

## Floristic areas of the Middle Volga region: materials to the analysis

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**Abstract.** The publication presents some quantitative characteristics of the 17 pre-selected floristic areas of the Middle Volga region (the total number of species, number of indigenous taxa and the number of differentiating species). Based on the available data, a linear regression is constructed, illustrating the relative dominance of allochthonous or autochthonous trends in the development of flora in the selected areas. The cluster analysis of the species lists of the floristic areas was completed, and then DCA-ordination of the selected areas was implemented. It is revealed that the forest-steppe areas of the Cis-Volga and Trans-Volga regions are situated by the level of species richness, and the number of species in the selected floristic areas is increasing from West and East towards the Volga.

For the territory of the Middle Volga region (within the borders of Samara oblast and Ulyanovsk oblast) to date floristic zoning is absent, which complicates the characterization of the distribution of vascular plants in the region and identification of patterns of their distribution. Previously, the working floristic zoning of the region was proposed [1]. This publication presents some quantitative characteristics of the selected areas and applied methodological practices.

There are 17 pre-selected districts, the analysis of the floristic specificity of which is made on the basis of indigenous species (table). Alien, extinct species and some species of the genera *Alchemilla*, *Pilosella* and *Taraxacum* didn't enter into consideration.

The work is based on the information stored in the Salix database, which contains information on nomenclature and distribution of species of plant within the Middle Volga region [2].

As it can be seen from the table, the number of indigenous species in the areas is almost comparable and varies from 1101 species (Zhigulevsky) to 541 (the Cheremshansky). With the exception of the South Volga, Bugulmino-Belebeevsky and Zasursky areas, information about the flora of which is very scarce.

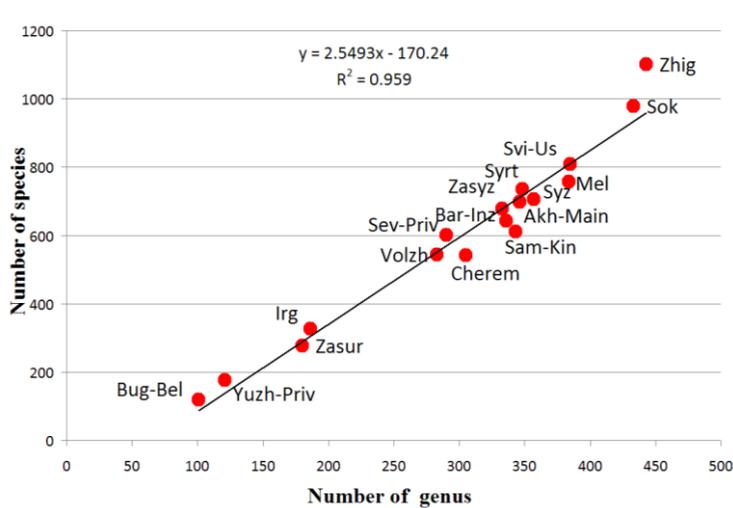
The forest-steppe areas of the Cis-Volga and Trans-Volga regions are situated by the species richness and the number of species in the selected floristic areas is increasing from West and East towards the Volga. It should also be noted that the floristic richness of the selected areas is associated not so much with the general physiographic conditions and degree of territory development, but also with their size.

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**Table.** The main characteristics of the floristic areas of the Middle Volga region

Floristic area	Total number of species	Total number of indigenous taxa			Number of differentiating species
		Families	Genera	Species	
Zhigulevsky	1358	107	443	1101	43
Sviyago-Usinsky	1043	103	385	808	5
Syzransky	822	96	357	706	10
Baryshsko-Inzensky	721	101	336	643	9
Severo-Privolzhsky	835	74	290	601	8
Zasursky	299	66	180	276	4
Yuzhno-Privolzhsky	187	40	121	175	1
Zasyzransky	759	86	333	678	4
Soksky	1156	104	433	978	22
Melekessky	1296	95	384	758	3
Samaro-Kinel'sky	683	92	343	611	6
Bugul'minsko-Belebeevsky	132	43	101	118	0
Cheremshansky	750	90	305	541	0
Akhtai-Mainsky	873	96	346	697	0
Irgizsky	369	53	186	327	30
Syrtovoy	877	82	348	735	8
Volzhsky	633	78	283	543	5



