SYNTAXONOMY OF STEPPE SEMI-SAVANOID WITH *Chrysopogon gryllus* (L.) Trin. AND *Bothriochloa ischaemum* (L.) Keng. From The Eurasian Area

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Abstract

Eurasian steppe semi-savanoid with species - golden beard grass Chrysopogon gryllus (L.) Trin.) *and bartgrass* (*Bothriochloa ischaemum* (L.) Keng.) *are well investigated floristically and phytocenotically in Europe, but less so in Asia. The analysis of the synthetic lists with these dominants showed that their communities are in mesoxerophyte stations within the isotherm of t: 5,1-10,5ºC and form stable communities with plant species that do not fully fit into the xeric meadows of Festuco-Brometea Br.-Bl., 1941 class. These steppe semi-savanoid can form separate communities of grasses from Chrysopogono-Bothriochloetea n. n. class, which may include the vast Eurasian area with cenoses from Chrysopogonetalia n. n. order, and to the north - to the xeric meadows of Festuco-Brometea class, Bothriochloetalia n. n. order. This may be more convincing as a result of more in-depth floristic and phytocenotic investigations on the entire area of semi-savanoid grasses and in Africa, Asia, Australia, Oceania.*

Keywords: *Chrysopogono-Bothriochloetea* n. n. class, *Bothriochloetalia* n. n. order,. *Chrysopogonetalia* n. n. order.

INTRODUCTION

The current meadows in the Republic of Moldova are heavily anthropized and distorted, so that it is difficult to identify the floristic composition appropriate to the pedoclimateric conditions of the stations. Based on the abundance of plant species present in the meadows, phytocenotic relationships have been established, which would correspond to the stations and those that have appeared over time.

Braun-Blanquet J. (1964) through phytosociological studies of plant communities identified the character of stable relationships in phytocenoses (with the nomination of dominant species, codominant, differential, occasional, etc.) and enumeration of common species to elucidate the degree of organization, stability, distribution and formation of authentic communities in the area within the limits of the soil and climatic conditions of the habitat.

It is obvious that the cenoses with the dominant *Bothriochloa ischaemum* and *Chrysopogon gryllus* in the current xerophytic meadows are outside the climatic preferences, but their area includes terrestrial stations within the

isotherm limit of (t: 5,1-10,5ºC) (Sburlino G. et al., 2013) and requires a thorough phytocenotic study. These are stations conditions, which keep the dominant communities in competition for light, water, nutrients and maintain tense vital relationships, in competition for living space, and they survive and are maintained due to priorities (stem height up to 2 m, the formation of bushes on large, compact areas), which ensures the species from the continental biogeographical regions, Pannonian steppes, Black Sea, Anatolian and Mediterranean to form stable meadows with the domination of *Bothriochloa ischaemum* or *Chrysopogon gryllus*, which occupy separate terrestrial haitats, but form also mixed communities, especially in their contact area.

Having a wide distribution area, we decided to analyze the floristic and phytocenotic composition of the steppe semi-savanoid with natural distribution. From west to east we notice that the altitude of the spread of these species increases from 80-100 m in the west to 2000-3000 m in the east (Himalayan mountains in western India). In the Mediterranean area (North Africa, Balkan Mountains, Eastern Alps, Apennines), there are species with a compact area, forming productive meadows, used as pastures, often to anthropization (Figure 1).

MATERIAL AND METHOD

Based on the bibliographic consultation of the synthetic lists from various biogeographical regions of Europe (with the most recent publications), separate communities of *Bothriochloa ischaemum* and *Chrysopogon gryllus* with accompanying species and with a high degree of fidelity were highlighted. These stations comprise fairly large areas south of the current xeric meadows of cl. *Festuco-Brometea* (Figure 1).

The chorological study of the communities of *Bothriochloa ischaemum* (Lazu Șt. et al., 2018) and *Chrysopogon gryllus* (Lazu Șt. et al., 2019) was performed with the demonstration of the diversified associative character and which depends a lot on the stations and the biogeographical region, where they are present a wide diversity of species of hemicryptophyte, therophyte, chamephite or phanerophyte plants. But the most eloquent index of the resort conditions is the presence of the dominant species (poaceae) and codominant (fabaceae), which are identified by analyzing the floristic composition of several surveys. This floristic analysis contributes to the identification of the own stations conditions, the dominant *Bothriochloa ischaemum* or *Chrysopogon gryllus*. That is why it is necessary to find the species, which is the most suitable for the stations conditions, in order to highlight the habitat where it has disappeared by anthropization.

The current phytocenotic studies of meadows with golden beard grass and bearded dominance in the Republic of Moldova are insufficient. We distinguished the phytocenotic position of this species by analyzing the synthetic tables on the vast natural area presented by numerous authors, who made phytosociological estimates in various biogeographic regions. Looking at the synthetic lists of *Chrysopogon gryllus* to which we had access, it was necessary to know more about the chorology and availability of coexistence and socialization of the dominant species with the local representative - exponent of the habitat with the faithful plant species (according to the concept Braun-Blanquet J., 1964).

Preliminary data in the study of the chorology of steppe semi-savanoid (*Bothriochloa ischaemum* and *Chrysopogon gryllus*) served both the own investigations on these communities (Lazu Șt. et al., 2016; 2017; 2018; 2019), as well as the bibliographic ones (Шабанова Г.А., 2012; 2014), which testify about the current xeric vegetation in great decline not only ecologically (global warming), but also by the great anthropogenic disturbances (grazing, trawling, mowing, etc.).

For starters I used the map of the biogeographical regions of Europe version of the year 2016, in shape file format, which I downloaded from the official website (w.w.w.eea.europa.eu). With the help of ArcGis software we were able to process the downloaded map in shape file format and GPS points taken from all authors cited in the reference or by the area specified by each author in the respective works where the species of Bothriochloa ischaemum and Chrysopogon gryllus were mentioned. On this thematic map of the biogeographical regions of Europe in the ArcGis program we indicated according to the GPS points established by the authors the numbered positions with numbers in green square species Bothriochloa ischaemum from 1 to 26 points and respectively in green circle species Chrysopogon gryllus, from 27 to 67 points.

The herbaceous plant species *Bothriochloa ischaemum* and *Chrysopogon gryllus* are widespread in various biogeographical regions. The analysis of the phytosociological literature regarding these plant species has demonstrated a wide diversity, including numerous habitats of biogeographic regions: Steppic, Continental, Mediterranean, Anatolian, Pannonian, Black Sea. They prefer climatic zones with sufficient heat and humidity, which meet it in the thermal limit of 7.4ºC and precipitation - 500 mm.

RESULTS AND DISCUSSION

The meadows dominated by *Bothriochloa ischaemum* and *Chrysopogon gryllus* have a compact spread in Eurasia, but separated from the xeric ones in Cl. *Festuco-Brometea*.

Лавренко Е. М., Рубцов Н. И. (1936) mentioned the spread of subtropical steppes with *Andropogon ischaemum* (*Bothriochloa ischaemum*) and *Chrysopogon gryllus* in the Caucasus, Central Asia, Crimea, Central Asian countries, southern areas - Anatolia and sub-Mediterranean (Afghanistan, Iran). In Figs. 4 and 6 demonstrate the presence of communities with these species worldwide. On the American continents they appear as plants applied in forage crops. In the Caucasus and Middle Asian steppes, the bearded cenoses are found both at low altitudes and in mountainous areas with altitudes between 500-800 m. calcareous rocks from pre-mountain and mountainous areas below.

In the Caucasus the bearded forms constant communities with *Festuca sulcata*, *Stipa capillata*, *S. lessingiana*, *S. szowitsiana*, *Kochia prostrata*. In Central Asia, the local ones are added to these species - *Inula grandis*, *Psoralea drupacea*, *Parovskia scrophulariifolia*, etc. In the Caucasus, the authors mention that on a not too large sector (in the area of bearded steppes) there is a cenosis dominated by *Chrysopogon gryllus*, but the other components are common with those of the phytocenoses with *Bothriochloa ischaemum*.

According to European biodiversity - Biogeographical regions and seas - 2002 (hereinafter EB-BR-2002) grass vegetation constitutes 14%, with decreasing tendencies, placed on hilly relief, plateaus with different altitudes (100-500 m), chernozem type soil on clays and loess; they occupy more of the central part of Europe.

By analyzing the lists of plants published by T. Săvulescu (1927), Гейдеман Т. С. (1959), Postcard G. Г., Истратий А. И., 1991, 1992, Шабанова Г. Г., 2012, 2014, as well as relatively recent lists (Lazu et al. 2015, Lazu et al. 2016), we can mention that the steppes in the Plain of Northern Moldova (Balti) with the dominance of *Bothriochloa ischaemum* include species that are not found in the Bugeac steppe, or they meet with a lower abundance-dominance. These are: *Achillea millefolium, Artemisia austriaca, Berteroa incana, Caragana mollis, Carduus thoermeri, Centauea diffusa, Eryngium campestre, Galium verum, Inula britanica, Iris halophila, Potentilla impolita, Salvia austriaca, Salvia nemorosa, Phleum tuberosus, Nepeta parviflora, Plantago lanceolata, Verbascum phoeniceum, Bromopsis inermis, Campanula sibirica, Elytrigia intermedia, Hypericum perforatum, Jurinea calcarea, Medicago romanica, Melilotus officinalis, Potentilla argentea, Potentilla recta, Salvia verticilata, Thymus marschalianus, Trifolium medium*.

