The current state of flora in the vicinity of the village of Aigursky

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Abstract. Monitoring of the species of dry steppe biocenosis on the right bank of the Aygurka River in the Stavropol Territory showed that there are 151 species of herbaceous plants belonging to 112 genera from 32 families, of which 11 are rare species of the regional Red Data Books. The projective cover of the biocenosis was 50-90%, with a plant height of 10-60 cm. In the study area, anthropogenic load (pasture farming, agriculture) led to the impoverishment and destruction of natural zonal steppes. There is a change in the positions of the zonal dominants of perennials to one-biennials. The share of fodder plants decreases to 48%, medicinal plants - 11%, melliferous plants - 7%, ruderal plants - 13%, and the share of synanthropic vegetation increases to 21%. There is not a large number of shrubs and semi-shrubs (4%), but there is no tendency towards afforestation. Cenopopulations of rare plants, mainly with a full age spectrum.

Recently, due to the influence of anthropogenic factors, the number of species of the world flora has been catastrophically decreasing. One of the urgent problems of our time is the problem of interaction between nature and man, which is expressed in the progressive intensification of anthropogenic loads on the natural environment. At the present stage of development of nature and man, anthropogenic influence has acquired a global scale. Without control, humanity's activities lead to environmental pollution, climate change, destruction of the ozone layer, accelerated development of erosion processes, degradation of soil and vegetation cover.

The extinction of species is associated both with natural factors (general climatic changes) and with a constant increase in anthropogenic load (plowing of land, uncontrolled grazing, fires, digging and cutting into bouquets of ornamental plants, etc.). Conservation of biodiversity of flora and fauna is a prerequisite for sustainable development of the biosphere. In accordance with the Basic Provisions of the National Strategy for the Conservation of Biodiversity of Russia, an inventory of flora and fauna, preparation and publication of the Red Regional Books, and the creation of a system of specially protected natural areas are being actively carried out in many regions of the country [1]. Monitoring plant populations in their natural habitats in situ is one of the priority tasks in the work of botanical gardens.

Natural plant communities of the northeastern and eastern parts of the lowland of the Stavropol Territory are distinguished by a high degree of plowing. There is a decrease in the soil-protective function of the vegetation cover, its projective cover has decreased from 70-80 to 30-50%. Wind and...
water erosion becomes more active, weakly fixed or mobile soils appear. The processes of land desertification are accelerating.

A consequence of the negative anthropogenic impact on natural forage lands is the impoverishment and reduction of the gene pool of flora and fauna, and the existing system of nature reserves and sanctuaries does not provide the desired environmental effect. In the current conditions, a program for inventory, monitoring and preservation of the remains of zonal virgin communities in the Ipatovsky district is of particular importance [2].

In this regard, the task was to study the current state of a fragment of a virgin community in the vicinity of the village of Aigursky with the aim of making an inventory, organizing monitoring and further identifying it as a nature reserve. The work was carried out in accordance with the state assignment and the topic of research: "Search, mobilization and conservation of genetic resources of cultivated plants and their wild relatives in order to study, preserve and use the biodiversity of forms of cultivated plants." The most reliable and effective method of conservation of floristic resources is the protection of plant species in nature and natural habitats, in which optimal development and renewal of plants is ensured.

The nature of the work is expeditionary, stationary, office. We used the method of route survey, which allows us to fully cover various elements of the relief with their characteristic specificity of plant communities. The trips were carried out at different times of the year, which made it possible to observe the objects under study at various stages of development as much as possible [3]. The habitats of species populations were established by the method of point mapping. Systematic descriptions and new combinations were presented in accordance with the International Code of Botanical Nomenclature [4, 5, 6]. Monitoring of rare species in culture and nature was carried out according to the "Program and methodology for observing cenopopulations of plant species in the Red Book of the USSR" [7].

