THE USA JOURNALS
THE AMERICAN JOURNAL OF ENGINEERING AND TECHNOLOGY (ISSN – 2689-0984)
VOLUME 06 ISSUE06

PUBLISHED DATE: - 30-06-2024
DOI: - https://doi.org/10.37547/tajet/Volume06Issue06-05 **PAGE NO.: - 32-40**

RESEARCH ARTICLE **Open Access**

ANALYSIS OF EXPERIMENTAL TEST RESULTS OF CURRENT AND NEW COMPOSITION COLONS

Sarimsakov Olimjon Sharipjanovich
Namangan Textile Industry Institute, professor, Uzbekistan

Ergashev Sharibboy Tulanovich
Namangan Engineerin-Construction Institute, professor, Uzbekistan

Shokirov Khasanboy Tuychiboy o'g'li
Namangan Engineerin-Construction Institute, PhD student, Uzbekistan

Abstract
In the process of separating cotton fiber from seed in a sawed fiber separator, the formation of raw material depends on several factors. The most important of them are the speed of rotation of the raw material, fiber, density, the amount of seeds separated from the fiber, etc. In addition, it is necessary to take into account the force of friction created by the walls of the working chamber due to the pressure created in the raw material. A high coefficient of friction of the colossal working surface has a negative effect on work efficiency, in particular, frictional forces cause the seed separated from the fiber to remain on the colossal working surface. These factors have an effect on the performance of the fiber separator and the quality of the extracted fiber. It is known that in the process of ginning, 25% of the fiber and seeds separated from the fiber remain in the raw material pile, causing mechanical damage.
The main goal of the research is to prevent fiber and seed damage in the process of separating cotton fiber from the seed by installing a colosnik structure with the new recommended composition, to increase the efficiency of the seed exit from the working chamber, and at the same time to study ways to reduce energy consumption during the ginning process.
This research paper presents an analysis of the results obtained after installing one of the working parts of the gin machine on the DL-10 gin machine of the existing and recommended composition of colosniks. The main purpose of introducing the new construction is to increase the efficiency of the DL-10 gin machine of the society, to develop it by filling it with new technologies, and to obtain quality fiber and seed.

Keywords Gin machine, Namangan 34, colosnik with content, seed, fiber, mechanical damage, hairiness, humidity, dirt, seed production, raw material, cotton, construction, technique, working chamber.

INTRODUCTION

Large-scale scientific research is being conducted in the world aimed at improving the technology of pre-treatment of cotton, including the process of separating cotton fiber from the seed, techniques and technology. In this direction, among other things, the scientific foundations of increasing the efficiency of the cotton ginning process are being developed, and attention is being paid to improving product quality and reducing costs by accelerating the wide introduction of scientific and modern techniques and technologies into production.

Increasing the production of finished products

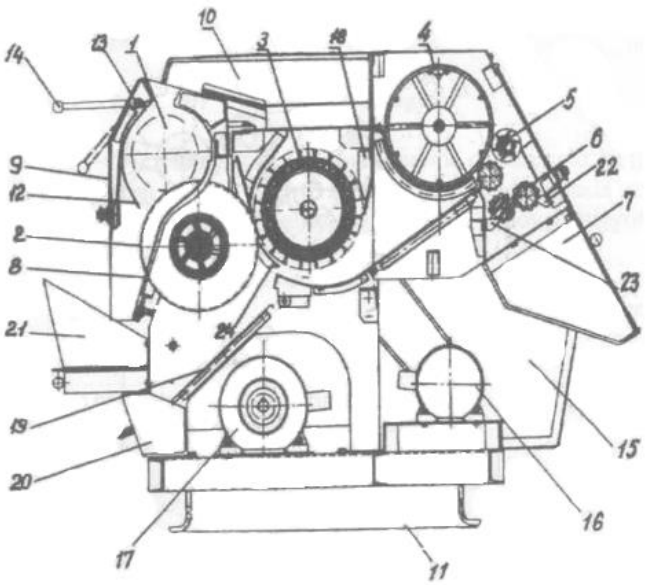
with high added value based on the deep processing of raw cotton in our republic, improving the structure of the country's cotton ginning industry, reducing the cost of cotton products on the basis of technical and technological restructuring, and ensuring its competitiveness by improving quality indicators. attention is paid. In the new development strategy of Uzbekistan for 2022-2026, including "...rapid development of the national economy and ensuring high growth rates and doubling the production volume of textile industry products" tasks were defined.[1]

In performing these tasks, on the basis of theoretical and practical analyzes of the process of separating raw cotton fiber from the seed, improving the working chamber of the fiber separator machine and increasing the efficiency of the ginning process due to it, including improving the interaction between the seed and the working surface of the colosnik, and increasing the productivity of the ginning process due to the coordination of the speed of the raw material. and reducing energy consumption are important issues.

