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METHODS OF GROWING A POTATO PLANT BY CHANGING THE SOIL TREATMENT PARAMETERS OF AND AGRICULTURAL MACHINERY

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ABSTRACT

Nowadays, agriculture needs to improve its quality by cultivating the soil and improve the soil fertility of the lands intended for cultivation, because any agricultural machine can produce a specific product soil, seeds, fertilizers, grain, processes agricultural products such as cotton, fruits, vegetables. Of course, before studying tillage machines, it is necessary to study the physical properties of the soil and the technological properties of tillage machines. The soil in which the crop is grown differs from the ordinary soil in terms of soil structure, ie fertility. Agricultural machinery only cultivates fertile soil. The physical properties of the soil for the cultivation of climate-resistant, disease-resistant varieties of Surkhandarya region, such as "Santa" and "Romana" for the effective cultivation of potatoes, the distances of tillage and tillage were studied. The majority of vegetable crops grow in high humidity conditions, and 70-75% of their production is water. Potato tuber contains 25% dry matter, 14-22% starch, 1.4-3% protein, around 1% wood, 0.3% fat and 10.8-1% ash, vitamins C, B, B1, There are B2, B6 and K. Due to the high content of vitamins in the new crop, if 150 quintals of tubers and 80 quintals of leaf stalks are harvested per hectare, 5,500 nutrients will be collected. The root penetrates mainly at a distance of 30 cm, then 50 cm. Potato roots make up 8-10% of the aboveground stem. Potato roots absorb nutrients from the soil. The results showed that the plow penetration angle at 75 ° was more efficient than the plow penetration angle at 90 °, as the tillage distance was effective at 70 cm intervals and the other at 80 cm and 90 cm intervals.

KEYWORDS: *Tillage, Plowing, Ploughshare, Capillary, No Capillary, Soil Porosity, Corpus*

INTRODUCTION

Today, more than 200 different food products are made from potatoes worldwide. Potatoes are eaten in different ways and are also used in processing. For livestock, potatoes are a nutritious fodder, fresh and cooked, 100 kg of fresh fodder, 29.5 silage, 8.5 fresh barley, 4 dry barley, and 52 food units. Alcohol, starch molasses, dextrin, glucose, rubber are obtained from potato tubers (M.Shomurodova, 2018; Ulugov, B. D. 2020, a). Before planting, the land is prepared, for which the fields cleared of winter wheat are well irrigated, plowed, and then plowed, 10-12 tons of mineral fertilizers per hectare, 200-220 kg of amorphous and 100-120 kg per hectare of potato fields. Potassium fertilizer is added. Potatoes receive more minerals than winter wheat, they are not demanding nutrients at the beginning of the growing season, and the demand for nutrients is observed during the formation of surface stems and tubers (M.Shomurodova, 2018; Ulugov, B. D. 2020, b). The optimal rate of application of mineral fertilizers depends on several factors that affect the yield. These factors include soil type and the degree of moisture retention in the soil. The nutritional status of the soil is also important. To increase the yield of any crop, it is necessary to cultivate the soil before planting. When cultivating the soil, the main focus should be on protecting the soil, maintaining its fertility, and if possible, restoring it. For this purpose, traditional and resource-efficient methods of tillage are used. Soil resource is understood as its fertility. When working with any agricultural machinery, it is necessary to choose a machine equipped with a working part that affects the soil conditions in the local conditions (M.Shomurodova, 2018; Bazar Dzhumaevich Ulugov. 2020). Which method to use is chosen according to local conditions. The main village is agro-technical plowing, in which the soil is plowed deep (more than 20 cm). When plowing the soil, the top layer of soil is cut off and moved to the side and turned at a certain angle. As a result of the overturning, the cut stratum is deformed and crushed, the soil structure is restored, weed seeds and remnants and insects are buried, and the bottom layer of soil, ie enriched with hummus, is removed. Using this method, you can plow deep and very deep (27 cm or more) and drastically reduce weeds. Overturning hurts the soil, as organic matter released to the surface can be decomposed by sunlight and other factors, the carbon in the resulting gas can be released into the atmosphere and soil erosion can increase (M.Shomurodova, 2018). This has been proven experimentally to reduce soil fertility. It is the process of turning the soil upside down and shifting the top and bottom layers of the stalks relative to each other. Every year on plowed, ie cultivated lands, the plow body is traditionally turned upside down by 130 ° - 140 ° (M.Shomurodova, 2018; Ulugov, B. 1996). Larger pieces of soil are formed depending on the composition of the soil during tillage with a larger tilting angle. In our Surkhandarya region, this method is not effective in growing potatoes. In the course of the experiment, we changed these values from 120 ° to 130 °, taking into account the presence of abrasive elements in light sandy soils, which, depending on the composition of the soil, cause the erosion of the ploughshare of the plow. In the process, we heat-treated the ploughshare to increase its corrosion resistance. As a result, the ploughshare blade does not wear out quickly. If erosion is observed on the ploughshare blade, different stresses are created during the tractor's agro-technical tillage, which leads to an increase in fuel consumption. The following experiment showed effective results in light sandy soils (Figure 1).

