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## ANALYSIS OF THE DEGREE OF DAMAGE OF SEEDS IN THE TECHNOLOGICAL PROCESS OF COTTON PROCESSING

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**Аннотация.** В данной статье авторы наряду с анализированием степени повреждения семян в технологическом процессе обработки хлопка, приводят также технологические процессы, вызывающие наибольшее повреждение семян, а также их преимущества и недостатки.

**Ключевые слова.** Хлопок, семена, пневмотранспорт, повреждённость, технологический процесс, джин, линтер.

**Аннотация.** Ушбу мақолада муаллифлар пахтани қайта ишлаш технологик жараёнида чигитнинг шикастланиш даражасини аниқлашни таҳлил қилиш билан бирга, энг кўп чигит шикастланиши содир бўладиган технологик жараёнлар ҳамда уларни авзалликлари ва камчиликлари келтирилган.

**Калит сўзлар.** Пахта, чигит, пневмотранспорт, шикастланиш, технологик жараён, жин, линтер.

**Annotation.** In this article, the authors analyze the process of determining the degree of damage to the seed in the technological process of cotton processing, as well as the technological processes that cause the most seed damage, as well as their advantages and disadvantages.



**Keywords.** Cotton, seeds, pneumatic transport, damage, technological process, gin, linter.

**Introduction.** The production of high-quality fiber in line with world standards poses an important task for specialists and scientists in the field of cotton processing, such as the improvement of existing equipment and technology [1]. In turn, the increasing level of improvement of spinning and weaving equipment also requires great attention to the quality of cotton fiber.

The initial processing of cotton consists of a number of technological processes (placement, storage, transportation, drying, cleaning, fiber separation, etc.), which form a unique technological chain. The performance and quality of each piece of equipment in this chain is closely related to the performance and quality of the previous machines. Given this situation, it can be concluded that the impact of each piece of equipment in the technological chain on the quality of cotton products is significant.

**Literature review.** Seed damage is important in the technological process of ginneries. This is because seed damage results in various defects that affect the quality of the fiber.

In the research conducted by A. Burhanov (1) in the technological process of primary processing of cotton to the linter machine, the number of cotton samples was taken at 5 points to check the damage to the seeds.

The largest seed damage was  $2.5 \div 3\%$  at the fifth and eighth points on the linter machine with gin. At five points up to the gin machine, the damage to the seed was 1.5%. Thus,  $1.0 \div 1.2\%$  showed that at the first and third points, i.e., the cotton was in the air-carrying device in the pipes (Fig. 1).

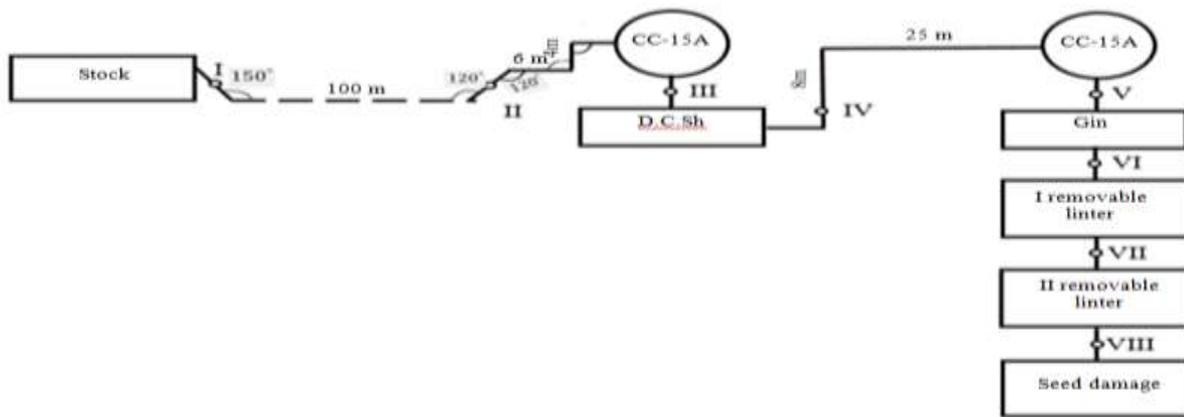


Figure 1. Scheme of technological process of processing of raw materials in ginning enterprises I-VIII sample points

Thus, as can be seen from the graph in Figure 2, 1.2% of cotton seeds were damaged, while in pneumatic transport and after drying and cleaning of cotton, this figure was  $2.6 \div 2.8\%$ .

