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Theoretical Justification Of The Dimensions Of The Working Part Of The Combined Aggregate Cutting Grinder

Raxmonov Xusan Tojiyevich[1] , Xusanov Axmadjon Juraevich[2] , Yuldashev Odiljon Toshpo'latovich[3] , Do'smatov To'g'onboy G'aniyevich[4]

[1]*Associate professor of the Kokand State Pedagogical Institute.*
[2]*Associate professor of the Kokand State Pedagogical Institute.*
[3]*Teacher of Kokan State Pedagogical Institute.*
[4]*Teacher of Kokan State Pedagogical Institute.*

Annotation: In this article, the dimensions of the working parts of the cutting grinder of the combined aggregate, which make the soil soft before planting, are theoretically studied. Analyzing the work of a number of scientists who carried out scientific research in this area in the conditions of Uzbekistan on such machines that make the soil soft before planting, it was determined that research on this work was not carried out, as a result of this research, the topic was relevant to achieve high-efficiency yields from the sown areas.

This machine used a pile drum for cutting crumbs, which gives a good effect only in zones with light soil. In the conditions of Uzbekistan, there are cases when kesak gets stuck in the drum-elevator range in more field areas and passes without crushing. That is, the intermediate distance at which the drum is located from the elevator start part is short, and the drum pegs cannot reach the crushing of the cuts due to the fact that they are fixed to it not fixed. Therefore, our main task was the creation of drum pegs as movable and the theoretical justification of its main parameters. When substantiating the parameters of the proposed working parts, based on its construction and based on the scientific work of most researchers, the operating parameters of the agragat elevator are substantiated using formulas in order to ensure the elution of the soil on agrotechnical demand.

Keywords: combination, aggregate, soil, chisel, grinder, machine, productivity, fixed, action, elevator.

INTRODUCTION

Certain works are being carried out in our republic regarding the reform of agriculture, especially the improvement of the management system in the field, the widespread introduction of market relations, the attraction of investments in the field, the introduction of resource-efficient technologies, and the provision of agricultural products producers with modern techniques.

Decree of the President of the Republic of Uzbekistan No. PQ-3003 of May 24, 2017 "On measures to fundamentally improve the system of training engineer-technical personnel for agriculture and water management sectors", July 27, 2017 "Higher "On measures to further expand the participation of economic sectors and sectors in improving the quality of education of educated specialists"

Decisions No. PQ-3151 were adopted, and in order to ensure the implementation of these decisions, the agricultural machines used in Uzbekistan before planting the soil are mainly processed without turning the soil, digging and grinding the soil, The possibility of using aggregates for preparing for sowing determines the interest of the topic.

LITERATURE ANALYSIS AND METHODS

Such machines, which soften the soil before planting, are used in the conditions of Uzbekistan by prof. N. Bayboboev, Yu. Asatillaev, R. Rustamov and others tried it. This machine uses a drum with piles for crushing, which works well only in areas with light soils. In our conditions, there are cases where cuttings get stuck in the drum-elevator gap and pass without being crushed.

That is, the distance between the drum and the elevator starting point is short, and the piles of the drum are fixed to it so that it cannot crush the pieces. Therefore, our main task was to make the drum piles mobile and to theoretically justify its main parameters. In justifying the parameters of the proposed working parts, based on its construction and based on the scientific works of most researchers, the aggregate speed V_m=1,2–1,86 m/s; elevator speed V_e=2,2 m/s; drum diameter R_b=0,32 m; the distance between the elevator shafts h_e=0,025 m we accept that [1.2.]. First of all, we will try to create a filter process module.

DISCUSSION

It is known that the filtration process consists of two consecutive technological operations:

- transfer the mass to the elevator by digging;
- separation of the mass in the elevator.

This process is represented schematically in Figure 1.

