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INFLUENCE OF VERTICAL ZONATION OF THE UZYNKAR RIDGE ON SOIL FORMATION IN THE STEPPE LOW-MOUNTAIN AND FOOTHILL ZONES OF THE UYGHUR DISTRICT

Abstract. The article presents data on soil fertility in pastures of the foothill-steppe zone with steppe cereals, legumes and wormwood herbs, located at altitudes of 1100-1600 m, and the foothill-dry steppe zone with wormwood and cereals, located at altitudes of 850-1100 m. The foothill-steppe zone is characterized by light loamy sierozems with a humus content of 3.8-3.9%, decreasing to 1.47% in degraded areas. The content of absorbed bases varies from medium to high. The content of total nitrogen in the soils is low. The soils are deficient in mobile phosphorus. The content of mobile potassium is high. In general, a slight deficiency of nitrogen and phosphorus is observed in the soil, which indicates the need for surface application of phosphorus and nitrogen fertilizers. The granulometric properties of the soil are favorable for the growth and development of grasses on the studied pastures.
Keywords: relief, Uzynkara ridge, soil, medium loam, humus, absorbed bases.

Introduction. The Uzynkara range under study is located within Kazakhstan between 44°00′ N and 43°20′ N, and between 79°30′ E and 85°00′ E. The length of the range is over 400 km, and the width is 40–50 km. According to the physical-geographical zoning of Kazakhstan, the Uzynkara range is part of the Central Asian country, the Tien Shan region, the North Tien Shan province, the Chilik-Ketpen district, which also includes two regions: the northern slope of the range and the Kegen-Tekes district [1]. The maximum height of this range reaches 3,680 m near the border with China (Mount Podnebesnaya). To the west and east, the elevation gradually drops to around 3,400 m. The peaks do not reach the snow line, and glaciers, typical of high-mountain peaks, are virtually absent. In northern Kazakhstan, the Uzynkara range borders the Dzungar Alatau, divided by the Ili Depression; to the west, it borders the Kungey Alatau; to the east, it gradually transitions into the Temerlik range, merging with the Boro-Khoro Mountains. On the Chinese side, the Temerlik range is connected to a series of mountain ranges that descend to the east and are separated by depressions: the Kuldzhin Depression to the north, the Kash Depression to the south, and the Tekes Depression to the southeast. In the south, the border runs along the Khalyktau Mountains. Within Kazakhstan, the northern slope of the Uzynkara range is cut by a dense network of deep valleys, while the southern slope, steeper and devoid of foothills, descends sharply to the vast Kegen-Tekess Depression. The central and western parts of the region are occupied by the Aygyrzhol, Basylutau, Karatau, Sarytau, Sumbetau, Yelchik-Buiryk, Laylytau, and Zhabyrtau mountains. The Aygyrzhol and Zhabyrtau mountains are characterized by gentle mid-mountain terrain with elevations ranging from 1,800 to 2,600 meters above sea level. While Yelchik-Buyryk, Basylutau, Laylytau, Sumbetau, and Sarytau belong to high-mountain regions with elevations ranging from 2,200 to 3,600 m, their northern slopes are steep, while their southern slopes, although also steep, are more dissected and have a significant outcrop of bedrock [2]. The diversity of the natural conditions of the Uzynkara ridge is primarily due to the altitudinal dissection of its surface. The ridge is an ancient Paleozoic structure that was smoothed to the stage of peneplained plains and then re-uplifted in Tertiary and Quaternary times to modern heights. The combination of flat relict landforms at different altitudes with younger, highly dissected elements indicates the different chronological formation of the landscape of this area. Analyzing the modern relief and tectonics of the Tien Shan, S.S. Shultz concludes that the processes of sedimentation, folding, and mountain building do not represent separate sequential stages, but a single, long-term process of recent tectonics [3]. Research shows that three glaciations occurred in the highland regions of Kazakhstan. The most ancient glaciation was semi-sheltering and covered high-elevation mountain ranges that had not yet been dissected by erosion. The early Middle Quaternary period saw powerful tectonic movements and increased climate humidification, which contributed to the active development of the hydrographic network. Glaciers of this period, descending along already depleted valleys, gave them their characteristic trough shape. The geological structure of the Uzynkara ridge has been examined in detail by S.S. Shultz. The axial portion of the ridge is composed of intrusive rocks-pinkish-gray or light-gray pink-manka-biotite granites, outcrops of which are also observed on the northern slope of the ridge [3]. The study area is characterized by a complex, highly dissected topography (figure 1).

