrchy Hills HÁJEKOVÁ et al. (2001) placed the stands with *Carex paniculata* to the ass. *Cirsietum rivulare* and subass. *caricetosum davallianae*, this association does not correlate with the new association as well. (Tab. 7).

The *Carex panniculata* community described by RUŽIČKOVÁ (1986) fit with the new association very well (Tab. 2, 4). The *Carex paniculata* stands recorded by FAJMONOVÁ (1991) in Strážovské vrchy hills, by ONDREJOVÁ & HRIVNÁK (1994), KYSELOVÁ (1976), Háberová & FAJMONOVÁ (1995), ŠPÁNIKOVÁ & ZALIBEROVÁ (1982), RYBNÍČEK (ined.), ŠUCHOVÁ (1970) and LESKOVJANSKÁ et al. (ined.) may be included in the new association because of similar floristical composition (Tab. 2).

The *Carex paniculata* communities in Tichá and Tomanová valley placed ŠMARDA (1960) into the association *Caricetum paniculatae*. The table 4 suggest the possibility to take them into the new association since the diagnostical species of the alliance *Magnocaricion elatae* and the ordo *Magnocaricetalia* are lacking, while diagnostical species of the alliance *Calthion* and *Caricion davallianae* and of the ordo *Caricetalia fuscae* are abundant. This is supported by the presence of the moss *Paludella squarrosa*, typical fen species.

The association *Caricetum paradoxae* in Germany (OBERDORFER 1977) has similar dominant feature, floristical composition and constancy as the *Caricetum paniculatae*, apart from three species *Carex elata*, *Lycopus europaeus* and moss *Climacium dendroides*, differing in constancy.

In Slovakia, the *Caricetum paradoxae* is reported in Záhorská nížina lowland by KLIKA (1958) and by BOSÁČKOVÁ (1970, 1975), in Turčianska kotlina basin by ŠKOVIROVÁ (ined.) and BOSÁČKOVÁ (1974) and in Orava region by ŠOLTÉS (2000).

Lacking indicator species of the alliances *Caricion davallianae* and *Calthion* as well of the ordo *Caricetalia fuscae*, this growths are distinctly separated from the new association, while these species are present in Slovakia, suggesting including these communities into the association *Geo rivali-Caricetum paniculatae* (Tab. 4). The similarity is particularly outstanding by the relevés recorded by BOSÁČKOVÁ (1970) in the National Nature Reserve Abrod and in Turčianska kotlina basin (Tab. 2, 4), one relevé recorded by ŠOLTÉS (2000) in Orava region prognosticates the similarity of the Orava communities occurring in fens near the settlements of Beňadovo, Bobrov and Trstená (MIGRA, pers. cont.).

Neither the *Carex appropinquata* communities in Záhorie lowland are coincidental with those in Germany, separating mainly by the presence of the species from the alliances noticed above and lacking in Germany (Tab. 2), despite the occurrence of some indicator species of the alliance *Magnocaricion elatae*. This is distinctively recorded by BOSÁČKOVÁ (1975) in her relevés. This is the reason why they had been included in the association *Caricetum paradoxae* (cf. Tab. 2, 5).

Based on the similar ecological features and similar floristical composition, it seems that the growths with *Carex appropinquata* in Slovakia is a viking community of the *Geo rivali-Caricetum paniculatae*. This is the reason why we suggest to place this community in the association *Geo rivali-Caricetum appropinquatae*.

Nevertheless, more work is needed for the analysis of the communities with *Carex appropinquata*, especially for those with the highest extent.

Figure 2 introduce the more widespread association *Geo rivali-Caricetum paniculatae* compared to the association *Caricetum paniculatae*, restricted predominantly to the Borská nížina lowland, where may interfere the Atlantic climatic conditions. This supports the validity of the description of the new association.

Threat and gene pool importance

The spring vegetation dominated by the sedge *Carex paniculata* belongs to the minerotrophic fens of the endangered alliance *Caricion davallianae*. Due to the destruction of wetlands by drainage in the past, the original, unchanged fens became rare, there are mostly only patchy remnants to meet. The original, unchanged communities with *Carex paniculata* are very valuable (e. g. location Pálenice near Východná settlement). Their botanical value is supported by presence of 13 endangered and protected species, like *Primula farinosa*, *Pinguicula vulgaris*, *Dactylorhiza majalis*, *D. maculata* subsp. *schurii*, *Epipactis palustris* and others. In the relevé Nr. 25, we noticed no fewer than 8 such species. From a gene pool point of view, these valuable communities were suggested for protection (cf. ŠKOLEK 1999).

In Strážovské vrchy hills are met along brooks bottomland communities dominated by *Carex paniculata*, not identical to the *Caricetum paniculatae* (SMATANOVÁ 2000). The floristical composition suggests the belonging to our new association. Competitive more powerful sedge *Carex paniculata* pushes out more submissive species and contributes to overgrowing of unscythed fen meadows. The remnants of well preserved fens the author (SMATANOVÁ 2000) calls for protection.

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References

- BALÁTOVÁ-TULÁČKOVÁ E. (1968): Grundwasserganglinien und Wiesengesellschaften (Vergleichende Studie der Wiesen aus Südmähren). – Přír. Práce Ústavu Českoslov. Akad. Brne 2: 1-37.
- BALÁTOVÁ-TULÁČKOVÁ E. (1976): Rieder- und Sumpfweiden der Ordnung *Magnocaricetalia* in der Záhorie-Tiefebene und dem nördlich angrenzenden Gebiete (Synökologische Studie der *Magnocaricetalia* - Gesellschaften). – Vegetácia ČSSR, B 3, Veda, Bratislava. [258 pp.]
- BALÁTOVÁ-TULÁČKOVÁ E. (1985): Travinná spoločenstva v Československu. – In: RYCHNOVSKÁ M. et al., Ekologie lučních porostů, p. 14-95, Academia, Praha.
- BARKMAN J., MORAVEC J. & RAUCHERT S. (1988): Kód fytocenologické nomenklatury. – Zprávy Českoslov. Bot. Společn. 1: 1-59.
- BOSÁČKOVÁ E. (1970): Kvetena a rastlinné spoločenstvá štátnej prírodnej rezervácie Abrod na Záhorí. – Práce a štúdie českoslov. ochrany prírody pri SÚPSOP v Bratislave, ser. II, spis 1, p. 1-83.
- BOSÁČKOVÁ E. (1974): Ochranný výskum močiarnych biocenóz Turčianskej kotliny (vegetačné pomery význačnejších lokalít). – Českoslov. Ochr. Přír. 14: 59-102.
- BOSÁČKOVÁ E. (1975): Rastlinné spoločenstvá slatinových lúk na Záhorskej nížine. – Českoslov. Ochr. Přír. 15: 173-273.
- FAJMONOVÁ E. (1991): Ohrozené spoločenstvá pramenísk v Strážovských vrchoch. – Biológia (Bratislava) 46 (5): 427-433.
- HABEROVÁ I. (1978): Rastlinné spoločenstvá alúvií Silickej planiny. – Acta Bot. Slov. 4: 123-135.
- HABEROVÁ I. (1997): Klasifikácia rastlinných spoločenstiev rašelinísk. – In: Flóra a vegetácia rašelinísk, Zborn. z vedeck. konferencie, pp. 75-82, Orava.
- HABEROVÁ I. & FAJMONOVÁ E. (1995): Rastlinstvo ŠPR Rojkovské rašelinisko. – Ochr. príř. (Banská Bystrica) 13: 15-31.
- HRAŠKO J. et al. (1991): Morfogenetický klasifikačný systém pôd ČSFR. – VÚPÚ, p. 1-106, Bratislava.
- KANTOROVÁ D. (1971): Vegetácia a rastlinné spoločenstvá Osturnianskych jazier. – Ms. [Mgr. thesis; Přír. fak. UK, Bratislava].
- KLIKA J. (1958): K fytocenologii rašelinných a slatinných společenstev na Záhorské nížine. – Biol. Práce Slov. Akad. Vied. IV(4): 1-34.
- KYSELOVÁ Z. (1976): Travinnobylinné spoločenstvá doliny Čierneho Váhu. – Ms., 102 pp. [Mgr. thesis; Přír. fak. UK, Bratislava].
- MARHOLD K. & HINDÁK F. (eds.) (1998): Zoznam nižších a vyšších rastlín flóry Slovenska. – Veda, Bratislava. [687 pp.]
- MORAVEC J. et al. (1994): Fytocenologie (Nauka o vegetaci). – Academia, Praha. [403 pp.]
- MUCINA L. & MAGLOCKÝ Š. (eds.) (1985): A list of vegetation units of Slovakia. – Doc. Phytosoc. 9: 175-220.
- OBERDORFER E. (1977): Süddeutsche Pflanzengesellschaften. Teil I. – Stuttgart. [311 pp.]
- ONDREJOVÁ I. & HRIVNÁK R. (1994): Zaujímavé mokradné lokality z okolia Liptovskej Štiavnice. – Bull. Slov. Bot. Spoločn. 16: 99-101.
- OTAHELOVÁ H., HRIVNÁK R. & VALACHOVIČ M. (2001): *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941. – In: VALACHOVIČ M. (ed.), Rastlinné spoločenstvá Slovenska 3. Vegetácia mokradí, Veda, Bratislava (in press).
- RUŽIČKOVÁ H. (1980): Spoločenstvá zväzu *Caricion davallianae* v Liptovskej kotline. – Biológia (Bratislava) 35 (4): 275-284.

