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Results of Experimental Research of the Corps That Provide Functionality to the Plantation Area of Poly Crops

D. Sh. Chuyanov
Karshi Engineering Economics Institute (Uzbekistan)

Abstract: The article describes the results of experimental studies of the guiding plate casings used in the planting area of polys crops.

Keywords: Poly crops, soil, hull, diverter plate, irrigation ditch, palaxa, plant residues, tenzobarmak, weeds.

Introduction. The weather and soil conditions of our country are very favorable for obtaining abundant harvests from polys crops. Therefore, it is appropriate to grow polize products on a large scale not only to satisfy the needs of the population of our republic, but also to sell them to other countries [1,2].

It is very important to use intensive technologies in agriculture and increase productivity at a low cost [3-8]. Therefore, it is very important to carry out experimental studies on the justification of the structural parameters of the housings with guide plates that are used in the planting area of polys crops.

Materials and methods. The object of the study is the guiding plate housings, which work on the planting area of polys crops. The study of the technological work processes of the plate casings of the combined machine was carried out according to the literature sources and the results of testing in field conditions [9,10].

Taking into account the results of theoretical studies, an experimental device equipped with plate casings, which are directed to the planting area for plowing, was made for conducting laboratory-field experiments. The technical description of the device is presented in Table 1.

Researches were conducted in the fields of Sertepa farm of Kashkadarya region and Scientific Research Institute of Agricultural Mechanization of Yangiyol district of Tashkent region. In experimental studies, the length of the guide plate and the depth of processing on the performance of the casings were studied.

The burial completeness of plant residues in the planting area was determined by the mass of plant residues and weeds that remained unburied on the soil surface. Counting of unburied plant debris and weeds was carried out in plots with a length of 5 m and a width equal to the coverage width of the hulls. Unburied plant debris was collected and weighed on a balance with an error of ±10 g.

Table 1. Technical description of the experimental device for plowing the planting area

Name and unit of indicators	The value of indicators
Coverage width, m	0,90-1,05
Processing depth, cm	20–27
Number of cases, pcs	2
Casing width, cm	45-52,5
Type of working surface of casings	Screw-shaped
Number of guide plates, pcs	2

The depth of burial of plant residues was determined by measuring the distance from the surface of the plow to the upper limits of the placement of plant residues. Two vertical cuts were made in each pass. Measurements were made with an accuracy of ±0.5 cm and in quadruplicate.

The energy evaluation of the device housings was carried out together with their agrotechnical evaluation. During the experiment, the total resistance of the device R, the path traveled by the device S and the experimental time t were determined. The total resistance of the housings with guide plates was determined by the tension on the tension fingers installed in the suspension mechanism of the device.

Results and discussion. In the implementation of the proposed technology, i.e., the formation of the primary irrigation ditch with high-quality overturning of the blades is influenced by the coverage width of the casings, the length of the guide plate, and the depth of processing.

When determining the effect of the length of the guide plate on the energy and quality indicators of the casings, the depth of processing was a=25 cm, the speed of the device was 1.72 m/s, the coverage width of each casing was 52.5 cm, and the coverage width of the device was 105 cm.

According to the results of experimental studies (Figure 1 and Table 2), it was found that the length of the guide plate has a significant effect on the overturning of the blades and the profile of the plow.

When the casings are operated without a guide plate, the blades are mainly laid on the untreated field surface to the right and left, respectively. In this case, an open embankment with a width of 103.2 cm and a depth of 31.8 cm is formed in the middle of the treated area. When the length of the guide plate is l_3=40 cm, cases of incomplete overturning of the blade were observed, and an open egate 91.6 cm wide and 29.8 cm deep was formed. When the length of the guide plate was further increased, the technological process went reliably.

As the length of the guide plate decreases, the tensile strength of the casings also decreases (Fig. 1). Because in the absence of a guide plate, up to a certain point, the blade is only affected by the body, and then it is overturned by the force of inertia. In this case, the pressure on the blade tipper is reduced and there is no resistance of the guide plate. With the increase in the length of the guide plate, the value of its resistance to traction and frictional forces on the working surface increases. This leads to an increase in the energy consumption spent on flipping the blade.

When the length of the guide plate was 93 cm, each blade was turned on its edge, and the depth of the trench formed in the middle of the processing area was 9.8 cm. In this case, the guiding plate affects the blade from the beginning of its rise to its complete overturn, i.e., until 160-1700 overturns.

