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Heredity of Determination Coefficient in Cotton Plant Hybrids

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Abstract: The fiber yield and fiber length are strong, the weight of 1000 cottonseeds is average, and the weight of cotton boll in one piece is weakly determined. The weight of cotton in one cotton boll was recognized as ecological, the weight of 1000 seeds as biological, and the length of the fiber as genotypic indicator. The similarity of the first-generation hybrid with L-395 was 92.7%, and with L - 620-50.9%, according to the nature of inheritance of the degree and structure of correlations. This showed that the first-generation hybrid was similar to the L-39 range. When conducting breeding work in breeding, it is recommended to attach importance to the length of the fibers and the selection of genotypes, and to use the "correlation matrix comparison" method when comparing them.

Key words: Cotton, hybrid, correlation coefficient, heredity, determination quantitative.

Introduction

The level of correlation between the signs of the organism (morphological-qualitative and quantitative) plays an important role in the selection of primary sources for selection, in the conduct of targeted selection studies. In the following years, attention has been paid to the determination of the degree of determinability of the signs (determination is a square of the correlation coefficient, which determines the limit of the signs). As a result, scientifically based eco-biological, biological,

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genotypic and environmental indicators were recommended for selection [2].

Numerous studies have been conducted on the study of the degree of determinability of plant signs [1,3,4,5,6,7,8]. In spite in the cross-section of hybrids there is little data on the heredity of the degree of determinism of the signs. In this article, the purpose of the study was to determine the degree of determinability of signs of goose hybrids and to analyze their heredity. For this, there was used the method “comparison of correlation matrices”.

Object and methods of research

As an object of experiment, the L-620 and L-39 lines of the middle-fiber porcine and the hybrids of the first and second generation, which were synthesized with their participation, were obtained. The experiment was conducted in 4 sets of returns. All phenological observations and computational studies were carried out on the basis of the methodological instruction issued by Uzbekistan Cotton Industry Research Institute. The statistical program SPSS-14 was used in the calculation of the coefficients of correlation (r), determination (r^2) and data (Cv,%) between the studied characters [4]. When determining the determinants of the indicators, R^2ch, R^2m, the distance between them D=1-r is used to compare the formula and the correlation matrices of N.S. Rostova’s method was used [2].

The results obtained and their analysis

From the initiative data, the difference in the quantitative indicators of the characters studied in the cotton plant lines and hybrids there was noted in the Table 1. the fiber length at L-620 was 35,29 mm, at L-39 was 36,83 mm. The L-39 dominated the fiber length from L-620 to 1,54 mm. The difference in fiber length between these lines became real. This can also be seen from satistic indicators. It was noted that the L-620 line on fiber output is superior to 39% from L-2,09. Although there was not a sharp difference between these lines by the fiber index, the difference in weight of 1000 pieces of cotton seed, weight of cotton in one breast, was found to be real. This was the basis for calculating the levels of determinability and variability of the data obtained.

Table 1
Quantitative characteristics of cotton plant hybrids and their statistical indicators

Combinations	Fiber length, mm	Fiber output, %	Fiber index, gr.	Weight of 1000 cotton seed, gr.	Weight of cotton pod, gr.
L-620 ♀	35,29±0,28	38,21±0,53	6,57±0,14	106,39±1,32	5,30±0,12
F_1 L-620 x L-39	34,77±0,15	37,05±0,27	6,50±0,09	110,54±1,24	5,65±0,08
F_2 L-620 x L-39	38,12±0,18	35,84±0,31	6,39±0,07	114,33±1,03	6,10±0,11
L-39♂	36,83±0,19	36,12±0,31	6,53±0,10	116,70±1,64	6,19±0,14

These data are presented in Figure 1 below. From the information in the picture, it was found that the fiber index (3) to the strongly determinated characters in the first generation hybridization. This symbol is located to the right side of the chart. In this case, the variability of this symbol will depend more on the genotype. It was noted that the fiber output (2) and 1000 units of seed weight (4) were of medium-grade determinated and variated symbols. It was found that the weight of cotton (5) in one plant was strongly correlated and poorly determined. It was noted that the fiber length was the least determinated and the least variasized.

