
Results of studies on studying the influence of the number of speed of a rotary ripper on its working indicators.

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Abstract— The article presents the results of studies on the influence of the number of revolutions of a rotary cultivator on its performance. It has been established that in order to provide at least 80% of soil fractions with a diameter of 25 mm, according to agrotechnical requirements, the number of revolutions of a rotary cultivator must be at least 300 r/min.

Keywords: Forestry, plantation, rotary cultivator, number of revolutions, research results, energy indicators, experimental plant, traction resistance, unit speed..

INTRODUCTION

Extensive work is currently underway to establish forestry plantations, expand and develop their areas [1].

It is important to use combined aggregates, which prepare the forestry nursery lands in one pass of the unit and prepare it for planting. This is because the soil is less compacted, which creates the basis for the good development of the root system of future crops. In addition, the need for machines and direct operating costs will be reduced, productivity will increase.

No special aggregates have been developed to prepare forestry plantation lands for planting. Therefore, it is necessary to use existing aggregates or their adapted variants in the preparation of lands.

The analysis and research is aimed at the development of technological processes in the preparation of forest plantations for planting, the development of a combined unit, which performs in one pass of the unit.

Combined aggregate frame, spring opener for opening irrigation canals, rotary softener for soil compaction, protection device to prevent scattering of crushed soil, reducer that changes the direction of movement of the rotary softener and its transmission device, as well as the support wheels and the installers for hanging the unit on the tractor, the loosened soil is pulverized at the required level in one pass of the unit and the stalks are harvested and prepared for planting.

Here are the results of a study conducted to determine the performance of the rotary softener of the combined unit.

Experiments to determine the effect of the number of rotary softener cycles on its agro-technical and energy performance were conducted on the experimental farm KXMITI (Research Institute of Agricultural Mechanization) using the device shown in Pic. 1.



1-rama; 2 rotary softeners; 3- protective barrier to prevent the scattering of crushed soil; 4 rotary softener motion transmission device; 5.6-motion transmitter; 7 base wheels; 8 -device of the device on the tractor.

Pic 1. An experimental device for conducting tests to determine the number of revolutions of a rotary softener

In this case, the experimental areas were plowed to a depth of 28-30 cm and chiseled to a depth of 14-16 cm. The experimental field soils are gray soils of medium-heavy loam mechanical composition, with groundwater at a depth of 10-12 m. Prior to the experiments, soil moisture and hardness in layers 0–10 and 10–20 cm were determined. According to the results, the soil moisture in the 0-20 cm layer varies from 9.2% to 12.8%, and the hardness from 1.24 MPa to 1.72 Mpa [2,3].

Experiments “Testing of agricultural machinery. Soil surface treatment machines and weapons. Test program and methods”, “Testing of agricultural machinery. The method of energy evaluation of machines” determined the quality of soil compaction, depth of cultivation and its uniformity, traction resistance and power consumption.

Gravity resistance was determined using strain gauges mounted on it. Before conducting experiments and after the transfer, the strain fingers were scanned. At the same time, the lower right and left strains were loaded at intervals of 4.0 kN in the range of 0-20 kN, and the upper strains were loaded at intervals of 2.0 kN at intervals of 0-10 kN. The error in the dialing was 1.8%.

According to the information received in the survey, the coefficient of the survey was determined. The data obtained in the experiments were then multiplied by the traction coefficient and the true value of the gravitational force was determined.