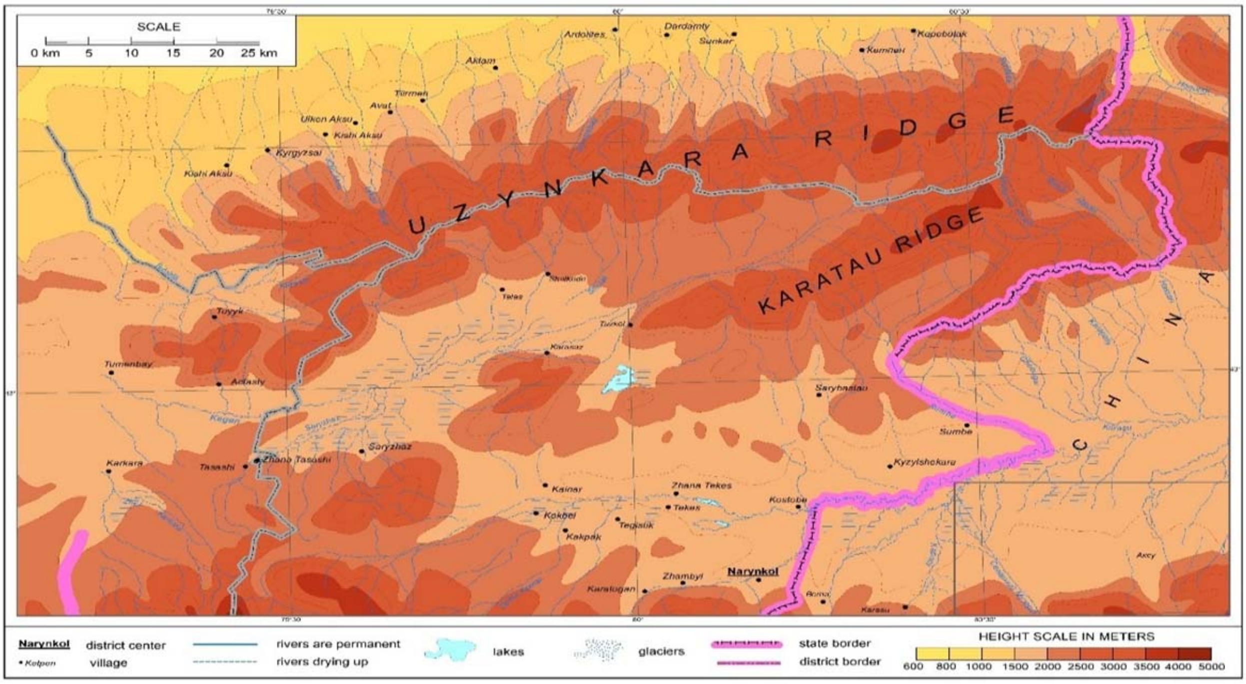

Figure 1 – Map-diagram of the studied area of the Uzynkara ridge

Based on the results of many years of research, the surface structure of the Uzynkara ridge can be divided into the following geomorphological regions: 1. Mountainous region with absolute elevations of 1300–3600 m. 2. Foothill, strongly sloping, undulating foothill plain, with absolute elevations of 800–1600 m above sea level. 3. A gently sloping plain with an absolute elevation of 650-800 m. The river network of the Uzynkara range is unevenly developed. The largest rivers here are the Kegen, Achinakho, Shunkar, Chushanai, Dardymty, Ulken-Aksu, Chulak, Tigermen, Avat, Zhanaozeksai, Arlyksay, Temerlik, Khonakhai, Kash, Ortakaragandy, Chonkaragandy, Chimbulak, Shalkudusu, Ulken-Shiybut, Sumbe, Kirgizsay, Boguty, Khasan, and others. Numerous small streams flow down the northern slopes of the ridge, ending on the foothill plateau. The Temerlik river, the main tributary of the Charyn river, flows down the western slope. The hydrographic network of the southern mountainous part of the district includes the Temerlik, Sumbe, Chushanai, and Sarybulak rivers, as well as numerous streams originating on the northern slopes of the Chushanai and Uzynkara ridges. All the waters of the southern slope of the Uzynkara ridge collect in a large tectonic basin, formerly a lake, known as the Shalkudysu. The Kegen river, the largest tributary of the Ili river, is called the Shalkudysu in its upper reaches, the Kegen in its middle reaches, and the Charyn outside the district. Flowing as a mountain stream into the Kegen-Shalkudinskaya Depression, the river slowly flows westward along low, sometimes marshy banks [3, 4].

The soils of the Uzynkara range are highly varied and complex and obey the laws of vertical zonation inherent to all mountainous regions (table 1). Below we provide a systematic list of soil types in the mountain belt and their brief characteristics [5, 6].

Table 1 – Soils of the mountain belt of the Uzynkara ridge

Soil types	Belts
Mountain meadow alpine	Mountain
Mountain meadow-steppe alpine	
Mountain meadow subalpine	
Mountain meadow-steppe subalpine	
Mountain meadow-steppe chernozem-like	
Mountain-forest dark-colored	
Mountain chernozems	
Mountain dark chestnut	
Mountain light chestnut	
Light chestnut	
Ordinary sierozems	Foothill steppe
Light sierozems	