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In the second generation of hybridization, it was noted that fiber output (2) is strong, fiber index, 1000 units of seed weight are moderately high, breast weight is strongly variated, and fiber length is less determinated and less variasized. The fiber index, which is one of the strongest determinated signs at L-39, obtained for chatting, was found to be fiber output at L-620. It was found that even at L-39 and L-620, the fiber length was less determinated and less variably marked. It was noted that the weight of cotton in one breast (5) is varasyable and less determinable on these lines.

Based on the results obtained, it was determined that the fiber output from the cotton marks, the fiber index was strong, the weight of 1000 seeds was medium, the length of the fiber was low, and the weight of cotton in one breast was strong, which is one of the most volatile signs. Based on these data, it was found that the fiber length is genotypic, the fiber index is eco-biological, the weight of 1000 seeds is biological, and the weight of cotton in one breast is one of the environmental indicators. Fiber length is one of the most stable signs and has been found to be reliable in carrying out selection studies. The weight of cotton in one breast was strongly correlated and poorly determined, which determined the degree of adaptation of the genotype to the external environment.

As we noted above, the degree of determinism of the sign (correlation link) determines its association with other signs. This can also be seen clearly from the information in the picture 2 below.

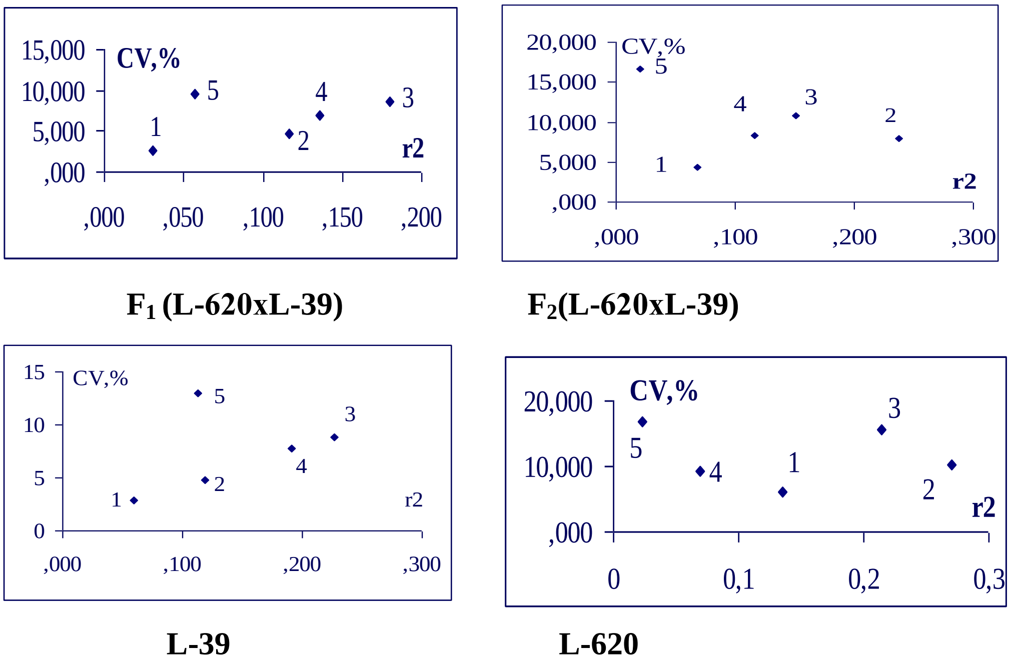

Figure 1. Variability (Cv,%) and determinability (r^2) levels of cotton plant hybrid characters
Note: *numbers mean characters.1-fiber length, mm; 2-fiber output,%; 3-fiber index; g. 4-1000 PCs. weight of cotton seed, g; 5-weight of cotton wool in the pod,g.*

