

<https://doi.org/10.33472/AFJBS.6.6.2024.6522-6528>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

New, Ultra-Early Great, High Quality and Quantity of Fiber Cotton Variety Itpiti-101

Avtonomov V. A.¹, Manzhaeva M. B.²

^{1,2}Research Institute of Breeding, Seed Growing and Agrotechnology of Cotton Growing, Tashkent, Republic of Uzbekistan

Article Info

Volume 6, Issue 6, June 2024

Received: 03 May 2024

Accepted: 16 June 2024

Published: 01 July 2024

doi: [10.33472/AFJBS.6.6.2024.6522-6528](https://doi.org/10.33472/AFJBS.6.6.2024.6522-6528)

ABSTRACT:

The article characterizes the extreme soil and climatic conditions of the Surkhandarya region, when during the period of formation and accumulation of the raw cotton harvest, daytime temperatures reach 50°C or more and are accompanied by prolonged hot winds (3-5 days) and a lack of irrigation water. The article briefly describes the stages and results of breeding and seed research related to the development of the new variety ITPITI-101, which has been submitted for evaluation in the state test of the Republic of Uzbekistan since 2023. The ITPITI-101 variety is resistant to the above-mentioned abiotic environmental factors, has high productivity and yield rates of raw cotton. At the same time, the ITPITI-101 variety combines high early maturity in relation to the standard S-6524 variety, up to 10 days. It has a high fiber yield of +4.9%, and also has a high fiber quality at the level of the best varieties of world selection, while the staple length of the fiber in the new variety is 0.02 inches longer, the linear density is 2-7 m/tex less. The specific breaking length is 2.6 g.s/tex higher. Based on the analysis of the results of the research, the authors draw the following conclusions: - due to the fact that the new cotton variety ITPITI-101 is highly resistant to some abiotic environmental factors, as well as a complex of high values of the main economically valuable traits, it should be quickly tested, propagated and offered for introduction into production in the conditions of the south of Uzbekistan. ; - in order for the TX-101 variety to fully demonstrate its potential in terms of productivity and the rate of return of the entire raw cotton harvest, it is necessary to use the recommended elements of agricultural technology for its cultivation.

Keywords: cotton, *G.hirsutum* L., selection, seed production, variety, ITPITI-101, heat resistance, recognized, ultra-earliness, length, yield, fiber, agricultural technology.

© 2024 Avtonomov V. A., This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made

1. Introduction

The south of the Republic of Uzbekistan is located in extreme soil and climatic conditions. Which are characterized by a short frost-free period and, at the time of formation and accumulation of the raw cotton harvest, high daytime temperatures, 50 or more 0C and hot winds (harmsils) and a lack of irrigation moisture during the growing season. More than 40% of the Republic's raw cotton is produced in these zones. In connection with the above, the Republic needs genetically new ones with ultra-earliness - 105-110 days. High yield of raw cotton of 50 c/ha or more, combined with high quality and quantity of fiber. Resistant to high daytime air temperatures, blowing hot winds (garmsils) and lack of irrigation moisture during the formation and accumulation of raw cotton harvest.

In connection with the above, the accelerated creation and introduction into production of the south of Uzbekistan of an early-ripening, highly productive, high quality and quantity of fiber, combining resistance to some abiotic environmental factors of the medium-fiber cotton variety *G.hirsutum* L., will solve the main problem of the industry, and namely, increasing its profitability.

Based on the problem being solved within the framework of the laboratory: - "Primary seed production and seed science" of the Research Institute of Fine Fiber Cotton, the research goal was determined, the accelerated creation of pure-grade, original material and the introduction into production of a new medium-fiber variety ITPITI-101, which has a complex of high trait values.

In connection with the problem being solved and the purpose of the research, the following tasks were identified:

- summarize the results of station and competitive variety testing of the medium-fiber cotton variety ITPITI-101;
- create a pure-grade, original material of medium-fiber grade ITPITI-101;
- improve the elements of agricultural technology of the cotton variety ITPITI-101.