- RUŽIČKOVÁ H. (1986): Trávne porasty Liptovskej kotliny. – Biol. Práce Slov. Akad. Vied. 32 (2): 1-140.
- RYBNÍČEK K., BALÁTOVÁ-TULÁČKOVÁ E. & NEUHAUSL R. (1984): Přehled rostlinných společenstev rašeliníšť a mokřadních luk Československa. – Studie ČSAV. 8, Academia, Praha. [123 pp.]
- SLOBODNÍK V. & KADLEČÍK J. (2000): Mokrade Slovenskej republiky. – SZOPK, Prievidza. [148 pp.]
- SMATANOVÁ J. (2000): Slatinná vegetácia Strážovských vrchov. – In: STANOVÁ V. (ed.), Rašeliniská Slovenska, p. 139-142, DAPHNE. Inštitút aplikovanej ekológie, Bratislava.
- STANOVÁ V. (ed.) (2000): Rašeliniská Slovenska. – DAPHNE. Inštitút aplikovanej ekológie, Bratislava. [194 pp.]
- ŠKOLEK J. (1999): Floristicko-vegetačné pomery hydromorfných lokalít ochranného pásma TANAPu na Hornom Liptove. – Ochr. Prír. (Banská Bystrica) 17: 101-112.
- ŠKOVIROVÁ K. (1971): Rastlinné spoločenstvá Turčianskej kotliny na dolnom toku Turca. – Ms. [Mgr. thesis; Prír. fak. UK, Bratislava].
- ŠMARDÁ J. (1960): Reliktní společenstvo s převládající *Carex paniculata* v Západních Tatrách. – Biológia (Bratislava) 15 (5): 344-351.
- ŠOLTĚS R. (2000): Glaciálny relikt mach *Helodium blandovii* na Slovensku. – Ochr. Prír. (Banská Bystrica) 18: 41-49.
- ŠPÁNIKOVÁ A. (1985): Vegetačné pomery južnej časti Východoslovenskej nížiny. – Acta Bot. Slov. 8: 192.
- ŠPÁNIKOVÁ A. & ZALIBEROVÁ M. (1982): Die Vegetation des Poprad-Flussgebietes (die Becken Popradská kotlina und Ľubovnianska kotlina). – Vegetácia ČSSR, B 5. [303 pp.]
- ŠUCHOVÁ, H. (1970): Vlhkomilné lúčne spoločenstvá na alúviu horného Hnilca. – Ms. [Mgr. thesis; Prír. fak. UK, Bratislava].
- URBANOVÁ V. & ZALIBEROVÁ M. (1996): Rastlinné spoločenstvá v zátopovom území vodného diela Žilina. – Vlastiv. Zborn. Považia 8: 143-173.

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Tab. 1-7 on the pages 44-66.

Tab. 1. Association Geo rivali-Caricetum paniculatae, subassociation 1 – typicum, 2 – valerianetosum simplicifoliae, variant a – typicum, b – with *Primula farinosa*.

		1															2																	
Subassociation		a															b																	
Variant																																		
Relevé Nr.		1	2	3	4	5	6	7	8	9	C1	0	1	2	3	4	5	6	7	8	9	0	C2	C										
Diagnostic species of the association																																		
C	<i>Carex paniculata</i> (dm)	5	5	4	4	4	4	5	4	5	V	4	4	4	4	3	5	5	4	3	4	5	5	4	4	4	4	5	4	3	4	V		
C	<i>Geum rivale</i> (sdm, d)	2	2	1	1	2	3	+	1	1	V	1	1	2	2	1	1	2	3	1	1	2	1	1	1	+	2	2	1	2	2	V		
C	<i>Cirsium rivulare</i>	3	3	1	2	3	.	3	.	1	IV	3	3	2	3	1	2	2	4	1	1	3	2	1	2	.	1	2	+	1	2	2	V	
C	<i>Caltha palustris</i> subsp. <i>laeta</i>	1	2	1	2	3	1	3	3	2	V	2	3	1	3	.	1	.	3	.	1	2	2	1	.	1	.	1	+	1	+	IV	V	
C	<i>Lathyrus pratensis</i>	1	3	+	3	2	2	3	2	3	V	2	1	2	3	2	1	1	.	1	1	2	1	2	2	.	1	2	.	2	2	3	V	V
M	<i>Filipendula ulmaria</i>	2	2	1	1	3	2	3	5	2	V	2	2	2	4	1	3	2	2	1	1	1	2	1	1	1	1	3	.	2	.	V	V	
C	<i>Myosotis scorpioides</i>	.	2	+	.	1	2	+	2	2	IV	2	3	3	2	.	1	.	1	3	1	1	1	.	.	1	.	1	.	1	.	IV	IV	
C	<i>Angelica sylvestris</i>	2	.	+	1	2	2	1	2	IV	.	1	1	.	.	1	+	1	1	+	+	1	.	2	1	.	.	.	.	.	1	III	IV	
C	<i>Crepis paludosa</i>	1	2	.	1	2	.	2	1	IV	.	1	.	+	.	1	1	.	1	+	.	.	.	1	1	1	1	2	1	1	.	1	IV	IV
M	<i>Equisetum palustre</i>	.	.	1	1	.	1	2	1	III	.	1	2	.	2	2	1	1	1	2	1	2	1	2	1	.	3	2	2	2	2	IV	IV	
M	<i>Galium uliginosum</i>	1	2	.	2	+	.	+	1	IV	2	2	.	1	.	1	1	3	1	1	2	1	.	2	1	.	2	.	2	.	IV	IV	IV	
Cd	<i>Carex panicea</i>	1	.	1	.	.	.	.	.	II	1	.	1	.	2	.	1	.	1	+	1	.	1	.	1	.	1	1	+	1	+	1	IV	III
Differential species of subassociations and variants																																		
Cd	<i>Valeriana simplicifolia</i>	.	.	.	.	+	.	.	.	.	.	1	2	2	1	2	2	1	3	1	1	2	3	3	2	2	1	2	+	2	3	2	V	IV
Cd	<i>Carex davalliana</i>	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	1	1	1	1	2	+	1	1	1	+	1	+	2	.	IV	III	
Cd	<i>Eriophorum latifolium</i>	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	1	+	1	.	2	1	+	1	1	.	1	.	3	+	IV	III	
Cd	<i>Carex flava</i>	.	.	.	.	.	.	.	.	.	.	1	+	.	+	+	.	1	.	.	3	.	.	.	1	2	.	+	.	.	III	II	II	
Cd	<i>Pinguicula vulgaris</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	2	.	1	.	.	II	I	I
Cd	<i>Primula farinosa</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	+	1	.	.	II	I	I	
Cd	<i>Epipactis palustris</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	2	.	R	3	II	I	