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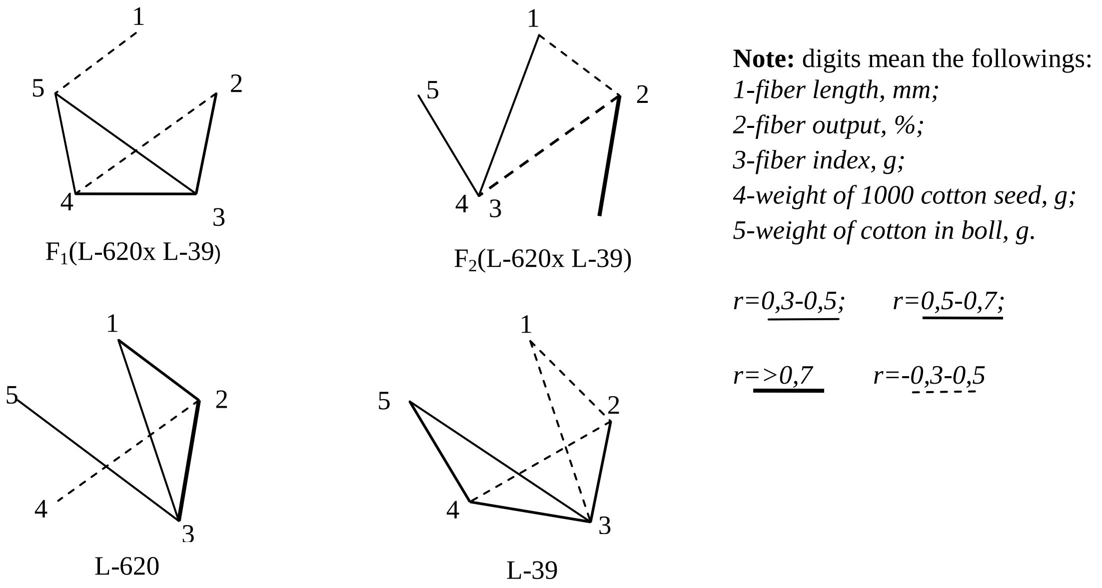

Picture 2. Level of correlation bond between cotton indicator quantitative indicators

From the information in the picture, it can be seen that at L-620, a moderate correlation link between fiber length (1) and fiber output (2) is recorded. The coefficient of correlation between these signs (r=0,6) was equal. And in L-39, a weak, but reverse correlation link between these signs was noted. This means that the longer the fiber at L-620, the higher the fiber output. This condition is observed very rarely in the larynx. In L-39, it was noted in reverse, that is if the fiber is long, than the fiber output is so low.

And in the hybrids of the first generation between these lines, the correlation coefficient between these characters did not become real. In the hybrid type of the second generation, a similar result was recorded, namely L-39. A mean and strong correlation was recorded between fiber output (2) and fiber index (3) in all variants. In this case, it was found that the fiber output depends primarily on the fiber index. The degree of correlation between these signs was preserved in the hybrids of the first, second generation. This is an indication that these signs are hereditary without attachment. A reverse correlation link was found between 1000 pieces of cotton seed weight (4) and fiber output (2). This means that in cases where the cotton seed is heavy, the fiber output is reduced. The average correlation between the weight of cotton in the breast (5) fiber index (3) was recorded.

