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CREATION OF VARIETIES OF GRAIN THAT MEET WORLD STANDARDS FOR FAST-GROWING, HIGH-YIELD FIBER PRODUCTION OF TYPES IV-V

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Abstract
Among the valuable economic characteristics, the vegetation period in the newly created systems was from 114 to 116 days. According to the results of the research, the fiber yield of families was higher than that of the standard variety, from 35.0% to 36.8% in the standard variety, and from 35.2% to 40.0% in families, which was 0.2-3.2% higher than that of the standard. Wilt infection was observed on average 2.4% in standard varieties, and no hybrid generations were infected with wilt.

Keywords: Cotton, soil, variety, promising, starting material, nursery, fastness, pattern, fiber length, fiber yield, hybrid, valuable economic traits, productivity.

Introduction

In the Republic of Uzbekistan, the cotton industry is one of the strategic priority areas of the country's economy, playing an important role in the development of light industry, textile and export potential. The cultivation of cotton varieties that are competitive in the world market, have high fiber quality indicators, and meet the requirements of the processing industry is one of the priority tasks of agrarian policy today. Climate change, limited water resources, reduced soil fertility, and increased pressure from diseases and pests have a serious impact on maintaining the stable yield and quality indicators of existing varieties. Therefore, the creation of new cotton varieties that are early maturing, high-yielding, disease-resistant, and whose fiber meets the requirements of world standards is on the agenda as an urgent scientific and practical task in the field of selection and seed production.

The soil and climatic conditions of the Fergana Valley, and in particular, the Fergana region, have great potential for growing agricultural crops, including cotton, with high yields. At the same time, sharp temperature changes during the growing season in this region, limited irrigation water resources, and the spread of certain diseases, in particular, bollworm, further increase the demand for cotton varieties. Not all existing varieties are sufficiently adapted to these factors; in particular, the complex embodiment of such valuable traits for the farm as early maturity, bollworm resistance, fiber yield and fiber length is not always ensured. Therefore, the creation of genotypes adapted to the region, with stable yields and high fiber quality is becoming a priority area of selection work.

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In recent years, the Fergana Scientific Experimental Station of the "Scientific Research Institute of Cotton Selection, Seed Production and Agrotechnologies" has been conducting extensive scientific research on complex crossings, self-pollination and evaluation of hybrid generations based on various types of cotton varieties and lines. In particular, special attention is paid to working with selection materials with IV–V fiber types, early maturing, high-yielding, fine and longitudinally stable fibers, and resistance to wilt disease. Manual pollination was carried out based on combinations formed with the participation of varieties and lines such as S-8290, Namangan-77, S-9096, S-2120, S-6588, and F_1 hybrid seeds were obtained, as well as experiments were organized on S-8296 and S-8297 varieties aimed at ensuring genetic stability through self-pollination. A comprehensive selection method was used, including flower isolation, limiting cross-pollination, and carefully selecting hybrid generations based on differential traits.

In the experiments, the families and lines formed in the selection nursery were compared with the standard variety in terms of the main economic and botanical characteristics, such as the yield of 1 plant, the weight of cotton in 1 boll, fiber yield, fiber length, and the degree of damage by wilt disease. As a result of the studies, it was determined that the fiber yield in some families was in the range of 35.2–40.0%, which is 0.2–3.2% higher than the standard, and genotypes were also isolated among the hybrids that were not damaged by wilt. This allows the selection of disease-resistant, high-fiber-yielding and early-ripening lines during the selection process. The fact that the vegetation period is around 114–116 days creates an additional advantage for obtaining the crop in a relatively short period of time, efficient use of water, and increasing agrointensities.

The purpose of this research work is to create promising cotton families and lines suitable for the soil-climatic conditions of the Fergana region, with IV–V fiber types, early maturing, high-yielding, high-quality fiber and resistant to wilt disease, and to evaluate their complex of valuable economic traits by comparing them with the standard variety. Also, based on the obtained selection materials, the most promising genotypes that can be recommended for future variety testing and the development of scientifically based recommendations for their introduction into cotton selection and seed production practice will further increase the relevance of this work.

MAIN PART

Based on the study of breeding laws, it is urgent to create new varieties of cotton that are suitable for the soil and climatic conditions of the Fergana region, are early maturing, resistant to diseases and pests, and have high fiber yields suitable for machine harvesting.

The development of cotton breeding and seed production is of great importance in modern cotton production. To this end, it is necessary to quickly and in a short time multiply and introduce into production new varieties of elite seeds with higher productivity and fiber yield compared to the cotton varieties planted in large areas in today's production.

It is known that if the varietal purity of a variety is increased, that is, if the purity of the variety is high, its yield, early maturity, resistance to diseases and pests, and fiber quality are maintained, the viability of the variety is strengthened, it lives for many years, and the demand for it increases. In agriculture, timely and high-quality agrotechnical work is of great importance for the growth and development of plants, as well as for high and high-quality productivity. Similarly, in cotton varieties, if agrotechnical work is carried out correctly and in a timely manner, depending on the characteristics of the variety, a high and high-quality cotton yield is obtained.

