Research Article

Comparative Performance Analysis of Some Cotton Varieties: A Case Study for Azerbaijan

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Abstract | The main purpose of this research, prepared from here, is to comparatively analyze the technical and economic performances of different cotton varieties. The research was conducted in 2017-2020. The applications were carried out in the trial area of the Plant Protection and Technical Plants Research Institute in the Samuh region of Azerbaijan. Local Ganja-110 cotton variety and S-6524 (Uzbekistan), Akala Beret (Israel), BA-440 (Türkiye), Tashauz-68 (Turkmenistan) and Selekt (Greece) cotton varieties brought from other countries were used as materials in the research.Varieties of cotton differ from each other in terms of the yield of raw cotton, and the yield indicator according to three-year data is 43.8 c/ha in Ganja-110, 33.0 c/ha in BA-440, 34.6 c/ha in Selekt, 31.0 c/ha in Akala Beret, 36.2 c/ha in S-6524 and in Tashauz-68 it is 33.2 c/ha (c = centner, 1 centner = 100 kg). In cotton varieties Selekt and BA-440, the mass of raw cotton in one boll is lower, since the bolls are small (5.4 - 5.9 g, respectively). The BA-440 varieties introduced from Turkey and the Selekt varieties imported from Greece have a high fiber output (40-42%), which led to a high fiber yield (13.2 and 13.8 c/ha). The net return that can be obtained after growing Ganja-110 cotton variety was calculated as 258.60 USD/ha and was higher than other varieties.

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Introduction

In order to achieve high yield and quality in cotton, a good balance between the vegetative and generative development of the plant must be maintained, and in maintaining this balance, appropriate plant management is as important as other environmental conditions. For a balanced and appropriate development and growth process in the plant, agronomic practices such as fertilization, irrigation and the use of plant growth regulators are very important for successful cotton cultivation. Getting the maximum product from a cotton field depends on the delicate balance between the vegetative and generative developments of the plants. The cotton plant is a plant that requires intensive examination at certain periods during its growth period, and the correct decisions taken during these periods have a positive impact on its

genetic potential, capacity and productivity (Bakhsh *et al.*, 2019; Karademir *et al.*, 2020). It is stated that factors such as cultural measures, fertilization, irrigation, hoeing, weed control, pix application, diseases and pests, as well as climate factors, are effective on both the vegetation period and flowering period of cotton varieties (Bolek, 2007).

In order to maintain and increase its competitiveness in cotton foreign trade for Azerbaijan, it is necessary to increase the quantity and quality in cotton production. Because; In order to obtain new cotton varieties that are highly productive and have superior fiber technological properties, cotton breeding studies must be continued uninterruptedly and intensively. Along with biotechnological studies in recent years, classical breeding studies continue to increase cotton yield and develop fiber technological properties suitable for industrial purposes. Success in breeding these traits that show quantitative inheritance; Predicting the genetic structure of the studied trait in the population created is directly related to the selection of appropriate rootstocks and hybrid combinations (Sullu *et al.*, 2018).

It is seen that some studies have been carried out on the morphological characteristics, genetic diversity and breeding of cotton varieties in different countries of the world (Alishah, 2001; Guang and Xiong-Ming, 2006; Sekloka *et al.*, 2008; Dahab *et al.*, 2013; Shakeel *et al.*, 2015; Munir *et al.*, 2020; Mubarik *et al.*, 2020; Shaheen *et al.*, 2021; Mare *et al.*, 2022; Shahzad *et al.*, 2022; Sorenson *et al.*, 2022; Khusanboy *et al.*, 2022). In these studies, it was determined that new hybrid varieties could be developed and new varieties could be obtained in terms of durability and quality. However, it would be beneficial to target improvement studies that are appropriate to the country and regional conditions and especially take climate change into account. In addition, it is necessary to continue interdisciplinary studies where technical and economic dimensions are evaluated together.

According to the 2022 data of the Azerbaijan State Statistics Committee, cotton was produced in an area of 104,267 hectares in the country. Cotton production areas increased more than fourfold in the 2013-2022 period. In the same period, the average yield per hectare increased from 1,925 kg to 3,092 kg. In 2022, 38% of cotton growing areas were located in Mil-Mughan, 28% in Karabakh and 24% in Shirvan-Salyan economic regions (ASSC, 2024).

