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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

STUDY OF GEOGRAPHICALLY DISTANT COTTON VARIETIES BIO MORPHOLOGICAL CHARACTERISTICS AND VALUABLE TRAITS IN ACCORDANCE WITH AGRICULTURE AND THEIR USE IN PLANT BREEDING

Speciality: 3103.04- **Plant breeding and seed production**
Field of science: **Agrarian sciences**
Applicant: **Aytan Ilham Zeynalova**

Baku-2024

The work was performed at the department "General farming, genetics and plant breeding" of the Azerbaijan State Agricultural University.

Scientific supervisor: Doctor of agrarian sciences, associate professor **Aladdin Alirza Tagiyev**

Official opponents: Doctor of agrarian sciences, associate professor **Vugar Suleyman Salimov**

PhD in agrarian sciences, associate professor **Qarib Alish Novruzlu**

PhD in agrarian sciences, associate professor **Farmayil Kamayil Kahramanov**

Dissertation Council at FD 1.29 of the Supreme Attestation Commission under the President of The Republic of Azerbaijan operating at Agrarian Science and Innovation Center, Research Institute of Crop Husbandry

Chairman of the Dissertation Council: Doctor of agrarian sciences, professor **Jalal Shamil Mammadov**

Scientific secretary of the Dissertation council: PhD in agrarian sciences, associate professor **Sevda Kamal Hajiyeva**

Chairman of the scientific seminar: Doctor of agrarian sciences, associate professor **Aladdin Nemat Sadigov**

GENERAL DESCRIPTION OF THE RESEARCH

The relevance of the research and the degree of the problematic research. Cotton is the most valuable among technical crops. One of the decisive factors in the dynamic development of cotton farming is the creation of new intensive type varieties and their wide application in production. Breeders are faced with the goal of developing new theoretically based synthetic methods for obtaining new plant varieties, various genetic-plant breeding methods for creating a rich gene pool. Intensification of plant breeding work, obtaining starting material for hybridization, improving individual characteristics of existing varieties, and developing methodical approaches to create new cotton varieties are very urgent problems.

Cotton growing, which is one of the strategic and important areas of the agricultural sector that brings foreign currency to the country, stands out for its high indicators of labor intensity and the volume of total output.

Measures taken in our country to restore the former glory of cotton, including the adoption of the “Law on Cotton Growing” on May 11, 2010, are very significant.

The basis for obtaining a higher yield in cotton cultivation was created by applying the innovative technologies of the advanced countries engaged in cotton cultivation in our republic, including China, Greece, Turkey and the International Atomic Energy Agency (IAEA). It is urgent to compare the quantitative and qualitative indicators of the cotton varieties cultivated in the cotton farms of the republic, introduced from geographically distant countries, and find out the preferred ones and apply them to farms.

The object and subject of the research. As a research object, at the "General Agriculture, Genetics and Breeding" department of ADAU, the properties of drought tolerance, resistance to diseases and pests, high fiber strength and high fiber yield for practical selection by using local Ganja-110 and imported geographically distant cotton varieties as donors in hybridization transfer to the hybrid generation and creation of desirable starting forms according to the indicated signs are planned.

The purpose and tasks of the research. The main goal of the research is to study in a comparative way the bio morphological features of geographically distant cotton varieties, economic value characteristics, and technological quality indicators of fiber, as well as to involve geographically distant cotton varieties in hybridization, and to use the obtained hybrids as the starting material in plant breeding. In order to achieve the goal set in the study, the following tasks fulfillment is planned:

-Comparative study of bio morphological, economically valuable signs and technological quality indicators of cotton varieties fiber introduced from local and foreign countries.

- Studying the soil and climate conditions of the area during the research years;
- Determining the selection of more promising cotton varieties for farms;
- Creation of starting material for plant breeding, hybridization of geographically distant cotton varieties;
- Directional use of initial forms obtained from the hybridization of geographically distant cotton varieties;
- Directional use of the second generation (F_2) obtained from the juncture of geographically distant cotton varieties;
- Application of hybrids of the third generation (F_3) obtained from geographically distant cotton varieties and their use in plant breeding;
- Determination of sowing quality of geographically distant cotton varieties seeds of;
- Determination of fat content in seeds of geographically distant cotton varieties;
- Studying the resistance of geographically distant cotton varieties to wilt disease;
- Estimation of economic efficiency.

Research methods. During the research, the goals and objectives were achieved by using the traditional and modern methods used in cotton growing. For this, bio morphological, economically valuable signs, technological quality indicators of fiber, phytopathological, plant breeding (individual plant breeding,

sample, numbered families), USTER HVI 1000 technological device, mathematical and statistical calculations were carried out.

Main points presented to the defense of the dissertation:

-Comparative assessment of productivity of domestic and introduced cotton varieties, vegetation periods, and mass of raw cotton obtained from one boll, amount of fat content in cottonseeds**;**

-Development of scientific and empirical basis for using opportunities of appropriate improvement and agronomic measures to increase resistance and adaptability to wilt disease;

-Using the methods of plant breeding, such as individual plant breeding and hybridization, which play an important role in the formation of economically valuable traits and in the improvement of genetic possibilities of varieties and hybrid forms.

-Adaptation of geographically distant cotton varieties to the country's soil and climate conditions, being promising for cotton farming, phenotypic dominance of hybrids obtained from crossbreeding, heterosis and using them as a starting material in plant breeding;

- Crossbreeding carried out between local and introduced cotton varieties, hybrids obtaining, study of their application and directional use in plant breeding;

- Determining the economic efficiency of research;

Scientific innovation of the research. As a result of the comparative study of the geographically Biomorphological, productivity, quality, durability, etc., formed on the basis of adaptation characteristics of cotton varieties introduced to our republic for the first time. characteristics were investigated, adaptive forms were determined by comparative research.