Gray-brown	
Introzonal soils	
Sands	
Meadow solonchaks	
Meadow solonetz	
Meadow-chestnut	
Meadow-gray soil	
Floodplain-meadow	
Mountain meadow	
Mountain floodplain-meadow	
Meadow-marsh	

Materials and methods of research. The study subjects were natural soils of the steppe part of the lower belt and the foothill part of the desert belt of the Uyghur region of the Uzynkara range. The research was conducted on the Uzynkara range (Northern Tien Shan) using field and stationary methods. The aim of the study is to determine the distribution features of the soil cover of the steppe part of the lower belt and the foothill part of the desert belt in the Uyghur region of the Uzynkara ridge. During field research, soil sections were excavated and soil samples were collected from various natural and anthropogenic zones to determine the characteristics of soil distribution in the Uyghur region of the Uzynkara ridge. The study utilized soil types from the steppe and semi-desert zones of the Uyghur region, including saline, solonchakous, and sandy soils. Research methods: This article examines several methods used to study the soil cover of the Uyghur region of the Uzynkara кange. Using field research, soil samples from the study area were collected for analysis. The abundance of species in phytocenoses was determined using the Drude abundance scale [7]. The species composition of plants in plant communities was determined using the relevant botanical identification guides, reference books, etc., such as: «Flora of the USSR» [8], «Flora of Kazakhstan» [9], «Identification Guide to Plants of Central Asia» [10], «Illustrated Identification Guide to Plants of Kazakhstan» [11], etc. Species and generic names of plant species are given according to the Plants of the World Online (POWO) database, as well as according to S.K. Cherepanov and S.A. Abdulina [12,13]. Collection and processing of herbarium material were carried out according to the generally accepted method of A.K. Skvortsov [14].

Laboratory analysis: Laboratory analysis of the selected samples was conducted at the U. U. Uspanov Kazakh Research Institute of Soil Science and Agrochemistry using standard methods. Studies were conducted to determine the physical and chemical properties of the soil layers. The analysis included measurements of the soil's base content for various elements, soil texture, pH, and humus.

