



ISSN: 2350-0328

**International Journal of Advanced Research in Science,  
Engineering and Technology**

**Vol. 7, Issue 11 , November 2020**

# **Results of Studies on Justification of Parameters of the Plane Roller of the Combined Unit**

**S.K. Kuchkorov, S.Sh. Eksanova**

Namangan engineering-construction institute, PhD  
Namangan engineering-construction institute, master

**ABSTRACT:** The article presents the results of theoretical studies to substantiate the parameters of the slatted roller of the combined unit for pre-sowing soil cultivation.

**KEYWORD:** implement, slatted roller, soil, ripper, leveler, machine, support wheel, bar, hitch, energy.

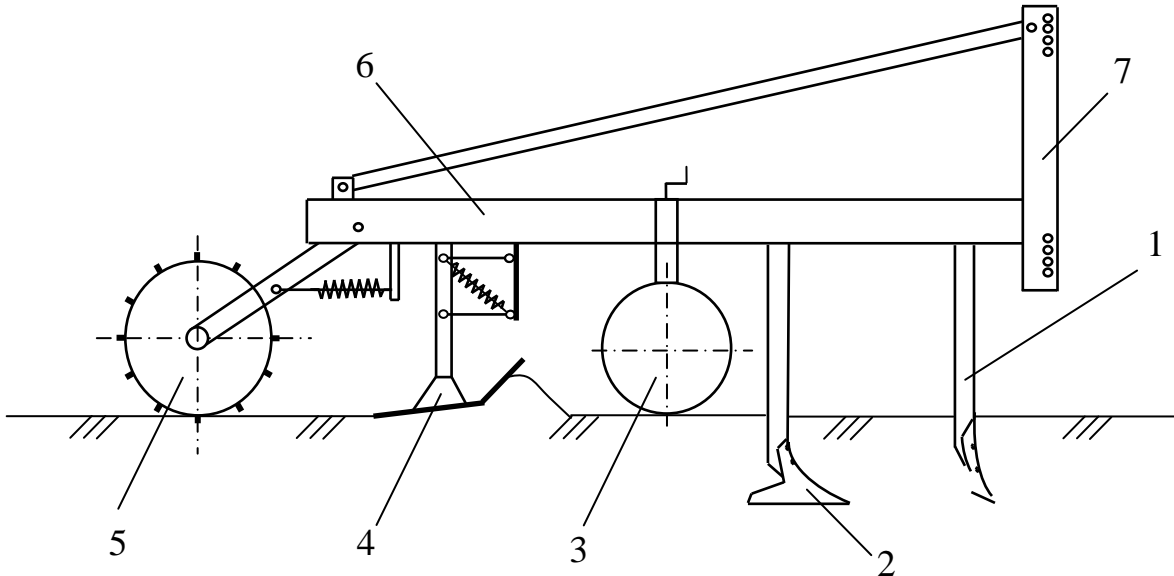
## **I. INTRODUCTION**

At present, for early spring soil preparation for sowing crops, chisel cultivators such as ChK-3.0 and ChKU-4A, tooth harrows BZSS-1.0, BZTS-1.0 and BZTKh-1.0, and small leveling machines of the type are used. MB -6.0, MB-6.5 and VP-8. When preparing the soil for sowing, these machines perform operations separately, which leads to the deterioration of the physical and mechanical properties of the soil by the MTA propellers, and the rapid evaporation of moisture in the soil, in addition, these machines do not meet modern resource-saving requirements. All of the above disadvantages lead to an increase in energy and labor costs.

Analyzing the literature data [1, 2], we can say that all of the above disadvantages can be eliminated by creating a combined presowing tillage unit.

## **II. RELATED WORK**

The combined pre-sowing tillage unit (Fig. 1) consists of a frame 6, attached to the frame of loosening working bodies 1-2 for loosening the soil surface (up to 15-20 cm), leveling-compacting working body such as an equalizer 4 and a compactor roller 5 to create a tortured layer and compaction, in addition to these working bodies, it is equipped with support wheels 3 to adjust the depth of soil cultivation and a hitch 7.



1- ripper; 2- arrow paw; 3- support wheel; 4- leveler-sealant; 5- slatted roller; 6- frame; 7-hitch

**Fig. 1. Combined unit diagram**

For partial, within the required level, leveling and compaction of the soil surface before sowing crops, a slatted roller is included in the combined unit and its main parameters have been studied.

### III. LITERATURE SURVEY

This article presents the results of theoretical studies to determine the number of bars and the diameter of a slatted roller.

Usually the diameter of the roller is determined from the condition that the lumps encountered in front of it can pass. From literary sources [3, 4] it is known that to fulfill the stated condition, the angle of compression of the lumps  $\tau$  (Fig. 2) must be less than the sum of the external and internal angles of friction, i.e.

$$\tau < \varphi_1 + \varphi_2, \tag{1}$$

where  $\varphi_1$  and  $\varphi_2$  are the angles of friction of lumps on the working surface of the roller and on the soil, respectively.

