IMPROVED PLANTING SECTION

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Abstract: In this article, an improved planting section and the idea of improving the technological processes, energy and resource saving in cotton seed planting, and the idea that the seeder planters open a trench in the soil, the compactor compacts the bottom of the opened trench, the sled compactor compacts the upper two parts of the trench and prepares the place where the seed is placed directly for planting. and considerations are stated.
Key words: technological processes, cotton seed, working bodies, seed distributor, adjuster.

To sow cotton seeds in the soil, modern cotton seeders use a planting section that performs various technological operations.

In the existing planting section of cotton planters, seeds are planted based on the following technology. The seed drill makes a furrow in the soil, the compactor compacts the bottom of the opened furrow, the sled compactor compacts the upper two parts of the furrow and prepares the place where the seed will be placed directly for planting. After the seeds fell into the ditch, shovels (zagortachs) buried the seed at the required depth. After burying, the prikatka, consisting of two concave cone-shaped coils, presses the soil and compacts it by making a slope on both sides (Fig. 1, a).

Planting section consists of skid cultivator1, compactor 2, skid 3, zagortach4 and prikatka 5 [1].

During the movement, Ekkich cuts the soil with a knife and spreads it from side to side at an angle.

A pod-like thickener compacts the bottom of the tuber, creating conditions for moisture to accumulate around the seed through capillary tubes from the bottom of the soil, and formation occurs.

The ski installed perpendicular to the neck of the ekkich limits the sinking of the sashnik and ensures the uniformity of the planting depth.

A bent shovel-shaped zagortach behind Ekkich buried the ditch by pushing the earth from both sides.

A top-mounted compactor consisting of two truncated cones forms a pile of soil over the buried seed and compacts a single field within itself [1].