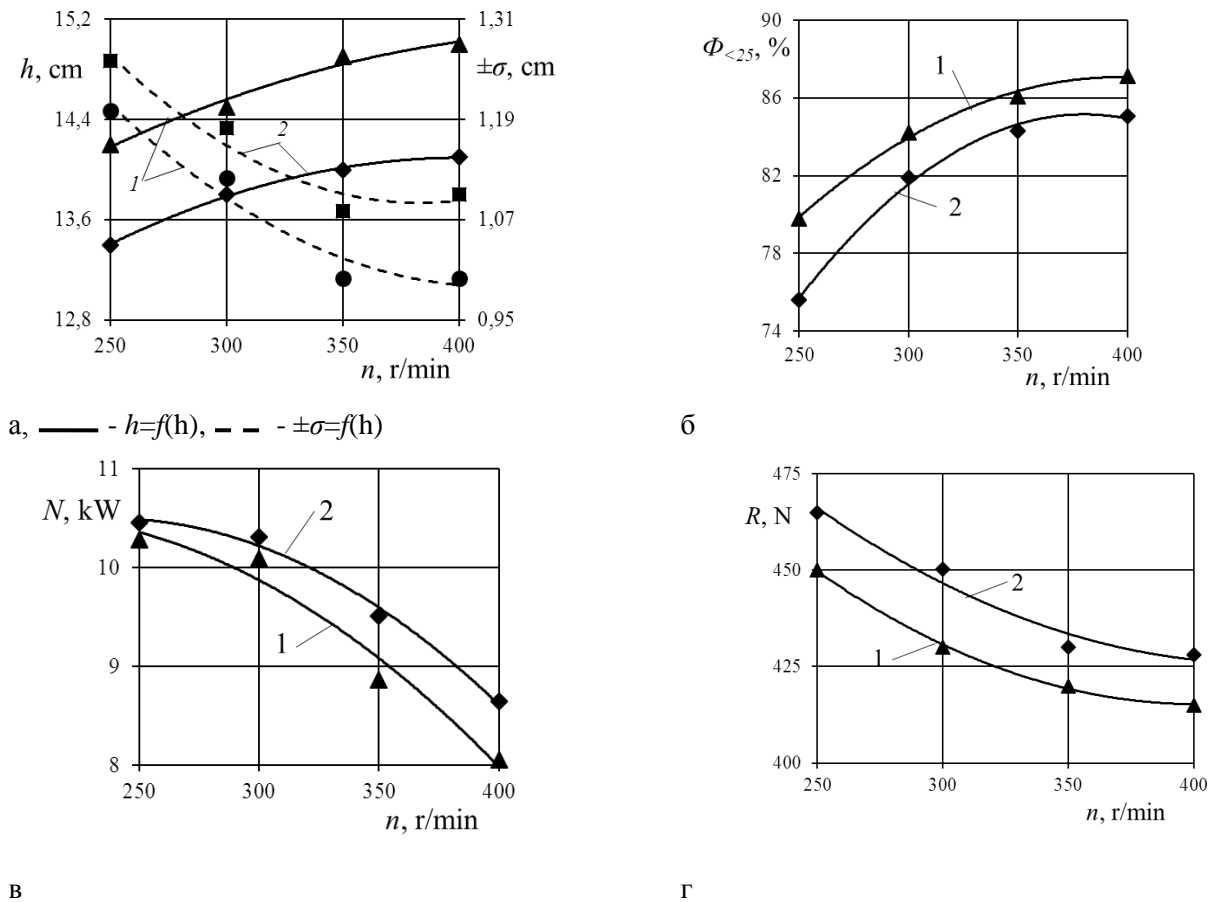
From tensometric fingers in conducting strain gauges and IP-264BS measuring equipment was used to record the signals emanating from the momentomer.

Experiments were performed by varying the number of rotary softener rotations from 200 r/min to 400 r / min at 100 intervals. In this case, the diameter of the rotary softener was 32 cm and the number of blades mounted on it was assumed to be 4 and constant. During the experiments, the speed of the unit was set at 5 and 7 km/h, respectively.

After aggregate treatment, the quality of soil compaction, tensile strength and power consumption were determined. The results are shown in Fig1.

The data show that when the number of revolutions of the rotary softener increases from 250 r / min to 400 r / min, the working depth at a speed of 5 km / h increases from 14.2 cm to 15.0 cm and its average square deviation from ± 1.20 cm At ± 1.00 cm, and at a speed of 7 km / h, these values varied from 13.4 cm to 14.1 cm and from ± 1.26 cm to ± 1.10 cm, respectively.

Fig.1. Influence of the number of revolutions of the rotary softener on the operating parameters of the device



1, 2 - when the unit speed is 5.7 km / h, a) - processing depth; б) - degree of soil erosion; в) - power consumption; г) tensile strength.

The amount of soil fractions smaller than 25 mm in size increased rapidly in the range of 250–350 r / min, while the number of revolutions of the rotary softener increased rapidly in the range of 350–400 r / min. Power consumption for the rotary softener varied little in the range of 250-300 r / min, decreasing rapidly in the range of 300-400 r / min. The main reason for this is that as the number of revolutions of the rotary softener increases, the speed of impact of its blades on the ground increases. The time between the previous blade and the next blade effect is shortened. This causes the thickness

of the soil to be cut with a knife to be reduced, i.e. its pitch to be reduced.

The gravitational resistance of the unit decreased with increasing number of revolutions of the rotary softener. As the aggregate speed increased, the depth of tillage and the degree of soil compaction decreased, the power expended and the traction resistance of the device increased. This is explained by the increase in the pitch of the soil pulley cut by the rotary softening blades as the aggregate velocity increases.

According to the agro-technical requirements, the number of rotations of the rotary softener should not be less than 300 r / min, provided that the amount of soil fractions less than 25 mm is not less than 80%.

Conclusion.

1. When using a combined aggregate that prepares forestry nursery lands for planting, the soil is less compacted, which creates the basis for better development of the root system of future crops, reduces operating costs, increases productivity.

2. According to the results of the experimental study, it was determined that the number of revolutions of the rotary softener should not be less than 300 r / min to grind the soil to the required level.

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