

**JUSTIFICATION OF THE IMPROVED FLAT PLOWING PLUG CONSTRUCTION
SCHEME USED IN SOIL TREATMENT AND THE RESULTS OF FIELD TESTS****Ravshanov N.Q.**

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Abstract. This article addresses the development of the improved plug construction scheme designed for leveling soil in field rows and for cereal crops. The scientific and technical solutions to these issues, as well as the initial field test trials and the analysis of the obtained results, are discussed.

Keywords: soil, soil, furrow, ridge, flat tillage, agronomic requirements, tilling tool, double-body, disc, knife.

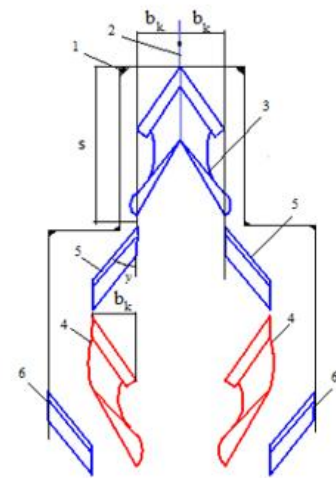
Introduction: Currently, scientific research is being conducted worldwide to develop resource-saving technologies for soil treatment, new scientific and technical solutions for the technical tools designed to implement these technologies. In this direction, one of the key tasks is to develop an improved plug that operates in semi-open and semi-closed conditions without forming furrows and ridges, and to substantiate the technological work process of its working part. Additionally, conducting targeted scientific research to ensure energy and resource efficiency during the interaction process with the soil is a significant task. [1]

Data and Analysis: The creation and application of leveling plows, as well as the justification of the parameters of their working parts, have been studied by L.C. Kaufman, V.A. Sakun, Y.P. Lobachevsky, S.A. Zolotarev, R.H. Mardonov, V.G. Kiryuxin, S.G. Lipitsky, and others. In our republic, scientific research has been conducted by F.M. Mamatov, R.I. Baymetov, A.T. To'xtaqo'ziyev, I.T. Ergashev, Sh.B. Kurbonov, S.M. Badalov, D.N. Choriyeva, N.Sh. Rashidov, and others. [4,3,5]

Based on the results of these studies, machines and tools developed have been applied in agricultural production, achieving certain positive results. However, the issues of substantiating the parameters of an energy-efficient plow operating in closed and semi-open cutting conditions for leveling furrows without forming ridges and ensuring high work quality and performance have not been sufficiently studied in the referenced works [2,3,6].

Based on these studies, the proposed improved plow design for leveling soil in garden row spaces and for cereal crops is shown in Figure 1, and the technology for leveling soil is illustrated in Figure 2. The plow is designed to operate in semi-open and semi-closed cutting conditions. The total working width of the plow is 180 cm, and the disk-shaped knives cut the soil into three sections at a depth of 12 cm and divide it into 90 cm segments. The double-body structure (Figure 1) lifts the soil from the second and third furrows (Figure 2) onto the first and fourth layers. The first set of shanks (Figure 1) pushes the second and third soil ridges by 45 cm from the internal edge points of the first and fourth layers. The left and right bodies (4) turn the soil from the first and fourth ridges into an

open furrow, while the second set of shanks (6) moves and arranges the second and third soil ridges into the first and fourth ridge locations. As a result, in one pass, a 180 cm area is leveled without forming furrows or ridges.



1-Rama; 2 - Disk-shaped knife; 3 - Double-body; 4 - Left and right bodies; 5 -First row of shanks; 6 - Second row of shanks.

Figure 1. Scheme of the flat plowing plug construction

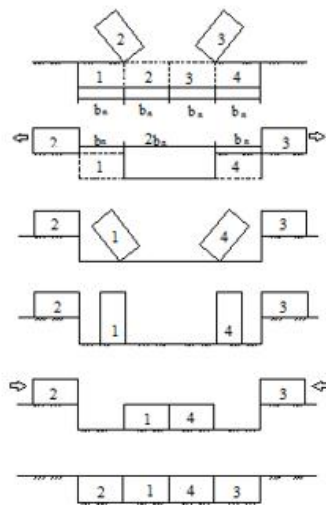


Figure 2. Technology of the flat plowing plug

To verify the results of the theoretical studies and to determine the parameters that ensure the working quality of the plow for leveling soil without forming furrows under closed and semi-open cutting conditions, initial field trials were conducted. [3].



Figure 3.

Photos from the Process of Obtaining Field Trial Results

In order to improve the quality indicators of the plow, various types of disk-shaped knives were used, and spherical disk-shaped knives were selected. To study the effect of spherical disk-shaped knives on the plow's quality indicators, the installation angles relative to the direction of movement (α) and to the vertical plane (β) were investigated. Based on the requirement for longer soil throwing, the angles $\alpha = 20-35^\circ$ and $\beta = 0-15^\circ$ were adjusted, and results were obtained. Considering the condition of preventing soil clogging, the distance from the tip of the double-body dawn to the center of the spherical disk-shaped knife (L) was varied from 30 to 60 cm with 10 cm intervals. In closed conditions, to fully separate the soil ridge and transfer it onto the layer, screw-shaped, semi- screw-shaped, and cultural types of tillers were used for the double-body plow. The first and second row of soil shanks were adjusted at angles between $35-50^\circ$ relative to the direction of movement with 5° intervals. Considering the condition for overturning the soil ridge by 180° , left and right bodies with screw-shaped tillers were selected. [1].

Conclusion: The results of the conducted research and field trials showed that the distance from the tip of the double-body dawn to the center of the spherical disk-shaped knife ($L = 50$ cm), the installation angles of the spherical disk-shaped knife ($\alpha = 30^\circ$, $\beta = 5^\circ$), and the angle of the first and second row of soil shanks relative to the direction of movement (45°) confirmed that the quality indicators of the plow met the agrotechnical requirements.

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