International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 06 ISSUE 06 Pages: 30-35
OCLC – 1368736135

Journal Website: http://sciencebring.com/index.php/ijasr

Research Article

Fibrous Waste Processing Technology

Submission Date: April 25, 2026, **Accepted Date:** May 22, 2026,
Published Date: June 11, 2026
Crossref doi: https://doi.org/10.37547/ijasr-06-06-04

Shodmankulov Alisher Mamatkulovich
PhD, Associate Professor, Jizzakh Polytechnic Institute Jizzakh region, Republic of Uzbekistan

Yuldasheva Mavlyuda Toramurodovna
Associate Professor, Jizzakh Polytechnic Institute Jizzakh region, Republic of Uzbekistan

Abstract

The article proposes a new technology based on the analysis of the current state of processing of fibrous waste. On the basis of the research carried out at the plant, the efficiency of the dinning of a mixture of fibrous waste with progenied seeds in a gin regenerator is justified.

Keywords

Fiber, fiber waste, fiber suitable for spinning, cleaner, gin, regenerator, condenser.

Introduction

One of the possibilities for increasing the fiber yield from cotton in cotton ginning enterprises is to separate and clean the fibers suitable for spinning from the fiber waste. The waste mixture leaving the fiber cleaner contains up to 60% fiber. Fiber loss occurs due to the lack of effective technology for processing fiber waste leaving the gin, fiber cleaner, and fiber condenser.

Methodology

The scheme of the technology for processing fiber waste in accordance with the requirements of the "Cotton Primary Processing Harmonized Technology (PDI 70-2017)" at all cotton ginning enterprises is presented in Figure 1.

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 06 ISSUE 06 Pages: 30-35
OCLC – 1368736135

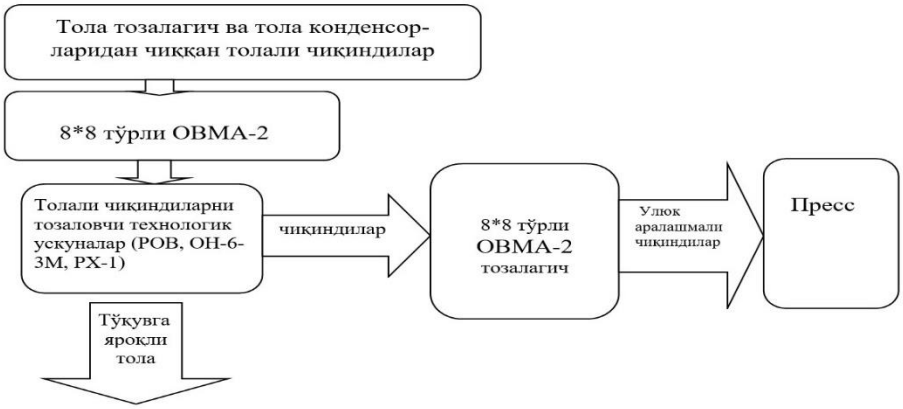

Figure 1. Technological scheme for processing fibrous waste

According to the technological scheme, fibrous waste is cleaned in an OVMA-2 cleaner, and then re-cleaned in a fiber waste cleaning device. In practice, regenerator ROV cleaners, RX and ON-6-3M were used to clean fibrous waste. The cleaning efficiency of the OVMA-2 and ON-6-3M cleaners is 60-65%, respectively, which leads to the loosening of the fibrous mass during the cleaning process, which makes it difficult to separate the fiber from the waste. Although the cleaning efficiency of the ROV and 2ROV regenerators is 85 and 60%, respectively, they are complex in design, have high metal and electrical energy consumption, are unreliable in operation, and have been removed from production due to the high fiber content in the separated waste (32-41%). The cotton regenerator RX-1, recommended for cleaning fibrous waste, was not put into production due to its low cleaning efficiency (24-47%).