The meadows with *Bothriochloa ischaemum* from the Bălţului Plain (Figure 1, N 1) (Lazu et al., 2016) and the "Iagorlâc" Nature Reserve (Figure 1, N 16 (Рущчук А. О. et al., 2006) have many floristic similarities with those

of the continental biogeographical region.

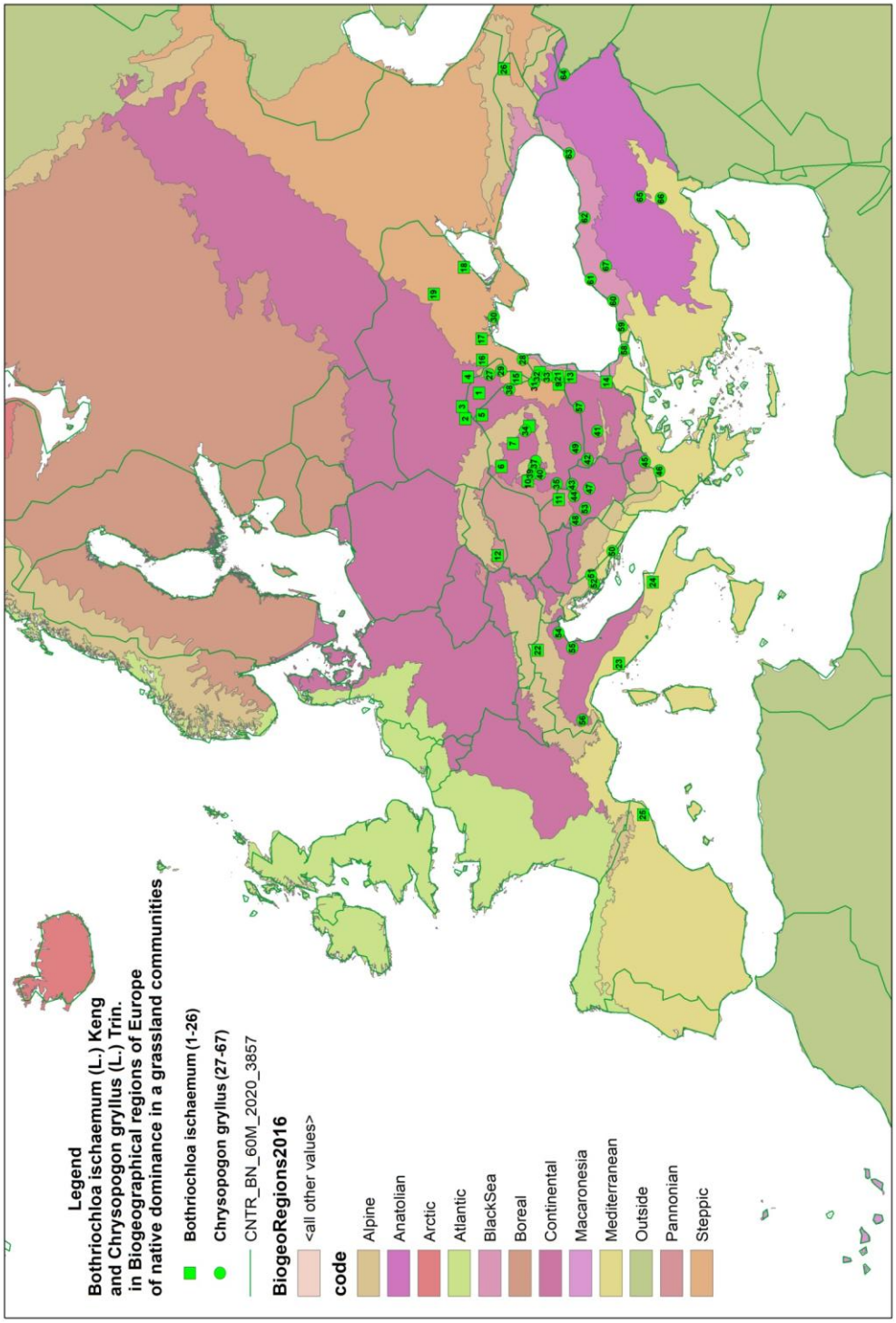


Figure 1. Distribution of xeric meadows with *Bothriochloa ischaemum* (L.) Keng. and *Chrysopogon gryllus* (L.) Trin. in the biogeographical regions of Europe (w.w.w.eea.europa.eu)

The characteristic and faithful species associated with *Bothriochloa ischaemum* (V), - *Asperula cynanchica* (IV), and ass *Asperulo* (*cynanchica*) - *Bothriochloetum ischaemii* n.n. (Figure 2) were highlighted.

Figure 2. Bothriochloa ischaemum (Vrănești village, district Sângerei), continental biogeographical region.

Săvulescu T. (1927), in the study of the steppes in Basarabia,

distinguishes the northern meadows with *Bothriochloa ischaemum* from the southern ones, by the presence in Hotin and Bălți of the faithful species *Asperula cynanchica* L., and of those from Bugiac - *Euphorbia seguieriana* Neck. In this context, Lazu et al. (2018) in the area of the continental biogeographical region of the Republic of Moldova (Bălți plain), bearded meadows form communities of ass. *Asperulo* (*cynanchica*) - *Bothriolchloetum ischaemum* n.n., and in the area the biogeographical region of the steppe (Bugiac plain) ass. *Euphorbio seguieriana* - *Bothriochloetum ischaemii* n.n. If we analyze the synthetic lists of other authors, we highlight the presence of the faithful species - *Asperula cinanchica* in the natural reservation "Iagorlâc" (Рущчук А.Д. et al., 2006); Bălțului plain (Lazu Șt. et al., 2016), Banat and Brașov (Romania) - (Cristea et al., 1979; Oroian S. et al., 2007); Dobrogea (Romania) - (Doina Ivan et al., 1993); Carpathians (Romania) - (Chifu T., 2014); SE and NE Balkans (Bulgaria) - Apostolova et al., 2006; Sopotleva D. et al., 2014 (Figure 1, N 2-5, 7, 13, 14).

In the study of the meadows with *Bothriochloa ischaemum* from the Republic of Moldova were used the surveys (26), which fixed the period 1989-2002 from the Bugeac Plain and the Bălţului Plain, as well as the data from the specialized literature (T. Săvulescu 1927, Гейдеман Т. С. 1959, Постолаке Г.Г., Истратий А.И., 1991, 1992, Рущук А.Д., 2008, Шабанова Г.А., 2012, 2014, Lazu Şt., 2014-2016) (Figure 1 , N2), as well as synthetic lists with dominance of *Bothriochloa ischaemum* from **România** (Puşcaru-Soroceanu Evd. et col., 1963; Dihoru Gh., Doniţă N., 1970 Cristea V., Csűrös Şt., 1979; Ivan D., Doniţă N. et col., 1963, Chifu T., 2014; Oroianu S., Hiriţiu M., Curticăpian M., 2007); **Bulgaria** (Apostolova I. Meshinev T., 2006; Sopotleva D., Apostolova I., 2014); **Ucraina** (Solomakha V.A. 1996; Коротченко И.А., Мала Ю.И., Фицайло Т.В., 2009); **Georgia** (Nackhutsrishvili I., 2013); **Tadjikistan** (Сафаров Н.М. (2015); **Spania** (Miquel de Caceres Ainsa, 1991-2001); **Italia** (Florineth Florin, 1974; Taffetani F., Zitti S., Giannangeli A., 2004; Faggi B., Lastrucci L., Gennai M., Viciani D., 2014); **Slovacia** (Dubravkova D., Hegedusoava Janisova M., Skodova I., 2010); **Serbia** (Mirjana Kristivojevic Cuk et col. 2015). Thus we have phytocenoses with *Bothriochloa ischaemum* from 5 biogeographical regions: Mediterranean, Black Sea, Pannonian, Continental and Steppic (Figure 1 N 5-26).

The phytocenotic assessment of *Bothriochloa ischaemum* meadows in the Eurasian area is not homogeneous. In the European area, the phytocenotic classification is made according to the principles of the Braun-Blanquet J. floristic school, the fidelity of the species are applied for definition in the phytocenotic nomenclature.

Currently, communities with *Bothriochloa ischaemum* according to the phytosociological

classification of xeric grasslands (Braun-Blanquet J., 1964) are part of the ass. *Bothiochloetum ischaemi* (Kristiansen 1937) I. Pop 1977, al. *Festucion valesiacae* Klika 1931; ord. *Festucetalia valesiacae* Br.-Bl. et. R.Tx. 1943 and cl. *Festuco-Brometea* Br.-Bl. et. R. Tx. 1943, and the faithful species are represented by the characteristic species of the association (Figure 3).