The economic and perspective indicators of the varieties were evaluated and for the first time economically important, scientifically based perspective forms were determined.

In order to create new cotton varieties, local and geographically distant cotton varieties were used in hybridization, and as a result, promising hybrids with various positive signs and characteristics, i.e., quantitative and qualitative indicators, productive, high fiber

yield, long fiber, large cones, and fast growing perspective hybrids were obtained.

Depending on the soil and climate conditions of the years of the study, the regularities of the transmission of quantitative and qualitative traits, fertility elements, important selection traits in the hybrid samples obtained as a result of hybridization from generation to generation (heterosis, dominance, etc.) were studied.

Theoretical and practical significance of the research. It is proposed to use the forms with ecological plastic with different economic value, different in many biological signs and indicators obtained by individual selection from geographically distant cotton varieties, were selected due to the soil and climate conditions of the country, evaluated according to their breeding potential, and use of those forms as starting material in breeding practice.

In accordance with the research, the hybrids obtained from the juncture between local and geographically distant cotton varieties due to the economically valuable traits (high yield, fast growing, high fiber yield, long fiber, large bolls, etc.), and they can be successfully used in plant breeding works as an incentive for obtaining intensive type varieties.

Approbation and application of work. The results of the research and the main provisions of the work were presented at the following international and national scientific-practical conferences:

Regularly, every year at the final annual report meetings of the Azerbaijan State Agricultural University (Ganja, 2017-2021); at the V International Scientific-Methodical Conference: "The role of physiology and biochemistry in the introduction and selection of agricultural plants" (Moscow, April 15-19, 2019); at the scientific-practical conference dedicated to the 100th anniversary of Azerbaijan State Agricultural University, "Innovative Development of Cotton Growing in Azerbaijan: achievements, perspectives" (Ganja, December 7, 2019); at the X international scientific-practical conference "Fundamental and applied research in the modern world" (Boston , May 12-14, 2021); at the International Scientific-Practical Conference "Science 2022: Results of research and discoveries" (Kemerovo, February 7, 2022); at the II International Conference on

Foundations of Science and Education (Baku, August 2, 2022); at the X International Scientific Research Conference (Baku, September 6, 2022); at the International Conference on biodiversity, land and water resources of Shusha and surrounding areas: a vision for the future (Baku-Shusha, September 22-24, 2022), Eurasia at the 7th International Conference of Applied Sciences (Budapest, March 10-12, 2023), Africa at the 2nd International Conference on New Horizons in Science (Cairo, June 28-30, 2023), Karadeniz at the 13th International Conference of Applied Sciences (St. Petersburg , July 21-24, 2023).

Based on the results of the research work, 22 scientific works reflecting the main propositions of the dissertation were published, 12 of them were articles (8 in journals included in the international summarizing and indexing database), and 10 were conference materials.

Published works. Based on the results of the research work, 16 scientific works reflecting the main provisions of the dissertation were published, 10 of them are articles, and 7 are conference materials. Among them, 5 articles and 3 conference materials were published abroad.

Name of the organization where the dissertation was performed: The dissertation work was carried out at the "Department of General Agriculture, Genetics and Breeding" of the Azerbaijan State Agricultural University.

The total volume of the dissertation with a sign indicating the volume of the structural sections of the dissertation separately. The dissertation consists of an introduction, five chapters, a conclusion, and a list of 186 references. There are 12 figures, 24 tables and 3 appendices.

In the structure of the dissertation, the title part and table of contents contain 3 pages of 4609 characters, the introduction is 8 pages of 12832 characters, the first chapter is 29 pages of 51107 characters, the second chapter is 11 pages of 16518 characters, the third chapter is 19 pages of 24684 characters, the fourth chapter is 30 pages of 48561 characters , the fifth chapter is 17 pages with 31922 characters, the conclusion is 2 pages with 1957 characters, the

recommendations are 1 page with 833 characters, and the bibliography (186 items) is 21 pages with 32146 characters. The general text part of the dissertation (excluding pictures, tables, graphs and the list of references) is 118 pages of computer text or 193023 characters.

CONTENTS OF THE WORK

The introduction should identify the topic; provide essential context of the topic and the general characteristics of the dissertation work.

In the first chapter, it was determined that most of the introduced varieties cannot realize their biological potential and it is important to carry out plant breeding works to obtain local varieties adapted to local cultivation conditions.

Another direction in the creative breeding is to pay due attention to the creation of ecologically plastic varieties. New varieties should have high adaptability; varieties should have productivity potential and be able to adjust quickly to different soil and climate conditions. Consequently, with wide ecological plasticity is of greater importance.

The only correct way to create varieties with complex traits, especially wilt resistance, is geographically distant hybridization. Vegetation period, productivity, fiber yield, boll size, etc. forms that are identical in terms of characteristics, surpass the first generation hybrids obtained in the process of crossing, as a matter of fact, therefore, heterosis is observed.

The second chapter deals with the soil and climate conditions of the place where the research was conducted. The research was carried out in the experimental field of the Scientific Research Institute of Plant Protection and Technical Plants located in the Ganja-Gazakh region. The territory belongs to the administrative division of Samukh district.

According to V.V.Akimtsev, the soils of the experimental areas of the Azerbaijan Scientific-Research Institute of Cotton Growing (currently the Scientific-Research Institute of Plant Protection and Technical Plants) belong to light-chestnut irrigated soils. The content

of humus is 2.5%, carbonates are 4.6-12.0%, total nitrogen is 0.08-0.18%, the amount of silicic acid is 56.0% in transitional layers, 57.8% in alluvial layers, the reaction of the soil is weakly alkaline (pH is 7.5-8.2%)[1]. Groundwater is located at a depth of 10-30 m from the soil surface and is suitable for irrigation. The water permeability of the soil is average. Therefore, the soil of the Scientific Research Institute of Plant Protection and Technical Plants was considered suitable for growing a high cotton crop due to both their chemical and water-physical properties.

