**Improving CHKU-4a in order to improve the reclamation of saline aged lands**

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**Abstract**. In the article, in order to improve the reclamation properties of gypsum soils, a channel-type chisel cultivator CHKU-4A has been installed on the farm. In this case, the main parameter of the fertilizer and soshnic band is based on the internal diameter. As a result of application of an improved kind of cultivator in practice, the crops will increase and product quality improved.

**INTRODUCTION**

The population living on Earth today is 8.0 billion. Accounts for many, their supply of food and clothing, including agricultural products, is increasing day by day. This condition assumes the effective use of existing irrigated lands. The rapid growth of the population and the reduction of arable land for various reasons, the exclusion of these lands from farm work, requires the use of saline gypsum land with low productivity for planting crops. At the same time, these soils are creating an increase in productivity, the need to develop and introduce into practice measures for greening the yield and quality obtained from agricultural crops [1-6].

This is a treatment of state significance in the presidential decree “on measures for the effective use of land and water resources in agriculture” (17.06.2019). PD-5742) and the tasks of designing, testing and organizing industrial production of agricultural, irrigation and reclamation machines and devices on the basis of Modern most advanced technologies, which save land and water resources in our republic and provide opportunities for their rational use, are taken into account in the lamb.

In the Presidential Decree “on approval of the concept of water development of the Republic of Uzbekistan for 2020-2030” (10.07.2020 y. PD-6024), however, due to global climate change, population in our republic, growth in economic sectors and exports of agricultural products, increase in demand for land and water resources from year to year, their effective use, improvement of the reclamation status of irrigated lands, ensuring stability, increase in land productivity, continuous reduction of the level of salinity of lands (including saline gypsum, the tasks of regularly reducing the areas of saline gypsum land are set.

**MATERIALS AND METHODS**

Currently, there are 4.3 million people per capita. At the same time, 10-15% of drywall is available on the territory of the complex (drywall makes up 10% of the building area) [1-5]. The drywall consists of CaSO4 and 2H2O drywall. The profiles of drywall pipes, the layout and cladding, the number of soil layers and sealed pipes are the factors determining the target environment of the research center [2, 4, 5].

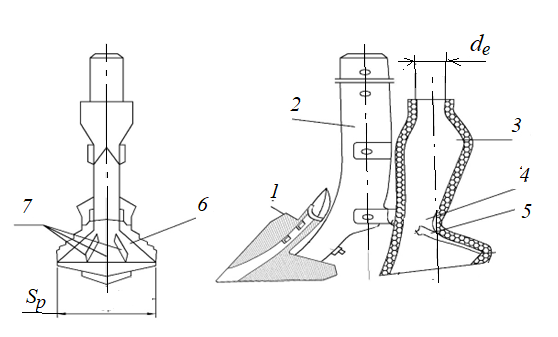
Due to the fact that during Independence Square and mass riots on the streets of Donetsk, plaster plaques with the names of the victims were installed, they were marked with inscriptions stating that they were killed. This is due to the fact that gypsum soils have varying degrees of grazing, humus (fertility) and winter elements, agrophysical properties, and biological activity [1].

Nowadays, as a result of the drying up of the Aral Sea, the amount of moderately and strongly saline lands is increasing year by year due to the strong winds and hurricanes, and the salt accumulated in its upper part is scattered to different parts of Central Asia [2-4].

That is why the Decree of the Republic of Uzbekistan “On the Strategy of Uzbekistan-2030” (No. PD-158, September 11, 2023) provides for a reduction in the area of irrigated land with strong and moderate salinity to 430,000 hectares.

In order to save about agricultural and waterproofing in the cultivation of agricultural and prevalents in saline agriculture in saline agriculture in saline agriculture in the cultivation of agricultural and prevalents in the cultivation of agricultural and waterprints in the cultivation of agricultural land in saline areas in the farms of the Republic (including repeat crops). It was recommended to put an average nitrogen (40 - 120 kg/ha), phosphorus (120-420 kg/ha), slaked lime (600-420 kg/ha) and manure (80-300 kg/ha) average 840 kg/ha to 1260 kg/ha [7].

Academician Khadjiev A.Kh. used Chisel-cultivators of the ChKU-4A model, which are currently being produced on an industrial basis [7]. The construction of the soshnic for placing mineral fertilizers recommended by (Fig. 1) is installed.