METHOD

After the construction of the new column was prepared, experimental tests were conducted by comparing it with the existing SCh 15-32 cast iron columns. For the experiment, Namangan 34 tezsion, III industrial grade was taken. Practical research work was conducted in December. We know that the experiment process depends on the air temperature. Before starting the ginning process, the moisture and dirtiness of the cotton was determined. The experimental research work of active and content colosniks was carried out and introduced at the "Chust Elite Seed Farm" LLC, which belongs to the "Namangan Seed Development Center" DM, regional administration. The main purpose of introducing the new design is to improve the efficiency of the DL-10 gin machine of the society by filling it with new technologies.

When the 10-saw fiber separating device prepared for the experiment is working, the cotton is placed from above. Cotton falls into the working chamber 2, the raw material becomes clean, the process of cutting and ginning of cotton begins through the saw cylinder 3, the process is adjusted through the adjuster 4 for better ginning of the seed with fiber, then the separated fiber-containing colosnik passes through the slits 6, and the separated seed is separated into the content colostrum. 5 falls from the working surface to the seed collector. [p. 5-62]



1 - working chamber; 2 - saw cylinder; 3 – brush drum; 4 - condenser drum; 5 - output shaft; 6 -

compaction rollers; 7 - hopper for fiber; 8 - columnar grill; 9 - apron; 10 - bar for raw cotton wool; 11 - ostov; 12 - seed comb; 13 - dough; 14 - seed comb handle; 16,17 - electric motors; 18 – guide; 19 – orientation plane; 20 – coffin; 21 - seed tray; 22, 23 – barriers; 24 - dead trump

Figure 1. DL-10 gin machine

RESULTS

Two identical DL-10 ginning machines were installed with active and content colosniks, 34 III type cottons were taken from 7 kg for the experimental process. A practical research process was conducted at the same time. Moisture and dirt levels of the sample taken before transfer were determined.

Cotton moisture

Cotton moisture is obtained from 40 g of Namangan 34 III industrial variety, measured in VXC device and left in the device for 5 minutes. The resulting weight was m=33.84 gr.[5-39-b]

$$W = \frac{m_{tak} - m_{we}}{m_{we}} * 100 - 0{,}6; \qquad (1)$$

In this, m_{tak} – was taken cotton weight, gr;

m_{we} – VXC cotton weight from the device, gr;

W- cotton moisture, %;

0,6 – correction factor for the result of the dryer

According to the above formula, it will have the following value:

$$W = \frac{40 - 33{,}84}{33{,}84} * 100 - 0{,}6 = 17{,}6\%.$$

This value is also shown in the formula. Thus, the moisture content of cotton was 17.6%.

Cotton contamination

Contamination of the cotton detected in the LKM device. To do this, take 300 g of cotton wool, mix well, chop and distribute evenly. Divide the resulting cotton into four parts and mix diagonally. We measure out 300 g of this mixture and place it in the LKM device for 3 minutes. After the specified time, impurities are separated from the cotton wool and its mass is determined.[5-56-b]

Figure 2. Process for determining cotton contamination

Namangan 34 III grade of cotton contamination m = 32.50 gr. Then the degree of contamination is determined. The degree of contamination depends on the moisture content of the cotton.

That:

K1 = 1.12 if the contamination is below 7% or more;

K2 = 0.98 if the moisture content of cotton is below 12%;

K2 = 1.0 These values are obtained if the moisture content of cotton is more than 12%.

From this we can understand that K1 is obtained evenly. The degree of contamination is determined using these data:

$$Z_R = \frac{m_{we}*100*K_1 K_2}{m_{tot}}; \qquad (2)$$

In this: m_{sep} – mass of separated dirty mixture, g;

M_{tot} – mass of a prototype cotton sample weighed with a dirty mixture, g;

K_1 – a correction factor that takes into account impurities remaining in the purified sample;

K_2 – factor that takes into account moisture in dirty mixtures.

