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Influence of the Diameter of the Comb Maker on the Performance of the Combined Unit

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ABSTRACT. The article presents the results of research on the effect of the diameter of the combined aggregate pile receiver on its performance.

KEYWORDS: combined aggregate, pile picker, pile picker diameter, direction of movement, working speed, soil crushing quality, pile height, total height of softened layer, traction resistance.

I.INTRODUCTION

Preparation of fallow fields for sowing in Uzbekistan consists of agro-technical measures such as fertilization, plowing, leveling, chiseling, harrowing, mulching and plowing of lands, which are carried out in late autumn and early spring with separate units, including chisel, harrow and mulching measures are performed at least two to three times. Repeated and repeated tillage of such a field into the soil leads to an increase in labor, energy and fuel consumption, disruption of its structure and over-compaction. It should be noted that in recent years, the world is moving to tillage without tillage and minimal, ie as little as possible, and methods of combining several or all technological processes to prepare the soil for planting in one pass from the field are becoming more common [1].

Based on the above, the Research Institute of Agricultural Mechanization and the Tashkent State Agrarian University have developed a combined unit that provides minimal tillage without preparing the fields for sowing. This unit consists of a softener, a fertilizer and a cotton picker, which is applied in the fall without plowing, the soil is loosened and fertilized one by one, and on the same loosened and fertilized tracks are formed buds, which are not softened. In early spring, the buds are prepared for planting and then the seeds are planted [2,3].

II. SIGNIFICANCE OF THE SYSTEM

The article presents the results of research on the effect of the diameter of the combined aggregate pile receiver on its performance. 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

This article presents the results of experimental studies on the effect of the diameter of a combined aggregate pile receiver on its performance.

The experiments were carried out at speeds of 6,0 and 8,0 km/h with pile receivers with a diameter of 450; 550 and 650 mm. In this case, the discs were set at an angle of 30 ° to the direction of movement and a working depth of 17 cm.

The results obtained are presented in Figures 1-5. These results show that the increase in disc diameter from 450mm to 650 mm did not significantly affect the crushing quality of the soil. The height of the pile increased by 2,7–3,8 cm due to the increase in the volume of cultivated soil when the disc diameter increased from 450 mm to 550 mm, and remained unchanged when increased from 550 to 650 mm. The total thickness of the softened layer also changed accordingly.

An increase in the diameter of the pile receiver from 450 mm to 650 mm resulted in an increase in proportion to its resistance.

Work speed At 6 km/h, the gravitational resistance increased from 1,28 kN to 2,37 kN, and at 8,0 km/h from 1,83 kN to 2,55 kN. This can be explained by an increase in the volume of soil that interacts with it as the diameter of the disc increases.

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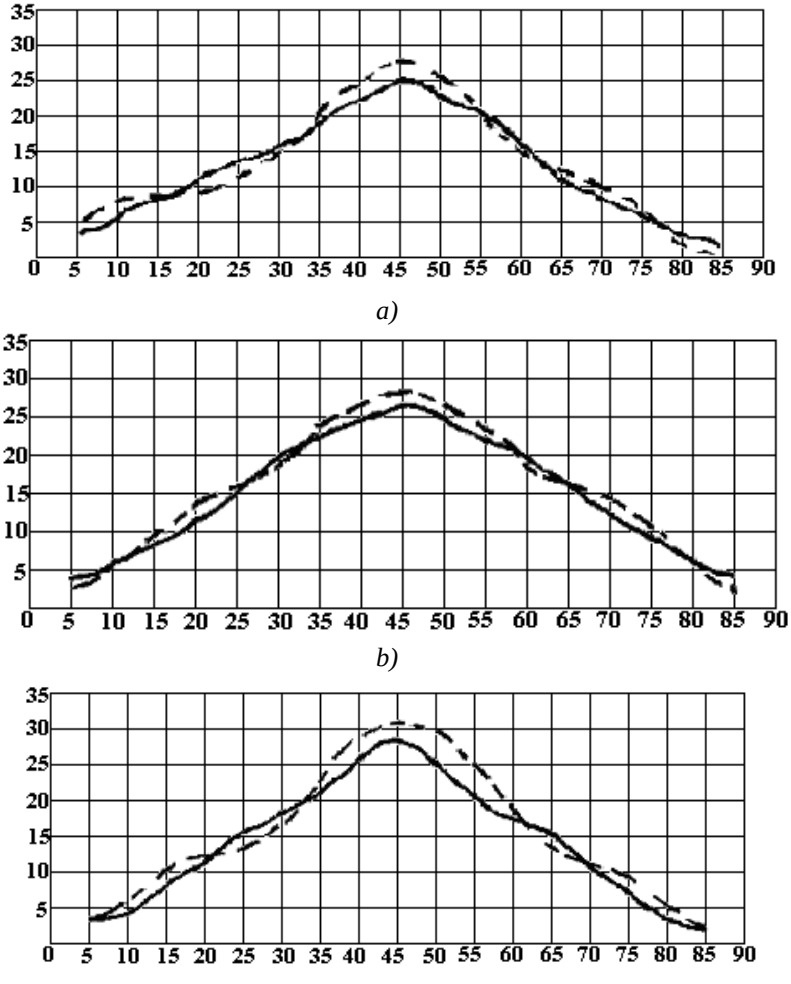
An increase in speed from 6,0 km/h to 8,0 km/h has led to a slight improvement in the quality of soil compaction, i.e. an increase in the amount of fractions smaller than 50 mm in size. This can be explained by an increase in the impact forces applied to the ground by the working body with increasing speed.

