PROCESSES OF IMPROVING SOIL WITH METAL AND SOIL WITH SOIL DURING MAIN SOIL WORKING.

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Abstract: This article presents the results of the study of the physical and mechanical properties of the soil during ploughing, i.e. hardness, density, and the friction forces generated during the study of the processes of friction of soil with metal and soil with soil.

Key words: plough, body, ploughshare, backhoe, soil moisture, soil hardness, soil density, ploughed field, tractor, wheels.

Studying the physical and mechanical properties of the soil is one of the most important dimensions in the design of machines and equipment, and it is impossible to design working bodies and machines without studying these properties. Therefore, it is very important to study the friction of soil with metal and soil with soil in conducting scientific research. Researches were carried out in laboratory conditions using the PSP-1.5 device.

PSP-1,5 jihozi tuproqni tuproq bilan ishqalanishini sodir etuvchi chang'isimon metall list, u shnur orqali parallelogramm mexanizmiga mahkamlangan, tuproq kanaliga yuk metall ustida o'rnatilgan. A DPU-0.05-2 force gauge dynamometer is installed between the parallelogram mechanism and the fixed column, which shows the resistance of the sled-like metal sheet during the movement of the cart.

Experiment at different speeds (V_1=1,1; V_2=1,4; va V_3=1,7 m/s) and different metal weights (m_1=3,75; m_2=6,75; m_3=8,75; kg) was carried out on polished and unpolished metal surfaces. In this way, it is possible to determine the resistance of soil to soil friction at different speeds and weights. For this purpose, a bottomless box measuring 360x230 mm was used.

The coefficient of friction was determined by the following formula.

$$f = \frac{P}{G} \tag{1.1}$$

where: R is the resistance of the metal sheet (friction force), kN (N)
G is the weight of the metal sheet (together with the load), kg (N).

Experiments show that the coefficient of friction increases and decreases the speed of movement. The results of the experiment are presented in Table 1.1.

Table 1.1

Coefficient of friction of soil with metal and soil with soil

Speeds (m/s)	The mass of the metal sheet together with the load, kg	Coefficient of friction between soil and metal.		The mass of the soil sample together with the box, kg	Coefficient of friction between soil and soil
		Polished surface	Unpolish-ed surface		
1,10	3,75 6,75 8,75	0,901 0,952 0,830	0,906 0,977 0,851	7,5 16 24	0,907 0,827 0,771
1,40	3,75 6,75 8,75	0,623 0,667 0,723	0,640 0,699 0,745	7,5 16 24	0,778 0,757 0,733
1,70	3,75 6,75 8,75	0,401 0,613 0,604	0,437 0,634 0,627	7,5 16 24	0,676 0,657 0,687

It can be seen from the table that with the increase of processing speed from 1,10 to 1,70 m/s, when the mass of the metal sheet increases from 3,75 to 8,75 kg, the coefficient of friction between the soil and the metal is from 0,906 to 0,627 on the polished surface or on the unpolished surface. It was found that the soil-soil friction coefficient decreased from 0,907 to 0,687 when the mass of the soil sample was increased from 7,5 to 24 kg.

Determination of relative resistance to displacement of the soil

Relative resistance to displacement of soil is one of the most important mechanical characteristics. The relative resistance of the soil in displacement is determined using the PSG-10 device. The specific resistance of the soil in displacement is found by the following formula.

$$T = \frac{Q_t \cdot n_t}{F} \tag{1.2}$$

where: Q_t – weight of the load on the hanger, N; - transmissions of the wheel.

sm ^{2}. number; $F -$ cross-sectional surface of the soil sample, sm ^{2},

One of the most important indicators is the study of soil moisture, coefficient of friction in sliding with steel, and relative resistance in sliding.

Soil moisture and shear resistance were studied at depths of 0-30 and 30-45 cm. The results of the experiment are presented in table 2.3.

The research conducted by A.S. Shokh showed that soil moisture increased from W=11,1 percent to 16,8 percent when the depth increased from 0-30 cm to 30-45 cm.

It was also found that the friction coefficient at these depths increased from f=0,599 to 0,749 and from 0,498 to 0,727. Relative resistance changed from 25,2 kPa to 19,4 kPa and from 23,6 kPa to 28,1 kPa at the studied depths. This indicates that the resistivity is higher in the plastered hard layer soil.

Research conducted by H.R.Gaffarov shows that increasing the moisture content of the soil reduces the coefficient of friction both on smoothed and unsmoothed surfaces.

Table 2.3

Coefficient of friction between steel and soil, soil and soil, and resistivity of soil

Soil layer, (cm)	Soil moisture, %	Coefficient of friction in moving soil with steel			Specific resistance of the soil in displacement, kPa
		Smooth surface	Unpolished surface	Soil with soil	
A.S.Shokh data (on pre-planted brown soil)					
0-30 30-40 40-50	11,1 14,2 16,8	0,599 0,692 0,749	0,571 0,664 0,659	0,932 1,017 1,126	25,2 19,2 19,4
H.R. Gafarov's information (on previously planted brown soil)					
0-30 30-40 40-50	7,8 8,5 16,2	0,841 0,902 0,751	0,804 0,823 0,663	0,951 1,060 1,132	32,5 31,2 20,2
Author information (On pre-planted plastered hard layer soil).					
0-30 30-40 40-50	10,7 11,4 16,5	0,498 0,654 0,727	0,542 0,624 0,691	0,841 0,998 0,019	23,6 31,5 28,1,

This situation is different in gypsum hard-layered soils, which are cultivated from the ground up, that is, as the moisture content of the soil increases, its coefficient of friction on smoothed surfaces increases, and the coefficient of friction on unsmoothed surfaces decreases.

So, the coefficient of friction depends on the soil composition and the type of crop.

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