Moisture is higher than 12% because W = 17.6%, K_2 = 1.0.

$$Z_R = \frac{32{,}50*100*1{,}12*1{,}0}{300} = 12{,}2\ \%$$

So, it was determined that cotton contamination is 12.2%.

Fiber moisture analysis

Fiber moisture content was determined for fiber from a gin with an existing colostrum. Fiber moisture is obtained for the fiber separated from the existing colostrum used in the DL-10 gin machine. For fiber moisture, 20 g was taken and measured on a VXC device. 3 minutes will be placed on the device. The resulting weight was m_{we} =17.61 gr. [5-41-b]

$$W = \frac{m_{tak}-m_{we}}{m_{we}} * 100 - 0{,}4; \qquad (3)$$

In this, m_{tak} – obtained fiber weight, g;

m_{we} – VXC fiber weight from the device, g;

W- fiber moisture, %;

0,4 – factor of correction of the result for the dryer.

The value is determined by the formula:

$$W = \frac{20-17{,}61}{17{,}61} * 100 - 0{,}4 = 13{,}17\ \%.$$

This value is also shown in the formula. So, fiber moisture was 13.17%.

Fiber moisture content was determined for fiber obtained after installing colostrum of the recommended composition on a DL-10 gin machine. 20 g of fiber moisture is collected, weighed in the VXC device and placed in the device

for 3 minutes. The resulting weight was m_{ch}=17,77 gr

$$W = \frac{20 - 17{,}77}{17{,}77} * 100 - 0{,}4 = 12{,}15\ \%.$$

So, fiber moisture was 12.15%.

Seed moisture

The moisture content of the seed is obtained identically for the seed separated in the existing and recommended colostrums used in the DL-10 gin machine. To determine the moisture content of the seed, 50 g of seed is selected and measured in the VXC device, and after 4 minutes, its weight was m_{we}=42,82[5-41]

$$W = \frac{m_{tak} - m_{we}}{m_{we}} * 100 - 0{,}5; \qquad (4)$$

In this, m_{tak} – the taken seed weight, g;

m_{we} – VXC weight of seeds from the machine, g;

W- seed moisture, %;

0,5 – correction factor for the result of the dryer.

According to the formula, it will have the following meaning:

$$W = \frac{20 - 42{,}82}{42{,}82} * 100 - 0{,}5 = 13{,}9\ \%.$$

This value is also shown in the table, so it turned out that the moisture content of the seed was 13.9%. Therefore, the fiber moisture content for the existing and recommended.W_t = 13,9% is taken

Hairiness of technical seed

Determination of hairiness is carried out on 200 seeds. During the separation process, small impurities found in the seed are separated from it. The mass of 200 seeds is measured, that is, the seed from the grate of the recommended composition was m = 21.46 g. The seed from the existing grate was m = 23.17 g. Loose fibers are manually separated from each seed and collected separately. The binding fibers are then separated [5-145-148-b]

recommendation	**existed**
The taken mass m = 21,46 g	The taken mass m = 23,17 g
Free fiber m = 0,02 g	Free fiber m = 0,03 g
Mandatory fiber m = 0,08 gr	Mandatory fiber m = 0,13 g
Dust m = 0,08 gr	Dust m = 0,08 g
M_{died} = 21,46-0,02-0,08-0,08= 21,28 gr	M_{died} = 23,17-0,03-0,13-0,08= 22,93 g
$M_{hairiness}$ = 0,02+0,08=0,10 gr.	$M_{hairiness}$ = 0,03+013=0,16 g.
So, M_t = 0,10 g.	So, M_t = 0,16 g

Determination of mechanical damage to the seed

50 g is allocated to determine the mechanical damage of the seed. It is thoroughly mixed in sulfuric acid until the seed becomes hairless, then it is turned with wood. Then it is washed in water and dried for a while. The dried seed is separated by watching it with a light [5-132-b]

Figure 2. The process of determining the mechanical damage of the seed

Note: We do not count empty seed during counting, because it is considered unsuitable for seed.

$$N_{vaible} + N_{bro} = N_{tot} \quad (5)$$

In this: N_{vaible} – number of viable seeds, pieces;

N_{bro} – number of broken seeds, pieces;

N_{tot} – total number of seeds, pieces.

