The conservation of biodiversity of mountain plant communities

S G Kozirev¹, S A Bekuzarova¹, A P Glinushkin² and I Yu Podkovyrov ²

¹ Gorsky state agrarian university, Vladikavkaz, Kirova str., 37, 362040, Russia
² State Scientific Institution "All-Russian Research Institute of Phytopathology", Russian Agricultural Academy", st. Institute, own 5, Bolshie Vyazemy, Odintsovo distr., Moscow reg., 143050, Russia;

Corresponding author’s e-mail: bekos37@mail.ru

Abstract. The biodiversity of mountain vegetation is of high value not only for the animal and plant world, but also as a factor in preserving the biosphere. In order to preserve biodiversity, the preserved biological objects were monitored, valuable forage grasses were sown, and after spring regrowth, the biological product NIKFAN was introduced in a concentration of 0.1% aqueous solution. The results of the experiments showed a more intensive growth of plants, an increase in both feed and seed productivity. Leguminous grasses were sown in degraded areas with preliminary introduction of clay deposits of rocks. The results obtained are indicators of positive results for biodiversity conservation and reintroduction of mountain plant communities

Keywords: seeding of herbs, feeding with biological products, feed value, biodiversity, phytocenosis

1. Introduction.
To preserve the biodiversity of mountain phytocenoses, geobotanical studies are usually carried out, where various ecotypes are determined which differ in morphological and ecological features. Vegetation, as a biotic component of any natural ecosystem, plays a crucial role in the structural and functional organization of the ecosystem and determining its boundaries.

At the same time, negative changes are taken into account both in the structure of vegetation cover (reduction of the area of indigenous associations, changes in forest cover), and at the level of plant communities and individual species (populations): changes in species composition, deterioration of Association and age spectrum of dominant coenopopulations [1, 2].

The population density of indicator species is one of the most important indicators of the state of the ecosystem, highly sensitive to the main anthropogenic factors. As a result of anthropogenic impact, the population density of negative indicator species decreases, and positive indicator species increases. The threshold value of the anthropogenic load should be considered a decrease (or increase) in the population density of the indicator species by 20% and the critical value is 50%.

One of the essential parameters of price populations is the age aspect - the share of participation in them. Age States were established on the basis of a set of morphological features of absolute age in
cases where its determination is not particularly difficult. The high biological diversity of mountain areas is associated with the history of their development, the manifestation of high-altitude zoning, and the proximity of different types of landscapes. They differ in the biogeochemical structure, which is based on a complex of biotic and bio-inert connections. Its characterization took into account indicators of the structure of plant communities, the diversity of species with different phylogenetic specialization, and parameters of autotrophic and heterotrophic biogenesis, which can be used in assessing biodiversity and shown on special ecological and geochemical maps. When compiling ecological and geochemical maps (scale 1:100000, etc.) for certain areas, data from field studies were used, including large-scale landscape mapping and geochemical testing of soils, plants and waters [3,4].

A huge amount of biological diversity is concentrated in mountainous areas, but the current negative impact has led to the fact that useful phytocenoses are destroyed, and the remaining ones are unproductive. Anthropogenic impact provoked the loss of important functions in plants – self-healing. There is a noticeable reduction in the territories of mountain phytocenoses, which violates the balance of the natural system. Unreasonable use of agricultural land provokes degradation of the soil cover in mountainous areas. It is known that the anthropogenic impact on the environment has acquired a huge scale [5].

Violations occurring in the phytocenosis reduce the adaptive capacity of the herbage, they weaken; reduce productivity, durability and resistance to adverse factors. Species that were previously characteristic of indigenous communities do not find ecological niches and are on the verge of extinction, which contributes to the depletion of the species composition. The variety of climatic and ecological conditions determines the different quantitative and qualitative ratio of plants within plant communities in different high-altitude zones [6,7,8].

Meadow agroecosystem, which is a biogeocenosis, the main role in which is assigned to the phytocenosis and the active anthropogenic factor, thanks to its photosynthetic ability, accumulates solar energy not only in the aboveground, but also in the underground mass, having a great influence on increasing soil fertility. As a community of perennial herbaceous species, grasslands play a huge role in ecology. Natural pastures and hayfields, as the most important component of the biosphere, have not only forage resources, but also determine the state of land resources, soil fertility, genetic diversity of flora and fauna, as well as the quality of human habitat [9].

Not only their economic significance, but also their ecological functions depend on the state of grassland ecosystems. Meadow communities are especially important in the mountainous zone. In the mountain zone, natural phytocenoses are subject to strong stress effects. The plant communities influenced by extreme climatic conditions, which contribute to the manifestation of adverse effects of anthropogenic and zoogenic factors. The scarcity of usable land in the foothills puts increasing pressure on mountain valleys where there is a risk of water erosion. Among the problems of nature protection and ecology, biodiversity is paramount. The mountainous regions of the Republic are a valuable source of biological diversity, but in recent years they have undergone significant changes, being subjected to anthropogenic destruction, leading to the disappearance of valuable plant species, and the remaining species are unproductive. Forage grasses of mountain phytocenoses are particularly affected. The human impact on grassland communities has become so powerful that they have lost their resistance to the processes of anthropogenic transformation and lose the most important property of self-renewal. In this regard, the area of populations of valuable grasses is reduced, which violates the relationship of the natural system.

