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JUSTIFICATION OF THE PARAMETERS OF THE LEVELING-SEALING WORKING BODY OF THE COMBINED MACHINE ACCORDING TO THE "PUSH-PUSH" SYSTEM

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ABSTRACT

The article presents the results of theoretical studies on the substantiation of the parameters of the leveling-compacting working body of the combined machine according to the "push-push" system for pre-sowing soil cultivation.

KEYWORDS: *Combined Machine According To The "Push-Push" System, Leveling-Sealing Working Body, Leveling Part, Sealing Part, Angle Of Installation Of The Sealing Part, Bending Angle Of The Leveling Part, Height Of The Working Body.*

INTRODUCTION

It is known [1-4] that one of the important ways to reduce energy consumption and increase labor productivity during soil cultivation is the use of tillage machines according to the "push-pull" system, because at the same time, due to an increase in vertical loads, slipping of the tractor propellers is reduced and their traction and coupling qualities.

We have developed a combined machine according to the "push-pull" system for soil cultivation before sowing seeds of agricultural crops and carried out studies to substantiate the rational values of the parameters of its working bodies.

The combined machine consists of a chisel cultivator mounted on the front of the tractor and an equalizer mounted on the rear of the tractor (Fig. 1). In one pass, it provides loosening of the soil to a depth of 12-20 cm, leveling the surface of the field, compaction and crushing of the topsoil.

1-2-loosening and sterile paws; 3-support wheel;

4-leveling and compaction working body; 5-slat roller

Fig. 1. Scheme of the combined machine according to the "push-push" system

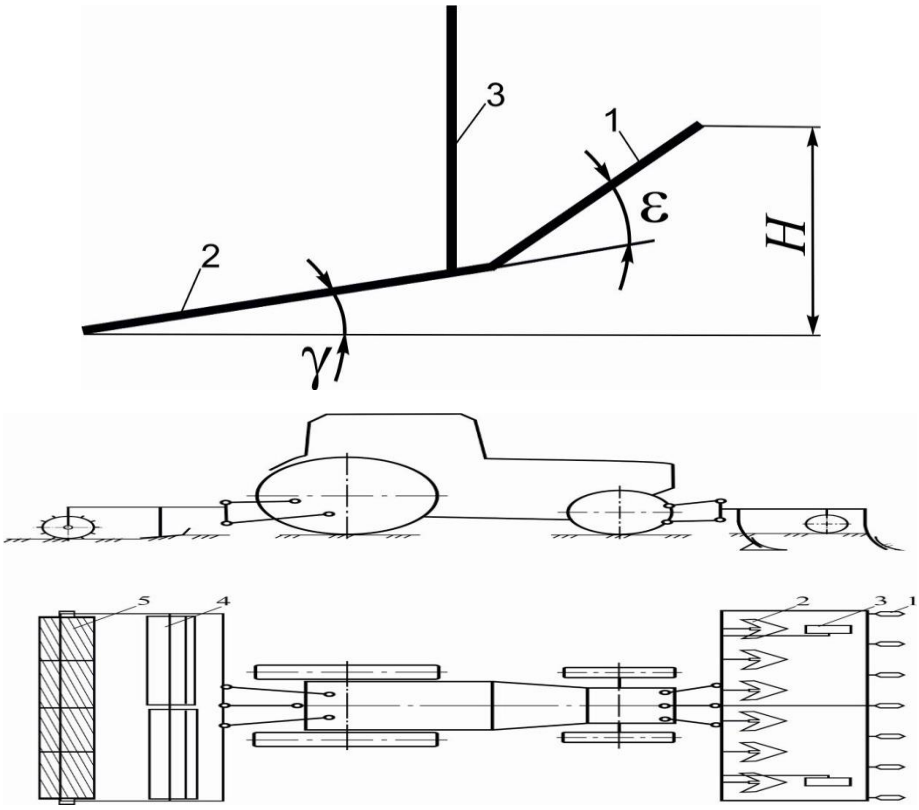

Fig. 2. Scheme and parameters of the compaction-leveling worker body combined machine

The angle of installation to the horizon of the sealing part of the working body was determined from the condition that, other things being equal, the time of its interaction with soil particles was minimal, since At the same time, firstly, the adhesion of the soil to its working surface is excluded and, secondly, the reliable performance of the technological process is ensured with minimal energy consumption.