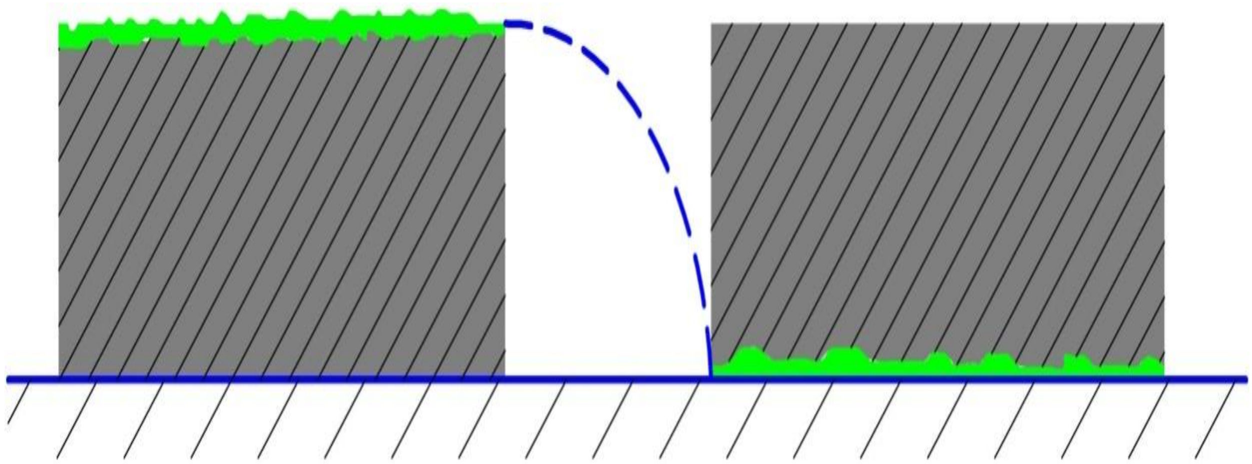

Figure 1 Topsoil collapse

Agricultural tractors play an important role in this process. This is very important to optimize the working efficiency and fuel consumption of all the physical properties of the soil to increase efficiency. Plowing and plowing operations on agricultural machines in the process of agro-technical processing include:

- Treatment of surface soil, which is the main nutrient, returning the used soil to the bottom;
- Apply mineral fertilizers to the bottom of the soil surface, thereby increasing the number of nutrients in the soil.

In agriculture, tractors are used for various purposes. Bringing the soil to the required quality in tillage is widely used to increase its fertility and prepare the sown areas for the process of seasonal sowing (M.Shomurodova, 2018). This is done by tilting the topsoil to a certain depth. In such cases, the fuel consumption of tractors varies depending on the composition of the soil, soil moisture, type, and size of the machine. In this process, the maximum force was observed at an angle of 90 °. This also has a significant effect on the width of the observed variable angles and minimal force is observed in bending (Marie J.A., 2014). Moisture content was also found to be inversely proportional to depth due to soil forces. The condition of the soil, moisture, and depth affect the power consumed by the tractor (Karimi I., 2012). Tillage is the process of creating favorable conditions for planting and germinating crops and improving the quality of the soil so that the soil is nourished with the necessary amount of oxygen to the plant roots. Machine tests showed that the soil conditions were good and that there was a good working area for tillage operations. Cultivation of this crop with the help of a plow has improved the physical condition of the soil, the porosity, and penetration of the soil (Bogunovic I. a., 2017; Fakhriddin Nosirov, Urishev B.U, Bozor Ulugov, et al. 2020).

The main purpose of this study is to study the effect of the plough on the soil penetration angle and tillage distances, as well as on the improvement of some mechanical properties for potato planting.

Method and Materials

The study was conducted in 2019 in the Jarkurgan district of the Surkhandarya region on the soil prepared for the cultivation of potatoes "Santa" and "Romana".

Experimental work was carried out in the cultivation of these potato varieties, taking into account some of the physical properties of the soil (Table 1).

Soil types	**Volumetric weight, g / cm^3**	**Specific gravity, g / cm^3**
Light	1,1-1,3	2,63-2,67
Medium	1,4-1,6	2,60-2,65
Medium	1,7-1,8	2,68

Table 1 Some physical properties of Central Asian soils

One of the properties that determine soil moisture and air capacity is porosity, which is determined by the following (1) (D. Y. Yormatova, 2008).

$$A = \left(1 - \frac{p}{p_1}\right) \cdot 100\% \qquad (1)$$

Where: ρ is the bulk density of the soil; ρ_1 is the specific gravity of the soil.

The density of the solid phase of the soil is equal to the ratio of the mass of the solid phase of the soil in the dry state to the mass of the soil with the same temperature of 40 oC. Its amount depends on the type of minerals and organic matter in the soil. For mineral soils, its value varies from 2.4 to 2.8 g / cm3. The density of solid-phase soils is used to determine the porosity of the soil and its total moisture capacity. The density of the soil is always smaller than the density of the solid phase soil, and its density depends on the density, composition, and porosity of its constituent substances. The density of soils varies from 0.9 to 1.8 g / cm3, depending on the mechanical components. Soil porosity is the sum of the volume of all pores in the soil and is measured as a percentage of the total volume of the soil. Depending on the mechanical components of the soil, porosity varies widely over different horizons. Soil porosity is divided into capillary and non-capillary. Capillary porosity is the volume of space between the capillaries of the soil. Nocapillary porosity is equal to the size of large cavities. The sum of the porosity types makes up the total porosity and is determined by the following (2) (D. Y. Yormatova, 2008).

$$A = \left(1 - \frac{\gamma}{m}\right) \cdot 100 \qquad (2)$$

Where: γ is the bulk density (soil density); m is the solid phase density of the soil.