Subassociation		1												2											
Variant																									

Subassociation		1												2												b											
Variant																																					
Relevé Nr.		1	2	3	4	5	6	7	8	9	C1	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	C2	C			
C	<i>Poa trivialis</i>	.	.	.	1	.	.	2	1	.	II	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
Cf	<i>Carex nigra</i>	.	.	.	.	.	.	.	+	.	I	.	1	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
M	<i>Sanquisorba officinalis</i>	.	2	1	.	.	.	.	.	.	II	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.			
M	<i>Lysimachia vulgaris</i>	.	.	2	1	1	.	.	.	.	II	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1			
Mg	<i>Galium palustre</i>	.	1	.	.	.	.	.	.	.	I	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.			
	<i>Briza media</i>	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	R	.	.	.			
	<i>Epilobium palustre</i>	.	1	.	.	.	.	.	.	.	I	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Anthoxanthum odoratum</i>	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Equisetum sylvaticum</i>	2	1	.	.	.	.	.	.	.	II	3	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	1	.			
	<i>Ajuga reptans</i>	.	.	.	.	.	.	.	+	.	I	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Primula elatior</i>	.	+	.	.	.	.	.	.	.	I	.	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Festuca rubra</i>	.	.	.	1	.	.	.	.	.	I	.	2	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Melampyrum nemorosum</i>	.	.	.	1	.	.	.	.	.	I	.	1	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+			
	<i>Mentha aquatica</i>	.	.	.	.	.	.	.	.	.	.	.	+	1	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Veronica chamaedrys</i>	.	.	.	.	+	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
	<i>Cirsium arvense</i>	.	.	.	1	1	.	.	.	.	II	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Rumex sp.</i>	.	.	.	.	1	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
	<i>Urtica dioica</i>	.	.	.	.	.	1	.	.	.	II	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Poa pratensis</i>	.	.	.	.	.	.	1	.	.	II	.	1	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Chaerophyllum hirsutum</i>	.	.	.	.	.	.	.	2	1	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.			
	<i>Carex hirta</i>	.	.	.	.	.	.	.	+	.	I	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
	<i>Alopecurus pratensis</i>	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
		.	+	.	1	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			

Species in 1 – 2 relevés only: *Achillea millefolium* 3 (+); *Aegopodium podagraria* 15 (1-2); *Alnus incana* 24 (+); *Anthriscus sylvestris* 7 (1); *Avenula pubescens* 11 (+); *Bistorta vivipara* 27 (+); *Blasmus compressus* 29 (+); *Cardamine amara* 2 (+); *Carex boreale* 17 (+); *C. rostrata* 13 (1); 30 (1); *C. lasiocarpa* 13 (1); *C. flacca* 13 (1); *C. fl*

(+); *Festuca ovina* 11 (+); *Galeopsis speciosa* 2 (+); *G. tetrahit* 4 (+); *Galium aparine* 15 (1), 2 (+); *G. verum* 11 (1); *Geranium palustre* 26 (+); *G. pratense* 7 (+); *Heracleum sphondylium* 7 (+); *Impatiens noli-tangere* 2 (+); *Jacea pratensis* 15 (+); *Juncus articulatus* 1 (1), 22 (1); *Linum catharticum* 18 (+); *Luzula multiflora* 4 (+); *Lysimachia nemorum* 19 (+); *Lythrum salicaria* 4 (+); *Molinia caerulea* 3 (+); *Phleum pratense* 19 (+); *Picea abies* 23 (+), 24 (1); *Polemonium ceruleum* 15 (1); *Prunella vulgaris* 25 (+); *Pyrola rotundifolia* 27 (2), 14 (2); *Rhinanthus serotinus* 9 (+), 13 (1); *Salix purpurea* 20 (1); *Symphytum officinale* 7 (1); *Trifolium alpestre* 2 (+), 29 (1); *T. pratense* 8 (+), 18 (1); *T. repens* 18 (+), 10 (+); *Veronica beccabunga* 2 (+); *Vicia sepium* 8 (1), 9 (1); *Valeriana officinalis* 7 (1), 13 (+).

Explanation 1: C – alliance *Calthion*, Cd – alliance *Caricion davallianae*, Cf – ordo *Caricetalia fuscae*, M – ordo *Molinietalia*, Mg – alliance *Magnocaricion elatae*, d – differential species, dm – dominant species, sdm – subdominant species.

Tab. 2. Synoptic table of the ass. *Geo rivali*-*Caricetum paniculatae* compared to ass. *Caricetum paniculatae* and ass. *Caricetum paradoxae*.

Association	<i>Geo rivali</i> - <i>Caricetum paniculatae</i>										<i>Caricetum paniculatae</i>										<i>Caricetum paradoxae</i>									
Relevé number	30	13	3	6	13	2	3	3	3	45	36	13	7	3	1	2	15	2	59											
Altitud (m asl.)	from 550	570	700	700	845	850	400	1240	670	100	200	200	460	490	670	200	150	200	100											
to	960	625	718		940	-	480	1530	-	700	-	-	500	510	-	-	200	-	700											
Author	Šk	Rž	Ky	*	Su	Le	Fa	Šm	Šp	Ob	Hr	Ma	Bo2	Škv	Šo	Bo1	Kl	Bo3	Ob											
Indicating species of the alliance <i>Calthion</i>																														
<i>Carex paniculata</i>	V ²⁻⁵	V ³⁻⁵	3/3 ⁴	V ⁸	V ²⁻⁴	2/2 ²⁻³	3/3 ⁴	3/3	3/3 ⁴	V	V ⁷⁻⁹	V ³⁻⁹		1/3 ¹																
<i>Geum rivale</i>	V ⁻³	V ⁻²	3/3 ⁺	III ¹⁻²	V ¹⁻¹	2/2 ⁺		2/3					IV ⁻¹	2/3 ¹⁻¹																
<i>Cirsium rivulare</i>	V ⁻³	IV ⁻²	2/3 ¹⁻¹	IV ¹⁻³	V ^{R-1}	1/2 ¹	2/3 ⁻²					I ²⁻⁴	I ⁴⁻⁵	IV ⁻²	3/3 ¹⁻²	1	2/2 ¹													
<i>Caltha palustris</i>	V ⁻³	V ⁻³	1/3 ⁺	V ²⁻⁶	IV ⁻¹	1/2 ⁺	2/3 ¹⁻³	2/3	1/3 ¹	I	II ¹⁻⁶	II ²⁻⁶	V ⁻²	3/3 ¹⁻²	2a	2/2 ¹	V ⁰⁻⁷	2/2 ⁺	I											
<i>Lathyrus pratensis</i>	V ⁻³	V ⁻²	2/3 ⁺	IV ¹⁻³	IV ⁺	1/2 ¹			1/3 ¹			II ²⁻⁵	III ⁺	3/3 ⁰⁻¹	+	2/2 ¹														
<i>Crepis paludosa</i>	IV ⁻²	IV ⁻²	2/3 ⁺	IV ²⁻⁵	III ⁺	1/2 ¹	2/3 ¹⁻¹	1/3		I	I ²		III ¹⁻¹	3/3 ¹⁻¹	1															
<i>Myosotis scorpioides</i>	IV ⁻³	II ¹⁻¹	1/3 ⁺	IV ²	III ^{R-4}			2/3		I	I ²		III ⁺	3/3 ¹⁻¹																
<i>Angelica sylvestris</i>	IV ⁻²			I ³	II ¹⁻¹		1/3 ^R			I	II ¹⁻⁵			3/3 ¹⁻¹		1	2/2 ⁺	1/2 ⁺	I											
<i>Cardamine pratensis</i>	II ⁺	II ¹⁻¹	1/3 ⁺	IV ²	IV ⁻¹	2/2 ^{R-4}					I ¹⁻²																			
<i>Cirsium palustre</i>	II ¹⁻¹	III ⁺		II ¹⁻³	I ^R	1/2 ⁺				I	I ²																			
<i>Scirpus sylvaticus</i>	II ^{R-3}	I ⁺	2/3 ⁺	I ¹	I ²		3/3 ⁺				III ¹⁻⁵	V ²⁻⁴						1/2 ⁺												
<i>Cirsium oleraceum</i>	I ¹⁻²		1/3 ⁺	I ³							I ¹⁻⁵	I ⁶																		
<i>Deschampsia cespitosa</i>	I ¹⁻¹	I ⁺	2/3 ⁺	II ²	I ^{R-4}	1/2 ²		2/3					I ⁺																	
<i>Ranunculus repens</i>	II ¹⁻²				II ^{R-4}				3/3 ⁺		II ²⁻³	I ³	II ³																	
<i>Poa trivialis</i>	I ¹⁻²	II ^{R-1}	1/3 ⁺	I ²						I	III ¹⁻³	II ²				2/2 ⁻¹	II ⁰⁻²													
<i>Trollius altissimus</i>	II ¹⁻¹		2/3 ¹⁻¹		III ^{R-1}	2/2 ⁺																								