Intensive and irrational use of natural forage lands has led to a widespread spread of degraded processes in the mountain zone. An urgent problem is the study of the biodiversity of plant communities in the Caucasus region. In this regard, the task of a comprehensive inventory of natural forage lands, taking into account their economically valuable features, is of particular importance.
2. Methods and materials
To sow grasses, the sod was mechanically processed, for which it was destroyed by star-shaped disks assembled in a battery with an adjustable angle of attack. When the unit moves across the field, the cultivator paws go deep into the blackened layer to a depth of 20 cm without vertical mixing and with the preservation of plant residues on the soil surface. Then a battery of star-shaped disks, which goes directly behind the loosening cultivator organs, produces additional loosening of the upper soil layer to a depth of 10 cm, while simultaneously sealing clay deposits, creating a fertile layer, retaining moisture. After this treatment, the seeds of grasses collected in the same areas were sown, that is, these crops were returned to their place of growth, that is, reintroduction. To improve the herbage and resume its growth, Nikfan was used as a stimulator - a biological product, which was sprayed at the beginning of regrowth in a concentration of 0.1% aqueous solution. This biological product enhances root formation and photosynthesis, resistance to diseases, and improves symbiosis with nitrogen-fixing bacteria.

3. Results and discussion
One of the urgent problems is the seeding of grasses, which are carried out by mechanisms adapted for this work for processing sod. Seeded legumes: alfalfa, clover, sainfoin and others, sown after the introduction of clay deposits of rocks, contain a number of micro- and macronutrients (boron, copper, molybdenum, zinc, manganese, cobalt, vanadium, iron, sulfur, phosphorus and other rare earth elements) within acceptable limits, providing nutrition for the seeded crops. The results of experiments showed that sown grasses and preliminary application of local clays of rocks provide high plant survival, while maintaining moisture in the soil, as well as the yield of the resulting hay and the number of nitrogen-fixing bacteria (table 1). The table data show that the best option is to apply clays within 0.3-0.5 t/ha, which increases the survival rate of plants within 86-91%, while maintaining moisture of 70-80 %, reaching a hay yield of 18-25 c/ha and the number of nitrogen-fixing bacteria on one plant from 75 to 115 PCs, which is 2-3 times higher than the control variant.

**Table 1.** Effect of seeding grasses mixed with clay deposits on the productivity of mountain phytocenosis

| Doses of clay deposits application | Plant survival rate, % | Amount of moisture in the soil, % | The hay crop, c/ha | Number of nitrogen-fixing bacteria, pieces of 1 plant. |
|-----------------------------------|------------------------|----------------------------------|-------------------|---------------------------------|
| Seeding of herbs (without clay) control | 67                     | 35-40                            | 6-8               | 46                              |
| Clay deposits 0.1-0.2 t/ha       | 75                     | 50-60                            | 10-15             | 75                              |
| Clay deposits 0.3-0.5 t/ha       | 91                     | 70-75                            | 20-25             | 115                             |
| Clay deposits 0.5-0.7 t/ha       | 86                     | 75-80                            | 18-20             | 82                              |

In the experiment on the use of the biological product Nikfan, it was found that such top dressing during the regrowth period increases the mass of plants, enriching the soil with valuable nutrients, in particular biological nitrogen (table.2).

**Table 2.** The influence of biopreparation Nichan on the growth and development of pasture plants

| Experience option               | Green mass of growing grass after 10 days, kg/m² | The height of plants (clover +timothy), sm |
|--------------------------------|-----------------------------------------------|------------------------------------------|
| Control (without processing)   | 1,65                                          | 35-42                                    |
Feeding with water 1,86 37-45
Feeding an aqueous solution of a biological product at a concentration of Nichan 0,2% 2,24 39-46
Feeding an aqueous solution of Nichan of 0.1 % (optimum variant) 2,95 41-48
Feeding Nikiana in the concentration of the aqueous solution 0,05% 2,35 38-47

The obtained results indicate that when feeding the growing herbage with the biological product Nikfan, an increase in green feed and its growth is provided.

4. Conclusion
On degraded pastures, taking into account vertical zoning, there is a decrease in valuable forage crops of legumes and grasses. One of the most important agricultural practices is reintroduction, that is, seeding grasses on damaged areas with seeds collected from preserved plants on this site.

To restore the biodiversity of mountain phytocenoses, it is recommended to carry out fertilizing with the biological product Nikfan in a concentration of 0.1% aqueous solution during the spring regrowth of plants.

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