Cotton varieties used by producers in Azerbaijan; Reported as Ganja-110, Beyaz Altin 440, Esperia, May 344, May 455, May 505, ProGen Flash, ProGen Lima, Golden West, ProGen 2018, Bomba, 2345 (Tondre, 2022). In previous years, domestic cotton varieties 30-38 Sort, AzNIXI-195 and Ganja-2 were developed in Azerbaijan. However, in recent years, it has been observed that Ganja-110, Ganja-114, Ganja-160, Ganja-182 and Ganja-183 cotton varieties that meet world quality standards and are high-yielding have been developed. However, in order to increase cotton yield, quality and farmer profits, it is necessary to use improved cotton varieties as well as improved soil, nutrient and water management practices. One of the most important reasons for the increase in cotton yield in Azerbaijan in recent years is the use of high-yielding varieties.

The yield of raw cotton in Azerbaijan can be increased through research. Because cotton is a plant of strategic importance in the country. For this reason, it is aimed to increase the productivity and quality of cotton. For this purpose, applications and technologies used in different countries are closely followed. There are some studies that make technical analysis of cotton agriculture in Azerbaijan (Guseinov *et al.*, 1979; Tagiyev, 2015; Mombekova *et al.*, 2016; Seyidaliyev and Mamedova, 2018; Seyidaliyev *et al.*, 2018; Prikhodko *et al.*, 2019; Gulaliyev *et al.*, 2019; Tagiyeva, 2020; Seyidaliyev *et al.*, 2021; Tagiyeva, 2021; Zeynalova, 2022). However, it is also necessary to conduct interdisciplinary research on cotton that makes technical and economic analyzes and can develop varieties suitable for farmer conditions.

It has become increasingly important to comparatively examine the quantitative and qualitative indicators of cotton varieties brought from different countries in Azerbaijan, to determine the cotton varieties that can be preferred under farmer conditions and to introduce them to farmers. The main purpose of this research, prepared from here, is to comparatively analyze the technical and economic performances of different cotton varieties.

Material and Methods

The research was conducted in 2017-2020. The applications were carried out in the trial area of the Plant Protection and Technical Plants Research Institute in the Samukh region of Azerbaijan. This region is lo-

cated in the north-west of the country and belongs to the Ganja-Dashkasan (Figure 1).

Figure 1: *Samukh region in Azerbaijan.*

Local Ganja-110 cotton variety and S-6524 (Uzbekistan), Akala Beret (Israel), BA-440 (Türkiye), Tashauz-68 (Turkmenistan) and A Selekt (Greece) cotton varieties brought from other countries were used as materials in the research. According to F.M. Mauer's taxonomy, the mentioned cotton varieties belong to the type Gossypium, subtype Eugossypium, G. hirsutum L. and have 52 chromosomes in somatic cells (Wendel and Grover, 2015).

Seed planting was done manually and a 60 cm x 20 cm scheme was used at this stage. Varieties were planted in 4 rows. The row length was taken as 15 meters and repeated 4 times. Field inspections were carried out 3-4 times during the vegetation period. Phenological observations were recorded based on the date of mass maturation when the bolus per plant reached 50% of the counting ranks.

Samples were collected for analysis several days before the first collection. Examples normally developed 2-5. 1st-2nd sympodial branches. taken from mature cocoons in the rows. 100 bolls samples were taken from each variety, with a 4-repeat planting pattern, 25 bolls from each repeat. Laboratory analyzes were performed on raw cotton taken from the test samples. Analyzes were carried out at the Department of General Agriculture, Genetics and Breeding at the Azerbaijan State Agricultural University.

When growing different cotton varieties, it is important to take into account the climate, soil and water requirements of these varieties in order to obtain high efficiency and quality products. In the research, studies were continued within the framework of the following technical and growing features.

The development, growth and high yield of the cotton plant depend on many factors. The most important of them is heat and light. water, food and soil. Irrigation is of great importance in the conditions of irrigation farming in obtaining a high yield with quality fiber from the cotton plant. The cotton plant uses the most water during the flowering and fruiting phases. Since the cotton plant originates in tropical zones, it is natural that heat plays a greater role as a factor in its life. Acceleration of biological processes in the plant, speed of height and development, accumulation of organic substances are determined by temperature.