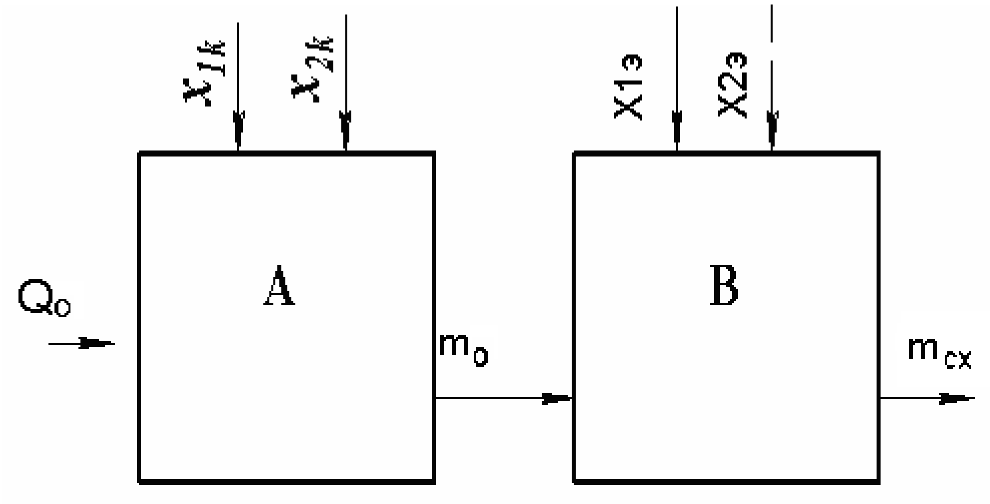

Figure 1. A model of the soil sieving process

A– digging and **V**– cutting working parts;

Q_o– the initial amount of soil depending on the physical and mechanical properties of the soil, the depth and width of digging;

X_{1k}, X_{2k} – factors characterizing the digging working part;

X_{1e}, X_{2e} – factors characterizing the sieving working part;

m_o – soil mass and fraction composition at the time of plowing;

m_{sx}– the mass and composition of soil falling from the elevator.

Input factor Q_o uncontrollable. However, a good technological treatment of the soil can have a positive effect on the input factor.

Based on the above, it is possible to express the level of soil sieving in the working parts of the sieve as follows y = f (Q_o, A, V,) yoki

$$y = \frac{m_0 - m_{cx}}{m_0},$$

(1)

in this $m_{\circ} = \delta \cdot F_{\circ} \cdot V_M$ – the mass of soil excavated by the unit in one second kg/s;

$F_{\circ} = в_м \cdot h$ – the surface of the cross section of the excavated soil, m^2;

v_m – furrow spacing, m;

h – digging depth, m;

δ – soil density, kg/m^3;

m_{sx} – the amount of soil mass that remains, kg;

(1) the expression determines the degree of crushing during the digging and sifting process. It is found by determining the values of this. Only m_c and in order to find the amount, it is necessary to solve the equation of soil displacement along the length of the elevator. Rate of sieving of fine particles at any time (relative sieving) q the function of the amount of small lumps of soil in the elevator will be, namely $q = f(Q)$.

$q = f(Q)$ assuming that it is a continuous function, its derivative will also be continuous. In it, its first order derivative is spread over the level row

$$\frac{dq}{dQ} = \varphi(q) = a_\circ + a_1 q + a_2 q^2 + \dots \quad (2)$$

Based on the elation process, the function will be decreasing, and we will write its linear approximation, limited to two hadi in an empty row.

$$\frac{dq}{dQ} = a_\circ - a_1 q \quad (3)$$

$\frac{a_\circ}{a_1} = q_{np}$ va $a_1 = k$ after elementary mathematical change and integration by defining as we will have the following exponential expression:

$$q = q_{np}(1 - e^{-kQ}) \quad (4)$$

As a result of practical studies, the value of the coefficients in this expression was determined by A.A. Sorokin, prof. Those identified by N.G.Bayboboev [1,2]:

$K = 0{,}0058 \frac{м.с}{кг} \cdot = Const$ to be

$q_{np} = 73{,}54 \div 155{,}32 \frac{кг}{м^2.с}$ in between

$q_{np.уp} = 112{,}5 \frac{кг}{м^2 с}$ was.

