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RESULTS OF SMOOTHING MACHINE TESTS

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Abstract: *The article provides information on the design and experimental design of a leveling machine for pre-sowing tillage in the preparation of fields for irrigation of cotton, grain and secondary crops in irrigated agriculture of the country, as well as technological processes, technical characteristics of the machine and the results of field tests.*

Keywords: *cotton, grain and secondary crops, pre-sowing tillage, leveling machine, longitudinal and transverse distance between roller blades, soil compaction rate.*

Rational use of energy and resources in primary and pre-sowing tillage, increasing productivity and quality of work are relevant in agricultural production. This is achieved through the development and improvement of combined machines. At present, a lot of scientific research is being conducted in our country in this regard [1-11].

Quality pre-sowing tillage is important in the production of abundant crops. Because if the soil is not treated before sowing, the seeds of agricultural crops cannot be sown at the level of agro-technical requirements, the sown seeds do not germinate and the required seedlings are not obtained from each hectare. This in turn leads to a decrease in crop yields [12].

One of the main tasks in preparing field fields for planting is to level the field surface immediately before sowing, compact it to the required level and crush large lumps to form a fine soil layer to ensure quality sowing and even germination of these seeds. At present, this is done using aggregates such as MV-6.0, MV-6.5 and gears BZSS-1,0, BZTS-1,0 and BZTX-1,0 [13]. However, in most cases, under their influence, the cuttings on the surface of the field are not sufficiently crushed, and during sowing they, ie uncut cuttings, cause the seeders to move unevenly (in terms of sowing depth) and the seeds to fall to different depths. As a result, firstly, the seeds do not germinate completely, and secondly, the germinated seedlings do not develop evenly. To prevent this, on farms and dehkan farms, the soil is mulched and raked 2-3 times before planting. This, in turn, leads to increased consumption of fuel, labor and materials in preparing the fields for planting, excessive compaction of the soil, loss of moisture in it and prolongation of planting times. It should also be noted that aggregates consisting of existing rakes and gear storms are large in length due to the fact

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that they are trailers, inconvenient to use, high material volume, low maneuverability and work efficiency, require a large turning area (and therefore time consuming) and storms. removal of clogged plant debris and weeds is done by hand. In addition, the transfer of aggregates consisting of rakes and storms from one field to another also requires additional manpower and vehicles.

Studies have shown that the noted shortcomings of aggregates consisting of rakes and gear harrows can be overcome by equipping the working surfaces of the rakes with special cutting blades and using gear or plank rollers instead of gear harrows. In this case, the pieces on the surface of the field are cut by knives mounted on the working surfaces of the plows and crushed by the planks or teeth of the plow. As a result, a smooth soil layer is formed on the field surface, which ensures quality sowing of seeds in one pass of the unit, and there is no need for additional tillage. In addition, when instead of gear storms, plank or gear rollers are used, the unit will be compacted and it will be possible to prepare it for suspension. As a result, material and energy consumption is reduced, the maneuverability and productivity of the unit is increased, it is easier to use, and the time spent on salt walks is reduced.

Based on the above, a leveler-smoothing machine (see picture) was developed, consisting of a leveler equipped with cutting blades on the working surface and a gear roller.

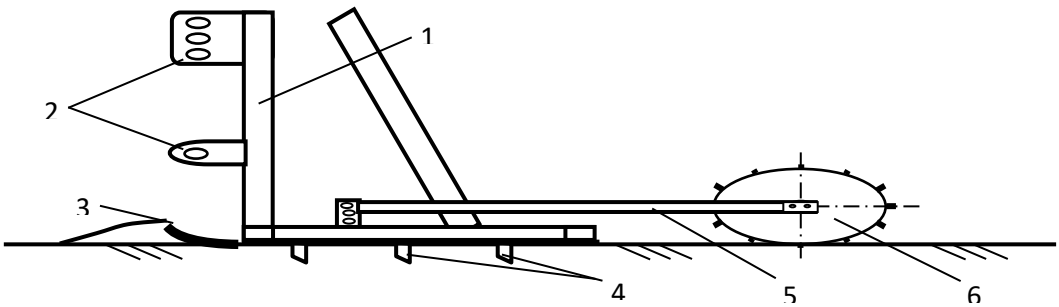
The pre-sowing leveling machine is used in the preparation of fields for planting cotton, wheat and secondary crops. In one pass, the surface of the field is leveled, compacted, and the large lumps in it are crushed, forming a fine layer of soil, i.e., the soil is ready for planting.

