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Based On Longitudinal Distance Of Sloped Column Working Bodies Working Between Garden Rows

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Annotation: In the article, when working with a plow-softener that works flat without a tiller, the longitudinal and transverse positions of the working bodies in relation to the frame depend on the resistance to the traction created during the working of the working bodies. the results obtained from experimental studies are presented.

Keyword: plug-softeners, soil, results, experimental, deformation, working, soil between, tillage, soil-protecting

Introduction

In the world, the use of energy-resource-efficient and high-performance technical tools for the main processing of the garden occupies one of the leading positions."The area of fruit crops around the world is 53.4 million. hectare, of which 20 mln. taking into account the fact that 1 hectare is fruit orchards", it requires the introduction of high-quality and efficient soil-protecting work and energy-resource-efficient machines and tools in the main tillage. In this regard, it is important to master the production and use of plug-softeners for the main processing of garden beds without a tipper.

In order to increase the productivity of any crop, it is necessary to cultivate the soil before planting it and make it comfortable. In tillage, the main focus should be on protecting the soil and restoring its fertility. For this purpose, traditional and resource-saving methods of tillage are used. Therefore, these two factors must be taken into account when choosing a tillage system, including technology and technical means.

LITERATURE ANALYSIS AND METHODS

A number of schemes for the arrangement of working bodies with three to six oblique columns in the frame are frontal, two-row, plug-like, one-sided parallel section, parallel section consisting of right and left working bodies. Experimental studies were conducted by L. Orsik to determine the effectiveness of the location of working bodies with inclined columns according to the above schemes. According to the results of his experimental studies, the plow-like and parallel-section schemes have advantages in terms of the plane of the field surface. It was observed that the weapon located according to the frontal scheme accumulates soil in front of the working bodies. Such a situation was also observed in the research conducted by Kh. Fayzullayev. According to energy indicators, the greatest traction resistance was observed in frontal and two-row schemes.

According to the results of the research conducted by L. Orsik, working bodies with an

inclined column in closed cutting conditions have 1.6 times greater tensile strength compared to working bodies working in semi-closed cutting conditions, and 2 times more than working bodies working in closed cutting conditions.

DISCUSSION

To reduce the drag resistance of the plug softener, A.Yu. Nesmiyan proposed to install left and right working bodies in pairs with their working surfaces facing each other (Fig.1). In this case, working bodies are arranged in pairs not only in the transverse direction, but also in the longitudinal direction. When the working bodies are placed according to this scheme, the working bodies of the front first pair work in closed cutting conditions, which leads to an increase in traction resistance. In addition, there may be accumulation of soil between them and, accordingly, clogging of the working organs with plant residues and soil flakes.

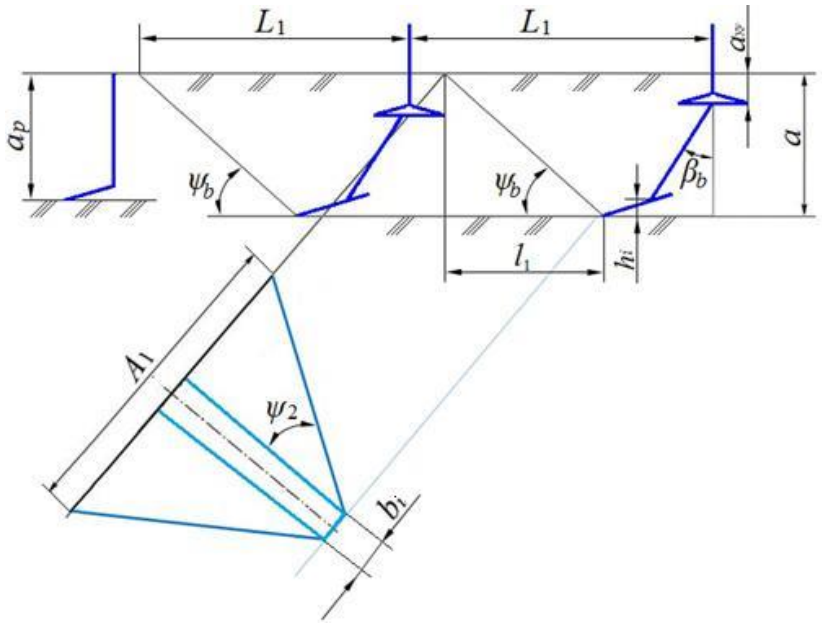

Figure 1. The scheme for determining the deformation zone of the soil under the influence of the tilting column working body

Based on the above, in order to reduce traction resistance and improve the quality of work, in the design of the plug softener we proposed, a needle-shaped softener was installed in front of a pair of working bodies bent forward against each other along their axis of symmetry.

When placing working bodies with inclined columns in the longitudinal direction, we determine the condition of eliminating their clogging with plant residues and soil slag. In this case, the sliding plane of the blade deformed by the punch of the next working body should not reach the structural elements of the previous working body according to Fig. 1

$$L_p = L_1 \geq l_1 + l_i \cos\alpha_i + H_{uk} tg\beta_b, \quad (1)$$

where l_1 is the deformation of the soil under the influence of the tilt column working body the length of the zone, cm;

l_i – length of needle, cm;

h_i – pin height, cm;

H_{uk} – height of the inclined part of the column of the working body with an inclined column, cm

