

Systematic and Ecological-Cenotic Analysis of the *Cyperaceae* Family of the Chechen Republic

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Abstract. In this communication, a systematic and ecology-coenotical analysis of representatives of the *Cyperaceae* family of the Chechen Republic is given. A complete list of genera of the studied family of the Chechen Republic is specified. These studies were carried out based on processing herbarium materials and field observations of the authors. Representatives of *Cyperaceae* family of the Chechen Republic for the first time will be well studied.

1 Introduction

The Chechen Republic is located on a territory where six altitudinal zones (from semi-desert to alpine) are successively replaced from north to south; therefore, the composition of plants is peculiar and original and remains deficiency studied.

Plants belonging to the *Cyperaceae* family have been recognized since antiquity, and this suggests that at least some family species have long been considered worthy of human attention. Even though the species of this family are sometimes considered plants of minimal practical importance, especially in comparison with *Poaceae*, a more detailed examination showed that this point of view is erroneous. According to a review by Simpson (2008), there is a wide range of historical or current uses for Sedge by humans. *Cyperus papyrus L.* is a prime example of food for domestic animals and even for humans (for example, the corms of the edible rhizome *Eleocharis dulcis* (Burm. f.).

Some species are interesting for horticulture as ornamental plants, and others are used to compact soils at risk of erosion or landscaping remarkably infertile areas. In addition, several family species (e.g., *Cyperus rotundus L.* or *C. esculentus L.*) are agricultural weeds.

In addition to purely practical aspects, the critical role of sedges in plant communities and entire ecosystems is undeniable. The species of this family inhabit various habitats from the tropics to the arctic regions, especially in wetlands. However, on the other hand, many sedge species are inferior in competitiveness, are limited to vulnerable habitats, and, therefore, are rare, endangered, and essential from a conservation point of view.

2 Material and Methods

These studies are based on the analysis of field studies and observations of the authors. Field research is a qualitative research method. Route-geobotanical, route-floristic methods were used. An integral part of the work is the inventory of the flora and the study of its current state, identifying the taxonomic composition of phytocenoses. Fieldwork was carried out

using the route-floristic method in different growing seasons of 2020-2021. Based on the research results, a list of the studied family was compiled, numbering 70 species. The collected material was processed at the Department of Botany, Zoology, and Bioecology of the Chechen State University, named after A.A. Kadyrov.

3 Results and Discussion

In the course of the study, 70 species of plants belonging to the Sedge family, united in 14 genera, grow in the wild on the territory of the Chechen Republic.

Table 1. Generic composition of the *Cyperaceae* family in the flora of the Chechen Republic

№	Genus name	Number of species	
		quantity	%
	Latin name		
1.	<i>Pycreus</i>	1	1,43
2.	<i>Juncellus</i>	2	2,86
3.	<i>Cladium</i>	1	1,43
4.	<i>Cyperus</i>	4	5,71
5.	<i>Schoenoplectus</i>	1	1,43
6.	<i>Bolboschoenus</i>	2	2,86
7.	<i>Blymus</i>	1	1,43
8.	<i>Eleocharis</i>	5	7,14
9.	<i>Kobresia</i>	3	4,29
10.	<i>Carex</i>	43	61,42
11.	<i>Schoenoplectus</i>	4	5,71
12.	<i>Schoenus</i>	1	1,43
13.	<i>Scirpus</i>	1	1,43
14.	<i>Scirpoides</i>	1	1,43
	Total	70	100

The genus *Carex* (*Cyperaceae*) in the flora of the Chechen Republic is represented by the most significant number of species - 43, which is (61.43%) of the total number of studied species. The genus *Eleocharis* (Bolotnitsa) is represented by five species (7.14%); genus *Cyperus* (Syt), *Schoenoplectus* (Shenoplektus) - four species (5.71%); the genus *Kobresia* (Kobresia) includes three species (4.29%), the genus *Juncellus* (Sitnichek), *Bolboschoenus* (Klubnekamysh) (2.86%) are represented by two species, the genus *Pycreus* (Sitovnik), *Cladium* (Sword-grass), *Isolepis* (Shenoplektus), *Blymus* (Blimus), *Schoenus* (Schinus), *Scirpus* (Reed), *Scirpoides* (Goloshenus), represented by one species (1.43%).