In the continental biogeographic area of Ukraine, Solomaha V.A. (1996) in Podolia, Абдулаева Я.П., Дідух Я.П. (1999) presents the meadows dominated by *Bothriochloa ischaemum* and *Chrysopogon gryllus* in the National Park «Подольский товтру», Дідух Я. П., Коротченко И. А. (2000) - in Pocutia (Figure 1 N 2-4).

Figure 3. Grassland with *Bothriochloa ischaemum* (L.) Keng. in Bugeac (Lărguța village, district Cantemir). The steppe biogeographical region.

Абдулаева Я.П., Дідух Я.П. (1999) in the national park "Podoliskii tovtru" in the Transnistrian Podolia area (Ukraine) at an altitude of 180-230 m on the Pliocene terraces of the Dniester River, slope 10-50º, chernozem soils formed on limestones, rainfall 480-550 mm, moon temperature July - 22ºC, grass cover - 40-85%, is present ass. *Bothriochloetum ischaemum*. In the synthetic list (14

surveys) the meadow is abundantly dominated by bearded, and *Festuca valesiaca* is registered only in 4 surveys with a reduced abundance. In the synthetic list presented by the author *Asperula cynanchica* is mentioned in all surveys, so it would correspond to ass. *Asperulo* (*cynanchica*) - *Bothriochloetum ischaemii* n.n. (Lazu et al., 2018) (Figure 1 N 3). Дідух Я.П., Коротченко И.А. (2000) in the phytocenoses of the meadows of Pocutia (Ukraine, Jabocruchi village, Tlumaţc district, Ivano-Francovsc region) the communities of dry meadows with the presence of *Bothriochloa ischaemum* is mentioned in ass. *Teucrio* (*pannonici*) - *stipetum cappilatae* var. *Bothriochloa ischaemum* in 5 surveys.

Such phytocenoses are found in the lower and middle part of the southern and southwestern slopes of fl. Dniester with a slope of 20-40º, chernozem soils rich in humus (Figure 1 N 2).

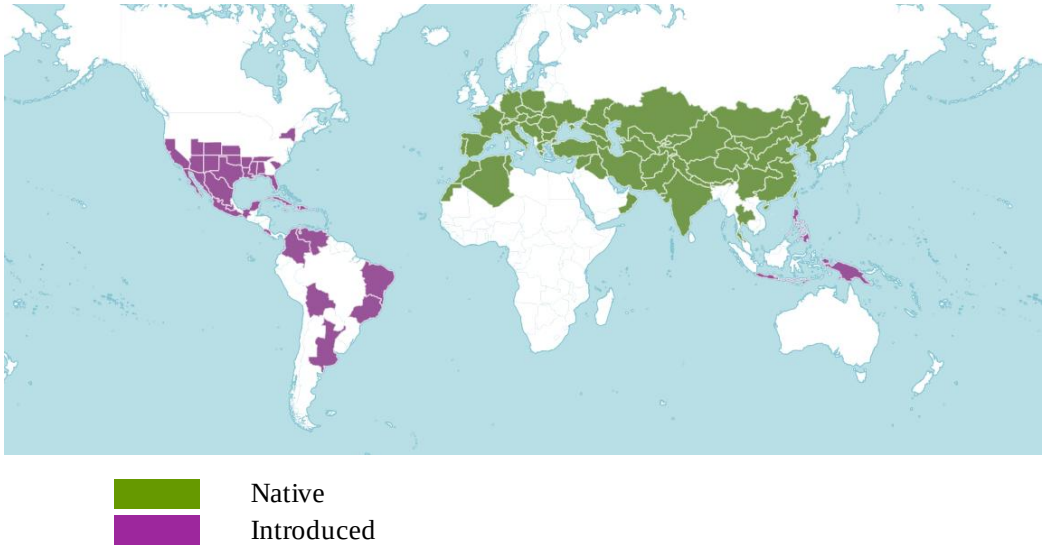
Syntaxonomy of sectors with ass. *Bothriochloa ischaemum* in various biogeographical regions is diverse.

In the continental biogeographical region the phytocenoses with *Bothriochloa ischaemum* include slopes, inclines and plateaus with an altitude of 100-600 m, and the characteristic and faithful species of these communities is *Asperula cynanchica* L. with various abundances, but with a stable frequency in all communities. The hydrotechnical coefficient is 0.8-1.0 (Figure 4).

In the steppe biogeographic region (Puşcaru-Soroceanu E. et al., 1963; Dihoru G. et al., 1970; Mirjana Kristivoj Cuk et al., 2015; Lazu Şt et al., 2016), and in the east, in Ukraine Мала Ю. І. (2016), Винокуров Д. С. (2014), Конайкова В. О. (2019), Kolomiychiuk V., Vinokurov D. (2016) in more arid climatic conditions the local exponent of these communities is *Euphorbia seguieriana* Neck., Which includes strongly arid resorts with altitudes between 100-250 m and the hydrotechnical coefficient of 0.7-0.8 (Figure 1 N 16-19).

Мала Ю. І. (2016) presents ass. *Bothriochloetum ischaemii* from the space attesting a transition from the natural forest-steppe area to the steppe itself (Ukraine). *Ajuga chia* (I) and *Pilosella officinalis* (II) are brought as characteristic species, where their frequency oscillates, including *Bothriochloa ischaemum* (8). The characteristic species of the communities with *Bothriochloa ischaemum* in the biogeographical region - steppe - *Euphorbia seguieriana* Neck.– 16 out of 20 surveys (Fig 1 N 19).

Винокуров Д. С. (2014) presents the syntax of the xerothermic vegetation from the Ingul river valley (Ukraine) (*Festuco-Brometea* class).



Native to: Afghanistan, Algeria, Austria, Bulgaria, China North-Central, China South-Central, China Southeast, Corse, Czechoslovakia, East Himalaya, France, Germany, Greece, Hainan, Hungary, India, Inner Mongolia, Iran, Iraq, Italy, Kazakhstan, Kirgizstan, Korea, Krym, Lebanon-Syria, Manchuria, Mongolia, Morocco, Nepal, North Caucasus, Oman, Pakistan, Poland, Portugal, Qinghai, Romania, South China Sea, South European Russi, Spain, Switzerland, Tadzhikistan, Taiwan, Thailand, Tibet, Transcaucasus, Tunisia, Turkey, Turkey-in-Europe, Turkmenistan, Ukraine, Uzbekistan, West Himalaya, Western Sahara, Xinjiang, Yugoslavia

Introduced into: Alabama, Argentina Northeast, Arizona, Arkansas, Aruba, Bolivia, Brazil Northeast, Brazil Southeast, California, Canary Is., Colombia, Colorado, Costa Rica, Cuba, Dominican Republic, Easter Is., Florida, Haiti, Jamaica, Jawa, Kansas, Leeward Is., Lesser Sunda Is., Louisiana, Mexico Central, Mexico Northeast, Mexico Northwest, Mexico Southeast, Mexico Southwest, Mississippi, Netherlands Antilles, Netherlands Antilles, New Guinea, New Mexico, New York, Ogasawara-shoto, Ogasawara-shoto, Oklahoma, Philippines, Puerto Rico, South Carolina, Tennessee, Texas, Utah, Venezuela

Figure 4. Distribution of *Bothriochloa ischaemum* (L.) Keng. in the native space and applied of the world (www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:1191417-2)

In the central area of the Ingul river valley, grass communities with *Bothriochloa ischaemum* are found on eroded soils, covering 70-90%, moss and lichens - 10%. Ass. *Artemisio marchaliana - Bothriochloetum ischaemii*. The author presents the synthetic table with 30 surveys. Diagnostic species - *Bothriochloa ischaemum* and *Cleistogenes bulgarica*. Diagnostic species of the habitat of communities in the biogeographic region - steppes - *Euphorbia seguieriana* Neck. in 22 surveys out of 30 (Figure 1 N 16).

Конайкова В.О. (2019) in the phytocenotic groups of the class *Festuco-Brometea* from the nature reserve "Еланецький степ", which is located in the steppe vegetation area, located in the Dniester-Dnieper interfluve. 6 associations were relaxed, where *Bothriochloa*

ischaemum is presented as a diagnostic species along with *Euphorbia seguieriana* Neck., and the dominants of these steppes would be *Festuca valesiaca*, *Stipa capillata*, *S. lessingiana*. *S. pulcherima*, *S. ucrainica* (Figure 1 N 17).

