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EFFECT OF THE COTTON LOOSENING DEVICE IN THE DRYING DRUM ON THE DISTRIBUTION OF COTTON

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Anonotation
In this article, on the basis of experiments, the looseningand distribution of cotton used in cotton ginneries as a result of movement in drying drums is studied. A cotton baking powder device was installed on the laboratory stand, research experiments were carried out in various versions, the movement of cotton was recorded on video and photo, and then the results of calculations obtained by the planometric method were presented.

Key words: raw cotton, wetness, drying, dryer drum, raw cotton, humidity, drying, tumble dryer, tumble dryer, trash, heat flow, loosening factor, fiber and seed density. cotton cleaning, peg drum.

At the cotton ginning plants of the Republic of Uzbekistan, 2SB-10 and SBO drying drums are used for drying cotton, and a cleaning stream consisting of a brand of cleaners 1XK and MCX [1] is used for cleaning.
The drying drum is partially cleaned along with the cotton drying in the SBO. In the cleaning stream, cotton is cleaned in 32 barbeddrums and up to 4 saw blade drums. During the cleaning process, cotton is subjected to the maximum possible mechanical impact. Therefore, the installation and use of additional cleaners to increase the efficiency of cotton cleaning leads to an increase in weeds in the fiber [2,3].
From studies [4,5,6] it is known that the overall cleaning efficiency of the technological processes of the cotton ginning plant can be increased by additional cleaning of cotton in the drying drum SBO. But the cleaning efficiency of the SBO dryer is low, it is 10-15%.
Analysis of the cotton cleaning process in the drum showed that the debris on the surface of the cotton is separated by hitting the cotton falling from the cotton blade on the mesh surface at the bottom of the drum.
In this case, there will be no additional separation of litters until the fallen cotton covers the surface of the mesh and rises to the top and falls from the shovel [7].

It is recommended to install a cotton baking powder device in the cleaning section of the drum to ensure the separation of the debris from the cotton in the discharge zone and to increase the size of the mesh surface involved in the cotton spread.

The device consists of a pipe 3 m long and piles installed on it and is attached to the surface of the drum on both sides with the help of 3 pipes with a diameter of 50 mm.

On the laboratory stand [7,8] it was established that the presence of 4 rows of pegs with a diameter of 25 mm, a height of 250 mm and a distance between the colcomas of 400 mm has a positive effect on the quality of cotton loosening .

Experiments were carried out on cotton of the breeding variety C6524, the initial humidity is 11%, weediness is 7.6%, the productivity is 6-9-12 t / h, the drum speed is n = 10-12 rpm.

The amount of cotton placed on the laboratory stand was determined by the following formula.

$$M_n = \frac{l}{L} \cdot G \frac{\tau}{60} \text{Kg} \qquad (1)$$

where: ɩ and L are the width of the laboratory bench and the length of the drying drum, respectively;

G-capacity of the drum kg/h;

τ-inthe belt of drying cotton in the drum, min.

The movement of cotton was recorded on video and photographs, and then using a planometric method, the size, quantity, effective diameter, total surface area and the coefficient of use of cotton lumps in the fall zone were determined.

The effective diameter d_{eff} in the cotton drop zone was determined by the following formula [4].

$$d = \frac{d_1 S_1 + d_2 S_2 + \ldots + d_n S_n}{S_1 + S_2 + \ldots + S_n} \qquad (2)$$

Где: D_1, D_2... d_n - диаметр комков хлопка в зоне падения;
S_1, S_2... S_n-пповерхность комков хлопка.

The utilization factor of the drop zone K_P was determined by the following formula.

$$K_n = \frac{\sum_{i=1}^{n} S_n}{S_\Pi}$$

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where $\sum_{i=1}^{n} S_{\Pi}$ - the sum of the surfaces of the lumps of cotton in the fall zone:
S_P is the surface of the fall zone.

(a) Q=9 t/h (b) Q=12 t/h

Rice. 2. Distribution of cotton when installing a barbedpipe in the center of the experimental equipment.

(a) Q=9 t/h (b) Q=12 t/h

Fig.3. Distribution of cotton on the surface of the drum in the case of placing the tube without a peg center of experimental equipment

Figures 2 and 3 show the distribution of cotton obtained in the variants when the cotton is placed in a drum with 6 blades at an angle of φ = 50 from the radial direction and installed in the center of the pipe with a rod of 400 mm. It can be seen that the setting of the blades $\varphi = 5^0$ eliminated the gap on the lifting side.