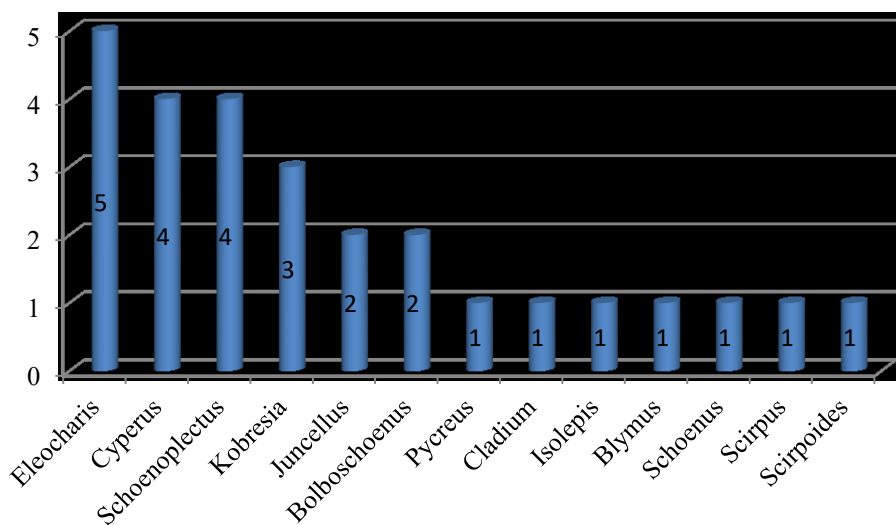


Fig. 1. Generic structure of the *Cyperaceae* family in the flora of the Chechen Republic.

In the ecological- coenotical analysis of the Sedge family, we have identified 105 florocenoelements, the spectrum of which is shown in Table 2. The number of florocenoelements in the flora is always more significant than the number of species. This position is confirmed by many researchers of the flora of the North Caucasus, who analyzed regional flora [1, 4, 5, 6, 7, 8].

Table 2. The phytoene-ecological spectrum of *Cyperaceae* of the Chechen Republic.

FLOROCENO ELEMENT	quantity flora-ceno-elements	% of the total number of species
Forest	8	7,62
Flat	10	9,52
Subalpine	7	6,67
Alpine	16	15,24
Steppe	6	5,71
Calcepetrophilic	7	6,67
Psammophilic	3	2,86
Halophilic	2	1,9
Hygrophilic	33	31,43
Hydrophilic	13	12,38
TOTAL	105	100

There are eight species of forest florocenoelements (7.62%). These are such species as *Carex Transsilvanica* Schur (*C. depressa* Link), *C. Transsilvanica* Schur (*C. depressa* Link), *C. digitata* L., *C. divulsa* Stokes, *C. polyphylla* Kar.et Kir., *C. contigua* Hoppe , *C. remota* L., *C. leporine* L., *Scirpus sylvaticus* L. [10].

There are ten types of flat florocenoelements (9.52%). These are species such as *Carex songorica* Rfr. et Kir., *C. Michelii* Host., *C. Transsilvanica* Schur (*C. depressa* Link), *C. Transsilvanica* Schur (*C. depressa* Link), *C. caryophyllea* Latourr. *C. humilis* Leyss. (*C. Buschiorum* V. Crez.), *C. pallescens* L., *C. tomentosa* L., *C. contigua* Hoppe, *C. leporine* L.

Subalpine florocenoelements, seven species in total (6.67%). This is *Carex songorica* Rfr. et Kir., *C. Michelii* Host., *C. Transsilvanica* Schur(*C. depressa* Link), *C. Transsilvanica*

Schur(*C. depressa* Link), *C. caryophyllea* Latourr. –, *C. humilis* Leyss. (*C. Buschiorum* V. Krecz.), *C. pallescens* L., *C. tomentosa* L., *C. contigua* Hoppe, *C. leporine* L..

Subalpine floracenoelements, seven species in total (6.67%). These are types such as *Carex tristis* Bieb. (*C. meinshauseniana* V.Krecz.), *C. rostrata* Stokes, *C. capillaries* L., *C. canasica* Stev., *C. transcaucasica* Egor., *C. canescens* L., *C. brunnescens* (Pers.) Poir. [6].

