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TECHNICAL-ECONOMIC COMPARISONS AND HYBRIDIZATION OF GANJA-110 COTTON VARIETY WITH DIFFERENT COTTON VARIETIES: A CASE STUDY FROM AZERBAIJAN

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Abstract

The main purpose of this research is to compare the bio-morphological properties, fiber properties, technological quality indicators and net return levels of different cotton varieties, to include different varieties in hybridization and to use the obtained hybrids as a starting material in selection. The research was carried out in the experimental area of the Plant Protection and Technical Plants Scientific Research Institute in Samukh district in 2017-2020. Research material consisted of the local Ganja-110 cotton variety and some cotton varieties S-6524 (Uzbekistan), BA-440 (Turkey), Akala Beret (Israel), Selekt (Greece), Tashauz-68 (Turkmenistan) brought from cotton growing countries. The results of this research revealed that cotton varieties differ from each other in terms of raw cotton yield, this yield indicator was 4,380 kg/ha in Ganja-110 cotton variety against lower yields in the other varieties. The raw cotton mass of the Ganja-110 cotton variety was 6.3 g in a boll while it varied 5.2-6.0 g in a boll for the other different cotton varieties. It has been determined that the net return of other cotton varieties was also lower than Ganja-110 variety. It is recommended to use hybrids with enhanced heterosis effect obtained from crossbreeding between different cotton varieties.

Key words**:** *cotton growing, cotton breeding, hybridization, economic analysis.*

INTRODUCTION

One of the most valuable crops among field crops is cotton. It is cultivated in 53 countries of the world grace to its economic importance for the producing countries, where it contribute to the creation of jobs, raw materials for processing industry, income for farmers and value added helping the economic development [19, 8].

The creation of new intensive varieties and their dissemination in production is a decisive factor in the dynamic development of cotton growing. The aim of the breeders is to develop new theoretically based synthetic methods to obtain new plant varieties, and to develop various genetic selection methods to create a rich gene pool. Intensifying selection efforts, obtaining starting material for hybridization, improving the individual characteristics of existing varieties, and developing methodical approaches for the creation of new cotton varieties are pressing issues.

Increasing the amount and quality of the product obtained from the unit area constitutes the primary goal of cotton breeding programs. However, success in the breeding program, besides determining the purpose well, choosing the method to be used in the breeding study and the rootstocks to be used in these methods; It is possible with a good combination of genetic structures in hybrid combinations of rootstocks. For this reason, for the breeder to be successful, it is important to determine the breeding methods that can be followed by creating a wide variability in the early generations, as well as being careful in the selection of parents by determining the purpose well [10].

Many studies have been carried out on the morphological characteristics, genetic variation and breeding of cotton varieties in different countries of the World [5, 34, 16,

33, 15, 11, 41, 29, 28, 30, 38, 13, 23, 7, 40, 21, 42].

In these studies, it is seen that new hybrid varieties suitable for the conditions of the country and region are created, and new varieties are obtained in terms of durability and quality. However, in a period when climate change is on the agenda, it would be beneficial to set targets in this direction for improvement studies.

On the other hand, it is seen that there are many studies that reveal only the economic aspects of cotton cultivation in different countries [20, 4, 6, 26, 19, 2, 39, 24, 47, 46, 1, 14, 48].

However, interdisciplinary studies that evaluate technical and economic aspects together need to be continued [32].

Cotton growing, which is one of the strategic and important areas of the agricultural sector that brings foreign currency to the country, draws attention with its high labor intensity and total production volume indicators. In Azerbaijan, the measures taken to restore cotton to its former glory, including the "Cotton Growing Law" adopted on May 11, 2010, are very important. It has been tried to obtain higher yields in cotton planting by applying innovative technologies of countries such as China, Greece and Turkey. Comparing the quantitative and qualitative indicators of cotton varieties grown domestically and imported from other countries, and creating and applying options for preference will make significant contributions.

Some studies have been carried out on the technical aspects and development of cotton cultivation in Azerbaijan [18, 43, 27, 35, 36, 17, 31, 44, 37, 45, 49]. However, there is also a need for research that evaluates the issue from interdisciplinary technical and economic aspects and can develop varieties suitable for farmer conditions.

