Study of the vegetative cover of the natural monument "Mulin Dol" stow (Bol'shechernigovsky District, Samara Oblast, Russia)

T M Lysenko¹,² and A V Ivanova²
¹ General Geobotany Laboratory, Komarov Botanical Institute RAS, St.-Petersburg, Russia
² Samara Federal Research Center RAS, Institute of the Ecology of the Volga Basin RAS, Togliatti, Russia

E-mail: ltm2000@mail.ru

Abstract. The "Mulin Dol" stow is a natural monument of regional significance located in the Samara Oblast (Russia). It was established in 1987 in order to protect the natural complex of upland steppes in the southeastern part of the region. The natural monument is located southwards off the Bol'shoy Irgiz River valley, on the slopes of the Siniy Syrt steppe upland, which is a part of the Obshchey Syrt highland area. This protected area is a part of the Irgiz low-plain steppe physical-geographical region of the southern type. The flora and vegetation of this area were little affected by anthropogenic changes, so it attracted our attention. In total, 311 species of higher vascular plants have been registered here as a result of the study of vegetation cover. The Fabaceae-type flora prevails, Asteraceae, Poaceae and Fabaceae are dominant families. Four associations and two sub-associations, belonging to the class Festuco-Brometea, order Tanacetoo achilleifolii-Stipetalia lessingianae, alliance Tanacetoo achilleifolii-Stipion lessingianae, have been described in accordance to the approach suggested by J. Braun-Blanquet.

1. Introduction
The "Mulin Dol" stow is a natural monument of regional significance. It was established in 1987 in order to protect the natural complex of the upland steppes of the Rostashin-Irgiz Syrt [1]. Nowadays, the territory of the "Mulin Dol" serves as a refugium for steppe flora and fauna. The flora and vegetation of this area were little affected by anthropogenic changes, so they attracted our attention. The natural monument is located in the southeastern part of the Samara Oblast, southwards off the Bol'shoy Irgiz River valley, on the slopes of Siniy Syrt steppe upland, which is a part of the Obshchey Syrt highland area. According to the zoning principles suggested by A.V. Stupishin [2], this area belongs to the Irgiz low-plain steppe physico-geographical region of the southern type. The climate is temperate continental; this is the driest area of the Samara Oblast. The dominating soils are dark kastanozems calcareous; they occupy the middle and lower slopes of syrts (uplands) and sloping hills. The southern chernozems are noted in the upland areas of the Obshchey Syrt. The research area belongs to the dry steppe subzone of the steppe zone [3]. Steppe vegetation is zonal. Irgiz Region is characterized by a minimal forest cover; the floodplain forests only are presented in the Bol'shoy Irgiz River valley near the Pestravka village and downstream.

The territory of the "Mulin Dol" natural monument is 5090.02 hectares [1]. In 1999-2015, the employees of the Samara State University and the Samara State Social-Pedagogical University...
performed a number of field trips to study the area [4-6]. In total, 497 vascular plants species belonging to 237 genera, 50 families, and 3 divisions were reported [5].

2. Materials and Methods
Employees of the Laboratory of Phytodiversity Problems of the Institute of the Ecology of the Volga River Basin of the Russian Academy of Sciences studied the flora and vegetation of the "Mulin Dol" stow in 2014, 2015, and 2016. During these surveys, the vegetation cover of the area in the vicinity of the abandoned Fitali village and the Zherebyatnitsa Mountain was studied. The studies of the steppe vegetation were carried out in accordance to the approach suggested by J. Braun-Blanquet [7]. Geobotanical relevés were performed for the sites of 25-100 m² using standard methods [8; the data were introduced into the "Vegetation of the Volga and Ural Basins" database [9], developed using the TURBOVEG computer program [10] and processed in the JUICE program [11]. The total projective cover was estimated as a percentage (%). In order to assess the abundance of plant species on the studied sites, the scale suggested by B.M. Mirkin was applied [12]. The syntaxa names are given in accordance with the "International Code of Phytosociological Nomenclature" [13], the system of higher syntaxa, in accordance with "Vegetation of Europe..." [14]. Latin names of plants are given according to S.K. Cherepanov [15]. In total, 311 vascular plant species were found, four associations and two sub-associations were described.