The length of cotton plant development in Azerbaijan's irrigated farming system is on average as follows: 5-7 days in favorable temperature and soil moisture conditions and 10-15 days in less favorable conditions, 25-30 days from the beginning of the appearance of true leaves to the beginning of budding; 25-30 days from the beginning of flowering to the beginning of flowering; It takes 50-60 days from the beginning of flowering to the beginning of ripening.

The cotton plant's attitude to temperature is not the same at different development stages. The average daily air temperature needs to be <13.6°C to initiate the true leaf stage, <19.6°C to pass the budding stage, <14.5°C to pass flowering, and <12.6°C to pass maturation without heating. Cotton plant is a light-loving plant. The attitude towards a bright day changes depending on the temperature of the external environment. The cotton plant grows and develops better in a relatively short day of 9-10 hours. Cotton varieties vary less and less from day to day.

Although the cotton plant is resistant to drought thanks to the very strong and deep root system of the soil, it grows and develops better under artificial irrigation conditions, produces many fruits and branches, and has a high number of cones. The transpiration coefficient of different cotton varieties is equal to 600-700 during one vegetation period. Most often, this coefficient varies between 400-800, depending on cotton cultivation conditions. Among the varieties included in the research, the ones that are more resistant to drought are BA-440 and Ganja-110 cotton varieties. The larger the stem and vegetative organs of the cotton plant, the greater the demand for nut-

rients. Under different conditions, depending on the variety, nitrogen and phosphorus are more in the leaves than in other organs in the first cycle of development. The soils of some cotton regions in Azerbaijan are inadequate in nutrients. In order to obtain high yield and quality fiber, these soils need to be fertilized. Fiber quality indicators are more dependent on each agrotechnical measurement applied, as well as on the biological and morphological characteristics of the variety grown. The higher the quality of the fiber, the higher the quality of the products produced from it, and along with economic indicators, net income also increases significantly. As a result of correct determination of fertilizer rates, plant density and irrigation, taking into account soil and climate conditions, seed quality indicators increase significantly.

In the study, the economic performances of cotton varieties were also compared. For this purpose, gross and net return calculations were performed. The following equations were used to calculate the gross and net return from cotton production (Kiral *et al.*, 1999);

$$\text{Gross Return (USD/ha)} = \text{Cotton Production (kg/ha)} \times \text{Cotton Price (USD/kg)}$$

$$\text{Net Return (USD/ha)} = \text{Gross Return (USD/ha)} - \text{Production Costs (USD/ha)}$$

Results and Discussion

One of the main indicators in the creation of competitive varieties is the ability to meet modern requirements. Reducing the vegetation period of plants for several days has a great impact on biological and economic values (Mirzayev and Kerimov, 2019). For the formation of a complex of traits inherent in varieties, soil, and climatic conditions and agrotechnical measures also play an important role (Tagiyev and Khelilov, 2019).

Phenological observations were carried out to determine the vegetation and interphase periods of different cotton varieties. To calculate the duration of individual phases of plant development, records were made in the period from 100% seed germination to the maturation phase, the results are given below.

According to the average three-year indicator, seed germination in the cotton variety Ganja-110 was accelerated by 2-3 days compared to introduced varieties, emergence-flowering by 6-8 days, flowering-ripening by 6-9 days, and as for the duration of vegetation by 14-18 days (Table 1).

Table 1: *Duration of development phases of cotton varieties (days).*

Cotton varieties		2017	2018	2019	Average
Ganja-110	Emergence	11	10	12	11
	Flowering	50	50	53	51
	Maturation	61	61	61	63
	Vegetation period	122	121	126	125
BA-440	Emergence	13	14	13	13
	Flowering	59	58	60	59
	Maturation	70	69	68	70
	Vegetation period	142	141	141	142
Selekt	Emergence	13	14	13	13
	Flowering	58	59	61	59
	Maturation	68	68	70	69
	Vegetation period	138	140	144	141
Akala Beret	Emergence	13	15	14	14
	Flowering	59	59	61	60
	Maturation	70	68	71	70
	Vegetation period	140	142	146	143
S-6524	Emergence	12	14	12	13
	Flowering	59	58	60	59
	Maturation	65	66	69	67
	Vegetation period	136	138	141	138
Tashauz-68	Emergence	12	14	12	13
	Flowering	56	57	60	58
	Maturation	66	66	68	67
	Vegetation period	134	137	140	137