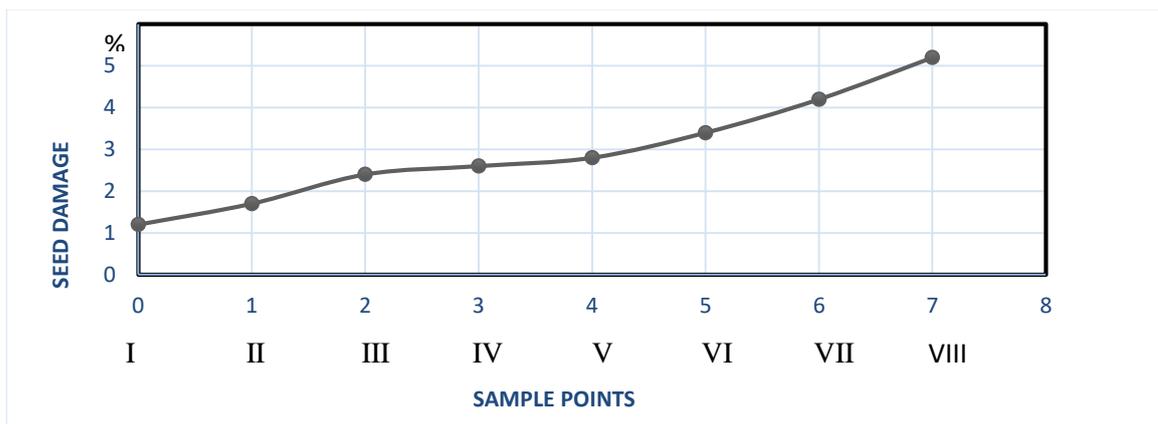


Figure 2. Graph of seed damage in the technological process of cotton processing.

Furthermore, the occurrence of seed damage in the technological process of cotton processing affects the quality of the fiber obtained after the gin machine. This prevents fiber from being sold in the upper class, which in turn leads to a decline in the economic performance of ginners.

**Research Methodology.** The territory and workshops of the ginnery use various means of transport to transport raw materials and finished products from one place to another during the initial processing of cotton. In this case, the type of transport used to transport cotton from the gins and warehouses of the enterprise to the shops and

from one shop to another can be a mechanical and air transport device. An air-carrying device has several advantages over a mechanical type of transport.

With the help of mechanical type lintals, it is much more difficult to transport cotton from the gins to the shops. The main reasons for the widespread use of air-lifting device are its reliable operation, minimal loss of material when transporting cotton, compactness of the device, its ability to be used in places inconvenient and cramped for mechanical transport, its ease of maintenance and repair. In addition, transporting cotton by airflow helps the cotton to shrink and lose a certain amount of moisture. Also, during the separation of cotton from the air, the initial cleaning of cotton from fine impurities and dust is provided.

The air-carrying device is also widely used in the ginning industry due to its number of advantages.

Airborne devices also differ from other devices in the simplicity of use, ease of operation, the ability to automate transport processes.

The disadvantage of the device for transporting cotton by air is the damage to the seeds in the transported cotton and the high consumption of electricity. Currently, air transport devices are also used for mechanization of transportation and loading and unloading of seeds and industrial waste.

Air-transporting devices used to transport cotton can be classified according to the following characteristics:

Depending on the place of installation and use, air-operated devices are divided into types that can be installed inside the plant, between shops and inside the shop [2,3].

Cotton ginners use a suction-type air-carrying device to transport cotton (Figure 3).