IV. EXPERIMENTAL RESULTS



a)

b)

c)

a, b, c - cross-sectional profile of piles formed by piles of 450; 550 and 650 mm in diameter;
The speed of the unit was 6,0 km/h;
The unit speed was 8,0 km/h.

Figure 1. Cross-section profiles of piles formed with pile pickers of different diameters

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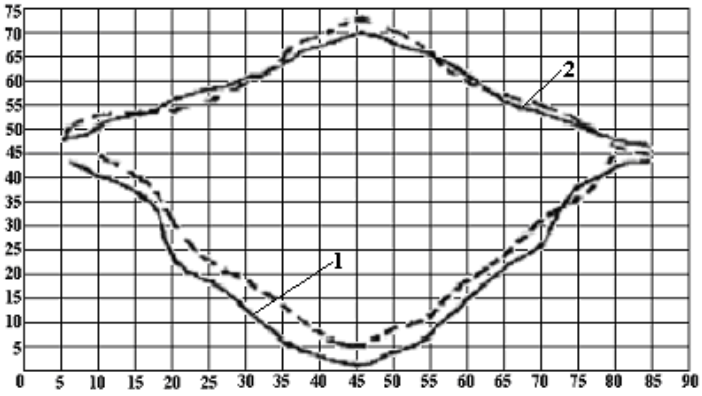
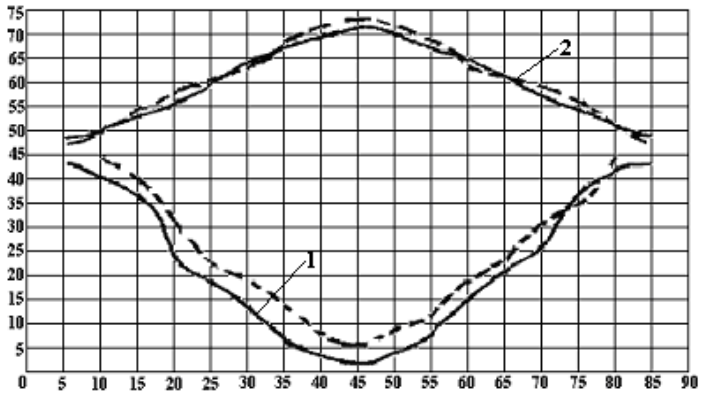
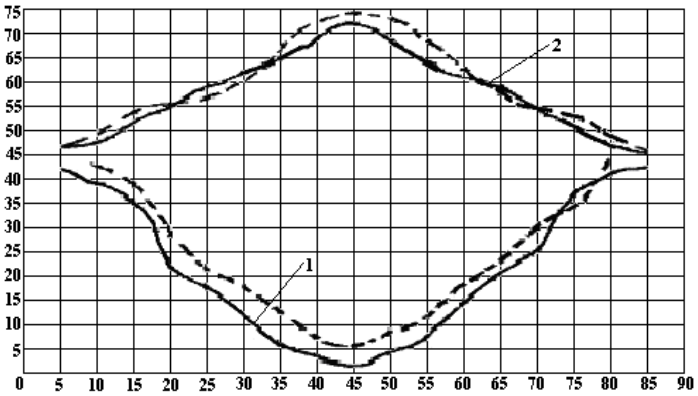


a)



b)



c)

a, b, c - piles with a diameter of 450; 550 and 650 mm, respectively obtained with discs; aggregate speed was 6,0 km/h; unit speed was 8,0 km/h; 1 softened layer bottom; 2 pile surface

