

ASSESSMENT OF THE COMPOSITION OF WASTE GENERATED IN COTTON CLEANING MACHINES AND THE COTTON LOSSES THEREIN

Djamolov R.K., Karimov T.K.

Research Institute of Fiber Crops

Abstract. This article presents an experimental study on the composition of waste generated during the initial cleaning process of cotton. Industrial trials conducted on the UXK-type cleaning system determined the amount of waste and the proportion of cotton particles within it. The analysis results indicated that a certain amount of fiber is lost during the cleaning process. Based on the data obtained, recommendations for reducing these losses are presented.

Keywords: raw cotton, cleaning equipment, waste, fiber loss, regeneration, efficiency.

In recent years, systematic efforts have been undertaken in our republic to elevate the cotton industry to a new level. Specifically, modernizing cotton ginning enterprises, equipping existing technological lines with modern machinery, and increasing the profitability of raw material processing through the implementation of energy-saving and efficient operating modes have been identified as priority tasks. This process serves not only to increase production volume but also to improve the quality of finished products and ensure their competitiveness in both domestic and foreign markets.

In this area, specific objectives have been defined at the state policy level. In particular, the Development Strategy, approved by Decree No. PF-60 of the President of the Republic of Uzbekistan, sets the tasks of strengthening the stability of the national economy, consistently increasing the volume of industrial production, and significantly boosting the output of textile products [1]. These strategic goals necessitate the deep and efficient processing of raw cotton.

From a practical standpoint, losses occurring during the cotton cleaning process adversely affect the industry's economy. In particular, cotton fragments that are transferred to the waste during the cleaning stage lead to a reduction in the total mass of the raw material. This situation diminishes production efficiency and limits value-added opportunities.

From this perspective, the development and practical implementation of regeneration equipment that allows for the effective separation of the fibrous fraction remaining in the waste is a pressing issue. Such a technical solution serves, on the one hand, to increase the cotton mass and, on the other hand, to organize the cleaning process in a stable and cost-effective manner. As a result, the raw material utilization rate improves, the production cost decreases, and the overall economic efficiency of the sector increases.

The cleaning stage is of great importance in the primary processing of cotton. During this process, foreign matter is separated; however, in some cases, a certain portion of the fiber is observed to be discarded along with the waste. In practice, CHX-3M, CHX-5, 1XK, and UXK-type cleaners are widely used. Although their operational efficiency is satisfactory, the retention of the fibrous fraction in the waste is not acceptable from a production standpoint [2, 3, 4].

Therefore, studying the composition of waste discharged from cotton cleaning machines and determining the amount of cotton within it is of practical importance.

The experiments were conducted at a cotton ginning enterprise using the UXK cleaning system. For the study, raw cotton of the 1st industrial grade with an average trash content of 8.6% and a moisture content of 9.2% was selected.

In each experiment, the initial mass of the cotton was determined, the total amount of waste separated after cleaning was measured, and the cotton fragments within the waste were separately isolated and weighed.

The average values of the obtained results are presented in Table 1.

Table 1

Amount of Waste and Cotton Content in the UXK Cleaning System

No	Initial cotton, kg	Separated waste, kg	Cotton separated from waste, kg	Waste share, %	Share of cotton in waste, %	Cotton losses, %
1	4250	301,8	42,4	7,10	14,06	1,00
2	4700	329,5	45,5	7,01	13,80	0,97
3	4650	333,4	48,7	7,17	14,60	1,05

As the data in Table 1 indicates, an average of 7% of the initial raw cotton was separated as waste. Approximately 14% of this waste composition consists of cotton fragments, which means that about 1% of the initial mass is lost on average.

Experiments show that during the cleaning process, a portion of the cotton is discharged along with impurities due to mechanical and aerodynamic effects. In particular, the uneven distribution of the cotton layer on the drum surface and an imbalanced airflow cause the fibrous fraction to be carried into the waste.

On an industrial scale, this figure can lead to significant economic losses. For example, when processing 100 tons of raw cotton, it is likely that an average of around 1 ton of cotton will be left in the waste.

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