THE EFFECT OF THE SCRAPER'S INSTALLATION ANGLE RELATIVE TO THE HORIZONTAL ON THE PERFORMANCE OF THE DISC PLOUGH

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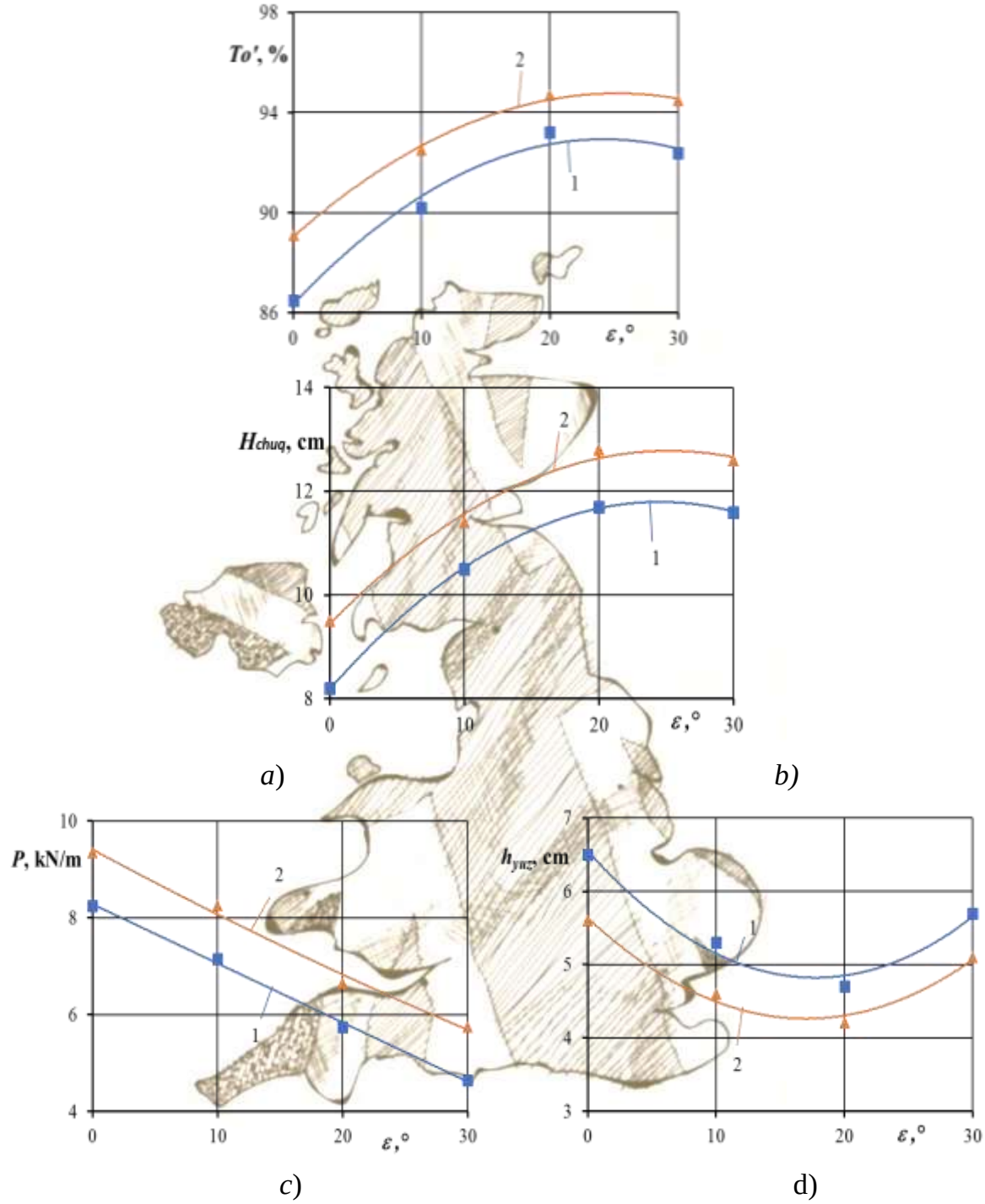
In these experiments, the following parameters were set: the curvature radius of the scraper's working surface was 30 cm; its installation angle relative to the horizontal was 20°; its installation height relative to the center of rotation of the disc body was 15 cm; the length of the working surface was 30–35 cm; the tillage depth was 25 cm; and the forward speed of the aggregate was set at 6 and 9 km/h.

The results obtained from experiments aimed at studying the effect of variations in the scraper's installation angle relative to the horizontal on the agrotechnical and energy performance indicators of the disc plough are presented in Figure 1. The analysis of these data indicates that changes in the installation angle of the scraper relative to the horizontal influence the previously mentioned performance indicators of the disc plough, as outlined below:

Varying the scraper's installation angle from 0° to 20° had a significant positive effect on soil crumbling quality, with a noticeable improvement observed as the angle increased. However, increasing the angle from 20° to 30° led to a decline in this indicator.

The completeness and depth of plant residue burial also improved considerably when the installation angle (ε) increased from 0° to 20°. This improvement is attributed to the fact that the soil slices ejected upward by the working parts did not cause clogging and were sufficiently and completely inverted. However, when the angle increased from 20° to 30°, this performance indicator deteriorated.

The height of surface irregularities formed on the ploughed layer decreased sharply as the installation angle increased. This is explained by the fact that, at optimal angles, the soil slices cut and thrown by the working parts reached the scraper's working surface and were completely inverted, leading to a smoother surface. However, when the angle increased from 20° to 30°, surface irregularities increased again. This was due to the soil slices not fully reaching the scraper's surface and thus not being completely inverted by the disc body.



1, 2 – correspond to forward speeds of 6 and 9 km/h, respectively

Figure 1. Graphs showing changes in the completeness of plant residue incorporation (T_{to}) (a), depth (H_{chuq}) (b), height of arable land surface irregularities (h_{yuz}) (c) and specific traction resistance of the plough (P) (d) depending on the angle of the scraper relative to the horizontal (ε)

Conclusion. An increase in forward speed from 6 km/h to 9 km/h also had a positive effect on soil crumbling quality in this case. Specifically, when the scraper's installation

angle (ε) changed from 0° to 20°, a significant improvement in soil fragmentation was observed, while increasing the angle from 20° to 30° led to a decline in this indicator. Similarly, the completeness and depth of plant residue burial improved noticeably as the angle increased from 0° to 20°, but decreased when the angle ranged from 20° to 30°. The height of surface irregularities decreased sharply with an increase in angle from 0° to 20°, whereas a further increase from 20° to 30° caused surface unevenness to rise again. Additionally, as the installation angle (ε) increased, the specific draft resistance of the disc plough tended to decrease.

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