In the case when a pipe with pegs d = 400 mm is installed in the center of the drum, the cotton falls on the pipe and with the help of pegs partially unfolds on the right side, as a result of which the empty zone is reduced. But there was a space at the bottom of the pipe.

In Fig. Figure 3 shows the distribution of cotton in the version with a pipe without pegs, while the space at the bottom of the pipe is not eliminated.

The performance of the dryer did not significantly affect the nature of the cotton distribution.

Analyzing the results obtained, in the case when a pipe with a diameter of d = 100 mm is installed in the center of the drum, the drum is filled with cotton and in other variants its uniform distribution is used, it showed that it is relatively high.

The obtained results are analyzed in the version when a pipe with a diameter of d = 100 mm is installed in the center of the peg drum.

options are the use of cotton dressing in the drum and an even distribution of the droplet zone. Pproved to be relatively high.

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(b

(a) Q=9 t/h

4-rasm. Distribution of cotton in the drum when installing a pipe with a diameter of d = 100 mm in the center of the experimental equipment.

In this version, a number of experiments were conducted to study the distribution of cotton on the surface of the cross-section of the drum.

The results of the experiment are presented in Figures 5-7.

The size and surface of cotton particles were determined using tracing paper divided into 2x2 mm cells. Table 1 shows the total surfaces of raw cotton particles in the tested versions.

It was found that the surface area in the cotton fall zone is higher for split pipes with a diameter of d = 100 mm compared to other options, and the surface area of the cotton-free zone is the maximum number of bladeswithtand covered with a minimum of cotton.

Table 1 Resource requirements by component Change of cotton surfaces in the drum

№	Index	Intermsof experience							
		Acting		Tubes with peg d=400 mm		Tubes without barbsin d=400 mm		Tubes with peg d=100 mm	
		Capacity, t/h.							
		9	12	9	12	9	12	9	12
1.	Total surface area of cotton, m^2	3,91	4,133	4,345	5,194	4,938	5,252	6,384	7,046
2.	Springzone of fall cotton-raw, m^2	2,072	2,081	2,226	2,879	2,483	2,602	3,134	3,296
3.	Surface area on cotton blades, m2	1,838	2,052	2,119	2,315	2,455	2,65	3,25	3,75
4.	Free area in the fall zone, m2	1,728	1,718	1,573	0,919	1,314	1,198	0,666	0,504
5.	Number of bladeswithtyakh with cotton coating	6,5	6	7,5	7,5	7,5	8	8,5	8,75
6.	Fall Zone Utilization Rate	0,55	0,55	0,59	0,76	0,65	0,68	0,82	0,87

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The fall zone utilization rate was 0.87.

Charts in Fig. 5 show that the effective diameter of clumps of cotton in the zone of the drum fall is large depending on the performance.

In particular, with a capacity of 6 t/ h deff = 37.9 cm, pri 12 t / h it is 62.7 cm, that is, it has increased by 1.65 times.

Due to the increase in productivity, the amount of cotton in the drum increased from 600 kg to 1200 kg, that is, it doubled.

It has been observed that the total cotton area in the fall zone increases with increasing productivity.

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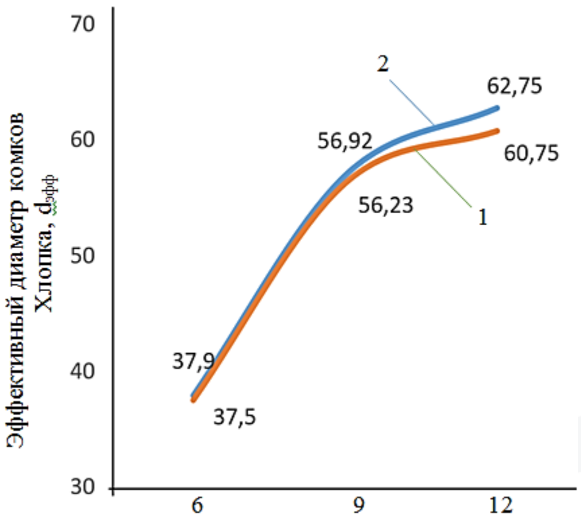