As a result of the conducted research, it was recommended to add the separated and cleaned fibers from the fiber waste in two options - to the cotton before the gin and to the main fiber flow before the condenser. Experiments have shown that the implementation of such a technology leads to a decrease in the quality of the fiber.

To solve this problem, a new effective technology for processing fiber waste from the fiber cleaner is proposed, in which fiber waste is mixed with the ginned seeds and ginned in the gin regenerator, and then the separated fibers and seeds are cleaned in the cleaners (Figure 2). The main task of the proposed technology is to sufficiently clean the fiber obtained from the fiber waste and sell it at fiber prices.

Depending on the impurities in the cleaned fiber, it can be added to the main fiber flow or separately. This technology uses the existing gin-regenerator 1DR-119 for separation and cleaning of fiber from waste, and there is no additional cost for it.

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 06 ISSUE 06 Pages: 30-35
OCLC – 1368736135

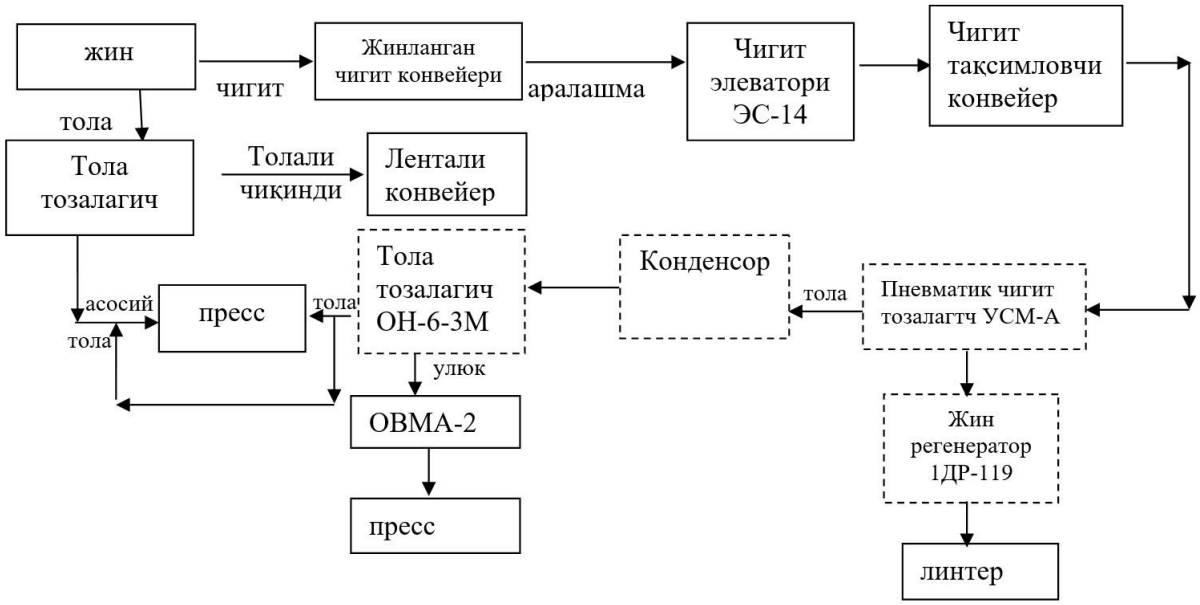

Figure 2. Recommended technological scheme for cleaning fibrous waste

To implement the proposed technology, additional belt conveyors, a gin-regenerator 1DR-119, a fiber cleaner ON-6-3M, and a pneumatic seed cleaner USM-A will be installed at cotton ginning plants.