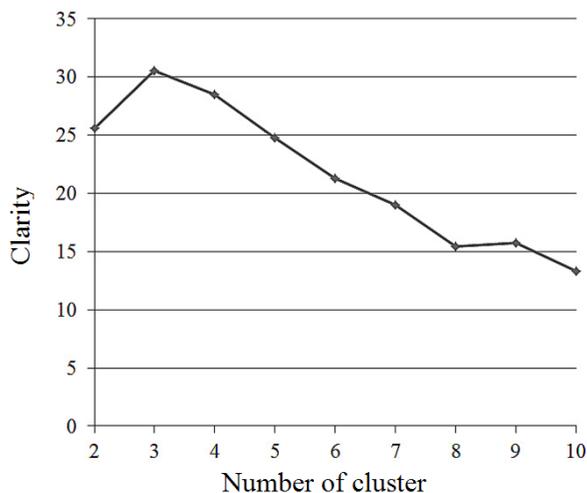
**Fig. 1.** The dependence of the number of species from the number of genus in the selected floristic areas

The number of identified at the moment of the differential species varies from 0 to Bugulmino-Belebeevsky, Cheremshansky and Ahty-Mainsky to 22 in Soksky, 30 in Irgizky and 43 in Zhigulevsky floristic areas. The total number of differential species is 156, which is about 10.5% of the sample. At the same time, 86 species are noted only in the Cis-Volga region, whereas 62 species are known solely in the Trans-Volga region.

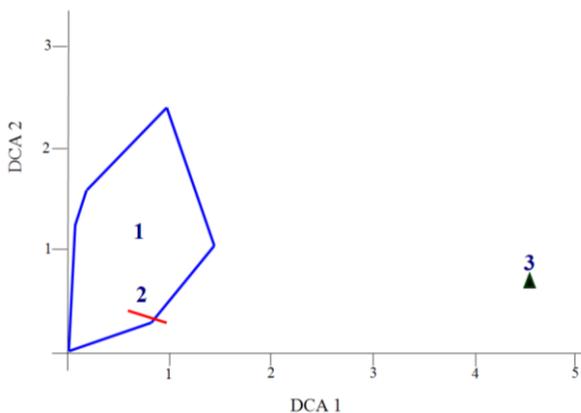
According to the algorithm proposed by O.V. Khitun and A.A. Zverev [3], linear regression was constructed on the basis of the ratio of the number of species and genus, illustrating the relative dominance of allochthonous or autochthonous trends in selected

floristic regions (Fig. 1). The coefficient of determination was very high in this case (0,959).

Floristic lists for the areas were formed into a database on the platform of the program TURBOVEG [4]. Processing and analysis were conducted with the assistance of the JUICE 7.0. software package [5]. Using the PC-ORD 5.0. program, the data were subjected to cluster analysis that divided the sample into 3 groups (Fig. 2), and after that the DCA-ordination was conducted using the built-in JUICE program of the "Ordjuice" module from the R software package [6].



**Fig. 2.** The results of the cluster analysis of species-specific lists



**Fig. 3.** DCA-ordination of the floristic areas of the Mid-Volga region

The first cluster unites almost all forest-steppe areas of the Cis-Volga and the Trans-Volga regions. The second cluster is the Zhigulevsky and Soksky floristic areas demonstrating the linkage between Zhiguli and the Urals, and the spread of most of the endemic species with the South Ural-Volga area is associated with these areas. The third cluster is Irgizky area, demonstrating a territory which is transitional to the dry steppe area (Fig. 3).

Thus, the proposed work represents an attempt to understand and analyze the working of the scheme of floristic zoning of the region. The study itself is an exploratory one, and the achieved results are largely preliminary.

## References

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