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Research Article

RATIONAL OF THE HOPPER-DOSER HOPPER SIZE DETERMINATION

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ABSTRACT

The article presents the results of analytical and experimental determination of the required size of the hopper of the seed seed hopper-dispenser. It was determined that the necessary size of the bunker-doser hopper is directly related to its productivity and the residual hairiness of the seed. Taking into account that the recommended productivity of hairy seed preparation workshops is equal to 3 t/h, the rational size of the hopper was determined. It was concluded that the seed should be from 8.57 to 11.14 m 3 depending on the residual hairiness of the seed.

KEYWORDS

Bunker, size, cotton seed, seed hairiness, natural seed shedding.

INTRODUCTION

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Increasing competition in the world's cotton markets, growing and zoning new selection varieties of cotton in cotton-growing countries, improving the consumer characteristics of the product and reducing production costs due to the development of seed preparation technologies are increasing the urgency of reducing wholesale prices. Accordingly, in order to improve the quality of seed cotton seed in the world market and reduce its cost, to increase its fertility through targeted treatment, to reduce seed consumption, to increase disease resistance, at all stages of seed seed production, as well as in the processes of seed collection and transfer in the specified standard, factors that have a negative effect on product quality identifying and eliminating them, creating resource-efficient technologies that reduce product production costs remain one of the important tasks [1].

Increasing the productivity of cotton, which is one of the main crops in our republic, depends on the quality of seed preparation. With the increase in the demand for the quality indicators of the seeds, it is necessary to carry out their sorting and treatment works perfectly. Bunker-doser devices were installed in order to improve the performance of the technological equipment in the technological system of seed preparation, as well as to improve the quality indicators of the sorting and treatment processes. Scientific research work was carried out at the joint-stock company . "Cotton Industry Scientific Center" to determine the main parameters of the hopper-doser, which serves to dose transfer of hairy seed at a certain specified working fertility.

The following empirical expression of the slope of the bunker walls by I.I. Novitsky was used in this work.

$$U = 24 + 6{,}1 \times Q_{on}^{0{,}445} \quad (1)$$

recommended to be equal to 8.63 m 3.

Based on the analysis of the scientific research conducted at the joint-stock company . "Cotton Industry Scientific Center" it can be said that the experiments on the justification of the size of the bunker were not conducted enough [2].

The main part

Based on studies of the performance of existing seed processing plants, we determined that the residual hairiness of seed delivered to existing seed processing plants varied from 9.0 to 11.0 percent. It is more correct to select the size of the hopper-dispenser hopper depending on the residual hairiness of the seed, because it is self-evident that the higher the residual hairiness of the seed, the more volume it occupies.

During the experiments, we determined the coefficient of residual hairiness of the seed seed with K and assumed K=1 at 9.0 percent hairiness.

The rational size of the hopper of the hopper-doser can be determined from the following expression, taking into account its performance [3].

$$E = t_0 \frac{Q_m}{\tau_{cp}} \times K\left[m^3\right] \quad (1)$$

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where: productivity of Q-bunker-doser for seed transfer, t/h;

τ_{cp}- the average density of seed in the bunker, kg/m^3; (τ_{cp}=350kg/m^3);

K is the coefficient of residual hairiness of seed in the hopper;

t_0 - to the bunker seed the seed to fill and release time, s.

Experiments as a result seed sow residual hairiness change the coefficient to 1.0-1.3 was determined. Of this for residual hairiness 9.0; 9.5; 10.0; to 10.5 percent equal to has been seeds natural in the spill volume was determined and 9.0 percent equal to when determined of the K-coefficient in volume amount is equal to 1 that acceptance done.

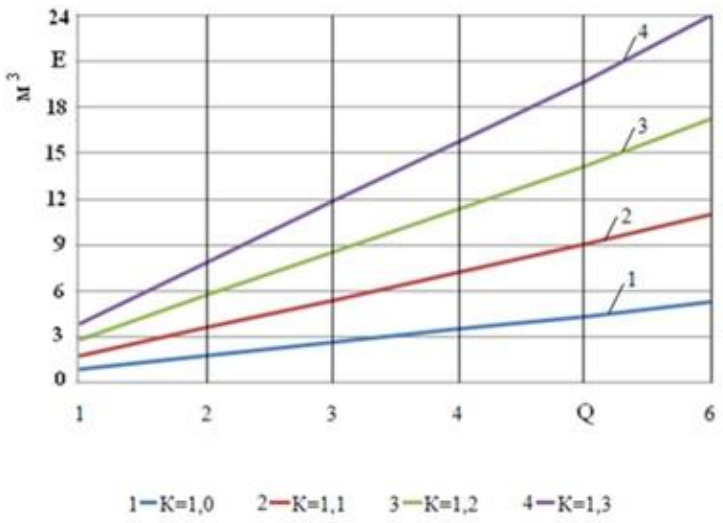

Figure 1. Graph of the dependence of the required volume of the hopper-doser hopper on the performance (at values of K-coefficient equal to 1.0, 1.1, 1.2 and 1.3).

After determining that the residual hairiness coefficient of the seed can vary from 1.0 to 1.3, using the above expression, we made a graph that determines the required size of the hopper depending on its performance (Fig. 1).

Since the operation of the hopper-doser is continuous, we assumed that t0=1. Because the times of filling the hopper with seed and emptying the seed are equal to each other.

CONCLUSION

From Figure 1, it can be concluded that the required size of the hopper-doser hopper is directly related to its productivity and the residual hairiness coefficient (K) of the seed. Taking into account that the recommended productivity of hairy seed preparation workshops is equal to 3 t/h, it can be deduced from the above

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graph that the rational size of the hopper should be from 8.57 to 11.14 m3 depending on the residual hairiness of the seed.

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