As a result of the comparative examination of the bio-morphological and economically valuable characteristics of other cotton varieties and the technological quality indicators of the fiber, the selection of more promising cotton varieties for cotton growing farms can be determined. Bio-morphological, productivity, quality, sustainability, etc. database of cotton varieties introduced for the first time in Azerbaijan should be created based on adaptation characteristics. For this purpose, examining the features and determining the adaptive characteristics with comparative studies will make important contributions. For this purpose, economically important, scientifically based perspective characteristics should be determined for the first time by evaluating the economic and perspective indicators of the varieties. If locally and other cotton varieties are used in hybridization to create new cotton varieties, promising hybrids with various positive signs and characteristics such as quantitative and qualitative indicators, productive, high fiber yield, long fiber, coarse, can be produced. In this way, bolls and fast-growing perspective hybrids can be obtained.

The main purpose of this research is to compare the bio-morphological properties, fiber properties, technological quality indicators and net return levels of different cotton varieties, to include different varieties in hybridization and to use the obtained hybrids as a starting material in selection.

MATERIALS AND METHODS

As the research area, the experimental area belonging to the Scientific Research Institute of Plant Protection and Technical Plants in the Ganja-Kazakh region was chosen. The region belongs to the administrative division of the Samukh region. The soils of the experimental areas of the Azerbaijan Cotton Growing Scientific-Research Institute (currently the Plant Protection and Technical Plant Scientific-Research Institute) are light chestnut coloured and belong to irrigated soils, humus content of 2.5%, carbonates 4.6-12.0%. The total nitrogen is 0.08-0.18%, the amount of silicic acid is 56.0% in the transition layers, 57.8% in the alluvial layers, the soil reaction is weakly alkaline (pH 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 moderate. Therefore, the soils of the Plant Protection and Technical Plants

Scientific Research Institute are considered suitable for growing high cotton crops due to both their chemical and water-physical properties [3].

The research was carried out and completed in 2017-2020 in the experimental area of the Plant Protection and Technical Plants Scientific Research Institute in Samukh district. Analyzes and evaluations were made in the department of General Agriculture, Genetics and Selection in Azerbaijan State Agricultural University (Photo 1).

Photo 1. Research area
Source: Original photo (taken by authors)

Research material consisted of the local Ganja-110 cotton variety and other cotton varieties Akala Beret (Israel), BA-440 (Turkey), S-6524 (Uzbekistan), Selekt (Greece), Tashauz-68 (Turkmenistan) brought from cotton growing countries. According to Mauer's systematics, these cotton varieties belong to the genus Gossypi-um, subgenus Eugossypium, G. hirsutum L., and have 52 chromosomes in their somatic cells [25].

Sowing was done by hand considering 60 cm x 20 cm, each variety was carried out in 4 rows, each row was 15 meters and was repeated 4 times. Field inspections were made 3-4 times in different growth periods of the plants. To clarify the height and growth rate of the plants and to determine the rod collecting ability, the sympodial branches and rod organs were determined by measuring the height of 25 plants in each replicate. Laboratory analyzes were carried out for raw cotton properties using test samples. To create selectable material, hybridization was made between cotton varieties as follows. For each combination, 50 flowers were washed and powdered 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 number obtained is indicated by statistical calculations. The main characteristics of the plants in F_1 and F_2 were analysed, and the dominance of phenotypic characteristics was determined by the following formula [9].

$$H_p = [(F_1 - M_p) / M_p] \times 100 \quad \text{.....(1)}$$

where:
H_P =Heterosis, M_p = Average of plant parent, F_1= Hybrid.

In addition, the indicators obtained from the experiment were calculated using the Dospekhov method by biological and statistical methods as follows [12].

$$m = \frac{\sqrt{\sum L^2}}{\sqrt{n-1}} \quad \text{.....(2)}$$

where:
m = Average fiber production per plant, n= Number of plants, L= The sum of the squared differences from the average.

Bio-morphological characteristics of different cotton varieties were investigated. Phenological observations were made to determine the vegetation and interphase periods of different cotton varieties.

During the research, objectives and targets were analyzed by using traditional and modern methods used in cotton cultivation. For this, bio-morphological, economic indicators, technological quality indicators of fiber, phytopathological, selection (individual selection, sample, numbered parents) were examined, USTER HVI-1000 technological device was used, mathematical and statistical calculations were made.

In the research, the selection of suitable cotton varieties for cotton-growing farms was determined because of the comparative examination of the bio-morphological and economically valuable properties of different cotton varieties and the technological quality indicators of the fiber.