Kolomiychuk V., Vinokurov D. (2016) mentions the syntaxonomy of *Festuco-Brometea* class dry meadows on the coastal area of the Azov Sea (Ukraine). The authors note the discreet presence of *Bothriochloa ischaemum* in the cl. *Festuco-Brometea*, with a representation of 3-16% in three associations: C_2 - *Ephedro distachyo - Stipetum capillatae*; C_1 - *Stipa branneri - Bromopsidetum cappadopsidociae* n.n.; A_1 - *Goniolimon tauricum - Poetum angustifoliae*. The authors mention the presence of steppes with *Festuco-Brometea* and in the east of the Kherson region, everywhere is the presence of *Euphorbia seguieriana* Neck. (Fig 1 N 18).

In the study of meadows with *Chrysopon gryllus* and *Bothriochloa ischaemum* from the Republic of Moldova were used both the results of floristic collections from different periods of the century 20th (Săvulescu Tr., 1927; Zahariadi C., (1932–1934) - the steppe hills of the Southern Moldavian Plain; Николаева Л. П. (1950-1955) - steppe meadows from the forests with pubescent oak; (1980-1981) reservation of medicinal plants - village Minjir, Poruceni, Selişte Leu (Nisporeni), the edge and meadows of the mesophytic forests Kononov V. (1956), as well as grass collections from the 20th century - mesophytic forest edges and meadows from the forests with fluffy oak (Hânceşti) - Vorniceni, Bucovăţ, Codreanca (Străşeni), Sadova (Călăraşi) (Шабанова Г. А., 2012, 2014), "Ciumai" Postolache Gh. s. Moscovei, distr. Cahul) Miron Al., Titica Gh., Pavliuc A. (2017); in Câmpia Bugeacului - Ghendov V., Izverscaia T., Şabanova G. (2015); Titica Gh., 2017: 2018; Lebedenco district Cahul district, Titica Gh (2017), Iordanovca district Basarabeasca district - Titica Gh. (2018), as well as their phytocenotic treatments analyzed by Шабанова Г. А. (2012). It is obvious that these grasslands with *Chrysopogon gryllus* and *Bothriochloa ischaemum* in the Republic of Moldova tend to expand (Figure 1 N 27-29).

By chorological analysis of phytocenoses in the associations announced by the authors, as well as their position in the resort (biogeographic region, altitude, climate, soil, substrate, light, heat, moisture, mineral nutrition, etc.), as well as the degree of fidelity and spread of the dominant species in relation to the resort conditions, but also of the plant species, which have a predisposition to coexist with the stepoforming species (*Chrysopogon gryllus* or *Bothriochloa ischaemum*) over large areas. Some theorists of the phytocenotaxonomy of *Botriochloetum* signal the need for their appreciation as communities with specified but territorial are

seen in the composition of the xeric meadows of cl. *Festuco-Brometea* Br.-Bl. and R. Tx. ex Klika et Hadač 1944, ord. *Festucetalia* Br.-Bl. and R. Tx. ex Br.-Bl. 1949, all. *Festucion valesiacae* Klika 1930 (Figure 5).

In contemporary studies, there is an increased attention to poaceae communities with tendencies to expand both territorially and associative. Such works were highlighted in the Balkan Mediterranean area - Sburlino G. et al., 2013; Pirini Ch. et al., 2014; Romeo Di Pietro et al., 2015; Fanelli Juliano et al., 2015; Terzi M., 2015) we decided to analyze the lists of communities with semi-savanoid grass dominance in order to identify the specifics of the floristic components and the phytocenotic structure based on the habitat conditions.

Figure 5. Phytocenosis with *Chrysopogon gryllus* (L.) Trin.
(National Botanical Garden „Alexandru Ciubotaru", Chișinău city).

Currently, the communities of meadows with the dominance of semi-savanoid grasses are mentioned in cl. *Festuco-Brometea* Br.-Bl. 1941, notwithstanding the fact that they are found in different biogeographical regions (Continental, Steppe, Pannonian, Black Sea, Anatolia), Mediterranean and manifests a special component and structure. If we examine their spread around the world, we identify the insufficiency of phytosociological data in the center

and east of the area, which would complete the vision on these communities (Figure 6).

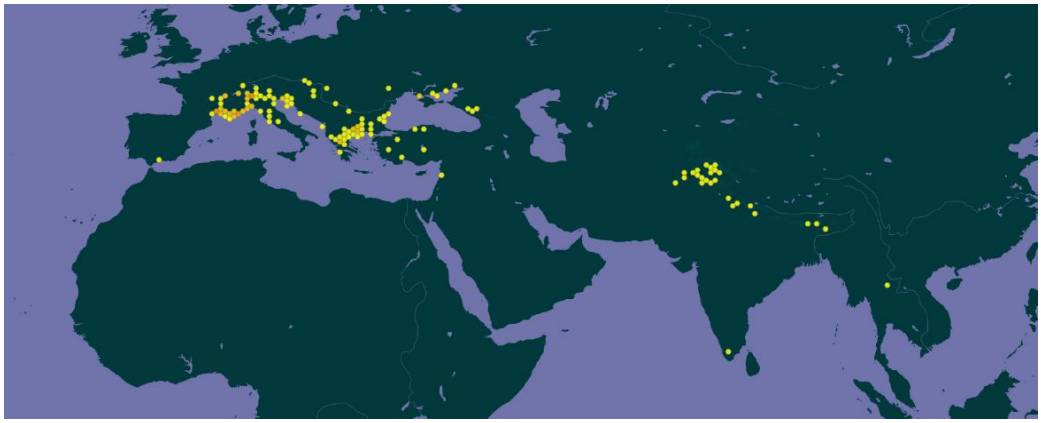


Figure 6. Distribution of *Chrysopogon gryllus* (L.) Trin. in the native space worldwide (https://www.gbif.org/species/5674318)

Chrysopogon gryllus (L.) Trin. – species of semi-savanoid grasses that form dry (xeric) meadows over a fairly large area (from southern France to the western Himalayas (India), Thailand, and Australia). It is remarkable that in the west of the area the meadows are represented by a single species of the genus *Chrysopogon* - *Ch. gryllus*, and in Asia (western Himalayas) besides *Chrysopogon gryllus* are also mentioned *Chrysopogon montanus*, *Ch. aciculatus*, *Ch. fulvus*, *Ch. serrulatus*. Ganatsas PP et al., (2004); Joshi MC, et al., (1964); Neamsuvan O. et al., (2009); Qureshi IM et al., (1964); Sundrlyal RC (1995); Singh Vikaspal et al., (2015) In Australia, after Blake ST (1944), the genus *Chrysopogon* is present with 10 species widespread in the northern grasslands of Australia: *Chrysopogon aciculatus*, *Ch. elongatus*, *Ch. pallidus*, *Ch. parviflorus*, *Ch. setifolius*, *Ch. stipoideus*, *Ch. sylvaticus* and *Ch. gryllus*, which is the most diverse comprising two subspecies - *calcaratus*, *pallidus* and two varieties - *pallidus* and *spicigera*, Dobignard A. et al. (2010) mention the presence of *C. gryllus*, *C. aucheri* (Boies.) Stapf., *C. plumulosus* Hochst.

Golden beard grass (*Chrysopogon gryllus*) is a geophyte 50-180 cm high, mainly dominates in sunny meadows, xero-, xeromesophytes, subtermal, on chernozem soils, as well as chestnut coloured, on various substrates (sand, loess, limestone, river rocks , marls, debris, etc.) form stable, discrete communities with a specific habitat. It is mostly dependent on the thermal regime, which extends within the isotherm of 7.5-10.5°C (Sburlino G. et al., 2013) and includes various biogeographic regions - Continental, Steppe, Pannonian, Black Sea, Anatolian, but more commonly found in the

Mediterranean region at various altitudes.

Chrysopogon gryllus have a compact spatial spread in the northern hemisphere stretching from Western Europe to East East Asia (Pacific Ocean), where they form communities with various plant species of local flora. It mainly prefers resorts with high relief, up to 400-500 m in Europe. In the western Himalayas (India) at high altitudes (over 3000 m) have a spread of communities of these herbs in humid, warm and bright conditions (Figure 6).

The phytocenotic evaluation of the meadows with *Chrysopogon gryllus* in the Eurasian space is not homogeneous. In the European area, the phytocenotic classification is represented according to the principle of the Braun-Blanquet J. (1933, 1964) floristic school, the constancy or frequency of the species is applied for definition in the syntaxonomic nomenclature of the association. In the Republic of Moldova, the phytocenotic classification of golden beard grass meadows was carried out according to the floristic-ecological principles with the delimitation of the group of associations. Currently, communities with sadina dominance according to the phytocenological classification (Braun-Blanquet J., 1964), accepted by most phytocenologists, are frequent various species of grasses, which express local ecological conditions specific to the estimated region. Moreover, the dominant species *Chrysopogon gryllus* is not ubiquitous, but sometimes its range is interspersed with *Bothriochloa ischaemum*, which expanded into the northern hemisphere with warming and arid climate (Lazu Șt., 2014; Lazu et al., 2016 ; 2017; 2018).