There are 16 species of Alpine floracenoelements (15.24%). These are types such as *Blymus compressus* (L.) Panz. ex Link, *Eleocharis quinqueflora* (F.X. Hartm.) O.Schwarz (*E. pauciflora* (Lightf) Link), *Kobresia schoenoides* (C.A. Mey.) Steud., *K. macrolepis* Meinsh. (*K. Capillifolia* (Decne) Clarke), *K. persica* Kuk. et Bornm. (*K. Humilis* (C.A. Mey. ex Trautv.) Serg.), *Carex tristis* Bieb. (*C. meinshauseniana* V.Krecz.), *C. dichroa* Freyn (*C. pamirica* (O.Fedtsch.) O. et B. Fedtsch.), *C. Huetiana* Boiss., *C. capillaries* L., *C. oligantha* Steud., *C. cespitosa* L., *C. cespitosa* L., *C. kotschiana* Boiss. et Hohen. (*C. orbicularis* Boiss. et Hohen.), *C. canescens* L., *C. brunnescens* (Pers.) Poir., *C. heleonastes* Ehrh. [10].

There are six species of steppe florocenososis of elements (5.71%). These are types such as *Carex caryophyllea* Latourr., *C. tomentosa* L., *C. Bordzilowskii* V. Krecz. (*C. Schkuhrii* Willd.; *C. liparocarpos* Gaudiri), *C. supine* Willd. ex Wahlenb., *C. praecox* Schreb., *C. stenophylla* Wahlenb. (*C. uralensis* Clarke; *C. dimorphotheca* Stschegl.; *C. Stenophylloides* (V.Krecz.) Egor.) [10].

Calcepetrophilic floracenoelements there are one species (6.67%) - *Carex alba* Scop. [10].

There are three types of psammophilic elements (2.86%). Of these, only on sands are inhabited by *Carex colchica* J.Gay, *C. colchica* J.Gay, *C. praecox* Schreb. [10].

There are two types of halophilic floracenoelements (1.9%). They are all coenotypically correct. These are species such as *Eleocharis uniglumis* (Link) Schult. (*E. multiseta* Zinserl.), *Carex divisa* Huds. [10].

There are 33 types of hygrophilic floracenoelements (31,43%): *Pycreus flavescens* (L.) Beauv. ex Reichenb., *Juncellus pannonicus* (Jacq.) Clarke (*Acorellus pannonicus* (Jacq.) Palla), *J. serotinus* (Rottb.) Clarke (*Cyperus serotinus* Rottb.), *Cyperus fuscus* L., *C. glaber* L., *C. glomeratus* L., *C. longus* L., *Isolepis setacea* (L.) R.Br. (*Schoenoplectus setaceus* (L.) Palla; (*Scyrpus setaceus* L.), *Bolboschoenus glaucus* (Lam.) S.G.Sm., *B. maritimus* (L.) Palla (*B. compactus* (Hoffm.) Drob.), *B. compressus* (L.) Panz. ex Link, *Eleocharis acicularis* (L.) Roem.et Schult., *E. quinqueflora* (F.X. Hartm.) O.Schwarz (*E. pauciflora* (Lightf) Link), *E. parvula* (Roem. et Schult.) Bluff. Neeset Schauer, *E. palustris* (L.) Roem.et Schult. (*E. eupalustris* Linld.fil., *E. crassa* Fisch. et C.A. Mey. ex Zinserl.; *E. intersita* Zinserl.), *E. uniglumis* (Link) Schult. (*E. multiseta* Zinserl.), *Carex hirta* L., *C. rostrata* Stokes –, *C. dichroa* Freyn (*C. pamirica* (O.Fedtsch.) O. et B. Fedtsch.), *C. melanostachya* Bieb. ex Willd., *C. songorica* Rfr. et Kir., *C. omskiana* Meinsh. (*C. Elata* All.), *C. cespitosa* L., *C. cespitosa* L., *C. remota* L., *C. leporine* L., *C. canescens* L., *C. heleonastes* Ehrh., *Schoenoplectus litoralis* (Schrad.) Palla (*S. litoralis* Schrad.), *Sch.s triquetet* (L.) Palla (*S. triquetet* L.), *Schoenus nigricans* L., *Scirpus sylvaticus* L., *Scirpoides holoschoenus* (L.) Sojak (*Holoschoenus vulgaris* Link incl. *H. romanus* (L.) Fritsch) [10].

