**Determination of Cotton Seedlings Through Experimental Studies**

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**Abstract.** The main primary products of cotton processing enterprises are fiber, seeds, lint and fiber waste. Cotton fiber is one of the main raw materials of the textile industry, and it is one of the goods that has its own permanent buyers on a global scale. If we rely on the latest statistical data, the world's populationIt is 7,925,742,451 people. The population growth rate is 116.7% compared to the death rate.[1] This, in turn, affects food andleading to an increase in demand for clothing products. The number of people living in hunger in the worldIt is 858,351,690 people.A large-scale effort is underway worldwide to meet the current needs. The only way to solve the problem is to increase the production of food and household products using new modern technologies and scientifically based methods and tools. According to the UN, the above-mentioned problems are caused by the increase in global warming on a global scale. This, in turn, leads to a decrease in the area of highly fertile lands and an increase in the demand for fertile land. Currently, the decrease in the area of highly fertile lands and the decrease in their productivity due to soil erosion are being compensated by the expansion of desert areas. The cultivated desert area on our planet is about 1.2 million hectares.

**Keywords:** Experimental, organoleptic, expert, sociological, calculated, differential, complex quality assessment, humidity, Dirt,Variety, class

**INTRODUCTION**

In the wake of global warming, many countries, including Uzbekistan, are moving towards solving the problem. In this regard, our President is developing additional action plans to improve the irrigation system in agriculture. In particular, farms specializing in drip and sprinkler irrigation are being established. The intended goal of these is to ensure food security in the region and further expand the activities of enterprises specializing in the sector.

Uzbekistan is a country with a leading position in the world in cotton production and processing.

In order to meet the needs of cotton fiber, which is the basis of textile and sewing and knitting products in the world market, it is planned to increase productivity by growing products using scientifically based methods. In recent years, special attention has been paid to the care of cotton in cotton fields. In this case, when planning the types of crops of agricultural products, the expected yield is planned based on the miliary state of the land, and the market supply and demand balances are maintained based on these values. For this purpose, districts with low productivity and susceptibility to soil diseases are divided into areas for growing orchards, cotton and grain, fruit and vegetable growing, melon growing, and fodder crops. The foothills and mountain slopes are considered favorable for growing orchards, and the lowlands and plains are considered favorable for growing cotton and grain. Fruit, vegetable and melon growing is mainly based on the produce grown by homesteaders, filling market stalls [1].

Along with providing the population with consumer goods, the role of cotton fiber in satisfying the need for clothing, including textile and knitwear, is incomparable. The fact that cotton fiber does not have a negative impact on human health is constantly increasing its position in the world market. As a result of the correct reforms carried out in our country, the quality indicators of cotton fiber are increasing. The increase in the annual economic indicators of cotton ginning enterprises under the existing textile cotton clusters in our republic also indicates that the driver of textile enterprises is well-founded. As a result of the conclusion of annual mutual contracts with farms at the beginning of the season, the costs of all agrotechnical activities, from sowing seeds in the fields to harvesting, are being covered by cluster enterprises in a timely manner. New jobs are certainly being created on the basis of new enterprises. The establishment of one enterprise producing yarn with an average capacity of 10 thousand tons creates 350-400 jobs. This will help an average of 1,500-2,000 people live a happy life [2].

As a result of extensive scientific research, the use of scientifically based modern methods in the cultivation of cotton raw materials is yielding results. Based on many years of experience, farmers prove that it is possible to obtain a yield of 40 to 60 centners from each hectare of field. We studied this based on the final results of the cotton harvest in Namangan region in 2019-2020 and 2021 (Table 1) [3].

**TABLE 1.** Cotton crop cultivated in the Namangan region in 2019, 2020, and 2021 (in metric tons)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Districts** | **2021 harvest** | | | **2022 harvest** | | | **Harvest of 2023** | | |
| **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** |
| 1 | Mingbulak | 31453 | 37362 | 118.8 | 35050 | 39413 | 112.5 | 41911 | 43925 | 104.8 |
| 2 | Kasonsoy | 10237 | 9047 | 89.9 | 11300 | 11321 | 100.2 | 11023 | 8934 | 81.0 |
| 3 | Namangan | 19838 | 20414 | 102.9 | 19838 | 21169 | 106.7 | 20318 | 21155 | 104.1 |
| 4 | Narin | 21182 | 20201 | 95.4 | 21182 | 21805 | 102.9 | 31737 | 20479 | 94.2 |
| 5 | Pop | 26175 | 28816 | 110.1 | 28850 | 30904 | 107.1 | 33190 | 34629 | 104.3 |
| 6 | Turakurgan | 16120 | 14208 | 88.6 | 15720 | 16132 | 102.6 | 15830 | 16771 | 105.9 |
| 7 | Housekeeper | 20862 | 19106 | 91.6 | 20862 | 20897 | 100.2 | 21382 | 20020 | 93.6 |
| 8 | Uchkurgan | 32967 | 30438 | 92.3 | 33168 | 33952 | 102.4 | 34377 | 31844 | 92.6 |
| 9 | Attic | 3413 | 3694 | 108.2 | 3813 | 4056 | 106.4 | 3866 | 3976 | 102.8 |
| 10 | Chust | 10253 | 11124 | 108.5 | 11467 | 11820 | 103.1 | 12366 | 12787 | 103.4 |
| 11 | Yangikurgan |  |  |  |  |  |  |  |  |  |
| **Total province:** | | **192500** | **194410** | **101.0** | **201250** | **211469** | **105.1** | **226000** | **214520** | **99.3** |