In the Republic of Moldova, sadina meadows were studied phytocenotically by Șabanova G.A., 2012; 2014, distinguishing the group of associations - *Chrysopogon gryllus*, with *Festuca valesiaca* based on 17 surveys from the forest meadows with fluffy oak. The second group of associations, the author distinguishes *Chrysopogon gryllus* with *Bothriochloa ischaemum* based on the analysis of 19 surveys on continental steppe slopes. These groups of associations with sadina cannot be analyzed in more detail, because the synthetic tables are not presented. The analysis of the phytocenotic publications from the Republic of Moldova (Шабанова Г.А. 2012, 2014) regarding the communities with *Chrysopogon gryllus*, as well as the authors of the above mentioned floristic studies from the evaluated resorts, the faithful species of these meadows, highlighted the thyme Thymus marschalianus Wild. (T. pannonicus All. Ciocârlan 1990, 1992) as a species present in both biogeographical regions (continental and steppe). To elucidate the specificity of the resort and the faithful species of *Chrysopogon gryllus* and *Bothriochloa ischaemum*, found in various biogeographical regions, we

analyzed the composition and abundance of floristics in the phytocenoses of meadows presented by authors in synthetic lists: Ukraine - Dubyna D.V. (1996); Romania - Puşcaru, Soroceanu Ev. et al., 1963; Borza Al., 1963; Csűrös St., Nidermaier K., 1966; Dihoru Gh., 1970; Doina Ivan, N. Donita et al., 1993; Donita N., A. Popescu et al., 2005; Oprea A., C. Sârbu, 2005; Drăgulescu C., Schumacher B., 2006; Ştefan N., et al., 2007; Chifu T. et al., 2014; Italy - Meyer M., 1975; Nimis P. L. and G. Fonda, 1997; Sburlino G. et al., 2013; Serbia - Jovanovici Sl. et al., 2017; Djodjovici Vl. et al., 2012, Djodjovici L. et al., 2013; Acici Sv. et al., 2015; Croatia - Bernhardt K-G. et al, 2006; Ilijanici L. et al., 1972; Jasprica N. et al., 2007; Albania - Fanelli G. et al., 2015; Greece - Pirini Chr. B. et al., 2014; Bulgaria - Tachev Al. et al., 2010; Pedaşenco Hr. Et al., 2013; Macedonia - Matevski V. et al., 2015 (Figure 1 N 29-67).

Дубина Д. В., Дзюба Т. П. (2005), in the biospheric reservation Dunaiskii (island Djarilgaci, Herson, Ucraina) registered phytocenoses from ass. Dauco (guttati) – Chrysopogonetum grylli Popescu, Sanda et Doltu 1980 (11 surveys) with the following floristic composition – Chrysopogon gryllus (V), Plantago lanceolata (V), Inula salicina (V), Cynanchicum acutum (III), Dianthus bessarabicus (III), Linum austriacum (III), Tragus racemosus (III), Scirpoides holoschoenus (V), Gypsophila paniculata (III), Koeleria sabuletorum (I), Euphorbia seguieriana (I), Daucus carota (III), Alopecurus pratensis (I), Kochia laniflora (IV), Koeleria glauca (IV), Carex colchica (II), Calamagrostis epigeios (IV), Teucrium scordium (III), Solanum nigrum (I), Anisantha sterilis (I), Vincetoxicum hirundinaria (II), Periploca graeca (I), Verbascum banaticum (III), Festuca beckeri (I), Apera maritima (IV), Secale sylvestris (I) (Figure 1 N 30).

Давидова А. О. (2019) presents the syntaxonomy of vegetation in the natural park "Djarilgaţichii" (Kherson, Ukraine) class Festucetea vaginatae where it mentions ass. Apero maritimi – Chrysopogonetum grylli with Festuca beckeri, Apera maritima, Bromus squarosus, Secale sylvestre, Carex colchica, Euphorbia segueriana, Chrysopogon gryllus, Stipa borysthenica, Poa bulbosa, Scirpoides holoschoenus, Dianthus platyodon, Juncus borysthenica, Koeleria sabuletorum, Syrenia montana, Kochia laniflora, Agrostis meotica, Alyssum desertorum, Anisantha tectorum, Arenaria leptochados, Bromus hordeaceus, Calamagrostis epigeios, Cerastium glutinosum, Cynanchicum glutinosum, Cynodon dactylon, Milium vernale, Phragmites australis, Sisymbrium polymorphum, Rumex acetosa, Cladonia foliaceae, Cladonia rangiformis, Syntrichia ruralis.

Davydova (2019) shows two subassociations with Chrysopogon gryllus: 1. Apero maritimi – Chrysopogonetum grylli typicum

Davydova (2019) subass. nov. and 2. Apero maritimi – Chrysopogonetum grylli stipetum borysthenicae Davydova 2019 subass. nov. (Figure 1 N 30).

In the Republic of Moldova, meadows with Chrysopogon gryllus, as mentioned in the previous publication (Lazu Şt. et al., 2019), are found in the steppe hills of the Southern Moldavian Plain, steppe meadows in fluffy oak forests, medicinal plant reserves village Minjir, Poruceni, Selişte Leu (Nisporeni), meadows from the mesophytic forests of the central area of the Republic of Moldova. Chrysopogon gryllus - Bothriochloa ischaemum (19 surveys) Both the first and second group of species have a high frequency of the dominant species and form stable phytocenoses with Thymus marschallianus, which is the exponent of sadina grasslands in steppe and continental ass. Thymo (pannonici) Chrysopogonetum grylli Doniţa et al., 1992 (Figure 1 N 27, 28).

Pirini et al. (2014), analyzing the vegetation of the meadows around Vegoritida and Petron lakes in northern Greece, altitude 575-720 m, distinguished the group *Chrysopogon gryllus - Bothriochloa ischaemum*, along with the 3 ruderalized, but with specified plant composition, which the authors considers seminatural. The group *Stipa capillata - Koeleria macrantha* is also presented, whose components are faithful participants of the Eurasian steppes. It is obvious that *Chrysopogon gryllus* and *Bothriochloa ischaemum* are in full agreement with the Balkan habitat, because they are also present in the clusters - *Artemisia campestris - Dasypirum villosum* and *Satureja montana - Artemisia alba*. These communities are attributed by the authors to cl. *Festuco - Brometea*, ord. *Astragalus - Potentillietalia*. The authors consider these communities similar to steppes, or secondary meadows, with some relict species from the Tertiary period and secondary meadows were formed as a result of the degradation of *Quercus trojana* forests, forming open spaces or "shibliak" type forests.

The list of plant species of natural grasslands with phytocenoses *Chrysopogon* (*gryllus*) - *Bothriochloa ischaemum* around the lakes Vegoritida and Petron (north-central Greece) based on the analysis of 245 surveys mentions the presence of the following species of vascular plants (Pirini Ch. B. et al ., 2014): Differential taxa *Erysimum crassistylum* (31), *Avena sterilis* (15)[1], *Bromus tectorum* (15), *Micromeria cremnophila* (23), *Marrubium peregrinum* (8)[*], *Cynodon dactylon* (4)[*], *Anthemis arvensis* ssp. *icrassata* (4)[*], *Vulpia ciliata* (4), *Bromus cappadocicus* (19), *Fumana scoparia* (19), *Petrorhagia thessalia* (12), *Artemisia alba* (23)[*], *Teucrium capitatum* (69), *Koeleria macrantha* (54), *Euphorbia myrsinites* (42),

[*] - plant species that are also found in the flora of the Republic of Moldova.

Thymus sibthorpii (85), *Chrysopogon gryllus* (58)*, *Satureja montana* ssp. *macedonia* (42), *Fumana procumbens* (23)*, *Hypericum rumelicum* (27), *Stachys iva* (15), *Asperula purpurea* ssp. *purpurea* (23), *Asperula aristata* (4), *Astragalus sericophyllus* (15), *Scabiosa webbiana* (15), *Helianthemum salicifolium* (58), *Eryngium campestre* (62)*, *Crupina crupinastrum* (73), *Helichrysum luteoalbum* (31), *Bothriochloa ischaemum* (77)*, *Stipa capillata* (35)*.

