

CHARACTERISTICS OF THE PASTURES OF THE NAVOI REGION AND THEIR USE

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Abstract

The article describes the characteristics of the types of pastures of the Navoi region, the degree of degradation and the ways of their rational use. The materials on the species composition of the vegetation cover and halophytic species cultivated during irrigation with artesian waters are presented.

Keywords

foothills, sandy desert, Kyzyl-Kum deserts, degradation, pasture types, yield, feed units, grazing, halophytes

Introduction

There are about 23.3 million hectares of desert and semi-desert pastures in Uzbekistan, the annual precipitation is 180-250 mm (it falls mainly in winter and spring). In Uzbekistan, the desert zone occupies more than 60% of the total territory and is used as pastures for karakul breeding, goat breeding and camel breeding make up 95% of the diet of Karakul sheep concentrated in breeding, farming and households farms.

Desert pastures are characterized by low productivity (on average, 0,35 t/ha of air-dry mass). The unstable yield of these pastures is the main reason for the unstable development of the karakul-growing industry, its low profitability, and the poor quality of the products produced. [1] Pastoral animal husbandry is based almost on year-round or partially year-round animal maintenance on natural arid pastures and it can successfully exist under certain conditions that contribute to an optimal relationship between vegetation and animals.

Animal husbandry is the main source of life support and well-being of the population living here, the income from which in the family budget is from 75% and higher, the efficiency and condition of animal husbandry is directly dependent on the state of pastures.

The problem of land degradation and desertification in this area is largely related to the cutting down of shrub vegetation for fuel and the clearing of new areas for irrigated agriculture every 2 years. This form of agriculture, without taking into account natural conditions, although it partially provides vegetable and melon products, but has the most negative environmental consequences, leads to secondary salinization of land.

The current state of arid pastures does not meet the requirements of full-fledged animal feeding. About 40% of desert pastures are degraded to various degrees, the average yield of pastures has decreased by 21%. Natural pastures with unregulated grazing of livestock are subject to vegetation degradation, which leads to pasture digression and reduced productivity. The area of pastures of the Navoi region is 8737.7 hectares, of which about 40% has been degraded. Thus, during the period 1994-2004, 1566.3 thousand pastures were subjected to digression in the Republic of Karakalpakstan. in the Bukhara region, 1019.0 thousand hectares, in the Navoi region, 4093.6 thousand hectares of area, the productivity of natural forage lands in the Republic of Uzbekistan has also been reduced by 23.3%. [2]. Table 1.

Table 1

Pasture digression and decrease in productivity of natural forage lands for the period 1994-2004

Regions	Pasture digression, thousand hectares	Reduction of productivity of natural forage lands, %
Republic of Karakalpakstan	1566,3	27,0
Navoi	4093,6	26,5
Bukhara	1019,0	18,5
Jizzakh	168,4	10,9
Kashkadarya	185,7	6,2
Samarkand	117,3	10,9
Surkhandarya	205,7	17,4

In most karakul farms, a significant amount of money is spent to buy feed. In some farms, the costs associated with the purchase of feed exceed 45-50% of the cost of gross output, which negatively affects the profitability of the industry. It is obvious that the way out of the current situation in the karakul breeding is the intensification of feed production.

Since desert animal husbandry, in particular karakul breeding, is the only industry for development and land use in the Navoi region, the welfare of the population living here depends on the level of its development and efficiency.

The pasture fund in the Navoi region is (8759.9 thousand hectares), the area of degraded pastures is 4.1 million. ha, or 47.0% [2,3]. The main hindering factor for the further development of animal husbandry in Uzbekistan is the poor supply of feed. Currently, 50% of households and farms have a lack of feed, especially in the autumn-winter period in the desert zone-pasture degradation, low yield, excessive load on pastures, the number of livestock animals and the area of pasture lands does not correspond. In this regard, in recent years there has been a tendency to increase feed prices, in recent years feed prices have increased almost 2 times.