Adaptation characteristics of cotton varieties introduced in Azerbaijan for the first time were created by considering the bio-morphology, productivity, quality, and sustainability.

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

The equations presented below were used in the calculations of gross and net return of cotton production by different varieties [22].

Gross Return (AZN/ha) =
Cotton Production (kg/ha) x Cotton Price (AZN/kg) ..... (3)

Net Return (AZN/ha) =
Gross Return (AZN/ha) – Production Costs (AZN/ha) ..... (4)

RESULTS AND DISCUSSIONS

According to the results of the research, 2-3 days for seed germination of Ganja-110 cotton variety, 6-8 days for germination-blooming period, 6-9 days for flowering-maturity period, 14-18 days for vegetation period are required.

At the maturation stage of plant development, the height of the main stem of the plant was highest in different cotton varieties compared to local variety. Plant height is 120 cm in local cotton variety, 135 cm in cotton variety BA-440, 128 cm in Selekt variety, 130 cm in Akala Beret variety, 125 cm in S-6524, and 130 cm in Tashauz-68 variety (Table 1).

The amount of raw cotton obtained from a boll is one of the important indicators in increasing productivity.

Although there are many bolls in the bushes, the mass of the bolls is small compared to the local cotton varieties. In other words, while the weight of raw cotton obtained from a single 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 raw cotton weight obtained from a boll was determined as 6.1 g in S-6524 variety imported from Uzbekistan and 6.0 g in Tashauz-68 variety imported from Turkmenistan (Table 1).

Although the number of sympodial branches was 15 to 18 in different cotton varieties, the number of sympodial branches is 20 in Ganja-110 variety, which is superior to other cotton varieties. The number of bolls per plant was 17 in the local cotton variety Ganja-110, 16 in Selekt, Akala Beret and Tashauz-68, and 15 in BA-440 and S-6524 cotton varieties (Table 1).

Table 1. Average technical results of different cotton varieties

Varieties	Plant height (cm)	The number of bolls per bush	Raw cotton obtained from a boll (g)	Raw yield (kg/ha)	Fiber yield (kg/ha)	Fiber length (mm)
Ganja-110	120	17	6.3	4,380	1,580	35.2
BA-440	135	15	5.4	3,300	1,250	33.3
Selekt	128	16	5.1	3,460	1,380	33.8
Akala Beret	130	16	5.5	3,100	1,110	32.7
S-6524	125	15	6.1	3,620	1,300	34.0
Tashauz-68	130	16	6.0	3,320	1,220	34.2

Source: Results of this research.

Ganja-110 cotton variety differs from domestically introduced cotton varieties with its early maturation, high opening rate of raw cotton and high yield. The yield value of Ganja-110 cotton variety was 4,380kg/ha. S-6524 variety took the second place in terms of productivity value (3,620kg/ha). The productivity values of other cotton varieties are 3,300kg/ha for the BA-440 variety, 3,460kg/ha for the Selekt variety, 3,100kg/ha for the Akala Beret variety, and 3,320kg/ha for the Tashauz-68 variety. Among the different cotton varieties, S-6524 variety has the highest yield value with 3,620kg/ha, while Akala Beret variety has the lowest yield value with 3,100kg/ha. The yield of Ganja-110 cotton variety was found to be 760-1,280kg/ha higher than the different cotton varieties (Table 1).

The fiber yield of cotton varieties is one of their economically valuable basic characteristics. The creation of new cotton varieties with high fiber yield has both theoretical and practical importance. The fiber yield of cotton varieties was 36.0-40.0%. Selekt and BA-440 cotton varieties have high fiber yield (39.5-40.0%). Ganja-110 cotton variety's fiber yield was determined as 36.0-38.5%. According to the research, it is concluded that the fiber yield of BA-440 and Selekt is higher than the different cotton varieties. The fiber yield of locally and different cotton varieties varied between 1,110-1,580 kg/ha. The fiber yield in the local Ganja-100 cotton variety was 1,580 kg/ha. Fiber yield of imported cotton varieties is 1,250 kg/ha for BA-440 variety, 1,380 kg/ha for Selekt variety, 1,110 kg/ha for Akala Beret variety, 1,300 kg/ha for S-6524 variety and 1,220 kg/ha for Tashauz-68 variety (Table 1).

Ganja-110 cotton variety had 35.2 mm longer fiber length, while Akala Beret variety had 32.7 mm shorter fiber length. Among other different cotton varieties, 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 Turkmenistan are closer to Ganja-110 cotton variety according to the economic value of fiber length (Table 1).