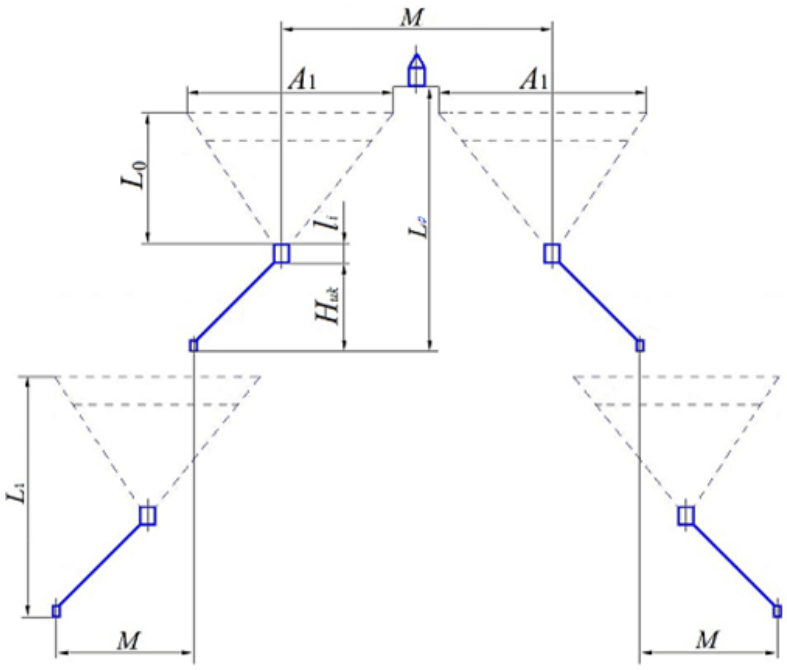

Figure 2. The scheme for determining the longitudinal distance between working bodies with an inclined column

The length of the deformation zone can be determined by the following expression

$$l_1 = a_{\max} ctg\, \psi_b, \qquad (2)$$

in this ψ_b – angle of refraction of the soil in the longitudinal direction, º.

RESULTS

The angle of refraction in the direction along the soil is psb V.P. It is determined by the following expression proposed ψ_b Goryachkin

$$\psi_b = \frac{\pi - \varphi_1 - \varphi_2 - a_i}{2}, \qquad (3)$$

in this φ_1, φ_2 – internal and external soil friction angles, º.

l_1 and ψ_b we put the values of (1) and (2) into (4).

$$L_p = L_1 \geq a_{\max} ctg\left(\frac{\pi - \varphi - \varphi_1 - \alpha_i}{2}\right) + l_i \cos\alpha_i + H_{yк} tg\beta_b. \qquad (4)$$

Based on the expression (4), it was reasoned that the longitudinal distance between the plug-softening working bodies depends on the physical and mechanical properties of the soil, the working depth and the parameters of the working body with a slanting column.

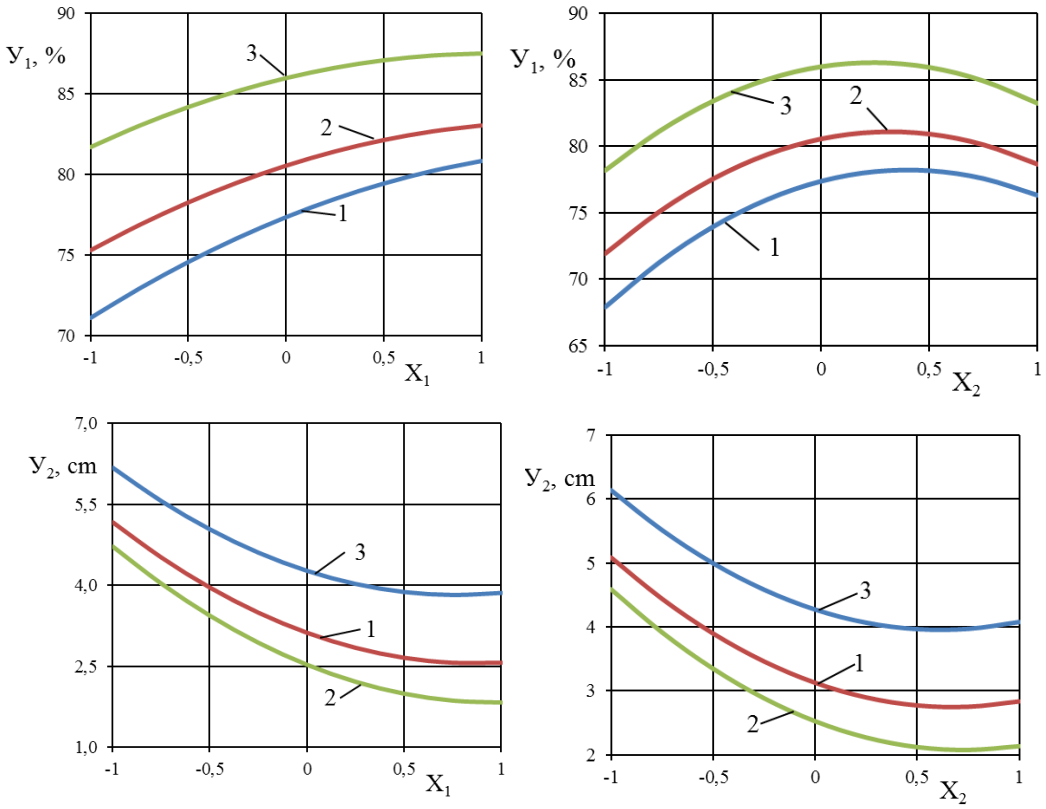

Figure 3. Optimizing the parameters of the bottom softener covered with a cob according to multifactorial experimental studies

CONCLUSION. The optimal value of the longitudinal distance between the working bodies of the plow-softener, which works on the soil of garden rows without a tiller, ensures that the degree of soil compaction is softened to the level of agrotechnical requirements while using less energy when working on the soil between garden rows.

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