The mechanical components of the soil studied in the field are determined based on external signs and the approximate amount of sand and mud particles crushed between the fingers. For this purpose, clay rings can be made of sand, sand, loam, or loam. For this reason, we experimented on a simple light sandy soil of these soil types on a tractor MTZ-100. In this tractor, the plowing angle was entered in two stages between 75 ° and 90 °, and the three distances between them were between 70, 80, and 90 cm. The experimental tillage tractor has a working width of 2790 mm, a length of 4120 mm, a height of 1970 mm, and a weight of 3750 kg. MTZ - 100 tractor engine power 100 horsepower, maximum speed 34.3 km / h, engine type Perkins (diesel), 4-cylinder, hydraulic lifting system 30 kN, and fuel tank capacity 156 liters. The tractor engine is economical and has increased its engine resources. The service life of the machine is achieved by increasing the strength of the piston-connecting rod elements and individual parts of the system.

Mechanical characteristics

Fuel consumption- is measured by the amount of fuel consumed to complete the job and is determined by the device in mL (3) for processing length (50 m) (Asharifi, 2009).

$$Q_F = \frac{Q_D \cdot 1000}{W_P \cdot D \cdot 100} \text{ mL} \qquad (3)$$

Where: Q_F- fuel consumption L / ha; Q_D- (100 m) tillage length fuel consumption; W_P- machine width (m); D is the length of tillage (60 m).

Percentage of shift - Measured with practical and theoretical speed (Alsharifi S., 2009).

Practical speed - The depth of tillage and the plowing process that turns the soil with practical speed have been determined experimentally. Moisture and tillage depth was repeated three times within the tillage length (60 m) for the soil and were determined using the following equation (4):

$$V_P = \frac{3{,}6 \cdot D}{T_P} \text{ km/hr} \qquad (4)$$

Theoretical speed - Without plowing the soil, only the device touches the soil at a speed of 3 km/hr during tillage and the length (60 m) is repeated for both soil moisture and three tillage depths. The calculation of the theoretical speed is determined by the following equation:

$$V_T = \frac{3{,}6 \cdot D}{T_t} km/hr \qquad (5)$$

Where: V_T- theoretical speed km/hr; $T_t -$ is the theoretical time (hr).

Using Equation (6), the calculation of the percentage of displacement resulting from the practical and theoretical velocities was performed:

$$S = \frac{V_t \cdot V_P}{V_t} \cdot 100\ \% \qquad (6)$$

Equation (7) calculates the percentage of energy expended as a result of the displacement (Asharifi, 2009).

$$P_S = \frac{F(V_t \cdot V_P)}{270} kw \qquad (7)$$

Where: $P_S -$ is the displacement power (kW)

Machine efficiency - is the ratio of the power consumed by an efficient machine to a given amount of time to the theoretical power consumption of a machine (Alsharifi S. M., 2019).

The theoretical size - of a machine is the speed at which it uses the full width and time of the machine and is determined by (8):

$$T_{FC} = \frac{S \cdot W}{C} \qquad (8)$$

Where: $T_{FC} -$ is the theoretical size of the machine; S - speed is used; W is the sheer width of the device (M) and C is the shear coefficient.

The effective size of the machine is the actual stage of the work and is determined by (9):

$$E_{FC} = \frac{A}{T} \qquad (9)$$

Where: E_{FC} - is the effective machine size; A - distance (hr); T - time. The calculation of machine efficiency is determined by (10) (Oduma, 2015).

$$F_E = \frac{E_{FC}}{T_{FC}} \cdot 100\% \qquad (10)$$

Yield and its components

Sprout percentage - The proportion of seedlings should be five copies at a distance of one meter from the agate, given that the plants are 60 cm wide.

Plant height - The height of the potato is measured from the soil with a ruler or ruler, and this is repeated three times, up to the tip of the plant.

Potatoes weighing 1000 kg - Given that the average weight of one meter of potato taken by random samples for ten plants is 5 kg, theoretically, an average of 20 square meters of land is required for 1000 kg of potato.

Potatoes weighing 1000 kg - Assuming an average of 4 potatoes per seedling, the average number of random specimens per ten bushes is 20.

Potato yield - Random samples The average number of potatoes per sapling was 4, while the average number of random samples per ten bushes per meter was 20, which saved the land and produced more potatoes than the previous planting method.

Physical properties

The physical properties of the soils were determined, and six randomly selected soil samples of 10, 14, and 18 cm were taken by a tractor hydraulic device for the three working depths determined in the experiment. 12-14% of moisture was detected in soil samples of different depths obtained in the experiment (Behzad, 2014).

Samples were taken to measure soil moisture. Topsoil samples, 10 cm, 14 cm, and 18 cm, were taken and dried in an oven at 105 oC. The moisture content of soil samples is determined by the following (11) (Dehroyeh, 2015).

$$W = \frac{W_W}{W_S} \cdot 100\% \qquad (11)$$

Where: W is the percentage of soil moisture;W_W - Weight of wet soil, W_S- Weight of dry soil.

Three different soil samples were collected from the ground to measure the total soil density. The collected samples were dried at 105 oC for 48 h. The mass of the dried soil was weighed, and the density of the soil mass was determined as follows (12) (Langston, 2014).

$$P_b = \frac{M_S}{V_T} \qquad (12)$$

Where: P_b - is the dry mass density (mg / m^3); M_S - Weight of dried soil sample (mg); V_T is the total volume of the soil sample (m^3).

The determination of the total porosity collected for each soil sample was calculated using the following equation, with an approximate particle density of 2.65 mg / m^3. The total porosity of the soil is determined by (13) (Anna, 2010).

$$T_{SP} = \left(1 - \frac{P_b}{P_S}\right) \cdot 100\% \qquad (13)$$

Where: $T_{SP} -$ is the total porosity of the soil (%); $P_b -$ is the dry mass density (mg / m^3); P_S - is the partial density (mg / m^3).