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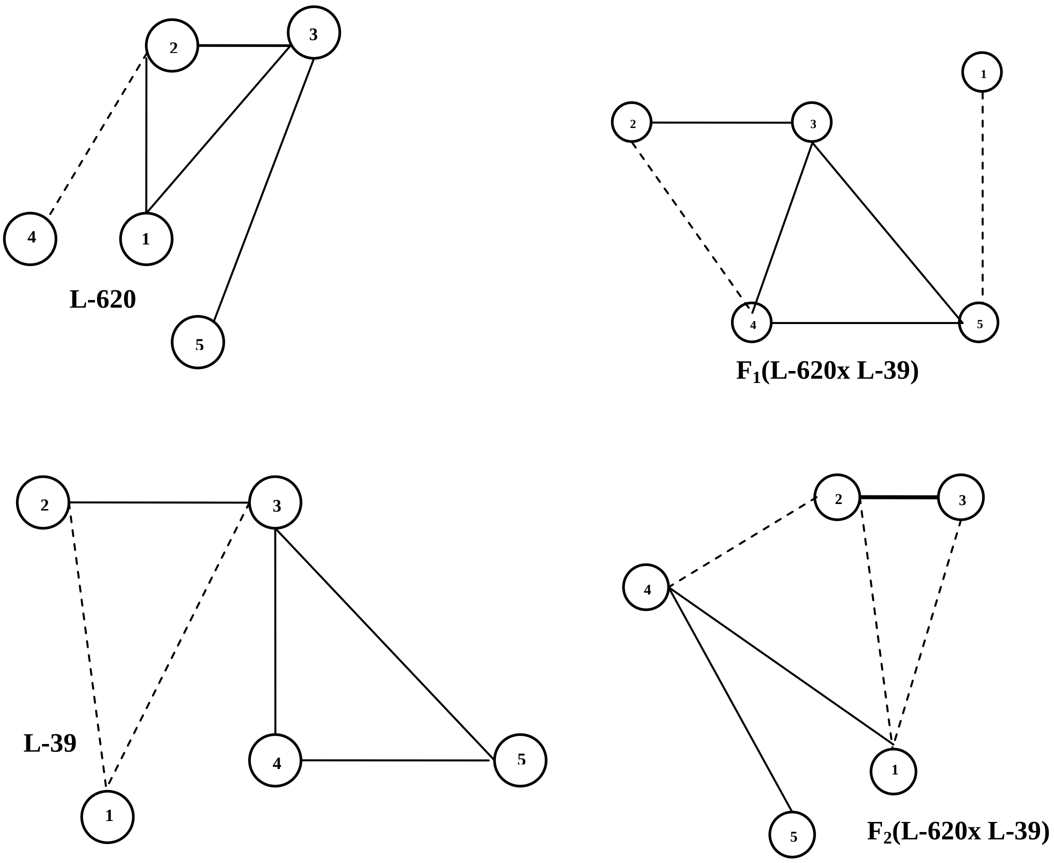

Picture 3. Structure of correlation bonds in cotton lines and hybrids

Note: digits means the indicators. See picture 2.

As is known correlation bonds are not chaotic, but forms a “group” or “collection” that occurs on the basis of pressure [1; 55-105]. This can be clearly seen from the information in the picture 3. Strong correlation bonds between fiber output (2) and fiber index (3) were maintained in all variants. These signs were at the center of the correlation group, and this group was called the “*quantity of fiber*”. Especially in the combination F_2(L-620xL-39), the degree of correlation between these signs was strong. This can also be seen clearly from the distance between the signs.

The method of *“comparison of correlation matrices”* was used to determine how similar the cotton plant lines and hybrids were. These data are presented in Table 2. From the information in the table, the similarity of the first-generation hybrids with the second-generation hybrids was 68,2%. The similarity of the first generation of hybrids with L-620 was 50,9%, with L-39 - 92,7%. Based on the accepted classification, if the similarity of correlation matrices is higher than 90%, this is an indication of their mutual similarity, less than 90% of the difference. So the first generation of hybrids became similar to the L-39 line.

Table 2
Similarity of correlation matrices

Combinations	F_1	F_2	L-620	L-39
F_1 L-620 x L-39	100%	68,2%	50,9%	92,7%
F_2 L-620 x L-39		100%	58,3%	61,9%

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L-620			100%	22,7%
L-39				100%

It is known that in the second generation the laws of heredity occur mainly a strong divergence. As we noted above, the similarity of these genotypes was 68,2%. The similarity of the cotton plant lines (L-620, L-39), selected as the parent, was 22,7%. This means that the selected genotypes differ strongly in the degree of interconnection of the studied characters (Table 2). Such a difference can not be determined from the data in Table 1.

Conclusions

1. It was found that the fiber output and fiber length were strong, the weight of 1000 cotton seeds was average, and the fiber length, as well as the weight of cotton in one breast were less determinated. The weight of cotton in one breast is ecological, the weight of 1000 seeds is biological, and the length of fiber is recognized as a genotypic indicator.

2. It was found that the degree and structure of correlation links between the quantitative indicators of cotton plant marks have a hereditary property. The level of strong correlation between fiber output and fiber index was maintained even at first and second generation hybrids.

3. The similarity of the first-generation hybrids with L-39 line was 92,7%, with L - 620-50,9%. This showed that the first generation hybrids are similar to the L-39 line.

4. When conducting selection studies, it is recommended to give importance to the length of the fiber and to use the method *"comparison of correlation matrices"* in the selection, comparison of genotypes.

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