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CHALLENGES IN THE HARVESTING, LOADING-UNLOADING, TRANSPORTATION, AND STORAGE OF THE COTTON CROP.

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Abstract. Methods for solving certain problems of cotton-growing farms during harvesting, loading, transportation, and storage.

Keywords. Cotton field, harvesting, hand-harvesting, cotton compaction, laboratory analysis of cotton procurement sites, scales, unloading of cotton from the vehicle body, bundling, leveling, covering with tarpaulin, tunneling.

Cotton is one of the most widespread industrial crops and is also a high-oil crop. In the world, cotton occupies more than 40% of the area allocated for other crops. Technical crops such as hemp, flax, hemp, and jute rank second in area. Cotton is primarily grown for its fiber and oil. Currently, various chemical products are also produced from it. For example, valuable organic acids (citric acid, malic acid, vinegar) are produced from cotton stalks, leaves, and seed coats, as well as essential substances and medicines.

In recent years, with state support, significant changes have occurred in the cotton ginning industry regarding the improvement of raw cotton processing machinery and technology. At the same time, great attention has been paid to the use of flexible raw cotton processing technologies. These technologies allow for the compact placement of equipment, taking into account the initial quality characteristics of the raw material, which reduces energy consumption per ton of fiber by at least 10-15%, simplifies maintenance, and improves product quality by reducing mechanical impact. Along with measures to re-equip enterprises, significant work has been carried out to implement a quality management system in accordance with the international ISO 9001 standard at the "Uzpakhtasanoat" Association, "Pakhtasanoat" territorial associations, and a number of cotton ginneries.

The independence of the Republic of Uzbekistan and its entry into the world market gave a new powerful impetus to the development of the cotton ginning industry. New economic relations necessitated a revision of technological policy in the field of raw cotton processing; there was a need to develop efficient technologies, reduce the number of equipment in the technological process, and at the same time preserve product quality.

In recent years, a steady trend in this direction has been observed in the industry a number of cotton mills have been radically modernized and transport communications have been significantly reduced. The cotton mills were compact in terms of territory, fully mechanized, and environmentally friendly. The Government of the Republic of Uzbekistan pays great attention to the development of industry science and personnel training, which will allow it to compete worthily with the world's leading countries in the field of cotton processing in the near future.

For the normal development of the cotton plant and obtaining a high yield, it requires sunlight, heat, water, air, and nutrients. The necessary air, water, and nutrient regimes are ensured through appropriate soil cultivation. Preparation of the fields for sowing begins immediately after the harvest of the previous year. In this process, cotton stalks are collected, fields, roads, and irrigation networks are cleaned, deep tillage, washing, and backup irrigation are carried out during the autumn-winter period, and soil cultivation is carried out in the spring. High-quality seeds are

used for sowing, with a germination rate of 95–100%, which are pre-processed in special workshops of cotton ginneries. This treatment involves cleaning individual batches of seeds from delint, calibration, and disinfection with specialized chemical preparations.

Sowing dates vary across different regions depending on climatic and meteorological conditions. In regions with early stable warm weather, sowing is completed in the first decade of April, and in northern regions in the second decade.The depth of sowing seeds in the soil depends on the structure and moisture of the soil, usually ranging from 3 to 5 cm. If the soil is very dry and the air is hot, the sowing depth is increased to 4–5 cm. It is not recommended to sow seeds deeper than 3 cm into the soil, as most of the seeds remain on the soil surface and the rest fall into layers where there is insufficient moisture. At the same time, sowing seeds deeper than 5 cm leads to a slowing of budding.



Figure 4.7. MX-1.8 two-row cotton-weighing machine used in areas with a row spacing of 90 cm.



Figure 4.8. The MX-2.4 four-row trailed cotton harvester, used in fields with a row spacing of 60 cm

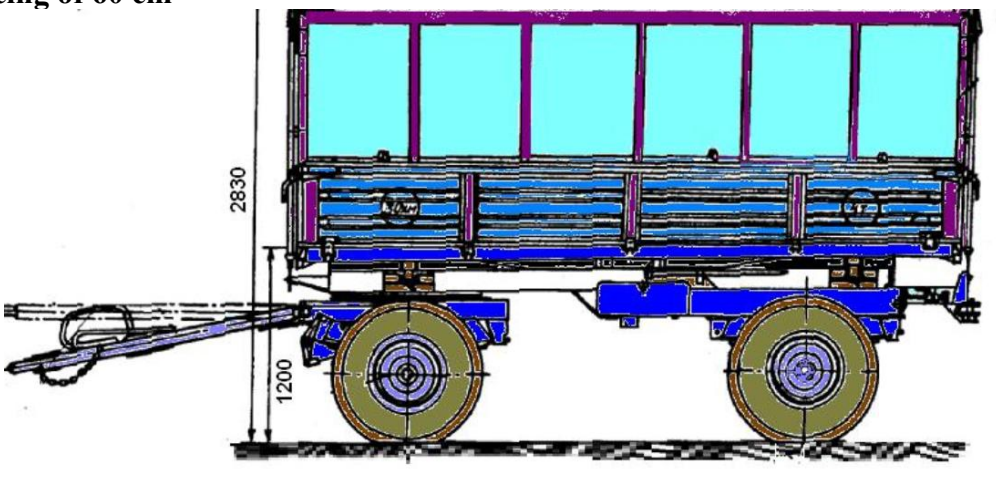


Figure 4.11. 2PTS-4-793 trailed wagon for long-distance transportation of raw cotton without trapping