The study of the species composition of the phytocenosis was carried out using the standard method for describing geobotanical sites. Determined the ecological characteristics of the habitat (features of the relief, soil type, salinity, the nature of moisture, features of lighting). When studying the age states of populations, the following symbols were used: juvenile plants (j), immature (im), generative (g), and blue (s).

Sozological studies of rare species were carried out by analyzing the categories of protection and the status of the species of the species. Population vitality was determined using a 5-point scale. The abundance of species was determined according to Drude [8]. The category of protection means the degree of importance of preserving the gene pool of a given species and is subdivided into five categories: regional endemics, subendemics, relict species that have point habitats in the region and are rare beyond its borders: glacial and xerothermal relics, species that do not belong to the first four categories are rare in natural reasons.

Observations of the state of the biocenosis were carried out in 2012, 2015, 2016, 2019, in the Ipatovsky district of the Stavropol Territory. The investigated area of virgin lands is the right terraced slope of the Aygurka river bank, dissected by ravines, with elevation changes, with an area of more than 90 hectares. The climate is sharply continental: summers are hot and dry with a maximum summer temperature of +44 °C and a minimum winter temperature of -34 °C. It is characterized by dark chestnut and chestnut soils; with an average annual precipitation of 433-482 mm, GTC = 0.64-0.81, an average annual air temperature of 10.7-11.2 °C, with a sum of temperatures above +10 °C - 3650-3800 [9]. The preserved study area of virgin lands (105-126 m above sea level) is located between the villages of Aigursky and Sovetskoye Runo, which is characterized by a plowed-up land of more than 70%, a spontaneous type of resource use in pasture farming, and a complete lack of maintenance and restoration work.

According to geobotanical mapping, the virgin community studied by us is located in the area - wormwood-fescue-feather grass steppe with an admixture of representatives of the semidesert zone - Kochia prostrata (L.) Schrad, Tanacetum millefolium (L.) Tzvelev, Achillea micrantha Willk., Achillea micrantha Willk., Alyssum turkestanicum, var. desertorum (Stapf) Botsch and others on complexes of solonetzes and chestnut soils.
Monitoring showed that the rare flora of the studied area contains 151 plant species belonging to 112 genera from 32 families (Poaceae, Caryophyllales, Rosaceae, Boraginaceae, Ranunculaceae, Lamiaceae, Fabaceae, Scrophulariaceae, Asteraceae, Dipsacaceae, Geraniaceae, Apiaceae, Rubiaceae, Violaceae и др.), of them - 11 rare species of the Red Regional Books (table 1).

Table 1. Floristic composition and abundance of plants in the vicinity of village Aygursky in 2012-2019 (10×10, n =40).