Differential taxa of *Festuco-Brometea:*

Melica ciliata (19)*, *Ononis pusilla* (19), *Lomelosia argentea* (23), *Linum tenuifolium* (12)*, *Sedum urvillei* (12), *Sanguisorba minor* (4), *Minuartia glomerata* ssp. *macedonica* (8), *Helianthemum nummularium* ssp. *nummularium* (4)*, *Sedum ochroleucum* (4), *Onobrychis arenaria** ssp. *lasiostachya* (12), *Convolvulus cantabrica* (15)*, *Alyssum montanum* ssp. *montanum* (8), *Allium sphaerocephalon** ssp. *sphaerocephalon* (4), *Chondrilla juncea* (8)*, *Astragalus onobrychis* (8)*, *Paliurus spina-christi* (4)*, *Prunus spinosa* (4)*, *Aurinia saxatilis** ssp. *orientalis* (4), *Linaria simplex* (15), *Bromus squarrosus* (23)*, *Euphorbia helioscopia* (23), *Geranium rotundifolium* (15)*, *Consolida regalis* (12)*, *Coronillla scorpioides* (23), *Lathyrus cicera* (4), *Fumaria officinalis* ssp. *officinalis* (4), *Echinops sphaerocephalus* ssp. *albidus* (17)*, *Leontodon crispus* (19)*. *Acinos suaveolens* (12), *Centaurea grisebachii* (31), *Minuartia verna* ssp. *collina* (23), *Xeranthemum inapertum* (46), *Poa bulbosa* (19)*, *Thesium humile* (27), *Silene radicosa* (23). *Bromus intermedius* (23), *Silene conica* (31)*, *Medicago minima* (38)*, *Hippocrepis ciliata* (27), *Verbascum leucophyllum* (31), *Echinops microcephalus* (23), *Allium guicciardii* (4), *Valerianella rimosa* (35)*, *Potentilla recta* (19)*, *Paronychia macedonica* (4), *Arenaria serpyllifolia* (31)*, *Sideritis montana* ssp. *montana* (12)*, *Scorzonera mollis* ssp. *mollis* (12), *Ornithogalum divergens* (4), *Carlina corymbosa* (15), *Petrorhargia illyrica* ssp. *illyrica* (4), *Brachypodium distachyon* (19), *Orlaya daucoides* (8), *Cruciata pedemontana* (15), *Arrhenatherum palaestimum* (15), *Crepis sancta* (19), *Avena barbata* ssp. *barbata* (23), *Calamintha nepeta* (4)*, *Alyssum sibiricum* (4), *Medicago monospeliaca* (4), *Medicago tuberculata* (4), *Trifolium scabrum* (8), *Centaurea salonitana* (4), *Goniolimon heldreichii* (19), *Tesium macedonicum* (4), *Crucianella graeca* (15), *Psilurus incurvus* (8), *Ranunculus sprunerianus* (4), *Lens nigricans* (8), *Bupleurum praealtum* (8), *Pilosella bauhini* (4), *Pterocephalus plumosus* (4), *Verbascum graecum* (4), *Potentilla detommasii* (4), *Catapodium rigidum* (4), *Erodium cicutarium* (4)*, *Taraxacum* sp. (4)*, *Medicago orbicularis* (4), *Minuartia hamata* (8), *Clypeola jonthlaspi* ssp. *jonthlaspi* (8), *Silene graeca* (12), *Hypochaeris cretensis* (4), *Lathyrus*

saxatilis (4), *Tragopogon porrifolius* (4), *Geranium purpureum* (4), *Ziziphora capitata* (12), *Valerianella carinata* (4)*, *Medicago coronata* (8), *Medicago medicaginoides* (4), *Scandix australis* (8), *Lotus corniculatus* (4)*.

Phytocenoses with *Chrysopogon gryllus* as well as those of *Bothriochloa ischaemum* have in their composition a set of species of vascular plants that together with the dominant species form climax communities, and anthropogenic activities (mowing, grazing) influence them less compared to other grass communities. These species have acquired a series of adaptations in the evolution of biological peculiarities and the root system to support aridization with numerous roots and rhizomes and form bushes on large areas, and in the aerial part reaches a height of up to 1-1.5 m with light. and the heat occupies the vegetative and seed propagation to the extension of the surfaces with this plant, in the living space. That is why species of semi-savanoid herbs require separate treatment in the phytosociological hierarchy, especially since we are pressured by anthropological activities, and the consequences of these activities are evident in desert areas of ancient civilizations - Mesopotamia, Egypt, ancient Greece, Roman Empire.

Cl. *Chrysopogono-Bothriochloetea* n. n. includes the following species widespread in the Republic of Moldova and in the natural area of steppic communities: *Chrysopogon gryllus* (L.) Trin., *Bothriochloa ischaemum* (L.) Keng., *Cynodon dactylon* (L.) Pers., *Eryngium campestre* L., *Melica ciliata* L., *Linum tenuifolium* L.. *Helianthemum nummularium* (L.) Mill., *Onobrychis arenaria* (Kit.) DC., *Convolvulus cantabrica* L., *Allium sphaerocephalum* L., *Astragalus onobrychis* L., *Paliurus spina-christii* Mill., *Prunus spinosa* L., *Aurinia saxatilis* (L.) Desv., *Echinops sphaerocephalus* L., *Leontodon crispus* Vill., *Poa bulbosa* L., *Potentilla recta* L., *Scorzonera mollis* Bieb., *Calamintha nepeta* (L.) Savi, *Taraxacum officinale* Wigg., *Lotus corniculatus* L., *Fumana procumbens* (Dun.) Gren. et Godr.

Terzi M. (2015) mentions in the Mediterranean meadows of the western Balkans (Croatia, Albania, Montenegro, Slovenia and Serbia, Italy, Kosovo, Bosnia and Herzegovina, Bulgaria), the floristic composition of the species from the group of *Chrysopogonetum*. Thus, it was established all. *Chrysopogono-Saturejon subspicatae* Cernjavski et al. 1949, ord. *Scorezoneretalia villosae*, cl. *Festuco-Brometea* with associations:

1. Ass. *Danthonio-Chrysopogonetum grylli* Boscaiu 1972 (at high altitudes)

2. Ass. *Asphodela microcarpi – Chrysopogonetum grylli* Horvatić 1963 (low altitudes in the eastern region)

3. Ass. *Schoeno nigricantis - Chrysopogonetum grylli* Pignatti ex Feoli Chiapella et

Poldini 1993 (low altitudes in the western Mediterranean regions).

By analyzing 159 surveys, Terzi M. (2015) established al. *Chrysopogono grylli-Saturejion subspicata* Cernavski et al., 1948 and ord. *Scorzoneretalia* (*villosae*), and we took as a basis for establishing the provisional phytocenotic class - *Chrysopogonetalia* n. n. With the component species: *Satureja montana* subsp. *variegata* (42), *Bupleurum veronense* (40), *Salvia officinalis* (31)*, *Onosma echioides* subsp. *dalmatica* (18), *Euphorbia fragifera* (15), *Centaurea cristata* (15), *Carduus nutans* subsp. *micropterus* (14), *Genista sylvestris* subsp. *dalmatica* (11), *Centaurea spinosociliata* (9), *Centaurea tommasini* (9), *Astragalus muelleri* (7), *Festuca lapidosa* (4), *Achillea nobilis* (4)*, *Onobrychis arenaria* subsp. *tomasini* (3)*, *Jurinea mollis* (3), *Muscari botryoides* (5), *Edraianthus tenuifolius* (5), *Crepis chondrilloides* (1), *Bunium alpinum* subsp. *montanum* (2), *Iris pallida* subsp. *illirica* (3), *Stachys recta* subsp. *labiosa* (1)*, *Allium ericetorum* (1), *Potentilla pusilla* (1), *Teucrium montanum* (38)*, *Koeleria splendens* (60), *Globularia cordifolia* (5), *Stipa eriocaulis* (24), *Scorzonera austriaca* (6)*, *Seseli Kochii* (13), *Potentilla heptaphylla* ssp. *australis* (16), *Genista sericea* (7), *Inula ensifolia* (2)*, *Dianthus sylvestris* ssp. *tergestinus* (26), *Genista sylvestris* ssp. *sylvestris* (13), *Trinia glauca* (1), *Potentilla tommasiniana* (9), *Stachys recta* ssp. *subcrenata* (15)*, *Ornithogalum ortophyllum* ssp. *Kochii* (7), *Euphrasia illyrica* (2), *Hyacinthella dalmatica* (3), *Centaurea scabiosa* ssp. *fritschii* (2)*, *Rhinanthus alectorolophus* ssp. *freynii* (7)*, *Filipendula vulgaris* (1)*, *Plantago media* (5)*, *Ononis spinosa* (4), *Trifolium rubens* (1)*, *Hypochaeris maculata* (1), *Scorzonera villosa* ssp. *villosa* (11), *Knautia illyrica* (1), *Centaurea jacea* ssp. *weldeniana* (4)*, *Dorycnium pentaphyllum* ssp. *herbaceum* (8), *Ferulago campestris* (3), *Prunella laciniata* (4)*, *Salvia pratensis* (32)*, *Eryngium amethystinum* (69), *Chrysopogon gryllus* (48)*, *Festuca illyrica* + *F. stricta* ssp. *sulcata* (32), *Plantago vulneraria ssp. polyphylla* (2), *Stachys officinalis* (4)*, *Scabiosa triandra* (18), *Centaurea jacea* ssp. *gaudinii* (1)*, *Dorrycnium pentaphyllum* ssp. *germanicum* (15), *Festuca valesiaca* (43)*, *Veronica barrelieri* (8)*, *Medicago prostrata* (23), *Naccaea praecox* (9), *Leucanthemum platylepis* (1), *Euphorbia nicaeensis* (4), *Seseli montanum* ssp. *tommasinii* (6), *Bromus erecta* s.l. + *B. condensata* (79), *Sanguisorba minor* (52), *Carex humilis* (17)*, *Helianthemum nummularium* ssp. *obscurum* (21)*, *Brachypodium pinnatum** + *B. rupestre* (11), *Thymus langicaulis* s.l. (58), *Galium lucidum* (33), *Teucrium chamaedrys* (26)*, *Galium verum* (4), *Briza media* (1)*, *Euphorbia cyparissias* (28)*, *Asperula cynanchica* (24)*, *Hippocrepis comosa* (25), *Globularia bisnagarica* (9), *Anthericum ramosum* (7)*, *Carex*

