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COMBINED DEVICE LABORATORY TEST RESULTS

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ABSTARCT

At present, in order to ensure food security in the Republic, one of the most important and complex agro-technical measures is the timely and even harvesting of seedlings in the areas vacated by grain.

According to the results of the analysis, there are technologies and technical means developed by foreign scientists, but they are not suitable for the climatic conditions of the Republic.

Addressing this pressing issue requires the development of energy, resource and water-saving technologies and technical means for the cultivation of secondary crops in areas devoid of winter grain.

Based on the above, scientists of the Samarkand Institute of Veterinary Medicine (Sam IVM) and designers of JSC "BMKB-Agromash" have developed a model of a combined device for road tillage and sowing of intermediate crops in one pass.

A mock-up of the device working section is shown in Figure 1 and the location of the section in the ground channel is shown in Figure 2.

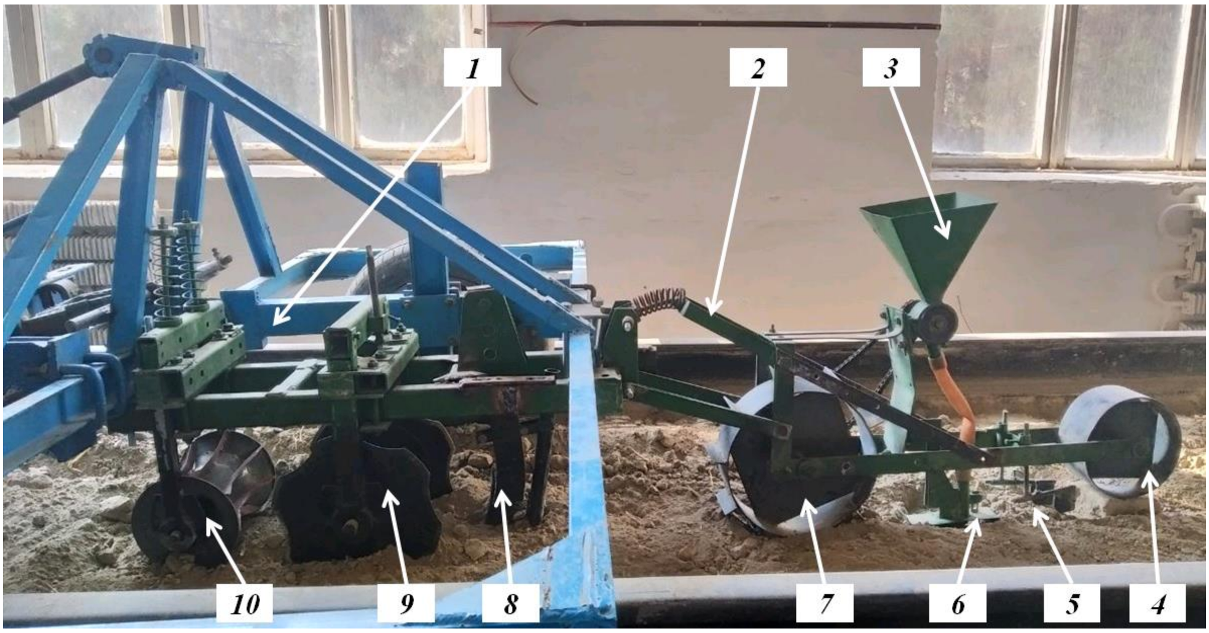


Figure 1. The combined device of road tillage and sowing of seeds is a laboratory device of the working section

The working section of the device consists of frame 1, parallelogram mechanism 2, seed box 3, compaction roller 4, coverer 5, opener 6, leveling and transmission roller 7, rotary claw softener 8, flat cut discs 9 and grinder 10 (Fig. 1).

As the combined device section moves, the plant residue on the surface of the pile is partially cut or crushed by laying it on the field surface along the coverage width of the crusher 10 attached to the frame 1. The flat-cut discs moving behind it cut the 9 ridges vertically, defining the boundaries of the strip at the set width. In addition, the discs act as a barrier to prevent the pieces of soil from protruding from the ridges to the sides when the rotary claw deep softener 8 deforms the soil. The rotary claw softener 8 works the soil to a depth of 10-20 cm. The smoothing and motion-transmitting roller 7 attached to the parallelogram mechanism 2 crushes, flattens and partially compacts the existing lumps on the surface of the softened strip. To sow the seeds in the treated soil, the anchor socket forms a ditch 6 and places the falling seeds from the seed bunker 3 into the ditch.

a) *b)*

2-picture. Location of the working section in the soil channel

a-side, b-top

Since the width of the soil channel is narrow, a single section of the breech sample is installed.