The fiber cleaning capabilities of existing and proposed fiber waste processing technologies were analyzed. Their overall cleaning efficiency is determined by the following formula.

$$K = \left[1 - \left(1 - \frac{K_1}{100}\right)\left(1 - \frac{K_2}{100}\right)\right] * 100$$

Where K1, K1 are the cleaning efficiency of fiber cleaners, respectively, in%. The overall cleaning efficiency can also be determined by the formula below.

$$K = \frac{C_1 - C_2}{C_1} * 100$$

Here, the dirtiness of S1, S2 fiber at the bottom of the main fiber cleaner after ginning and the dirtiness before sieving,% Then from (1) and (2)

$$C_2 = C_1\left(1 - \frac{K_1}{100}\right)\left(1 - \frac{K_2}{100}\right)$$

RESULTS

In the existing technology of processing fiber waste, fiber can be cleaned in the OVMA-2 +ON-6-3M or OVM-A- II +RX-1 scheme, and in the new technology, it is cleaned in the 1DR-119 +OVM-6-3M scheme. In order to determine the efficiency of cleaning 1DR-119 when ginned with mixed fiber waste, experimental tests were conducted at the Dalvarzin cotton ginning enterprise together with the employees of the Tashkent Regional Branch of the Cotton Industry and the Cotton Industry Scientific Center. The experiment was conducted on cotton of the 2nd industrial grade An-Bayavut-2 selection, 2nd class, with an initial

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 06 ISSUE 06 Pages: 30-35
OCLC – 1368736135

ISSN-2750-1396

moisture content of 18.4% and an impurity of 9.6%. In this case, the moisture content of cotton in the 5DP-130 gin tray was 9.6% and the impurity was 2.5%. During the experiment, samples were taken from the gin 5DP-130, fiber cleaner 2VPU, waste, 1DR119 gin regenerator tray and after it and after the condensers to determine fiber impurities, staple mass length, grain hairiness, and damage. The results of the experiment are presented in Table 1.

Table 1

Results of processing fibrous waste mixed with ginned grain in the 1DR-119 gin regenerator

№	Indicators	5DP-130 after demon	1DR-119 in the genie regenerator		
			before	after	Cleaning efficiency
1	Amount of defects and impurities in the fiber,%	4,4	48,14	10,0	79,2
	Including -large impurities -large -broken seeds -fibrous seed husk -fine impurities -complexly tangled fiber	 0,89 1,25 0,59 0,48 0.69 0,5	 20,2 18,73 4,21 1,3 3,7 -	 2,45 3,03 1,42 1,2 1,9 -	 87,9 83,8 66,3 7,7 48,6 -
2	Fiber content in the product,%	95.6	51,86	90,0	
3	Fiber staple length	32,0	-	30.0	
4	Fiber grade and class	2(o'rta)	-	3(iflos)	
5	Seed hairiness	13,1	-	11,6	
6	Seed damage,%	1,5	1,5	3,6	

According to the results of Table 1, the fiber staple length produced in the 1DR-119 gin regenerator was 2 mm different from the fiber staple length obtained from the 5DP-130 gin, and corresponded to the 3rd grade "dirty" class in terms of quality.

The productivity of the gin 5DP-130 was 2188.8 kg/h in fiber, 4910 kg/h in seed, and the amount of fiber waste separated per hour was 76.5 kg/h. The cleaning efficiency of the gin regenerator was high, reaching 79.2%, including 87.9% and 83.8% in large impurities and filth, respectively.

Since the fiber extracted from the fiber waste contains 10% impurities, it is one grade and two classes lower than the main fiber produced, meaning it is sold at a price 11.5% lower than the

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 06 ISSUE 06 Pages: 30-35
OCLC – 1368736135

ISSN-2750-1396

main fiber. To increase its price, that is, to increase its grade and class, it must be further cleaned or mixed into the main fiber stream if it does not affect the class.

