



DETERMINATION OF HARDNESS, VOLUMETRIC WEIGHT AND AGGREGATE COMPOSITION OF THE SOIL WHEN THE PLANNER WORKS

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The task of conducting the experiment included a study on the application of auger bucket, changes in volume weight in the composition of soil, leveling of field surface.

The results of the volume weight and substance of the soil hitched in the speed of the unit are shown in tables 1 and 2.

As it is shown by research, increase the speed of planning unit causes in reducing volume weight soil. Table 1 shows changes volume soil weight, depending on the speed of the auger working body.

According to the result of the experiment from table 1 can be said that increasing the driving speed of unit reduces volume soil weight. In the table 1 are given the results (data) obtained with ground speed 0.69 ...2.08 m/s are the most satisfactory, responding for agricultural requirements as compared with the data from the other vehicle speeds. The difference in change volume weight soil between the minimum and maximum speeds of the scheduler in the slice consist of the following:

For the layer 0-5 cm - 0.179 g/cm³ or 12.8 %, for the layer 5-10cm - 0.137 g/cm³ or 9.7 %, for the layer 10-15 cm - 0.123 g/cm³ or 8.34 %.

The average to a depth up to 15 cm the difference can be 0.146 g/cm³ or 10.2 %.

Changing volume soil weight, depending on the speed of the auger working body.

Table 1.

Layer, sm	Soil moisture, %	Volume weight soil, g/cm ³					
		Before passage	After passage				
			Ground speed, in m/s				
		0,69	1,05	1,44	1,8	2,08	
In the slice							
0-5	12,48	1,121	1,400	1,349	1,270	1,262	1,221
5-10	14,80	1,155	1,412	1,315	1,314	1,303	1,275
10-15	16,18	1,265	1,473	1,406	1,381	1,399	1,350
The average to a depth of up to 15 cm	14,49	1,180	1,428	1,357	1,322	1,321	1,282
At the two graders							
0-5	12,48	11,21	12,70	12,50	12,21	11,95	11,90
5-10	14,80	11,55	13,15	13,20	12,90	12,89	12,74
10-15	16,18	12,65	13,81	13,92	13,53	13,40	13,29
The average to a depth up to 15 cm	14,49	11,80	13,22	13,21	12,88	12,74	12,64



As can be seen from this analysis (table. 1) The difference of changes of volume weight soil between maximum and minimum speeds with the increase in depth decreases.

The same phenomenon with a change in volumetric soil weight, depending on the speed of the flows to graders. The difference in the change of volumetric soil weight between the minimum and maximum speeds at the graders is: For the layer 0-5 cm, 0.80 g/cm³ or 6.3 %, for the layer 5-10cm - 0.4 g/cm³ or 3.12 %, for the layer 10-15 cm - 0.52 g/cm³ or 3.77 %.

The average to a depth up to 15 cm difference is 0.058 g/cm³ or 4.38%.

It is known that the unit structure of the soil is one of the main qualitative indicators of the work of agricultural machine. Increasing of forward speed can result in excessive soil dispersal, and the latter may cause soil erosion.

Table 2 shows the change in the nature of the soil, depending on the speed of the auger working body of scheduler.

The change in the composition of soil depending on the speed auger working body

The speed of act	The contents of the factions, % size in mm			
	100 +50	50 + 10	10 + 0,25	< 0,25
Before pass unit				
	28,62	50,82	19,42	1,72
After pass unit				
0,69	28,41	48,38	20,25	2,59
1,05	26,81	48,81	24,36	1,92
1,44	19,76	47,73	30,17	2,21
1,8	16,00	50,72	30,25	3,05
2,08	13,41	47,98	34,99	3,69

As can be seen from the table increase speed of auger working body of large lumps (Ø100 ... 50mm) are crushed, medium-sized lumps (Ø 50 ... 10mm) almost do not change - this is the transition large lumps in the medium-sized and medium-sized to small. A valuable structural units (Ø 10 ...0.25 mm) is increasing.

Table 3. shows the difference in changes of the factions in the soil between the minimum and maximum speeds: Large lumps Ø 50 ... 10mm - 52.8 %, the average lumps Ø 50 ... 10mm - almost without changes in quantitative composition. Valuable units size of Ø 10 ...0.25 mm increases to 72 %. The composition of the factions size of Ø<0.25 mm as can be seen from the table increases slightly within the range inspection requirements.

Above described results of the study will favorably affect the winter crops condition background contains ammoniacal and reduce costs for the use of guns for chopping large and medium-sized lumps seeding background.

Improvement of the quality of leveling of longitudinal profile is one of the main and crucial factors in the study of the work of technology planning units.

Table 3 shows the extent flattering in the longitudinal direction, depending on the speed of the unit.

Changing the extent equalizing depending upon the speed of the unit

Table 3

Drowing indicators	Speed, m/c				
	0,69	1,05	1,44	1,8	2,08
σ_{∂}	9,94	11,05	10,80	10,30	10,10



σ_{π}	7,89	8,27	7,32	6,82	6,84
K (%)	20,6	25,1	32,2	33,8	32,2

$\Sigma_{\text{д}}$ - rms deviation from height one decimal place bumps up to pass scheduler, sm; σ_{π} - the same after passage scheduler, see; - the degree of выравниваемости in percentage.

Apparently from table 3 data, with increase of speed of progress of the scheduler with working body degree of uniformity of a planned site increases. It occurs at the expense of crushing of large lumps of soil to which is promoted by work of two units which rotation are directed every which way. On speeds of movement 1,8 ... 2,08 km/s uniformity degree above in comparison, than on other speeds of movement. It speaks steadier course of working body on the raised speeds. Besides, the increase in speed of movement in the specified limits promotes crushing of large and average lumps of soil in a drawing prism much more. Work of two шнеков allows uniform distribution of soil on width of pass, the last also improves quality of a lay-out.

Conclusion and offers.

1. With increase in speed of movement of the scheduler with working body from 0,69 to 2,08 km/s reduces volume weight of soil, and the modular structure of soil improves.
2. Increase of forward speed of movement to 2,08m/with improves quality of a lay-out in a longitudinal direction.
3. It is necessary to devote the further researches to studying of parametres working body and its arrangement in a ladle of the scheduler.

References:

1. Norov S.N. Research and development of a machine system for complex mechanization of precultival treatment of agricultural conditions in the bukhara region» Монография Lambert Academic Publishing Germaniya 2019. 67 p.
2. Khasanov I.S., Norov S.N. Theoretical prerequisites for the results of experiments on the use of auger in front of the planner bucket. Universum Journal: Engineering Sciences Moscow 2019 December Issue: 12(69) 41-44pp.
3. Khasanov I.S., Norov S.N. "Theoretical preconditions for determining some parameters of the screw working jointly with the planner bucket" Agrarian science. Moscow, 2015
4. Khasanov I.S. et al. Theoretical preconditions for determining the maximum productivity of planning machines. Materials of the international scientific and practical conference, May 26-28, 2009 Ulyanovsk.
5. Norov S.N., Hamraeva M.F. Analytical research of determining the maximum efficiency of planning machines. International Journal of Advanced Research in Science, Engineering and Technology Vol. 6, Issue 6, June 2019 361-362 p.