Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 3352–3357
Received 15 April 2021; Accepted 05 May 2021

Inheritance of the Level of Correlational Relationships Between Cotton Signs in Reciprocal Crossing

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Abstract: It was found that there are correlations between the fiber yield and the fiber index in cotton at medium and strong levels. When mixed with the cotton reaction, the fiber yield and fiber index are highly deterministic and variable, and the fiber length is weakly deterministic and variable. The fiber length is independent, stable, and has few deterministic and variational features. When recirculating, the similarity of the correlation matrices was 52-96%.
Keywords: 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, 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 [3,4,5]. 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" [5,7].

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

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coefficients of correlation (r), determination (r^2) and data (Cv,%) between the studied characters [8]. 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[1].

The results obtained and their analysis

The results of the statistical analysis of the primary data showed that the cotton lines selected for crossing differed in terms of characteristics. The fiber length was 28.13 mm in L-15 and 33.98 mm in L-608. The difference between them was statistically real. Exactly the same result was recorded for fiber output and fiber index. The lines did not differ from each other by the weight of 1000 seeds mass. The hybrid synthesized with these lines (F_2L-608 x L-15) had a fiber length of 32.05 mm in the hybrid with microclanial fuzz (**n-mh**) in combination, while **Rhs** had a length of 31.87 mm and 31.82 mm in the fuzzy cottonseed. In the reverse combination (F_2L-15 x L-608) the fiber length was respectively 32.29; 32.63; 61.65 mm. The fiber index was 7.88 g in L-15 and 6.12 g in L-608. L-15 outperformed L-608 in fiber index. This in turn had a high rate of fiber output. In hybrids, the fiber yield was 7.29 g in the n-ms form of the F_2L-608 x L-15 combination, while the relatively high result was 7.83 g in the fuzzy cottonseed form of the F_2L-15 x L-608 combination.

From the initial data, the fiber length and quantity of heredity in cotton hybrids varied in cross section of hybrids. This in turn became the basis for the study of their variation.

This information is shown in the figure below. From the data in the figure, the fiber index (3) at L-15 was a relatively strong determinant (average determination 0.20). At line 608, the average coefficient of determination of the fiber index was 0.09. From these data, it can be seen that the fiber index in L-15 is strongly determined relative to L-608.

Table 1

Quantitative indicators of signs of cotton in reciprocal crossing

Statistical indicators	Fiber length, mm	Fiber output,%	Fiber index, g	Weight of 1000 cottonseed mass, g
	L-15			
Medium	28.13±0,20	42,76±0,18	7,88±0,10	106,17±1,15
Minimum	25,90	38,19	5,19	90,36
Maximum	31,70	45,93	9,40	123,52
	L-608			
Medium	33,98±0,30	36,61±0,50	6,12±0,12	105,90±1,32
Minimum	30,20	30,86	4,46	89,08
Maximum	38,00	45,03	8,39	125,54
	F_2 L-608 xL-15			
Medium n-mh	32,05±0,42	41,52±0,58	7,29±0,22	102,48±0,85
Minimum	28	36	4	80
Maximum	35,8	46,62	8,79	119,73
Medium **Rhs**	31,87±0,25	40,72±0,59	6,69±0,15	97,58±1.16
Minimum	28	32	4	80
Maximum	36,6	46,71	8,65	115,38
Medium Fhs	31,82±0,30	39,65±0,79	6,47±0,23	97,90±1,86
Minimum	28	30	4	80

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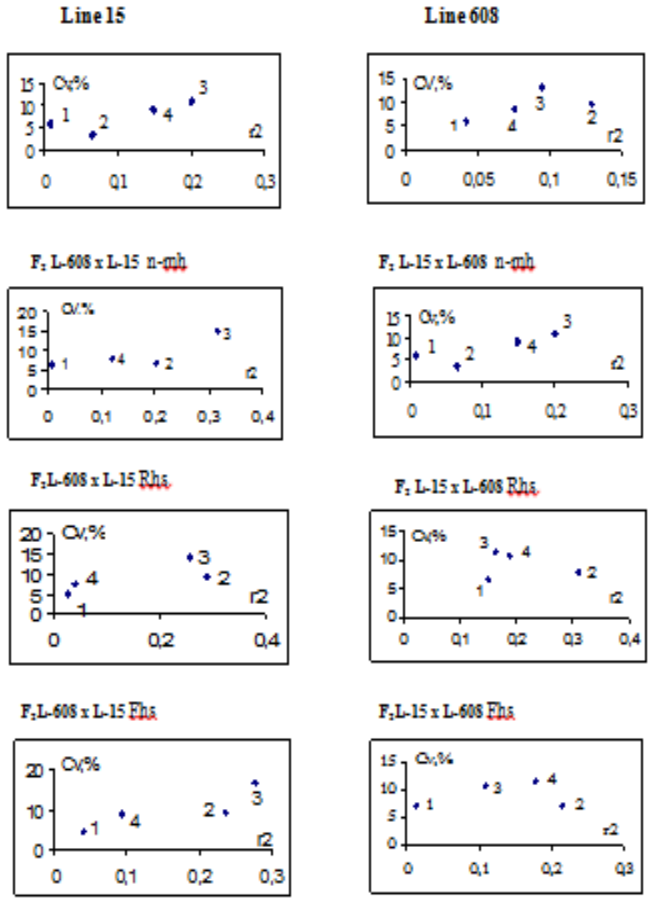
Maximum	34,1	47,48	9,28	118,64
	F_2 L-15 xL-608			
Medium -n-mh	32,29±0,32	43,17±0,45	7,52±0,12	99,39±1,50
Minimum	26	34	5,5	85
Maximum	38,9	48,79	9,27	119,17
Medium - Rhs	32,63±0,23	42,21±0,35	7,63±0,09	104,48±1,22
Minimum	26	34	5	80
Maximum	37,9	49,63	9,39	123,78
Medium - Fhs	31,65±0,32	42,60±0,44	7,83±0,11	105,52±1,74
Minimum	24	34	6	80
Maximum	38,9	47,87	9,56	122,54