Figure 4.12. PGX-0.5 brand grab loader used for loading and unloading raw cotton

To determine the net weight of raw cotton, automobile scales are installed at the procurement points. First, a wagon filled with cotton is weighed on scales, then the mass of the empty wagon is measured after the cotton is unloaded. The difference between the mass of the wagon filled with cotton and the mass of the empty wagon gives the net weight of the received raw cotton.

Before weighing a wagon filled with cotton, the classifier-commodity expert takes several samples of cotton in the first zone (Figure 5.2).

Sampling of raw cotton for the accepted batch is carried out as follows: samples of 100–150 g each are taken from at least three different depths for every two tons of imported cotton batch.

The obtained point samples are placed in a container with a capacity of 1 kg, covered with a tightly closed lid, and formed into a combined sample.

If it is assumed that the moisture content of the raw cotton is not measured, the obtained point samples can be placed in any container without removing unmixed impurities.

The combined samples are placed in large containers with a capacity of 6–8 kg, covered with tightly closed lids, and collected throughout the day according to the batches collected for each raw cotton supplier. Thus, the average daily sample is obtained.



Figure 5.4. A cotton pile widely used for long-term storage of raw cotton at procurement points



Figure 5.5. Storage (arrangement) of raw cotton on a bale plot

The cotton harvested from the farm's fields is compacted and trampled several times throughout the cotton field-consumer chain, resulting in the quality of the fiber grown by the farmer becoming significantly lower than its original quality. Cotton harvested by hand is first compacted in furrows, and if there is no trailer in the field, it is dumped at the edge of the field or in specially cleaned areas inside the field. In this case, the raw material is contaminated with plant residues and cotton leaves in various ways, and its original quality decreases. In the next technological process, the cotton is compacted once again when loading the spilled cotton into the body of a tractor trailer at the edge of the field or inside the field. In this case, 1500-1800 kg of cotton is compacted in the

body of the trailer with a volume of 15 m3, and the quality of the fiber decreases further. Harvested raw cotton is stored at cotton harvesters in open bales with a capacity of 200-300 tons each before processing.

From the tractor trailer, the cotton is transferred to the horizontal transport or receiver, after which it is delivered to the inclined transport leading to the bale. The cotton harvest loaded into the bale field is leveled by hand. After the bale is fully formed, the top and all sides are covered with solid brazen. During the storage of 200-300 tons of cotton bales for 3-4 months, air is supplied to the bales through tunnels using longitudinal and shaping machines to maintain fiber quality, and transverse tunnels are formed.

Raw materials are sent to cotton ginning plants for processing. The cotton in the bund is loaded onto a vehicle using special machines and transported to the plant. At the cotton processing plant, the raw material is first dried, and fiber, seeds, and lint are separated from it using special machines.

CONCLUSION

The following shortcomings can be pointed out regarding the separation of fiber, seeds, and lint from raw materials at a cotton processing plant from a farm field.

1. Cotton harvested by hand is often spilled inside the field or at the edge of the field, which leads to cotton contamination; furthermore, clods and plant residues enter the harvested raw material. Due to the lack of transport trailers in this process, machine-harvested cotton must also be dumped at the edge of the field. When the harvested raw material is dumped into the cotton field, cotton contamination increases.

2. The cotton spilled in the field is loaded into the trailer body by manual labor or by a loader. In this process, cotton is compacted by manual labor to more fully utilize the volume of the trailer body. This affects its contamination and fiber quality.

3. Raw materials harvested at cotton procurement sites are delivered from farms by tractor trains with 2-3 or even 4-5 trailers. And this is security 9.

4. Delivery of cotton to cotton procurement points

5. High pressure in the lower parts of the raw cotton in the formed bale negatively affects the fiber and seeds. Loading and unloading of harvested cotton in developed foreign countries, units and the technologies and machines analyzed during the scientific and design work carried out in our country recommend reducing the impact of various mechanisms and equipment in order to preserve the initial quality of the cotton grown at processing enterprises.

6. During the development of the "Cotton-Textile" cluster system, it is more appropriate for our country to apply "Module Technology." This technology is delivered to the processing enterprise without changing the quality of the cotton grown in the field, and the farm is incentivized according to the quality of the cotton grown.

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