| №  | Species, floristic group  | Abundance | Vital cycles | Vital forms |
|----|--------------------------|-----------|--------------|-------------|
| 1. | *Agropyron desertorum* (Fisch. ex Link) Schult. | sp³ | M | Cr, geophyte |
| 2. | *Agropyron pectinatum* (M. Bieb.) P. Beauv. | sp³ | M | Cr, geophyte |
| 3. | *Anisantha tectorum* (L.) Nevski | sp³ | O | T |
| 4. | *Bothriochloa ischaemum* (L.) Keng | sp³ | M | Cr, geophyte |
| 5. | *Bromopsis riparia* (Rehmann) Holub | sp³ | M | Cr, geophyte |
| 6. | *Bromus squarrosus* L. | sp³ | O | T |
| 7. | *Bromus japonicus* Thunb. | sp³ | M | Hk |
| 8. | *Dactylis glomerata* L. | sp³ | M | Hk |
| 9. | *Poa angustifolia* L. | sp³ | M | Hk |
| 10. | *Poa bulbosa* L. | sp³ | M | Hk |
| 11. | *Festuca valesiaca* Gaudin | cop³ | M | Hk |
| 12. | *Festuca ovina* L. | cop³ | M | Hk |
| 13. | *Phleum phleoides* (L.) H. Karst. | sol | M | Cr, geophyte |
| 14. | *Koeleria macrantha* (Ledeb.) Schult. | sp³ | M | Hk |
| 15. | *Cleistogenes bulbarica* (Bormm.) Keng | sol | M | Cr, geophyte |
| 16. | *Hordeum leporinum* Link | sp³ | M | T |
| 17. | *Cynodon dactylon* (L.) Pers. | sp³ | M | Hk |
| 18. | *Elytrigia repens* (L.) Nevski | sp³ | M | Cr, geophyte |
| 19. | *Setaria pumila* (Poir.) Roem. & Schult. | sp³ | O | T |
| 20. | *Stipa ucrainica* P.A. Smirn. | sol | M | Hk |
| 21. | *Stipa tirsia* Steven. | cop³ | M | Hk |
| 22. | *Stipa lessingiana* Trin. & Rupr. | sol | M | Hk |
| 23. | *Stipa pennata* L. | sol | M | Hk |
| 24. | *Stipa capillata* L. | sol | M | Hk |
| 25. | *Carex supina* Willd. ex Wahlenb. | sp³ | M | Hk |
| 26. | *Carex stenophylla* Wahlenb. | sp³ | M | Hk |
| 27. | *Pulsus* | | | |
| 28. | *Astragalus bungeanus* Boiss. * | [sp³] | M | Hk |
| 29. | *Astragalus calycinus* M. Bieb. * | [sp³] | M | Hk |
| 30. | *Astragalus brachycarpus* M. Bieb. * | [sp³] | M | Hk |
| 31. | *Astragalus dolichophyllus* Pall. | [sol] | M | Hk |
| 32. | *Trifolium arvense* L. | sol | O | T |
| 33. | *Trifolium repens* L. | sol | M | Hk |
| 34. | *Medicago lupulina* L. | sp³ | M | Hk |
| 35. | *Medicago romanica* Prodan | [sp³] | M | Hk |
| 36. | *Medicago minima* (L.) Bartal. | un | O | T |
| 37. | *Melilotus officinalis* (L.) Pall. | sp³ | DV | Hk |
| 38. | *Lathyrus tuberosus* L. | sp³ | M | Hk |
| 39. | *Securigera varia* (L.) Lassen | sp³ | M | Hk |
| 41. | Glycyrrhiza glabra L. | [sol] | M | Hk |
| 42. | Vicia cracca L. | [sol] | M | Hk |