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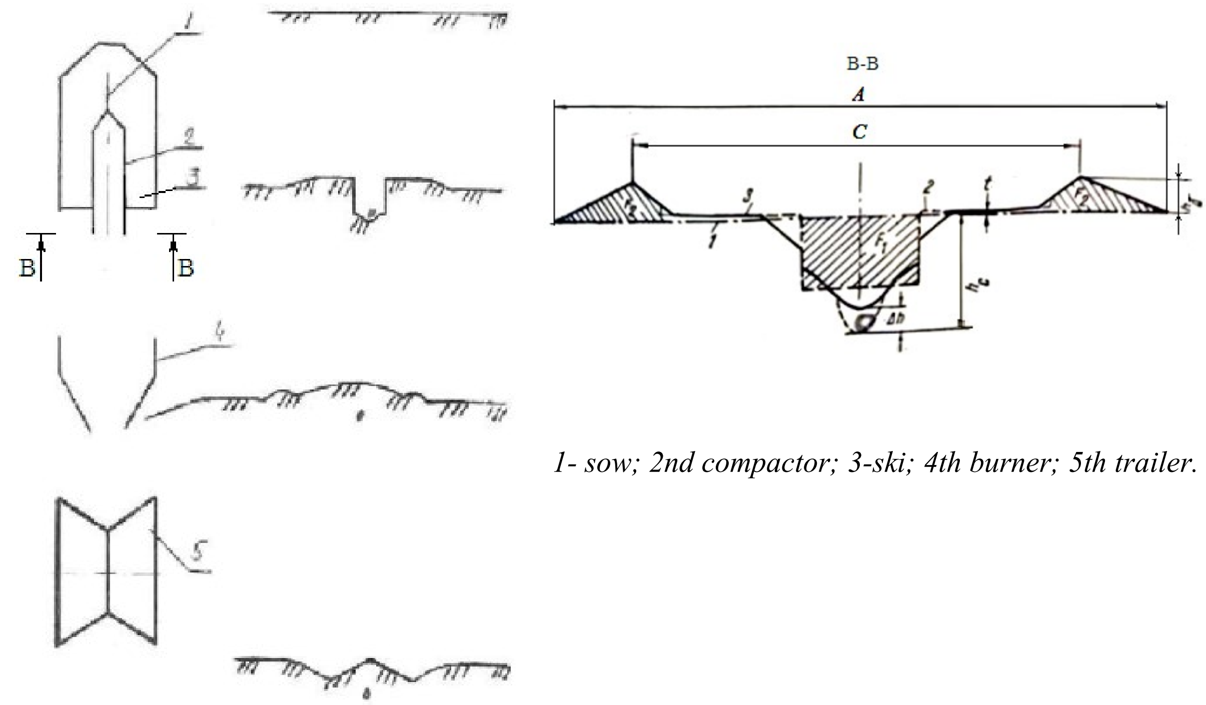
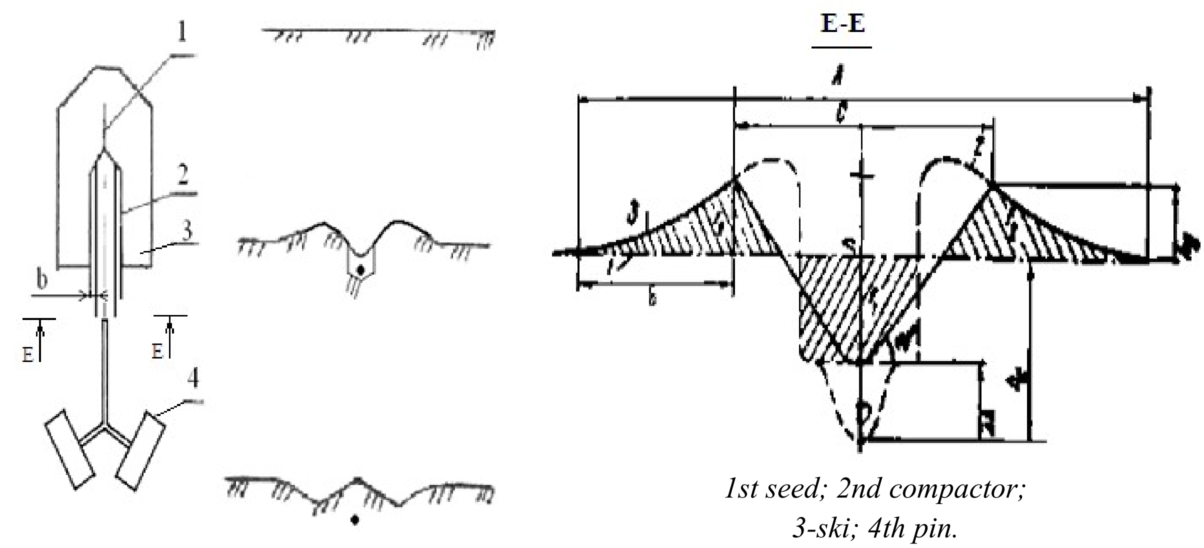


1- sow; 2nd compactor; 3-ski; 4th burner; 5th trailer.

a) exists



*1st seed; 2nd compactor;
3-ski; 4th pin.*

b) improved

Figure-1 Technological scheme of planting cotton seeds

The disadvantage of this technology is that the depth of planting changes due to the soil moving from the upper part of the wall of the trench before the seed is placed in the ditch opened for the seed.

In addition, the angle between the neck wall and the ski is 900, and due to the moisture of some parts of the soil, the wet soil sticks between them, the ski rises to a certain distance, and this negatively affects the planting depth.

A coulter consisting of two truncated cones cannot adequately compact the soil above the seed. As a result, the number of plants in the field will decrease.

Taking into account the constructions of foreign seed drills, we offer the following new improved planting technology, which works with improved working bodies, taking into account the above shortcomings (Fig. 1, b) [5].

In the planting section of the proposed improved experiment, since the sledge is placed at a distance (30-40 mm) from the jaw of the plow, the pile of soil formed by the plow stays in its place (does not compact under the sled), creating the necessary soil pile for the burial process, creating a good opportunity. Since the tail part of the sled is located further from the planter, it does not affect the soil pile (it does not push the soil pile into the ditch), but it provides the planting depth. as a result of the natural movement of the soil pile into the ditch, the seed is buried. After planting, a pair of concave cone-shaped rollers with a gap between them (at a distance of 30-40 mm) presses the soil pile, compacts it with a slope on both sides, and forms a soft soil pile on the seed.

The experiment is determined on the basis of determining the parameters of the sower in the model, studying the movement of the pile, the direction of the velocity vector, the movement along the surface of the wall and the value of the natural slope angle during the process of sliding the soil pile from the wall of the sower and burying the seed in the ditch [3].