Research material and methodology. The research work was conducted out in 2017-2020, in the experimental field of Plant Protection and Technical Plants Scientific Research Institute, in Samukh district. Analysis and analyzes were carried at the "Department of General Agriculture, Genetics and Breeding" of the Azerbaijan State Agricultural University.

The following cotton varieties introduced from cotton-growing countries were implemented as a research material: local Ganja-110 cotton variety, BA-440 (Turkey), Selekt (Greece), Akala beret (Israel), S-6524 (Uzbekistan), Tashauz-68 (Turkmenistan). In accordance with the systematics of F.M. Mauer[2], the above mentioned cotton varieties belong to the Gossypium genus, Eugossypium subgenus, G. hirsutum L. species, and have 52 chromosomes in their somatic cells.

Field inspections were conducted 3-4 times at different development stages of plants during the vegetation period. In order to clarify the height and growth rate of plants, to determine the ability to collect harvest, the height of 25 plants was measured in each repetition, and the amount of sympodial branches and testicle was determined.

Laboratory analyzes were carried out on the raw cotton of the taken test samples.

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[1] Akimtsev, V.V. Soils of the Ganja region // Materials on zoning of Azerb. SSR, - Baku: - 1928, 108 p.

[2] Mauer, F.A. Origin and taxonomy of cotton / F.A. Mauer. - Tashkent: Cotton, - 1954. - 384 p.

In addition, crossbreeding between cotton varieties was carried out in order to create starting material for breeding practice.

For each combination, 50 flowers were castrated, and pollinated according to the method.

Ganja-110 x BA-440

Ganja-110 x Selekt

Ganja-110 x Akala Beret

Ganja-110 x S-6524

Ganja-110 x Tashauz-68

Each obtained figure was specified by statistical calculations, the main characteristics of plants in F_1 and F_2 were analyzed by the method of D.A. Brubaker[3], and the dominance of phenotypic traits was calculated by the following formula:

$$H_p = \frac{X_{f1} - \frac{X_{P1}+X_{p2}}{2}}{\frac{1}{2}(X_{p1}-X_{P2})},$$

and the indicators obtained from experience were calculated by the method of by biological and statistical systems, according to the Dospekhov[4] method:

$$m = \frac{\sqrt{\sum L^2}}{\sqrt{n-1}}$$

In the third chapter, the biomorphological characteristics of geographically distant cotton varieties were studied. Phenological observations were conducted to determine the vegetation and interphase periods of geographically distant cotton varieties.

The Ganja-110 cotton variety was faster than the introduced cotton varieties by 2-3 days for seed germination, 6-8 days for the germination-flowering phase, 6-9 days for the flowering- ripening phase, and 14-18 days for the vegetation period.

In the ripening stage of plant development, the height of the main body of the plant developed more intensively in geographically

[3] Brubaker, D.L. Agricultural genetics / D.L. Brubaker. - Moscow: Kolos, - 1966. - 223 p.

[4] Dospekhov, B.A. Methods of field experience / B.A.Dospekhov. - Moscow: Agropromizdat, - 1985. - 351 p.

distant cotton varieties. While the height of the plant in the local cotton variety is 120 cm, it is 135 cm in the introduced cotton varieties BA-440, 128 cm in the Selekt variety, 130 cm in the Akala Beret variety, 125 cm in the S-6524 variety and 130 cm in the Tashauz-68 variety, the height of the main stem is more intensively developed.

The number of sympodial branches and the type of branching they belong to, are of particular importance in the mechanization of cotton harvesting in the cotton plant.

Although the number of sympodial branches in geographically distant cotton varieties is 15-18 pieces, the number of sympodial branches in the Ganja-110 variety is 20 pieces, and it is superior to the introduced cotton varieties.

One of the main elements of productivity is the amount of bolls on a bush, which depends on its biological characteristics, environmental factors, cultivation agrotechnics and other factors.

The number of bolls per bush was 17 in the local cotton variety Ganja-110, 16 in the Selekt, Akala Beret and Tashauz-68 varieties, and relatively less - 15 in the BA-440 and S-6525 cotton varieties.

In the fourth chapter, economic value characteristics of geographically distant cotton varieties were studied.

Fertility being a complex feature depends on a number of genetic and external environmental factors.

Ganja-110 cotton variety differs from the cotton varieties introduced to the country by its early maturation, high rate of opening of raw cotton, as well as its high productivity.

The yield of Ganja-110 cotton variety was 43.0 cents/ha, S-6524 variety with the productivity index - 35.5 cents/ha- is in the second place. The productivity of other geographically distant cotton varieties was as follows: BA-440 variety – 30.5 cents/ha, Selekt variety – 32.2 cents/ha, Akala Beret variety – 28.0 cents/ha and Tashauz-68 variety 31.0 cents/ha. Among the geographically distant cotton varieties, the S-6524 variety has the highest yield of 35.5 cents/ha, while the Akala Beret variety is the least productive variety with 28.0 cents/ha. The productivity of Ganja-110 cotton variety was

7.5-15.5 cents/ha higher than the productivity of geographically distant cotton varieties.

Fiber yield of cotton varieties is one of the main economic valuable traits[5]. The creation of new cotton varieties inherited due to high fiber yield has both theoretical and practical significance.

