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Agrochemical Characteristics of Newly Developed Light Sierosem of the Fergana Valley

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Annotation: The current state, agrochemical and soil-reclamation conditions of light sierozems in the North of the Fergana Valley are considered. The questions of the structure of the soil profile, the state of drainage and the effect of irrigation on the change in agro-chemical properties, morphological features of the studied gray soils are considered. It is shown that for a short period of 2-3 years under irrigation conditions when cultivating medicinal plants such as lavender in light gray soils. Taking into account the washout, there is a slight improvement in the properties of the washed-out part of the light gray soils.

Key words: agro chemistry, valley, light gray soil, humus, nutrients, washed away, lavender, medicinal plants

Introduction. In mountainous, foothill, adyr regions in arid conditions, the process of soil formation is associated with degradation processes. The processes of erosion and degradation of serozems are associated with changes in the power of the surface, humus horizon of soils, where the main elements of plant nutrition and humus are concentrated. Erosion, degradation leads in all soils of vertical zones of Uzbekistan to a decrease in fertility, deterioration of the water-air regime, physical and chemical properties of soils. Such soils, that is, light gray soils on the pebble in the specified territory amount to 23203 hectares, which are gradually introduced into agricultural circulation and transferred to the group of irrigated. Irrigated newly developed light gray soils are subject to irrigation erosion and degradation. They are still poorly studied or not studied in the northern part of the Fergana Valley. In Uzbekistan, large-scale comprehensive studies of degraded not only serozems, but also other soils based on the soil-genetic approach are being conducted. The Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030 identifies important primary tasks for the modernization of the agricultural and food sector, the rational use of natural resources, providing for the rational use of land and water resources and the forest fund, improving the environmental protection system, increasing soil fertility and labor productivity in farms, improving the quality of products and developing modern control systems [1]. In this regard, the study of weakly and medium-eroded, reclaimed interadyr soils acquires important scientific and practical significance.

The purpose of the study. To assess the current agrochemical state of the northern newly developed, interadyr light serozems on eluvial-proluvial parent rocks and to develop a proposal for their use.

Material and methods of research. The studies were carried out in the field, laboratory and cameral conditions. During the field work of 2020-2022, on the basis of standard methods generally accepted in soil science, samples of soils formed in automorphic conditions on the pilot production fields of Mehrigiyo for the cultivation of medicinal plants of the type, lavender, which is located on the territory of the Papal district of the Namangan region, were selected. Soils according to the soil classification of Uzbekistan [2] Laboratory tests were carried out according to the method of E.V. Arinushkina "Manual for chemical analysis of soils" and "Methods for studying the physical properties of soils and soils" by A.F. Vadyulina and Z.A. Korchagina.

The results of the study and their discussions. In the territory studied by us, it was said that medicinal plants of the "lavender" group are grown. The soils on which lavender has been grown since 2020, according to studies, can be attributed to cartilaginous-gravelly light, low-power loamy serozems. It should be noted that these soils have been used in recent years for irrigated crops, where the above-mentioned culture is cultivated. Skeletal, weakly skeletal, poorly cultivated in places lie pebbles from 0.5-1 m. According to the collected We

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and the available archival materials studied by us light serozems cartilaginous-gravelly, loamy, skeletal on eluvial-proluvial skeletal small-earth, pebble mother rocks formed in the Fergana soil and climatic district, which includes the Andijan, Namangan, Fergana regions of the Republic of Uzbekistan. Our studied array is located in the inter-mud position, the length from north to south is 200 meters, the width is 140 m. Production experimental options are located in one tier. The soils are weakly washed, medium washed, that is, the first strip of 50 m is slightly washed, the second strip is another 50 meters medium washed, then there is a weakly washed soil.

From the above it can be seen that there are no highly washed soils. The studied soils are poor in humus in conditionally arable horizons, which are not clearly distinguished from the underlying layers, the content of humus, gross nitrogen, phosphorus and potassium is low.

Serozems in the Fergana Valley are not found everywhere their distribution is confined on the border from the desert zone and above to mountain structures. They, that is, serozems, including light serozems, belong to the soils of vertical zonality, form the lower tier of the Turan soil and climatic zone.