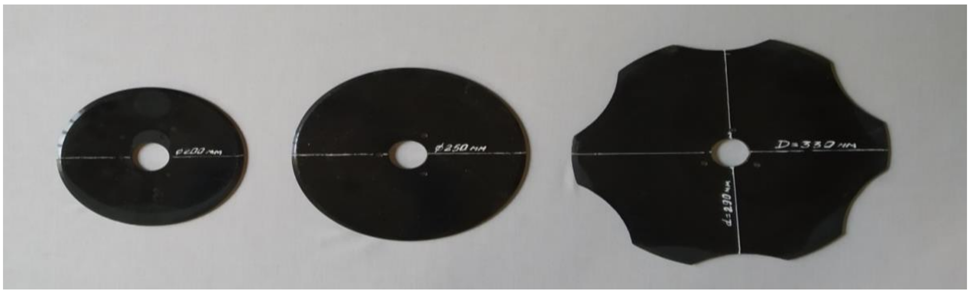
All working bodies on the device are made so that it is adjustable and securable. The motion of the transmission mechanism is obtained by means of a chain transmission from the smoothing cathode.

The speed of the transmission mechanism can be changed by switching the stars.

The disc blades of the combined planting aggregate perform the following functions:

- Fixed width over push and pole cutting at set depth;
- To ensure that the incisors formed by the softener in the stripe, which are separated from the plumage by cutting two wool, do not fall into the furrow.

In fulfilling the above requirements, the combined planting aggregate was tested for discs of different diameters and different shapes for the laboratory device (Figure 3).



a) *b)* *c)*

Figure 3. Disc blades of different diameters and shapes

In the laboratory testing of disc blades of the combined sowing unit in the laboratory, the distance between the disc blades was set at a width of 10, 15, 20 cm and a depth of 5-15 cm. The length of the soil channel is 20 m.

a)

b)

Figure 4. Installation of the disc blade in the soil channel (a) and the process of cutting the disc blade from the ridge marked strip (b).

The combined sowing device was carried out by conducting disc blades experiments under laboratory conditions in three repetitions for each disc and by measuring five locations of the disc in the soil channel. The results of the study are presented in Table 1.

Table 1. Results of laboratory tests of disc blades

№	Diameter of disc blades, mm	Distance between the disc blades, cm	Built-in processing depth of disc blades, cm	Average processing depth of disc blades, cm
1	Ø200	10	5	5,9
		15	7	5,3
		20	9	8,2
2	Ø250	10	8	7,2
		15	10	8,5
		20	12	10,2
3	Ø330/290	10	10	8,8
		15	12	12,5
		20	15	16,4

From Table 1 Above, It is possible to see that the machining of disc blades is less in most cases than the depth of their installation. The processing depth of a flat disc knife with a diameter of Ø200 mm is more than 0,9 cm in the first case after installation, in the remaining two cases respectively 1,7 and 0,8 cm less. Diameter Ø250 mm li fixed flat disc Blade 8 cm, 10 cm, 12 cm depth respectively 0,8;1,5 and 1,8 cm less. Diameter Ø330/290 mm cut disc knife, while the largest immersion was determined, respectively 8,8 cm, 12,5 cm and 16,4 cm. It was found that the depth of immersion in these two cases exceeds the depth of installation.

The deviation of the disc blades from the specified processing depth depends on their diameter and The Shape of the flange. When the diameter of the flat discs is small and the width of the stripe is changed, it becomes difficult for the flat-rim disc to cut the untreated pusher, as the disc Blade arrows touch the pusher.

When the diameter of the cut (groove) disc was large, the disc Arrows did not touch the puncture and the cut flange provided that the pole of the specified width and depth of the puncture was cut at the required level.

On the basis of the selected disc blades, as well as on the basis of analyzes, laboratory tests of working organs with Rotary shutters (chisel-shaped) for road-treatment of soil were carried out.

Together with the fact that the softeners have the least resistance to drag, it is necessary to soften the soil qualitatively and to process it evenly. The study was aimed at studying the effect of softener parameters on drag resistance, changes in the shape and size of the plumage.

The following basic requirements are imposed on the softener:

- Lane loosening of push-up soil to the specified width and depth;
- In the process of softening, do not spoil the shape of the Bush and do not let the processed stripe soil into the holder;
- Between the softener column and the working organs close to it, it is necessary to ensure that the plant remains are not clogged.