Proper agrotechnical measures related to inter-row cultivation and harvesting by agricultural machines play an important role for such morphological characteristics of cotton as the shape of the bush, the number of sympodial branches, the height of the main trunk, etc. (Tagiyev *et al.*, 2021). The height of the main trunk developed more intensively, while the height of the plant in the local cotton variety was 120 cm, in the introduced cotton variety BA-440-135 cm, in the Selekt variety-128 cm, in the Akala Beret variety -130 cm, in the C -6524 variety -125 cm and in the Tashauz-68 variety -130 cm. In different cotton varieties used in the study, the plant height was higher, developing more intensively in phases than in the

local cotton variety (Table 2).

Table 2: *Plant height in the development phases of cotton varieties (cm).*

Cotton varieties		2017	2018	2019
Ganja-110	Emergence	24	24	30
	Flowering	84	63	63
	Maturation	120	114	113
BA-440	Emergence	25	25	34
	Flowering	95	65	67
	Maturation	135	116	126
Selekt	Emergence	21	27	32
	Flowering	93	73	74
	Maturation	128	110	123
Akala Beret	Emergence	23	24	33
	Flowering	92	71	70
	Maturation	130	112	118
S-6524	Emergence	22	21	29
	Flowering	80	72	71
	Maturation	125	115	114
Tashauz-68	Emergence	25	24	32
	Flowering	87	75	68
	Maturation	130	119	115

The mechanization of cotton harvesting depends on the number of sympodial branches and on the type of branching the cotton belongs to (Güvercin, 2018).

In Table 3, the number of sympodial branches in different cotton varieties in 2017 was 13-15 pieces. The local cotton variety Ganja-110 has 18 sympodial branches, surpassing cotton varieties. In 2018, the number of sympodial branches on a bush was 13-15 pieces. The number of sympodial branches in different cotton varieties was 13-14, in the local variety Ganja-110 it was 15, surpassing cotton varieties. There was a similar case in 2019.

As can be seen from Table 3, the number of bolls per bush in different cotton varieties in 2017 was 13-15 and in the local cotton variety Ganja-110- the number was 18. In 2018, the number of bolls per bush in the studied cotton varieties was 15-17. In the local cotton variety Ganja-110, the number of bolls per bush was 17 pieces. There was a similar case in 2019. Thus, in the research conducted by years (2017-2019), it can be said that the number of bolls per bush depends to a greater extent on the biological characteristics of each cotton variety, as well as on environmental factors.

The research of agricultural valuable traits of varieties and their use in farms plays a significant role in measures to increase crop yields and improve product quality (Dzhumaev, 2017; Odabasioglu and Copur, 2017).

According to a study in 2017, the Ganja-110 cotton variety surpassed different cotton varieties in terms of yield at the level of 7.5-15.5 c/ha (c = centner, 1 c = 100 kg).

The creation of highly productive cotton varieties with a hereditary character of high fiber output is both theoretically and practically important (Güngöz, 2017).

In 2017, the fiber output of cotton varieties was 36.0-40.0%. Cotton varieties Selekt and BA-440 were distinguished by a high fiber output (39.5-40.0%). The fiber output of local cotton Ganja-110 was 38.5%. In the introduced varieties Akala Beret, S-6524 and Tashauz-68, on the contrary, the fiber output was low and amounted to 36.0, respectively; 36.0 and 37.0%.

Table 3: *The number of sympodial branches and bolls from one bush in cotton varieties.*

Cotton varieties	2017		2018		2019	
	Number of sympodial branches (pcs)	Number of bolls from one bush (pcs)	Number of sympodial branches (pcs)	Number of bolls from one bush (pcs)	Number of sympodial branches (pcs)	Number of bolls from one bush (pcs)
Ganja-110	15 ±0,61	18 ±1,74	15 ±0,79	17 ±1,46	20 ±1,41	25 ±1,48
BA-440	12 ±0,78	15 ±1,49	14 ±0,59	15 ±1,53	18 ±1,29	23 ±1,83
Select	10 ±0,72	14 ±1,66	14 ±0,59	16 ±1,47	15 ±1,35	21 ±1,53
Akala Beret	11 ±0,95	15 ±1,63	13 ±0,78	16 ±1,47	16 ±1,32	19 ±2,18
S-6524	10 ±0,84	13 ±1,44	13 ±0,78	15 ±1,32	15 ±1,46	19 ±1,63
Tashauz-68	12 ±0,91	15 ±1,44	14 ±0,61	16 ±1,54	16 ±1,50	18 ±1,53