In Uzbekistan, the largest massifs of serozems border the outer mountain ranges -Chatkal, Turkestan, Hissar, Kuraminsky and enter the largest intermountain basin-Fergana valley [3]. They rise along the slope of the foothills in the northern part of Uzbekistan, within the Chirchik-Angren basin to an altitude of 1200-1300 m, and in the southern regions - higher, up to 1500-1600 m.

In general, serosems develop on loose rocks of the Quaternary period, but rarely on sorted and low-power eluvial-proluvial parent rocks. A large group of serozems formed on loess and loess loams [4,5]. According to the degree of cartilage and the content of the jackdaw of the medium of light serozems, a large group of differences can be distinguished, ranging from weakly to strongly pebble differences. Regular, annual watering for a long period of time of 40-50 years or more light sulfur is transformed into irrigated and oasis [6].

The skeletal nature of these soils and the close occurrence of jackdaws determine their main morphological and agrochemical features.

As expected, the profile of these soils is poorly differentiated into genetic horizons. These soils are structureless with a fairly high skeletal content (Table 1).

Table-1

Soil skeletality (Fractions larger than 0.25 mm. and shallow soil), %

N, the name of the incisions	Depth, cm	Skeleton	Melkozem
1- slightly washed	0-10 10-40 40-80 80-100	21,86 49,25 60,13 91,25	78,14 50,75 39,87 8,75
2- medium washable	0-10 10-40 40-80 80-100	20,96 50,22 58,85 94,27	79,04 49,78 41,15 5,73
3- washed	0-15 15-40 40-80 80-100	18,55 37,46 61,15 92,51	81,45 62,54 38,85 7,49

From which it can be seen that the content of the skeleton, regardless of the degree of erody in the true horizons, ranges from 18.55 to 21.86%. The high content of the skeleton is found within the depth of the parent rocks, at a depth of 80-100 cm, where its content fluctuates in the range of 91.25-94.27%, which is associated with the genesis of the parent rocks, which is characterized as weathered proluvial rocky rocks.

The amount of shallow earth in the studied soils varies in the range of 5.73-80.45%. At the same time, the content of the skeleton from top to bottom along the profile increases, the amount of shallow earth falls, which is associated with the genesis of these serosems.

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According to the mechanical composition, these soils are lightly loamy, where the content of physical clay in them varies in the range of 21.4-45.3%. Taking into account the hydrogeological conditions of salt accumulation, the soils studied by us are unsalted, where the content of water-soluble salts in almost all genetic horizons varies in the range of 0.061-0.082%, chlorine is contained in the range of 0.003-0.014%. There are many published works on the non-salinity of light gray soils [7,8]. The position of the soils themselves in geomorphological terms is occupied by interadyr, zaadyr depressions and upper pebble parts of dry cones-removal [9].

Taking into account the above, it seemed that these soils could be attributed to the type of gray-brown, especially taking into account the above-mentioned number of scientists [10], in the soils studied by us, there is no brown compacted horizon, in addition, there is no lumpiness, a gypsum horizon, which are characteristic of gray-brown soils of the desert zone.

Not a small humus of the upper part of the profile, skeletality, cartilaginous-loamy composition, eluvial-proluvial skeletal-small-earth mother rocks bring them closer to gray-brown.

Despite the fact that many similarities of the studied light gray soils are similar to the gray-brown soils of deserts, these soils are difficult to attribute to the type of gray-brown. Our research shows that there is no presence of salinity in them, the brown horizon is not detected, therefore, the soils studied by us in such semi-desert soil-forming conditions belong to the light cartilaginous-loamy serozems of the serozem belt of the north of the Fergana Valley. This is also indicated by the study, where high-altitude zones are highlighted, information and analytical data are given [11,12]. These soils are newly developed, that is, watered starting in 2019. It is possible that they could lose the signs of gray-brown. In such a short period, development is impossible, although it is known that during irrigation there is a significant change in the properties of soils, especially in the first years of development. The climate of the surface layer is changing, water, biological, salt and other soil regimes are changing. Erosion processes begin, the formation of an agro-irrigation layer on the surface, especially in hollows. These processes under such conditions can erase the signs of former evolutionary soil formation and can create soils morphologically similar to serozems.

