

# Investigation of the Effect Of 5lp Liners on Seed Lintering Process and Product Quality in A 30-Saw Stand View with Existing and Improved Blade Mixers

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## Abstract

Comparison-experimental work was carried out in laboratory conditions on the 5LP linter with an improved mixer 30 saw, with selected blades bent 60 degrees towards the rotation of the seed roller with the existing mixer 30 saw linter. In the comparison work, it was studied that the productivity of the linters, the quality of the produced seed and fluff in the proposed mixer linter, when the distance between the saw cylinder and the mixer blades is changed by 9-12 mm, is higher than that of the 30-saw linter with the existing mixer. Especially, during the period of comparison-experimental work, when the distance of the improved blade mixer with a saw cylinder is changed by 9-10 mm, the hairiness level of the seed produced from the linter of Namangan-77 selection grade I technical seed in the 5LP linter is on average 6.78% to 7.0%. UzDst 596:2016 showed that it fulfilled the requirements of the state standard. The quality of seed produced improved from 0.33 (abs)% to 0.17 (abs)%, and the quality of lint improved from 0.54 (abs)% to 0.8 (abs)% compared to the quality of seed produced from the existing mixer linter. In this case, the linter's seed productivity was 28 kg/h and 10 kg/h higher than the existing mixer linter's seed productivity. The staple length of the produced fluff was 6/7 mm, it was one class higher than the improved quality and according to the state standard UzDst 645:2016, it corresponded to the class I grade B type "Middle".

The results of the comparison-experimental work conducted on the 5LP linter with 30 blades showed that the efficiency of the linter with improved mixing blades is higher than the efficiency of the linter with the existing design mixer. In the proposed mixing linter, the distance between the saw teeth in the saw cylinder with the improved blades in the mixer is 9 mm and 10 mm. it was recommended to take 12 mm when lintering seeds .

**Keywords:** Linter, mixer, parrack, saw cylinder, saw, seed, lint, performance, hairiness, damage, dirt, quality.

## Introduction

For 5LP linter, the results of the research conducted on the effect of the agitator with blades bent at 30, 60 and 90 degrees towards and against the rotation of the seed roller on the performance of the linter, the improvement of the quality of the produced seed and fluff, in the direction of the rotation of the seed roller. The use of a stirrer with blades in the working chamber of a 30-saw linter showed that the linter process was effectively carried out without interruption with an increase in linter productivity, improvement of seed and lint quality compared to others [ 1]. Taking these into account, the ends of the improved blades were bent to 60 degrees towards the rotation of the seed roller and obtained as an alternative size [2].

Comparison-experimental work was carried out on the mixer with the blades of the existing construction and the mixer with the improved blades of alternative size (Figures 1, 2). Experiments were carried out on a 5LP linter with 30 saws. Effect on seed linting process, linter performance, seed and fluff quality by changing existing and improved mixer blades with saw cylinder in the 9-12 mm range.



1- working camera, 2- improved blades , 3- saw cylinder, 4- density valve .

Picture 1. Agitator working chamber with improved fins bent at 60 degrees



Picture 2. Improved view of a 30 saw 5LP linter with an agitator.

was studied. During the research period, samples were taken from the seeds fed to the linter and produced from the linter, and from the fluff after the linter, and analyzed in the technological laboratory. In order to determine the performance of the linter in terms of seed and fluff, the seed and fluff produced in each 5-min interval were weighed and averaged. In order for the results to be accurate, the samples were taken 7 times and their average values were determined.

Experiments were carried out on Namangan-77 selection technical seed with an average hairiness of 10.3%, damage of 3.14%, and moisture content of 8.34%.

Experiments were initially carried out on a 30 saw 5LP linter with an existing blade mixer. The results are presented in Table 3.9, Figures 3.27 and 3.28.

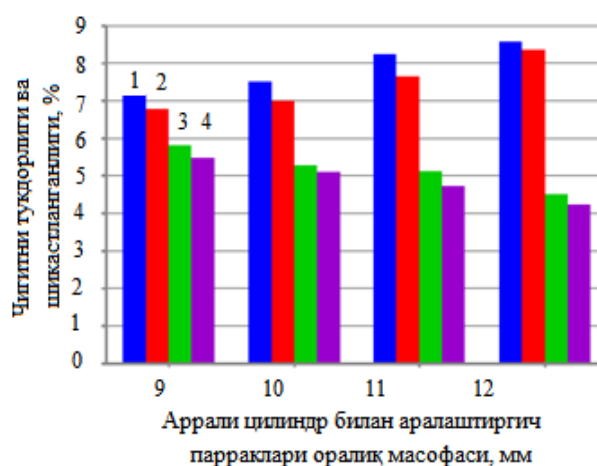
From the table, it can be seen that when the distance between the saw cylinder and the mixer blades changes from 9 mm to 12 mm, the hairiness of the seed after linter increases from 7.16 %