Table 4: *Yield indicators of cotton varieties.*

Cotton varieties	Productivity (c/ha) (*)			Fiber yield (%)			The mass of raw cotton obtained from the boll (g)			Fiber length (mm)		
	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Ganja-110	43.0	41.5	47.0	38.5	38.0	38.2	6.3	6.1	6.4	35.0	34.8	35.2
BA-440	30.5	32.0	36.5	40.0	39.0	41.0	5.4	5.2	5.5	32.5	33.0	33.3
Selekt	32.2	34.5	37.0	39.5	40.0	40.0	5.1	5.3	5.3	33.0	33.5	33.8
Akala Beret	28.0	31.0	34.0	36.0	35.8	36.0	5.5	5.7	5.8	32.0	32.5	32.7
S-6524	35.5	36.0	37.0	36.0	36.0	37.0	6.1	6.0	6.0	34.2	33.8	34.0
Tashauz-68	31.0	33.5	35.0	37.0	36.5	36.0	6.0	6.0	6.1	34.0	34.2	34.5

**c= centner, 1 c = 100 kg*

In 2018, the fiber output of cotton of the Ganja-110 variety was 38.0%, BA-440-39.0%, Selekt-40.0%, Akala-35.8%, S-6524-36.0 %, Tashauz-68-36.5%.

According to a two-year study, it can be said that the different cotton varieties BA-440 and Selekt have a higher fiber output. There was a similar case in 2019 (Table 4).

One of the important indicators of increasing the productivity of cotton is to obtain as much mass of raw cotton from one boll as possible. Despite the variability of this indicator, it is more stable than the yield indicator (Satish, 2021). So, in the Ganja-110 cotton variety, raw cotton obtained from one bush weighed 6.3 g, while in BA-440 - 5.4 g, in Selekt - 5.1 g, and in Akala Beret -5.5 g, in C-6524 variety 6.1 g, in Tashauz-68-6.0 g.

Obtaining the longest possible cotton fiber with high technological qualities is an important aspect of the textile industry (Rahmankulov, 2017). Along with the nature of the variety and other elements, the length of the cotton fibers is also affected by the location of the bolls on the tiers (Memon *et al.*, 2017; Kumar *et al.*, 2019).

According to the study, the fiber lengths of the cotton varieties C-6524 and Tashauz-68 were close to those of the local cotton variety Ganja-100. In the third year of the study, the fiber length of different cotton varieties exceeded the fiber length of previous experimental years. In cotton varieties, the fiber length varied within 32.7-35.2 mm. (Table 4).

Cotton cultivation in all regions of the Earth suitable for cotton is carried out to obtain high-quality fiber as a crop. Cotton fiber is considered the main raw material of the textile industry (Nawaz *et al.*, 2019). In this regard, the yield and quality of the fiber of each variety is determined along with the yield of raw cotton. Fiber output of a variety directly affects the increase in fiber yield, that is, with an increase in fiber output, the fiber yield also increases (Güngöz, 2017; Satish, 2021).

The local cotton variety Ganja-110 surpassed cotton varieties in terms of fiber yield. An increase in fiber yield to 38.5% in 2017 also led to an increase in fiber yield by 16.5 c/ha. In the second year of the study, the fiber yield of local and different cotton varieties ranged from 11.1 to 15.8 c/ha. In the local cotton variety Ganja-100, the fiber yield was 15.8 c/ha (Table 5).

Table 5: *Fiber yield of cotton varieties (c/ha) *.*

Cotton varieties	Years		
	2017	2018	2019
Ganja-110	16.5 ±0.70	15.8 ±0.84	17.9 ±0.91
BA-440	12.2 ±0.72	12.5 ±0.67	15.0 ±0.75
Selekt	12.7 ±0.85	13.8 ±0.76	14.8 ±0.51
Akala Beret	10.1 ±0.81	11.1 ±0.77	12.2 ±0.82
S-6524	12.8 ±0.81	13.0 ±0.95	13.7 ±0.67
Tashauz-68	11.5 ±0.72	12.2 ±0.65	12.6 ±0.69