Research results. Our research in 2024-2025 was conducted in the Uyghur district of the Almaty region. In 2024, fieldwork and expeditionary work were conducted throughout the grazing season in the mountainous North Tien Shan province, on the Uzynkara ridge, at the Shalkode summer pasture. This included May in the spring, July in the summer, and early October in the fall (figure 2).

a

b

Figure 2 – Uzynkara ridge. Pasture in the gorge of Ulkend Diqan (*a*); Summer pasture of Shalkode (*b*)

Based on the results of field studies conducted in 2024-2025, changes in vertical zonation zones of the Uzynkara ridge were grouped (table 2).

Table 2 – Vertical zonation in the study area

Vertical zonation			Plant communities	Soils
Macrorelief	Zonation	Height, m		
Mountain	Highlands	3600-3200	Alpine meadows	Low-power mountain meadows
		3200-2700	Subalpine meadows	Mountain meadow
	Middle belt	3200-2700	Coniferous forests	Podzolic
		1800-2700	Mixed forests	Brown forest
		1600-1800	Meadow forests	Black soils
	Foothill-steppe lower belt	1100-1600	Foothill steppe, cereal-legume-forb with Artemisia	Dark chestnut and light chestnut soil
		850-1100	Foothill-dry steppe, mixed-grass community with Artemisia	Gray soils
Foothills	Foothill semi-desert	550-850	Cereal community with Carex	Ordinary gray soils
	Desert	Above 550	Mixed-herb community with Artemisia terrae-albae	Light gray soils

Our research in the alpine zone identified alpine-mountain-meadow soils at elevations of 3200-3600 m. In the subalpine zone (2700-3200 m), subalpine-mountain-meadow soils were identified. In the mountain-steppe zone, in the low-mountain belt at elevations of 1100-1600 m, light chestnut soils were identified, which are quite widespread within the region. Further down the slope, at a level of 850-1100 m, there are dark meadow gray soils.

Our research was conducted in the Uyghur district of the Almaty region. In the steppe belt of the lowlands of the Uzynkara ridge, the research was conducted on pastures of three farms. On the first farm, soil studies were conducted at three locations. At the first point, the coordinates of the study are E 43°28´48.96´´ N80°32′32.96″ at an altitude of 1381 m above sea level, the coordinates of the second point are E 43°28´48.10´´ N80°32′33.15″ at an altitude of 1383 m above sea level, the coordinates of the third point are E 43°28´21.20´´ N80°32′34.70″ at an altitude of 1448 m above sea level. In the second peasant farm, soil studies were carried out at two points. At the first point, the coordinates of the study are E 43°28´23.96´´ N80°32′2.42″ 1416 m above sea level, the coordinates of the second point are

E 43°27′50.86′′ N80°32′7.12″ 1416 m above sea level. In the third peasant farm, soil studies were carried out at two points. At the first research point, the coordinates of the study are E 43°31′56.99′′ N80°32′49.80″ 1140 m a.s.l., the coordinates of the second point are E 43°31′010′′ N80°32′56.75″ 1206 m a.s.l. (figure 2).

