SLOW TO THE GROUND THE TEETH OF THE WORKING UNIT IS ACROSS THE SOIL SOFTENING ZONE STUDY OF THE EFFECT OF SECTION AND ANGLE OF SHOT

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Abstract. One of the most important works in the whole complex of agro-technical measures to prepare the ground for sowing of cotton is harrowing. The article examines the impact of cross-sectional shape and angle of the tooth cusp of a new joint-spike-tooth harrow made of local recycled ferrous metal by casting. Examined the teeth of various cross-sections: square, oval, round. The teeth are wedge-square work surface and different value sharpening angle. The optimal value of the cross-sectional shape and angle of taper of the tooth.

Keywords: Cross-sectional surface, gear softening soil link, Deformation, rate of advance.

Village household their crops in cultivation to the ground planting before processing to give many work and energy demand to do is an operation . T to the ground processing in giving important from the process considered toothed blizzards of the soil surface to the part processing give and give was of the soil surface part of softens and his/her natural humidity save to stay conditions creation with together , growing emerging stranger the grass loses and lands known to the extent smooths .

Proposal being pushed plow local raw from the thing , that is secondary black from metal casting method with is prepared . Such toothed of the snowplow optimal parameters justification for , to take visited scientific and practical research as a result following situation being necessary was theoretical research issues come it turned out

a) K decimal section surface shape; b) Sharpening angle; c) Thickness; g) Tooth tip length, etc.

In the article, gear softening soil cross section of the link the issue of justifying the shape of the surface was considered. The tines of the harrow grind the

soil The soil is first compressed in the horizontal direction during the movement of the tooth, and then crushed when the deformation reaches a critical value . The degree of soil softening depends mainly on the deformation rate of the soil and the shape of the transverse cross-section of the tooth [1]. As the deformation rate increases, the stress concentration also increases. As a result, the quality of soil softening increases.

We will consider the interaction of teeth with a circular, oval, and wedge-shaped cross-section, mounted vertically on a harrow, with the soil . When a circular tooth moves with a speed V_n, its working surface is hit soil particles AV at the station (this on the ground $\alpha_1 \le \varphi$, α_1 – don't move forward speed direction with of the soil to the tooth beaten from the point around passed normal between corner, φ -t is a noun steel with friction corner) only tooth way according to forward speed with will be pushed (this at the station $\alpha > 90 - \varphi$) . $V_{a1} = V_n$ (1)

However, this only occurs during the initial period of movement . Because in the AB section, a cone-shaped core is formed from soil particles [2]. Further deformation of the soil occurs through this core. As a result, the tensile resistance of the tooth increases, and the quality of soil loosening deteriorates . Because there, the friction of the soil on the steel is replaced by the friction of the soil with the soil, which leads to excessive energy consumption.

Tooth A D and BC at the station tooth with meet soil the angle of friction of the particles on the circle normal φ moves in a direction that deviates from . This in motion (Figure 1, a) of the soil deformation this on earth α_1 - the angle between the normal and the forward velocity direction transferred to the circle . From formula (2) and Fig. 1, a, it can be seen that the soil deformation velocity in sections AD and BC is proportional to the forward direction of the aggregate movement. to the speed correct proportional being, soil particles contact point tooth from the arrow to move away looking at less is, that is α_1 increase with decreases and $\alpha_1 = 90^0$ when it is to zero equal will be.

Thus, when a circular tooth is used, the deformation rate of the soil is not uniform along the thickness of the tooth , i.e. , it is greater than the maximum value

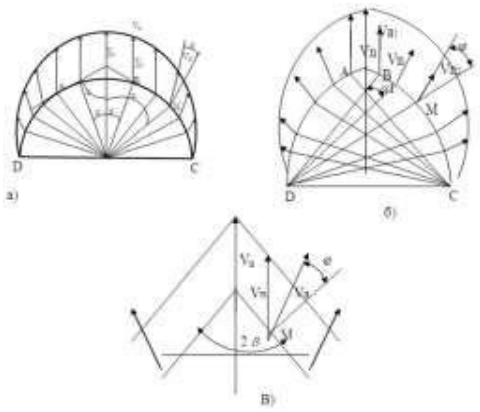
corresponding to the axis of symmetry ($V_{n \text{ of the unit).}}$ from speed) decreases to zero. This effect of the tooth on the soil reduces the concentration of stresses, as a result, the quality of soil softening decreases . In addition, the speed of the tooth deformation of the soil is small. or to zero equal was right on the part arrived lumps without crushing to the side

pushed will remain. Oval Simon teeth both to the ground effect will be similar to circular teeth (Fig. 1 , b).

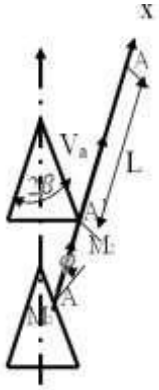
Soil deformation speed as follows:

$V_a = V_n \frac{\text{class } \beta}{\cos \varphi}$, (3) this on the ground β -t work exacerbation corner half.

