INFLUENCE OF ELECTROFIELD AND LASER IRRADIATION ON THE COTTON FIBRE QUALITY

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ABSTRACT

Cotton fibre physico-mechanical qualities (durability, density and creeping), of grown from the preliminary influenced seeds by laser radiation and electric field, have been investigated. Increasing of density, durability and decreasing of fibre creeping was determined.

Regulation of physico-chemical structure of materials with the beforehand set characteristics is one of the most important problems in modern material-management, the ways of achieving of which can be both chemical and physical.

One of the most perspective methods, giving the possibility to change the cotton fibre characteristics and structure, in our opinion, is the method of beforesowing treatment of seeds in the electric field of high tension and under the influence of He-Ne laser irradiation (λ = 632 nm).

The investigation results of beforesowing treatment influence of cotton seeds by the electric field and laser irradiation on the physico-mechanical characteristics (durability, creeping and density) of the cotton fibre are presented in this report. The irradiation methods of seeds
are given in the paper [1]. Cotton fibres in the form of a bundle with the middle size of a single fibre cross-section 100-125 m² were used for the investigation of durability, creeping and density. The investigations were carried out at the ambient temperature 20±1°C, and the relative moisture of air 67 per cent. The duration of the preliminary samples condensation is 24 hours. At this, the moisture contents is 8 per cent from the weight. Methods of sample preparation are presented in details in the paper [2].

The investigation results are given in Fig.1-3. To find the optimal variants of the dose influence on seeds, the cotton fibre densities, grown in different conditions of beforeseowing treatment, were determined (Fig.1).

![Figure 1](image-url)

**FIGURE 1.**
Dependence of fibres density ($\rho$) on the laser power (1) and on the electric field tension $E$ (2) at the ambient temperature.

As it is seen from Fig.1, under the electric field tension $E = 400$ kV/m and laser radiation power $P = 25$ mW, the increase of fibre density value is observed. Attached to this, the influence of the electric field brings to relatively greater change of it. If for the initial fibre its density ($\rho$) consists 1482 kg/m³, then at laser irradiation influence and electric field tension, it correspondingly forms