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PROBLEMS IN CLEANING COTTON-SEED AND THEIR SOLUTION

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Abstract:

Objective. to identify problems and give recommendations on the processes of cleaning cotton at the cotton gins of the region, taking into account the increase in demand and the need for the use of cotton fiber in the republic and the world in the near future.

Methods. analysis of the state of the cotton industry and cotton processing factories in Uzbekistan today, as well as the level of demand and consumption of cotton fiber at the world level. Determine the factors that negatively affect the quality of cotton fiber by studying the activities of cotton processing factories in the regions of the republic. Analysis of the achievements and shortcomings of ongoing research in this direction.

Results. in the process of studying the activities of cotton ginning factories in the region (Kosonsoy, Norinsky, Torakorgon, Namangan regions), it was scientifically proven that the YXK cleaning line was used to clean cotton from small impurities, as a result of which the quality of the fiber and seeds was violated due to mechanical impact on pieces of cotton.

Conclusion. the development of the correct technological process and the creation of new devices and equipment for obtaining high-quality products from raw cotton at ginneries is of particular importance.

Keywords: raw cotton, textile industry, cotton industry, updating technology, cotton fiber consumption, ginneries, raw cotton quality, development program, material and technical base, number of neps (entangled fibers), cotton impurities, seed damage.

Introduction. Cotton is the economic backbone of our country. Therefore, today the state creates ample opportunities to ensure private initiative in the industry, produce products in accordance with existing international standards, bring cotton industry products to international markets, further develop international cooperation in the industry, and attract large international branded enterprises in the textile industry to the investment network[1,2].

It is known that the international coalition Cotton Campaign announced the end of the boycott of Uzbek cotton, and in recent years in other consumer countries, interest in our cotton and products of our textile industry has been growing. The global cotton market is expected to reach US\$46.5 billion by 2027, with a CAGR of 2.74% between 2020 and 2027.

Therefore, in cooperation with the secretariat of the International Advisory Committee (IAC) to further enhance the prestige of the Uzbek cotton industry in the world market, a number of successes were achieved following the results of the 76th IAC plenary meeting on the theme "Cotton in the era of globalization and technological development" and the XIII International Uzbek Cotton and Textile Fair (with the participation of about 1,500 foreign guests from more than 44 countries and local experts) and many other events. At such events, open and thematic problems related to the development of the cotton and textile industry in cotton-growing countries, trends in the global cotton market, trade, logistics and insurance issues were considered, and ways to solve them in cooperation were proposed. Such activities allow us to fully solve the problems that have arisen in the global environment. In addition, it invites experts in the field to exchange ideas, improve skills and take a scientific approach to the problem.

In addition to the above, issues of genetics and biotechnology for creating cotton breeding varieties, agrotechnics for

growing cotton, protecting it from pests and diseases were widely discussed. In particular, the importance of paying special attention to the problems and achievements in the field of primary processing of cotton, instrumental assessment of the quality of cotton fiber, and its processing by textiles was noted. We see that almost all issues discussed at the event are aimed at a comprehensive improvement in the quality of cotton fiber.

Methods. As a result of the measures taken by the state to improve the system of preparation of raw cotton and optimize the methods and technologies of primary processing of cotton, today the share of fibers of the "High" and "Good" classes amounted to 92.0% of the total volume of cotton fiber, which is 10% more than last year. 99% of all manufactured fibers have a micron index of 3.5-4.9 and comply with international requirements. The length of the fiber produced has also improved somewhat. In particular, the share of fiber code 37 in the season increased from 21% to 23%. The proportion of fiber type 4 was 85 percent.

Due to the increase in demand for cotton fiber in Uzbekistan, consumption is expected to increase in the coming years. Therefore, the state plans to implement dozens of investment projects as part of the development program until 2026. The implementation of these projects will bring the level of processing of cotton fiber to 100% of the total production and increase the export potential of the Uzbek industry by more than 3 times [2].

A Concept and a program for the development of the cotton industry of the Republic of Uzbekistan for the period up to 2030 have been developed. To ensure the implementation of the program in practice, it is necessary to analyze the current state of the equipment and technologies necessary for the pre-treatment of cotton raw materials, and identify a number of problems. It is known that the quality of the harvested cotton and the fiber obtained as a result of its processing depends on many

factors, including: the timely collection of cotton and its receipt at ginneries, cleaning operations, removing moisture and dirt as necessary, and warehouse work. However, even in modern conditions of such work, the quality of cotton fiber cannot be recognized at the proper level. It is these shortcomings that make the modernization work at cotton ginning enterprises, as well as the further improvement of the material and technical base, a task of everyday life.