to 8.57 %. Seed damage rate decreased from 5.81% to 4.5% (Figure 3). The mass fraction of impurities and whole seed in lint produced from seed linting decreased from 6.38% to 6.1%. In this case, when the distance between the saw cylinder and the mixer blades was changed from 9 mm to 12 mm, the fluff removal from the seed surface was on average 3.11% and 1.51%. The staple length of the produced fluff is on average 6/7 mm, and according to the quality indicator, according to the state standard UzDst 645:2016, it corresponded to the class I grade B type "Iflos". In the process of linting, the productivity of the linter for seed decreased from an average of 150 kg/h to 128 kg/h, and the productivity of lint decreased from an average of 5.48 kg/h to 4.8 kg/h. Namangan-77 selection grade I technical seed with an average hairiness of 10.3%, damage of 3.14%, and moisture content of 8.34% from sawn gin produced in a 30-saw 5LP linter with an improved mixer had an improved blade spacing of 9 mm to 12 mm, post-linter seed hairiness averaged 6.78% to 8.16%, compared to seed hairiness produced from a 30-saw 5LP linter with an existing agitator with a saw cylinder and agitator blades spaced from 9mm to 12mm. showed that it was less than 0.38 (abs)% to 0.41 (abs)%. It was found that the fluff removal from the seed surface averaged 3.3% and 2.12%, which was 0.19 (abs)% to 0.61 (abs)% higher than the lint removal rate from the seed surface in the linter with the existing mixer. showed. The seed damage rate was reduced from 5.48 % to 4.23 % compared to the seed damage produced from 30 saw linters with existing mixers from 0.39 (abs)% to 0.27 (abs)% [3]. The mass fraction of impurities and whole seed in the fluff produced by the linting process averaged 5.84% and 5.36%, respectively, compared to the mass fraction of impurities and whole seed in the fluff produced from the existing mixer linter from 0.54 (abs)% to 0 decreased by .74 (abs)% (Fig. 4). Linter seed productivity averaged 178 kg/h and 136 kg/h, an increase of 28 kg/h to 8 kg/h compared to the existing agitator 30 saw 5LP linter for comparison. Linter productivity was found to be 6.11 kg/h and 5.36 kg/h on average, 0.63 kg/h and 0.56 kg/h higher than linter productivity with existing agitator (Fig. 1 table). The staple length of the produced fluff is 6/7 mm on average, and according to the quality indicator, according to the state standard UzDst 645:2016, it corresponded to the class I type B type "Medium" [4].

As it is known, UzDst 596:2016 Technical Fertilizer, Technical Conditions State Standard specifies that the hairiness level of the seed sent to the oil-oil enterprises during the linting of I-type technical fertilizers should be up to 7.0%. The results of experimental and comparative work on a 30-saw 5LP linter with existing and improved mixers, when the proposed mixer is bent at 60 degrees to the rotation of the seed roller, with the improved blade ends and the distance between the saw teeth in the saw cylinder are set to 9 mm and 10 mm, the degree of fluffiness of the seed produced from the linter is 6.78% to 7.0%, which showed that it met the requirements of the UzDst 596:2016 state standard [5]. The quality of the seed produced is there compared to the quality of seed produced from the mixer linter improved from 0.33 (abs)% to 0.17 (abs)%, and the quality of fluff from 0.54 (abs)% to 0.8 (abs)%. Work on the linter seed at this 9mm and 10mm spacing

productivity was 28 kg/h and 10 kg/h higher than the productivity of the existing mixer linter on seed. The staple length of the produced fluff was 6/7 mm, it was one class higher than the improved quality and according to the state standard UzDst 645:2016, it corresponded to the class I grade B type "Middle".

It is known that according to PDI70-2017- "Coordinated technology of preliminary processing of cotton" in cotton ginning enterprises along with long and medium fiber technical cottons, seed cottons are also accepted [ 6]. Seeds produced by ginning of long and medium fiber cotton in saw and roller gins are mechanically treated like technical seeds 5LP before sending them to the seed preparation workshop.



