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TYPE SELECTION AND JUSTIFICATION OF THE PARAMETERS OF GRANADELLA COMBINATION UNIT

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Abstract
In clause reduction results of researches on shall choose types and substantiation of parameters a crest educational of the combined unit for the minimal processing of ground.

Keywords: Combination unit, a spherical disk, granetelli, the height of the ridge, the transverse profile of the comb, the diameter of the disc, the traction resistance of the working body, the quality of crumbling soil.

Introduction

In order to choose the type of combined unit [1] for minimal tillage that ensures high work quality with low energy consumption, comparative tests of single-turner, two-turner and spherical disk working bodies were conducted according to the following parameters:
- the resistance of the working body to gravity;
- the height of the resulting push;
- the cross profile of the resulting powder;
- quality of soil compaction.

The upper body of the PD-4-45 plow was used as a single-turner working body, the working body of the GX-4 punch receiver was used as the two-turning working body, and the working body of the TDB-3/5 disk harrow was used as the working body of the spherical disk [2].
The test results are presented in Table 1 and Figure 1.

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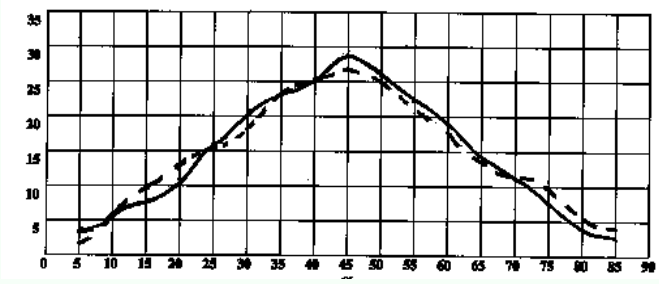
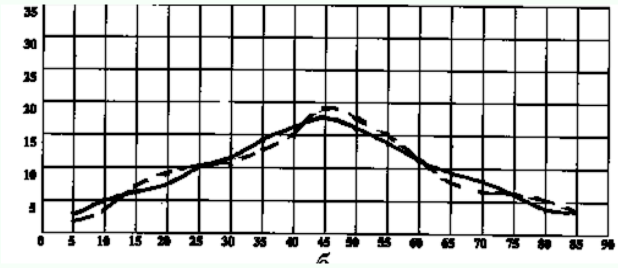
Table 1 Quality and energy indicators of different pushers

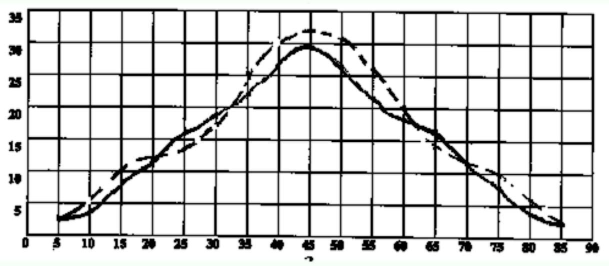
Types of receivers	Amount of the following size (mm) fractions,%			Pink high-league, cm		To pull has been resistance, kN
	>100	100-50	<50	$M_{ўр}$	± σ	
One-way	$\frac{13,97}{10,97}$	$\frac{11,30}{13,16}$	$\frac{74,73}{75,87}$	$\frac{17,8}{15,9}$	$\frac{1,85}{2,08}$	$\frac{3,31}{4,05}$
Two-wheeled	$\frac{11,13}{9,77}$	$\frac{14,43}{10,73}$	$\frac{74,44}{79,50}$	$\frac{25,5}{27,8}$	$\frac{1,29}{0,98}$	$\frac{3,34}{4,89}$
Spherical disk	$\frac{9,2}{8,53}$	$\frac{12,17}{11,80}$	$\frac{78,63}{79,67}$	$\frac{30,3}{28,9}$	$\frac{1,28}{1,92}$	$\frac{2,37}{2,55}$

Note: Aggregate speed in photo is 5.0 km/h and denominator is 7.0 km/h.



a





б *в*

a- push formed by a working body with a tipper; b-a push created by a working body with two flippers; v-spherical disc formed by the push;
when the aggregate speed is 5.0 km/h; when the aggregate speed is 7.0 km/h