We also conducted a series of experiments with the proposed aggregate depending on the type of soil. The results of the experiment (Fig. 2) showed that if the cultivated land is heavily fed with organic fertilizer $q_{np} = 150{,}5 \div 210,.кг \cdot м^{-2} \cdot с^{-1}$ the value of only the moisture content of the soil

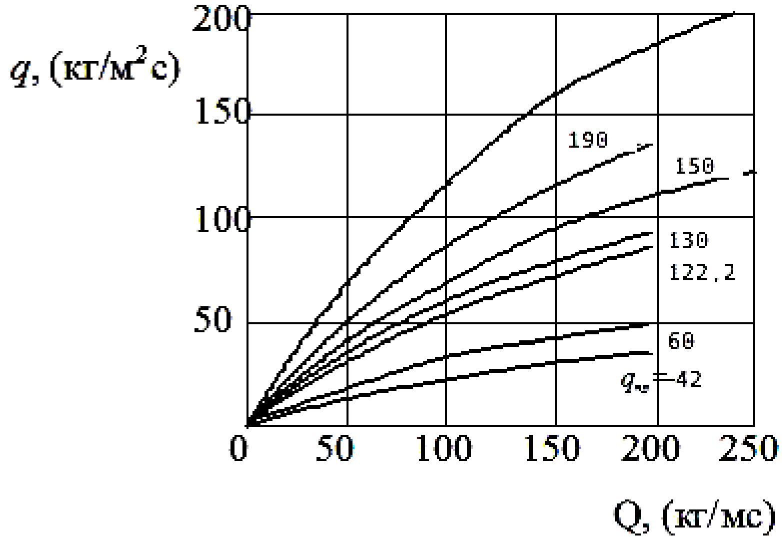

Figure 2. Dependence Q of the amount of relative leaching on the initial soil mass

$W_\circ = 18\%$ in selecting the mass $q_{np} = 130{,}1 \div 190,.кг \cdot м^{-2} \cdot с^{-1}$ in heavy soils $q_{np} = 60{,}7 \div 131{,}1.кг \cdot м^{-2} \cdot с^{-1}$ on rocky soils with low moisture $q_{np} = 42{,}5 \div 122{,}2$ kg·m^{-2}·s^{-1}. It was determined to be in the amount. The change of the soil mass along the elevator in the elemental length of the elevator dl width 1 m can be expressed as follows: $dm = -q \cdot dl$

(4) using the connection m_o from m_{cx} between

$L = -\frac{1}{q_{np}} \int_{m_n}^{m_{cx}} \frac{dm}{1 - e^{-km}}$ Integrating, we get the following analytical expression that determines the length of the working parts:

$$L = \frac{1}{Kq_{np}} \left[\ln \frac{1 - e^{-km_n}}{e^{-km_n}} - \ln \frac{1 - e^{-km_{cx}}}{e^{-km_{cx}}} \right] \quad (5)$$

in this $m_n = \frac{n в_м \delta \cdot V_м \cdot h}{B}$ in one second 1 m the mass of soil falling into the width separator, $кг \cdot м^{-2} \cdot c^{-1}$;

$m_{cx} = m_0 \cdot V_м \cdot 10^{-2}$ – in one second 1 m a mass of crushed soil from a wide elevator:

n – the number of rows the machine will process;

V_m – aggregate speed, m/s;

V – separator width, m;

v_m – line spacing width, m.

(5) the expression is shown in the form of a nomogram in Figure 3. This is through the nomogram n=2; v_m =1.40; V_m =1 m/s; δ=1200 kg/m² h=0,22 m without changing their values q_{pr}, Q_0 it is possible to find what the length of the elevator will be in different quantities of its values.