These negative reasons mainly include: the presence of foreign heavy impurities (stones, scraps, etc.) in cotton shipped from cotton mills. To date, according to the conclusions made by international experts, including Chinese, to the cotton fiber of Uzbekistan: low competitiveness of cultivated cotton, poor cleaning quality and a large number of neps (tangled fibers) in cotton fiber; it is noted that cotton fiber is not cleaned enough, resulting in quality fiber does not meet the required level.² Such an assessment of Uzbek cotton in the international field prompted us to study the processes of cotton processing in more depth.

Results. In the process of studying the work of cotton ginning plants in the region (Kosonsoy, Norinsky, Torakorgan, Namangan regions), the following stages of work were observed and analyzed: 1) drying of raw cotton (drying using 2 SB-10 - drying drums); 2) cleaning shop (dried cotton raw materials are cleaned from large and small impurities on the USC cleaning line); 3) separation of fiber from purified

cotton raw materials (separation of fiber from seeds at plant 5 DP-130 (gin)); 4) press shop (fiber spinning is carried out in the press shop using press equipment DB-8237); 5) weighing packing fiber on electronic scales (weighing on electronic scales and transferring finished products to the warehouse using a belt conveyor); 6) extraction of fluff from seeds (VP - fluff is extracted from seeds in fluff aggregates); 7) backfilling of fluff (filled in the DA-237 pressing equipment and fluff is weighed on electronic scales and transferred to the finished product warehouse. The seed product is weighed on electronic scales and fed to the seed warehouse through an elevator and augers).

When considering the above 7-stage process, the quality of raw cotton is at the required level at the initial stages of cotton harvesting (Fig. 1-a), and there are few problems with its processing at the plant, but at the middle and late stages of harvesting, the quality of the resulting cotton fiber deteriorates due to the influence of various impurities, etc. on the quality of the fiber (Fig. 1-b).

Various problems arise during the processing of such cotton at the plant, especially at the 2nd stage of the process, that is, at the UXK cleaning line, in the process of cleaning from coarse and fine impurities, on the one hand, while the impurities contained in raw cotton are practically cleaned, on the other hand, it is observed that a piece of cotton during this process is divided into smaller pieces (Fig. 1c).



Fig. 1. Raw cotton cases:

a) cotton collected in the primary collection; b) cotton picked in the middle and at the end of the cotton harvest; c) Cleaned cotton after UXK cleaner

It is known that recently a drum with pile has been used in the cleaning department of the YXK type cotton gin (Fig. 2). As we can see, 2 types of hammers were used here: bladeless and blade hammers. Although the use of blade hammers increases the efficiency of cleaning cotton by 20%, on the other hand,

it can cause significant (750-800 million soums) economic damage to an enterprise producing 20-25 thousand tons of cotton fiber per year due to seed damage. In addition, it is natural to increase the number of short fibers (neps) in the fiber composition. This situation leads to a decrease in fiber quality.

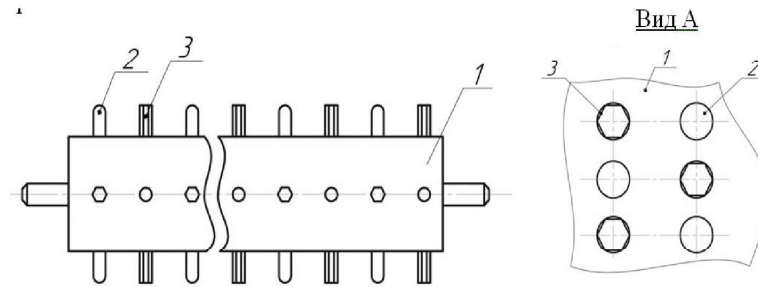


Fig. 2. A pile drum used in a cotton cleaner
 1- drum; 2- bladeless hammers; 3-6-blade hammers

In the analysis of studies conducted by the specialists of the Mingbulok cotton ginning enterprise, which is part of the ART SOFT CLUSTER HOLDING company, with the cleaning efficiency of the 1XK machine (23-29 percent), the Namangan-77 variety, the 1st grade and the 1st group received piece fiber: dirt - 0.5%, seed husk - 0.8%, broken seeds - 0.5%, immature seed fiber - 0.5%, immature fiber fragment - 0.1%, tangled fibers - 0.1%, the percentage of total impurities and defects was 2.5% [4].