Soil moisture%	Depth of soil to a pan, cm	The mass density of soil mg / m^3	% Total porosity of the soil
10-12%	10	1,28	51,69
	14	1,32	50,18
	18	1,44	45,66
12-14%	10	1,34	49,43
	14	1,41	46,79
	18	1,49	43,77

Table 2 Features of the experimental machine

The effects of soil moisture and tillage depth, mass density, and soil porosity are shown in Table 2. All results are significantly different from the interactions, and given that the best results are 1.28 mg / m^3 and 51.59%, the soil moisture is between 10% -12%, and the treatment depth is between 10 cm. We choose 1.34 mg / m^3 and 49.43% for 12% -14% of soil moisture for the best results of plowing depth of interactions.

Soil moisture%	Depth of soil to a pan, cm	Extremely moist soil	Gil	Sand	Soil tissue
10-12 %	14	490	360	150	
	16	480	390	130	
	18	460	370	170	
12-14%		476,67	373,33	150	
	14	480	380	140	
	16	490	350	160	
	18	450	390	160	
		473,37	373,33	153,33	

Table 3 Analysis of ground minute volume in an experimental machine

1.1.Selection of the design of the tillage plow

Features of the pile and methods of its use. We made extensive use of the pile as a tillage device. N (N perpendicular to the sides of the P) forces N are formed on the sides of the pontoon, which are several times greater than the force P that pushes it forward, and are determined by (14) (M.Shomurodova, 2018).

$$N = \frac{P}{sin\frac{\propto}{2}} \qquad (14)$$

Here $\propto$ is the angle of the pile.

If $\propto = 30°$, then N = 4P, ie the pressure N on the body near the pile is four times greater than the force P moving it. (Figure 2). The pile allows you to penetrate any object with minimal effort and extract the desired part from it. Using the above, the shape of the working parts of agricultural machinery is made to resemble a flat or curved pile.

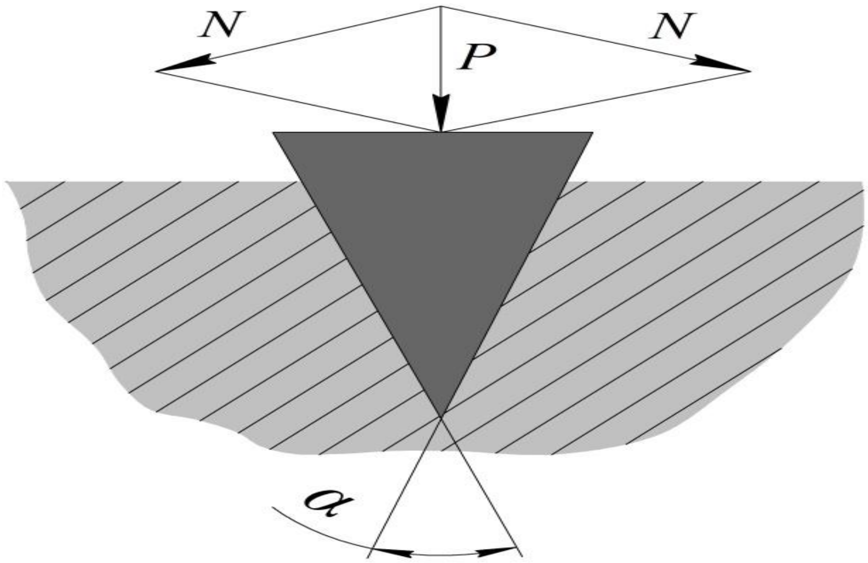

Figure 2 Angle of entry of the pile into the ground and the forces acting

The effect of the pile on the soil surface. The pile can be single, double, or triple sided. The plow ploughshare is a one-sided pile, the harrow is a double-sided pile, the cultivator's softening teeth are a plow, and the plow body is a three-sided pile. According to the following formula, the smaller the pile angle $\propto$, the greater the pressure N it exerts and the force P exists (M.Shomurodova, 2018).

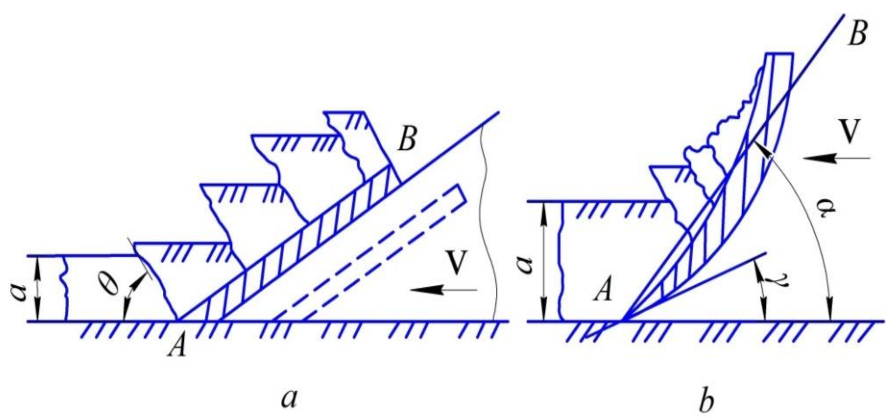

Figure 3 Deformation of soil under flat and curved piles: a - cracking under flat piles; b is the curvature of the curved surface pile

Classification of plows. Plows are divided into different types depending on their function, method of connection to the tractor, construction, number of housings, and the intended working speed. Depending on the design of the plug body can be divided into ploughshare, rotary, and combined. The most common are ploughshare plugs (M.Shomurodova, 2018).

Examples of Ploughshare plugs are simple (widely used) plugs. This group includes plows for annual tillage (M.Shomurodova, 2018).