PURPOSE OF THE STUDY :

The purpose of the work was to study the state of various types of pastures in the Navoi region, the degree of degradation and the ways of their rational use. The obtained materials are used in the development of scientific and practical bases for the adaptive use of agroecological resources, including optimization of the composition of flora, assessment of biological diversity and identification of the resource potential of natural vegetation.

MATERIALS AND RESEARCH METHODS :

When conducting research the following methods were used: The description of vegetation, taking into account its floral composition, was carried out according to the Drude method generally accepted in geobotany [4]. The range was clarified on the basis of literature data and surveys of distribution areas within the Navoi region. We used the traditional route method of geobotanical research, as well as methods of cameral decryption of satellite images from Landsat, MODIS and Google. To study the seasonal dynamics of the feed mass, transects with an area of 10 m² were laid on the reference pasture plots and mowing was carried out, then the biomass of forage plants and their nutritional value were determined by laboratory methods [5].

The types of pastures were distinguished according to the scheme of the typology of pastures of Uzbekistan (Methodological guidelines for the geobotanical survey of natural forage lands of Uzbekistan, 1980) [4]. The contour areas were determined by GIS methods. Age-related changes in plants according to the method of T. A. Rabotnov [6]. The phenology was carried out according to the method of I. N. Beideman [7]. The species belonging of plants was specified according to S. K. Cherepanov [8] and the Determinants of Plants of Central Asia and Identifier Keys to Plants of Central Asia (vol. I-X, 1968-1993).

RESULTS AND DISCUSSION :

In natural terms, the pastures of the Navoi region are a typical section of the desert of the South-Western Kyzylkums. The most common forms of relief on the territory are dunes and dune chains, bumpy, ridge and hollow sands, deep drainless depressions, sandy plains, salt marsh depressions. The territory is dominated mainly by the type of sandy deserts. As is known, sandy deserts differ from other ecological types of deserts in the most favorable water regime due to the physical properties of sand. The sand has a slight capillarity, which leads to easy penetration of sediments deep into the sand thickness and their weak evaporation. It should be added to this that sands and desert sandy soils have a greater condensation capacity compared to other desert soils [9, 10].

According to the physical and chemical properties of the soil and the nature of the relief, the territory can be divided into two geomorphological zones: 1 - a zone of sandy deserts with bumpy and ridge sands in the western part of the farm, and 2 - a flat zone in the central and eastern part of the farm. The soil cover of the territory is quite diverse, which is due to the diverse terrain and the nature of the underlying rocks. The soil of the first zone is mainly represented by Aeolian sands with a poor structure and low humus content. The soil cover of the plain zone is characterized by different types of soils due to different levels of salinity, which led to the formation of sandy loam, gravelly-cartilaginous, gray-brown, crushed-gypsum-bearing and saline soils [9, 10].

Climatic conditions. The territory is located in the Kyzylkum desert, with a pronounced continental climate, manifested in annual and daily fluctuations in air temperature, instability of climatic indicators over the years, low precipitation and increased solar radiation. Some years are characterized by sharp aridity, causing crop failure of the fodder mass on pastures.

The species composition of the vegetation cover. The vegetation cover of the pasture territory is represented by a variety of plant life forms, including ephemeral and ephemeroids up to desert shrubs (trees) characteristic of this zone. During the geobotanical descriptions in 2020, only 36 species of perennial and annual plants were recorded in the pastures of the project territory.

Despite the relatively high diversity of species, the composition of plant communities mainly consists of several shrub and semi-shrub species of edificers. The species composition of ephemeral and ephemeroids of desert pastures was determined on the basis of aboveground parts of plants preserved on the roots from the spring season of this year. Since the inventory of pastures was carried out in the summer (2020) period, the established number of species may be higher due to ephemeral and ephemeroids and annual salt pans in the autumn seasons [10,11]. The names of plants with their feed values are given in Table 2 below.