Figure 2. Cross the pink and softened layer section profile

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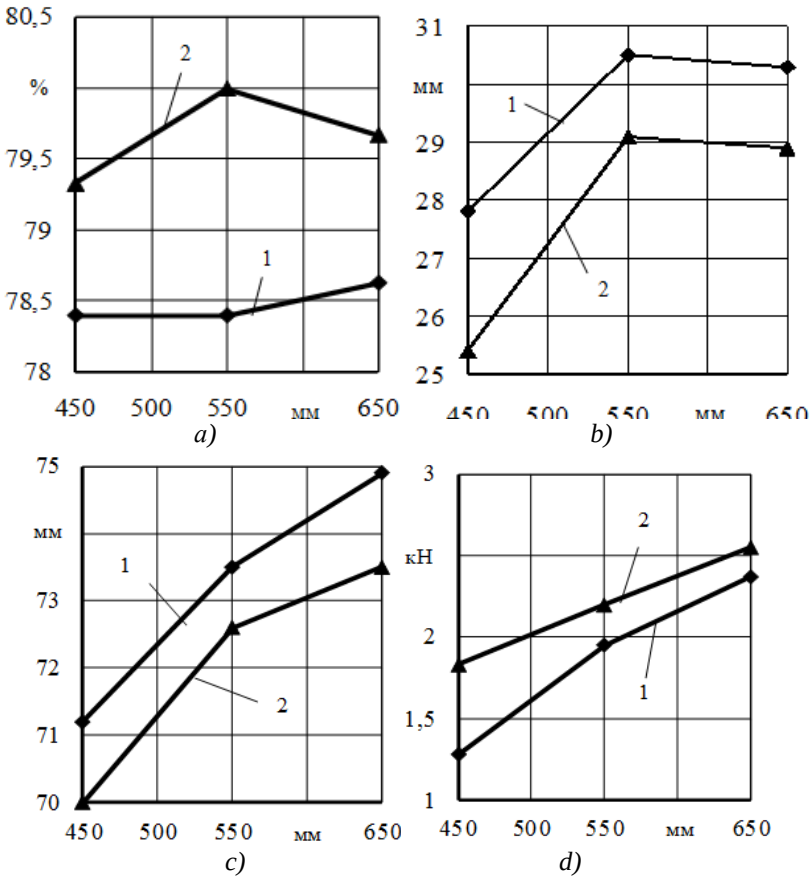

1.2 - at speeds of 6,0 and 8,0 km/h, respectively

Figure 3. The compaction quality of the soil (a), the height of the pile (b), the total height of the loosened layer (c) and the drag resistance of the pile receiver (g) depend on its diameter.
depending on the change graphs

As can be seen from the data in Fig 1 and 3, the pile height and the thickness of the softened layer decreased with increasing velocity. This can be explained by the fact that as the velocity increases, the throwing distance of the soil particles increases and as a result the soil particles do not fall into the middle of the pile.

With increasing velocity, the gravitational resistance of the working body increased (Fig. 3, d). For example, a disk with a diameter of 450 mm has a tensile strength of 1,28 kN to 1,83 kN when the speed varies from 6 km/h to 8 km/h, and a disk with a diameter of 550 and 650 mm has a tensile strength of 1,95 kN to 2,20 kN and increased from 2,37 kN to 2,55 kN. Because with increasing speed, the inertial forces acting on the working body by the soil increase.

V. CONCLUSION AND FUTURE WORK

So, summarizing the above, it should be noted that with low energy consumption, it is possible to produce piles with spherical discs with a diameter of 550 mm, the height of which meets the requirements of agrotechnics (27-30 cm) at operating speeds of 6-8 km/h.

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