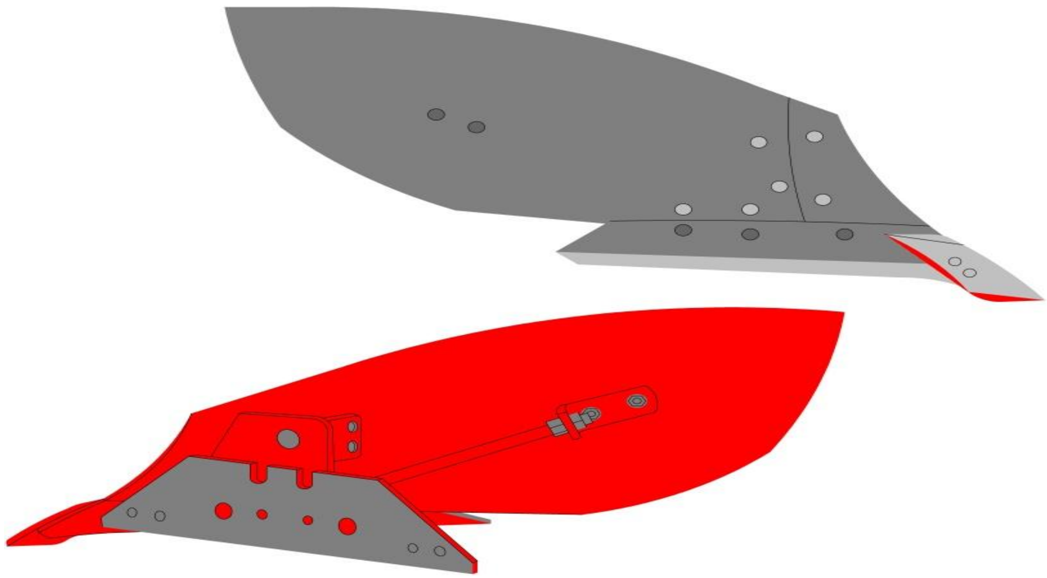

Figure 4. Housing designed according to the design

The body of the plow is characterized by the width of the cover, the depth of plowing, the angle of inclination of the plowshare blade to the plow wall g, and the angle of inclination of the plowshare to the plow bottom ∝_o and the shape of the working surface. The width of the body in ordinary plugs can be mainly 30, 35, and 40 cm, in special plugs - 45, 50, 60, 75, and even 100 cm (M.Shomurodova, 2018). The reason for the production of many types of hulls, which vary in width, is the need to cultivate the land at different depths, depending on local soil conditions and the type of crop. The maximum driving depth should not exceed 79% of the body coverage width, ie b = 1.27a_max. Otherwise, the blade will not turn properly. Hence, the studies show that if plowing is assigned at a depth of a = 27 cm, b = 1.27a = 1.27 · 27 = 35 cm, if a = 30 cm is required, b = 1.27 · A body with 30 = 40 cm indicates that a built-in plug should be used.

As a result of experiments on the soils of the Santa and Romana potato fields, the design of Ploughshare plows for agricultural machines used to improve soil quality through agro-technical tillage and prepare it for planting was carried out. As a result of the experiment, it is important to choose the size of the plow body based on the characteristics of the soil to be treated. Because the tillage equipment is selected correctly, the result will be effective, otherwise, this process may lead to an increase in fuel consumption as a result of various straining forces on the tillage machine (M.Shomurodova, 2018). For this process, we designed the dimensions of the plug body based on the composition of the light soil. (Figure 6).

Body parts. The body consists of a plowshare, a tipper, a support board, and a column. Plowshare (pictured) cuts a piece of soil from the bottom, separates it from the ground, lifts it slightly, and passes it to the overturner. As the compacted soil moves along the surface of the plowshare under high pressure, the blade wears out quickly, becoming impenetrable and narrow. The drag resistance of the impenetrable plowshare plug can increase dramatically (up to 30%) (M.Shomurodova, 2018). Therefore, by heating it, the metal stock (magazine) on the back is moved to the blade, as a result of which the original width of its position is restored. The restored blade is sharpened at 250-35o until it is 1.0 mm thick, and the metal stock in the Ploughshare store is enough to stretch the blade 4-5 times. The impermeable plug not only increases the drag resistance of the plug but also makes it difficult to sink to the designated depth and ensures smooth movement. Plowshare is made of special corrosion-resistant steel. The designed plowshare lasts 2-2.5 times longer than a normal plowshare. The shape of the plowshare is selected according to the type of soil to be plowed. Due to a large number of soil types, plowshare also has different shapes: trapezoidal, scaffolding, triangular, interchangeable beak, and others. The replaceable beak plowshare (Fig. 5) is very simple in structure, inexpensive to prepare and repair, immersed in hard soil faster than other types of the plowshare and is resistant to corrosion by abrasive elements in the soil. Therefore, because this plowshare is used in the cultivation of light soils, its strength is increased by heat treatment of the material.

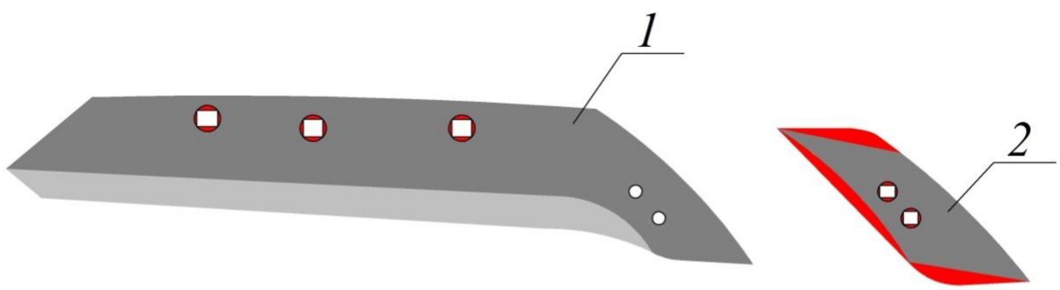

Figure 5. Interchangeable muzzle plowshare: 1 - base; 2 - interchangeable muzzle.