The soil is pushed into the ditch under the angle of descent or the angle of the natural slope.

In the direction of the speed of movement, we direct the Ox axis, in the vertical direction, the Ou axis down, and take the center of the soil pile as the coordinate origin point 0 (picture-2) [2].

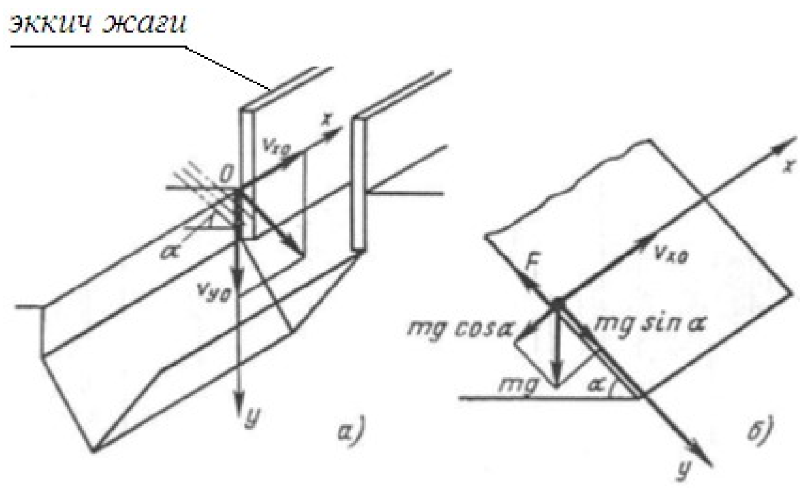


Figure-2 Land slippage behind Ekkich: a) to the ditch b) along the line creating the slope.

In the process of work, the pile of soil, after passing through the jaws of the planter, falls into the ditch begins, it is affected by the force of gravity mg and the resistance force of the external environment. Since the initial velocity of the soil pile in the vertical direction is zero

and the value of the height of the fall is small, the resistance of the external environment cannot be taken into account. [2].
Then the equation of motion of the soil pile will have the following form:

$$m\frac{d^2x}{dt^2} = 0; \quad m\frac{d^2y}{dt^2} = mg.$$

From here we define:

$$\frac{d\upsilon_x}{dt} = 0; \quad \frac{d\upsilon_x}{dt} = g; \quad (1)$$

Multiplying both sides of the equation by dt and integrating it gives the following we define:

$$\upsilon_x = C_1, \quad \upsilon_y = gt + C_2. \quad (2)$$

According to the initial conditions $t = 0, \ \upsilon_x = \upsilon_{x0}, \ \upsilon_y = 0$ when in that case $C_1 = v_{x0}$, $C_2 = 0$.
Substituting the constants of the integral into equation (2), we get:

$$\frac{dx}{dt} = \upsilon_x = \upsilon_{x0}; \quad \frac{dy}{dt} = \upsilon_y = gt;$$

from this: $X = \upsilon_{x0}t + C_3; \ Y = \frac{gt^2}{2} + C_4$ we define .

From the initial condition $C_3 = C_4 = 0$ we determine that , then

from here: $$X = \upsilon_{x0}t; \quad y = \frac{gt^2}{2};$$

$$y = \frac{gx^2}{2\upsilon_{x0}^2};$$

$\upsilon_{x0} = \upsilon_x$ into account the v… it in (3), we get the following:

$$y = \frac{xtg\alpha}{(tg\varphi - tg\varphi_1) + (tg\varphi - tg\beta)\sin\beta}$$

The speed can be found from this:

$$\upsilon_y = \frac{gx}{\upsilon_{x0}} = \sqrt{\frac{gxtg\alpha}{(tg\varphi - tg\varphi_1) + (tg\varphi - tg\beta)\sin\beta}}$$

Resulting speed of soil accumulation:

$$\upsilon = \sqrt{\upsilon_{x0}^2 + \upsilon_y^2},$$

Angle of descent:

$$\alpha = arctg\frac{\upsilon_y}{\upsilon_{x0}}.$$

The soil pile is pushed from the boundary … sliding or natural descent from a sloping surface is α[4].