There are 13 species of hydrophilic floracenoelements (12.38%). These are types such as *Cladium mariscus* (L.) Pohl, *Bolboschoenus maritimus* (L.) Palla (*B. compactus* (Hoffm.) Drob.), *Eleocharis acicularis* (L.) Roem.et Schult., *E. palustris* (L.) Roem.et Schult. (*E. eupalustris* Linld.fil., *E. crassa* Fisch. et C.A. Mey. ex Zinserl.; *E. intersita* Zinserl.), *Carex vesicaria* L. (*C. inflata* Huds.), *C. acutiformis* Ehrh., *C. riparia* Curt., *C. pseudocyperus* L., *C. hordeistichos* Vill., *C. diluta* Bieb., *C. Otrubae* Podp., *Schoenoplectus lacustris* (L.) Palla

(*Scyrcus lacustris* L.), *Sch. tabernemontanii* (C.C. Gmel.) Palla (*S. tabernemontanii* C.C.Gmel.) [10].

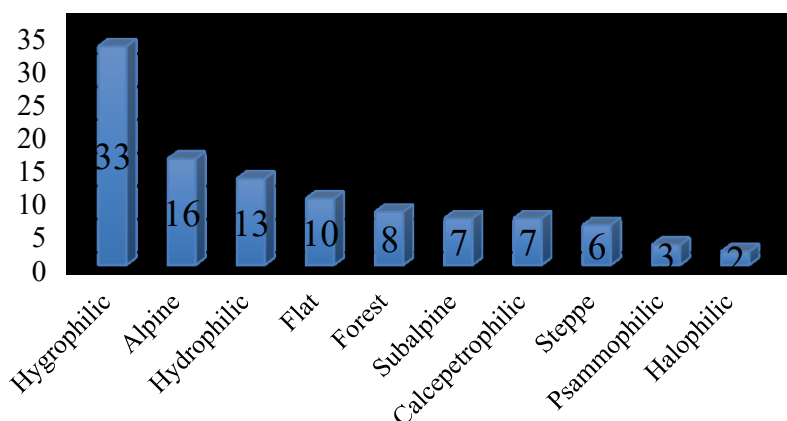


Fig. 2. Spectrum of floracenoelements of the *Cyperaceae* family of the Chechen Republic.

The spectrum of floracenoelements of the Sedge family of the Chechen Republic is shown in Table 3. Hygrophilic floracenoelements occupy first place, and the Alpine floracenoelements take second place. Lowland floracenoelements occupy third place. The smallest is the halophilic floracenoelement.

Occurrence of species of the family *Cyperaceae*.

A cosmopolitan family with a wide variety of habitats, with a preference for open countryside and wetlands. The third most prominent family of monocots and the seventh-largest among the angiosperms.

Usually (26 species) there are representatives of the family such as *Bolboschoenus maritimus* (L.) Palla (*B. compactus* (Hoffm.) Drob.), *Blymus compressus* (L.) Panz. ex Link, *Kobresia schoenoides* (C.A. Mey.) Steud., *K. macrolepis* Meinsh. (*K. Capillifolia* (Decne) Clarke), *Carex tristis* Bieb. (*C. meinshauseniana* V.Krecz.), *C. rostrata* Stokes, *C.acutiformis* Ehrh., *C.riparia* Curt., *C. melanostachya* Bieb. ex Willd., *C. Michelii* Host., *C. Huetiana* Boiss., *C. caryophyllea* Latourr., *C. diluta* Bieb., *C. digitata* L., *C. pallescens* L., *C. tomentosa* L., *C. alba* Scop., *C. caucasica* Stev., *C. oligantha* Steud., *C. omskiana* Meinsh. (*C. Elata* All.), *C. Otrubae* Podp., *C. praecox* Schreb., *C.leporine* L., *C.canescens* L., *C.brunnescens* (Pers.) Poir., *Schoenoplectus lacustris* (L.) Palla (*Scyrcus lacustris* L.).