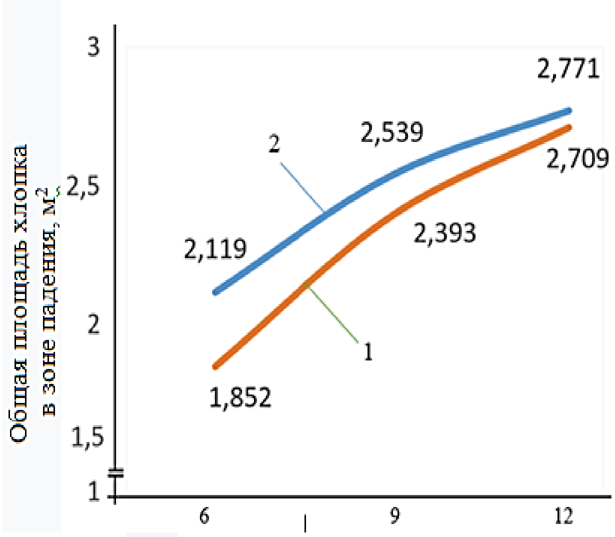

Capacity t/h Capacity t/h

1. n=10 about/мин; 2. n=12 about/min.

1. n=10 about/мин; 2. n=12 about/min.

Rice. 5. Performance Impact

on the effective diameter of the lump of cotton in the drop zone

Rice. 6. Performance effect on the total surface area of cotton in the fall zone.

It was observed that the total cotton area in the fall zone increased with increasing productivity (see Figure 6).

Cotton surface S_T=2,119 m2 with a capacity of 6 t/h, 2,709 m2 at 12 t/h (at n=10 rpm). With an increase in the number of revolutions of the drum from 10 rpm to 12 rpm, the area increased from 1852 m² to 2771 m². However, the increase in surface S_T is less

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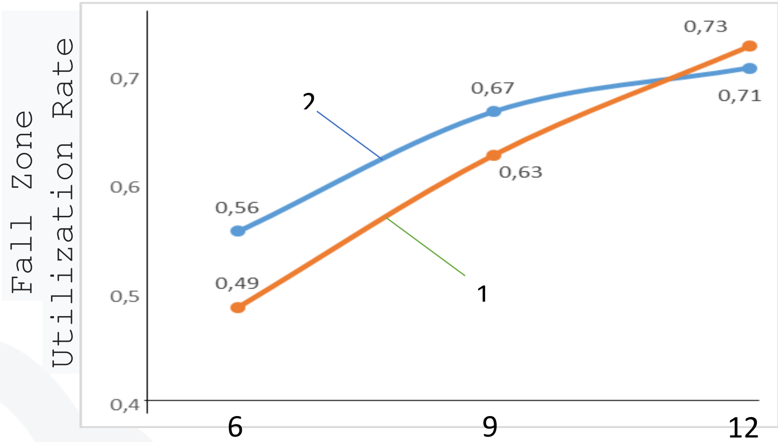
than the increase in productivity, with an increase in productivity by 2 times, S_T increases by 1.28 times.

However, with the increase in productivity, the utilization rate of the K $_t$ zone increased by n = 10 m / min, the productivity was 0.56 with 6 t / h and 0.71 at 12 t / h (Fig. 7).

But the increase in the Kton coefficient is less than the rate of performance, and this can lead to some increase in the density of cotton.



Capacity t/h 1. n=10 rpm; 2. n=12 rpm;

Rice. 7. Performance Impact on Utilization fall zones

In addition, in the above variants, in the zone of fall and in addition to the value of the total surface of cotton, its density and air heat, thelag exchange is considered a factor affecting the separation of impurities.

As cotton density decreases, it becomes easier for hot air to penetrate between clumps of cotton, and the contact area with cotton increases.

The results obtained from the calculation of cotton density and cleaning efficiency in a known drum drop zone are presented in Table 2.

