



CHANGES IN THE WEIGHT OF RAW COTTON IN ONE BOX IN VARIETARY COTTON HYBRIDS

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Abstract

A comparative analysis of the mass of raw cotton in one boll was carried out in 4 hybrid combinations of cotton, with an enriched genetic basis in three regions of Uzbekistan. The proportion of the influence of genotype and environmental factors on the manifestation of the trait has been established. Among modern methods that make it possible to achieve an increase in the effectiveness of selection, the use of various ecological and geographical zones is becoming more widespread.

Keywords: cotton, raw cotton weight per boll, adaptive selection, introgressive forms, dispersion.

The solution of problems of adaptive selection is based on the study of methods for assessing the interaction between the genotype and the environment. There are several methods available to the breeder for assessing adaptive capacity. They differ both in the degree of computational complexity and in the applied approaches (regression, dispersion, cluster, etc.) [2.3.4].

The mass of raw cotton in one boll is an important element of cotton productivity. In order to establish the influence of genotype and environmental factors on the manifestation of the mass of raw cotton in one box, we used a two-factor analysis of variance with repetitions in our experiments [1.5]. The mass of raw cotton of one boll was studied in four hybrid combinations F2 and F3 with the participation of introgressive forms in three contrasting soil-climatic regions of the republic - Tashkent, Kashkadarya and Fergana. Experiments were set up randomly, in four repetitions.

To determine the mass of raw cotton in one box, individual selections of F2 and F3 hybrids were collected. Under laboratory conditions, the mass of raw cotton of one box was determined by dividing the total mass of raw cotton by the number of boxes.

In the experiments of 2018, the largest average weight of raw cotton in one box by region was in the hybrid combination F2 [(F8 L-247 x S-484) x F15 L-248] on average 6.2 g (Table 1). It must be said that this combination showed stability in terms of traits in all three regions.

The smallest weight of the box was noted in the combination F2 [(F15 L-248) x (F8 L-243 x S-2552)] - 5.6 g, and in the combination F2 [(F8 (Bukhara 6x L-h) x L-247)x (F8 L-247 x S-6593)] - 5.7 g. In a comparative analysis of groups of hybrids by region, the largest boll mass was formed in hybrids in the Tashkent region 6.2 g on average, in the Ferghana region -6.0 g. And the lowest indicator of the trait was observed in Kashkadarya area, here the mass of raw cotton in one box on average for the group was 5.4 g.



A two-way ANOVA analysis of the mass of raw cotton in one boll revealed that the hybrids differ insignificantly in this trait and the genotype in this experiment does not significantly affect its variability. The share of unaccounted factors is 57.3%. The environment significantly influences the trait by 26.0%. Thus, we can say that the indicators of the mass of raw cotton in one box in hybrid combinations are close, but in different regions they fluctuated in one way or another.

The highest coefficient of variation was observed in hybrid combinations F2 [(F15 L-248) x (F8 L-243 x S-2552)] - 19.9%, F2 [(F8 L-247 x S-484) x F15 L-248] and 10.8% in the Tashkent region. In the Ferghana region, approximately the same coefficient of variation in the mass of raw cotton in one box was 9.0 - 10.1%. In the Kashkadarya region, the coefficient of variation of the trait was relatively low, 2.7–6.6%, with an average of 5.2–5.7 g.

Table 1 Weight indicators of raw cotton of one box in F2 hybrids

Region	Hybrid combinations	n	\bar{x}	S	S2	V %
Tashkent (Salar)	F2 [(F8 L-247 x S-484) x F15 L- 248]	24	6.5	0.70	0.49	10.8%
	F2 [(F8 (Buxara 6x L-h) x L-247)x (F8 L-247 x S-6593)]	22	5.8	0.43	0.18	7.3%
	F2 [(F15 L- 248) x (F8 L-243 x S-2552)]	20	6.3	1.26	1.58	19.9%
	F2 [(F15 L- 248) x S-2016]	28	6.1	0.44	0.19	7.2%
	St. Namangan 77	23	5.5	0.26	0.14	3.4%
	St. S-6524	22	6.1	0.48	0.19	5.8%
Ferghana (Kuva)	F2 [(F8 L-247 x S-484) x F15 L- 248]	22	6.4	0.57	0.33	9.0%
	F2 [(F8 (Buxara 6x L-h) x L-247)x (F8 L-247 x S-6593)]	17	6.1	0.61	0.37	9.9%
	F2 [(F15 L- 248) x (F8 L-243 x S-2552)]	20	5.4	0.55	0.30	10.1%
	F2 [(F15 L- 248) x S-2016]	24	6.2	0.62	0.38	9.9%
	St. Namangan 77	22	5.6	0.21	0.11	3.5%
	St. S-6524	23	6.2	0.58	0.46	6.2%
Kashkadarya (Casby)	F2 [(F8 L-247 x S-484) x F15 L- 248]	23	5.7	0.24	0.06	4.2%
	F2 [(F8 (Buxara 6x L-h) x L-247)x (F8 L-247 x S-6593)]	17	5.3	0.14	0.02	2.7%
	F2 [(F15 L- 248) x (F8 L-243 x S-2552)]	16	5.2	0.14	0.02	2.7%
	F2 [(F15 L- 248) x S-2016]	21	5.4	0.36	0.13	6.6%
	St. Namangan 77	27	5.2	0.16	0.05	4.1%
	St. S-6524	24	5.6	0.28	0.08	6.7%