Figure 2 – Profile of subalpine mountain meadow soil

As a result of field studies in 2024, mountain-meadow subalpine soils were identified within the subalpine zone. Figure 2 shows that horizon A1 (0-14 cm) is peaty with layers of sod and fibrous roots of grasses. The soil color is dark brown, with a gradual transition to the next horizon. Horizon A2 (14-37 cm) is brown, with inclusions of gruss, crushed rock, and stones. Horizon B (37-68 cm) is light brown. Field research conducted in 2025 on the territory of the first and second farms revealed that the soils in the study areas are chestnut, transitioning to light chestnut on the western and southern slopes. Dark meadow gray soils are common on the third farm. We believe it is necessary to assess the fertility of the soils under study. Soil fertility is a complex characteristic that determines the soil's ability to provide plants with the necessary conditions for growth and development, as well as high yields. It depends on many factors, including nutrient content, particle size distribution, structure, and water and air conditions. This is an emergent property of soil: it appears only through the interaction of its components. Emergent soil properties are properties that arise from the interaction of various soil components (minerals, organic matter, water, air, microorganisms) and are not inherent to the individual components individually. These properties manifest themselves at the system level (the soil as a whole) and cannot be predicted or inferred from the properties of individual components. Soil fertility indicators include the hydrophysical properties of the soil (mechanical and aggregate composition, soil structure), humus content, nutrient content in the soil (nitrogen, phosphorus, potassium), soil pH, and the content of absorbed bases in the soil. Soil texture, also known as particle size distribution, characterizes the content of particles of varying sizes, such as sand, silt, and clay. Depending on the percentage of these particles, soils are classified as sandy, sandy loam, loamy, and clayey. Sandy soils contain a lot of sand, are well-drained, and aerated, but are poor in nutrients. Sandy loam soils contain more sand than clays, are well-drained, and aerated, but are also poor in nutrients. Loamy soils contain approximately equal amounts of sand and clay, are well-drained, and rich in nutrients. Clayey soils contain a high clay content, are poorly permeable, and are rich in nutrients. Soil texture significantly influences its physical, chemical, and biological properties, as well as fertility. For example, sandy soils dry quickly and are easily cultivated, while clayey soils, on the contrary, warm up slowly, are poorly permeable, and are rich in nutrients.

Our study of soil texture in the steppe belt of the lowlands of the Uzynkara Range revealed that the soils are classified as medium loam. Physical clay content ranged from 32.4 to 39%. In the adjacent surface soil layer, the clay content was 40.8-42.5%, meaning that the soils in this layer can be classified as heavy loam based on their mechanical composition (table 3).

Table 3 – Granulometric composition of the soil of the studied steppe belt of the lowlands of the Uzynkara ridge, content of fractions in absolute dry soil, %

Peasant farms	Number of points	Depth, cm	Content of fractions						
			sand		dust			silt	clay
			1-0,25	0,25-0,05	0,05-0,01	0,01-0,005	0,005-0,001	<0,001	<0,01
I	1	0-8	22,559	11,485	12,305	16,407	40,197	12,305	16,407
		9-30	27,581	8,112	11,357	17,035	36,504	11,357	17,035
	2	0-8	38,906	9,726	14,184	8,511	32,421	14,184	8,511
		9-30	42,932	11,746	14,986	8,910	35,642	14,986	8,910
	3	0-8	35,470	12,092	14,913	7,255	34,260	14,913	7,255
		9-30	40,363	7,669	20,989	8,476	37,134	20,989	8,476
II	1	0-8	31,282	8,531	13,813	16,657	39,001	13,813	16,657
		9-30	24,768	8,669	16,099	17,750	42,518	16,099	17,750
	2	0-8	31,971	3,642	13,355	4,856	21,854	13,355	4,856
		9-30	31,682	10,154	16,653	14,216	41,024	16,653	14,216
III	1	0-8	39,976	9,287	18,978	8,480	36,745	18,978	8,480
		9-30	37,149	14,133	16,959	9,691	40,783	16,959	9,691
	2	0-8	41,212	9,293	15,758	7,677	32,727	15,758	7,677
		9-30	22,559	11,485	12,305	16,407	40,197	12,305	16,407

As table 3 shows, the underlying soil layer (9-30 cm) shows a 3-10% increase in physical clay content compared to the surface layer. This is likely due to the leaching of clay particles from the upper soil layer into the lower soil layer, i.e., the formation of an illuvial layer. The illuvial layer, known as the leaching horizon, is the soil layer located beneath the eluvial horizon. Various substances, such as clay, silt, and other materials, are washed out from the overlying soil layers and deposited in the underlying soil layer. This type of erosion is called illuvial soil erosion. As analyses (table 2) have shown, the fine earth of the soil is dominated by the coarse silt fraction. The results of the agrochemical analysis of the studied soils of the steppe belt of the lowlands of the Uzynkara ridge are presented in table 4.