Association		Geo rivali-Caricetum paniculatae										Caricetum paniculatae										Caricetum paradoxae									
Relevé number		30	13	3	6	13	2	3	3	3	3	45	36	13	7	3	1	2	15	2	59										
Altitud (m asl.)	from	550	570	700		845	850	400	1240	670		100	200	200	460	490	670	200	150	200	100										
	to	960	625	718		940	-	480	1530	-		700	-	-	500	510	-	-	200	-	700										
Author		Šk	Rž	Ky	*	Šu	Le	Fa	Šm	Šp		Ob	Hr	Ma	Bo2	Škv	Šo	Bo1	Kl	Bo3	Ob										

Indicating species of the alliance *Caricion davallianae*

<i>Valeriana simplicifolia</i> (1)	IV ¹⁻³	V ¹⁻³	2/3 ⁺	III ²⁻³	IV ¹⁻²	1/2 ¹	2/3 ¹⁻²	1/3	.	(I)	.	(IV ¹⁻¹)	(2/3+)	1	(2/2 ¹⁻²)	(V ²)	(2/2 ¹)	(I)
<i>Carex davalliana</i>	III ¹⁻²	V ¹⁻³	.	III ³	V ^{R-4}	2/2 ⁺	2/3 ¹	1/3	.	.	.	III ¹	1/3 ⁺	.	2/2 ¹	III ⁰⁻⁴	1/2 ⁺	.
<i>Carex panicea</i>	III ¹⁻¹	IV ¹⁻²	1/3 ⁺	V ²⁻⁵	IV ¹⁻²	2/2 ¹⁻²	2/2 ¹	1/3	1/3 ¹	I	I ³	V ⁺	.	.	2/2 ¹	II	1/2 ⁺	I
<i>Eriophorum latifolium</i>	III ¹⁻³	V ¹⁻²	2/3 ⁺	II ²	IV ^{R-2}	2/2 ¹⁻²	2/3 ¹⁻¹	1/3	.	.	.	IV ⁺	1/3 ⁺	.	1/2 ⁺	I ⁰⁻⁶	1/2 ⁺	.
<i>Carex flava</i>	II ¹⁻³	II ¹	.	III ¹⁻³	IV ^{R-2}	1/2 ³	.	3/3	.	.	.	.	.	.	1/2 ⁺	.	.	.
<i>Parnassia palustris</i>	I ¹⁻²	III ¹⁻²	.	.	I ^{R-2}	2/2 ¹⁻²	.	2/3	.	.	.	III ¹	.	.	.	.	.	.
<i>Pinguicula vulgaris</i>	I ¹⁻²	II ¹	.	II ^{R-3}	1/2 ^R	.	.	3/3	.	.	.	.	.	.	.	.	.	.
<i>Primula farinosa</i>	I ¹⁻¹	II ¹	.	I ²	IV ¹⁻²	2/2 ¹⁻²	.	.	.	.	.	.	.	.	.	.	.	.
<i>Epipactis palustris</i>	I ^{R-3}	II ¹⁻²	.	.	.	1/2 ⁺	.	2/3	.	.	.	.	.	.	1/2 ¹	I ⁰⁻²	.	.
<i>Blysmus compressus</i>	I ¹	.	.	.	I ¹	.	.	.	.	.	.	.	.	.	.	.	.	.

Indicating species of the alliance *Magnocaricion elatior*

<i>Carex appropinquata</i>												I			V ²⁻⁴	3/3 ⁴⁻⁵	2a	2/2	V ⁰⁻⁵	2/2 ³⁻⁴	V										
<i>Carex acutiformis</i>								1/3 ¹				III	III ²⁻⁶	IV ²⁻⁸		3/3 ¹				1/2 ¹	II										
<i>Naumburgia thyrsiflora</i>												I			II ¹						II										
<i>Galium palustre</i>	I ¹⁻¹	II ¹	2/3 ¹	V ²⁻³	I ¹⁻¹			1/3	2/3 ¹⁻¹			IV	III ²⁻⁵	I ²	II ¹⁻¹			2/2 ⁺	IV ⁰⁻²	2/2 ¹⁻¹	V										
<i>Scutellaria galericulata</i>					I ¹							II	II ¹⁻³	I ²	IV ⁺	1/3 ⁺				1/2 ⁺	I										
<i>Lythrum salicaria</i>	I ¹			I ³								III	IV ²⁻³	V ²⁻⁴	III ¹			2/2 ⁺	III ⁰⁻²	2/2 ⁺	II										
<i>Stellaria palustris</i>												I	I ³								II										

Association	Geo rivali-Caricetum paniculatae										Caricetum paniculatae					Caricetum paradoxae									
	30	13	3	6	13	2	3	3	3	3	45	36	13	7	3	1	2	15	2	59					
Relevé number	550	570	700		845	850	400	1240	670		100	200	200	460	490	670	200	150	200	100					
Altitud (m asl.)	from 550	570	700		845	850	400	1240	670		100	200	200	460	490	670	200	150	200	100					
to	960	625	718		940	-	480	1530	-		700	-	-	500	510	-	-	200	-	700					
Author	Šk	Rž	Ky	*	Šu	Le	Fa	Šm	Šp		Ob	Hr	Ma	Bo2	Škv	Šo	Bo1	Kl	Bo3	Ob					
<i>Comarum palustre</i>											II								1/2 ¹	III					
<i>Peucedanum palustre</i>											II	I ²⁻⁵	II ²⁻³					II ⁰⁻⁴		IV					
<i>Carex elata</i>											I	I ²	I ³					1/2 [*]		IV					
Indicating species of the ordo <i>Molinietalia</i>																									
<i>Filipendula ulmaria</i>	V ¹⁻⁵	IV ^{*-2}	2/3 ^{*-1}	III ¹⁻³	III ^{*-1}		1/3				I	II ¹⁻⁶	II ²⁻³	III [*]	2/3 [*]			II		II					
<i>Equisetum palustre</i>	IV ¹⁻³	V ^{*-3}	2/3 ^{*-1}	V ²⁻⁷	V ^{*-3}	1/2 ¹	3/3 ²	3/3	1/3 [*]		II	II ¹⁻⁶	I ³⁻⁶	V [*]	3/3 ^{*-2}	1			1/2 [*]	II					
<i>Galium uliginosum</i>	IV ^{*-3}	IV ^{*-1}	2/3 ^{*-2}	I ²	IV ^{*-2}							II ²⁻³	II ²⁻³	III [*]	1/3 [*]	+	2/2 [*]	II	2/2 [*]						
<i>Lychnis flos-cuculi</i>	III ^{*-1}	II [*]	2/3 [*]	IV ¹⁻³	II ^{R-1}		2/3	1/3 [*]			I	I ¹⁻²		III [*]	3/3 ^{R++}	R	1/2 [*]	IV ⁰⁻³		II					
<i>Dactylorhiza majalis</i>	II ^{*-2}	III [*]		I ³	II ^{R++}	1/2 [*]	1/3							II [*]	1/3 ^{R++}	+	2/2 [*]			I					
<i>Lysimachia vulgaris</i>	I ¹⁻²		2/3 [*]	II ²⁻³			2/3 [*]					IV ²⁻³	IV ²⁻⁶	II [*]	3/3 ^{*-1}		2/2 ¹	II ⁰⁻⁴	2/2 ^{*-1}						
<i>Sanguisorba officinalis</i>	I ^{*-2}	I [*]	1/3 [*]	I ²	I [*]							I ¹⁻²	I ²	V [*]	1/3 ^R										
<i>Succisa pratensis</i>	II ^{*-2}	III [*]		II ²	III ^{*-2}	2/2 ¹⁻³									1/3 [*]										
<i>Juncus effusus</i>				I ²								I ²⁻⁵	II ³⁻⁶						1/2 [*]						
<i>Juncus conglomeratus</i>	II ^{*-1}	I [*]			I ^{R++}				1/3 [*]																
<i>Ranunculus auricomus</i>	III ^{*-2}	I [*]	3/3 [*]	I ²	II ^{*-1}																				
Indicating species of the ordo <i>Magnocaricetalia</i>																									
<i>Galium palustre</i>	I ^{*-1}	II [*]	2/3 [*]	IV ²⁻³	I ^{*-1}						IV	III ²⁻⁵	I ²	II ^{*-1}			2/2 [*]	III	2/2 [*]	V					
<i>Carex acutiformis</i>				I ²			1/3 ¹				III	III ²⁻⁶	IV ²⁻⁹		3/3 ¹				1/2 ¹	II					
<i>Scutellaria galericulata</i>											II	II ¹⁻³	I ²	IV [*]	1/3 [*]				1/2 [*]	I					