Or if we want to base this on the length of the elevator through the mass of the soil, which is dug up with the initial lemex and falls into the elevator, then [2]:

$$\ell = \frac{(Q_{\max}^{1-\ell} - Q^{1-в})}{aB(1-в)} \quad (6)$$

we use the expression.

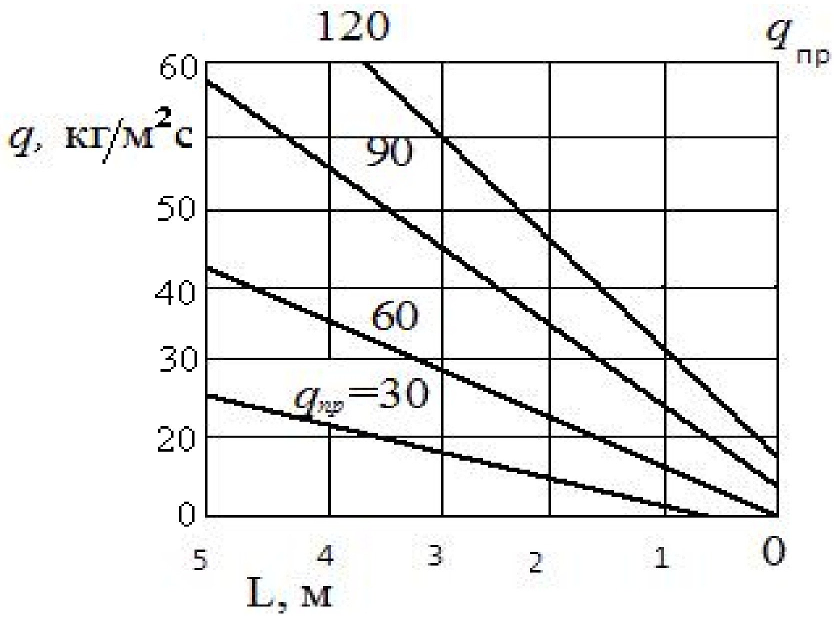

Figure 3. The length of the ambassador separator L=f (q_{pr}) definition nomogram in function view.

The length of the elevator with this expression can be anicized by the degree of soil absorption.

in this: Q_{max} – initial soil quantity (kg/s);

Q – the elevator was from the beginning to the end ℓ the amount of soil eaten at a distance (kg/s);

V – separator width, m;

α – coefficient indicating the rate of elution of the initial soil mass;

v – the level indicator depends on the amount of the initial soil and where the working part will be located.

CONCLUSION

Many researchers have found the level of absorption [2,3] $\varepsilon = \frac{Q_{\max} - Q}{Q_{\max}}$ is expressed in the form of in which (6) can be written as:

$$\ell = \frac{Q_{\max}^{1-в}\left[1-(1-\varepsilon)^{1-в}\right]}{\left[aB(1-в)\right]}, \quad (7)$$

If we put the numerical values of the coefficients determined based on the results of A.A.Sorokin [1] and N.G.Bayboboev [2] into the elevator length formula (6):

$$\ell = 1{,}785 Q_{\max}^{0,28}\left[1-(1-\varepsilon)^{0,28}\right] \quad (8)$$

In the laboratory field experiments conducted with the unit we offer, the mass that the tiller digs and transfers to the elevator $Q_{\max} = 200$ kg/s a mass of soil that can be sifted up to a drum $Q_i = 130$ kg/s is the mass that falls on the surface of the field from the back of the elevator $Q_{cx} = 70$ kg/s showed that it will be equal to.

If we calculate the length of the elevator by entering the obtained results into the expression (8). $\ell = 1{,}785(200^{0,28} - 70^{0,28}) = 2м$. The theoretical studies carried out above have been proven based on the results of experimental tests.

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