Zaytsev G.S. was engaged in the selection of varieties of medium-fiber cotton in Uzbekistan at various periods. (1963), S.S. Kanash (1964), Rumshevich (1949), Mirakhmedov S.M. (1971, 1974), Avtonomov A.A., (1973), Avtonomov Vad.A. (1993), Avtonomov Vik.A. (2010), Avtonomov Vad.A. (1993), Ravshanov A.E., Avtonomov V.A. (2021), who developed and introduced competitive medium-fiber cotton varieties into production. The possibility of combining high yields of raw cotton and fiber, as well as resistance to *Verticillium dahlia* Klebhan, in one variety was theoretically substantiated and practically proven.

To date, Avtonomov breeders Vad.A. (1993), Egamberdieva S.E. (2005), Namazov Sh.E. (2006), Kurbonov A.E., Avtonomov Vik.A. (2020), Ravshanov A.E., Avtonomov V.A. (2021) created a number of varieties of the species *G.hirsutum* L that are widely planted in the republic. However, Uzbekistan needs modern varieties that combine early maturity of 105-115 days, raw cotton yield of 50 c/ha or more, high quality and quantity of fiber, as well as resistance to some biotic environmental factors, which will solve the problem of accelerated introduction into production.

Based on the above problem, the goal of the study was determined - the creation and accelerated introduction into production of a new variety of medium-fiber cotton, ITPITI-101, with the above-mentioned parameters.

A significant number of previously conducted theoretical and practical studies, including domestic (Simongulyan N.G. 1971, 1977, 1987, 1991) and foreign scientists (David W. Albers and Curtis Wiiams, 1999), (Ken E.Lege 1999), (Jose Eduardo, 1999), (Meek P.A., 1999).

As part of a number of completed applied projects funded by the Ministry of Innovative Development of the Republic of Uzbekistan and the work of the laboratory in the period from 2018 to 2022. by a team of authors led by Professor V.A. Avtonomov. A new variety of medium-fiber cotton, ITPITI-101, has been created and submitted for state testing in 2023.

2. Venue, Materials and Methods

Climatic conditions during breeding and seed research in the Tashkent and Surkhandarya regions in 2018-2022 are typical for these zones. Sowing was carried out at optimal times. 50% of seedlings were obtained, as a rule, after replenishing irrigation in the conditions of the Tashkent region and reserve irrigation in the conditions of the Surkhandarya region. Plants developed at constantly rising temperatures, and hot summers and warm autumns made it possible to complete the harvest of experimental raw cotton seed by September 15 each year. Field experiments related to the creation of the ITPITI-101 variety were carried out according to the classical methods of conducting breeding work with cotton (1992). Variational-statistical processing of the results was carried out according to a computer program. The dominance index (hp) for F1 hybrids was determined by Allard (1966). Heritability coefficient for F2-F3 hybrids according to Beil Atkins (1965).

The evaluation of the initial material involved in the experiment and the created F1-F5 hybrids and breeding material was carried out in natural field conditions of the central experimental base (NISSAVH).

Competitive variety testing was carried out in accordance with the program of breeding work until 1990 (methodological instructions).

3. Results and Discussion

Selection of variety ITPITI-101. The ITPITI-101 variety was bred jointly by the Research Institute of Breeding, Seed Production and Agrotechnology of Cotton Growing (NISSAVH) and the Research Institute of Fine Fiber Cotton, NIITH, using the method of synthetic selection from the hybrid combination F4[F5(C-6570 x Bukhara-6) x Namangan-34]. Hybridization involving the above varieties was carried out in 2013.