Fiber yield of cotton varieties was 36.0-40.0%. Selekt and BA-440 cotton varieties had high fiber yield (39.5-40.0%). The fiber yield of local Ganja-110 cotton variety was 38.5%. Based on the research conducted, it can be said that BA-440 and Selekt have higher fiber yield than the geographically distant cotton varieties.

The mass of raw cotton obtained from one boll is one of the important indicators in increasing productivity. Despite the fact that the bushes have many bolls, the mass of the bolls is small compared to local cotton varieties.[6] So, although the mass of raw cotton obtained from one boll in Ganja-110 cotton variety is 6.3 g, it is 5.4 g in BA-440 variety, 5.1 g in Selekt variety, and 5.5 g in Akala Beret variety. The mass of raw cotton obtained from one boll was 6.1 g in the S-6524 variety imported from Uzbekistan, and 6.0 g in the Tashauz-68 variety from Turkmenistan.

The length of the fiber varies depending not only on the characteristics of the variety, but also on the layers of bolls in the plant, etc.[7]

Ganja-110 cotton variety had a longer fiber length of 35.2 mm, and Akala Beret variety had a shorter fiber length of 32.7 mm.

Among other geographically distant cotton varieties, it was 33.3 mm in BA-440 variety, 33.8 mm in Selekt variety, 34.0 mm in S-6524 variety, and 34.2 mm in Tashauz-68 cotton variety. S-6524 imported from Uzbekistan and Tashauz-68 imported from

[5] Babaev, D. Importance of creating high-yielding varieties of cotton // Problems of sustainable development of the agro-industrial complex of the CIS countries in modern conditions, - 2009. - p. 28-30.

[6] Jumaev, Sh. V. Yield and technological parameters of early maturing, medium-fibre cotton lines // International Agricultural Journal. - 2017. № 5, - c. 38-39.

[7] Ibragimov, S.Sh. Yield and technological properties of fiber of districted cotton varieties // Agrarnaya nauka, - Moscow: - 2011. № 9, - c. 13-14.

Turkmenistan were closer to the Ganja-110 cotton variety according to the economic value of the fiber length.

According to the conducted research, it was determined that the local Ganja-110 cotton variety is superior to other introduced cotton varieties in terms of fiber length and is more adapted to the soil and climate conditions of the country.

The cotton plant is cultivated for its fiber yield in all cotton-growing regions of the world. The increase in fiber yield is directly depends on the fiber yield of the variety, that is, the higher the fiber yield, the higher the fiber crop.

The fiber yield of local and geographically distant cotton varieties varied between 11.1-15.8 cents/ha. In the local Ganja-100 cotton variety, the fiber yield was 15.8 cents/ha. Fiber yield from imported cotton varieties was as follows: BA-440 variety - 12.5 cents/ha, Selekt variety - 13.8 cents/ha, Akala Beret variety - 11.1 cents/ha, S-6524 variety - 13.0 cents/ha, Tashauz-68 variety - 12.2 cents/ha .

Technological quality of geographically distant cotton varieties fiber. In the textile industry, various technological fiber products are used in the various assortment of fabric products preparation.[8]

The technological qualities assessment of the geographically distant cotton varieties fiber used in our research, was carried out in the "USTER HVI-1000" device. Microneurium of the studied geographically distant cotton varieties varied from 4.27 to 5.17, when the samples analyzed. Among the cotton varieties, the optimal micronaire was 4.27 units in the Ganja-110 variety, and 4.71 units in the BA-440 variety. Among other introduced cotton varieties, Selekt variety had 4.88 units, Akala Beret variety had 4.93 units, S-6524 variety had 4.95 units, and Tashauz-68 variety had 5.17 units (table 1).

The local Ganja-110 cotton variety was superior to the other geographically distant cotton varieties studied in the study in terms of the fiber technological quality, along with economic valuable

[8] Bigaraev O.K. Technological properties of fiber in variety testing of studied varieties / O.K. Bigaraev, I.R. Huseynov // Makta sharuashylygyn damytudyn gylym negizderi, - Atakent: 2012. - p. 360-362.

Table 1

Technological quality indicators of geographically distant cotton varieties the fiber (2017-2019)

№	Cotton varieties	Microneur, unit	Upper average length (in mm)	Equal to length index (in %)	Specific breaking load (Str) (g/tex)	Fiber length at break (Elg) (in %)	Refraction coefficient (Rd) (in %)	Degree of yellowness, (+b)	Three-digit code, (CG)
1	Ganja -110	4.39	32.32	87.5	29.6	6.2	79.4	6.5	21-2
2	BA-440	4.68	31.46	87.7	28.2	5.1	80.0	6.5	31-1
3	Selekt	4.85	32.30	89.3	28.4	4.8	77.7	7.6	41-1
4	Akala Beret	4.89	31.15	86.6	28.2	6.3	79.6	5.1	31-1
5	S-6524	4.97	30.59	88.7	28.9	5.0	79.6	7.5	31-1
6	Tashauz-68	5.16	31.13	88.2	27.6	4.7	80.1	8.0	31-1

traits.Therefore, we recommend that the Ganja-110 cotton variety could be cultivated in larger areas than farms.

Fat content of cotton varieties seeds. The most valuable of the substances contained in cottonseed is cottonseed oil, which is widely used as food in the food industry. Depending on the different varieties of cotton, the seed contains 19 to 27% oil.

The amount of oil in different varieties depends on the formation of seeds on plants, the dynamics of oil accumulation in seeds, agro technical care, fertilizer background, irrigation regime and other factors. In order to create cotton varieties with a high content of oil in the seed, it is considered appropriate to use parental forms with a high content of oil as donors in hybridization, and to carry out directional selection in the hybrid generations.

