

## ECOLOGICO-FITOCENOTIC STAFF OF RARE PLANTS IN KANSK FOREST-STEPPE (eastern part of KATEK)

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**ABSTRACT.** Potential flora of rare plants in the Kansk forest-steppe includes 381 species, but the real staff now includes 294 species. Now we cannot find 90 species of rare plants, which were found before by other scientists. The rare plants of the Kansk forest-steppe are divided into 6 groups and 15 subgroups. The large part of the rare plants ecologico-cenological property marked at the groups of the steppe (92), forest (83) and meadows (79) species. In almost all cases, there were the humans who destroyed zonal complex and floristic complexes on the territory of the Kansk forest-steppes, causing thus rarity or disappearance of many plants.

Botanists are worried about the tempo of decreasing of species. The most valuable thing about the preservation of the biological variety on our planet is how to find and preserve the most valuable objects of nature; rare and disappearing plants and complicate the definition of their status. In nature rare plants belong to a very vulnerable biological group, because they grow on very limited area, usually the population of rare plants is not numerous, and they do not have quick tempo, of vegetation and family reproduction. The spread of farming lands caused that groups of rare plants which grew on the forest-steppes of Sredney Siberia disappeared causing disastrous effect on ecological and cenological complexes. That is why making ecological and fitocenologic estimation of all places in the habitat and the research of the population of rare relict and endemic species, and finding the ways to preserve them in nature became an actual problem to the botanists of our region. This work is necessary for the publishing of the Red Book of Krasnoyarsk region. This territory is very large with rich flora. Unfortunately, we still do not have a summary of rare and disappeared plants. We have to use a corresponding publication about Russia (1988), ex-USSR (1978, 1984), Siberia (1980), as guide books. These materials, based on the researches of the 1950s and 1960s, are unlikely to depict present conditions of the vegetable cover of our region.

Botanic books on the flora in the Krasnoyarsk region [5, 6] that concern this question, do not show us the changes that have happened in the last ten-years with buildings of objects of KATEK and others enterprises.

Kansk forest-steppe is situated on the south-east part of Krasnoyarsk region, it occupies a part from large Kansko-Rubinsko-Usolskoy hollow [7]. This plain surrounded by mountains at North, south frontier areas of Chyno-Birysinskogo Plato at North-west with Eniseyskiy circle, at south with spurs of East Sayan. Predominant plain surface with a growth from 130 – 200, to 500 m height at south. plants are found in concentric circles with a kserofit kernel and with predominant

forest surface in the frontier areas.

## MATERIAL AND METHODS

More than 12 thousand herbarium sheets were collected and about 500 geobotanic descriptions were made in Kansk forest steppe during the periods of expeditions (1984–1991; 1994–1997). The materials of Herbarium named after P. N. Krylova TGU, central Siberian botanic garden CO RAN and Krasnoyarsk Teachers Training University and other literature information.

Researching of flora was realized by a method included in the work of studying 12 local floras. All research stations were visited 3 times in different years and in different vegetation seasons. In analyzing of flora, traditional and mathematical methods were used.

## RESULTS

Species, that have 1-3 location in Kansk forest-steppes, were analyzed. The species with location 1 – 6 [8] were taken as rare plants in the territory of Hakasiy. List of rare plants that we now have for the analyzing include the following categories of taxons:

I – Species that existed on this territory in the past and that we still have nowadays.

II – Species that were not noted before, but that are found now (first time gathered).

III – Species that existed earlier, but are not found now (not found).

The real staff of rare plants in Kansk forest-steppe makes a total of two first categories (291 species). Potential flora includes taxons of all categories, that exist nowadays and taxons that existed before [9]. In the first unit of ecological analysis we consider ecologico-fitocetonic group (ecological for short), which includes species with similar reactions to the atmosphere on the places of their habitat in certain botanic-geographical zones. In the conditions of Kansk forest-steppe 6 groups and 15 subgroups (Table 1) are recognized. Common species are very often found in different places of habitat. In this case such species were recorded in a group as usual.

## DISCUSSION AND CONCLUSION

There was no special research in Kansk forest-steppes. Some researches that we made, showed us the staff [10], number of species and concrete places of habitats of rare plants in Kansk forest-steppe. In a regional summary of rare and disappearing plants of Siberia only 16 species, or 2% of the staff of flora (1980) on the territory of

Kansk forest-steppe were recommended. The obtained information for protection helps us to observe and to compare the fate of different ecological groups of rare plants, and understand the causes of their rarity in Kansk forest-steppe.