Table 4 – Agrochemical analysis of the soil of the steppe belt of the lowlands of the Uzynkara ridge

Farms	Point number	Depth, cm	Determined indicators							
			Total humus, %	Gross, %			pH	Exchangeable ammonium, mg/kg	Mobile, mg/kg	
				N	P	K			P	K
I	1	0-8	3,87	0,308	0,229	2,199	7,34	7,5	52	590
		9-30	2,74	0,210	0,183	2,099	7,25	6,6	24	440
	2	0-8	2,43	0,196	0,362	2,698	7,24	29,7	62	2000
		9-30	1,67	0,112	0,297	2,598	7,69	6,3	20	1300
	3	0-8	3,69	0,238	0,212	2,798	7,58	13,9	48	590
		9-30	2,09	0,168	0,161	2,099	7,93	5	10	460
II	1	0-8	1,87	0,182	0,115	2,099	7,72	7,1	18	370
		9-30	1,47	0,168	0,053	2,698	7,82	3,3	4	100
	2	0-8	2,96	0,224	0,146	2,698	7,07	6,1	42	500
		9-30	2,36	0,196	0,106	2,398	7,75	5,2	10	270
III	1	0-8	1,16	0,140	0,133	2,498	8,06	3	40	340
		9-30	1,13	0,112	0,107	2,299	8,04	1,7	14	210
	2	0-8	1,10	0,084	0,126	2,498	8,07	7,4	22	340
		9-30	1,09	0,112	0,112	2,498	8,04	2,7	10	180

In light chestnut soils, the humus content should be 2.5-3%, in sierozem soils 0.95-1.5%. The data in table 3 show that in terms of humus content, at the first Askarov farm, at two points in the surface 0-8 cm soil layer, the humus content was slightly above the norm and amounted to 3.8-3.9% for light chestnut soils. At the remaining studied points, the humus content was significantly below the norm, from 1.47% to 2.7%, i.e. within the norm. On the third farm, humus content drops to 1.09-1.16%. The pastures on this farm are located approximately 300 meters lower than on the two previous farms. Based on total nitrogen content, the soils in the study area can be classified as low to moderately rich. Based on total potassium content, as shown in the table, the soils in the study area are highly potassium-rich. As Table 3 shows, on the first farm, the content of available phosphorus in the surface 0-8 cm soil layer ranges from low to moderate. In the 9-30 cm soil layer, the total phosphorus content is very low. Some of the increase in phosphorus content in the surface layer is likely due to fertilization with animal manure during grazing. Based on the content of available potassium, the soils in the study area can be classified as high and rich. Exchangeable potassium content in soils generally ranges from 500-600 mg/kg of soil. Only at the second farm, at point 1, in the 9-30 cm soil layer, did potassium content drop to a low level of 100 mg/kg of soil (table 4). The adsorbed bases in the soil adsorption complex (SAC) are cations held on the surface of soil particles by electrostatic forces. These cations can be exchanged for other cations in the soil solution. The main adsorbed bases in soil are calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^+), sodium (Na^+), and hydrogen (H^+). The composition of the adsorbed bases influences the reaction of the soil environment (acidity, alkalinity), the availability of nutrients to plants, the structure, and other soil properties. Absorbed bases play a vital role in the formation and maintenance of soil fertility, and their composition and quantity determine many agronomic and ecological properties. Soil acidity in the study area ranges from neutral to slightly alkaline, with pH values ranging from 7.24 to 8.07 (table 5).