**FIGURE 1.** Constructive diagram of a soshnic mounted on a chisel cultivator for applying a fertilizer mixture to the soil (A. Khajiev): 1-claw, 2-column, 3-conical hole, 4-slit hole, 5-valve, 6-diffuser, 7-plates; *Sp*-is the width of the fertilizer strip.

During the work of the chisel-cultivator-fertilizer, the mineral fertilizer mixture falling from the fertilizing tank passes through the throat (de) of the cross-section of the soshnic in the form of a circle. It passes through the 3-conical hole, 4-narrow hole, 5-valve, 6-diffuser, 7-plates and is given to the softened ground in the form of a strip to a depth of 15-20 cm. In order for the work process to be performed reliably, the fertilizer-conveyor and the throat (de) of the hopper should freely pass the mineral fertilizer falling from the fertilizer application device without getting stuck in its interior.

Based on the norm of fertilizing the land, the following amount of fertilizer should be provided per one meter length of one row of chisel-cultivator fertilizers:

|  |  |
| --- | --- |
|  | (1) |

where *Q* –is the rate of application of mineral fertilizer mixture, kg/ha;

*lq*–is the length of the strip on which the fertilizer mixture is applied in one hectare (its value depends on the distance between soshnics of the chisel-cultivator Sc (in cross-section), m/ha.

On the other hand, the amount of fertilizer placed at a distance of one meter is A. Khajiev and Sh.Khaydarova [9] propose to determine using the following formula:

|  |  |
| --- | --- |
|  | (2) |

where *Fу* – is the cross-sectional area of ​​the fertilizer flow, m2;

*Vk* – is the speed of the cultivator in forward motion, m/s;

*ρ* – density of organo-mineral fertilizer mixture, kg/m3.

*Vу* – speed of fertilizer falling from the fertilizer conveyor, m/s;

Equating the right-hand sides of expressions (1) and (2) to each other and solving with respect to *Fу*, we determine the value of the optimal surface of the cross-section of the soshnic of fertilizing throat using the following formula:

|  |  |
| --- | --- |
|  | (3) |

It is known that the value of the *Fу* value of the cross-sectional surface of the cross-sectional surface of the fertilizer conduit and the soshnic throat, through which the fertilizer mixture flows from the chisel-cultivator fertilizer tank, can be determined by the following expression:

|  |  |
| --- | --- |
|  | (4) |

Here *de*is the main parameter of the throat of the chisel-cultivator fertilizer, and the throat of the soshnic of ground fertilizer, its internal diameter (only when adding a mixture of mineral fertilizers), mm.

Solving the expressions (3) and (4) together, we determine the inner diameter of the chisel-cultivator fertiliser and the throat of the soshnic using the following formula:

|  |  |
| --- | --- |
|  | (5) |

**RESEARCH RESULTS**

As a result of the research and analysis of the results of scientific research and experimental design work, it was observed that there is no possibility of continuous and reliable execution of this technological process when using existing fertilizer conveyors and soshnics when applying organo-mineral fertilizers with a chisel-cultivator to gypsum lands. Because the construction of the chisel-cultivator fertilizing conveyor and the soshnic throat is designed only for applying 12-mineral fertilizers to the ground, and the presence of blockages (traffic jams) in the process of applying organic-mineral fertilizers to the ground was not taken into account.

As a result of the cultivation of research work and agricultural production in the country in the saline soils in the country at the time of saline soils at TSTU, the mixture of the organ CKU-4A fertilizer was not always uninterrupted in the required environment.

As a result of the observations, there were frequent cases where the fertilizing device and the soshnic were left without the organic-fertilizer mixture being thrown on the ground. As a result, there will be interruptions in the mixture of organic-mineral fertilizer applied to the ground. This leads to the violation of the technological process of the chisel-cultivator fertilizer apparatus. This can be seen from the diversity in the development of agricultural crops on saline gypsum lands. Farmers suffer a lot from this. That is, due to the fact that the required organo-mineral fertilizer mixture is not supplied to the saline gypsum land, the crops in these zones develop slowly or do not grow at all, the yield decreases and the product quality deteriorates. Currently, the chisel-cultivator, which is produced on an industrial basis, does not have devices or automatic devices that control this process.

In many conversations with agricultural workers and farmers, they gave suggestions and recommendations on how to eliminate these malfunctions in the CHKU-4A chisel-cultivator and the KXU-4B universal cotton cultivator, the fertilizer transferor and the soshnic. Taking this into account, we suggested adding the coefficient "k" to the above-mentioned formula (5).

|  |  |
| --- | --- |
|  | (6) |

where k is the coefficient required to increase their diameter in order to ensure that there will be no clogging of the fertilizer conduit and the throat of the soshnic, taking into account the change in the physico-mechanical properties of the organo-mineral fertilizer mixture when organic fertilizers are added to the mineral fertilizer composition; taking into account the experiments carried out in practice, we accept its value as k = 1.1-1.3.