Using the scheme in Fig. 3, a, we determine the interaction time of the compacting part of the working body with soil particles

$$t = \frac{h_0}{V_e \sin\gamma} = \frac{h_0}{V_M(\cos\gamma - \sin\gamma\, tg\varphi)\sin\gamma}, \qquad (1)$$

where is the depth of immersion in the soil of the sealing part of the working body; V_M –Speed of sliding of soil particles on the working surface of the sealing part of the working body; V_e - forward speed of the machine; φ –The angle of external friction of the soil.

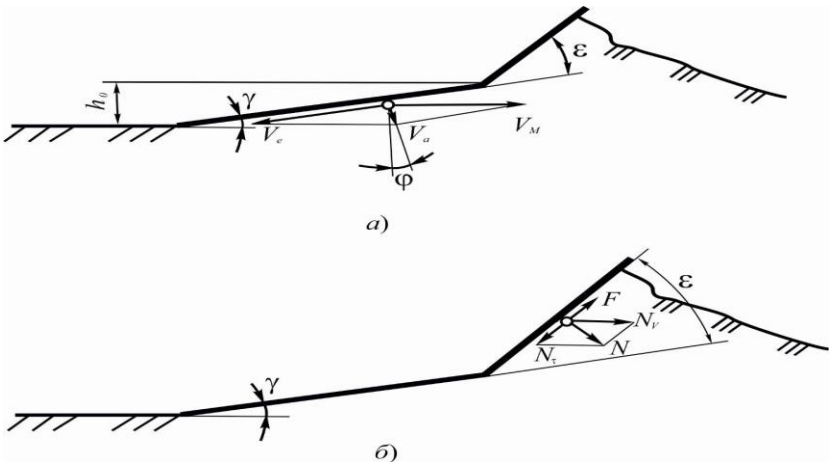

Fig. 3. Scheme for determining the angle of installation of the sealing part (a) and the angle of bend of the leveling part (b) of the leveling-compaction working body of the combined machine

We investigate expression (1) with respect to the extremum [5] and obtain

$$\gamma = \frac{\pi}{4} - \frac{\varphi}{2}. \qquad (2)$$

During the operation of the machine from the side of the leveling part of the working body, the normal force and the friction force act on the soil particle $F = Ntg\varphi$.

We decompose the normal force acting on a soil particle into components and, acting respectively in the direction of movement of the working body (machine) and along the working surface of its leveling part $N_V = N / \sin(\gamma + \varepsilon)$ (3)

and

$$N_\tau = Nctg(\gamma + \varepsilon). \quad (4)$$

Obviously, to ensure high-quality leveling of the soil surface, the following condition must be met

$$N_\tau < F, \quad (5)$$

Otherwise, soil particles are pressed into its depth without sufficient longitudinal movement and, as a result, the required leveling quality of the soil surface is not ensured.

Taking into account (2) and (4), as well as the above value of F, we have

$$\varepsilon > 90° - (\gamma + \varphi). \quad (6)$$

The height of the working body was determined from the condition of excluding soil spilling through its upper edge. In this case, the following expression was obtained

$$H \geq \sqrt{\frac{4Z_н l_н}{\pi[ctg\mu - ctg(\beta - \varepsilon)]}}, \quad (7)$$

where, - the average height and length of the longitudinal irregularities of the field surface; - the slope angle of the soil of the drag prism formed in front of the leveling part of the working body.

Calculations carried out according to expressions (2), (6) and (7) at,, m and m [6], showed that the angle of installation to the horizon of the lower sealing part of the working body should be, the bending angle of its leveling part relative to the sealing part should not less and the leveler height is at least 16 cm.

REFERENCES:

1. Yurin A.N., Kitun A.V. Substantiation of the design and layout scheme of tillage and sowing units // Materials of the International Scientific and Practical Conference of Young Scientists "Energy-saving technologies and technical means for their provision in agricultural production". - Minsk, 2010 .-- S. 31-36.

2. Kyurchev V., Mitkov V., Chorna T., Mitkov V. Prospects for the use of combined machine-tractor aggregates // Mechanization in the field of agriculture. - Sofia, 2013. - No. 3. - S. 21-24.

3. Tukhtakuziev A., Mansurov M.T. Investigation of the stability of a tractor with front and rear mounted implements against side skid // Tractors and agricultural machines. - Moscow, 2015. - No. 9. - P. 34-35.