#### I. GROUP OF FOREST SPECIES.

Forest in Kansk forest-steppe predominate in natural vegetation. That is way forest flora is one of the most varied (4 subgroups) and rich in species. Pine forest subgroup is scanty. There are few dry pine forests in the forest-steppe marked only at two points. Mixed - forest subgroup includes species, that grow up in dry birch groves, and in other petty-leaf forest in mixed forests. Swamp-forest subgroup which is most numerous, includes plants in the swamp forests and in the places which are overgrown with scrubs on the river banks. plants in umbrophilus-forest subgroup give most shadow, and usually grow close to valleys with fir forests (*Smilacina trifolia* (L.) Desf., *Allium microdysction* Prokh., *Rubus arcticus* L.). In general, the potential staff in this group is 83 species or 21,9% of all rare plants, but the real staff is 72 (18,9%). Forest flora in Kansk forest-steppe corresponds to enviromental conditions. A great number of rare plants contained in the forest flora is a result of strong influence of antropogenic factors (fell, increased recreation activities and stock-breeding). The least changes concerning the number and staff of rare plants are in the border parts (pine forest and umbrophillous-forest groups). They are most resistant to the influence of antropogenic factors.

#### II. GROUP OF STEPPE SPECIES.

Group of steppe species includes 92 species or 24,3%, but the real staff is 72 (18,9%) of rare plants. There are few steppe places in the territory of forest-steppes which are ploughed, where roads and houses are built, etc., being exploited and with excessive stock-breeding. These serious changes are not only caused by mechanical destroying of steppes, but also by modern climatic conditions. A lot of steppes species in Kansk forest-steppes are situated in the North boarder of their areas, with few of those plants of little abundance.

#### III. GROUP OF MEADOW SPECIES.

Meadows in Kansk forest-steppes are an integral part of the landscape and occupy a large part of general staff of flora. All meadows are antropogenus. Coefficient of utilization of meadows in Kansk forest-steppes is very high, particularly near the villages and stock-breeding farms. That is why the number of rare plant is 82 (or 21,7% all of rare plants) in this group.

#### IV. SWAMP SPECIES.

On lowland and grassy swamps in Kansk forest-steppes 41 rare plants (10,8% all rare plants) were marked. The appearance of a great number of rare plants among swamp species on the territory of steppes is both on purpose (drainage, etc.) and natural (breach of feeding, fill in etc.)

## V. GROUP OF WATER SPECIES.

In general there are 47 species of rare plants (12,4% in the group). The main cause of their rarity is the same as for swamp species. It is the pollution of water by organic waste, mineral fertilizer and pesticides caused by the operation of the objects of KATEK.

TABLE 1.

Group	Undergroup	Potential flora	Real flora	plants Pesap-percing
I. Forest species		83	72	11
	1. Pine forest	8	7	1
	2. Mixed-forest	24	20	3
	3. Swamp-forest	34	29	5
	4. Umbrophiluss-forest	17	16	2
II. Steppes		92	72	20
	5. Steppes	67	51	16
	6. Meadow-steppes	25	21	4
III. Meadow Species		82	54	29
	7. Pratum siccum	29	21	8
	8. Valley-meadow	48	28	20
	9. Pasture	5	4	1
IV. Swamp Species		41	24	17
	10. Low-lying swamp	41	24	17
V. Water Species		47	40	7
	11. Coastal	27	24	3
	12. Water	20	16	4
VI. Weed Species		36	30	6
	13. Segetalis	17	11	6
	14. Ruderalis	3	3	
	15. Viarum	16	16	
All		381	291	90

## VI. GROUP OF WEED-RUDERALIS SPECIES.

In the research of rare plant we researched all 36 species or 9,5% of weed plants. Some weed plants that had been found earlier by other scientists were not found. Causes of rarity of weed plants are clear. They are not protected from modern methods of struggle. Ruderalis plants that usually inhabit the places of rubbish, are less than weeds. There is no special struggle and its preservation is very high. In the under-group of Viarum plants there are the plants that live not only by village and field roads but also near railway embankment (*Isatis costata* C.A.Mey., *Linaria acutiloba* Fisch. ex Reichenb.). In this subgroup 16 species are marked and 12 newly marked. It is evident that the unremitting process of enrichment of flora of Kansk forest-steppes, in general, consist of species that grow near the railway roads.

So, in Kansk forest-steppe we can find a total of 381 ecological groups (47,5%

of all staff in Kansk-forest steppe), out of which we found 11,2% from all staff of flora, and the real staff is 291 (36,3% from all staff of flora). Most of rare plants are marked as

1. group of steppe species (92 or 24,3% of all rare species)
2. group of forest species (83 or 21,9% of all rare species)
3. group of meadow species (82 or 21,7% of all rare species)

In almost all cases, the rarity in Kansk forest-steppes is caused by human pressure. Spreading of steppes species is limited by climatic factors. Anthropogenic factors on the territory of Kansk forest-steppes destroyed zonal and floristic complexes. In this case we must consider the question how to save not only species but the entire forest-steppe landscape.

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