To determine the percentage of seed damage in the composition, the following formula is appropriate:

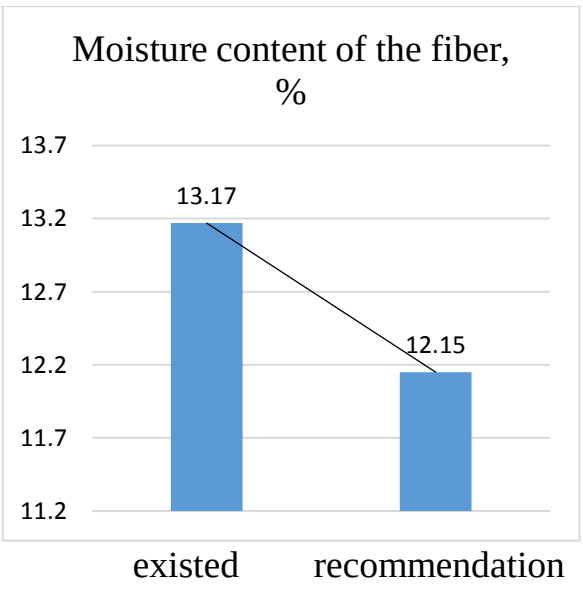
$$N_{bro}/ N_{total}*100\%; \quad (6)$$

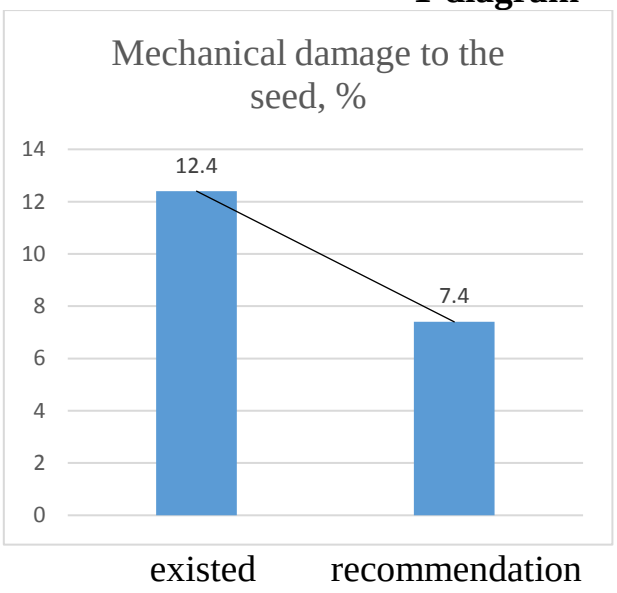
recommendation	existed
The number of broken seeds is 32	The number of broken seeds is 52
The number of valid seeds is 386.	The number of valid seeds is 366
So, 386 + 32 = 418 pieces	So, 366 + 52 = 418 pieces
$N_{bro}/ N_{tot}*100\% = 32/418*100 = 7,6\%$	$N_{bro}/ N_{tot}*100\% = 52/418*100 = 12,4\%$

1-table
Results of production testing of the Namangan 34 III/1 variety

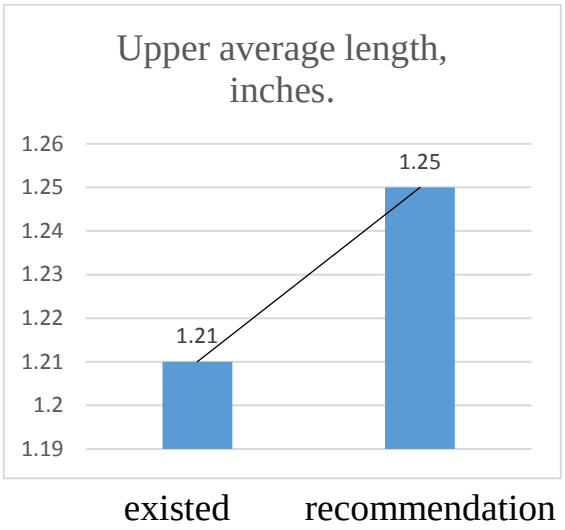
№	Specified features	unit	existed	ecommendation
1	otton taken for the experiment	kg	7	7
2	otton moisture	%	17,6	17,6
3	otton dirt	%	12,2	12,2
4	otton processing time	minute	9,50	9,42
5	eparated fiber weight	kg	2,247	2,260
6	eparated seed weight	kg	3,759	3,628
7	iber moisture	%	13,17	12,15
8	eed moisture	%	13,9	13,9
9	airiness level of technical seed (for 200 pieces of seed)	g	0,16	0,10
10	taple fiber length	mm	39	40
11	igh average length	inch	1,21	1,25
12	Iechanical damage to the seed	%	12,4	7,4
13	Iass fraction of impurities and defective compounds in the fiber	%	9,64 dirty	9,44 dirty