It can be seen from the expression (6) that the internal diameter of the fertilizer, and the throat of the soshnic *d*e, the rate of organic-mineral fertilization of cotton, corn, sorghum, sunflower and other technical crops is *Q*, the distance between the soshnics is *Sc*, the speed of the unit is *Vk,* the fertiliser, fertiliser, and the soshnic, of the organic-mineral fertilizer mixture it was found that the rate of fertilizer passing through the throat is inversely proportional to *Vу.*

If we accept the following data based on the results of previous tests and researches to determine the calculated diameter of the fertilizer-conveyor and the soshnic throat, which performs the function of smoothing gypsum lands plowed before planting agricultural crops with a chisel-cultivator and continuously supplying the organo-mineral fertilizer mixture to the ground (at a depth of 15-20 cm into the soil):

*Q* = 840....1246 kg/ha; *Vk* = 1,94 ... 2,36 m/s; *Vy*=1.5 m/s, ρ = 480 kg/m3 [7] (6) calculations made according to the expression, to ensure that the mixture of mineral fertilizers falling from the fertilizing device is continuously passed through the fertilizer pipe and the throat of the soshnic, without getting clogged (accumulated) inside it, the main parameter of the fertilizer pipe and the soshnic throat is at least its inner diameter It was determined that it should be 42-51 mm (43 mm in series cultivators).

In order to ensure that the organo-mineral fertilizer mixture is passed freely through the fertilizer pipe and the throat of the soshnic, without getting clogged (accumulated) inside it, it was determined that the main parameter of the fertilizer pipe and the soshnic throat should be at least 50-61 mm in diameter (43 mm in series cultivators).

**CONCLUSION**

1. The fertilizer is an internal crop to ensure that the selected fertilizer and soshnic crops as a result of a mixture of landscapes and thresholds of the orgniki threshold It is recommended to select the main parameter of the diameter and soshnic impurity de = 50...61 mm.

2. As a result of installation of improved structure fertilizer-conveyor and soshnic (with the main parameter - internal diameter de=50...61 mm) on the CHKU-4A chisel-cultivator, the reliability of the technological process of applying organo-mineral fertilizers to the saline gypsum lands, the machine's productivity and the productivity of the cultivated crops will increase, and the quality of the products will be improved.

**REFERENCES**

1. Gafurova L.A., Abdullaev S.A., Nomozov, Nomozov. Reclamation soil science.-Tashkent: TSU, 2003. 180 p.

2. Scientific and practical bases of increasing productivity. // Collection of articles (Part 1) / Ministry of Agriculture and Water and the Water Department of Uzbekistan and B. -428 p.

3. Matkulov A.V. Effective use of irrigated irrigated land in agriculture.-2017.-135 p.

4. Report of the international scientific-practical conference on the figure of the agriculture "Sustaining and water-saving technicles in the agriculture. December 2, 2010. / Ministry of Agriculture and Water Resources of Uzbekistan and B.-TASHKENT: EPITI, 2010.-360 p.

5. Cotton reference / Tahriet coast.-Tashkent: Science and technology, 2016.-540 p.

6. Sametive technological cards for care of the hotel and cultivation of production. For 2016-2020. I-part and Part II. / Ministry of Agriculture and Water Resources of Uzbekistan and B.-Tashkent, 2016.-215 p.

7. Masharip Khajiev, Mubarakhan Atadjanova, and Jakhongir Dusiyorov. Development of combined aggregate for improvement of meliorative condition of saline gypsum soils// BIO Web of Conferences 105, 01006 (2024) [https://doi.org/10.1051/bioconf/202410501006 AEGISD-IV 2022](https://doi.org/10.1051/bioconf/202410501006%20AEGISD-IV%202022).

8. Khadzhiev A.Kh. Mechanization of local introduction of mineral fertilizers for cotton.-Tashkent: Mehnat, 1988 .-185 p.

9. Xadjiev A.X., Khaidarova Sh. Determining the parameters of the shooting secturator of the cotton-drilled soshnik fertilizer of the cotton cotton-mineral fertilizer. / J. Agrohilm, March-April, 2020, № 2 (65), Tashkent. -99 p.