| Raznotravie |
|---|
| 43. | Rhamnus cathartica L. | [un] | M | Phn |
| 44. | Prunus stepposa Kotov. | [sol] | M | Phn |
| 45. | Rubus caesius L. | [sol] | M | Ph |
| 46. | Rosa, sp. | [sol] | M | Ph |
| 47. | Ajuga chia Schreb. | un | M | Hk |
| 48. | Alyssum turkestanicum var. desertorum (Stapf) Botsch. | sp¹ | O | T |
| 49. | Althaea hirsuta L. | [sol] | M | T |
| 50. | Artemisia scoparia Waldst. & Kit. | un | M | T |
| 51. | Artemisia austria Jacq. | sol | M | Hk |
| 52. | Artemisia lacernana Weber ex Stechm. | sp¹ | M | Hk |
| 53. | Arenaria serpyllifolia L. | sp¹ | O | T, Hk |
| 54. | Achillea arabica Kotschy | sol | M | Hk |
| 55. | Allium rotundum L. | un | M | Cr, geophyte |
| 56. | Allium pseudoav藩um Vved. | [sol] | M | K |
| 57. | Asparagus officinalis L. | [sol] | M | Cr, Γ |
| 58. | Androsace maxima L. | sp² | O | Hk |
| 59. | Agrimonia eupatoria L. | sol | M | Hk |
| 60. | Amygdalus nana L. | sol | M | Ch |
| 61. | Bassia prostrata (L.) A.J. Scott | [sol] | M | Ch |
| 62. | Buglossoides arvensis (L.) I.M. Johnst. | sp¹ | O | T |
| 63. | Buglossoides tenuiflora (L. f.) I.M. Johnst. | sp¹ | O | T |
| 64. | Jurinea eversmannii Bunge * | [sol] | M | Hk |
| 65. | Jurinea arachnoidea Bunge | [sp¹] | M | Hk |
| 66. | Delphinium consolida L. | sp¹ | O | T |
| 67. | Linum austriacum L. | sp¹ | O | T |
| 68. | Linum tenuifolium L. | sp¹ | O | T |
| 69. | Lactuca serriola L. | sp³ | O– DV |
| 70. | Linaria vulgaris Mill. | sp³ | O– DV |
| 71. | Lithospermum officinale L. | sp³ | O– DV |
| 72. | Marrubium vulgare L. | sol | M | Hk |
| 73. | Melampyrum arvense L. | sol | O | T |
| 74. | Myosotis micrantha Pall. ex Lehm. | sp³ | O– DV |
| 75. | Falcaria vulgaris Bernh. | sp³ | M | T |
| 76. | Ferulago galbanifera (Mill.) W.D.J. Koch | [sol] | M | Hk |
| 77. | Holosteum umbellatum L. | sp¹ | O | T |
| 78. | Herniaria incana var. angustifolia Fenzl. | sp³ | M | Ch |
| 79. | Pastinaca pinnellifolia M. Bieb. | sol | M | Hk |
| 80. | Phlomis pungens Willd. | sp³ | M | Hk |
| 81. | Potentilla recta L. | sp³ | M | Hk |
| 82. | Polygonum aviculare L. | sp³ | O | T |
| 83. | Potentilla polygonum Waldst. & Kit. | sp³ | M | Hk |
| 84. | Plantago lanceolata L. | sol | M | Hk |
| No. | Species Name | Genus | Subgenus | Insect | Reference |
|-----|--------------|-------|----------|-------|-----------|
| 92. | Ranunculus sceleratus L. | sol | O | T |
| 93. | Reseda lutea L. | sol | M | T, Hk |
| 94. | Camelina microcarpa Andr. | sp² | O | T |
| 95. | Cardaria draba (L.) Desv. | sol | M | Hk |
| 96. | Carduas acanthoides L. | sol | DV – | Hk |
| 97. | Carduas uncinatus M. Bieb. | sp¹ | DV – | Hk |
| 98. | Cirsium incanum (S.G. Gmel.) Fisch. | sol | M | Hk |
| 99. | Cichorium intybus L. | sol | M | Hk |
| 100. | Chondrilla juncea L. | [un] | DV – | Hk |
| 101. | Colchicum laetum Steven.* | [sol] | M | Cr, Γ |
| 102. | Convolvulus arvensis L. | sp³ | M | Hk |
| 103. | Goniolimon tataricum (L.) Boiss. | sol | M | Hk |