Table 2.
Species composition of vegetation cover (summer period 2020)

№	Latin name	Life form	Eatability
1	<i>Haloxylon persicum</i>	shrub	good
2	<i>Salsola richteri</i>	shrub	good
3	<i>Salsola arbuscula</i>	semishrub	average
4	<i>Salsola orientalis</i>	semishrub	good
5	<i>Halothamnus subaphylla</i>	semishrub	good
6	<i>Convolvulus hamadae</i>	semishrub	average
7	<i>Halimocnemis villosa</i>	herbaceous	poorly
8	<i>Climacoptera lanata</i>	herbaceous	average
9	<i>Acanthophyllum pungens</i>	semishrub	uneaten
10	<i>Carex physodes</i>	ephemeroid	good
11	<i>Aristida pennata</i>	herbaceous	good
12	<i>Agriophyllum latifolium</i>	herbaceous	poorly
13	<i>Poa bulbosa</i>	ephemeroid	good
14	<i>Eremopyrum buonapartis</i>	ephemer	good
15	<i>Anisantha tectorum</i>	ephemer	good
16	<i>Astragalus villosissimus</i>	semishrub	good
17	<i>Astragalus unifoliolatus</i>	semishrub	average
18	<i>Alhagi pseudalhagi</i>	herbaceous	good
19	<i>Ammodendron Conollyi</i>	shrub	poorly
20	<i>Calligonum setosum</i>	shrub	good
21	<i>Calligonum arborescens</i>	shrub	good
22	<i>Calligonum leuocladum</i>	shrub	good
23	<i>Peganum harmala</i>	herbaceous	uneaten
24	<i>Ferula foetida</i>	herbaceous	good
25	<i>Dorema sabulosum</i>	herbaceous	poorly
26	<i>Lycium turcomanicum</i>	shrub	average
27	<i>Cousinia bipinnata</i>	herbaceous	poorly
28	<i>Cousinia dichotoma</i>	herbaceous	poorly
29	<i>Artemisia diffusa</i>	semishrub	good
30	<i>Mausolea eriocarpa</i>	semishrub	average
31	<i>Ephedra strobilacea</i>	shrub	good
32	<i>Tamarix hispida</i>	shrub	poorly
33	<i>Heliotropium micranthum</i>	herbaceous	poorly
34	<i>Malcolmia sp.</i>	ephemer	poorly
35	<i>Eremosparton</i>	shrub	uneaten

	<i>flaccidum</i>		
36	<i>Tamarix hispida</i>	shrub	uneaten

The study of the species composition of the vegetation cover showed that the number of species varies depending on the weather conditions of different years, mainly due to annual species. So, in 2016, 28 species were recorded on pastures, and in 2020 (more favorable) - 44. In total, there are more than 100 species of sand – loving plants in the phytocenoses of the sandy desert, which have somehow adapted to life on the sands. Thus, our research shows that the species composition of the vegetation cover of pastures has been reduced by about half due to their irrational use.

Characteristics of pastures and their use. The pastures of the Navoi region are characterized by good productivity of 0.35-0.45 t/ha and are used all year round. The percentage of degradation is 45-55%. Pastures of year-round use, feed units of 100 kg / ha, digestible protein of 15 kg/ha.



Figure 1. Foothill pastures

Figure 2. Sandy pastures

Especially good forage lands are in the Tamdy district (Yamankum Massif) and Uchkuduk districts (Altintau Massif), the biodiversity of well-eaten species of forage plants is widely represented on these pastures.

In general, the 3 most common plant associations are distinguished in the pastures of the region.

Shrub-ephemeral-ephemeroid. This plant community is the most widespread throughout the Navoi region, and is located mainly on bumpy and ridge sands. The yield is 0.35-0.40 t/ha, the

percentage of degradation is 40-45%. Pastures of year-round use, feed units 140 kg / ha, digestible protein 16 kg/ha.