flacca (1), *Leontodon crispus* (23)*, *Carex caryophylea* (8)*, *Linum tenuifolium* (20)*, *Asperula purpurea* (19), *Sedum sexangulare* (48), *Pilosella officinarum* (20), *Carlina acaulis* (2), *Petrorhagia saxifraga* (42)*, *Campanula glomerata* (1)*, *Pimpinella saxifraga + P. alpina* (2)*, *Allium lusitanicum* (9), *Bothriochloa ischaemum* (35)*, *Asperula aristata* (18), *Medicago falcata* (1)*, *Centaurea jacea* (3)*, *Fumana procumbens + F. ericoides* (30)*, *Koeleria macrantha* (12), *Artemisia alba* (19), *Thymus pulegioides* (1), *Melica ciliata* (23)*, *Medicago lupulina* (4)*, *Trifolium campestre* (11)*, *Ranunculus bulbosus* (1), *Echinops ritro* (4)*, *Anthyllis vulneraria* (26), *Polygala nicaeensis* (9), *Teucrium capitatum* ssp. *capitatum* (36), *Galium corrudifolium* (19), *Saturea montana* (13), *Carex hallerana* (19), *Kengia serotina* (18), *Paronijchia kapela* (7), *Alyssum montanum* (14), *Poa bulbosa* (8)*, *Armeria canescens* (1), *Argyralobium zanonii* (9), *Lactuca viminea* (6).

Based on this list we propose the following composition of the ord. *Chrysopogonetalia grylli* n. n. with plant species included in the Flora of the Republic of Moldova: *Achillea pannonica* Scheele, *Koeleria cristata* (L.) Pers., *Carex supina* Wahlenb., *Helichrysum arenarium* (L.) Moench, *Medicago romanica* Prod., *Inula hirta* L., *Elytrigia repens* (L.) Nevski, *Galium campanulatum* Vill., *Securigera varia* (L.) Lassen, *Dianthus membranaceus* Borb., *Adonis vernalis* L., *Crocus reticulatus* Stev. ex Adam, *Arabidopsis thaliana* (L.) Heynh., *Myosotis micrantha* Pall. ex Lehm., *Veronica verna* L., *Galium verum* L., *Hypericum perforatum* L., *Gagea minima* (L.) Ker-Gawl., *Gagea pusilla* (F. W. Schmidt) Schult et Schult. fil., *Caragana mollis* (DC.) Bess., *Doronicum hungaricum* Reichenb. fil., *Pulsatilla grandis* Wend., *Pulsatilla nigricans* Störck, *Viola ambigua* Waldst. et Kit., *Bromus inermis* Leyss., *Jurinea mollissima* Klok., *Otites moldavica* Klok., *Stachys officinalis* (L.) Trevis, *Lathyrus pannonicus* (Jacq.) Garcke, *Lathyrus pallescens* (Bieb.) C. Koch, *Brachypodium pinnatum* (L.) Beauv., *Calamagrostis epigeios* (L.) Roth, *Dactylis glomerata* L., *Poa angustifolia* L.

The steppe semi-savanoid with bearded domination make up ord. *Bothriochloetalia ischaemum* n. n., currently widespread in biogeographical regions: Continental, Steppe and less in the Mediterranean. Based on the list of phytocenotic surveys mentioned by Doina Ivan, Nicolae Doniță et al., 1993 through the analysis of 219 surveys, it included the continental and steppe biogeographical regions of Romania.

Doina Ivan, Doniță N. et al., 1993, (Romania), with ass. *Bothriochloetum* (*Andropogonetum*) *ischaemi* (Krist. 137) I. Pop 1977, proposed as a basis for the phytocenotic order the list of plant species *ord. Bothriochloaetea* n. n.: *Chrysopogon gryllus* (I), *Festuca*

valesiaca (IV), *Bothriochloa ischaemum* (V), *Poa angustifolia* (I), *Thymus pannonicus* (II), *Medicago lupulina* (II), *Cynodon dactylon* (II), *Medicago minima* (I), *Stipa ucrainica* (I), *Carex humilis* (I), *Brachypodium pinnatum* (I).

Al. Festucion rupicolae

Festuca rupicola (I), *Polygala major* (I), *Salvia nutans* (I), *Centaurea orientalis* (I), *Teucrium polium* (I), *Salvia nemorosa* ssp. *tesquicola* (I), *Potentilla recta* (I), *Convolvulus catabrica* (I), *Ajuga laxmanii* (I), *Seseli campestre* (I), *Stipa capillata* (I), *Nonea pulla* (I), *Cleistogenes serotina* ssp. *bulgarica* (I), *Trinia ramosissima* (I), *Onosma visianii* (I), *Cephalaria uraliensis* (I), *Aster oleifolius* (I), *Stipa pulcherima* (I), *Dorycnium herbaceum* (II), *Veronica orchidea* (I), *Artemisia austriaca* (II), *Astragalus dasyanthus* (I), *Phlomis pungens* (I), *Xeranthemum annuum* (I), *Pulsatilla montana* (I), *Salvia austriaca* (I), *Agropyron pectinatum* (I), *Echium russicum* (I), *Inula germanica* (I), *Taraxacum serotinum* (I), *Phlomis tuberosa* (I), *Ranunculus illyricus* (I), *Stipa lessingiana* (I), *Orlaya grandiflora* (I), *Rumex tuberosus* (I), *Crupina vulgaris* (I), *Astragalus austriacus* (I), *Reseda lutea* (I), *Agropyron cristatum* (I), *Achillea clypeolata* (I), *Anchusa barrelieri* (I), *Androsace elongata* (I), *Artemisia absinthium* (I), *Cardus hamulosus* (I), *Centaurea marschalliana* (I), *Ceratocephala testiculata* (I), *Crambe tataria* (I), *Dianthus capitatus* (I), *Dianthus leptopetalus* (I), *Herniaria incana* (I), *Hyacynthella leucophaea* (I), *Iris sintenisii* ssp. *brandzae* (I), *Lathyrus pallescens* (I), *Linum austriacum* (I), *Linum hirsutum* (I), *Melampyrum arvense* (I), *Oxytropis pilosa* (I), *Serratula radiata* (I), *Verbascum speciosum* (I), *Astragalus asper* (I), *Allium fuscum* (I), *Astragalus monspessulanum* (I), *Anchusa officinalis* (I), *Cruciata pedemontana* (I), *Medicago rigidula* (I), *Bupleurum affine* (I), *Veronica incana* (I), *Cerastium brachypetalum* (I), *Potentilla astracanica* (I), *Scorzonera lanata* (I), *Fumana procumbens* (I), *Petrorhagia illyrica ssp. haynaldiana* (I), *Achillea crithmifolia* (I), *Silene bupleuroides* (I), *Valerianella pumila* (I), *Ajuga pseudochia* (I).

Festucetalia valesiacae

Asperula cynanchica (II), *Centaurea biebersteinii* (II), *Achillea setacea* (II), *Trifolium montanum* (I), *Campanula sibirica* (II), *Stachys recta* (I), *Coronilla varia* (II), *Onobrychis viciifolia* (I), *Potentilla cinerea* (II), *Hieracium bauhini* (II), *Leontodon crispus* (I), *Fragaria viridis* (II), *Poa bulbosa* (I), *Verbascum phoeniceum* (I), *Elytrigia intermedia* (I), *Scabiosa ochroleuca* (II), *Chondrilla juncea* (III), *Astragalus onobrychis* (I), *Veronica prostrata* (I), *Onobrychis arenaria* (I), *Iris pumilla* (I), *Muscari tenuifolium* (I), *Achillea nobilis* ssp. *neilreichii* (I), *Eryssimum diffusum* (I), *Artemisia campestris* (I), *Silene otites* (I), *Bupleurum falcatum* (I), *Chamaecytisus austriacus* (I),

Dianthus membranaceus (I), *Inula hirta* (I), *Inula salicina* (I), *Allium rotundum* (I), *Bromus inermis* (I), *Echinops ruthenicum* (I), *Echium italicum* (I), *Melica ciliata* (I), *Senecio jacobaea* (I), *Siderites montana* (I), *Jurnea arachnoides* (I), *Linum tenuifolium* (I), *Euphorbia nicaeensis* (I), *Dianthus pallens* (I), *Achillea pannonica* (I), *Anthemis tinctoria* (I), *Asperula tenella* (I), *Cephalaria transsilvanica* (I), *Minuartia setaceae* (I), *Tanacetum millefolium* (I), *Erophila verna* (I), *Haplophyllum suaveolens* (I), *Ornithogalum ortophyllum* (I), *Veronica austriaca* (I), *Anthemis ruthenica* (I), *Aegilops cylindrica* (I), *Asyneuma canescens* (I), *Carthamus lanatus* (I), *Alyssum linifolium* (I), *Tunica saxifraga* (I), *Vicia lathyroides* (I), *Centaurea tenuiflora* (II), *Hieracium hoppeanum* (I), *Androsace maxima* (I), *Achillea ochroleuca* (I).