Since the seeds of Ganja-110 and S-6524, Tashauz-68 cotton varieties introduced from Central Asia were larger, the amount of both kernel and total oil in the seeds was high. The amount of oil in the seed kernel of the Ganja-110 cotton variety was 46.5%, the total was 27.2%, the amount of oil in the kernel of the S-6524 variety was 45.9%, the total was 26.7%, the amount of oil in the kernel of the

Tashauz-68 variety was 44.0%, and the total was 26.3%. The small size of the seeds of other geographically distant cotton varieties imported from abroad has caused the oil content of their seeds to be low. Thus, the amount of oil in the seed kernels of the BA-440 cotton variety was 41.0%, the total was 21.6%, the amount of oil in the kernels of the Selekt cotton variety was 40.5%, the total was 20.3%, the amount of oil in the kernels of the Akala Beret cotton variety was 39.0%, and the total was 21.0% (figure 1).

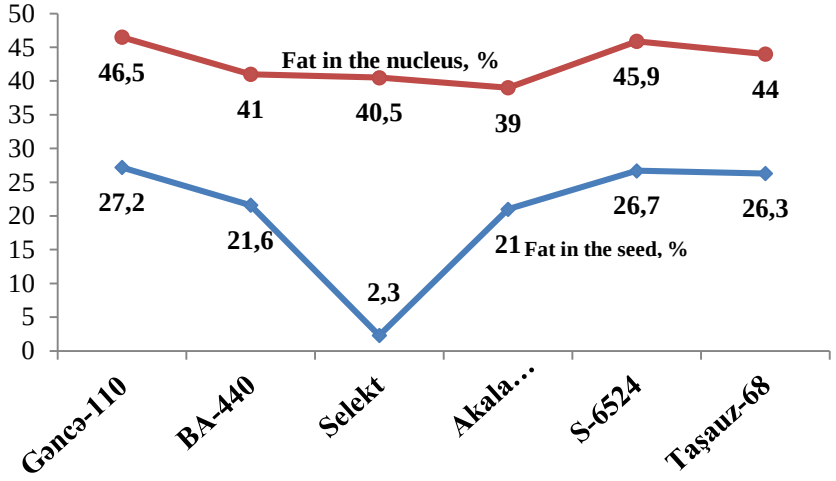

Figure 1. Fat content of geographically distant cotton varieties seeds, %

Study of resistance of geographically distant cotton varieties to wilt disease. One of the important factors affecting both productivity and quality of the plant, one of the problems on the agenda is the resistance of the created varieties to diseases. Taking into account the opinions of world breeders, we can note that the main goal of breeding is to create varieties that can withstand various stresses and give stable yields, along with increasing the productivity of varieties. One of the most urgent problems at present is the strengthening of selection work, the creation of new cotton varieties that are stable in all conditions, stable productive, complex durable,

and maintain high quality indicators due to the correct selection of parental forms for successful selection work, and planting and cultivating them in farms.

Geographically distant cotton varieties were studied and evaluated on the background of artificial infectious wilt created in research institute of plant breeding and industrial crops (RI PPIC).

The purpose of planting and cultivating geographically distant cotton varieties in the background of artificial infectious wilt is to detect resistance to the disease and determine whether they are promising varieties for planting in farms.

The evaluation of resistance to wilt disease of the geographically distant cotton varieties used in our study is indicated thoroughly. As it is obvious from the table, local Ganja-110 cotton variety is less infected with wilt disease (table 2).

Table 2

The assessment of resistance to wilt disease of the geographically distant cotton varieties

Ordinal numeral	Cotton varieties	Wilt-infected plants, in %					
		Total			Including		
		2017-year	2018-year	2019-year	2017-year	2018-year	2019-year
1	Ganja-110	15,8	12,5	13,0	5,2	6,2	4,3
2	BA-440	15,4	9,1	13,3	7,7	5,5	6,7
3	Selekt	17,5	10,3	16,7	7,2	6,7	5,5
4	Akala beret	25,0	16,0	22,0	10,0	7,0	7,7
5	S-6524	37,5	26,7	33,3	21,0	15,3	16,7
6	Tashauz-68	29,3	23,0	26,5	16,5	13,1	14,0

Economic efficiency of geographically distant cotton varieties. The economic efficiency of planting local Ganja-110 cotton variety and geographically distant cotton varieties was compiled based on technological maps in accordance with the agro technical measures carried out during the growing season in the field. On average, 1140 manats were spent on the cultivation of one

hectare of cotton field and harvest, and the selling price of 1 kg of raw cotton was 0.65 manats, and it was calculated based on the average yield. The productivity of the local Ganja-110 cotton variety was 43.8 cents/ha. 1140 manats spent on cultivation of cotton varieties and collection of raw cotton, the net income was 1707 manats, the cost of one centner of the product was 26.0 manats, the level of profitability was 150% (table 3).

When comparing economic indicators of Ganja-110 cotton variety and geographically distant cotton varieties, it can be seen that cotton varieties introduced to the country have low economic indicators. Therefore, the cultivation of Ganja-110 cotton variety in farms will give great economic benefits.

Table 3

3-year average yield and economic efficiency of geographically distant cotton varieties

№	Cotton varieties	Productivity, cents/ha	Cost per hectare, manat	The cost of the product purchased from one hectare of manat	Bir hektar sahədən net income of the obtained product, manat	Cost of one centner of product, manat	Profitability level, %	Comparative economic assessment of varieties, %
1	Ganja-110	43.8	1140	2847	1707	26.0	150	100
2	BA-440	33.0	1140	2145	1005	34.5	88	59
3	Selekt	34.6	1140	2249	1109	32.9	97	65
4	Akala beret	31.0	1140	2015	875	36.8	76	51
5	S-6524	36.2	1140	2353	1213	31.5	106	71
6	Tashauz-68	33.2	1140	2158	1018	34.3	89	59

In the fifth chapter, the creation of starting material for selection was studied.