This means that the fiber index on the L-15 line is strongly correlated with the signs. Unlike the L-15, the fiber output in the L-608 was strongly determined and varied. This means that this trait depends not only on the genotype but also on the external factors. Fiber length (1) was found to be less variable and deterministic in L-15, L-608, and all hybrid combinations. In Line-15, the average coefficient of determination for this sign was 0.01, while in L-608 it was 0.04. This means that this character is less associated with other characters and has the property of independent variation.



Pic. 1. The degree of variation (CV, %) and determination (r^2) of quantitative indicators of characters in cotton hybrids

Note: digits mean characters: 1-fiber length,mm; 2-fiber output,% 3-fiber index, 4-weight of 1000 cottonseed mass, g

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In the cross-section of the hybrids, there was noted a difference in the degree of determination of the characters. This can also be seen in the following second generation hybrids. In the combination of F_2L-608 x L-15 **n-mh** and F_2L-608 x L-15 **Fhs**, the fiber index (3), F_2L-608 x L-15 **Rhs** - fiber output (2), was relatively strongly variable and strongly determined. In the F_2L-608 x L-15 **Rhs** combination, the average coefficient of determination for fiber output was 0.29, while in the L-608 it was 0.13. In this combination, the degree of determination of fiber output increased by 2 times compared to the maternal form (L-608). In the inverse combination (F_2L-15xL-608 **n-mh**), the fiber index (3) F_2L-15 x L-608 **Rhs**- fiber output (2) was strongly varied.

In general, reciprocal confusion crossing influenced on the degree of determination of the characters. Fiber length was found to be one of the least variable and deterministic characters in reciprocal crossing. It has been noted that this trait is more genotype dependent. The degree of determination of fiber output and fiber index in repiproc crossing has changed. Fiber index has recognized eco-biological indicator as a genotypic indicator.

The degree to which the characters are determined shows how well they are connected. This can also be clearly seen from the data in Figure 2 below. In the L-15 line, the degree of correlation between other characters of fiber length was not real. For this reason, the degree to which this character is associated with others is not indicated. A weak (r = 0.3–0.5) correlation was noted between the fiber output (2) and the fiber index (3). In this case, the fiber output depended on the fiber index. The correlation coefficient between the fiber index was moderate. The heavier the cottonseed, the higher the fiber index is.

In the L-608 line of cotton, weak correlations between fiber length (1) and seed weight (4), there were noted moderate correlation bonds between fiber output and fiber index (3). There were identified inverse correlational bonds between fiber output (2) and seed weight. Strong correlation bonds between fiber output (2) and fiber index (3) were noted in L-608 x L-15 combinations. In this case, the correlation coefficient was greater than 0.7. This was not the case with the parents of these hybrids. In a normal micropylar fuzzy hybrid (F_2L-608 x L-15 **n-mh**), the degree of cross-correlation of fiber length with other studied characters was not real. The same has been observed with the L-15. In reciprocal crossing (F_2L-15 x L-608), (F_2L-608 x L-15) the degree of correlation between the characters was relatively different. A weak inverse correlation was found between the fiber length (1) and the fiber output (2) and the fiber index (3).

A correlation matrix comparison method was used to determine the similarity of genotypes by the degree of correlation bonds. These data are presented in Table 2 below. In the data given in the table, the similarity of the L-15 and L-608 lines in terms of the level of correlation was 36.0%. This showed that the lines selected for crossing differed sharply in terms of quantitative characteristics. It should be noted that the similarity of correlation matrices is considered to be more than 90% - very similar, 90-80% - similar, 80-70% - less similar and less than 70% - not similar.

We also noted that there is a difference between the lines based on the data in Table 1 above. The similarity of the L-15 obtained for crossing with the F_2L-608xL-15 **n-mh** hybrid was 86.1%, the similarity with the F_2L-608xL-15 **Rhs** was -52.1%, and the similarity with the F_2L-608xL-15 **Fhs** was 57.1%. These data suggest that the micropilar part of the seed is higher than that of fuzzy hybrids L-15 compared to fully fuzzy hybrids.