| 104. | Centaurea diffusa Lam. | sol | M | Hk |
| 105. | Centaurea orientalis L. | sol | M | Hk |
| 106. | Cephalaria uralensis (Murray) Schrad. ex Roem. & Schult. | sol | M | Hk |
| 107. | Cascuta campestris Yunck. | sol | O | T |
| 108. | Euphorbia stepposa Zoz ex Prokh. | sp¹ | M | Hk |
| 109. | Euphorbia seguieriana Neck. | sol | M | Hk |
| 110. | Erigeron annuus (L.) Pers. | sp¹ | O | Hk |
| 111. | Eryngium campestre L. | sp¹ | M | Hk |
| 112. | Erodium ciconium (L.) L’hé. | un | O – | T |
| 113. | Ephedra distachya L. | [sol] | M | Ch |
| 114. | Echium vulgare L. | sol | DV | Hk |
| 115. | Galium humifusum M. Bieb. | sp¹ | M | Hk |
| 116. | Galium album Mill. | sol | M | Hk |
| 117. | Galium aparine L. | sol | O | T |
| 118. | Gypsophila glomerata Pall. ex Adams * | sp¹ | M | Hk |
| 119. | Geranium tuberosum L. | sol | M | Hk |
| 120. | Viola arvensis Murray | sol | O | T |
| 121. | Veronica chamaedrys L. | sp¹ | M | Hk |
| 122. | Veronica arvensis L. | sp¹ | O – | T |
| 123. | Veronica verna L. | sol | O – | Hk |
| 124. | Vinca herbeacea Waldst. & Kit. | sp¹ | M | Hk |
| 125. | Verbascum lychnitis L. | sol | M | Hk |
| 126. | Verbascom phlomoides L. | sol | DV | Hk |
| 127. | Iris halophila Pall. | [sol] | M | Cr, Γ |
| 128. | Iris pumila L. | [sol] | M | Cr, Γ |
| 129. | Iris furcata Bieb. * | [sol] | M | Cr |
| 130. | Inula britannica L. | [sol] | M | Hk |
| 131. | Scorzonera mollis M. Bieb. | sol | M | Hk |
| 132. | Scleranthus annuus L. | sp¹ | O – | T, Hk |
| 133. | Silene wolgensis (Hornem.) Besser ex Spreng. | sol | DV | Hk |
| 134. | Salvia deserta Schangin | [sp¹] | M | Hk |
| 135. | Salvia aethiopis L. | [sol] | M | Hk |
| 136. | Scabiosa ochroleuca L. | sol | M | Hk |
| 137. | Stachys atherocalyx K. Koch | sol | M | Hk |
| 138. | Taraxacum officinale F.H. Wigg. | sol | M | Hk |
On 60% of the study area, the projective cover, one of the main indicators of abundance in phytocenology, was 70-90%, 25% - 40-70%, and 15% of the territory - up to 25%, plant height from 10 to 60 cm. species depends not only on the floristic richness, but also on the degree of study and the extent of the territory. The number of species per 100 m² was subject to significant fluctuations and depends on the timing of the description (March-July). On average, there are 25 to 42 species per 100 m². In the study area, the flora is represented by perennials - 78%. Annuals account for 15%, the rest - for annuals, biennials and others no more than 4%. There is a change in the positions of the zonal dominants of perennials for one- and biennials. The share of fodder plants decreases to 48%, medicinal plants - 11%, melliferous plants - 7%, ruderal plants - 13%, and the share of synanthropic vegetation increases to 21%. There is not a large number of shrubs and semi-shrubs (4%), but there is no tendency towards afforestation. Cenopopulations of rare plants, mainly with a full age spectrum.