The main purpose of intraspecific hybridization in selection is to plan the selection correctly, as well as to achieve the directions taken into account in the selection work (disease and pest resistance,

high productivity, creation of intensive type varieties for irrigation conditions, high fiber quality direction) based on the mechanism of transmission of specific traits that concern the breeders. .

It would be more appropriate for the hybrid fields to be located on well-leveled land with high natural fertility, for the purposeful placement of hybrids and for the good development of economically valuable traits (first of all, high productivity) in them. In order to achieve normal growth and development of hybrid plants, the most favorable agrotechnical conditions should be created in this area. During sowing, the area of the field is adjusted depending on the amount of seed obtained from the cross.

The cones obtained from the cross are planted in the first generation hybrid field, combined in combinations or separately. In this field, field inspections are conducted, characteristics of dominance of signs are determined. The selection is made for early maturity, strong development of plants, disease resistance.

Creation of starting material for plant breeding, hybridization of geographically distant cotton varieties, directional use of starting material obtained from hybridization of geographically distant cotton varieties were studied.

In the first generation of hybrids, in almost all combinations, they grow somewhat stronger than the parental forms, and at the same time, individual economic value indicators are explained by the power of heterosis, which is characteristic of the first generation of hybrids, and is more prominently observed in the geographically distant hybridization than in the parental pairs (figure 2).

Hybrids of all combinations were more diverse in the second generation than in the first generation of hybrids due to individual traits.

However, almost most of the quantitative and qualitative indicators of the second generation hybrids were lower than the first generation. As a result, it was concluded that this was due to the strong cross-breeding characteristic of the second generation of fairly diverse forms (figure 3).

The selected hybrid forms assessed as rich starting forms for practical plant breeding due to drought resistance, disease resistance,

strong fiber characteristics, economic value indicators and technological fiber quality characteristics.

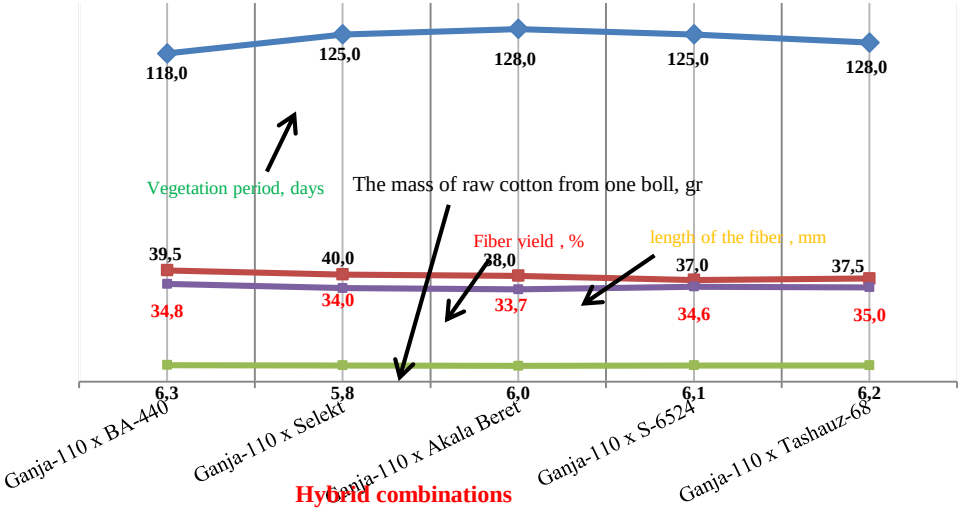

Figure 2. Economic value indicators of the hybrid field of the first generation (F_1).

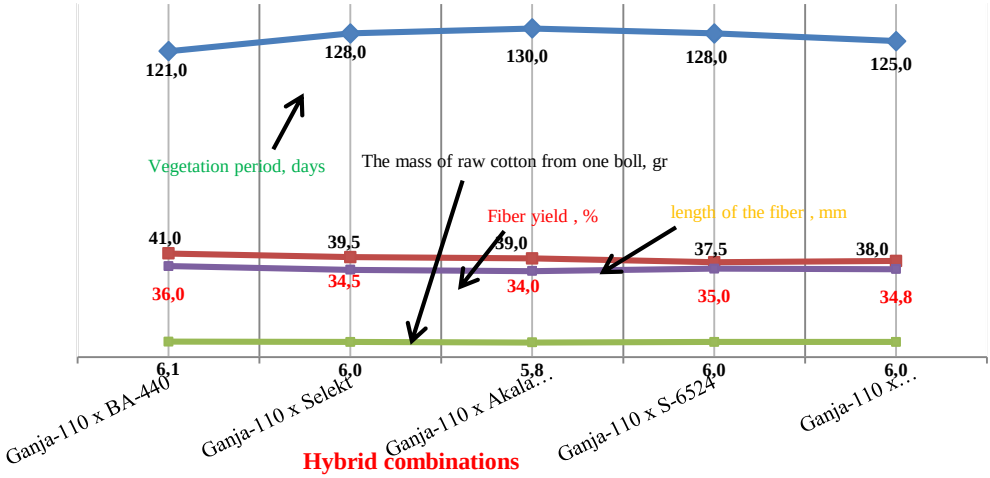

Figure 3. Economic value indicators of the hybrid field of the second generation (F_2).

In the third generation of hybrids, it is considered legitimate that the average numbers of individual economic indicators are higher than the indicators of the second generation (table 4). As a result, stable forms with individual and sometimes several positive characteristics were selected.

Thus, the main part of the individuals selected from the third generation hybrid field were considered promising starting forms for studying in the later stages of the plant breeding process due to certain useful bio morphological signs, characteristics and economic value indicators.