It consists of the following main working elements: cotton is fed to the pipe by means of a mechanical conveying device (1), which is transported by air along the working pipe (2), cotton is separated from heavy mixtures in a sieve (3) and fed to a separator (4). The polluted air is transferred to the cyclone (8) and the dust chamber (9) through the suction air duct (5), the centrifugal fan (6), which creates pressure in

the pipes, the exhaust air duct (7). They in turn ensure that the air is cleaned of dust before it is released into the atmosphere.

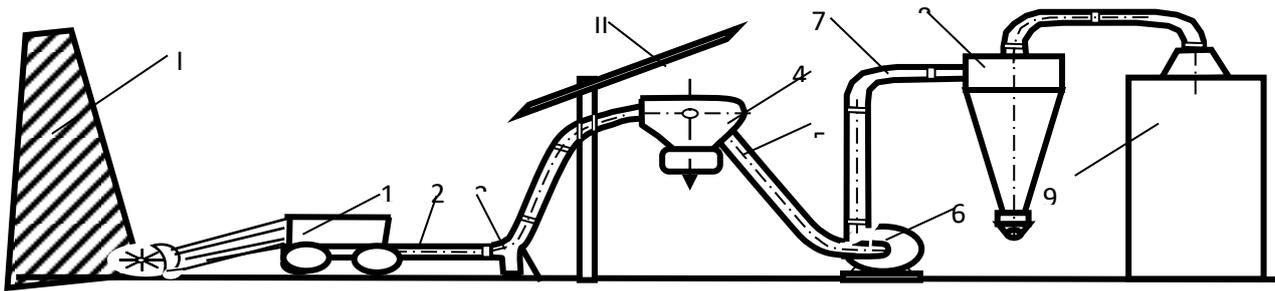


Figure 3. Air-powered device in ginneries.

- 1-Cotton mechanical transmission equipment for pipe; 2-Working pipe;  
3- stonemason; 4- separator; 5- suction air duct; 6- fan; 7-exhaust air duct; 8-dust collector; 9-dust chamber (I - cotton mill, II - production workshop).

The principle of operation of the air-carrying device is that under the flow formed by the pressure difference, the atmospheric air sucked into the pipe, following the material being transported with it. Inside the tube, the cotton moves with the air and reaches the separator. The separator separates the material from the carrier air and transfers it to the process equipment [4].

**Analysis and results.** The advantage of the suction air carrier is that the working pipe system can be easily changed without difficulty, depending on the location of the gins, and its length can be extended by connecting additional pipes to the primary pipes. The production efficiency of the air-carrying device depends on the production capacity of the ginnery. For an advanced cotton ginning plant with one battery, it is 10 tons per hour.

The growth of the rate of cotton production puts before the cotton processing industry the task of increasing production capacity, increasing the productivity of equipment, improving product quality.

The performance of these tasks depends in many respects on the operation of the air-carrying device installed in the area. This is because it is directly involved in the continuous technological process of the ginning plant and is an important part of determining its initial and operating speed.



The increase in the volume of cotton production has led to the expansion of the territory of enterprises and the increase in the length of the network of air-carrying devices in it, in some cases to a length of 200 m and more. Since the radius of movement of a single air-transport device served by a fan BIQ-12M does not exceed 100-110 meters, transportation of cotton from very long distances is usually done by connecting the carrier devices in series using additional moving air [5].

A suction-type air-carrying device is more common for transportation in the technological process of a ginning plant. During transport at high speeds, the speed of cotton inside the pipe reaches 20÷25 m / s, at which speed it hits the walls of the pipe, rubs, bends the pipe, hits the inner walls of the stone and separator [6,7]. This inevitably has a negative impact on the quality indicators of cotton. However, one of the conditions to ensure the maintenance of cotton quality, ie to prevent damage to the cotton seed and the occurrence of technological defects in the fiber - is to choose the optimal mode for air transportation.

**Conclusion / Recommendations.** In this article, the authors provide a detailed analysis of the problem of determining the degree of seed damage in the technological process of cotton processing, as well as the operation of the pneumatic transport device, which causes the most seed damage.

Focusing on the classification of the device for transporting cotton by air, showed the advantages and disadvantages of the pneumatic transport device and its main elements.

In our future work, research will be conducted to reduce the risk of seed damage in the technological process of cotton processing.

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