Table 5 – Content of absorbed bases in the studied soil of the steppe belt of the lowlands of the Uzynkara ridge, mg equivalent per 100 g of soil

Peasant farms	Place of sampling	Depth, cm	Absorbed bases				
			Ca	Mg	Na	K	∑ SAB
I	Point 1	0-8	27,23	7,43	0,52	0,31	35,49
		9-30	27,23	8,42	0,37	0,24	36,26
	Point 2	0-8	12,87	3,96	0,37	1,65	18,85
		9-30	12,38	2,48	0,37	1,11	16,34
	Point 3	0-8	16,83	4,95	0,37	0,36	22,39
		9-30	14,85	3,96	0,37	0,24	19,42
II	Point 1	0-8	21,29	5,45	0,35	0,48	27,57
		9-30	34,65	8,42	0,30	0,24	43,61
	Point 2	0-8	11,88	5,94	0,35	0,52	18,69
		9-30	15,84	3,96	0,35	0,42	20,57
III	Point 1	0-8	10,40	1,98	0,35	0,24	12,97
		9-30	10,89	1,98	0,37	0,24	13,48
	Point 2	0-8	9,41	0,49	0,37	0,24	10,57
		9-30	11,39	0,49	0,37	0,24	12,49

The content of absorbed bases in soil, expressed as the sum of exchangeable cations (S), is an important characteristic of soil fertility. It determines the soil's ability to retain nutrients and resist acidification. Classifying soils by their content of absorbed bases allows one to assess their potential fertility and limiting needs [15].

According to the classification of absorbed base content in table 6 and the data in Table 4, the soils in the study areas range from moderate to very high in absorbed base content. On the territory of the first farm, located at an altitude of 1,300-1,350 m above sea level, the absorbed base content ranges from moderate to high. At the second farm, located at an altitude of 1,350–1,410 m, in an eroded area (point 2), the content of these elements decreases to average levels. At the third farm, located at an altitude of

Table 6 – Classification of soils by the content of absorbed bases

Degrees	Sum of absorbed bases, mg – equivalent per 100g of soil
Very low	≤ 5
Low	5-10
Moderate	10-20
High	20-30
Very high	≥ 30

1,000–1,100 m, the overall content of exchangeable bases decreases to average to low levels. This is likely explained by the fact that the third farm is located approximately 300 meters lower than the two aforementioned farms. This 300-meter difference in vertical zonation undoubtedly leads to reduced precipitation and increased air temperature, which in turn leads to aridization and more pronounced desertification compared to the other two farms, which are located at an altitude of 1300-1400 meters.

Discussion. Thus, it was established that the steppe pasture soils of the Uzynkara ridge lowland are classified as medium loams in terms of mechanical composition, with a physical clay content of 32-39%, which ensures good air and water permeability, favorable for aerobic plants. The humus content in the foothill-steppe lowlands ranges from 3.8-3.9% (above the norm) to 1.47% in degraded areas and 1.09-1.16% in the more arid regions of the third farm. The content of absorbed bases varies from medium to high in the first and second farms, decreasing to medium and low in the third. The soils are characterized by low to medium total nitrogen content, high total potassium content, and low to medium available phosphorus content. Soil acidity is neutral to slightly alkaline (pH 7.24-8.07), which also creates favorable conditions for the growth of aerobic plants.

Conclusion. The study found that the soils of the steppe pastures in the Uzynkara range's lowlands are classified as medium loam in terms of texture. The physical clay content ranges from 32-39%. This indicates that these soils are well-permeable to air and water, creating favorable conditions for the growth and development of aerobic plants. Aerobic plants are known to comprise almost all the grass in the pastures of this zone. In the foothill-steppe lowlands, in the zone of grass-wormwood communities on light chestnut soils, humus content was slightly higher than normal, fluctuating between 3.8-3.9%. In degraded pasture areas, humus content dropped to 1.47%, significantly below the norm of 3.5%. The pastures of the third farm are located approximately 300 m lower than the two previous farms. This 300 m difference in vertical zonation undoubtedly leads to reduced precipitation and increased air temperature, which in turn leads to aridization and more pronounced desertification. Humus content ranges from 1.09-1.16%, with dark meadow sierozem soils formed here, where the grass stand is dominated by wormwood communities.