Table 1 Resource requirements by component

Results of calculation of cotton density and cleaning efficiency

№	Capacity t/h	Cotton weight in the Q_T drop zone	Coefficient a¹	Maximum surface of cotton between the blades coming out of the drum, m²	Коэффициент ξ	Cotton density ρ_T кг/м³	Cotton weediness, %		**Cleansing effect, %**
							Initial	After the drum	
1	6	171,4	0,2	0,282	13,3	9,21	7,4	5,61	4,2
2	9	321,4	0,147	0,301	2,7	15,82	7,4	5,75	22,3
3	12	428,6	0,1	0,322	12,1	25,35	7,4	6,04	18,4

Findings:

1.Increasing productivity from 6 t/h to 12 t/h, reducing the value of the coefficient x, which characterizes the increase in the fall surface of cotton from shovels, as a result of a decrease in the density of cotton in the fall zone, its density increases from 9.21 kg / m^3 to 25.35 kg / m^3.

2.As a result of blows to the pipe with cotton spikes descending from the blades, it was noticed that impurities separated and collided with the mesh surface before cotton, and cotton was captured by the piles of the pipe and its movement slowed down for a short time.

As a result, the separation of the sora is improved, in addition, another blade is added, simultaneously participating in cleaning, the surface of which is 2.4^{m2}.

3. Cotton cleaning efficiency ranged from 18.4% to 24.2% depending on performance. The results obtained showed that the installation of a blade with an angle of $\varphi = 5^0$ and the use of a baking powder device are effective.

References

1. Scientific Center of Cotton Industry. 2017. Coordinated technology of primary processing of cotton (PDI 70-2017). Uzpakhtasanoatexkspert LLC.
2. Parpiyev A., Sharakhmedova M. Analysis of deformation of cotton in technological processes. International Jurnal of Emerging Trends in Engineering Research 8(9), September 2020, 6618-6622.
3. Parpiyev A.P., Kayumov A.H., Pardayev H.N. Effect of temperature of steady heating components of cotton-seed at drying process // Europen science review-vienna №7-8.2016 p.205-207.
4. I. D. Madumarov Improving the efficiency of the cleaning process of cotton on the basis of alternating heat and humidity and uniform supply // Doctor of Technical Sciences (DSs) dissertation. Tashkent. 190 p. (2019).
5. A.Djuraev, O.Rajabov. Experimental study of the interaction of multifaceted and cylindrical spinky cylinder in cotton cleaner from small waste. Scopus. International journal of advanced research science. Engineering and technology. Volume-6, Issue-3, march (2019, p. 8382-8387).
6. Akhmatov N. M., Toshkulov I. S., Akhmatov M., Kosimov O. Z., Usmanov Kh. S. Productiontests of the modernized drying and cleaning drum. International scientific and practical conference "Scientific and practical research". ISSN 2541-9528. No 8.3 (23). December 2019 18-28 pp. Omsk 2019. http://weeqly.ru E-mail hello@weeqly.ru.
7. N.M.Akhmatov., M.Akhmatov., Kh.S. Usmanov., A.E.Tangirov., Kosimov O.Z.

Construction of a registration model for drying and cleaning of raw cotton. U55 Universum: Technical Sciences: Scientific Journal. – No 12(69). Part 2. M., Ed. "MCNO", 2019. – 76 p. – Electron. version of the furnaces. Publish. – http://7universum.com/ru/tech/archive/category/1269.

8. Usmankulov A.K. Creation of a high-performance cotton-drying plant and technology based on the intensification of heat-mass transfer processes // Dissertation for the degree of Doctor of Technical Sciences Tashkent, 2016. p. 190.
9. Эшмуродов, Дилмурод, Зухра Давлатова, and Нилуфар Хашимова. "ПАХТАНИ ҲАВО ОҚИМИДАН АЖРАТИШ ЖАРАЁНИДА ТЎРЛИ ЮЗАНИНГ ЧИГИТЛИ ПАХТАГА ТАЪСИРИНИ ТАҲЛИЛИ." Eurasian Journal of Academic Research 2.13 (2022): 218-225.
10. Khodjiev, M. T., Eshmurodov, D. D., & Ortiqova, D. A. (2021, December). Study on the development of improved routing technology of CC-15A cotton separator. In IOP Conference Series: Earth and Environmental Science (Vol. 939, No. 1, p. 012070). IOP Publishing.
11. Navruzov, N. A., Eshmurodov, D. D. Ў., Yakubov, K. N. Ў., & Abdumazhidov, A. (2022). THE INFLUENCE OF COTTON STRUCTURE ON THE PRODUCTIVITY OF GIN. Universum: Technical Sciences,(7-2 (100)), 35-38.