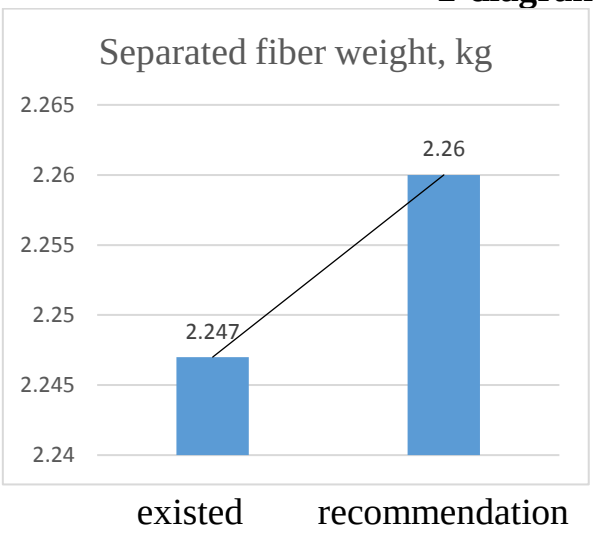
1-diagram



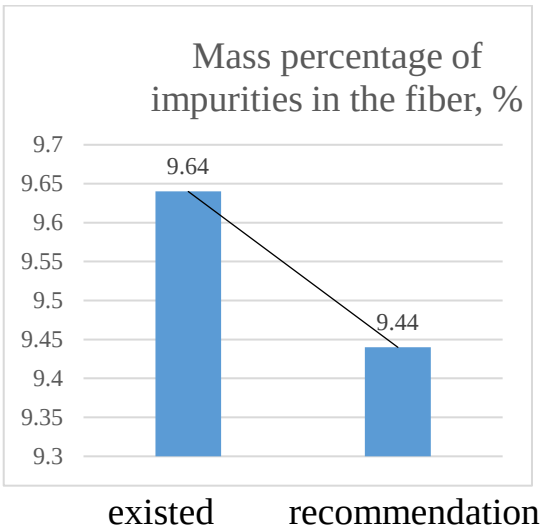


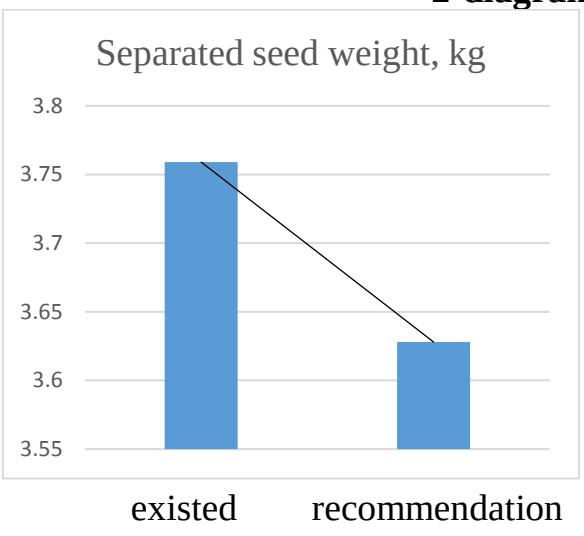
2-diagram





2-diagram





DISCUSSION

The second important feature of the grate is the low factor of friction of the working surface of the grate with cotton, which reduces the friction force opposing the movement of the seed separated from the fiber during operation. As a result, the seed slides through the colostrum under the influence of gravity, moves down easier and faster and leaves the working chamber faster. Therefore, after installing the new colostrum, the cotton removal time was reduced, meaning the gin's productivity increased. In addition, if the saw comes out of the work chamber faster, it will no longer hit the saw teeth.