The species composition is dominated by *Haloxylon persicum*. In addition, the vegetation composition is represented by various shrubs, semi-shrubs and perennial herbaceous plants, such as *Calligonum arborescens*, *Calligonum leucocladum*, *Salsola richteri*, *Ammodendron Conollyi*.

The semi-shrubby plant community is located mainly on the remnants of the Altintau Uchkuduk, Kanimekh, and the foothills of the Nurata districts. The species composition is dominated by *Artemisia*. The grassy tier consists of *Carex physodes*, *Poa bulbosa*, *Anisantha tectorum*. The surface of the soil is covered with sod of *Carex physodes*. A plant community with a pure dominance of *Artemisia* is not found in large areas. The yield is 0.25-0.35 t/ ha, the percentage of degradation is 10-15%. Pastures with a year-round use period.

The plant community on saline lands type is common on takyrs and salt marshes, which are slightly interspersed with semi-shrub-ephemeral and shrub-grass pastures, sometimes forming complexes with them.

The vegetation cover is very sparse and mainly consists of salt pans. Pastures composed of annual halophyte plants - *Climacoptera lanata*, *Gamanthus gamocarpus*, *Salsola carinata*, etc. are of great pasture value.

The yield of halophyte plants, depending on their differences, is in the range of 0.05—0.60 t/ha of dry eaten mass.

The plant community on saline lands is located on the territory of the Kanimeh, Nurata, Kiziltepa districts. Mainly there are camel grass *Alhagi pseudalhagi*, *Climacoptera lanata*, *Aeluropis litoralis*, *Peganum harmala*, *Karelinia caspica*, *Zigophyllum oxianum*. The yield is 0.45-0.65 t/ ha, the percentage of degradation is 15-20%. Pastures of the autumn-winter period of use, feed units of 130 kg/ha, digestible protein of 13 kg/ha.

The pastures of the former shirkat farm "Madaniyat" belong to the typical farms of the Kyzylkum region, the main activity of which is desert animal husbandry, in particular karakul breeding, camel breeding.

However, there are currently unused natural resources in this farm, which, if used rationally, could become a source of additional income. One of these resources is more than 12 self-draining artesian wells, with an average water debit of 18 l/s. In general, there are more than 63 wells in this area. When using these water sources in irrigated agriculture, special approaches and specific agrotechnical methods of growing agricultural crops are needed.

Currently, some local residents of this region, using these water sources, grow melons, in particular melons and watermelons. However, individual irrigation plots are used mainly for 2 years. In the third year, farmers are forced to develop a new site, since the yield of melons is sharply reduced on the old site due to secondary salinization of the soil, depletion of soil nutrients.



Figure 3. Deep well



Figure 4. Determination of water



Figure 5. Kochia scoparia



Figure 6. Saline lands

Pasture conditions. The pastures of the region are characterized by low productivity and a significant degree of degradation of natural plant communities. The productivity of pastures is on average 0.3-0.5 t/ ha. There are 3 types of pastures: shrub-ephemeral, semi shrubs-ephemeral and coarse-grass-ephemeral [10, 11].

Coarse- grass -ephemeral pastures are the best for the spring keeping of sheep. They are widely distributed in the foothill semi-desert and are covered with *Carex-Poa* vegetation.

The projective coverage of these pastures is 60-70%, the yield is up to 0.65 t/ha. The best forage plants on these pastures are *Carex pachystylis*, *Poa bulbosa*, camel grass -*Alhagi pseudalhagi*, *Climacoptera lanata*. Pastures of summer use, feed units of 120 kg / ha, digestible protein of 11 kg/ha.

Semi-shrubs-ephemeral. The vegetation is based on such species as *Artemisia diffusa* Alhagi pseudalhagi, *Peganum harmala*, *Carex pachystyles*, *Ferula foetida*, *Poa bulbosa*, legume grass and ephemeral cereals. The projective coverage of these pastures is 30-40%, the yield is up to 0.45 t/ha. Pastures of year-round use, feed units of 110 kg/ha, digestible protein of 13 kg/ha.