Analysis of variance of the mass of raw cotton of one box in hybrids F2

Source of Variation	SS	df	MS	F	P-Value	F critical
Sample	1.834375	3	0.611458	1.814529	0.16196	2.866266
columns	5.505417	2	2.752708	8.168779	0.001188	3.259446
Interaction	1.69375	6	0.282292	0.837713	0.549092	2.363751
Inside	12.13125	36	0.336979			
Total	21.16479	47				
	8.7%					
	26.0%					
	8.0%					
	57.3%					

The highest indicators of the mass of raw cotton in one box in 2019 were observed in all three regions in the hybrid combination F3 [(F15 L-248) x S-2016] - 6.3, 6.9 and 7.7 g, respectively, in Tashkent, Ferghana and Kashkadarya regions (Table .2). The lowest indicators for this trait were observed in combinations F3 [(F8 (Bukhara 6 x L-h) x L-247) x (F8 L-247 x S-6593)] and F3 [(F15 L-248) x (F8 L -243 x S-2552)] from 5.5 to 6.2 g.

As can be seen from Table 2, the lowest coefficient of variation in the mass of raw cotton of one box appeared in the hybrid combination F3 [(F8 L-247 x S-484) x F15 L-248] - 2.1, 10.2 and 1.7%, respectively, regions. Since the rates vary by region, it can be assumed that this trait is still not stabilized.

Table 2 Weight indicators of raw cotton of one box in F3 hybrids

Region	hybrid combinations	n	\bar{x}	S	S ²	V %
Tashkent (Salar)	F3 [(F8 L-247 x S-484) x F15 L- 248]	14	6.1	0.13	0.02	2.1%
	F3 [(F8 (Buxara 6x L-h) x L-247)x (F8 L-247 x S-6593)]	22	5.5	0.69	0.48	12.5%
	F3 [(F15 L- 248) x (F8 L-243 x S-2552)]	12	5.7	0.39	0.15	6.8%
	F3 [(F15 L- 248) x S-2016]	17	6.3	0.39	0.16	6.2%
	St. Namangan 77	25	5.0	0.15	0.02	3.1%
	St. S-6524	25	5.4	0.34	0.12	6.4%
Ferghana (Kuva)	F3 [(F8 L-247 x S-484) x F15 L- 248]	16	6.9	0.70	0.49	10.1%
	F3 [(F8 (Buxara 6x L-h) x L-247)x (F8 L-247 x S-6593)]	24	6.2	0.73	0.54	11.7%
	F3 [(F15 L- 248) x (F8 L-243 x S-2552)]	19	6.2	0.79	0.62	12.8%
	F3 [(F15 L- 248) x S-2016]	15	6.9	1.16	1.35	16.8%
	St. Namangan 77	25	6.5	0.18	0.03	3.0%
	St. S-6524	25	5.9	0.65	0.42	1.8%
Kashkadarya (Casby)	F3 [(F8 L-247 x S-484) x F15 L- 248]	14	7.3	0.12	0.01	1.6%
	F3 [(F8 (Buxara 6x L-h) x L-247)x (F8 L-247 x S-6593)]	21	6.4	0.15	0.02	2.3%
	F3 [(F15 L- 248) x (F8 L-243 x S-2552)]	18	6.1	0.38	0.15	6.2%
	F3 [(F15 L- 248) x S-2016]	23	7.7	0.36	0.13	4.7%
	St. Namangan 77	25	6.5	0.12	0.01	2.0%
	St. S-6524	25	5.6	0.21	0.04	4.2%



Two-way analysis of variance in the mass of raw cotton of one box in hybrids F3

Source of Variation	SS	df	MS	F	P-Value	F critical
Sample	8.008207	3	2.669402	7.931919	0.000346	2.866266
columns	8.537478	2	4.268739	12.68422	6.77E-05	3.259446
Interaction	1.542898	6	0.25715	0.7641	0.602886	2.363751
Inside	12.11541	36	0.336539			
Total	30.204	47				
Sample	0.27					
columns	0.28					
Interaction	0.05					
Inside	0.40					

Two-way analysis of variance showed that there are significant differences between hybrid combinations and groups of samples by region. The share of the influence of the genotype and the environment on the weight of raw cotton in one box in our experiments turned out to be approximately the same and equaled 27% and 28%, respectively. The interaction of these factors on the manifestation of signs was not significant. The share of unaccounted factors turned out to be quite high and was equal to 40%.

Conclusions:

In 2018, the largest mass of raw cotton in one box by region was noted in the hybrid combination F2 [(F8 L-247 x S-484) x F15 L-248] on average 6.2 g. In 2019 - in the hybrid combination F3 [(F15 L-248) x S-2016] - 6.3, 6.9 and 7.7

The average weight of raw cotton per boll in hybrid combinations F2 was close, but in different regions they fluctuated in one way or another.

The share of the influence of the genotype and environment on the mass of raw cotton of one box of F3 hybrid combinations turned out to be approximately the same and equaled 27% and 28%, respectively.

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