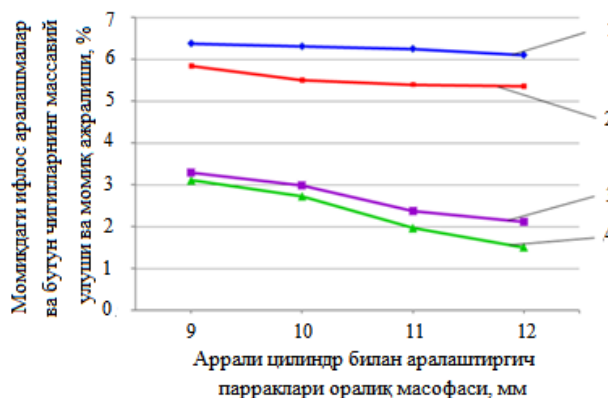
1, 3- in the existing construction mixer, 2, 4- in a mixer with an improved design

Figure 3. Dependence on the hairiness and damage of the seed coming out of the working chamber and the distance between the saw teeth in the saw cylinder and the mixer

Table 1 Effect of saw cylinder saw tooth spacing on linter performance with stirrer blades in 30-saw 5LP linters with simple and improved design stirrers

The distance between the saw teeth of the saw cylinder with the mixer blades, mm	Post linter seed		Linter productivity, kg/s		Lint separation, %	Mass fraction of impurities and whole seeds in fluff, %	Staple length and type of wool, mm	A variety of fluff and class
	hairiness, %	damage, %	by seed	on fluff				
1	2	3	4	5	6	7	8	9
In a linter with an existing construction mixer								
9	7.16	5.81	150	5.48	3.11	6.38	6/7, B	I, "Filthy"
10	7.51	5.27	141	5.31	2.73	6.31	6/7, B	I, "Filthy"
11	8.23	5.11	135	5.12	1.97	6.25	6/7, B	I, "Filthy"
12	8.57	4.5	128	4.8	1.51	6.1	6/7, B	I, "Filthy"
In a linter with an agitator of improved construction								
9	6.78	5.48	178	6.11	3.3	5.84	6/7, B	I, "Medium"
10	7.0	5.1	151	5.85	3.0	5.51	6/7, B	I, "Medium"
11	7.65	4.72	149	5.68	2.38	5.4	6/7, B	I, "Medium"
12	8.36	4.23	136	5.36	2.12	5.36	6/7, B	I, "Medium"

processed in linters . Special requirements are placed on linters to prevent seed damage during linting of seeds in linters. According to the technological regulation of seed preparation - UChT97-2022, the level of hairiness of seed produced from linters in cotton ginning enterprises should not exceed 9%, damage should not exceed 4.3% [7]. But to produce seeds with 4.3% damage level from existing linters, their hairiness level is 9.5% instead of 9% and averages 10% in some breeding varieties. As a result of the high hairiness of the seed from the linting workshop, the hairiness of such seed is less than 1.5-2.5% in the seed seed preparation workshop according to the state standard UzDst 663-2017



1, 4- in the existing construction mixer,  
2, 3- in a mixer with an improved design

Figure 4. Dependence of the mass fraction of impurities and whole seeds in the fluff and the separation of fluff with the mixer and the distance between the saw teeth in the saw cylinder

in the preparation of hairy seeds, there is an increase in the level of seed damage [8]. In the period of experimental work, the distance between the saw teeth in the saw cylinder with the proposed mixer was 12 mm. it was studied whether the produced seed met the requirement for the level of hairiness and damage of the seed.

**Summary**

The results of the comparison-experimental work conducted on the existing and improved mixers with blades bent 60 degrees to the rotation of the seed roller on a 30-saw 5LP linter showed that the hairiness level of the seed produced from the linter was 6.78 on average. % to 7.0%, UzDst 596:2016 state standard fulfilled the requirement for technical seed to be produced after linter. The quality of the seed produced is there compared to the quality of seed produced from the mixer linter improved from 0.33 (abs)% to 0.17 (abs)%, and the quality of fluff from 0.54 (abs)% to 0.8 (abs)%. The linter's seed productivity was 28 kg/h and 10 kg/h higher than the existing mixer linter's seed productivity. The staple length of the produced fluff was 6/7 mm, it was one class higher than the improved quality and according to the state standard UzDst 645:2016, it corresponded to the class I grade B type "Middle".

When the bladed mixer improved with a saw cylinder was installed at a distance of 12 mm, the hairiness of the seed produced from the linter was 8.36% on average, and the damage was 4.23%. met the requirements for the level of hairiness and damage.

The proposed mixer linter is higher than the efficiency of the linter with the existing construction mixer, it was determined that the distance between the saw teeth in the saw cylinder with the improved blades in the mixer in the proposed mixer linter is 9 mm and 10 mm, and 12 mm in the seed linter. .

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