In the breeding study, a complex, intervarietal hybrid combination F4[F5(C-6570 x Bukhara-6) x Namangan-34] was used, in which heterosis effects were established in F1 based on a set of main traits, and a negative effect of complete overdominance was established based on the micronaire and precocity traits. In F2-F3 hybrids, the heritability coefficient of the above-mentioned hybrid for the group of main characters is set in the range from 0.6 to 77.

The ancestral family 1741 was isolated in 2017 and its reproduction as L-1741 began in 2018 and at the same time it passed station and competitive variety testing in 2020-2022. (Table 1), where it showed its advantages. During the same period, pure-grade original material L-1741 was created under the name variety ITPITI-101 (Table 1).

The ITPITI-101 variety has significantly better fiber quality than the standard variety S-6524 (Table 2), but at the same time requires fewer vegetation irrigations, which are carried out at reduced irrigation rates.

During the growing season, the new variety tolerates reduced watering rates well. It is highly resistant to *Verticillium dahlia* Klebhan (on average for 2020-2022), its incidence of the disease was a total of 14.1%, including a strong 5.1%, against the standard variety C-6524, in which this figure was in total noted at the level of 71.4% and, to a strong extent, equal to 37.6%.

Table 1 Results of competitive variety testing of a new cotton variety ITPITI-101

Years	Variety, (st), new variety	Raw cotton yield, c/ha	Fiber yield, c/ha	Soon-ripeness, day	Weight cotton-raw one box, G	Fiber output, %
2020	S-6524 (st)	35.1	12.2	121	5.4	34.7
	ITPITI-101	38.1	14.7	109	6.1	38.6
2021	S-6524 (st)	32.9	11.1	122	5.6	32.9
	ITPITI-101	37.0	14.2	111	6.3	38.4
2022	S-6524 (st)	32.9	12.1	120	5.6	33.4
	ITPITI-101	41.7	15.4	113	6.2	38.7

As can be seen from Table 2, on average over 3 years, the advantage in fiber yield was 4.9%, in raw cotton yield - 5.9 c/ha, in fiber yield - 2.9 c/ha, in early ripening the advantage was on average - 10 days and in weight raw cotton – 0.7 grams.

Table 2

Results of technological analysis of cotton fiber variety

ITPITI-101 (based on the results of a competitive test, analysis was carried out in SIFAT, harvest 2021-2022)

Variety standard, new variety	Годы испытания									
	2021					2022				
	fiber output %	Staple length fibers, D	linear fiber density, m/text	specific gap-length fibers, g.s/text	Micronaire	exit fiber %	staple length fiber, inch	linear density fibers, м/текс	specific fiber breaking length, g.s/text	micronaire
C-6524 (st)	33.7	1.14	172	31.1	4.4	33.4	1.13	171	32.1	4.6
ITPITI-101	38.6	1.16	169	33.9	4.2	38.7	1.15	167	34.1	4.2

In 2022, the ITPITI-101 variety successfully passed station and competitive 3-year testing and has been accepted for state testing since 2023. A patent application has been filed for the new variety ITPITI-1.

The new variety of medium-fiber cotton ITPITI-101, as shown by the analysis of the results of field research, is of interest for the production and textile industry and its introduction into production in the Surkhandarya region and the entire south of Uzbekistan.

Primary seed production. In 2022, the seeds of the new variety ITPITI-101 in the form of 340 individual selections and 102 family collections were transferred for propagation to the elite seed farm for preliminary propagation of new varieties of cotton at the Research Institute of

Fine Fiber Cotton, Termez district, Surkhandarya region (NIITH), according to the instructions for the work of the elite seed farm preliminary testing of new varieties of cotton (1986).

According to the botanical description, the new variety of medium-fiber cotton ITPITI-101 is assigned to the species *G.hirsutum* L. It has a cone-shaped bush, zero type of branching, of medium size, the height of which is 100-120 cm, green and tans in the fall. Monopodium on the plant 0-2. The bud of the first sympodium is formed on the 4-5 fruiting node. Leaves are 3-5 lobed, medium-sized, green. A rounded-elongated box with a long spout. The fiber is white, the seeds are medium, the fluff is dense gray. Cream-colored flower, medium.