To the line forming the sloping surface *mgsinα* value is affected by the pile of soil (Fig. 2, b). The soil piler moves along the sloped surface. This movement is resisted by the force of friction, that is:

$$F = mg\cos\alpha \cdot tg\varphi_1$$

Equation of motion of soil pile:

$$m\frac{d^2x}{dt^2} = 0; \qquad m\frac{d^2x}{dt^2} = mg\sin\alpha - mgcos\,\alpha tg\varphi_1;$$

After the integrals, we have:

$$\frac{d\upsilon_x}{dt} = 0, \quad \frac{d\upsilon_y}{dt} = g\cos\alpha(tg\alpha - tg\varphi_1).$$

or $\upsilon_x = C_1, \ \upsilon_y = gt\cos\alpha\ (tg\alpha - tg\varphi_1) + C_2 \ 0, \ \upsilon_x = \upsilon_{x0}, \ \upsilon_y = 0,$

$C_1 = \upsilon_{x0}, \ \ C_2 = 0.$

Putting the constants in the equations v_x, v_y we determine the values.

$$\upsilon_x = \upsilon_{x0}, \ \ \upsilon_y = gt\cos\alpha(tg\alpha - tg\varphi_1), \text{ ёки } \frac{dx}{dt} = \upsilon_{x0}, \quad \frac{dy}{dt} = gt\cos\alpha(tg\alpha - tg\varphi_1).$$

from here

$$x = \upsilon_{x0}t + C_3, \quad y = \frac{1}{2}gt^2\cos\alpha(tg\alpha - tg\varphi_1) + C_4$$

According to the initial condition $C_3 = C_4 = 0$. we determine that:

$$x = \upsilon_{x0}t\ , \ y = \frac{1}{2}gt^2\cos\alpha(tg\alpha - tg\varphi_1) = \frac{1}{2\upsilon^2{}_{x0}}gx^2(tg\alpha - tg\varphi_1)$$

Now the vertical component of the velocity can be determined:

$$\upsilon_y = \frac{gx\cos\alpha}{\upsilon_{x0}}(tg\alpha - tg\varphi_1).$$

The resulting speed of the fall

$$\upsilon = \sqrt{\upsilon^2{}_{x0} + \upsilon^2{}_y}.$$

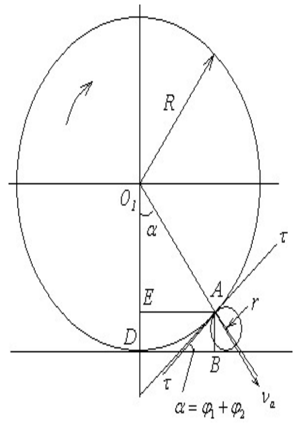
Angle of descent:

$$\alpha = arctg\frac{\upsilon_y}{\upsilon_{x0}}.$$

The initial times of soil boundary lay dip angle are defined as follows, respectively.

$$t_1 = \sqrt{\frac{2y}{g}}; \quad t_2 = \sqrt{\frac{2y}{g\cos\alpha(tg\alpha - tg\varphi_1)}}$$

During this time, the nesting device in the planter ensures that the seed falls into the ditch, the seed in the ditch is partially buried by the natural fall of the soil, and then the seed is buried from both sides with the drill [6].
The parameters of the press are determined by the condition of connecting the lumps in the soil with the flange of the press. (picture-3).



Picture-3. Determining the diameter of the pin.
The diameter of the pin is determined as follows from Figure-3

$$AB = r[1+\cos(\varphi_1+\varphi_2)] = 2r\cos^2\left(\frac{\varphi_1+\varphi_2}{2}\right) \qquad (1)$$

$$AB = ED = R[1-\cos(\varphi_1+\varphi_2)] = 2R\sin^2\left(\frac{\varphi_1+\varphi_2}{2}\right) \qquad (2)$$

From here we generate the following

$$R \geq rctg^2\left(\frac{\varphi_1+\varphi_2}{2}\right) \qquad (3)$$

According to the results of the experiment, the largest cut size in the planting background *r=8 cm*, friction angles φ_1 =30^0 and φ_2 =56^0 taking into account the fact that $R \geq 9{,}2$ We determine whether it is cm (92 mm) or the diameter of the wheel $D \geq 184$ We accept mm.
So, the diameter of the pin should be 184 mm.

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