As a result of the division of cotton fiber into groups according to impurities and defects, the following results were obtained, the percentage of defects and impurities in the 1st grade: high - 2.0%; good-2.5%; average-3.0%; simple-4.0%; dirty - 5.5%, average in this class - 3.3%; The percentage of defects and impurities in the 2nd grade: high - 2.5%; good-3.5%; average-4.5%; simple-5.5%; dirty - 7.0%, average in this class - 4.6%; The percentage of rejects and impurities in grade 3: good - 4.0%; average-5.5%; simple - 7.5%; dirty - 10.0%, average in this class - 6.7%; The percentage of defects and impurities in grade 4: good-6.0%; average-8.5%; simple - 10.5%; dirty - 14.0%, average in this class - 9.7%; The

percentage of defects and impurities in grade 5: average - 10.5%; simple - 12.5%; dirty -16.0%, it can be seen that the average in this class is -13.%. From the foregoing, we can conclude that an increase in the category (1-5) leads to an increase in the proportion of defects and impurities in the class, that is: in the highest class - by 0.5%; in a good class - by 3.5%; in the middle class - by 7.5%; in the regular class - by 8.5%; it can be seen that in the dirty class it increased by 10.5%.

Further, after determining the parameters of the pile drum chipping, improved by researchers in order to increase the cleaning efficiency of the separator-cleaner, taking into account the importance of studying the distance between the ends of the strap and the chipping and the mesh surface, the drum rotation speed for the cleaning action and mechanical damage to the seeds, the distance between the pile top and the mesh surface in the device 12; 14; 16; Transition to 18 mm, the number of revolutions of the drum 400; 420; The experiments were carried out at a setting of 440 rpm. Cotton of the I technical grade with a dirtiness of 6.2% and a moisture content of 8.8% was

used. The results of the experiment are presented in Table 1 [5].

At the same time, due to a change in the number of turns and the distance between the mesh surface and the tip of

the pile (in the 1XK cleaning unit), we see that the cleaning efficiency has changed (Table 1), but it was found that with these changes, seed damage increased from 0.8% to 1.2%.

Table 1

No	circ/quantity	Distance from the wall surface to the tip of the pile, mm	cleaning effect, %	Increased mechanical damage to seeds, %
1.	400	12	3,4	0,8
		14	3,2	0,6
		16	2,8	0,5
		18	2,6	0,5
2.	420	12	4,5	0,9
		14	4,4	0,7
		16	3,8	0,5
		18	3,2	0,5
3.	440	12	4,2	1,2
		14	4,0	1,0
		16	3,6	0,8
		18	3,0	0,8

From the above study, it can be concluded that the use of a pile drum in the cleaning section of cotton-cleaning devices, on the one hand, increases the cleaning efficiency (increases the profit of the enterprise), on the other hand, increases seed spoilage. This situation leads to the fact that the company does not have enough seeds for seed production in the future. Therefore, in the future, we will need to develop completely new technologies for cleaning raw cotton from small impurities.

In this regard, based on the results obtained on the creation of an improved technology for cleaning cotton from impurities, the “Pakhtasanoat Scientific Center”, Tashkent Institute of Textile and Light Industry, Namangan Institute of Engineering and Technology, Namangan Engineering and Construction Institute and other universities are conducting research on an improved cotton ginning plant that

performs vertical cleaning of raw cotton. However, modern requirements require the modernization of the cotton ginning industry, the active implementation of technical and technological re-equipment, the need to use changeable technologies that do not affect the natural properties of cotton in the ginning process and ensure the production of competitive products.

Conclusion: it is natural that high-quality fiber products will be in high demand in international markets in the future, otherwise there will be a “fewer buyers” situation. Of particular importance is the development of the correct technological process and the creation of new equipment for obtaining high-quality products from raw cotton at ginneries. If the technological process of the enterprise is developed correctly, then the cost of the resulting product and production costs will decrease, and the enterprise will receive a good profit.

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