The gear frame is hinged to the frame of the machine.

Table 1 shows the technical characteristics of the smoothing machine.

An experimental version of the smoothing machine was prepared on the basis of a design scheme developed for field tests.

The purpose of the study. Carrying out field tests of the experimental version of the developed leveling-smoothing machine.



1-rama; 2 hanging device; Level 3; 4 cutting blades; Gravity of the 5th reel; 5-roller

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a)

Design diagram of the leveling machine before planting in the soil (a) and general views of the experimental version (b)

Table 1. Technical description of the experimental version of the smoothing-smoothing machine

T/p	Name of indicators	The unit of measurement of indicators	The value of indicators
1.	Type	-	Осма
2.	Combined tractor class (model)	-	2-3 (MX-135, MXM-140, Claas ARES 697 ATZ, Keys 4240X, APION630S, New Holland T7060)
3.	Work speed	km / h	6,0-9,0
4.	Coverage width	m	4,0
5.	Processing depth	see	10 each
6.	Number of blades	dona	58

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7.	The distance between the blades	see	7,0
8.	Longitudinal distance between blades	see	17,5
9.	The diameter of the roller	see	30,0
10.	Number of roller shutters	dona	8
11.	Total mass	kg	980

Research methods. Field tests of the machine experimental copy Tst 63.04.2001 in field 5 of the experimental farm KXMITI plowed in autumn to a depth of 30-35 cm. “Ispytaniya selskoxozyaystvennoy technical. Mashiny i orudiya dlya poverxnostnoy obrabotki pochvы. Program i metody ispytaniy ”[14], during the preparation of lands for sowing. An experimental version of the machine developed in the tests was assembled and used on a New Holland T6070 tractor. Operating speeds were set at 6.0 and 9.0 km / h.

Prior to the experiments, the soil moisture in the 0-10 cm and 10-20 cm layers was 15.82 and 17.42 percent, respectively, with a density of 1.13 and

1.19 g / cm3, and the hardness was 0.97 and 1.34 MPa.

The following were accepted as evaluation criteria: speed of movement; soil compaction quality; average quadratic deviation of field surface irregularities; soil density.

The results of the study. The test results of the experimental version of the developed smoothing-smoothing machine are given in Table 2.

Table 2. Results of economic tests of the experimental version of the smoothing-smoothing machine

T/p	The name of the indicator	The unit of measurement of the indicator	The value of the indicator		
			According to preliminary requirements	According to the test results	
1.	Speed of movement	км/соат	6,0-9,0	6,0	9,0
2.	Amount of soil fractions by size: >50 мм		– –	2,8 13,1	

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	50-25 мм < 25 мм	%	> 80	84,1	2,3 10,8 87,9
3.	The standard deviation of the notes on the field surface	см	± 2	1,2	1,7
4.	Soil density	г/см^3	1,1-1,2	1,15	1,14

From the data presented in Table 2, it can be seen that the performance of the leveling machine corresponds to the agro-technical requirements imposed on it. The level of soil compaction, ie the size of the fractions smaller than 25 mm, was 85.1% and 88.4% (agrotechnical requirements) after the experimental version of the leveler-softening machine developed at operating speeds of 6.0 and 9.0 km / h. this amount should not be less than 80%), the average square deviation of the unevenness of the treated field surface was 1.1 and 1.6 cm (according to agro-technical requirements, the average square deviation of this indicator should not exceed ± 2 cm) and soil density 1, 16 and 1.18 g / cm3 (according to agrotechnical requirements this figure should be 1.1-1.2 g / cm3).

Conclusion

The use of a leveling machine that prepares the fields for sowing cotton, grain and secondary crops will reduce the cost of fuel, labor and material costs in the cultivation of arable land, as well as increase the quality and productivity of work.

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