Association		Geo rivali-Caricetum paniculatae										Caricetum paniculatae					Caricetum paradoxae																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Relevé number		30	13	3	6	13	2	3	3	3	3	45	36	13	7	3	3	1	2	15	2	59																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																</

Association	Geo rivali-Caricetum paniculatae										Caricetum paniculatae					Caricetum paradoxae				
	30	13	3	6	13	2	3	3	3	3	45	36	13	7	3	1	2	15	2	59
Relevé number	550	570	700	845	850	400	1240	670	100	200	200	200	200	460	490	670	200	150	200	100
Altitud (m asl.)	from 960	625	718	940	-	480	1530	-	700	-	-	-	-	500	510	-	200	-	700	-
Author	Šk	Rž	Ky	Šu	Šu	Fa	Šm	Šp	Ob	Hr	Ma			Bo2	Škv	Šo	Bo1	Kl	Bo3	Ob
<i>Philonotis fontana</i>				I ²	I ¹		2/3													
<i>Marschandia polymorpha</i>							2/3									2				
<i>Paludella squarrosa</i>							1/3													
<i>Aulacomnium palustre</i>						1/2 ²									2					
<i>Campylopus stellatum</i>		IV ²⁻⁴												I ¹		1/2 ¹				
<i>Calliergon giganteum</i>				F ²	I ¹					I ⁷							IV		1/2 ¹	
<i>Plagiomnium affine</i>										I ³				III ¹		2/2 ²				
<i>Hemitocaulis vernicosus</i>					I ^R												III			
<i>Rhizomnium punctatum</i>	1/3 ¹						1/3													
<i>Thuidium philiberti</i>			1/3		II ¹															
<i>Fissidens adianthoides</i>					I ¹											1/2 ¹				

Species in 1 column only: E₁ *Galium mollugo* (Šk); *Picea abies* (Šk); *Salix purpurea* (Šk); *Trifolium alpestre* (Šk); E0 *Brachythecium mildeanum* (Hr); *B. rivulare* (Hr); *Campylopus stellatum* (Rž – IV2-4); *Drepanocladus aduncus* (Ob); *Helodinium blandowii* (Šo); *Hyphnum pratense* (Le); *Philonotis calcarata* (Le); *Plagiomnium ellipticum* (Šk); *Thuidium recognitum* (Bo2).

Explanation to table 2: Šk – Školek (constancy and abundance transferred from tab. 1); Rž – Ružicková (1986); Ky – Kyselová (1976); * – Háberová; Fajmonová (1995) – 1 zápis; Hrivnák, Cvachová ined – 1 zápis; Ondřejová, Hrivnák (1994) – 1 zápis; Rybníček ined – 1 zápis; Španíková, Zailberová (1982) – 2 zápisy; Šu – Šuchová (1970); Le – Leskovjanská et al. ined; Fa – Fajmonová (1991); Šm – Šmarda (1960); Šp – Španíková (1985); Ob – Oberdorfer (1977); Hr – Hrivnák (in Otašelová, Hrivnák, Valachovič 2002); Ma – Malovcová ined; Bo1 – Bosáčkova (1970); Bo2 – Bosáčkova (1974); Bo3 – Bosáčkova (1975); Škv – Škovirová ined; Šo – Šoltes (2000); Kl – Klika (1958).

(¹) – *Valeriana dioica*.

Tab. 3. The number of the alliance and ordo species (constancy III-V) in the stands of presented in tab. 1.

Alliance, ordo	Indicating species		
	in literature	in our stands	
	total number	number	%
<i>Caricion davallianae</i>	9	4	44
<i>Calthion</i>	16	8	50
<i>Magnocaricion elatae</i>	12	0	0
<i>Caricion rostratae</i>	5	0	0
<i>Caricetalia fuscae</i>	7	1	15
<i>Molinietalia</i>	10	5	50

Tab. 4. Ordination of the stands with *Carex paniculata* and *C. appropinquata* into association based on the number of alliance and ordo indicating species with constancy III-V according the authors from tab. 2.

Author	Geomorphological unit	The number of indicating species - alliance - ordo							Association
		Cd	Cal	Mge	Cr	Cf	Mol	Mgl	
Šk	Liptov basin	4	8	0	1	1	5	0	Gr-Cp
Rž	Liptov basin	4	7	0	1	2	4	0	Gr-Cp
Ky	Čierny Váh river	2	9	1	0	0	6	0	Gr-Cp
Le	Slovenský raj paradise	8	10	1	2	4	2	0	Gr-Cp
Šu	Slovenský raj paradise	5	9	0	1	2	3	0	Gr-Cp
*	Popradská kotlina basin								
	Skorušinské vrchy hills	2	8	2	3	1	4	1	Gr-Cp
	Veporské vrchy hills								
	Západné Tatry Mts.	4	6	0	2	5	4	0	Gr-Cp
	Strážovské vrchy hills	3	5	0	1	1	3	0	Gr-Cp
Šp	Východosl. níž. lowland	0	5	1	1	0	2	0	Gr-Cp

Author	Geomorphological unit	The number of indicating species - alliance - ordo							Association
		Cd	Cal	Mge	Cr	Cf	Mol	Mgl	
Bo1	Borská nížina lowland	5	6	2	1	2	4	1	Gr-Capp
Bo2	Turčianska kotlina basin	3	7	3	3	3	7	1	Gr-Capp
Škv	Turčianska kotlina basin	3	7	1	2	0	7	1	Gr-Capp
Šo	Oravská kotlina basin	1	4	1	1	0	3	0	Gr-Capp
Bo3	Borská nížina lowland	3	4	8	4	4	4	4	Cpar
Kl	Borská nížina lowland	2	3	4	1	1	1	1	Cpar
Hr	more in Slovakia**	0	0	5	1	0	1	3	Cp
Mal	Borská nížina lowland	0	1	4	1	0	1	1	Cp
Ob	Germany	0	1	3	1	0	0	2	Cp
Ob	Germany	0	0	5	4	0	0	2	Cpar

Explanation: ** Borská nížina lowland, Nitrianska pahorkatina hill-country, Žilinská kotlina basin, Turčianska kotlina basin, Horehronské podolie basin, Veporské vrchy hills, Spišská Magura hills.

Abbreviation of the authors see tab. 2.

Cd = alliance *Caricion davallianae*, Cal = all. *Calthion*, Mge = all. *Magnocaricion elatae*, Cr = all. *Caricion rostratae*, Cf = ordo *Caricetalia fuscae*, Mol = or. *Molinietalia*, Mgl = or. *Magnocaricetalia*.

Tab. 5. Review of the stands with *Carex paniculata* (ass. Gr-Cp, as. Cp) a s. C. *appropinquata* (ass. Gr-Capp, ass. Cpar) in Slovakia – authors and geomorphological units.