To perform the above tasks, ripper of different sizes were selected (fig.4)

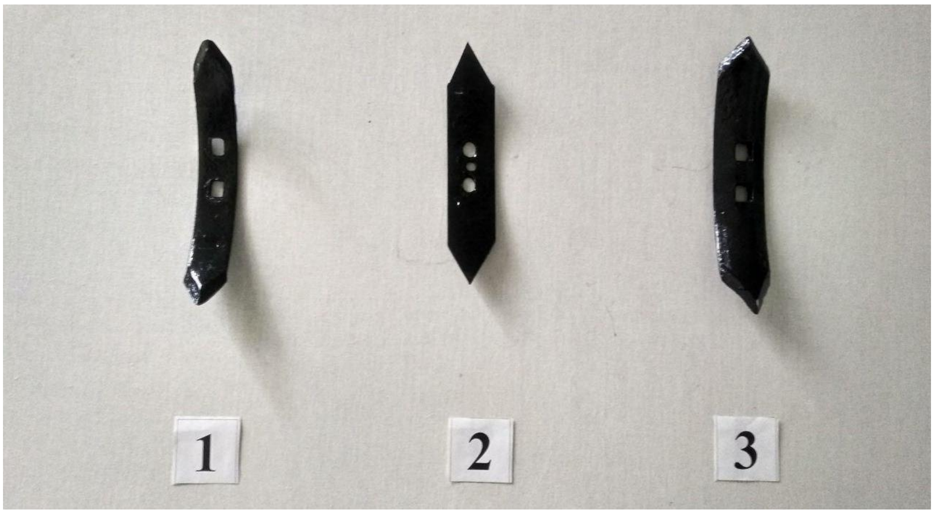


Figure 3. Ripper

Figure 5. Installation of the ripper on the section

The coverage width of the selected claw softeners is 35 mm, 40 mm and 45 mm, and its remaining dimensions are: height 250 mm, 225 and 265 mm, respectively, and the processing depth is set to 10 cm, 15 cm and 20 cm depth. Laboratory studies were conducted in the soil channel at velocities of 1.1 and 1.4 m/s.

Figure 6. Post-processing of the ripper profile and its detection process

The results of the experimental study are presented in Table 2. The table shows the results of the first transition and the second transition in the denominator.

Processing depth was determined from the middle of the pile using a measuring ruler. Measurement results were obtained at 25 repetitions every 10 cm from the beginning, middle and end of the soil channel.

The deviation of the softener from the specified depth was determined by processing the results obtained.

The profile of the machined ridge was taken from the beginning, middle and end of the ridge using a special profilometer.

Table 2 The resistance of the ripper to gravity and the dependence of the work quality indicators on the coverage band

Indicators	Ripper width, mm		
	35	40	45
Processing depth, cm			
$M_{ўр}$	19,8/19,5	21,2/20,3	21,4/20,9
$\pm\sigma$	0,96/1,56	1,6/0,84	0,86/1,37
Indicators number of soil fractions, %			
< 1 mm	3,1/2,8	2,8/3,7	2,2/1,8
1...5 mm	61,6/68,5	68,3/70,6	65,4/68,3
> 5 mm	35,3/28,7	28,9/25,7	32,4/29,9
Sectional traction resistance, кN			
$M_{ўр}$	1,75/1,78	1,65/1,68	1,74/1,62
$\pm\sigma$	0,24/0,39	0,42/0,28	0,15/0,25

Note: in the photo, when the aggregate movement speed is 1,1 m/s; in the denominator, the aggregate movement speed is 1,4 m/s.

Resistance to drag was determined in combination with grinders and discs.

From Table 2, when the width of the softener coverage ranged from 35 to 45 mm, it was found that its tensile resistance decreased from 1,75 kn to 1,65 kN, followed by an increase of 1,74 kN, while the quality indicators were almost identical. The surface of the treated area with softener also made up 310-343,5 N/cm2 when compared resistance softener coverage width was 35mm when compared to increase from 5,56-5,74 N/cm^2, 40 mm when compared to 4,88-5,17 N/cm2 and 50 mm when treated area was 4,82-5,06 N/cm^2. When the softener with a width of 35 mm worked at a depth of 20 cm, the traction resistance was significantly increased as a result of an increase in critical depth. When the coverage width was 40 and 45 mm, the relative traction resistance was significantly reduced due to the fact that the softener came out of the critical depth on account of the vertical scraping depth of the discs. Therefore, it is desirable to take the softener coverage width 45 mm.

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