ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 8, Issue 1 , January 2021

Establishing the Earth Entrange Corner of Combined Machine Software and Skin Fingers

A.Tukhtako'ziev, I.Abdimominov

Doctor of technical sciences, professor, Research Institute of Agricultural Mechanization (RIAM), Yangiyul, Uzbekistan

Senior lecturer, Andijan Institute of Agriculture and Agrotechnology, Andijan, Uzbekistan

ABSTRACT. The article describes the development of a combined machine consisting of softeners and ridges, leveling-compactor and plank rollers for use in preparing the soil for planting, and according to the results of theoretical research, the angle of entry of softeners and ridges to the soil at low energy consumption 25-32^o should be.

KEYWORDS: preparation of soil for planting, combined machine, softener and curved claws, their angle of entry into the soil, soil deformation and decomposition processes, energy consumption, soil compaction quality.

I. INTRODUCTION

At present, the preparation of lands for sowing in the Republic consists of agro-technical measures of chiseling, mulching and harrowing, carried out with separate units. Therefore, preparing land for planting requires a lot of labor, fuel and costs. Based on this, we have developed a combined machine that can be used to prepare the land for planting. It consists of a frame (Fig. 1), a suspension mounted on it, support wheels and working bodies, depending on the process in which they are performed. consists of a series of softeners and axial claws, a leveling-compactor, and a lattice hoop.

II. SIGNIFICANCE OF THE SYSTEM

The article describes the development of a combined machine consisting of softeners and ridges. The study of literature survey is presented in section III, methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and conclusion.

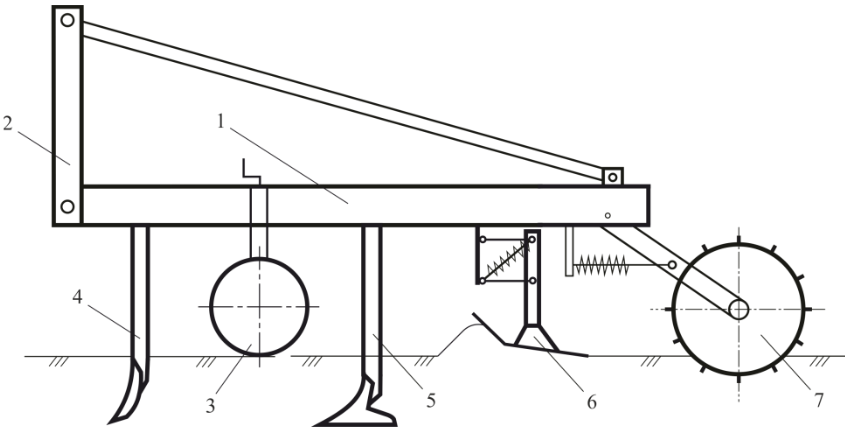
III. METHODOLOGY

In the process of work, softeners and ridges loosen the soil to a depth of 14-18 cm, leveling-compactor and plank roller flattens, compacts the surface of the layer treated by them and forms a soft soil layer on the field surface, ie sowing seeds or other crops in the field prepares for. This leads to reduced labor, energy and fuel consumption and does not over-compact the soil.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 8, Issue 1 , January 2021



1-frame; 2 hanging device; 3 base wheels; 4 and 5 softener and axle claws; 6 leveler-compactor; 7-plank roller coaster Figure 1. Schematic of a combined machine

This paper presents the results of research on the theoretical substantiation of the angles of entry of the combined machine softener and axial claws into the ground. To solve the problem, we consider the processes of deformation and disintegration of the soil under the influence of two-sided flat piles. This is because the effect of the softener and axial claws on the soil is similar to that of two- and three-sided flat claws [1-4]. The processes of deformation and disintegration of the soil under the influence of a two-sided flat pile are as follows [1-5]: when the pile passes from position I to position II (Fig. 2) with respect to the direction of motion (in this case - the angle of refraction of the soil in the longitudinal direction, degrees) is broken along the plane AVV1A1 at an angle, and from it separates a piece in the form of a prism AVV1A1DSS1D1.

IV. EXPERIMENTAL RESULTS

The processes noted in the subsequent migration are repeated in a series of steps S, i.e. the soil is first compacted and then prismatic lumps are separated from it [4, 5]. Our research [5] shows that the decomposition step of the soil can be determined by the following expression [4]:

$$S=\sqrt{2}\left\{k_c\left[b+htg\left(\frac{\pi}{4}-\frac{\varphi_2}{2}\right)\right]h\cos\varphi_2\cos\frac{1}{2}(\varphi_1+\varphi_2-\alpha)\right\}^{\frac{1}{2}}:$$

$$:\left\{q_0 bcco^3\frac{1}{2}(\alpha+\varphi_1+\varphi_2)\sin\alpha\right\}^{\frac{1}{2}}, \qquad (1)$$

where the specific shear resistance of the soil, Pa; b is the width of the, m; h - processing depth, m; ph1, ph2 - external and internal friction angles of the soil, respectively degree; α – angle of penetration of the pan into the soil, degrees; q0 is the coefficient of volumetric compaction of the soil, N/m3.