Number	Author	Geomorphological units	Relevé number
Association Geo <i>rivali</i> - <i>Caricetum paniculatae</i> (Gr-Cp)			
1	Škotek	Liptovská kotlina basin	30
2	Ružičková (1986)	Liptovská kotlina basin	13
3	Ondrejová, Hrivnák (1994)	Liptovská kotlina basin	1
4	Kyselová (1976)	Čierny Váh river	3
5	Spániková, Zaliberová (1982)	Popradská kotlina basin	2
6	Háberová, Fajmonová (1995)	Veľká Fatra Mts.	1
7	Rybniček ined	Skorušinské vrchy hills	1
8	Grebenščikov et al. (1956)	Oravská Magura hills	1
9	Šuchová (1970)	Slovak Paradise	13
10	Leskovjanská et al. ined	Slovak Paradise	2
11	Šmarda (1960)	Západné Tatry Mts.	3
12	Fajmonová (1991)	Strážovské vrchy hills	3
13	Spániková (1985)	Východoslovenská nížina lowland	3
Total relevés			76
Association Geo <i>rivali</i> - <i>Caricetum appropinquatae</i> (Gr-Capp)			
14	Škovirová ined	Turčianska kotlina basin	3
15	Bosáčková (1974)	Turčianska kotlina basin	7
16	Šoltés (2000)	Oravská kotlina basin	1
17	Bosáčková (1970)	Borská nížina lowland	2
Total relevés			13
Total			89

Number	Author	Geomorphological units	Relevé number
Association <i>Caricetum paniculatae</i> (Cp)			
1	Malovcová ined	Borská nížina lowland	13
2	Balátová-Tuláčková (1968)	Borská nížina lowland	1
3	Balátová-Tuláčková (1976)	Borská nížina lowland	8
4	Hrivnák ined	Borská nížina lowland	1
5	Valachovič ined	Borská nížina lowland	1
6	Ripka ined	Nitrianská pahorkatina hill-country	3
7	Urbanová, Zaliberová (1996)	Žilinská kotlina basin	1
8	Škovitrová (1971)	Turčianska kotlina basin	3
9	Háberová ined	Horehronské podolie basin	2
10	Hrivnák, Cvachová ined	Veporské vrchy hills	1
11	Kantorová (1971)	Spišská Magura hills	1
Total relevés			35
Association <i>Caricetum paradoxae</i> (Cpar)			
12	Klika (1958)	Borská nížina basin	15
13	Bosačková (1975)	Borská nížina basin	2
14	Háberová (1978)	Slovak karst	1
Total relevés			18
Total			53
Total in all relevés			142

Tab. 6. Review of the stands with *Carex paniculata* and *C. appropinquata* according to floristical notices in the publications „Mokrade SR“ (M) and „Rašeliniská Slovenska“ (R) published in 2000.

Number	Author	Geomorphological units	Locality	Publication
Possible association <i>Geo rivali-Caricetum paniculatae</i>				
1	Turis	Spišsko-gemerský kras karst	Dolina Trsteník	M
2	Turis	Horehronské podolie basin	Za Havraník	M
3	Chilová	Veľká Fatra Mts.	Biatnická dolina	M
4	Chilová	Turčianska kotlina basin	Rybníky Mošovce	M
5	Chilová	Turčianska kotlina basin	Konské	M
6	Chilová	Turčianska kotlina basin	Hľisná studňa	M
7	Dobošová	Turčianska kotlina basin	Hrabinka	R
8	Dobošová	Turčianska kotlina basin	Kozinská	R
9	Gojdičová	Oravská Magura hills	Salvatorské lúky	M
10	Buraľ	Branisko hills	Hostovické lúky	M
11	Leskovjanská	Laborecká vrchovina hills	Húzovské	R
12	Cvachová	Sloval Paradise	Predajnínska slatina	R
13	Cvachová	Horehronské podolie basin	Polonka	R
14	Cvachová	Horehronské podolie basin	Rohozná	R
15	Cvachová	Veporské vrchy hills	Močiar	R
16	Smatanová	Krupinská vrchovina hills	Vrchteplá	R
17	Smatanová	Strážovské vrchy hills	dolina Štandardová	R
18	Smatanová	Strážovské vrchy hills	Žalobná	R
19	Devánová, Deván	Biele Karpaty hills	U Mitochov, U Čechov	R
20	Devánová, Deván	Biele Karpaty hills	Gruň	R
21	Devánová, Deván	Biele Karpaty hills	Blažejová	R
22	Devánová, Deván	Biele Karpaty hills	Záhradská	R
23	Devánová, Deván	Biele Karpaty hills	Matejov	R

Number	Author	Geomorphological units	Locality	Publication
Possible association <i>Caricetum paniculatae</i>				
1	Staff (CHKO Záhorie)	Borská nížina lowland	Červený rybník	M
2	Staff (CHKO Záhorie)	Borská nížina lowland	Jasenácke	M
3	Stanová	Borská nížina lowland	Zelenka	M
4	Nížňanská, Chromý	Hnilecké vrchy hills	Zadné Hámské lúky	R
5	Nížňanská, Chromý	Hnilecké vrchy hills	Pod Palmovým vrchom	R
6	Stano	Ondavská vrchovina hills	Veľká Domaša	M
Possible association <i>Caricetum paradoxae</i>				
7	Stanová	Borská nížina hills	Alúvium Rudavy	M
8	Vágenknecht	Borská nížina hills	Bezdné	R
9	Vágenknecht	Borská nížina hills	Nové Pole	R
10	Chilová	Turčianska kotlina basin	Kláštorské lúky	M
11	Šoltés	Vysoké Tatry Mts.	Uhlíšatka	R
12	Šoltés	Vysoké Tatry Mts.	Brezina	R

Tab. 7. Synoptic table of the ass. *Geo rivali-Caricetum paniculatae* compared to subass. *Cirsietum rivularis caricetosum paniculatae* (Cir-cp), subass. *C. r. caricetosum davallianae* (Cir-cd), and subass. *Angelico-Cirsietum oleracei caricetosum paniculatae* (AC-cp).

Association		Geo rivali-Caricetum paniculatae							Cir-cp	Cir-cd	AC-cp
Relevé number		30	13	3	6	13	2	3	20	5	7
Altitud (m asl.)	from	550	570	700		845	850	1240	400	380	400
	to	960	625	718	*	940	-	1530	590	590	500
Author		Šk	Rž	Ky		Šu	Le	Šm	HaM	HaP	HaM
Indicating species of the alliance <i>Calthion</i>											
<i>Carex paniculata</i>		V^{3-5}	V^{3-5}	$3/3^4$	V^{2-8}	V^{2-4}	$2/2^{2-3}$	$3/3$	V^{1-5}	IV^{2-2}	V^{1-3}
<i>Geum rivale</i>		V^{2-3}	V^{2-2}	$3/3^+$	III^{1-2}	V^{2-1}	$2/2^+$	$2/3$	V^2	I^2	.
<i>Cirsium rivulare</i>		V^{2-3}	IV^{2-2}	$2/3^{2-1}$	IV^{1-3}	V^{R-1}	$1/2^1$	.	V^{2-4}	V^2	.
<i>Caltha palustris</i>		V^{2-3}	V^{2-3}	$1/3^+$	V^{2-6}	IV^{2-1}	$1/2^+$	$2/3$	IV^{2-3}	IV^{2-2}	III^{2-1}
<i>Lathyrus pratensis</i>		V^{2-3}	V^{2-2}	$2/3^+$	IV^{1-3}	IV^+	$1/2^1$	.	V^{R-2}	II^+	III^{2-1}
<i>Crepis paludosa</i>		IV^{2-2}	IV^{2-2}	$2/3^+$	IV^{2-5}	III^+	$1/2^1$	$1/3$	.	III^{2-2}	I^1
<i>Myosotis scorpioides</i>		IV^{2-3}	II^{2-1}	$1/3^+$	IV^2	III^{R-2}	.	$2/3$	.	.	.
<i>Angelica sylvestris</i>		IV^{2-2}	.	.	I^3	II^{2-1}	.	.	II^{2-2}	.	III^{2-2}
<i>Cardamine pratensis</i>		II^+	II^{2-1}	$1/3^+$	IV^2	IV^{2-1}	$2/2^{R-2}$	.	.	.	.
<i>Cirsium palustre</i>		II^{2-1}	III^+	.	II^{1-3}	I^R	$1/2^+$	.	I^{R-2}	I^+	III^1
<i>Scirpus sylvaticus</i>		II^{R-3}	I^+	$2/3^+$	I^1	I^2	.	.	II^{2-2}	II^+	III^{2-1}
<i>Cirsium oleraceum</i>		I^{2-2}	.	$1/3^+$	I^3	.	.	.	I^{2-2}	II^+	V^{1-3}
<i>Deschampsia cespitosa</i>		I^{2-1}	I^+	$2/3^+$	II^2	I^{R-2}	$1/2^2$	$2/3$	I^{2-3}	II^{2-1}	II^{2-1}
<i>Ranunculus repens</i>		II^{2-2}	.	.	.	II^{R-2}	.	.	III^{2-2}	II^{R-2}	.
<i>Poa trivialis</i>		I^{2-2}	II^{2-1}	$1/3^+$	I^2	.	.	.	V^{2-3}	II^+	V^{2-1}
<i>Trollius altissimus</i>		II^{2-1}	.	$2/3^{2-1}$	.	III^{R-1}	$2/2^+$	.	.	.	.