Forbs predominates in the biocenosis - 73% (Achillea nobilis, Myosotis micrantha, Euphorbia stepposa, Veronica arvensis, Salvia desertu, etc.), cereals and sedges account for 18%, the rest is leguminous components (Astragalus bungeanus, Astragalus calycinus, Astragalus calycinus Melilotus officinalis, Medicago lupulina, Vicia cracca, etc.), which are one of the main feed components. After the last detailed study of V.G. Tanfilyev [10], it was found that the number of therophytes decreased by 2 times and the hemicyrptophytes increased, and according to the recommendations of Vlasenko, the following ratio was recommended for the operation of the ecosystem: 70% - fodder, 15% - medicinal, 7% - ruderal, 5% - poisonous, 1% - others. species [11]. In the study area, the total composition contains 48% - forage plants, medicinal - 11%, melliferous - 7%, ruderal - 13% and others - 21%, which indicates the loss of biodiversity due to improper economic activities, without control grazing. There is not a large number of shrubs and semi-shrubs (4%), but there is no tendency towards afforestation.

But despite this, the remains of dry virgin wormwood-cereal and wormwood-fescue steppes are in a fairly good condition with a good composition of fodder grasses and legumes and a large amount of forbs. The anthropogenic load consists of unregulated grazing, wind erosion, and is subject to protection.

As a result of multiple expedition trips to the territory with coordinates 45.689917° N; 43.272859° E at an altitude of 120 m above sea level, on an area of 2.5 hectares, the habitat of the species listed in the Red Book of the Stavropol Territory is established: Astragalus calycinus Bieb., Astragalus bungeanus Boiss., Colchicum laetum Steven, Tulipa biebersteiniana Schult. & Schult. F., Astragalus sytinii V. Belous et A. Laktionov, Jurinea ciscaucasica Ilijin., Iris taurica Lodd. (table 2) [12].
Table 2. Current State of Endangered Species Populations in the Vicinity of village Aigurcky (2012-2019).

| Species                  | Area of local populations, m² | Height of plants, cm | Population density, piece. | Agerange, % | The vitality of populations, score |
|--------------------------|-------------------------------|----------------------|---------------------------|-------------|----------------------------------|
| Astragalus calycinus     | 3300                          | 18.1±1.2             | 10                        | 45.2        | 28.0                             |
| Astragalus bungeanus     | 10400                         | 19.4±1.5             | 14                        | 48.7        | 26.8                             |
| Colchicum laetum         | 2500                          | 16.0±2.1             | 13                        | 23.1        | 46.2                             |
| Tulipa biebersteiniana   | 8000                          | 15.7±2.2             | 15                        | 26.7        | 40.0                             |
| Astragalus sytinii       | 2000                          | 10.2±1.9             | 2                         | 80.0        | 0                                |
| Jurinea ciscaucasica     | 1500                          | 53.9±2.3             | 2                         | 70.0        | 15.0                             |
| Astragalus brachycarpus  | 5000                          | 16.6±1.2             | 17                        | 41.2        | 35.3                             |
| Tulipa gesneriana        | 1400                          | 24.7±1.6             | 7                         | 43.0        | 28.5                             |
| Iris taurica             | 10000                         | 17.9±1.7             | 2                         | 70.3        | 29.7                             |
| Gypsophila globulosa     | 9000                          | 44.7±2.5             | 12                        | 51.3        | 22.5                             |
| Jurinea ewersmannii      | 1200                          | 55.7±2.8             | 3                         | 60.5        | 25.5                             |

Conventions: g - generative, v - vegetative, j – juvenile.

Due to their decorative effect, they turned out to be especially vulnerable (Tulipa gesneriana, T. biebersteiniana, Iris taurica, Colchicum laetum) - collection for bouquets and digging for landscaping. The rest of the species are subject to strong grazing and trampling by livestock, the proximity of the studied biocenosis to settlements affects.

The age spectrum of the cenopopulation reflects the life strategy of the species: most of the populations are stable, where the ratio of generative and young individuals is approximately the same. Plants in these populations look normally developed, healthy, bloom and bear fruit profusely, their general vitality is estimated at 5 points. Small populations, where on meter marks, protected species are found mainly in the generative phase, in single specimens - refer to declining populations and are estimated at 3-4 points. An anthropogenic factor affecting the state of rare and endangered species in the study area is grazing and digging up plants for landscaping.

In the total composition of the remains of dry virgin wormwood-cereals and wormwood-fescue steppes, there are fodder plants - 48%, medicinal - 11%, melliferous - 7%, ruderal - 13% and synatropic plants - 21%, which indicates the loss of biodiversity due to improper economic activities, without control grazing. There are not many shrubs and semi-shrubs, but there is no tendency towards afforestation. Cenopopulations of rare plants are mostly full-member, with a full spectrum of life. An anthropogenic factor affecting the floristic state of the biocenosis in the study area is unregulated grazing and digging out plants for landscaping, collection for bouquets.

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