This results in less mechanical damage to the seeds, which in turn reduces the fiber defect known as flakiness. Therefore, after installing a new grate, the mass fraction of impurities and defective compounds in the fiber content decreased. [6]

CONCLUSION

1. 1. If we pay attention to the results of the experiment in the tables, the cotton release time is reduced in the 34 III/1 variety, that is, in the

recommended colosniks (8.42 seconds on average) compared to the existing ones (9.5 seconds on average), that is, productivity From 0.74 kg/s to 0.83 kg/s, i.e. from 2.664 t/h to 2.988 t/h, it was determined.

2. The mechanical damage of seed in Namangan 34 III/1 variety was found to be 12.4% in the existing colostrum and 7.4% in the colostrum with the recommended composition.

3. Separated fiber weight (from 2.247 kg to 2.260 kg), separated seed weight (from 3.759 kg to 3.628 kg), hairiness level of technical seed (from 0.16 g to 0.10 g), and other positive results were achieved from practical research work.

4. A positive change was also found in the indicators of the mass fraction of impurities and defective compounds in the fiber, which indicates the high efficiency of the new colosnik.

REFERENCES

1. O‘zbekiston Respublikasi Prezidentining 2022 yil 28 fevraldagi «2022 — 2026-yillarga mo‘ljallangan Yangi O‘zbekistonning taraqqiyot strategiyasini “Insonga e’tibor va sifatli ta’lim yili”da amalga oshirishga oid davlat dasturi to‘g‘risida»gi PF-27-sonli Farmoni. (On February 28, 2022 of the President of the Republic of Uzbekistan "On the state program for the implementation of the development strategy of New Uzbekistan for the years 2022-2026 in the year of attention to people and quality education" Decree No. PF-27.)
2. Zikriyev E.Z. Paxtani dastlabki qayta ishlash. O‘quv qo’llanma. - T. Mexnat, 2002. - 290 b. (Zikriyev E.Z. Primary processing of cotton. Study guide. - T. Mekhnat, 2002. - 290 p.)
3. “O‘zpaxtasanoat” uyushmasi “Paxtani qayta ishlashning muvofiqlashtirilgan texnologiyasi”, (PDQI 41-2002; PDI-2007) T. "Mehnat". 2012. – 58 b. (Association "Uzpakhtasanoat" "Coordinated technology of cotton processing", (PDQI 41-2002; PDI-2007) T. "Labor". 2012. - 58 p.)
4. X.T. Axmedxodjaev, M.A. Tojiboev, X.N. Sharipov. Tola ajratish jarayonini takomillashtirish: monografiya / - “Navro‘z” nashriyoti, 2021 140 bet. (Kh.T. Akhmedkhodjaev, M.A. Tojiboev, H.N. Sharipov. Improvement of fiber separation process: monograph / - "Navroz" publishing house, 2021 140 pages.)
5. Salimov A. Mahsulotlar sifatini aniqlash va sertifikatlash. -T.: «Fan va texnologiva», 2019, 216 bet. (Salimov A. Product quality determination and certification. - T.: "Science and Technology", 2019, 216 pages.)
6. Patent UZ № FAP 02331. Sh.T.Ergashev, O.Sh. Sarimsakov, Kh.T. Shokirov, A.O. Sharifjanov. 31.08.2023 y.
7. Элёрбек Шамсиддинов, & Хасанбой Шокиров (2022). ЖИН МАШИНАСИ ИШЧИ ВАЛИНИНГ ЭГИЛИШИ. Central Asian Academic Journal of Scientific Research, 2 (4), 102-110. (Elyorbek Shamsiddinov, & Khasanboy Shokirov (2022). JEAN CAR DRIVE SHAFT BEND. Central Asian Academic Journal of Scientific Research, 2 (4), 102-110).
8. Khasanboy, S., & Olimjon, S. (2021). Investigation of the Movement of Cotton Seeds Along the Groove Formed on the Surface of the Grate in the Working Chamber of the Saw Fiber Separator. International Journal on Orange Technologies, 3(9), 103-110.
9. Sarimsaqov, O. S., Inamova, M. D., & Ortiqova, K. I. (2023). URUGLIK CHIGIT TOLASINI ARRA TISHLARIDAN YECHIB OLISH JARAYONLARI SAMARADORLIGINI OSHIRISH: URUGLIK CHIGIT TOLASINI ARRA TISHLARIDAN YECHIB OLISH JARAYONLARI SAMARADORLIGINI OSHIRISH.