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Researching On Improvement of Cotton Fiber Quality

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Abstract *- At the saw ginning laboratory of joint-stock company "Paxtatozalash ilmiy markazi" (Uzbekistan) scientific research work-on improving cotton fibers quality in primary ginning processing was carried out. The researches were carried out on the laboratory bench of a saw gin. Conformities to natural laws in changing defect and impurities contents in cotton fiber in dependence on raw roller density were determined. The meanings of raw roller density that must be 200-210 kg/ m3 for providing rational ginning process and for obtaining cotton fiber of high quality were chosen and grounded.*

Keywords — *ginning process, cotton fiber quality, saw gin, defect and impurities content in cotton fiber, raw roller density.*

I. INTRODUCTION

It is well known that one of the main processes in primary cotton processing is ginning. The production quality mainly depends on a right organizing the present process. Scientific research work on improving cotton fiber quality in primary processing was carried out at the ginning laboratory of joint-stock company "Paxtatozalash ilmiy markazi" [1-4]

II. MATERIALS AND METHODS

In the result of theoretical research, the formula calculating shock pulse, which effects to raw roller from the side of saw cylinder was determined.

Calculations made in the formula showed that due to decreasing raw roller mass (density) the force of raw roller and saw cylinder decreases. That is, decreasing of raw roller density leads to decreasing of seeds damage by saws teeth at entering into the raw roller that is favorable for fiber quality.

With the aim of checking the theoretical research data a number of experiments on 30-saws bench unit of saw gin was made using seed cotton Namangan 77, sort 2, class 2. The experiment s were made in accordance with elaborated methodical program. According to the program, the influence of raw roller density on the fiber and seeds quality was researched at 4 different raw roller densities.

As a control one 30 saws model of a working chamber serial gin ДП-130 was used. For providing in the experiments constant loading in saw gin and for creating identical working regimes the intensiveness seed cotton feeding into the working chamber was regulated in such way as constantly to keep up the current force used by power engine of the saw cylinder drive on the same level.

The current force used by the power engine of the saw cylinder drive was controlled by reading an ammeter in the chain of the saw cylinder power drive. In all experiments, the current force was kept up on the level of nominal current value, of power engine loading on 30 saws saw gin bench unit.

Undertaking of the test preceded the adjustment, regulation and rolling of working chamber on been singled to move and under load. Before beginning of the test, during 15 minutes was producing product in its raw state platen on exercised and checking working chamber.

Then with displacement the handle regulation of power were conducted experiments for determination the mode of ginning, providing alike capacity on both stand installation of gins. At value the current of load electric motor of the drive saw cylinder, defined on evidence comprised of chain of the ammeter, did not exceed nominal importance. Hereon on found mode were conducted comparative tests of experimental and checking working chambers. On

termination of the experience was thrown and weighted pat product in its raw state platen, was defined its density, was weighted produced for time of the experience amount filament, and was defined capacity of the gin also specific consumption of electric powers.

Density pat product in its raw state platen was defined on formula:

$$\rho = \frac{m}{V}$$

where, ρ - density pat product in its raw state platen, kg/m^3

m - mass (weight) pat product in its raw state platen, kg

V - volume of working chamber of the gin, m^3

The consumed with gin power was calculated on formula:

$$N_{con} = 3 \cdot U \cdot I \cdot cos\varphi \cdot 0{,}001$$

where, N_{con} - the consumed with gin power, KW·h/t

U - voltage, V

I - power of current, A

$cos\varphi$ - factor of power

Specific consumption of electric power was defined on formula:

$$q = \frac{N_{con}}{P}$$

where, N_{con} - the consumed with gin power, KW

P - capacity of the gin on filament, t/h

III. RESULTS AND DISCUSSION

The experiments were made 3 times. The period of doing each experiment was fixed with the help of stop-watch. After each experiment, three samples for laboratory analysis were chosen. Qualitative value was made by laboratorial analysis of middle fiber and seed samples after gin.

To define the dependence of changing qualitative fiber indexes on the raw roller density and to exclude their influence of fiber cleaner, the quality of fiber taken immediately after gin was valued. The diagrams of changing qualitative fiber and seeds indexes in dependence on changing raw roller density are given fig. 1-6.

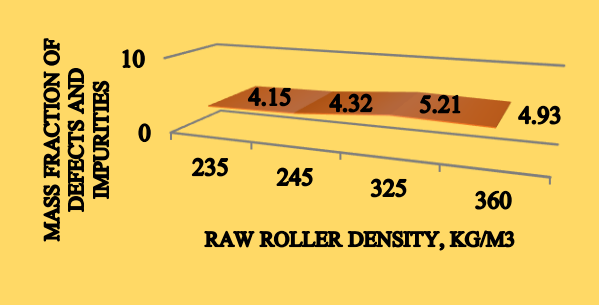

Fig.1. Changing mass fraction of defects and impurities in the fiber after gin in dependence on raw roller density

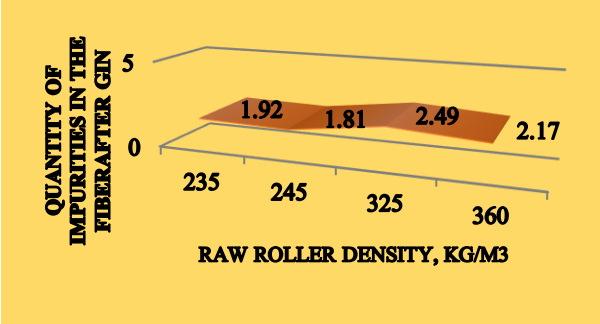

Fig.2.Changing the quantity of impurities in the fiber after gin in dependence on raw roller density.