3. Results and Discussion
The taxonomic parameters of the flora sample of the studied territory of "Mulin Dol" stow was considered as an element of the flora of entire Irgiz Region and in regard to its peculiarities as a part of the steppe zone flora. The data on the species composition of the "Desert Steppe Gryzly" natural monument were used for comparison [16, 17].

There were common features in the lists of the dominant families of the steppe flora spectra belonging to the same region. These were the Fabaceae-type, as well as the flora of the forest-steppe zone, represented by the flora of the Soksky physico-geographical region (Table).

Table. Dominant families of compared floras.

| Physico-geographical region | Irgiz | Gryzly | Sok |
|-----------------------------|-------|--------|-----|
| Botanical-geographical zone |       |        |     |
| Stow                        | steppe| steppe | steppe| forest-steppe |
| Number of species           | 770   | 311    | 352  | 1154           |
| Family                      |       |        |      |                |
| Ast (16.2)                  | Ast (18.8) | Ast (17.2) | Ast (15.8) |
| Poa (9.4)                   | Poa (11.0) | Poa (11.5) | Poa (8.9) |
| **Fab** (7.0)               | **Fab** (7.8) | **Fab.** Chen (7.5) | **Fab** (6.6) |
| Brass (5.1)                 | Lam (5.5)  | Brass (6.3)  | Ros (4.8) |
| Ros (4.8)                   | Brass (5.2) | Ran. Ros (4.0) | Brass (5.1) |
| Chen (4.7)                  | Scr.Api (4.8) | Api (3.7)  | Lam.Car (3.9) |
| Scr (4.0)                   | Car. Ros (3.6) | Lam (3.5)  | Cyp (3.6) |
| Lam (3.9)                   | Chen (2.9)  | Scr (3.2)   | Scr (3.6) |

The dominant flora families of "Mulin Dol" stow are Asteraceae, Poaceae and Fabaceae. They are also present in the analysis of 497 species performed by O.A. Kuzovenko [5]. The Astragalus genus dominates in the genera spectrum of the Fabaceae family of the flora of the considered natural monuments. The abundance of the Rosaceae family in the steppe zone is not high; it occupies lower
positions in the spectrum compared to the forest-steppe flora. However, Brassicaceae family has a slightly higher position. The contribution of the Chenopodiaceae family is increasing; it has higher positions in the steppe flora.

The studied vegetation is represented by dry steppes and their halophytic derivatives. The lower syntaxa belong to the class Festuco-Brometalia Br.-Bl. et Tx. ex Soó 1947, order Tanacetetalia lessingianae Lysenko et Mucina in Mucina et al. [17], alliance Tanacetetalia-Stipion lessingianae Royer ex Lysenko et Mucina in Mucina et al. [17]. The Tanacetetalia-Stipion lessingianae coenoses are often found in the "Mulin Dol" and occupy the gentle slopes of low hills adjacent to the Zherebyatnitsa Mountain from the north and on the steep southern and southwestern slopes of the mountain. They are found on the dark kastanozem calcareous soils, with a small number of small boulders on the surface. Limonio sareptanae-Stipetum lessingianae communities are found in the lower and middle parts of the southwestern slope of the Zherebyatnitsa Mountain on dark kastanozem solonetzic soils, in 0.5-km southeastwards of the Fitali village. Stipo pennatae-Stipetum lessingianae association is represented by two sub-associations: (1) Stipo pennatae-Stipetum lessingianae typicum coenosis locates in 0.5-km eastwards of the Fitali village, on the middle part of the slope of the Zherebyatnitsa Mountain and on the slopes of the low hills located near the mountain, on the southern chernozem soils; (2) Stipo pennatae-Stipetum lessingianae salvietosum tesguicolae communities are found in shallow depressions of the plain areas with southern chernozems in 1.5-km southwards of the Fitali village. Palimbio turgaicae-Stipetum pennatae coenoses are found rarely on the slopes of low hills with southern chernozems, they locate in 0.5-km southeastwards of the Fitali village.

4. Conclusion
In total, 311 species of higher vascular plants have been found in the vegetation cover of the "Mulin Dol" stow; the flora is characterized as Fabaceae-type of the steppe zone. Syntaxonomical analysis made it possible to distinguish four associations and two sub-associations belonging to the class Festuco-Brometalia, order Tanacetetalia-Stipetalia lessingianae, alliance Tanacetetalia-Stipion lessingianae.

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