Association		Geo rivaili-Caricetum paniculatae										Cir-cp		Cir-cd		AC-cp	
Relevé number		30	13	3	6	13	2	3				20	5				
Altitud (m asl.)	from	550	570	700		845	850	1240				400	380			400	
	to	960	625	718		940	-	1530				590	590			500	
Author		Šk	Rž	Ky	*	Šu	Le	Šm				HaM	HaP			HaM	
Indicating species of the alliance <i>Caricion davallianae</i>																	
<i>Valeriana simplicifolia</i> (1)		IV ¹⁻³	V ⁺³	2/3 ⁺	III ²⁻³	IV ⁻²	1/2 ¹	1/3			(III) ^{R-4}	V ²⁻³				(II) ⁺²	
<i>Carex davalliana</i>		III ⁺²	V ⁺³	.	III ³	V ^{R-4}	2/2 ⁺	1/3			.	V ⁺³				.	
<i>Carex panicea</i>		III ⁺¹	IV ⁺²	1/3 ⁺	V ²⁻⁵	IV ⁻²	2/2 ⁺²	1/3			I ⁺¹	V ⁺²				.	
<i>Eriophorum latifolium</i>		III ⁺³	V ⁻²	2/3 ⁺	II ²	IV ^{R-2}	2/2 ⁺²	1/3			.	IV ⁺¹				.	
<i>Carex flava</i>		II ⁺³	II ⁺	.	II ¹⁻³	IV ^{R-2}	1/2 ³	3/3			I ⁺¹	I ⁺				.	
<i>Panassia palustris</i>		I ⁺²	III ⁺²	.	.	I ^{R-2}	2/2 ⁺²	2/3			.	II ⁺				.	
<i>Pinguicula vulgaris</i>		I ⁺²	II ⁺	.	.	II ^{R-3}	1/2 ^R	3/3			.	.				.	
<i>Primula farinosa</i>		I ⁺¹	II ⁺	.	I ²	IV ⁻²	2/2 ¹⁻²	.			.	.				.	
<i>Epipactis palustris</i>		I ^{R-3}	II ⁺²	.	.	.	1/2 ⁺	2/3			.	.				.	
<i>Blysmus compressus</i>		I ⁺	.	.	.	I ⁺	.	.			.	.				.	
Indicating species of the alliance <i>Magnocaricion elatae</i>																	
<i>Carex appropinquata</i>		.	.	.	.	.	.	.			.	.				.	
<i>Carex acutiformis</i>		.	.	.	.	.	.	.			.	I ²				.	
<i>Naumburgia thyrsiflora</i>		.	.	.	.	.	.	.			.	.				.	
<i>Galium palustre</i>		I ⁺¹	II ⁺	2/3 ⁺	V ²⁻³	I ⁺¹	.	1/3			III ⁺²	II ^{R++}				III ⁺	
<i>Scutellaria galericulata</i>		.	.	.	I ¹	.	.	.			I ⁺	.				I ⁺	
<i>Lythrum salicaria</i>		I ⁺	.	.	I ³	.	.	.			.	.				III ⁺¹	
<i>Stellaria palustris</i>		.	.	.	.	.	.	.			.	.				.	
<i>Comarum palustre</i>		.	.	.	.	.	.	.			.	.				.	
<i>Peucedanum palustre</i>		.	.	.	.	.	.	.			.	.				.	

Association		Geo rivali-Caricetum paniculatae										Cir-cp	Cir-cd	AC-cp
Relevé number		30	13	3	6	13	2	3						
Altitud (m asl.)	from	550	570	700	845	850	1240	400	380	400				
	to	960	625	718	940	-	1530	590	590	500				
Author		Šk	Rž	Ky	*	Su	Le	Šm	HaM	HaM				
Indicating species of the ordo <i>Molinietalia</i>														
<i>Carex elata</i>														
<i>Filipendula ulmaria</i>		V ¹⁻⁵	IV ⁺²	2/3 ⁺¹	III ¹⁻³	III ⁺¹							I ⁺	IV ^{R-2}
<i>Equisetum palustre</i>		IV ¹⁻³	V ⁺³	2/3 ⁺¹	V ²⁻⁷	V ⁺³	1/2 ¹	3/3				III ¹⁻³	V ⁺¹	
<i>Galium uliginosum</i>		IV ⁺³	IV ⁺¹	2/3 ⁺²	I ²	IV ⁺²								
<i>Lychnis flos-cuculi</i>		III ⁺¹	II ⁺	2/3 ⁺	IV ¹⁻³	II ^{R-1}		1/3 ⁺				II ⁺¹	IV ⁺	III ^{R+}
<i>Dactylorhiza majalis</i>		II ⁺²	III ⁺		I ³	II ^{R+}	1/2 ⁺	1/3				II ⁺	IV ⁺	
<i>Lysimachia vulgaris</i>		I ⁺²		2/3 ⁺	II ²⁻³							IV ^{R-2}	I ⁺	V ⁺²
<i>Sanguisorba officinalis</i>		I ⁺²	I ⁺	1/3 ⁺	I ²	I ⁺						II ^{R-2}		III ⁺¹
<i>Succisa pratensis</i>		II ⁺²	III ⁺		II ²	III ⁺²	2/2 ¹⁻³							
<i>Juncus effusus</i>					I ²									
<i>Juncus conglomeratus</i>		II ⁺¹	I ⁺			I ^{R+}								I ⁺
<i>Ranunculus auricomus</i>		III ⁺²	I ⁺	3/3 ⁺	I ²	II ⁺¹								
Indicating species of the ordo <i>Magnocaricetalia</i>														
<i>Galium palustre</i>		I ⁺¹	II ⁺	2/3 ⁺	IV ²⁻³	I ⁺¹						III ¹⁻²	II ^{R+}	III ⁺
<i>Carex acutiformis</i>					I ²								I ²	
<i>Scutellaria galericulata</i>														I ⁺
<i>Carex disticha</i>														
Accompanying species														
<i>Ranunculus acris</i>		V ⁺³	V ⁻¹		V ¹⁻³	V ^{R-1}		2/3				V ^{R-2}	IV ⁺²	II ⁺
<i>Potentilla erecta</i>		IV ⁺³	V ⁺²	1/3 ⁺	IV ²	V ⁻¹	2/2 ²	2/3				II ⁺²	IV ⁺²	IV ⁻²

Geo rivali- <i>Caricetum paniculatae</i>									
Association	30	13	3	6	13	2	3	Cir-cp	AC-cp
Relevé number	550	570	700	845	850	1240	380	400	400
Altitud (m asl.)	960	625	718	940	1530	500	590	590	500
Author	Šk	Rž	Ky	*	Šm	Le	HaP	HaM	HaM
<i>Mentha aquatica</i>	I ⁺⁻¹	III ⁺⁻¹	1/3 ⁺	I ²	I ⁺	.	.	IV ⁻²	IV ⁻²
<i>Mentha longifolia</i>	.	.	.	.	.	.	.	I ⁺⁻¹	.
<i>Briza media</i>	I ^{R-1}	III ⁺⁻¹	.	III ¹⁻³	II ^{R++}	2/2 ⁺	1/3	III ⁺⁻⁴	III ⁺
<i>Juncus inflexus</i>	.	.	.	.	.	.	.	II ⁺⁻³	II ¹⁻²
<i>Festuca rubra</i>	I ¹⁻²	II ⁺⁻¹	.	I ²	III ^{R++}	2/2 ⁺⁻¹	.	III ^{R-2}	II ^{R++}
<i>Acetosa pratensis</i>	III ⁺⁻²	II ⁺	1/3 ⁺	.	II ^{R++}	.	.	I ¹⁻³	III ^{R-1}
<i>Carex nigra</i>	.	.	.	.	.	.	.	.	.
<i>Cruciata glabra</i>	III ⁺⁻¹	II ⁺	1/3 ⁺	I ²	II ⁺⁻¹	.	.	.	.
<i>Salix pentandra</i>	II ⁺⁻³	II ⁺	.	I ²	III ^{R++}	.	.	.	.
<i>Vicia cracca</i>	II ⁺⁻¹	.	.	.	II ^{R++}	.	.	II ⁺	III ^{R++}
E ₀									
<i>Calligonella cuspidata</i>	1/3 ¹⁻³	V ⁺⁻³	.	II ¹⁻³	II ⁺⁻³	.	1/3	III ¹⁻³	IV ⁺⁻²
<i>Climacium dendroides</i>	1/3 ³	I ⁺	.	I ¹	II ⁺	1/2 ¹	1/3	I ⁺⁻³	.
<i>Plagiommium elatum</i>	.	IV ⁺⁻⁵	1/3	II ⁵⁻⁶	III ⁺⁻³	2/2 ²	1/3	.	V ¹⁻³
<i>Bryum pseudotriquetrum</i>	1/3 ¹	III ⁺⁻³	.	II ²⁻⁵	.	1/2 ¹	1/3	.	IV ⁺⁻⁴
<i>Drepanocladus revolvens</i>	2/3 ³	IV ¹⁻³	.	I ²	I ⁺	2/2 ²⁻³	.	.	II ⁺
<i>Palustriella commutata</i>	.	.	.	I ³	III ⁺	1/2 ²	2/3	.	.
<i>Tomenthyphnum nitens</i>	2/3 ⁴⁻⁵	.	.	.	III ⁺⁻¹	1/2 ⁴	.	.	.
<i>Bryum scheucheri</i>	.	.	.	.	.	1/2 ¹	2/3	.	.
<i>Philonotis fontana</i>	.	.	.	I ²	I ⁺	.	2/3	.	.
<i>Marschallia polymorpha</i>	.	.	.	.	.	.	2/3	.	.