*Note: 1. Contract; 2. In fact; 3. Percentage*

Based on information from the State Statistics Committee of the Republic of Uzbekistan, the amount of cotton grown in 2021194410 tons, in 2022 it was 211469 tons, and in 2023 this figure was 214520 tons. Over the past two years, a 10.3% increase in production has been achieved. As can be seen from the graph above, cotton production in Namangan region Mingbulok, Pop and Uchkurgan districts are leading, while Kosonsoy and Chartok districts have relatively less productive crops. This is because the main land area of these districts is specialized in orchards and vegetable growing. Yangikurgan district of the region specializes entirely in fruit and vegetable growing [4].

**METHODOLOGY**

Today, in order to obtain high-quality products at primary cotton processing enterprises, improve the physical and mechanical properties of the main raw material fiber, develop rational design parameters that reduce the negative impact of the damaging machine working surfaces on the quality of fiber and seed during the transfer of cotton to production departments, and increase the non-texture correction index during transfer, a new frame design has been developed based on the inclination of the frame by (10-12)° in the frame direction and the arrangement of the frames in parallel [5].

When the existing gin machine interacts with the cotton gin, mechanical damage to the fiber and seed occurs as a result of the impact forces generated between them. This situation contributes to a sharp decrease in the cost of fiber and seed. In our study, the effect of ginning various selected and industrial varieties of cotton by hand, using an existing gin, and a new machine with a double-row design with vertical gins was studied [6].

**EXPERIMENTAL PART**

The study compared the effects of the forces generated during contact with cotton on the quality of the product, such as the removal of cotton raw materials from the cotton fields in the form of large, dense, and voluminous pieces. The results of manual removal, the use of existing cotton-breaking working bodies, and the impact of new cotton-breaking working bodies on the cotton layer were analyzed [7].

The experiment was conducted on 10 batches of first grade first class (I/I) Sultan, Andijan 35 seed cotton. Based on the physical and mechanical properties of the fiber and seed, the negative impact on the natural properties of the product during the process of breaking cotton bolls was determined in all three processes.the values being reachedchecked. During the initial stage of the Sultan variety experiment, laboratory analyses revealed that the grain moisture content was 7.9%, the impurities were 3%, the fiber moisture content was 8%, and the impurities were 2.5%. The analysis results were obtained based on the requirements of the State Standard of Uzbekistan 663-2006, Technical conditions for seed corn. According to it, the cleaning was carried out using a special fork, during the operation of the RP model and the proposed double-row cleaning and conveying machines. In this case, 300 g samples were taken from the linter machine 10 times per shift. 50 g of seeds were taken from each sample and reacted with 30 g of H2SO4 acid. The total number of dehulled seed corn was calculated, and the number of damaged and healthy seeds was determined. Figure 1.1. Each sample was tested for seed damage levels in laboratory conditions [8] Table 2.



 