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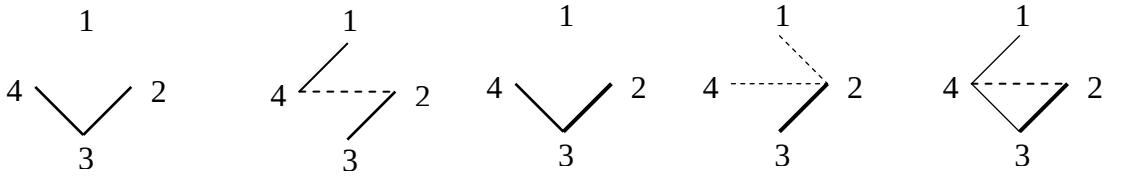


L-15 L-608 F_2L-608 xL-15 **n-mh** F_2L-608 xL-15 **Rhs** F_2L-608 xL-15 **Fhs**

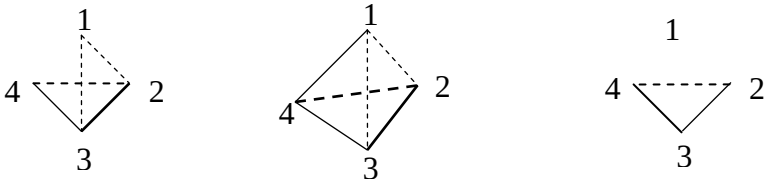
Pic. Influence of reciprocal crossing on the degree of correlation bonds between cotton characters

Note:
1-fiber length, mm
2-Fiber output,%
3-Fiber index, g
4.Weight of 1000 seed mass, g

n-mh- *normal micropillar hair*

Rhs- *Rare hairy seeds*

Fhs- *Fully hairy seeds*



F_2L-15 xL-608 **n-mh** F_2L-15 xL-608 **Rhs** F_2L-15 xL-608 **Fhs**

r=0,3-0,5; r=0,5-0,7 ; r=>0,7 r=-0,3-0,5

A relatively close resemblance was also noted in micropillar and semi-fuzzy hybrids. This indicates that the seeds of L-15 are micropillar fuzzy. The similarity of the hybrids synthesized with the L-608 line of cotton was 58.2%, 82.9%, and 91.9%, respectively. Here, too, it was noted that seed micropilar fuzzy hybrids had a high similarity to L-608 compared to full fuzzy hybrids. In the F_2L-608 x L-15 **Fhs** combination, the similarity of the hybrid with the L-608 was 91% and with the F_2L-15 x L-608 **Rhs** it was 93.5%.

Table 2

Similarity of correlation matrices in reciprocal crossing,%

Line and hybrid combinations	**L-608**	**F_2L608xL-15 n-mh**	**F_2L608xL-15 Rhs**	**F_2L608xL-15 Fhs**	**F_2L-15 xL-608 n-mh**	**F_2L-15 xL-608 Rhs**	**F_2L-15 xL-608 Fhs**
L-15	36,0	86,1	52,1	57,1	66,1	52,4	58,4
L-608		58,2	82,9	91,9	91,3	93,5	81,6
F_2L-608 x L-15 **n-mh**			85,6	83,4	80,9	65,8	59,9
F_2L-608 x L-15 **Rhs**				97,1	89,2	80,6	63,8
F_2L-608 x L-15 **Fhs**					95,1	89,1	76,5
F_2L-15 x L-608 **n-mh**						96,6	79,3
F_2L-15 x L-608 **Rhs**							72,5
F_2L-15 x L-608 **Fhs**							

From these data, it can be seen that in hybrids synthesized in the presence of L-608 in reciprocal crossing, the degree of cross-linking between the characters is fully inherited. With the participation of this L-608 line it is possible to synthesize promising hybrids. Hence, micropillar fuzzy

seeds have a dominant property over fuzzy seeds. This can be determined from the similarity of the following combinations F_2L-15 x L-608 **n-mh** and F_2L-15 x L-608 **Rhs**. The similarity of these combinations was 96.6%. This indicates that the micropillar fuzzy seed was superior to the half-fuzzy seed

In general, the characteristics of cotton hybrids differed in the degree of inter-correlation between the quantitative indicators, variability and determinism. Fiber output and fiber index were found to be strongly determinant and moderately variable. This trait depends on genotype and external environment. It was found that there were moderate to strong correlations between these characters. It was noted that the fiber length was less determined and varied, independent, stable.

Conclusion

1. It was noted that the fiber output and fiber index in cotton reciprocal crossing were strongly determined and varied, fiber length was less determined and less varied.

2. The similarity of the correlation matrices in the reciprocal crossing was 52-96%. It was noted that the micropillar part of the seed is superior to the fuzzy and semi-fuzzy part to the full fuzzy.

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