On the territory of the first and second farms, the content of absorbed bases ranges from medium to high. On the second farm, on an eroded plot, the content of these elements decreases to medium levels. On the third farm, the content of exchangeable bases decreases to medium to low levels. Absorbed bases play a crucial role in the formation and maintenance of soil fertility, and their composition and quantity determine many agronomic and ecological properties. Based on total nitrogen content, the soils in the study area are classified as having low to moderate levels of potassium. Based on total potassium content, the soils in the study area are considered to be high in potassium. Available phosphorus content ranges from low to moderate.

The soil acidity in the study area ranges from neutral to slightly alkaline, with a pH from 7.24 to 8.07, which also creates favorable conditions for the growth and development of aerobic plants in pastures.

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ҰЙҒЫР АУДАНЫ АУМАҒЫНДАҒЫ ДАЛАЛЫҚ АЛАҢ ТАУ ЖӘНЕ ТАУ ЕТЕКТЕРІ АЙМАҚТАРЫНДАҒЫ ҰЗЫНҚАРА ЖОТАСЫНЫҢ ТІК АЙМАҚТЫҒЫНЫҢ ТОПЫРАҒЫН ҚАЛПЫНА КЕЛУІНЕ ӘСЕРІ

Аннотация. Мақалада 1100-1600 м биіктікте орналасқан дала шөптері, бұршақ тұқымдастары және жусанды шөптер өсетін тау етегіндегі дала аймағындағы жайылымдардың топырақ құнарлылығы туралы деректер келтірілген, ал тау етегіндегі құрғақ дала аймағында 850-1100 м биіктікте орналасқан жусанды және шөптер өсетін жайылымдардың топырақ құнарлылығы туралы деректер келтірілген. Тау етегіндегі дала аймағы гумус мөлшері 3,8-3,9% болатын жеңіл сазды сироземдермен сипатталады, деградацияланған жерлерде 1,47%-ға дейін төмендейді. Сіңірілген негіздердің мөлшері орташадан жоғарыға дейін өзгереді. Топырақтағы жалпы азоттың мөлшері төмен. Топырақта жылжымалы фосфор жетіспейді. Жылжымалы калийдің мөлшері жоғары. Жалпы алғанда, топырақта азот пен фосфордың аздап жетіспеушілігі байқалады, бұл фосфор мен азот тыңайтқыштарын бетіне жағу қажеттілігін көрсетеді. Топырақтың гранулометриялық қасиеттері зерттелген жайылымдардағы шөптердің өсуі мен дамуына қолайлы.

Түйін сөздер: рельеф, Ұзынқара жотасы, топырақ, орташа саздауыт, гумус, сіңірілген негіздері**.**

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ВЛИЯНИЕ ВЕРТИКАЛЬНОЙ ПОЯСНОСТИ ХРЕБТА УЗЫНКАРА НА ПОЧВООБРАЗОВАНИЕ В СТЕПНОЙ НИЗКОГОРНОЙ И ПРЕДГОРНОЙ ЗОНАХ УЙГУРСКОГО РАЙОНА

Аннотация. Приведены данные о плодородии почв пастбищ предгорно-степной зоны со степными злаками, бобовыми и полынным разнотравьем, расположенных на высотах 1100-1600 м, и предгорно-сухостепной зоны с полынью и злаками, расположенных на высотах 850-1100 м. Предгорно-степная зона характеризуется легкосуглинистыми сероземами с содержанием гумуса 3,8-3,9%, уменьшающимся до 1,47% на деградированных участках. Содержание поглощенных оснований варьирует от среднего до высокого. Количество общего азота в почвах низкое. Почвы дефицитны по подвижному фосфору. Содержание подвижного калия высокое. В целом в почве наблюдается незначительный дефицит азота и фосфора, что свидетельствует о необходимости поверхностного внесения фосфорных и азотных удобрений. Гранулометрические свойства почвы благоприятны для роста и развития трав на исследуемых пастбищах.

Ключевые слова: рельеф, хребет Узынкара, почва, средний суглинок, гумус, поглощенные основания.