**FIGURE 1.** The process of determining the degree of mechanical damage to seeds

**TABLE 2.** Analyzing the degree of mechanical damage of high grade Sultan seed cotton seeds

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Seed cotton selection (Samples)** | **Variety and class** | **Quantity of seeds weighing 50 g, pcs** | **Healthy seed, grain** | **A broken seed, a grain** | **Injury rate, %** | **Impurity, %** | **Residual fiber, %** |
| **Ensuring the destruction of the grave by hand** | | | | | | | | |
| 1 | Sultan | I/I | 420 | 406 | 14 | 3.33 | 0.4 | 0.6 |
| 2 | Sultan | I/I | 419 | 406 | 13 | 3.10 | 0.5 | 0.6 |
| 3 | Sultan | I/I | 422 | 408 | 14 | 3.32 | 0.6 | 0.7 |
| 4 | Sultan | I/I | 419 | 406 | 13 | 3.10 | 0.5 | 0.6 |
| 5 | Sultan | I/I | 422 | 408 | 14 | 3.32 | 0.4 | 0.7 |
| **Through existing vandalism machines** | | | | | | | | |
| 1 | Sultan | I/I | 421 | 406 | 15 | 3.56 | 0.5 | 0.6 |
| 2 | Sultan | I/I | 420 | 404 | 16 | 3.81 | 0.4 | 0.6 |
| 3 | Sultan | I/I | 422 | 407 | 15 | 3.55 | 0.5 | 0.5 |
| 4 | Sultan | I/I | 419 | 403 | 16 | 3.82 | 0.4 | 0.6 |
| 5 | Sultan | I/I | 418 | 403 | 15 | 3.59 | 0.5 | 0.7 |
| **Through a newly designed scrap metal shredder** | | | | | | | | |
| 1 | Sultan | I/I | 422 | 410 | 12 | 2.84 | 0.3 | 0.4 |
| 2 | Sultan | I/I | 420 | 407 | 13 | 3.10 | 0.4 | 0.5 |
| 3 | Sultan | I/I | 422 | 411 | 11 | 2.61 | 0.4 | 0.5 |
| 4 | Sultan | I/I | 419 | 407 | 12 | 2.86 | 0.5 | 0.6 |
| 5 | Sultan | I/I | 421 | 409 | 12 | 2.85 | 0.4 | 0.6 |
| 6 | Sultan | I/I | 419 | 408 | 11 | 2.63 | 0.4 | 0.5 |
| **Analysis of the degree of mechanical damage of seed cotton of Andijan 35 selection varieties and II grade II class** | | | | | | | | |
| **Ensuring the destruction of the grave by hand** | | | | | | | | |
| 1 | Andijan 35 | II/II | 423 | 408 | 15 | 3.55 | 0.5 | 0.7 |
| 2 | Andijan 35 | II/II | 425 | 410 | 15 | 3.53 | 0.5 | 0.6 |
| 3 | Andijan 35 | II/II | 424 | 408 | 16 | 3.77 | 0.6 | 0.8 |
| 4 | Andijan 35 | II/II | 426 | 410 | 16 | 3.76 | 0.5 | 0.6 |
| 5 | Andijan 35 | II/II | 425 | 410 | 15 | 3.53 | 0.6 | 0.7 |
| **Through existing vandalism machines** | | | | | | | | |
| 1 | Andijan 35 | II/II | 426 | 410 | 16 | 3.76 | 0.6 | 0.8 |
| 2 | Andijan 35 | II/II | 425 | 408 | 17 | 4.00 | 0.7 | 0.9 |
| 3 | Andijan 35 | II/II | 426 | 410 | 16 | 3.76 | 0.6 | 0.8 |
| 4 | Andijan 35 | II/II | 424 | 408 | 16 | 3.77 | 0.5 | 0.7 |
| 5 | Andijan 35 | II/II | 426 | 409 | 17 | 3.99 | 0.7 | 0.8 |
| **Through a newly designed scrap metal shredder** | | | | | | | | |
| 1 | Andijan 35 | II/II | 425 | 411 | 14 | 3.29 | 0.5 | 0.7 |
| 2 | Andijan 35 | II/II | 426 | 411 | 15 | 3.52 | 0.6 | 0.7 |
| 3 | Andijan 35 | II/II | 426 | 411 | 15 | 3.52 | 0.4 | 0.5 |
| 4 | Andijan 35 | II/II | 424 | 410 | 14 | 3.30 | 0.6 | 0.6 |
| 5 | Andijan 35 | II/II | 425 | 410 | 15 | 3.53 | 0.5 | 0.7 |

**TABLE 3.** Analysis of the generalization of the obtained results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Measurement methods** | **A broken seed, a grain** | **Injury rate, %** | **Impurity, %** | **Residual fiber, %** |
| 1 | Ensuring the destruction of the grave by hand | 13.6 | 3.23 | 0.48 | 0.64 |
| 2 | Hacking through existing hacking machines | 15.4 | 3.67 | 0.46 | 0.6 |
| 3 | Through a newly designed scrap metal shredder | 11.8 | 2.81 | 0.42 | 0.54 |