Festuca-Brometea

Koeleria macrantha (I), *Eryngium campestre* (IV), *Teucrium chamaedrys* (III), *Plantago lanceolata* (III), *Galium verum* (II), *Filipendula vulgaris* (I), *Potentilla argentea* (III), *Salvia pratensis* (I), *Euphorbia cyparissias* (II), *Sanguisorba minor* (II), *Trifolium alpestre* (I), *Carex praecox* (I), *Plantago media* (I), *Dianthus carthusianorum* (I), *Trifolium campestre* (II), *Prunella laciniata* (I), *Phleum phleoides* (I), *Salvia verticillata* (I), *Anthericum ramosum* (I), *Veronica spicata* (I), *Pimpinella saxifraga* (I), *Echium vulgare* (II), *Carex humilis* (I), *Thymus glabrescens* (I), *Achillea collina* (II), *Trifolium arvense* (I), *Carex caryophyllea* (I), *Hieracium pilosella* (I), *Cardus nutans* (I), *Brachypodium pinnatum* (I), *Poa compressa* (I), *Centaurea jurneifolia* (I), *Acinos arvensis* (II), *Agremonia eupatoria* (II), *Asparagus officinalis* (I), *Galium glaucum* (I), *Erodium cicutarium* (I), *Linum genistifolia* (I), *Thlaspi perfoliatum* (I), *Daucus carota* (II), *Tragopogon dubius* (I), *Allysum alyssoides* (II), *Arenaria serpyllifolia* (I), *Berteroa incana* (I), *Dasypyrum villosum* (I), *Ajuga chamaepytis* (I), *Galium octonarium* (I), *Alyssum desertorum* (I), *Anchusa ochroleuca* (I), *Campanula glomerata* (I), *Cerinthe minor* (I), *Crepis foetida* ssp. *rhoeadifolia* (I), *Draba nemorosa* (I), *Erysimum odoratum* (I), *Euphorbia agraria* (I), *Gypsophila paniculata* (I), *Helychrisum arenarium* (I), *Hieracium echioides* (I), *Holosteum umbelatum* (I), *Lavathera thuringiaca* (I), *Linaria vulgaris* (I), *Marrubium peregrinum* (I), *Muscari comosum* (I), *Muscari racemosum* (I), *Picris hieracioides* (I), *Rapistrum perenne* (I), *Salva aethiopis* (I), *Sedum acre* (I), *Stachys germanica* (I), *Taraxacum erythrospermum* (I), *Thesium dollineri* (I), *Thymaelea passerina* (I), *Verbascum lychnitis* (I), *Verbascum phlomoides* (I), *Xeranthemum cylindraceum* (I), *Tunica prolifera* (I), *Crucianella oxyloba* (I), *Hierochloa odorata* (I), *Eragrostis minor* (I), *Myosotis stricta* (I), *Trifolium striatum* (I),

Marrubium pestalozae (I), *Achillea coarctata* (I).

Some researchers of communities with *Bothriochloa ischaemum* and *Chrysopogon gryllus Andropogonets* Redzic S (1999); Sburlino G. et al. (2013); Pirini Ch. Et al. (2014); Romeo Di Pietro et al. (2015); Fanelli Jul. et al. (2015) ; Terzi M. (2015); Matevski V. et al. (2015), signals the specificity of these communities of mesoxerophyte poaceae at the border with the steppes belonging to the *Festuco-Brometea* class. It is obviously higher, as well as their frequency, which is why we believe that these mesophilic communities should be viewed separately from the xeric ones - assigning them the highest rank in the hierarchy of phytocenotic taxa, as well as a more in-depth individual study.

CONCLUSIONS

Eurasian grasslands (golden beard grass - *Chrysopogon gryllus* (L.) Trin. and bearded - *Bothriochloa ischaemum* (L.) Keng.) are widespread in European biogeographical regions - Continental, Steppic, Pannonian, Black Sea, Anatolia, as well as in Central and East Asia. The analysis of the synthetic tables with the natural vegetation from various biogeographical regions of Europe highlighted the faithful associative character of the local plant species with the dominance of the steppe semi-savanoid. Meadows with *Bothriochloa ischaemum* in the continental and Pannonian biogeographical region form stable communities with ass. *Asperulo* (*cynanchica*) - *Bothriochloetum ischaemii* n. n. In steppe, ass. *Euphorbio* (*seguieriana*) - *Bothriochloetum* n.n., Alpine - ass. *Glycyrrhizo* (*glabra*) - *Bothriochloetum ischaemii*, in the Mediterranean - ass. *Melico* (*ciliata*) - *Bothriochloetum ischaemum* n.n. and others.

Grasslands with *Chrysopogon gryllus* (L.) Trin form discrete communities south of those with *Bothriochloa ischaemum*. In the continental and steppe biogeographic regions, after the analysis of the synthetic tables, the presence of phytocenoses from ass. *Thymo* (*pannonici*) - *Chrysopogonetum grylli* Doniță et al., 1992, and on the Black Sea coast - ass. *Dauco* (*guttati*) - *Chrysopogonetum grylli* Popescu, Sanda, Doltu 1980 and ass. *Apero maritimi - Chrysopogonetum grylli* n. n. In the Mediterranean biogeographical region, the communities of steppe semi-savanoid are dependent on the altitude of the locality. At low altitudes (50-100 m) there are spread the phytocoenosis ass. *Carici* (*humulus*) - *Chrysopogonetum grylli* Kojici, 1959; ass. *Schoeneto* (*nigricans*) - *Chrysopogonetum grylli* Kojic, 1959; ass. *Nerieto* (*olcandri*) - *Chrysopogonetum grylli* Jasprica et al., 2007; ass. *Teucrio capitati Chrysopogonetum grylli*

Sburlino et al., 2008, at medium altitudes, 200-500 m high - phytocenoses from ass. *Globularia* (*elongata*) - *Chrysopogonetum grylli* Ilijanici et al .; ass. *Bromo* (*erectus*) - *Chrysopogonetum grylli* Horvatič 1934; ass. *Asphodelo* (*ramosus*) - *Chrysopogonetum grylli* Horvatič (1936) 1957; at high altitudes (600-1200 m) phytocoenosis in ass. *Bromo* (*fibrosis*) - *Chrysopogonetum grylli* Tatic 1969; ass. *Danthonio* (*alpine*) - *Chrysopogonetum grylli* Kojic 1959; Boşcaiu (1970), 1972; ass. *Teucrio* (*capitati*) - *Chrysopogonetum grylli* Sburlino et al., 2003; ass. *Agrostis* (*capillari*) - *Chrysopogonetum grylli* Kojic 1959; ass. *Petrorhagia* (*haynaldianae*) - *Chrysopogonetum grylli* Matevski et al., 2015.

In the biogeographical regions - the Black Sea and Anatolia, synthetic tables mention *Chrysopogon gryllus* as a component of communities dominated by *Quercae* and *Juniperus phanerophytes*, less often as a component of high-altitude Anatolian grasslands. Unfortunately, we have not identified works with synthetic tables of meadows in the north, center and east of these poaces of Africa. These poaceae, from a syntaxonomic point of view, would form separate meadows from cl. *Bothriochlo-Chrysopogonetea* n. n. and ord. *Bothriochloetalia* n.n. and *Chrysopogonetalia* n.n. with existing alliances and associations.

In the Republic of Moldova communities of grasses from *Chrysopogono-Bothriochloetea* n. n. class are obvious and are found in two biogeographical regions - continental and steppe. In the northern area is the continental biogeographic region with the spread of bearded communities in the ass. *Asperulo* (*cynanchica*) - *Bothriochloetum ischaemii* n. n. In the south of the Republic of Moldova where the steppe biogeographic region is located, the bearded makes stable communities of ass. *Euphorbio* (*seguieriana*) - *Bothriochloetum* n. n. Both associations are components of all. *Bothriochlonion* n. n., ord. *Bothriochloetalia* n. n. Phytocenoses with *Chrysopogon gryllus* from the Republic of Moldova spread in the steppe biogeographic region and less in the continental one form communities of ass. *Thymo* (*pannonici*) - *Chrysopogonetum grylli* Doniţa et al., 1992; all. *Chrysoponion* n. n., ord. *Chrysopogonetalia* n. n., and both would form cl. *Chrysopogono-Bothriochloetea* n.n.

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