According to the research, it has been determined that Ganja-110 cotton variety is superior to the other cotton varieties introduced in terms of fiber length and is more compatible with the soil and climatic conditions of the country.

In the first-generation hybrids, in almost all combinations, in addition to their slightly stronger growth than the parental forms, at the same time individual indicators of economic value are characteristic of the first-generation hybrids, and the strength of heterosis is more pronounced (Table 2).

Table 2. First generation hybrid (F_1) results obtained by crossing

Hybrids	Vegetation period (day)	Fiber yield (%)	Amount of raw cotton obtained from a boll (g)	Fiber length (mm)
Ganja-110 x BA-440	118	39.5	6.3	34.8
Ganja -110 x Akala Beret	128	38.0	6.0	33.7
Ganja-110 x Selekt	125	40.0	5.8	34.0
Ganja -110 x Tashauz-68	128	37.5	6.2	35.0
Ganja -110 x S-6524	125	37.0	6.1	34.6

Source: Results of this research.

Table 3. Second generation hybrid (F_2) results obtained by crossing

Hybrids	Vegetation period (day)	Fiber yield (%)	Amount of raw cotton obtained from a boll (g)	Fiber length (mm)
Ganja-110 x BA-440	121	41.0	6.1	36.0
Ganja -110 x Akala Beret	130	39.0	5.8	34.0
Ganja-110 x Selekt	128	39.5	6.0	34.5
Ganja -110 x Tashauz-68	125	38.0	6.0	34.8
Ganja -110 x S-6524	128	37.5	6.0	35.0

Source: Results of this research.

Hybrids of all combinations are more diverse in the second generation than hybrids of the first generation due to individual characteristics. In conclusion, it was concluded that this is due to the strong crossing's characteristic of the second generation of quite diverse forms (Table 3).
The selected hybrid forms were evaluated as rich starting forms for practical selection due to their drought resistance, disease resistance, strong fiber properties, economic value indicators and fiber technological quality characteristics.
It is considered legitimate that the average number of individual economic indicators is higher in third-generation hybrids than in second-generation indicators (Table 4). As a result, stable forms with individual and sometimes several positive characteristics were chosen.

Table 4. Third generation hybrid (F_3) results obtained obtained by crossing

Hybrids	Vegetation period (day)	Fiber yield (%)	Amount of raw cotton obtained from a boll (g)	Fiber length (mm)
Ganja -110 x BA-440	120	40.0	6.0	35.0
Ganja -110 x Akala Beret	128	38.5	6.0	34.0
Ganja -110 x Selekt	124	40.0	6.1	34.8
Ganja -110 x Tashauz-68	127	37.0	6.0	34.0
Ganja -110 x S-6524	126	38.0	6.2	34.5

Source: Results of this research.

Thus, a large proportion of individuals selected from the third-generation hybrid field have been considered promising starting forms to study in the later stages of the selection process because of some useful bio-morphological signs and traits, yield indicators.
To determine the effect of heterosis, it was tried to cross the Ganja-110 cotton variety with different cotton varieties.
In the research, the heritability of the early trait of hybrids obtained by crossing Ganja-110 cotton variety with different cotton varieties was also investigated.
In the F_1 hybrid generation, the vegetation period in the hybrid combination "Ganja-110 x BA-440" was accelerated. Similar results were seen in the F_2 and F_3 generations. F_1 generation hybrids showed positive dominance (Table 5).

Table 5. Vegetation period characteristics of hybrids obtained by crossing

Hybrids	Parent couples characteristics		Hybrid characteristics (day)			
	♀	♂	F_1		F_2	F_3
			M	h_p		
Ganja -110 x BA-440	122	142	118	-1.40	121	120
Ganja -110 x Akala Beret	122	140	128	0.42	130	128
Ganja -110 x Selekt	122	138	125	-0.62	128	124
Ganja -110 x Tashauz-68	122	137	128	0.20	125	127
Ganja -110 x S-6524	122	136	125	-0.57	128	126

Source: Results of this research.

Fiber yield of F_1 hybrids is dominant and heritable in hybrid combinations of "Ganja-110 x Select" and "Ganja-110 x Akala Beret" (Table 6). The raw cotton mass obtained in F_1 is larger than in all combinations and close to the main form.
In the second (F_2) and third (F_3) hybrid generation, an increase in raw cotton mass was observed during hybrid generation selection (Table 7).