In the 2020-2022 crops in the fields where the new variety ITPITI-101 was propagated. NIITH of the Surkhandarya region amounted to over 45 c/ha.

Agricultural technology for cultivating cotton variety ITPITI-101. Sowing of the ITPITI-101 cotton variety is recommended to be carried out from March 20 to 30 in the conditions of the Surkhandarya region, after emergency irrigation during soil maturation, when the soil temperature at a depth of 10 cm for 7-10 days is 13°C and above. The sowing rate for bare seeds is 25-30 kg/ha, with pubescent seeds 55-60 kg/ha, for thickened crops 85-90 kg/ha. Seed placement depth is 4-5 cm. Plant placement scheme is 60x15-1 or 6 plants per linear meter : 90x10-1 or per linear meter of 9 plants with a two-line sowing scheme 60x30 - 15x1. The optimal plant density is 90-100 thousand plants/ha; with low soil quality, it is increased by 15-20%, and with two-row sowing by 25-30%.

The ITPITI-101 variety is highly sensitive to early feeding. The annual norm of fertilizers depending on the agrochemical cartogram of the cultivation zone in the active substance: nitrogen - 200-220 kg, phosphorus - 120-140 kg, potassium - 100-110 kg/ha. The first feeding is carried out in the phase of formation of 3-4 true leaves after thinning is completed. The second - in the budding phase, the last - during the period of flowering and mass fruit formation no later than July 10. The first growing season watering is carried out when plants are in mass flowering; the interval between subsequent growing season waterings is 15-18 days. The ITPITI-101 variety is highly responsive to a combination of 3 and 4 irrigations with the addition of organic matter - 20-30 tons per 1 hectare. The last watering is carried out at the end of August and beginning of September at half the field norm.

Vegetative irrigation is carried out according to schemes 1-1-1, 1-2-1, depending on the type of soil and the depth of groundwater. The ITPITI-101 variety performs well in areas with low supplies of irrigation water. Mintage is not carried out using the recommended agricultural technology. On highly fertile soils and with timely watering in the presence of 16-17 fruiting branches. Moderately fertile with 14-15 fruit branches and completed no later than July 5-10. If necessary, defoliation is completed before September 5.

Timely and high-quality implementation of the recommended agrotechnical measures for cultivating the ITPITI-101 variety allows you to obtain a full, high-quality early harvest of raw cotton and complete the cotton harvesting campaign with machines before October 10. All harvested material should be delivered to cotton gin plants in the highest and first grade. Higher yields, as well as increased yield and quality of fiber of the ITPITI-101 variety will allow each farm to receive up to 40-60% additional profit from its cultivation, also due to its high yield and quality of fiber.

4. Conclusion

Based on the analysis of the results of field research, the following conclusions should be drawn: due to the fact that the cotton variety ITPITI-101 is highly resistant to high daytime temperatures and hot winds blowing during the formation and accumulation of the crop, in combination with a high complex of values of the main economically valuable traits, it should

be quickly tested, simultaneously propagated and recommended for implementation not only in the conditions of Surkhandarya, but also in Bukhara, Kashkadarya and Navoi regions;
- in order for the ITPITI-101 variety to fully demonstrate its high potential in terms of productivity and the rate of return of the raw cotton crop, it is necessary to use the recommended elements of the above presented agricultural technology.