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In order to continuously continue the selection process at the Fergana Scientific Experimental Station of the Scientific Research Institute of Cotton Breeding, Seed Production and Production Agrotechnologies, in 2024, the following regionalized, promising and new varieties and lines were planted in the cross-breeding field: C-8290, Namangan-77, C-9096, C-2120, C-6588, and 4 combinations were created based on these varieties, 200 flowers were pollinated and F hybrids were harvested.

Breeding work was carried out in the last ten days of June and the first ten days of July. PollenTo perform the pollination, the flower was canned in the evening before it opened, and the cap was wrapped in a paper bag to prevent it from being pollinated from the outside. 200 flowers were pollinated in this way.

Also selection materialsIn order to conduct scientific research on improving the methods of pollination, self-pollination of cotton varieties S-8296 and S-8297 was carried out. In this case, the planned varieties were forced to self-pollinate while their flowers were still unopened (buds) in paper bags made of corrugated paper.

Table 1 Valuable economic characteristics of selected families with IV-V-type fibers in the breeding nursery

No.	Model and family number	Productivity		Weight of cotton in one sack, g	Fiber yield, %	Fiber length, mm	Wilt %
		1st plant crop	The difference from the model, +				
1	Size	76.8	-	6.0	35.0	33.5	1.4
2	98	88.0	+11.2	6.3	35.2	35.4	
3	Size	64.0	-	5.8	36.6	33.0	2.4
4	160	65.0	+1.0	6.6	38.2	34.5	
5	Size	64.2	-	6.5	35.8	34.0	3.1
6	480	75.0	+10.8	6.9	36.4	34.8	
7	Size	64.8	-	6.2	35.3	33.0	2.1
8	542	71.0	+6.2	6.0	37.0	35.7	
9	Size	63.5	-	5.9	36.8	34.6	3.8
10	610	62.1	-1.4	6.3	40.0	33.8	
11	Size	61.6	-	6.4	35.9	33.4	1.8
12	640	68.0	+6.4	6.9	36.0	35.0	

According to the data in the table, it was found that the fiber output of families is higher than that of the model type. It was observed that it was 35.0% to 36.8% in the sample variety, and 35.2% to 40.0% in the families, which was 0.2-3.2% higher than the sample.

When examining the rootstock of a plant, wilt infection was observed on average at 2.4% in standard varieties, while no wilt infection was detected in hybrid generations.

Among the valuable economic traits, the vegetation period in the newly created systems ranged from 114 to 116 days, and these lines were distinguished by their early maturity compared to the standard. The highest indicator of cotton weight per boll was 6.8 grams in the T-18 line, while the lowest indicator was 5.8 grams in the T-22 line, which was the same as the standard variety. The indicators of 1000-grain weight, fiber length, and fiber yield also showed their superiority over the standard variety.

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CONCLUSION

The results of this study showed that there is a possibility of creating new selection materials that are highly adapted to the soil and climatic conditions of the Fergana region, are early maturing, high-yielding and superior to the standard variety in terms of fiber quality. As a result of a comparative assessment of the IV–V type fiber cotton families and lines with the standard variety, positive differences were observed in terms of yield per plant, weight of cotton in 1 boll, fiber yield and fiber length. In particular, the fact that fiber yield in some families was in the range of 35.2–40.0% confirms the achievement of results that are 0.2–3.2% higher than the standard indicators. These indicators are of important practical importance in increasing the volume of finished products obtained from a unit of cotton raw materials.

The absence of cases of wilt disease in hybrid generations showed that there is a possibility of effective incorporation and strengthening of disease resistance traits in the selection process. The fact that the average level of damage observed in the current standard varieties, which is around 2.4%, is almost not observed in new lines indicates that these genotypes are promising in increasing the phytosanitary stability. The vegetation period of around 114–116 days ensures early ripening, creates additional conditions for relatively economical use of water resources, short-term crop formation and optimal timing of agrotechnical measures.

As a result of the integrated use of selection methods such as flower isolation, hand pollination, self-pollination, and selection of hybrid generations according to economic and valuable traits, genetically stable, promising lines were isolated. In most of them, indicators such as 1000-seed weight, fiber length, and fiber yield were noted to be higher than those of the standard variety. This means that there is a sufficient scientific basis for recommending these selection materials for state variety testing in the future, gradually introducing them into the seed production system, and using them in cotton production.

In general, the conducted studies showed that the selection strategy for creating cotton varieties with type IV–V fiber, early maturing, resistant to wilt and high fiber yield in Fergana conditions was chosen correctly. Based on the results obtained, it is advisable to conduct in-depth testing of the most promising families and lines, evaluate their economic efficiency in production conditions, and develop additional recommendations for their introduction into the selection and implementation system. The widespread introduction of these selection developments in the cotton sector will further strengthen the competitiveness of the sector by increasing productivity, improving fiber quality, and reducing losses from diseases.

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