Table 6. Fiber yield characteristics of hybrids obtained by crossing

Hybrids	Parent couples characteristics		Hybrid characteristics (%)			
	♀	♂	F_1		F_2	F_3
			M	h_p		
Ganja -110 x BA-440	38.5	40.0	39.5	0.33	41.0	40.0
Ganja -110 x Akala Beret	38.5	36.0	38.0	0.20	39.0	38.5
Ganja -110 x Selekt	38.5	39.5	40.0	2.00	39.5	40.0
Ganja -110 x Tashauz-68	38.5	37.0	37.5	0.33	38.0	37.0
Ganja -110 x S-6524	38.5	36.0	37.0	0.20	37.5	37.0

Source: Results of this research.

Table 7. Characteristics of raw cotton mass obtained from boll in hybrids obtained by crossing

Hybrids	Parent couples characteristics		Hybrid characteristics (g)			
	♀	♂	F_1		F_2	F_3
			M	h_p		
Ganja -110 x BA-440	6.3	5.4	6.3	1.00	6.1	6.0
Ganja -110 x Akala Beret	6.3	5.5	6.0	0.25	5.8	6.0
Ganja -110 x Selekt	6.3	5.1	5.8	1.00	6.0	6.1
Ganja -110 x Tashauz-68	6.3	6.0	6.2	0.50	6.0	6.0
Ganja -110 x S-6524	6.3	6.1	6.1	0.10	6.0	6.2

Source: Results of this research.

The fiber length differs in different combinations of the F_1 hybrid. In terms of fiber length, hybrid dominance was obtained in crossing Tashauz-68 variety with Ganja-110 variety. It was determined that the F_1 hybrid obtained by crossing Select and S-6524 with Ganja-110 showed intermediate inheritance. In the F_2 hybrid generation, all combinations are close to the main form with high fiber length.

Individual samples collected at F_3 have high form and are close to the parent form with high fiber length. It was concluded that individual samples collected from the hybrid parents studied in the study were sufficiently effective (Table 8).

Table 8. Fiber length characteristics in hybrids obtained by crossing

Hybrids	Parent couples characteristics		Hybrid characteristics (mm)			
	♀	♂	F_1		F_2	F_3
			M	h_p		
Ganja -110 x BA-440	35.0	32.5	34.8	0.80	36.0	35.0
Ganja -110 x Akala Beret	35.0	32.0	33.7	0.13	34.0	34.0
Ganja -110 x Selekt	35.0	33.0	34.0	0.00	34.5	34.8
Ganja -110 x Tashauz-68	35.0	34.0	35.0	1.00	34.8	34.0
Ganja -110 x S-6524	35.0	34.2	34.6	0.00	35.0	34.5

Source: Results of this research.

In the research, the seeds of the hybrids obtained because of crossing the cotton varieties introduced with the Ganja-110 cotton variety were sown in the first selection field. To continue the selection study, directional selection was made in the 1st selection area in hybrid forms.

Morphological and economic indicators of hybrid parents and the same sex of plants in the selection areas were carefully examined. Relevant phenological observations were also made in this area.

The economic results of growing the Ganja-110 cotton variety and other cotton varieties were found to be consistent with the activities

carried out in the field during the growing season.

In the research, the cost items such as seeds, fertilizers, pesticides, fuel, electricity, labor, etc. that can be paid by the farmers as cotton production costs were considered.

Cotton production costs were calculated as 1,140 AZN/ha, and 1 kg of raw cotton was marketed as 0.65 AZN. The yield of the local Ganja-110 cotton variety was determined as 4,380 kg/ha. The net return after growing and harvesting the Ganja-110 cotton variety is AZN 1,707/ha and the profitability level is 150% (Table 9).

Table 9. Average economic results of different cotton varieties

Varieties	Yield (kg/ha) (1)	Production cost (AZN/ha) (*) (2)	Gross return (AZN/ha) (*) (3)	Net return (AZN/ha) (*) (4=3-2)	Comparative net return of varieties (%)	Profitability level (%) (4/2x100)
Ganja-110	4,380	1,140	2,847	1,707	100	150
BA-440	3,300	1,140	2,145	1,005	59	88
Selekt	3,460	1,140	2,249	1,109	65	97
Akala Beret	3,100	1,140	2,015	875	51	76
S-6524	3,620	1,140	2,353	1,213	71	106
Tashauz-68	3,320	1,140	2,158	1,018	60	89

(*) AZN = Azerbaijan Manat, 1 AZN = 0.59 USD
Source: Results of this research.