Using Formula 1, the cleaning efficiency of existing technologies can be determined.
Fiber waste cleaning in the OVM-A-11+ON-6-3M variant

$$K = \left[1 - \left(1 - \frac{60}{100}\right)\left(1 - \frac{65}{100}\right)\right] * 100 = 86{,}0\%$$

OVM-A- II +RX-1 variant

$$K = \left[1 - \left(1 - \frac{79}{100}\right)\left(1 - \frac{65}{100}\right)\right] * 100 = 92{,}7\%$$

$$K = \left[1 - \left(1 - \frac{60}{100}\right)\left(1 - \frac{40}{100}\right)\right] * 100 = 76{,}0\%$$

iant

ator

variant has the highest cleaning efficiency.
Although the OVMA-2 variant of the cleaner also has a high cleaning efficiency (86.0%), this option cannot be used due to the low percentage of fiber separation from waste and fiber loss.
It should be noted that in the gin regenerator, the residual fibers in the seeds are also separated and the amount of fiber produced is found as follows:

$$M_{эс.р} = M_{т.т} + M_{к.т} = \frac{M * (T_1 - T_2)}{100} + \frac{M_{т.у} * B}{100}$$

Where Mt.t and Mq.t - the amount of fiber extracted from fiber waste and residual fiber seeds, respectively, kg; M-gin 5DP-130 productivity in terms of seeds, kg/h; T1, T2 - the total fiber content before and after the gin-regenerator, respectively,%;
Mt.u - the amount of fiber waste leaving the fiber cleaner 1VPU, kg/h;
V-fiber waste fiber recovery percentage,%;

We determine the amount of additional fiber obtained using the experiment conducted at the Dalvarzin cotton ginning enterprise.

$$M_{эс.р} + \frac{4910 * (13{,}1 - 11{,}6)}{100} + \frac{76{,}5 * 51{,}84}{100} = 113{,}8 кг / coam$$

Or it constitutes additional fiber compared to the cotton being processed

$$\Delta B = \frac{M_{эс.р}}{M_{\eta}} * 100 = \frac{113{,}8}{7200} * 100 = 1{,}6\%$$

The results obtained showed the advantages of the proposed fiber waste processing technology. However, it should be noted that in some cases, the addition of regenerated fibers to the main fiber stream can reduce the quality, i.e. grade, of the fiber. Therefore, it is necessary to clarify the issue of whether or not to add the fiber separated from the waste to the main fiber produced, based on the initial impurity of the cotton and the cleaning efficiency of the cotton ginning enterprises.

Conclusion

1. A new technology for processing fiber waste was recommended. In this technology, the fiber waste coming from the fiber cleaner is mixed with the ginned seeds and fed to the gin-regenerator, and fiber separation from the gin is carried out together with cleaning, and residual fiber seeds are ginned.
2. As a result of the experiment conducted in production conditions, the advantages of gin-regenerator ginning of fiber waste over existing technologies (resource-saving, high efficiency of fiber separation and fiber cleaning) were substantiated, and it was shown that it is possible to obtain fiber that meets the standard requirements.
3. It was determined that additional research should be conducted to clarify the issue of adding

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 06 ISSUE 06 Pages: 30-35
OCLC – 1368736135

ISSN-2750-1396

the fiber extracted from the fiber waste to the fiber produced, depending on the type and grade of cotton being recycled, or to sell it separately, depending on its impurity.

REFERENCES

1. Coordinated technology of primary cotton processing (PDI702017). "Uzpakhtasanoateksport" holding company, "Cotton Industry Scientific Center" JSC. Tashkent, 2017. S,4.
2. Sobirov K. The effect of adding fibrous waste to cotton on the quality and yield of the fiber. // Textile Problems. T.2006.N2 B.94-96. S,18.
3. Temporary recommendations for processing fibrous waste at cotton mills POH, 174-2003 NPO "Khlopkoprom", Tashkent 2003.S,12.
4. Issledovanie i analiz effektivnosti deystvuyushchih system po regeneration ulyuka na khlopkozavodakh i vybor optimalo varianta pererabotki ulyuka, report, theme 9426, NPO "Khlopkoprom", Tashkent 1994.S, 63,
5. Sobirov I. Q., Kushakaev B.Ya., Anvarov A.M. Issledovanie regeneratora RX-1 pri ochistki ulyuka soderzhashchikh otkhodov khlopkozavodov // Problemy tekstilya 2010, No. 8, S.5-9.