(Fig. 1, c) and expression (3) show that the soil deformation rate is the same on all working surfaces of the conical tooth and deforms the soil uniformly across the coverage width (tooth width) . Since the soil softened by the conical tooth is moved with relatively large kinetic energy, additional crushing occurs as a result of the collision of the pieces. From formula (3) it can be seen that the soil deformation rate in conical teeth depends on the aggregate speed and the tooth sharpening angle . With their increase, the deformation rate also increases and, due to this, the soil softening is improved.



1-picture When the shape of the teeth is different the soil Determining the rate of deformation.



2-picture A particle of soil tooth Scheme of studying the behavior under the influence.

in this case, the soil will stick to the working surface of the tooth, and the softening effect will be damaged. Therefore, the sharpening angle of the tooth 2β it is recommended to choose based on the condition of "ensuring the soil slip from the working surface" . T is determined from the following condition [2].

$$\beta < 90 - \varphi \qquad (4)$$

According to literature data [3], the coefficient of friction between unpolished steel and medium-heavy soil with a moisture content of 15...19% is 0.68..0.72 between will be. This friction corner $34..36^0$

for the price of suitable comes. Such in the case $2\beta = 110^0$ will be .O date 3B3S-1.0 and

3B3TU- 1.0 tooth harrows, this angle is $2\beta = 90^0$ (4) condition

It has been found from experiments that increasing the speed of the snowdrifts improves the loosening and leveling of the soil. However, the speed is 2.5 m/ s . After increasing from , excessive soil dispersion occurs. As a result, ditches are formed, the wet layers of the soil are pushed up, and the resistance to the rain is increased.

Let's look at soil scattering and ways to reduce it . tooth under the influence movement seeing we go out. Vertical located

tooth V_n speed with when moving m massive soil particle A , tooth

work surface From point M $\frac{V}{V} = \frac{\text{class}}{\beta}$ with absolute speed

$_1$ $_a$ $_n$ $\cos\varphi$

moves and known from time to time later M_2 comes to the point. That's it on point soil particle tooth from the outside separated, soil on the surface initial And speed with the movement continue will give and how much h to the distance go stops. This distance determination for of a particle field on the surface movement expressive

differential equation We will fix it. Particle And direction (x read) according to differential equation is as follows

It happens: $m\frac{d^2x}{dt^2} = -f^1 mg$ (5)

here $f^1 mg = T^1$ – friction force, f^1 – soil with soil friction coefficient.(5) equation t time according to if we integrate:

$$V_x = -f^1 gt + c_1 \quad (6)$$

$$x = -f^1 \frac{gt^2}{2} + c_1 t + c_2 \quad (7)$$

Using the initial conditions, the integral constant c_1 and c_2 what we find: $t = 0, V_x = And, x = 0$ when $c_1 = And, c_2 = 0$ will be.

(6) and (7) to equations c_1 and c_2 what values if we put,

$$V_x = V_a - f^1 gt \quad (8),$$

$$X = W_a t - f_1 \frac{g t^2}{2} \quad (9).$$

The fact that the final velocity of the particle is zero for By setting the right-hand side of equation (8) to zero, we find the time of movement of the particle:

$$t = \frac{And}{f^1 g} \quad (10)$$

Found t time (9) to the formula let's put, and $And = V_n \frac{class \beta}{\cos \varphi}$ that it is $V^2 class^2 \beta$ to your attention take, $L = \frac{n}{2 f^1 g \cos^2 \varphi}$ (11)

From equation (11) It looks like soil particle from the tooth from separation then from moving until it stops by pressing past L distance don't move forward speed and tooth exacerbation corner β of sinus to squares correct proportional of the soil physicist - mechanic to its properties (f^1 and φ) is related This will be from the equation again that to see it's possible to storm movement speed necessary to the extent increasing the soil designated far away of throwing provision for , tooth sharpening corner

It is necessary to reduce . Using expression (11), we can find the difference between β and V_n

to contact finding possible . This for plow speed every what distance L at the value does not change because reception we will do Snowstorm permission done maximum don't move forward speed V_{nk} with we mark .

$$\text{He in case } L = \frac{V_{nk}^2 \operatorname{class}^2 \beta_c}{2 f^1 g \cos^2 \varphi} = \frac{V_{nn}^2 \operatorname{class}^2 \beta_n}{2 f^1 g \cos^2 \varphi} \qquad (12)$$

$$\text{This from the ground } \beta = \operatorname{arcsine} \frac{V_{nk} \operatorname{class} \beta_c}{V_{n.n.}} \qquad (13)$$

Here β_c - existing ZBZS- 1.0 and ZBZTU- 1.0 of the tine exacerbation corner; β_n, V_n - fast moving of the snowplow suitable sharpening corner and don't move forward speed. (13) from the expression It can be seen that as the speed of movement increases, L It turns out that the angle of sharpening of the tooth needs to be reduced to keep the value unchanged.

Currently used of the snowplow permission done speed $V_{nk} = 2.5$ m / c and exacerbation corner $\beta_c = 45^0$ values (13) to the expression put, 3.0...3.3 m/ s speed for tooth exacerbation corner calculation possible.

$$\beta_n = 32...36^0 \text{ or } 2\beta_n = 64...72^0.$$

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