When the economic results of Ganja-110 cotton variety and different cotton varieties were compared, it was determined that the economic results of other cotton varieties were lower. For this reason, the income increases to be achieved by using the Ganja-110 cotton variety will be more.

CONCLUSIONS

Forms suitable for the soil and climatic conditions of the country were selected from different cotton varieties, with different economic values, with different ecological characteristics according to many biological signs and indicators, evaluated according to their reproductive potential, and these forms were used as a starting point. As a result of the research, it has been determined that the hybrids obtained from the hybridization of locally and different cotton varieties have economically valuable features (high yield, rapid growth, high fiber yield, long fiber, large cones, etc.) and are encouraging to purchase. These are dense type varieties, and they are successful in selection studies.

Among the different cotton varieties studied in the research, local Ganja-110 cotton variety is early (vegetation period 122 days), introduced S-6524, Tashauz-68 medium early (134-136 days), BA-440, Selekt and Akala bere medium-early cotton varieties. It is divided into 3 groups that mature in the late period (138-142 days).

While the raw cotton mass of the Ganja-110 cotton variety is 6.3 g in a boll, the raw cotton mass of the different cotton varieties varies between 5.2-6.0 g in a boll, especially the Selekt and BA-44 cotton varieties, small raw cotton with bolls has a lower mass (5.9-5.4 g, respectively). The varieties BA-440 from Turkey and Selekt from Greece had high fiber yields (40-42%), resulting in higher fiber yields (1,320 and 1,380kg/ha, respectively). Since the Ganja-110 cotton variety is better adapted to the climatic and soil conditions of the country, the economic value characteristics of the variety were higher. The study of the inheritance of trait transfer in hybrids of different cotton varieties showed that the hybrids exhibit different levels of phenotypic dominance depending on the extent to which the traits studied are represented in their parental forms.

Different cotton varieties differ from each other in terms of raw cotton yield, this yield indicator is 4,380kg/ha in Ganja-110 cotton variety, 3,300 kg/ha in BA-440 variety and

3,460kg/ha in Selekt cotton variety. According to the three-year figures, 3,100 kg/ha in the Akala Beret variety, 3,620kg/ha in the S-6524 variety and 3,320kg/ha in the Tashauz-68 cotton variety. It has been determined that Ganja-100 cotton variety, which can achieve higher yields than other varieties, can also obtain higher net returns.

Examination of the level of transgression in second generation (F_2) cotton hybrids showed a negative transgression with respect to vegetation time and a positive violation with respect to cone mass, fiber yield and fiber length. The results of the study show that combinations showing high dominance and heterosis in F_1 lead to positive transgressive traits in F_2. Thus, the study of high dominance and heterosis in F_1 allows to predict the evolution of reproductive efficiency at baseline.

Recombinants of cotton varieties BA-440, Selekt, Akala Beret, S-6524, Tashauz-68 and hybrids of cotton of the second generation (F_2) differ from combinations obtained with Ganja-110 and its participation. These varieties can be used for breeding purposes due to their yield elements. As a result of selection evaluation of hybrids of introduced different cotton varieties, families with complex positive traits because of directional selection (vegetation period 120 days, raw cotton mass in a boll 65-7.0 g, fiber yield 42%, fiber length 36.5 mm) selected and used in breeding practice.

In the light of these results, some suggestions can be made. It is not suitable to plant and grow different cotton varieties in the cotton regions of the country, and as a result, it is not possible to obtain products with high stability. While the cotton varieties are regionalized, the suitability of the cotton growing regions of the republic to the soil and climatic conditions should be investigated.

In Azerbaijan, it is recommended to plant the local Ganja-110 cotton variety, which is more suitable for soil-climatic conditions, and the highly productive BA-440 cotton varieties, which are adapted to these conditions and are more suitable for growing. Since the introduced cotton varieties are selected because of their high fiber yield, their fiber quality that meets the requirements of the textile industry, and their resistance to diseases, pests, and drought, it is appropriate to use them as a starting material in selection.

Increasing genetic diversity in cotton hybrids increases heterosis to some extent. In breeding practice, it is recommended to use hybrids with enhanced heterosis effect obtained from crossbreeding between different cotton varieties.

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