**TABLE 4.** Experimental results of the main quality indicators of seed cotton (Sultan variety, class I/I)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **The main indicator of seed cotton seed** | **Experiments conducted on the Sultan variety, class I/I** | | | | | |
| **1** | **2** | **3** | **4** | **5** | **Arithmetic value** |
| humidity % | **Analysis of available space** | | | | | |
| 7.9 | 8.1 | 8 | 8.3 | 8.1 | 8.08 |
| Dirt % | 3.01 | 3 | 3.02 | 2.9 | 3.2 | 3,026 |
| Mechanical damage to the seed | **Test sample taken from the field** | | | | | |
| 1.63 | 1.67 | 1.64 | 1.68 | 1.73 | 1.67 |
| **To provide a violation of the haraam using the hand** | | | | | |
| 3.33 | 3.10 | 3.32 | 3.10 | 3.32 | 3.23 |
| **Provide demolition through the existing demolition machine** | | | | | |
| 3.56 | 3.81 | 3.55 | 3.82 | 3.59 | 3.67 |
| **Provision through the proposed gharam demolition machine** | | | | | |
| 2.84 | 2.91 | 2.61 | 2.86 | 2.85 | 2.81 |

The analysis of the results obtained on the breaking of cotton gin fields and uniform transfer of raw materials to continuous technology showed that, if the moisture and dirt content of the cotton module during the processing of seed cotton are within the norm, the degree of mechanical damage to the seed improves, and the fewer defects in the seed during the stages of processing in the seed warehouses and reaching the planting stage, the higher its yield [9]. Also, the proper operation of the working bodies of the machines used to break the gin and ensure its transfer from open and closed warehouses of primary cotton processing enterprises increases the quality of the raw materials. In this case, a new working unit was proposed, consisting of a set of double-ring piles, which perform the functions of increasing the angle of inclination of the gin to the shaft axis and reducing additional friction and density [10]. The results obtained showed that the non-texture in the cotton spinning disappeared, the density was significantly reduced, and through analysis, a rational design and parameters of the working bodies of the gin were determined that would not negatively affect the quality indicators of the cotton. The obtained results can be used in primary cotton processing enterprises.

**CONCLUSION**

1. At the regional scale, the raw cotton grown in the districts was studied.

2. It was found that the quality of the seed will be higher if the working bodies of the machines used in the transfer of seed cotton from the fields to the production departments work in optimal condition.

3. The level of seed damage and the amount of residual fiber increases in cotton raw materials with high humidity and dirt.

The above analysis shows that there is much work to be done to increase the production capacity of existing enterprises and improve product quality.

**REFERENCES**

1. N. M. Sattarov, M. T. Khodjiev, E. E. Gaybnazarov, F. N. Sirojiddinov, and Sh. Sh. Isaev, “Modeling the process of separation of small contaminants into the stream of raw cotton moving in the area of treatment,” Int. J. Adv. Res. Sci. Eng. Technol. **5**(12), 7481–7487 (2018).
2. N. M. Sattarov, O. Sh. Sarimsakov, Sh. Khusanova, and Z. Siddikov, “Improvement of the process in disassembling of cotton stack and transferring the cotton into pneumotransport,” Int. J. Adv. Sci. Technol. **29**(7), 10849–10857 (2020).
3. N. M. Sattarov, O. Sh. Sarimsakov, N. M. Oripov, and F. Holmirzaev, “Changing the air parameters in the cotton pneumatic transport pipe,” Bosma Eng. **15**, 68–74 (2023). <https://www.scirp.org/journal/eng>
4. N. M. Sattarov, O. Sh. Sarimsakov, D. U. Turgunov, Sh. Tukhtaev, and S. T. Sultonov, “Analysis of the effect of fiber on differences in the microneur indicator module field,” AIP Conf. Proc. **2789**, 040026 (2023). <https://doi.org/10.1063/5.0145846>
5. O. Sarimsakov, D. Turgunov, N. Sattarov, S. Tukhtaev, and S. Sultanov, “Analysis of the effect of fiber on differences in the microneur indicator module field,” AIP Conf. Proc. **2789**, (2023).
6. R. Nurboev, Technical control of textile enterprises (Bukhara, 2021), 144 p.
7. J. Solokhiddinov, Sh. Korabayev, H. Bobojanov, M. Niyazalieva, and Kh. Ergashev, “To study the impact of technological processes on the quality of semi-finished and finished products in the spinning mill,” AIP Conf. Proc. **2789**, 040115 (2023).
8. O. Ishmuratov, Razrabotka perevalochnoy pnevmoustanovki vsasyvayushche-nagnetatelnogo deystviya dlya khlopka-syrtsa s tselyu snizheniya otritsatelnogo vozdeystviya na ego prirodnye svoystva, PhD thesis abstract (Tashkent, 1988), 151 p.
9. B. Mardanov and O. Sarimsakov, “Theoretical study of the process of mechanical destruction of cotton garam,” Sci. Tech. J. Fergana Polytech. Inst. **1**, 125–127 (2017).
10. Y. Ergashev, D. Turgunov, and Sh. Khusanova, “Study of the processes of direct-flow ginning,” AIP Conf. Proc. **3045**, 050003 (2024). <https://doi.org/10.1063/5.0198826>