It is self-evident that the smaller the disintegration step of the soil, the higher its crushing quality, and the lower the gravitational resistance of the working body. Based on this consideration, the expression for the penetration angle α of the pona from the expression (1) is given by tuproq Figure 2. Deformation and disintegration processes of soil under the influence of two-sided piles we determine the value that ensures that the decomposition step is minimal. To do this, we get the product at an angle a and make it equal to zero:

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 8, Issue 1 , January 2021

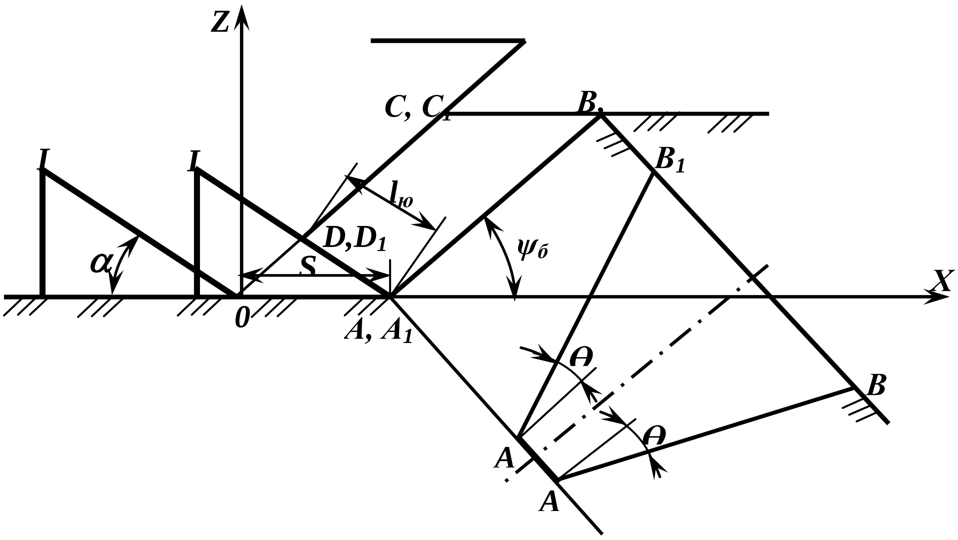


Figure 2. Deformation and disintegration processes of soil under the influence of two-sided piles

$$\sin\frac{1}{2}(\varphi_1+\varphi_2-\alpha)\cos^3\frac{1}{2}(\alpha+\varphi_1+\varphi_2)\sin\alpha+\left[\frac{3}{2}\cos^2\frac{1}{2}(\alpha+\varphi_1+\varphi_2)\sin\frac{1}{2}\times\right.$$

$$\left.\times(\alpha+\varphi_1+\varphi_2)\sin\alpha-\cos^3\frac{1}{2}(\alpha+\varphi_1+\varphi_2)cos\alpha\right]\cos\frac{1}{2}(\varphi_1+\varphi_2-\alpha)=0. \quad (2)$$

After some simplification, expression (2) will look like this:

$$2\sin^2\alpha+2\sin(\varphi_1+\varphi_2)\sin\alpha-1=\cos(\varphi_1+\varphi_2)\cos\alpha. \quad (3)$$

To solve this equation with respect to a, we extend the cosα in expression (3) to the Taylor series and take cosα = 1-1 / 2sin2α [6]. With this in mind, expression (3) has the following appearance

$$2\sin^2\alpha+2\sin(\varphi_1+\varphi_2)\sin\alpha-1=\cos(\varphi_1+\varphi_2)(1-\frac{1}{2}\sin^2\alpha) \quad (4)$$

Or this

$$\left[2+\frac{\cos(\varphi_1+\varphi_2)}{2}\right]\sin^2\alpha+2\sin(\varphi_1+\varphi_2)\sin\alpha-\left[1+\cos(\varphi_1+\varphi_2)\right]=0 \quad (5)$$

arises. Solving this equation with respect to a, we obtain the following final expression

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 8, Issue 1 , January 2021

$$\alpha = \arcsin\left\{\left\{-\sin(\varphi_1+\varphi_2)+\sqrt{\sin^2(\varphi_1+\varphi_2)+\left[2+\frac{1}{2}\cos(\varphi_1+\varphi_2)\right]\left[1+\cos(\varphi_1+\varphi_2)\right]}\right\}:\right.$$

$$\left.:\left[2+\frac{1}{2}\cos(\varphi_1+\varphi_2)\right]\right\}. \qquad (6)$$

It can be seen from this expression that the angles of entry of the combined machine softener and curved claws into the soil depend mainly on the internal and external friction angles of the treated soil. Assuming ph1 = 25-35º and ph2 = 35-45º, the calculations performed on expression (6) showed that the penetration angles of the softener and axial claws into the ground should be in the range of 25-32º.

V. CONCLUSION AND FUTURE WORK

Conclusion: Studies have shown that the angles of entry of the combined machine softener and axle claws into the soil should be in the range of 25-32° to ensure quality crushing of the soil with low energy consumption.

REFERENCES

[1]. Sineokov G.N., Panov I.M. Theory i raschet pochvoobrabatыvayushchix machine. - Moscow: Mashinostroenie, 1977. - 328 p.
[2]. Klenin N.I., Sakun V.A. Selskoxozyaystvennыe and meliorativnye mashiny. - Moscow: Kolos, 2005. - 671 p.
[3]. Mamatov F.M. Agricultural machinery. - Tashkent: Fan, 2007. - 338 p.
[4]. Karpenko A.N., Khalanskiy V.M. Selskoxozyaystvennыe mashiny. - Moscow: Agropromizdat, 1989. - 528 p.
[5]. Tokhtako'ziev A. Imamqulov Q.B. Scientific and technical bases of deformation and disintegration of soil with low energy consumption. - Tashkent: KOMRON PRESS, 2013. - 120 p.
[6]. Vygodskiy M.Ya. Reference book on higher mathematics. - Moscow: AST: Astrel, 2006. - 991 p.