Figure 7. Coarse herbs -ephemeral pastures



Figure 8. Semishrab-ephemeral pastures

Shrub-ephemeral. The dominant species of these communities are *Haloxylon aphyllum*, *Ammodendron conollyi*, various species of *Calligonum*.

The projective coverage of shrub-ephemeral pastures ranges from 20-30%, the yield is up to 0.30-0.42 t/ ha. Pastures of year-round use, feed units of 100 kg/ha, digestible protein of 15 kg/ha.

The second type of shrub-ephemeral associations is the Alhagi-Tamarix type growing mainly around wells, the projective coverage of these pastures is 60-70%, the yield is up to 0.48 t/ ha. Pastures of year-round use, feed units of 70 kg/ha, digestible protein of 6 kg/ha.

The following plants grow in cenoses, such as *Aeluropis litoralis*, *Peganum harmala*, *Karelinia caspica*, *Zigophyllum oxianum*.



Figure 9. Alhagi-Tamarix type

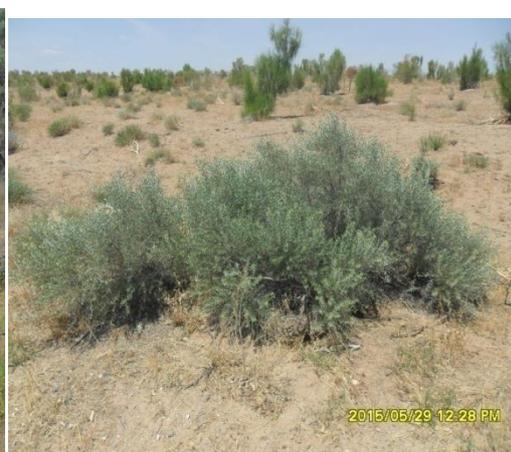


Figure 10. Haloxylon -ephemeral type

The productivity of these types of pastures is directly dependent on the degree of degradation of the soil and vegetation cover and on the degree of desertification.

Table 3.
Pasture productivity

№	Name of pasture differences	Yield by season, c / ha					
		Spring		Summer		Autumn	
		Yield	F.U.	Yield	F.U.	Yield	F.U.
1	Shrub-ephemeral <i>Haloxylon</i> with ephemeroid	4,2	2,7	3,3	1,5	3,8	1,5
	Shrub-ephemeral <i>Alhagi</i> with <i>Tamarix</i>	4,8	2,9	4	1,8	3,4	1,6
2	Semi-shrub-ephemeral <i>Poa</i> with <i>Carex</i> and <i>Artemisia</i>	4,5	3,4	3,3	1,3	3,6	1,5
3	Coarse herbs-ephemeral <i>Salsola-Cynodon</i>	6,4	3,7	6,4	3	5	1,9



Figure 11. Mountain Pastures



Figure 12. Soil sampling

CONCLUSIONS :

Rational use of various types of desert pastures, conservation of biodiversity, consistent increase in pasture productivity by sowing plants, rotation, introduction of technologies to increase pasture productivity ensure long-term rational use of pasture cenoses.

- Coarse grass and shrub pastures can be used in all seasons of the year
- Semi-shrub-ephemeral pastures are used in the spring-summer-autumn seasons of the year

- Shrub-ephemeral pastures are used in the spring-autumn and winter period
- Ephemeral pastures are used only in the spring and summer period
- Pastures with halophytic vegetation are recommended for use in the autumn-winter period and are bait feeds and good haymaking
- Cultivation of forage crops in desert conditions with irrigation from an artesian well allows you to create guaranteed feed stocks for the winter period

COMPETING INTERESTS :

Authors have declared that no competing interests exist.

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