Table 4

Agricultural value indicators in the third generation hybrid field (F_3) obtained from the juncture of Ganja-110 cotton variety and geographically distant cotton varieties.

Ordinal Numeral	Hybrid combinations	Vegetation period, days	Fiber yield, %	The mass of raw cotton from one boll, gr	Fiber length, mm
1	Ganja-110 x BA-440	120	40.0	6.0	35.0
2	Ganja-110 x Selekt	124	40.0	6.1	34.8
3	Ganja-110 x Akala Beret	128	38.5	6.0	34.0
4	Ganja-110 x S-6524	126	38.0	6.2	34.5
5	Ganja-110 x Tashauz-68	127	37.0	6.0	34.0

In order to determine the effect of heterosis, hybrids obtained from the juncture of Ganja-110 cotton varieties with geographically distant cotton varieties were studied.

The vegetation period in the hybrid combination “Ganja-110 x BA-440” of the F_1hybrid generation, is accelerated in comparison with the the parental pairs. The situation is almost identical in F_2 and F_3 generations. Thereby, the F_1 generation hybrids demonstrated positive dominance in accordance with the sign of vegetation period. (table 5)

Table 5

Characterization of the vegetation period of hybrids obtained from juncture of Ganja-110 cotton varieties with geographically distant cotton varieties.

Ordinal numeral	Hybrid combinations	Characteristics of parental pairs		Characteristics of hybrids, daily			
		♀	♂	F_1		F_2	F_3
				M	h_p		
1	Ganja-110 x BA-440	122	142	118	-1.4	121	120
2	Ganja-110 x Selekt	122	138	125	-0.62	128	124
3	Ganja-110 x Akala Beret	122	140	128	0.42	130	128
4	Ganja-110 x S-6524	122	136	125	-0.57	128	126
5	Ganja-110 x Tashauz-68	122	137	128	0.2	125	127

Hybrids obtained from the cross between Ganja-110 cotton variety and five geographically distant cotton varieties were studied. Fiber yield of F_1 hybrids in "Ganja-110 x BA-440" and "Ganja-110 x S-6524" hybrid combinations is of intermediate inheritance according to parental forms, fiber yield of F_1 hybrids of "Ganja-110 x Selekt" hybrid combination is dominant, "Ganja -110 x Akala Beret" hybrid combination of F_1 hybrids obtained from the fiber yield had a dominant heredity character. Fiber yield of F_1 hybrids of "Ganja-110 x Tashauz-68" hybrid combination had the character of negative dominance according to parental forms (table 6).

Fiber length is heritable differently in different combinations of the F_1 hybrid generation.

The mass of raw cotton obtained from one boll in F_1 was close to the parental form with larger boll in hybrids obtained in all combinations.

An increase in raw cotton mass was observed during selection in the second (F_2) and third (F_3) hybrid generations (table 7).

Table 6

Characterization of fiber yield of hybrids obtained from juncture of Ganja-110 cotton variety with geographically distant cotton varieties

Ordinal numeral	Hybrid combinations	Characteristics of parental pairs		Characteristics of hybrids, daily			
		♀	♂	F_1		F_2	F_3
				M	h_p		
1	Ganja-110 x BA-440	38.5	40.0	39.5	0.33	41.0	40.0
2	Ganja-110 x Selekt	38.5	39.5	40.0	0.2	39.5	40.0
3	Ganja-110 x Akala Beret	38.5	36.0	38.0	0.2	39.0	38.5
4	Ganja-110 x S-6524	38.5	36.0	37.0	0.2	37.5	37.0
5	Ganja-110 x Tashauz-68	38.5	37.0	37.5	0.33	38.0	37.0

Table 7

Characterization of raw cotton mass obtained from one boll in hybrids obtained from juncture of Ganja-110 cotton variety with geographically distant cotton varieties

Ordinal numeral	Hybrid combinations	Characteristics of parental pairs		Characteristics of hybrids, daily			
		♀	♂	F_1		F_2	F_3
				M	h_p		
1	Gəncə-110 x BA-440	6.3	5.4	6.3	1	6.1	6.0
2	Gəncə-110 x Selekt	6.3	5.1	5.8	1	6.0	6.1
3	Gəncə-110 x Akala Beret	6.3	5.5	6.0	0.25	5.8	6.0
4	Gəncə-110 x S-6524	6.3	6.1	6.1	0.1	6.0	6.2
5	Gəncə-110 x Taşauz-68	6.3	6.0	6.2	0.5	6.0	6.0

In terms of fiber length, the hybrid superior dominance obtained from the hybridization of the Tashauz-68 variety with the Ganja-110 variety, the F_1 hybrids obtained from the juncture of the geographically distant cotton varieties Selekt, S-6524 with the Ganja-110 variety, had an intermediate heredity compared to the parental

forms. In the F_2 hybrid generation, all combinations were close to the parental form with high fiber length.

Individual samples collected in F_3 for the indicated trait were higher than the parental forms, and sometimes they were close to the parental form with high fiber length. The individual samples collected in the hybrid families studied in the experiment were sufficiently effective (Table 8).

In the study, the hybrids seeds obtained as a result of hybridization between Ganja-110 cotton variety and introduced cotton varieties were sown in the 1st plant breeding field.