In the area of distribution of serozems, the terrain presents slightly wavy slopes, at the same time they are in an interadyr position. Near the foothills, the terrain becomes more wavy with washouts along the dry Sai. In the lowlands in interadyr conditions, the surface is often covered with a small layer (0.2-0.3 m) of fine earth.

Directly below the surface layer begins a fine-earthy-cartilaginous horizon. The soils are unfertilized, but according to [13] nis compressed into environmental assessments for the purpose of cultivating medicinal plants.

On these soils, cereals respond well to the use of humic preparations. Additional study of these soils from a taxonomic point of view is recommended, given their intensive introduction into agricultural circulation (14).

Natural vegetation is very sparse, there is no turf horizon. The content of humus in the shallow-earth part of the soil to a depth of 10-40 cm is small, it is 0.71-0.81% (Table 2). At the same time, there is a gradual accumulation of humus and the growth of the humus horizon of sections 3, which is located in the reclaimed part of the territory.The soils, newly developed about which it was said, arable and sub-arable horizons have not yet been formed.

Conventional humus under arable horizons (10-40 cm) contain 0.40-0.51% (Table 2).

Table-2

Agrochemical properties of light sulfur soils

Depth, cm.	Humus, %	Gross, %				Mobile, mg/kg		
		N	C: N	P_2The_5	K_2O	$N\text{-}NO_3$	P_2The_5	K_2O
Slightly washed, incision-1								
0-10	0,79	0,067	8,0	0,130	1,88	15,1	10,5	95
10-40	0,43	0,038	7,7	0,106	1,80	10,2	5,1	88
40-80	0,30	0,021	9,7	0,110	1,72	8,2	4,8	88
80-100	0,19	0,018	7,2	0,120	1,76	7,0	3,5	120
Medium washed, section-2								

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0-10	0,71	0,061	7,9	0,0125	1,87	10,2	10,4	91
10-40	0,40	0,035	7,8	0,100	1,77	8,5	5,1	85
40-80	0,25	0,023	7,4	0,115	1,70	8,5	4,5	85
80-100	0,20	0,019	7,1	0,121	1,76	7,1	3,4	122
Washed, cut-3								
0-15	0,81	0,078	7,1	0,140	1,98	15,5	11,4	105
15-40	0,51	0,040	8,6	0,120	1,79	10,9	5,5	98
40-80	0,31	0,029	7,2	0,110	1,77	8,3	4,9	89
80-100	0,20	0,018	7,3	0,123	1,78	7,3	3,5	125

It should also be noted here that arable and sub-arable horizons do not stand out, following the example of new-irrigated, old-irrigated soils. At a depth of 40-80 cm and 80-100 cm, the humus content varies in the range of 0.19-0.31% as for the gross and mobile forms of plant nutrients, their content is low and they characterize cartilaginous-loamy light serozems. The content of gross nitrogen is associated with humus and varies in accordance with its contents according to the profile of the studied soils. Gross phosphorus is contained in the range of 0.100-0.140%, potassium 1.72-1.98%. At the same time, there is a weak accumulation of humus, gross nitrogen, phosphorus and potassium on the surface horizon of washed soils. According to the content of mobile forms of nitrogen, phosphorus, potassium, these soils belong to the group of poorly provided.

Conclusion. Newly developed light serozems are cartilaginous-loamy on pebbles and proluvial deposits confined to the adyr sloping and to the same age and relief in the interadyr sloping plain. The soil cover is practically homogeneous, both in stony and in other indicators. The general feature is a rather large skeletal content and the presence of a pebble horizon at a depth of 50-100 cm.

The studied light serozems are unsalted, distinguished by exceptional poverty of humus and other nutrients. They are not yet contaminated with mineral and organic fertilizers, as well as pesticides. According to the set of properties noted in the work above, soils are defined as suitable for the cultivation of medicinal and agricultural crops, through irrigation without special reclamation.

But due to the loose build and light mechanical composition, the skeletal nature of the soil and genetic horizons, the inevitable loss of irrigation irrigation water for filtration. Therefore, these soils are recommended for medicinal plants such as lavender under the condition of drip irrigation. It is recommended to cultivate medicinal plants and conduct experiments in these conditions with the introduction of organic and mineral fertilizers, taking into account the needs of medicinal plants.

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