Association		Geo rivali-Caricetum paniculatae										Cir-cp	Cir-cd	AC-cp
Relevé number		30	13	3	6	13	2	3	20	5	7			
Altitud (m asl.)	from	550	570	700		845	850	1240	400	380	400			
	to	960	625	718	*	940	-	1530	590	590	500			
Author		Šk	Rž	Ky		Šu	Le	Šm	HaM	HaP	HaM			
<i>Paludella squarrosa</i>		.	.	.	.	.	.	1/3	.	.	.			
<i>Aulacomnium palustre</i>		.	.	.	.	.	1/2 ²	.	.	.	.			
<i>Campylopus stellatum</i>		.	IV ²⁻⁴	.	.	.	.	.	.	.	.			
<i>Calliergon giganteum</i>		.	.	.	I ⁶	I ⁺	.	.	.	.	.			III ¹⁻²
<i>Plagiomnium affine</i>		.	.	.	.	.	.	.	.	.	.			
<i>Hemitocaulis vernicosus</i>		.	.	.	.	I ³	.	.	.	.	.			
<i>Rhizomnium punctatum</i>		1/3 ¹	.	.	.	.	.	1/3	.	.	.			
<i>Thuidium philiberti</i>		.	.	1/3	.	II ⁺	.	.	.	I ¹	.			
<i>Fissidens adianthoides</i>		.	.	.	.	I ⁺	.	.	.	.	.			

Explanation to table 7: Šk – Školek (constancy and abundance transferred from tab. 1); Rž – Ružicková (1986); Ky – Kyselová (1976); * – Haberoová; Fajmonová (1995) – 1 zápis; Hrivnák, Cvachová ined – 1 zápis; Ondřejová, Hrivnák (1994) – 1 zápis; Rybníček ined – 1 zápis; Špáníková, Zaliberová (1982) – 2 zápisy; Šu – Suchová (1970); Le – Leskovjanská et al. ined; Šm – Šmarda (1960); HaM – Hájek (1998); HaP – Hájková, Hájek, Smatanová (2001).

(¹) – *Valeriana dioica*.

Appendix 1. List of localities.

The data sequence: number of relevé, land register, name and the topography of the locality; altitude (m asl.), aspect, slope (°), cover (herb, moss); date.

1. Východná-Pálenice; 950, W, 7, 100, 100; July 24, 1996.
 2. Východná-Suchý vrch, lateral stream of the Hybica brook, spring; 870, NW, 4, 100, 50; August 6, 1996.
 3. Jalovec, bottomland of Jalovčianka brook, depression; 675, SE, 0.5, 100, 90; June 10, 1991.
 4. Važec, north-westwards of the settlement; 782, S, 1, 100, 50; May 25, 2000.
 5. Východná, the bank of the Beliansky potok brook; 790, plane, 0, 90, 50; May 25, 2000.
 6. Východná, the bank of the Beliansky potok brook; 795, plane, 0, 100, 50; May 25, 2000.
 7. Važec, westwards of the settlement; 770, plane, 0, 90, 5; June 12, 2000.
 8. Východná-Pálenice; 960, W, 0.5, 100, 5; June 9, 2000.
 9. Východná-Pálenice; 950, plane, 0, 90, 0; June 9, 2000.
 10. Východná, Suchý vrch hill, lateral stream of the Hybica brook, spring; 880, NNW, 5, 100, 50; August 6, 1996.
 11. Hybe, eastwards of the spot height Glian; 795, plane, 0, 100, 10; June 28, 1999.
 12. Východná-Pálenice; 960, W, 0.5, 100, 10; June 9, 2000.
 13. Východná, behind Hrubý Grúň; 910, NW, 1, 100, 10; June 8, 2000.
 14. Východná-Suchý vrch hill, near Hybica river, terrain depression; 850, SSW, 5, 100, 90; August 9, 1996.
 15. Čierny Váh-Niž. Chmelienec, spring area of the feeder of Čierny Váh river; 720, N, 0.5, 100, not reported; June 20, 2000.
 16. Čierny Váh-Niž. Chmelienec, bottomland of Čierny Váh river; 720, plane, 0, 100, 0; June 20, 2000.
 17. Važec, the bank of the Beliansky potok brook; 790, SW, 0.5, 100, 60; June 12, 2000.
 18. Východná-Pálenice; 960, plane, 0, 90, 15; June 9, 2000.
 19. Východná-Vyšná Hybica; 760, W, 1, 90, 50; May 31, 1996.
 20. Východná-Suché, sloping mire, 910, SW, 2, 100, 80; August 6, 1996.
 21. Východná-Nižná Hybica, sloping mire; 785, N, 10, 90, 80; May 31, 1996.
 22. Východná-Pálenice, sloping mire, wetland approximately 1 ha; 910, SSW, 8, 90, 100; August 6, 1996.
 23. Važec-near Čierny potok; 810, plane, 0, 100, 80; June 12, 2000.
 24. Východná-Vyšné Belianske, bottomland of Beliansky potok; 935, SSE, 1, 100, 100; August 6, 1996.
 25. Východná-Pálenice; 950, W, 7, 100, 100; July 24, 1996.
 26. Východná-Biely Váh, bottomland near ponds; 730, plane, 0, 90, 50; June 19, 1997.
 27. Východná-Suchý vrch hill, near Hybica river, terrain depression; 850, W, 0.5, 95, 90; August 9, 1996.
 28. Partizánska Lupča, marshland on the bottomland of Lupčianka brook, northwards of the settlement; 550, plane, 0, 95, 50; September 12, 1998.
 29. Východná-Pálenice, sloping mire, wetland of 1 ha; 910, W, 1, 100, 80; June 13, 1996.
 30. Liptovská Kokava-spring area of the Dovalovec brook; 890, S, 0.5, 100, 100; June 21, 2000.
- TO COMPLETE THE DISTRIBUTION OF THE NEW ASSOCIATION, WE INTRODUCED THE LOCALITIES AS BELOW:
- a) Ružičková (1986):
 - 31) Lisková.
 - 32) Kalameny.
 - 33) Vitališovce.
 - 34) Hybe-bottomland of Hybice.
 - 35) Važec, Beliansky potok brook.
 - 36) Hybe-Gerlachovo.
 - 37) Važec-Za horou.
 - 38) Východná-Hlboký jarok.
 - 39) Východná-Hlboký jarok.
 - 40) Važec-Pastierisko.
 - 41) Východná-Pálenice.
 - 42) Hybe-Gerlachovo.
 - 43) Východná-near the road to railway station (relevés noted down in 1973-1977).

- b) ONDREJOVÁ & HRIVNÁK (1994):
- 44) Liptovská Štiavnica-behind the settlement near gamekeeper's lodge (relevé recorded in 1993).
- c) KYSELOVÁ (1976):
- 45) Svarín.
- 46) Nižný Chmelieneec.
- 47) Vyšný Chmelieneec.