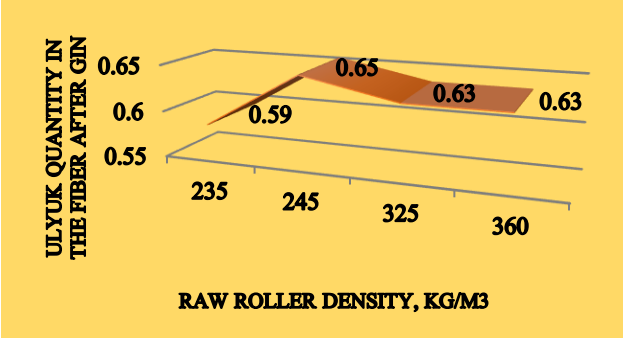

Fig.3. Changing the ulyuk quantity in the fiber after gin in dependence on raw roller density

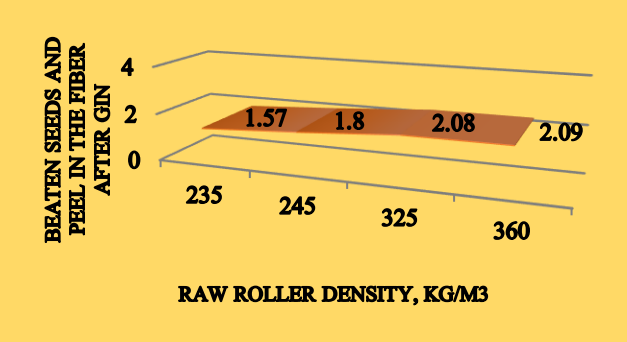

Fig.4. Changing the quality of beaten seeds and peel in the fiber after gin in dependence on raw roller density.

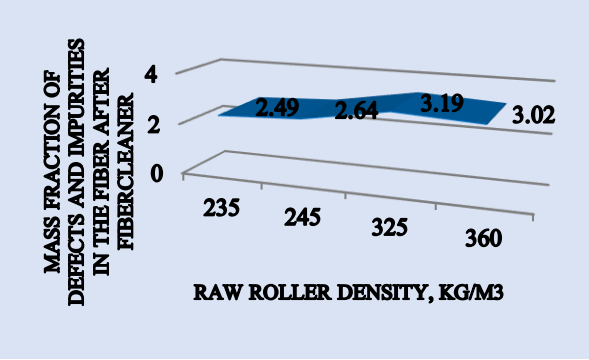

Fig.5. Changing mass fraction of defects and impurities in the fiber after fibercleaner in dependence of raw roller density

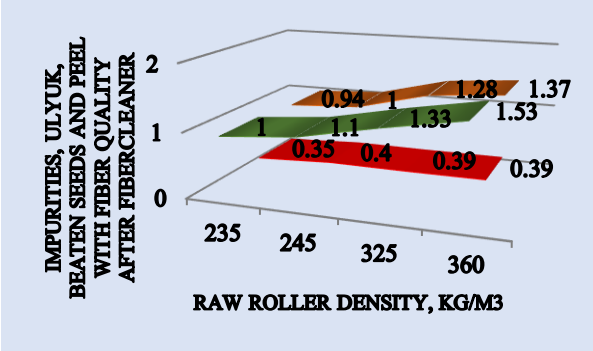

Fig.6. Changing impurities, ulyuk, beaten seeds and peel with fiber quality after fibercleaner in dependence of raw roller density

As it can be seen from the given data density value of raw roller essentially influences not only on many indexes of ginning processes but also on the quality of the production [5-8]. Analyzing the results in seed cotton processing Namahgan 77, sort 2, class 2. It is necessary to note that decreasing raw roller density leads to increasing the fiber quality.

For example a t raw roller density 325kg/m3 mass share of defects and impurities in the fiber after gin is 5,21 % (abs) , and after fiber cleaner -2,49 %(abs). The same indexes at raw roller density 245 kg/m3, accordingly -4,32 % (abs) and 2,64 %(abs), but at 235 kg/m3 -4,15%(abs) and 2,44 %(abs).

Increasing fiber quality is mainly at the expense of decreasing the impurities beaten seeds and peel with the fiber. Decreasing beaten seeds and peel with the fiber is caused by forming “soft” (less dense compared with one in serial working chamber) raw roller, as at entering the saw into “soft” raw roller its teeth less damage the seeds.

So we can say that experimental research completely confirmed the correctness of the theoretical research results and showed that with decreasing raw roller density the fiber quality increases.

IV. CONCLUSIONS

Theoretical and experimental research showed that the raw roller density essentially influences on the fiber quality. It was defined that with decreasing raw roller density fiber and seeds quality increased.

The meanings of raw roller density, which must be 200-210 kg /m3 for providing rational ginning process were chosen and argued.

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