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Basis of Rational Values of Chisellie Softener Parameters

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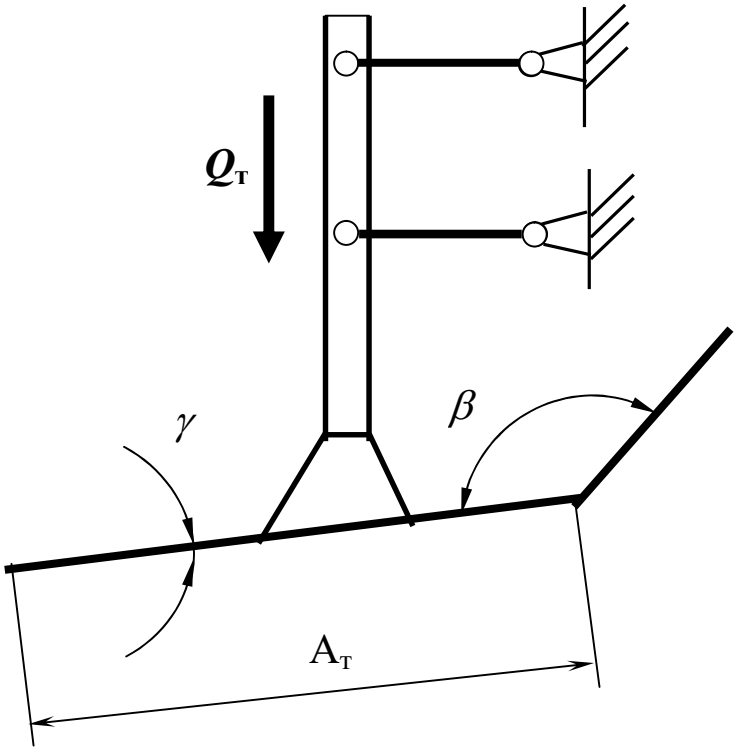
Based on our theoretical and experimental studies, the main factors affecting the performance of the leveler were identified and the limits of variation were determined. That is, [1,2] are the main parameters of the chisel softener (see figure):

- the angle of installation of the compactor of the leveler relative to the horizon g;
- the mounting angle of the leveler relative to the compactor β;
- the length of the leveling base surface $A_т$;
- the vertical compressive force applied to the straightener $Q_т$.
- aggregate movement speed $V_м$

To determine the rational values of these parameters that ensure the performance of the required level of performance at the specified speeds of the unit with minimal energy consumption, five-factor experiments were conducted according to Box-Bennin's B_5 plan [3,4].



Basic parameters of chisel softener

To determine their optimal values, five-factor experiments were performed according to the Hartley-5 (Ha_5) plan. In this case, the height of the leveler was assumed to be constant 16 cm. The following table shows the conditional designation of the factors and the limits of change.

The evaluation criteria were the degree of leveling of the field surface (V_1), soil density (V_2) and degree of compaction (ie the amount of fractions smaller than 25 mm) (V_3) and the specific gravity resistance of the leveler (V_4).

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Factors and limits of their change

№	Naming of factors	Determination of factors		Levels of factors			Changing interval
		real	conditional	low	basic	high	
				-1	0	+1	
1	The angle of installation of the compactor of the leveler relative to the horizon, grad.	γ	X_1	25	30	35	5
2	The angle of inclination of the straightening part with respect to the compaction part, grad.	β	X_2	110	130	150	20
3	The length of the base surface of the leveler, cm.	$A_т$	X_3	6,0	9,0	12,0	3,0
4	Vertical pressure force applied to the straightener, kH / m.	$Q_т$	X_4	2,0	2,5	3,0	0,5
5	The speed of movement of the unit, m / s.	$V_м$	X_5	1,5	2,0	2,5	0,5

Тажриба натижаларига «регрессион таҳлиллар» дастури бўйича ишлов берилди [5,6]. Бунда дисперсиянинг бир хиллигини аниқлашда Кохрен criterion, the Student's criterion was used to estimate the value of the coefficients of the regression equations, the Fisher criterion was used to assess the adequacy of the obtained regression equations.

The results of the experiment were processed in the prescribed manner and the following regression equations were obtained, which adequately represent the evaluation criteria:

by the degree of leveling of the field surface,%

$$Y_1 = 92.815+1.071x_1-2.043x_2-1.985\ x_3+4.434\ x_4+3.199x_5-3.086\ x_1^2-$$
$$-1.181x_1x_2-1.247x_1x_3+ 3.652x_2^2-3.833x_3^2-2.301x_4^2-$$
$$-2.590x_4x_5-2.802x_5^2; \quad (1)$$

on the density of the soil, г/см^3

$$Y_2 = 1,133+0,006x_1+0,026x_2+0,040x_3+0,095x_4-0,082x_5+$$
$$+0,0036x_1^2-0,060x_2^2-0,058\ x_4^2-0,046\ x_5^2; \quad (2)$$

according to the degree of erosion of the soil, %

$$Y_3 = 88,043 +0,801\ x_1+0,807\ x_2 +5,352\ x_3+5,650\ x_4+$$
$$+3,500\ x_5-2,900x_1^2\ -4,529\ x_2^2 -4,032x_3^2-3,351\ x_4^2 -3,400\ x_5^2; \quad (3)$$

on the specific resistance of the rectifier, кН/м

$$P_c = 1,158+0,012x_1-0,061x_2-0,099\ x_3+0,232\ x_4+0,193\ x_5+$$
$$+0,056\ x_1^2+0,072\ x_5^2. \quad (4)$$

Analyzing these obtained regression equations, we can note the following:

- all factors had a significant impact on the evaluation criteria;
- with the increase in the angle of installation of the compactor of the leveler relative to the horizon, all the parameters changed according to the laws of the bubble parabola, ie they first increased and then decreased;
- The increase in the angle of inclination of the leveling part of the leveler relative to the compaction part led to an improvement in the level of field leveling and the quality of soil compaction, as well as a decrease in soil density. The gravitational resistance of the leveler decreases with increasing of this parameter;

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- with the increase of the leveling base surface, its quality indicators first increased and then decreased, the energy index, ie the resistance to gravity decreased;
- all parameters increase with the increase of vertical compressive strength applied to the leveler;
- with increasing speed, the leveling of the field surface and the level of soil compaction improved, its density decreased, the gravitational resistance of the leveler increased.

(1) - (4) Regression equations are solved provided that the criterion V_1 is not less than 90%, criterion V_2 is not less than 80%, criterion V_3 is in the range of 1.10-1.15 g / cm3 and criterion V_4 is the minimum value, the working speed is 1.7-2 , In the range of 2 m / s, the leveler was found to have the following parameters: γ=29-30º, β=122-130º, A=10-12 см, Q=2,48-2,50 кН/м/

Омилларнинг бу қийматларида $У_1$, $У_2$, $У_3$ ва мезонлар мос равишда 90 %, 1,10-1,15 gr/sм^3, 85,00-86,98 % ва 1,05-1,09 кН/m ни ташкил этади.

At these values of the factors V_1, V_2, V_3 and the criteria are 90%, 1.10-1.15 gr / sm^3, 85.00-86.98% and 1.05-1.09 kH / m, respectively.

This means that the leveling angle of the chisel softener relative to the horizon is 29-30 º, so that the leveling part of the chisel softener can work at the required level of the soil at low operating speeds of 1.7-2.2 m / s (6-8 km / h). the relative mounting angle is 122-130º, the length of the base surface is 10-12 cm, the vertical compressive force applied to the leveler should be in the range of 2.48-2.50 kH / m.

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