There are 24 scattered species: *Pycrus flavescens* (L.) Beauv. ex Reichenb., *Juncellus serotinus* (Rottb.) Clarke (*Cyperus serotinus* Rottb.), *Cyperus fuscus* L., *Isolepis setacea* (L.) R.Br. (*Schoenoplectus setaceus* (L.) Palla; *Scyrcus setaceus* L.), *Bolboschoenus glaucus* (Lam.) S.G.Sm. -, *Eleocharis acicularis* (L.) Roem.et Schult., *E. palustris* (L.) Roem.et Schult. (*E. eupalustris* Lind.fil., *E. crassa* Fisch. et C.A. Mey. ex Zinserl.; *E. intersita* Zinserl.), *Kobresia persica* Kuk. et Bornm. (*K. Humilis* (C.A. Mey. ex Trautv.) Serg.), *Carex hirta* L. – Осока волосистая, *C. vesicaria* L. (*C. inflata* Huds.), *C. hordeistichos* Vill., *C.humilis* Leyss. (*C. Buschiorum* V. Krecz.), *C. Bordzilowskii* V. Krecz. (*C. Schkuhrii* Willd; *C. liparocarpos* Gaudiri), *C. supine* Willd. ex Wahlenb., *C. capillaries* L., *C. divulsa* Stokes, *C. polyphylla* Kar.et Kir., *C.contigua* Hoppe, *C. colchica* J.Gay, *C. divisa* Huds., *C. remota* L., *Schoenoplectus tabernemontanii* (C.C. Gmel.) Palla (*S. tabernemontanii* C.C.Gmel.), *Sch. triqueter* (L.) Palla (*S. triqueter* L.), *Scirpus sylvaticus* L., *Scirpoides holoschoenus* (L.) Sojak (*Holoschoenus vulgaris* Link incl. *H. romanus* (L.) Fritsch).

17 species are rare: *Juncellus pannonicus* (Jacq.) Clarke (*Acorellus pannonicus* (Jacq.) Palla), *Cyperus glaber* L., *C.Glomeratus* L., *C. Longus* L., *Eleocharis quinqueflora* (F.X.

Hartm.) O.Schwarz (*E. pauciflora* (Lightf) Link), *E.s parvula* (Roem. et Schult.) Bluff. Neeset Schauer, *E. uniglumis* (Link) Schult. (*E. multiseta* Zinserl.), *Carex dichroa* Freyn (*C. pamirica* (O.Fedtsch.) O. et B. Fedtsch.), *C. songorica* Rfr. et Kir., *C. pseudocyperus* L., *C. Transsilvanica* Schur(*C. depressa* Link), *C. transcaucasica* Egor., *C.kotschiana* Boiss. et Hohen. (*C. orbicularis* Boiss. et Hohen.), *C. stenophylla* Wahlenb. (*C. uralensis* Clarke; *C. dimorphotheca* Stschegl.; *C. Stenophylloides* (V.Crecz.) Egor.), *C.heleonastes* Ehrh., *Schoenoplectus litoralis* (Schrad.) Palla (*S. litoralis* Schrad.), *Schoenus nigricans* L..

Very rare 1 species – *Cladium mariscus* (L.) Pohl.

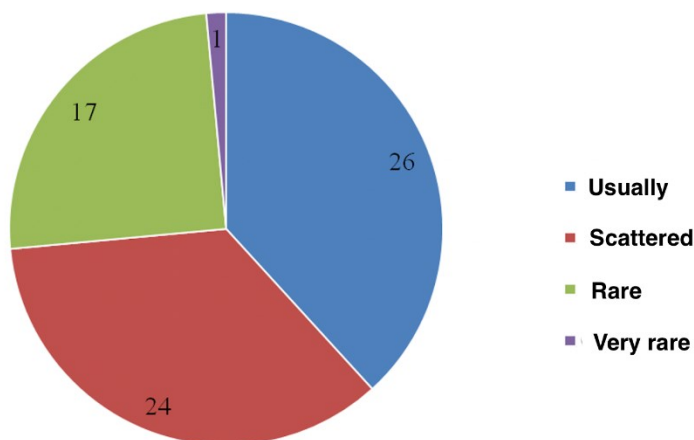


Fig. 3. Frequency of occurrence of species of the family *Cyperaceae* in the Chechen Republic.

4 Conclusions

The Sedge family in the flora of the Chechen Republic has 70 species belonging to 14 genera. The genus *Carex* (sedge) has the most significant number of species - 43; in second place in the genus *Eleocharis* (Bolotnitsa), which is represented by five species (7.14%); the genus *Cyperus* (Syt) *Cyperaceae* in the third place in terms of the number of species; one species (1.43%) includes the genus *Pycreus* (Sitovnik), *Cladium* (Sword-grass), *Isolepis* (Shenoplektus), *Blymus* (Blimus), *Schoenus* (Schenus), *Scirpus* (Reed), and *Scirpoides* (Goloshenus).

When carrying out the ecology-coenotical, it was revealed that the most significant number of species is confined to hygrophilic, alpine, hydrophilic floracenoelements. The smallest are halophilic floracenoelements [10]. In terms of prevalence, 26 species are common, 24 are scattered, 17 are rare, and one is very rare.

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