5. Bibliographical List

1. Law "On selection achievements", 1996
2. Law "On Seed Production", 1996
3. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 985 dated December 12, 2019
4. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 47 dated January 30, 2020
5. Program of breeding work until 1990 of the cotton breeding center (guidelines). Tashkent. 1990 P.106.
6. Instructions for pre-propagation of seeds of new varieties of cotton. Moscow. 1986 P.52.
7. Avtonomov A.I. Selection of the Egyptian type of cotton / In the book "Cotton selection" - Tashkent.Gosizdat.1948 – P.109-136.
8. Avtonomov A.A. Selection of fine-fiber cotton varieties. Tashkent. Fan.UzSSR. 1973. P.144.
9. Avtonomov Vad.A. Abstract doctoral dissertation. Tashkent. 1993.
10. Kurbonov A.Y., Avtonomov V.A. Creation of cotton varieties resistant to pathogens. Monograph. 2020 International Book Market Strvice Ltd, member of OmniScriptum Publishing Group 17 Meldrum Street, Beau Bassin 71504. P.188
11. Gavrillov E. Inheritance of boll size and fiber length during distant hybridization of cotton using repeated crossings. On Sat. "Genetics, biochemistry, selection, seed production of agricultural crops." Tashkent, publishing house "Fan", 1977, p.50-54.
12. Zaitsev G.S. Selected works. Moscow. Ear. 1963. P.343.
13. Iksanov M.I. Selection of long-staple cotton varieties with the first types of fiber. State and prospects for its development in Uzbekistan. International scientific and practical conference. Tashkent. 2006 P.194-196.
14. Ibragimov P.Sh. Genetic methods in cotton breeding. Monograph. Tashkent. 2006. 104 p.
15. Mirakhmedov S.M. Intraspecific distant hybridization of cotton for wilt resistance. Tashkent: FAN. 1974. P.88.
16. Kanash S.S. Directed change in the heredity of cotton.//Agrobiol. 1964. No. 3. P.352-357.
17. Kimsanbaev O.Kh. Monograph. "Prospects for the development of fine-fiber cotton." Tashkent. 2001.
18. Kurbonov A.Y., Avtonomov V.A. "Creation of cotton varieties resistant to pathogens." Monograph. 2020 International Book Market Strvice Ltd, member of OmniScriptum Publishing Group 17 Meldrum Street, Beau Bassin 71504
19. Ravshanov A.E., Avtonomov V.A. "Selection of modern varieties of cultivated cotton species in Uzbekistan." Monograph. 2021. International Book Market Strvice Ltd, member of OmniScriptum Publishing Group 17 Meldrum.
20. Simongulyan N.G. The problem of precocity in selection. - Tashkent. Fan.- P.122.
21. Simongulyan N.G. Combination ability and heritability of cotton traits. - Tashkent. Fan. UzSSR. 1977. – P.140.

22. Simongulyan N.G., Mukhamedkhanov S., Shafrin A. Genetics, selection and seed production of cotton. - Tashkent. Fan. UzSSR. 1987. – P.3-317
23. Khutornoy Yu.P. New varieties of Soviet fine-fiber cotton // Agriculture of Uzbekistan. No. 6. 1962.
24. Allard R.W. Principles of Plants Breeding, John Willey, Sons. New-York-
25. London-Sidney, 1966
26. Beil G.M., Atkins. Inheritance of quantitative characters in grain sorghum//Iowa State Journal of Science. 1965
27. David W. Albers and Curtis Williams paymaster Cjttonttd Ludbock, TX Stutdart. AR.PM 1215 BG/RR, PM 1218 BG/RR FND PM 1560 BG/RR. New cotton varieties. Beltwide Cotton Conferences. 1999. Pq.68-71.
28. Ken E.Lege New early maturing transgenic varieties from sure grow:SG125B/R, SG125R, SG501B/R, SG585B and SG585R. BELTWIDE Cotton Conferences. 1999. pq, 64-65.
29. Jose Eduardo. Comparative Analysis of Producing Transgenic Cotton Varieties Versus No Transgenic Variety in Deliclas. Mehico.Beltwide Cotton Conferences. 1999. pq, 255.
30. Meek P.A. Drought Tolerance and Follar Sprays of Glycine Bctaine. Beltwide Cotton Conferences. 1999. pq, 559.