Figure 1. Cross-sectional profiles of pulses produced by different pulse receivers

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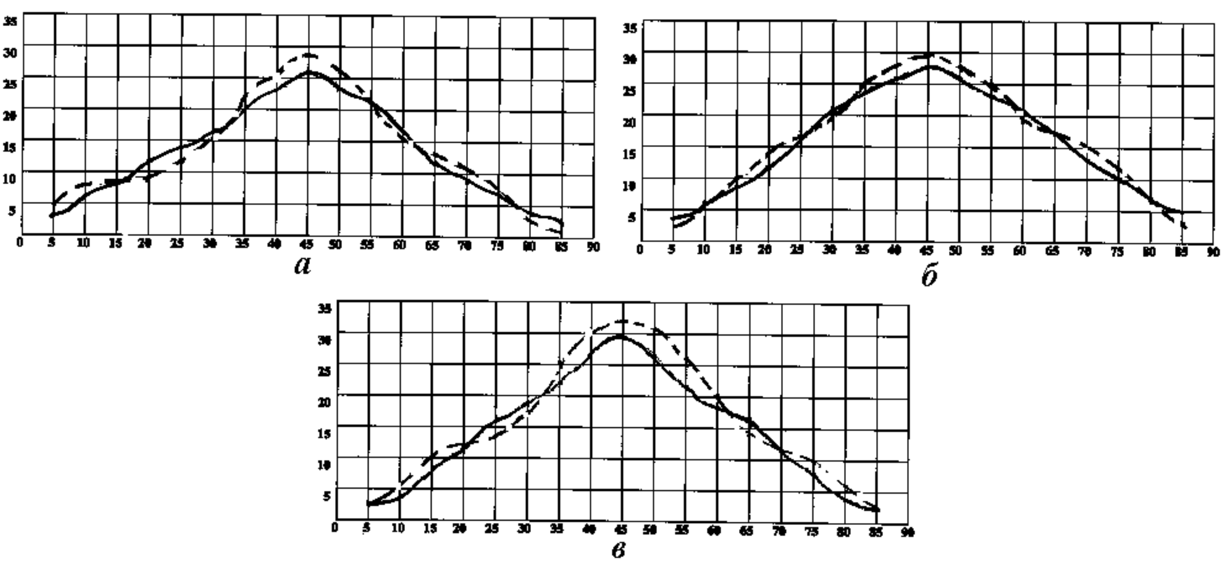
Methodology

The data presented in Table 1 and Figure 1 show that at both operating speeds, the spherical disk working tool provided high-quality soil crushing and the formation of the largest ridges with low drag resistance. In addition, no clogging of plant residues was observed when using this working tool.Based on these points, a spherical disc working body was selected for further research, and its diameter and angle of installation in relation to the direction of movement were studied [3].
The obtained results are presented in Tables 2.3 and Figures 2.3.

Table 2 Performance indicators of the piston receiver with different diameters

Diameter of the pusher, mm	Amount of the following size (mm) fractions,%			Push height, cm		To pull has been resistance, kN
	>100	100-50	<50	$M_{ўр}$	± σ	
450	10,63 / 9,70	10,97 / 10,97	78,40 / 79,33	27,8 / 25,4	1,19 / 1,38	1,28 / 1,83
550	10,87 / 9,67	10,73 / 10,33	78,40 / 80,00	30,5 / 29,2	1,42 / 1,08	1,95 / 2,20
650	9,2 / 8,53	12,17 / 11,80	78,63 / 79,67	30,3 / 28,9	1,28 / 1,92	2,37 / 2,55

Note: Aggregate speed is 5.0 km/h in the image and 6.5 km/h in the denominator



when the aggregate speed is 5.0 km/h; ----- when the aggregate speed is 6.5 km/h.