### IV. METHODOLOGY

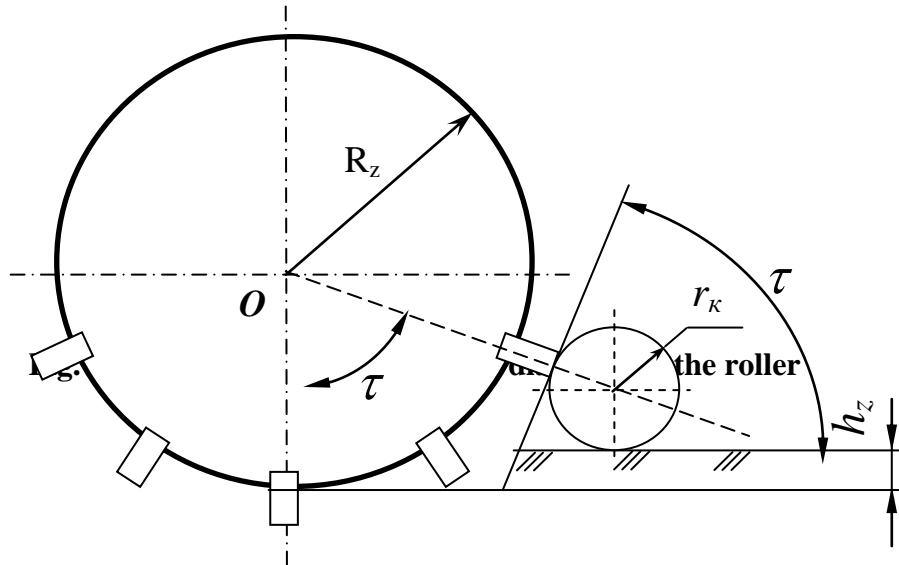
If we consider the shape of the round lumps encountered with the roller, then in accordance with the diagram shown in Figure 2, we will have:

$$R_z - R_z \cos\tau = r_k (1 + \cos\tau) + h_z, \tag{2}$$

where  $R_z$  is the radius of the roller;

$r_k$  - is the radius of the lumps;

$h_z$  - depth of immersion of the roller in the soil



Taking into account expression (1), we solve expression (2) with respect to R

$$R_z > \frac{r_k [1 + \cos(\varphi_1 + \varphi_2)] + h_z}{1 - \cos(\varphi_1 + \varphi_1)} \quad (3)$$

or

$$D_z > \frac{d_k [1 + \cos(\varphi_1 + \varphi_2)] + 2h_z}{1 - \cos(\varphi_1 + \varphi_1)} \quad (4)$$

where  $D_z$  is the diameter of the roller;  
 $d_k$  - lump diameter

Taking  $d_k = 10$  cm,  $h_z = 5$  cm,  $\varphi_1 = 300$  and  $\varphi_2 = 400$  [5, 6], we determine that according to expressions (3) and (4), the radius of the roller is at least 18 cm, the diameter is 36 cm.

## V. EXPERIMENTAL RESULTS

The number of roller strips is determined from the condition that during operation at least one strip is in contact with the soil (Fig. 3), and can be determined by the following expression

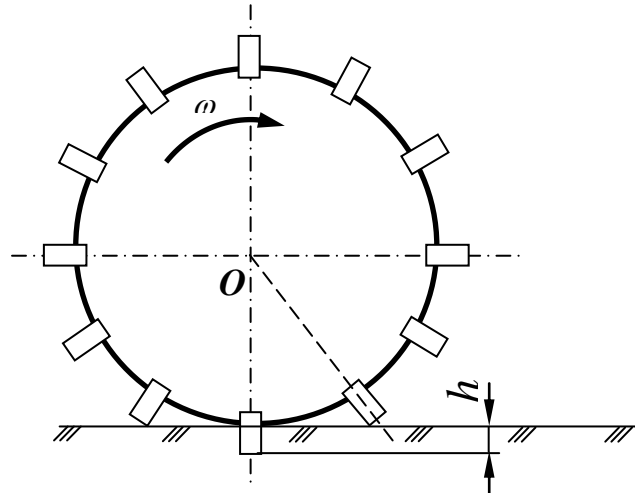


Fig. 3. Scheme for determining the number of roller strips

$$n \geq \frac{2\pi}{\arccos \frac{R_z - h_z}{R_z}} \quad (5)$$

## VI. CONCLUSION AND FUTURE WORK

As you can see, from the analysis of expression (5), the number of roller strips depends mainly on the diameter of the coil and the depth of its immersion in the soil. Substituting them into the previously determined values of expression (5), we find that the number of strips should be at least 8 pieces.

Drawing a conclusion, we can say that before sowing, for high-quality soil preparation, the diameter of the roller should be at least 36 cm, and the number of strips should be at least 8 pcs.

## REFERENCES

- [1]. Klenin N.I., Sakun V.A. Agricultural and reclamation machines. Moscow: Kolos, 1980 .- 617 p.
- [2]. Karpenko A.N., Khalansky V.M. Agreecultural machines. Agreecultural equipment. - Moscow: Agropromizdat, 1989 .- 52 p.
- [3]. Rudakov G.M. Technological fundamentals of cotton sowing mechanization. Tashkent .: Fan. 1974 .- 245 p.
- [4]. Research in Science, Engineering and Technology. - India. - No. 6, Issue 4, 2019. - pp. 8768-8770. (05.00.00; No. 8).
- [5]. Nasyrov I.Z. Selection of the type and justification of the parameters of the roller harrow for operation in a unit with a chisel cultivator in the cotton growing zone. Diss ... cand. tech. sciences. - Yangiyul. 1993.-152 p.
- [6]. Inoyatov I.A. Substantiation of the parameters of the grinding-compacting working body of the rotary non-power ripper. Author's abstract. diss ... cand. tech. sciences. - Yangiyul-1997. -18 s.