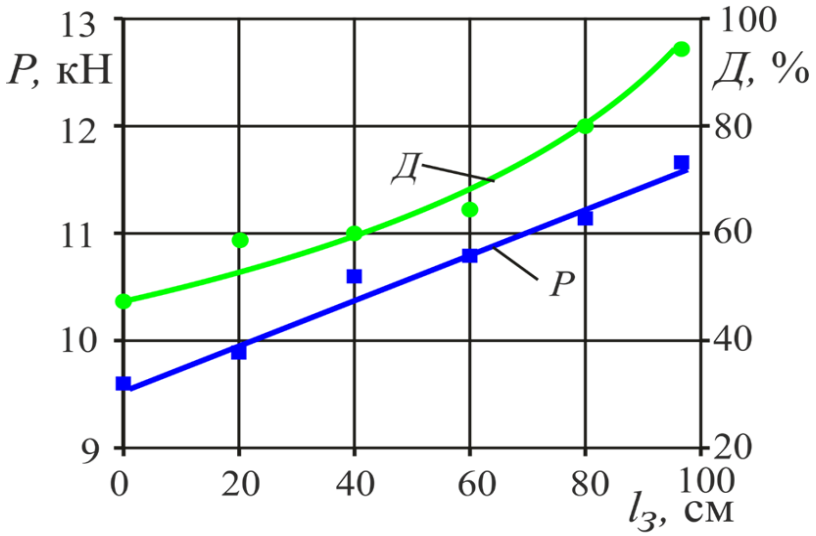

Figure 1. The variation of the drag resistance of the casings R and the mass of plant residues depending on the length of the plate that directs the burial completeness D

When the length of the guide plate is l_3=80 cm, a groove with a width of 60.2 cm and a depth of 28.8 cm is formed, which meets the requirements of the proposed technology.

Table 2. Effect of guide plate length on device performance

The name and dimensions of indicators	The length of the guide plate, m					
	0	**0,20**	**0,40**	**0,60**	**0,80**	**0,93**
Aggregate speed, m/s	1,72	1,72	1,72	1,72	1,72	1,72
Processing depth, cm: Mr ±s, cm	 24,9 1,8	 24,7 1,7	 24.6 1,5	 24,3 1,4	 24,2 1,4	 24,2 1,3
Coverage: Mr ±s, cm	 101,5 4,8	 104,5 4,4	 104,3 3,8	 105,4 3,5	 105,7 3,3	 105,9 3,3
Width of the ditch, cm	103,2	96,2	91,6	78,2	60,2	21,6
Ditch depth, cm	31,8	30,3	29,8	29,1	28,8	9.8
Burial completeness of plant remains, %	49,8	59,3	66,0	79,5	90,3	92,3
Average burial depth of plant remains, cm	3,3	3,9	7,2	10,4	11,3	13,2
Soil fertility, %	37,1	48,6	64,8	71,5	73,2	77,9
Tensile strength, kN	9,6	9,9	10,6	10,8	11,1	11,6

Weed burial follows a convex curve when the coverage width of the device is 105 cm, the coverage width of the housings is 52.5 cm, and the length of the guide plate is 80 cm (Figure 2).

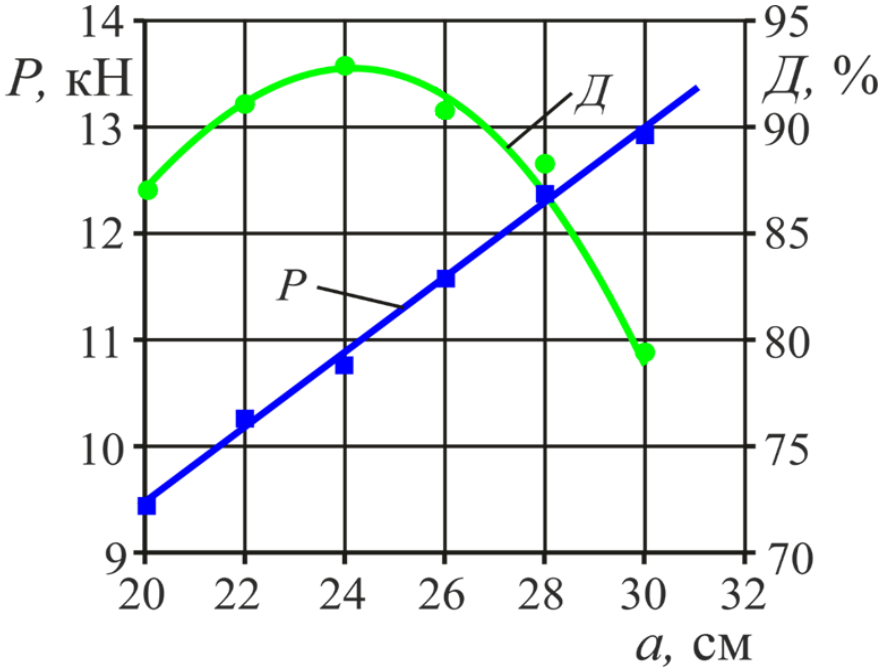

Figure 2. Variation of the tensile strength of the casings R and the completeness of burial D of the mass of plant residues depending on the depth of their processing

In the range of 22-26 cm of processing depth, the burial completeness of the mass of plant residues was up to 91-93%, that is, at the level of requirements. It can be seen from the graph (Fig. 2) that with the increase of processing depth α, the tensile strength of the casings R increases. With the increase of processing depth a from 22 to 30 cm, the tensile strength increases by 15.3%. Thus, it was determined that the completeness of burial of the mass of plant residues in the range of 22-26 cm of the rational processing depth of the casings is within the agrotechnical requirements.

Conclusion. The laws of change of the resistance of the guide plate body depending on its structural parameters, the working procedure and the properties of the soil were determined.

With low energy consumption, tilting of the blades relative to each other and formation of the initial irrigation ditch is ensured when the coverage width of the casings is 52.5 cm and the length of the guide plate is 80 cm.

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