Figure 2. Transverse profiles of ridges formed by spherical disks with diameters of 450 (a), 550 (b) and 650 (c) mm

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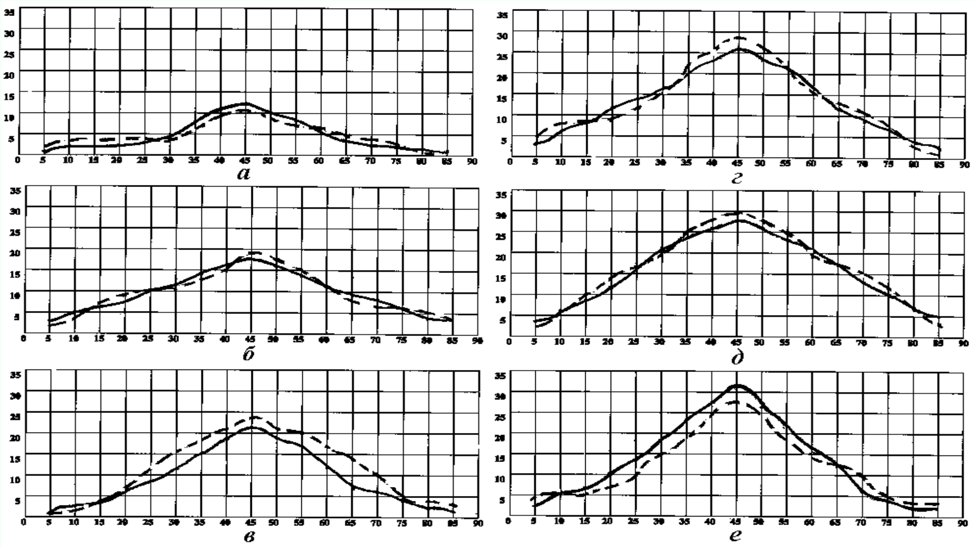
Results.

Table 3 The influence of the installation angle of the spherical disc relative to the direction of movement on its performance

The angle of installation of the spherical disk relative to the direction of movement, grad	Amount of the following size (mm) fractions,%			Push height, cm		To pull has been resistance, kN
	>100	100-50	<50	$M_{ўр}$	± σ	
15	17,0/12,3	15,33/13,83	67,67/73,87	10,5/9,8	1,81/1,91	1,08/1,14
20	15,83/13,10	15,0/11,5	69,17/75,4	15,4/14,3	1,92/1,32	1,68/1,97
25	14,47/12,13	12,43/11,47	73,1/76,4	21,5/23,2	1,08/1,42	2,34/2,64
30	10,87/9,67	10,73/10,33	78,4/80,0	30,5/29,2	1,42/1,08	2,83/3,06
35	11,33/10,17	11,77/13,57	76,9/76,26	30,1/29,4	1,84/0,92	3,57/3,67
40	14,1/10,6	11,6/11,57	74,3/77,83	31,5/29,8	1,32/1,91	4,82/5,06

Note: Aggregate speed in photo is 5.0 km/h and denominator is 7.0 km/h



a, b, v, g, d, e are the thrusts formed when the angle of installation of the disc relative to the direction of movement is 15, 20, 25, 30, 35, 40.

when the aggregate speed is 5.0 km/h; ----- when the aggregate speed is 6.5 km/h.

Figure 3. Horizontal profiles of ridges formed by spherical disks mounted at different angles to the direction of motion

Discussion

It can be seen from the data that increasing the diameter of the disk from 450 mm to 650 mm did not significantly affect the quality of soil compaction. The height of the ridge increased by 2.7-3.8 cm when the disc diameter increased from 450 mm to 550 mm, and remained unchanged when it increased from 550 mm to 650 mm. The drag resistance of the working body increased proportionally with the increase in disc diameter. This is because an increase in disc diameter leads to an increase in its working surface and, therefore, the volume of soil interacting with it. Changing the installation angle of the rake disc relative to the direction of movement from 150 to 400 led to an improvement in the quality of soil grinding, an increase in the rake height and the traction resistance of the working body [4]. As can be seen from the given data, the diameter of the disc should be 550 mm, and the angle of its installation in relation to the direction of movement should be 300-350 to create agrotechnical requirements of the plows with low energy consumption.

Conclusion

In order to produce high-quality pulses with low energy consumption, the pulse receiver of the combined unit should be in the form of a spherical disk, its diameter should be 550 mm, and the installation angle should be the range of 300-350 with respect to the direction of movement.

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