The over turner cuts the soil through the plowshare from the uncultivated land and lifts it and pushes it to the side. Abrasive particles in a sliding blade can cause the agitator to erode quickly and bend and break under the resistance of the soil. The over turner is made of two or three layers of special steel to make it resistant to abrasion and bending of the wing (M.Shomurodova, 2018). The working surface of such a dump truck is resistant to abrasive wear, and the soft layers on the surface that do not touch the middle and soil are bent. Often, the blade of the overturneris made replaceable because it wears out faster (M.Shomurodova, 2018). To reduce the friction of the soil moving along the surface of the over turner, it is sanded very gently. It is known that since the coefficient of friction of the soil with the soil is 1.5-1.8 times higher than the coefficient of friction of the soil with steel, the drag resistance of the plug increases (M.Shomurodova, 2018). The Ploughshare and the turntable are fastened to the pole with special bolts so that the head does not protrude from the surface of the body. The surface of the over turner should not rise above the plowshare.

Plowshares and their materials

Agriculture is practiced in 160 countries around the world and requires high-quality basic processing (Wolf, 2015). Many agricultural enterprises today prefer to purchase imported equipment because they have several advantages over local equipment (Petrovsky, 2015). The most important aspect of improving the technical level of tillage machines is to increase the stock of their working bodies. When the soil is overturned by agricultural machinery, its parts are eroded due to friction, so they need to be repaired. In the process of studying the durability of working bodies and parts of machines, it is necessary to determine the laws of their wear. There is a need to develop a computational framework for the resilience of the working bodies involved in this process. The relative speed of movement of abrasive particles in the soil and the relative velocity of the working surfaces is determined by the shape and nature of the relative displacement of the particles about erosion. Experiments show that (Severnev MM, 2011), (Blokhin, 2015) the wear characteristics of the parts of the working bodies of agricultural machinery depend on the soil conditions, the specific pressure of the soil at work. In the experiment, the results of determining the abrasive particles in the soil and their wear under the influence of friction with the relative speed of movement showed that plowshare (Blokhin, 2015) is proportional to the specific pressure of the working surface of the soil.

$$I = kN \qquad (15)$$

Where k is the coefficient of proportionality, N is the specific pressure.

Depending on the velocity of the abrasive particle, the wear equation of the ploughshare is expressed.

$$I = \mu V^b \qquad (16)$$

whereμ and b are constant coefficients depending on the physical and mechanical properties of the soil.

The results of the study showed that to prolong the service life of replaceable parts of agricultural machinery, it was necessary to increase its resistance to external influences by heat treatment of its surface in terms of achieving surface universality and cost-effectiveness.

Comparing the five variant results of heat treatment of 65G steel flat specimens on the surface layer studied in the experiment, taking into account the high durability, plasticity and adhesive properties for the heavily loaded variable parts of the working bodies of soil cutting machines, The most effective combinations increased the hardness using plasma at a temperature of 300o C.

Due to the very rapid heating rate in the plasma, the transformations take place at high temperatures, and this thermally active process has a strong effect on the kinetics of the formation and growth of new phase nuclei. The relationship between the degree of nucleation of austenite and their growth rate changes, and as the temperature increases, the nucleation process of austenite occurs faster than their acceleration, and the increase is due to a quantitative increase in the rate of nucleation. leads to the formation of rotating fine-grained austenite and turns into highly dispersed martensite with high strength properties.

Agricultural machinery is one of the most energy- and material-intensive industries, and tillage requires up to 45-50% of fuel and lubricant consumption. Due to the high annual consumption of replacement parts for tillage machines in agriculture, it is important to reduce operating costs and increase resistance to external influences and reduce the cost of spare parts and increase the level of competitiveness in the tillage process (Kanaev, 2018). Experiments show that in modern agricultural tillage it is necessary to ensure the strength of the product material at the level of

1500-1800 MPa. The impact force should be at least 0.8–1.0 MJ / m and the maximum possible surface hardness should correspond to values of 60–65 HRC (Shilov I.N. et al., 2010).

Replaceable parts for agricultural machinery are traditionally made of medium or high carbon St6, 65G, U8, and other steels. The plow plowshares, which is included in the replacement parts of the working bodies with increased surface hardness in plasma, is made of 65G manganese steel, the chemical composition and temperature of the critical points are given in Table 4 (Kanaev, 2018).

C	Mn	Si	P	S	Ni	Cu	Ac_1	Ac_3	Ar_1	Ar_3	Mн
0.63	0, 1.2	0.35	0.031	0.029	0.25	0.19	721	745	620	720	270

Table 4 Chemical composition (%) of Ploughshare material and temperature of critical points, ^oC

Mechanical properties of heat-treated steel material (hardening to 800-820 ^oC). The process after lubrication (air cooling to 340-380 ^oC) is shown in Table 5 (Kanaev, 2018).