**c= centner, 1 c = 100 kg*

It has been observed that the economic results obtained from cotton varieties are consistent with the activities carried out in the field. In the research, variable costs (seed, fertilizer, pesticide, fuel, electricity, labor costs, etc.) that the farmer can actually pay were taken into account as cotton production costs. According to data of the State Statistical Committee

Table 6: *Average economic results of cotton varieties.*

Cotton varieties	Average yield (kg/ha) (1)	Production cost (USD$/ha) (*) (2)	Gross return (USD$/ha) (*) (3)	Net return (USD$/ha) (*) (4=3-2)
Ganja-110	4,383	1370.56	1629.16	258.60
BA-440	3,300	1031.91	1226.61	194.70
Selekt	3,457	1081.00	1284.97	203.97
Akala Beret	3,100	969.37	1152.27	182.90
S-6524	3,616	1130.72	1344.07	213.35
Tashauz-68	3,317	1037.23	1232.93	195.70

(*) 1 AZN was 0.59 USD in 2019.

of the Republic of Azerbaijan for 2019 year, cotton production cost was 0.53 AZN/kg, and 1 kg of raw cotton was marketed as 0.63 AZN (AZN: Azerbaijan Manat). The yield of the local Ganja-110 cotton variety was determined as 4,383 kg/ha. The net return that can be obtained after growing Ganja-110 cotton variety was calculated as 258.60 USD/ha (Table 6).

Conclusions and Recommendations

Varieties of cotton differ from each other in terms of the yield of raw cotton, and the yield indicator according to three-year data is 43.8 c/ha in Ganja-110, 33.0 c/ha in BA-440, 34.6 c/ha in Selekt, 31.0 c/ha in Akala Beret, 36.2 c/ha in C-6524 and in Tashauz-68 it is 33.2 c/ha. According to the maturation time, local and introduced cotton varieties are divided into 3 groups: Cotton varieties Ganja-110 are early ripening (vegetation period is 122 days), introduced cotton varieties C-6524, Tashauz-68 are mid-ripening (134-136 days), BA-440, Selekt and Akala takes medium-late (138-142 days). The mass of raw cotton in one boll of the local cotton variety Ganja-110 is 6.3 g. In the case of different distant varieties of cotton, the mass of raw cotton in one boll varies between 5.2 and 6.0 grams. In cotton varieties Selekt and BA-440, the mass of raw cotton in one boll is lower, since the bolls are small (5.4 - 5.9 g, respectively).

The BA-440 varieties introduced from Türkiye and the Selekt varieties imported from Greece have a high fiber output (40-42%), which led to a high fiber yield (13.2 and 13.8 c/ha). The advantage of biomorphological traits and economically valuable traits of the Ganja-110 cotton variety in comparison with different cotton varieties can be explained by the good adaptability of the variety to the soil and climatic conditions of the country and its intensive type. The net return that can be obtained after growing Ganja-110 cotton variety was calculated as 258.60 USD/ha and was higher than other varieties.

In Azerbaijan, it seems possible to develop local varieties with a yield potential of over 5 tons per hectare with existing genetic stocks. For this purpose, the financing of research institutes should be increased within the framework of the local cotton growing program. Local varieties may carry a natural tolerance to the two main plant diseases affecting cotton in Azerbaijan. These diseases; the fungal disease verticillium wilt (Verticillium dahliae) and the bacterial disease- bacterial blight (Xanthomonas malvecearum). It can be claimed that imported varieties are more susceptible to diseases (Prikhodko *et al*., 2019).

In Azerbaijan, government policies such as hectare payments, input support, and tax exemptions to support farmers have been implemented and producers have started to receive premiums. Additionally, the government provides discounts per hectare on irrigation water, seeds, fuel and fertilizer for all types of crops (Tondre, 2022). It would be beneficial to increase and implement supports to ensure sustainability in cotton production.

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Novelty Statement

Comparatively examining the quantitative and qualitative indicators of cotton varieties in Azerbaijan and determining the cotton varieties that can be preferred under farmer conditions can contribute to increasing productivity. For this purpose, the technical and eco-

nomic performances of different cotton varieties were comparatively analyzed.

Author's Contribution

All authors contributed equally to the article. The results obtained in the study were interpreted together and all authors read and checked the article.

Conflicts of Interest

The authors have declared no conflict of interest.

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