Table 8

Characterization of fiber length in hybrids obtained from juncture of Ganja-110 cotton varieties with geographically distant cotton varieties

Ordinal numeral	Hybrid combinations	Characteristics of parental pairs		Characteristics of hybrids, daily			
		♀	♂	F_1		F_2	F_3
				M	h_p		
1	Gəncə-110 x BA-440	35.0	32.5	34.8	0.8	36.0	35.0
2	Gəncə-110 x Selekt	35.0	33.0	34.0	0.0	34.5	34.8
3	Gəncə-110 x Akala	35.0	32.0	33.7	0.13	34.0	34.0
4	Gəncə-110 x S-6524	35.0	34.2	34.6	0.0	35.0	34.5
5	Gəncə-110 x Taşauz-	35.0	34.0	35.0	+1	34.8	34.0

In the 1st plant breeding field, 19 families of 5 hybrid combinations were studied, 14 families were prospectively calculated and collected because they were similar in terms of complex economic value and bio morphological signs and phenotype. 78 individual samples were taken from families. Based on laboratory analysis, in addition to field observations, 11 families were assigned to the 2nd plant breeding field, taking into account that they are similar in terms of wilt resistance and phenotype, along with complex economic value indicators (Table 9).

Table 9

The main economic indicators of the families of the selected hybrids in the plant breeding (in Plant breeding plot).

Ordinal numeral	Families	Hybrid combinations	Productivity, cent/ha	Bir qozadan The mass of raw cotton from one boll, gr	Fiber length, mm	Fiber output, %
1	0	Gəncə-160, Standart	37,0	6,1	34,3	37,5
2	3	Gəncə - 110 x BA-	41,0	5,5	35,0	41,0
3	5	----------x----------	38,5	5,9	34,8	40,5
4	6	----------x----------	38,0	5,5	35,4	39,2
5	8	----------x----------	42,8	5,8	34,7	40,0
6	9	Gəncə -110 x Selekt	37,4	5,6	34,0	40,0
7	12	----------x----------	38,0	5,3	34,5	39,5
8	14	Gəncə - 110 x Akala	40,2	5,6	34,0	39,5
9	15	Gəncə - 110 x S –	38,1	5,8	34,0	37,0
10	17	----------x----------	40,0	6,1	35,2	37,5
11	18	Gəncə - 110 x Taşauz	37,5	6,4	35,0	38,0
12	19	----------x----------	39,0	5,8	34,5	37,5

CONCLUSION

1. Among the geographically distant cotton varieties studied in the conducted research, the local Ganja-110 cotton variety is early maturing (vegetation period 122 days), introduced S-6524, Tashauz-68 medium-early maturing (134-136 days), BA-440, Selekt and Akala beret is divided into 3 groups, which mature in the middle-late period (138-142 days).

2. Geographically distant cotton varieties differ from each other in terms of raw cotton yield. This economic value indicator is 43.8 cents/ha in Ganja-110 cotton variety, 33.0 cents/ha in BA-440

variety, and 34 cents/ha in Selekt cotton variety,6 cents/ha, 31.0 cents/ha in Akala beret variety, 36.2 cents/ha in S-6524 variety and 33.2 cents/ha in Tashauz-68 cotton variety, in accordance with the three-year figures.

3. While the mass of raw cotton in one boll of Ganja-110 cotton variety is 6.3 grams, the mass of raw cotton in one boll of geographically distant cotton varieties varies between 5.2-6.0 grams, especially Selekt and BA-44 cotton varieties have small bolls in one cotton boll and the mass of raw cotton is lower (5.9-5.4 g, respectively).

4. The varieties BA-440 introduced from Turkey and Selekt brought from Greece have high fiber yields (40-42%), which led to a high fiber yield (13.2 and 13.8 cents/ha, respectively). The economic value characteristics of the Ganja-110 cotton variety better adapts to the soil and climate conditions of the country, therefore, the economic value characteristics of the variety have been higher.

5. The study of the heritability of traits in the hybrids of geographically distant cotton varieties showed that the hybrids showed different levels of phenotypic dominance depending on the degree of representation of the studied traits in the parental forms.

6. As a result of selection assessment and directional selection of hybrids of introduced geographically distant cotton varieties, families with complex positive traits (vegetation period 120 days, mass of raw cotton in one cone 65-7.0 g, fiber yield 42%, fiber length 36.5 mm) were selected and used in selection works.

7. Domestic and introduced varieties have different economic indicators. The net income of Ganja-110 variety was 1707 manats, and the level of profitability was 150%, which was noticeably higher than the introduced varieties.

RECOMMENDATIONS

1. It is recommended to plant and cultivate the local Ganja-110 cotton variety suitable for the soil-climatic conditions of the republic and the highly productive BA-440 cotton varieties that have adapted to these conditions and are more convenient to cultivate.

2. It is appropriate to use BA-440, Selekt, S-6524 and Tashauz-68 cotton varieties, which are distinguished by their high fiber yield, high fiber quality that meets the requirements of the textile industry, resistance to diseases and pests, and drought, as starting material in selection.

3. The increase in genetic diversity in cotton hybrids increases heterosis to a certain extent. It is recommended to use hybrids with increased heterosis effect (Ganja-110 x BA-440, Ganja-110 x Selekt, Ganja-110 x Tashauz-68, Ganja-110 x S-6524) obtained from crossing between geographically distant cotton varieties.

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The defense of the dissertation will be held on 31 may 2024 at 11[00] at the meeting of the Dissertation council FD 1.29 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at Agrarian Science and Innovation Center, Research Institute of Crop Husbandry.

Adress: Az1098, Baku, Pirshagi settlement, sovkhoz No2, Research
Institute of Crop Husbandry

Dissertation is accessible at the library of Agrarian Science and Innovation Center, Research Institute of Crop Husbandry.

Electronic versions of the dissertation and its abstract are available on the official website of the Agrarian Science and Innovation Center, Research Institute of Crop Husbandry.

Abstract was sent to the required addresses on 29 april 2024

Signed for printing: 26.04.2023

Paper format: 210x297 1\4

Volume: 36733 characters

Number of hard copies: 30