Test temperature, °C	σ_B, MPa	$\delta, \%$	$\gamma, \%$	$\sigma_{0,2}, MPa$
Hardening in oil at 830 ° C. Cooling in the air at 350 ° C				
200	2200	15	44	1370
300	1670	19	52	1220
400	880	20	70	980

Table 5 Mechanical properties of 65G steel depending on the temperature

σ_T, MPa	σ_B, MPa	$\delta, \%$	$\gamma, \%$	HRC, mm
1220	1470	5,0	38	49

Table 6 Mechanical properties of the studied steel

	Sample order number					
	1	2	3	4	5	6
Work surfaceHRC	48,1	50,1	50,7	49,7	48,9	49,2
Back surfaceHRC	47,9	50	49,8	46,4	47	46,3

Table 7 Summarizes the measurement results

The hardness of the Ploughshare working surface is 49 ... 51 in the range of HRC values, while the hardness of the reverse side is 46 ... 50 in the range of HRC values. We can conclude that the hardness of working surfaces is related to the abrasive particles of the soil environment and the hardening of this surface under the influence of plastic deformations. At incomplete temperatures of 750 ... 770 ° C, steels are heat-treated with hypereutectoid, followed by an increase in hardness at low temperatures of 150 ... 200 ° C (A.M. Mikhalchenkov, 2004) and (A.M. Mixalchenkov, 2012).

The uneven wear of the Ploughshare working surface is explained by the difference in soil pressure, but this phenomenon may be due to the difference in mechanical properties in certain areas of the working surface.

For L, there is a certain regularity of HRC change. The minimum value of hardness in the area of the Ploughshare blade is explained by the superior effect of abrasive particles on the surface by friction destruction compared to the hardening of the working surface.

Based on the analysis of research and exploration, the most important way to improve the technical level of tillage machines is to increase the stock of their working bodies. This is because strong abrasive elements change the cutting geometry, which leads to the fact that the parts and overall dimensions of the working bodies do not work at the required level, which reduces the quality of tillage and increases energy costs.

RESULTS AND DISCUSSION

Fuel consumption.

The fuel consumption under the influence of soil penetration angles is shown in Table 6. The effect of 75o soil penetration angles on the plow is 9.55 L / ha with minimum fuel penetration by the plow. For potatoes of Santa and Romana varieties, the effect of mechanical properties on some growth characteristics is the effect of 90o soil entry angles on the plow with the plow having the lowest fuel consumption of 11,264 L / ha. Fuel consumption increased due to high pressure during plowing (Alsharifi S. a., 2018). These results show that the following conclusions show that fuel consumption at a processing distance of 70 cm is more efficient than a processing distance of 90 cm. The results showed fuel consumption of 9,958, 10,375 and 10,891 L / ha. Due to the high resistance of the plow to the soil, fuel consumption increased due to increased movement and tillage distances. The most effective results showed that fuel consumption was 9,082 L / ha at a soil penetration rate of 75 ° and a tillage distance of 70 ° (Behzad, 2014).

Percentage of shift

A decrease in the percentage of displacement has led to an increase in tillage distances. The processing distances were 8,935, 9,653 and 10,682%, respectively. This is due to the increased tillage distances and shear coefficient as a result of the tillage resistance of the soil (Alsharifi S., 2009). Table 7 shows the percentage of displacement, which showed that the plow penetration angle was significantly more effective at 75 ° than at 90 °, and was 9.303% and 10.264% (Bogunovic I. a., 2017). These results showed that the soil penetration at an angle of 75 ° to the plow for plowing was effective at a tillage distance of 70 cm.

Machine efficiency

The effect of soil entry angles on the plow is shown in Table 8,% of machine efficiency. has an efficiency of 71.786% in a machine with an angle of soil penetration of more than 75 °. In a machine with a soil penetration angle greater than 90 °, the efficiency required 69.339% on a low machine. The decrease in machine efficiency was due to high pressure, and in the tillage plow during the tillage process, there was an inverse relationship between the plow entrance angles and the tillage distances (Marie, 2014). Demonstrated better machine efficiency at a processing distance of more than 90 cm at a distance of 70 cm. The results were 71,963, 70,598, and 69,127%, respectively. Due to tillage distances and high resistance to tillage, plowing movement and thus machine efficiency are reduced (Sale, 2013). The best result (73.610%) was the tillage distance obtained at 70 cm of plowing and the angle of entry of the plow into the soil was 75 °.

Duration of tillage angles of the soil	Tillage distances cm		
	70	**80**	**90**
75°	9,082	9,656	9,915
90°	10,833	11,095	11,866

Table 8 shows the effect of tillage angles and fuel consumption L / hr at tillage distances

Duration of tillage angles of the soil	Tillage distances cm		
	70	**80**	**90**
75°	8,715	9,092	10,103
90°	9,155	10,214	11,261

Table 9 Effect of tillage angles and tillage distance on displacement%

Duration of tillage angles of the soil	Tillage distances cm		
	70	**80**	**90**
75°	70,816	69,221	68,418
90°	69,213	68,411	67,526

Table 10 Influence of tillage angles and tillage distances on tillage efficiency%

Seedling percentage

The soil penetration and tillage angle with the plow affected the seedling percentage, and the plow penetration angle to the soil at 75 ° and 90 ° resulted in 91,613 and 89,570%, respectively. At 70 cm tillage, the germination rate was higher than 91.810%, and at 90 cm tillage, the lowest germination rate was 89.227%. Low soil fragmentation, tillage distances, reduced physical properties of the soil, and germination rates of potato yields were negatively affected (Jassim, 2007). The best result was 93.113% at a tillage distance of 70 cm and a plow penetration into the soil at an angle of 75 °.

CONCLUSION

As a result of the research, an experimental study of soil fertility in the Jarkurgan district of Surkhandarya region in the cultivation of potatoes of the Dutch varieties "Santa" and "Romana" by changing the parameters of the working bodies of tillage machines and making additions In the process, we achieved the following results: the study area showed significantly more effective results at 75 ° to 90 ° than the plowing angle of the soil under conditions, and the overall tillage length was much better at 70cm, 80cm and 90cm. . It has been shown that the soil penetration angle and tillage distance of 70 cm at 75 ° for potato cultivation are effective. In the process, fuel consumption and the ability to replace the working parts of the tillage machine, in particular the lemex part of the plow, have been extended. Therefore, as a result of this experiment, the cultivation of this variety of potato in light sandy soils has shown effective results.

REFERENCES

A.M. Mikhalchenkov. (2012). Stress-strain state of restored parts from contact interaction to structure. Bryansk branch of FGBOU VPO Moscow State University of Railways, 168.

Alsharifi, S. (2009). The effect of two types of plows at. Journal of the University of Babylon, 182-205.

Alsharifi, S. (2009). The effect of two types of plows at. Journal of the University of Babylon, 182- 205.

Alsharifi, S. a. (2018). Study some. The Euphrates, Journal of Agriculture, 23-35.

Alsharifi, S. M. (2019). Effect of threshing machines, rotational speed, and grain. Bulgarian Journal of, 243–255.

Anna, J. H. (2010). Effect of conventional and. Biology and, 671-680.

Asharifi, S. (2009). The effect of two types of plows at. Journal of the University of Babylon, 182- 205.

Bazar Dzhumaevich Ulugov. (2020). Efficiency of use of Autodesk inventor engineering programs and pedagogical information technologies in the field of “Resistance of materials” in the process of teaching students of technical universities. ACADEMICIA: An International Multidisciplinary Research Journal (Double Blind Refereed & Reviewed International Journal), 10(5), 130-143. https://doi.org/10.5958/2249-7137.2020.00253.0

Behzad, S. A. (2014). Effect of conservation. A review International, 144-156.

Behzad, S. A. (2014). Effect of conservation. A review International, 144-156.

Blokhin, V. P. (2015). Theoretical study of the wearing process of reinforced moldboard and plowshare surfaces. Vestnik of the Bryansk State Agricultural Academy., Bryansk.

Bogunovic, I. a. (2017). Compaction of a clay. Journal of Agricultural Science and, 475-486.

Bogunovic, I. a. (2017). Compaction of a clay. Journal of Agricultural Science and, 475-486.

D. Y. Yormatova, M. Y. (2008). Fruit and vegetable growing. Tashkent: Interpretation.

Dehroyeh, M. (2015). Investigation of tire air pressure. Tehran: Agricultural machinery machines, Bio-system.

Gaidar, S. (2020). Protection of agricultural machinery against corrosion and wear using nanotechnology S.M. Gaidar G. S. Mikhailovich, the author. dis. for a job. learned. step. doc. tech. (b. Russia). Moscow: FGBOU VPO MGAU.

Jassim, A. a. (2007). The effect of the plow. Journal of University of, 181-188.

Karimi I., S. S. (2012). Performance evaluation of a light tractor during. International Research Journal of Applied and, 626-631.

Kanaev, A. (2018). Plasma hardening of replaceable parts. Bulletin of Science, 150-155.

Kanaev, A. (2018). Plasma hardening of replaceable parts. Bulletin of Science, 150-155.

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Shilov I.N. et al. (2010). Improving the performance of parts of the working bodies of agricultural machines. Minsk: Belarusian Agrarian Technical University.

Langston, A. (2014). Soil hydraulic and physical properties. Missouri: A Thesis Master of.

M.SHomurodova, T. A. (2018). Agricultural machinery. Tashkent: Teacher Publishing House.

Mari J.A, T. A. (2014). Effect of soil forces on the surface of. Journal of Agricultural Science, 277-281.

Mari, J. J. (2014). Effect of soil forces on the surface of. Bulgarian Journal of Agricultural Science, 277-281.

Mikhalchenkov, V.K. (2004). Residual stresses and hardness of the plowshares. Achievements of Science and Technology, 34-35.

Fakhriddin Nosirov, Urishev B.U, Bozor Ulugov, J. Dustmurodov, Panji Khaliyarov. (2020). Reduced Pump Power Consumption Micro Accumulating Power Plants. International Journal of Advanced Science and Technology, 29(7), 2128 - 2136. Retrieved from http://sersc.org/journals/index.php/IJAST/article/view/17478

Oduma, O. I. (2015). Performance. International, 199-204.

Petrovsky, D. (2015). On the issue of increasing the durability of the working bodies of tillage machines. Innovative directions of development of technologies and technical means of agricultural mechanization: materials of the international scientific and practical conference dedicated to the 100th anniversary of the department, Voronezh.

Rakhimov, N.R., Turaev, B.E., & Ulugov, B.D. Optoelectronic devices based on nanocrystal semiconductor (CDTE) AFN-films. Zbiór artykułów naukowych recenzowanych., 28.

Sale, N. G. (2013). Performance evaluation of some selected tillage. Proceeding of Nigeria Institution of, 71-77.

Severnev M.M, P. N. (2011). Wear and corrosion. Minsk: Science.

Shilov I.N. et al. (2010). Improving the performance of parts of the working bodies of agricultural machines. Minsk: Belarusian Agrarian Technical University

Ulugov, B. (1996). Safety and reliability life calculations of shafts in a vehicle gearbox considering the statistical distribution of stresses; p. 88-101.

Ulugov, B. D. (2020, a). Comparative analyses of modern current converters. EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal, 6(10), 319–325. https://doi.org/10.36713/epra2013

Ulugov, B. D. (2020, b). The problem of measuring large currents with the help of current sensors. EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal, 6(10), 312–318. https://doi.org/10.36713/epra2013

Wolf, N. (2015). Theoretical foundations for increasing the resource of the plowshare. Innovative directions of development of technologies and techniques, Voronezh.