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THE GENETIC NATURE OF THE MUTANT L-4 SYSTEM AND THE HERITAGE OF CHLOROPHYLES

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Annotation: Thesis covers the genetic nature of the mutant L-4 ligament and the genesis of chlorophyll. Thesis analyzes the morphine levels of chlorophyll in the «Hanthoverisens» yellow, green mutant L-4.
Key words: recessive, chlorophyll, phenotype, geterozygote. viresens, xanthoviresens, havirs, phenotype, geterozygote.

It is known that the amount of chlorophyll in the leaves of plants is an important ecological and physiological indicator in assessing the properties of their photosynthetic productivity.

As a result of the study of natural and experimental mutations of chlorophyll (3-6), mutation species were classified into 4 major groups and 16 subgroups. In the 3rd group of the indicated groups, the viresens-chlorophyll turns green in the normal range of degradation. It has a phenotypic appearance (xanthoviresens) in which the ontogeny in yellow-leaved plants turns into normal green leaves, and such a mutation is referred to as “havirs”. As a result of the study of a similar mutation in cotton (5), the gene expressing the (hantha) phenotype is recessive in the heterozygous state, but in the recessive homozygous state the organism is lethal. L-4 ridge young true leaves are yellow and green when mature. This mutation is Hanthoviresens recessive in nature. The color of the fiber is dark brown. Harvest branches are not limited. The ridges in all experiments are clawed 5-lobed in leaf shape.

In the F_1 plant generation, second-generation plants could be divided into the following phenotypic groups (classes) according to these characteristics:

1. The color of the plant is green, the color is fibrous, the hairs on the seeds are 100%, completely covered with hairs;
2. The color of the plant is green, fibrous, hairy on the seed, only, in the micropile part of the seed;
3. Plant color is green, fiber color, seed surface is 100% bare;
4. The color of the plant is green, the fibers are white, the hairs on the seeds are 100%, completely covered with hairs;
5. The color of the plant is green, the fibers are white, tklan on the seed, only, in the micropila part of the seed;
6. The color of the plant is green, the fibers are white, the seeds are bare, but such plants are not found;

ISSN 2515-8260 Volume 07, Issue 09, 2020

7. Plant color yellow-green, fibrous color, seed coat 100%, completely covered with hairs;
8. The color of the plant is yellow-green, fibrous, hairy on the seed, only, in the micropila part;
9. Plant color yellow-green, fibrous, seeds 100% hairless, bare;
10. The color of the plant is yellow-green, the fibers are white, the top of the seed is covered with a bunch of hairs, the hairs are 100%;
11. The color of the plant is yellow-green, the fibers are white, the hairs on the seeds, only, in the micropile part;
12. Plant color is yellow-green, fiber is white, seeds are 100% hairless, bare (table).

It should be noted that we did not encounter seed-bare plants in fibrous white phenogroups. This may be due to a lack of F_2 plants, or an interaction of other genes. to determine this, we analyzed the backbone hybrid plants using the L-105 (bare-seeded) ridge where the F_1 plants had a recessive state of the mark.

To clearly understand the relationship in character inheritance, we examined the cases of inheritance of each character separately.

We were completely convinced that the F_1 plants in terms of plant color were all green and that the L-105 ridge was completely superior to the L-4 in this character.

It was possible to group F_2plants:

1. Green plants;
2. Yellow-green plants;

Of the 81 plants studied, 67 were green and 14 were yellow-green in color, the theoretical ratio was close to 3:1, χ^2=2,58, P=0,20-0,05. 65 in fiber color and 16 white, control the ratio is close to 3:1, χ^2=1,19 P=0,50-0,20. The division of the seed into 3 phenogroups was 100% possible: the seed was 100% hairy-38, the seed was only micropila -39 and the seed was hairless naked, -4 theoretical ratios
6:9:1, χ^2=3,07, P=0,50-0,20.

ISSN 2515-8260 Volume 07, Issue 09, 2020

Inheritance of plant color, fiber color, and hairs on seeds in L-4 and L-105 ridge hybrid plants and their relationship.

Table

S/n №	Thing	n	Plant color												theoretically expected relationships	χ^2	P
			green						yellow								
			fiber color						fiber color								
			colored			white			colored			white					
			wool kind			wool kind			wool kind			wool kind					
			os	ms	rs	os	ms	rs	os	ms	rs	os	ms	rs			
1	L-4	40							40								
2	F_1 L-4 x L-105	30		30													
3	F_b(L-4 x L-105) x L-105	39		12	8		12	7							6:2:6:2	5,095	0,20-0,05
4	F_2 L-4 x L-105	81	25	27	2	5	8		6	3	2	2	1		54:81:9:18:27:3:18:24:3:6:9:1	11,57	0,50-0,20
5	L-105	30						30									

ISSN 2515-8260 Volume 07, Issue 09, 2020

To determine why the F_1 plant is heterozygous for the allele gene on these traits and how the genes that control these traits interact (L-4 x L-105) x 39 plants that studied the L-105 F_b plant could be divided into the following phenotypic groups:

1. Green plant, fiber color, seed hairless, only, in the micropile part of the seed;
2. Green plant, fiber color, seed surface 100% hairless bare;
3. Green plant, white fibers, seed hair, only, in the micropile part of the seed:
4. Green plant, fiber white, seeds 100% hairless, bare.

Among the Beccross plants, no biotypes of 100% hairy, yellow-green plant and fibrous dark brown (similar to L-4 ridge) seeds were identified.

The theoretical ratio of the 4 phenograms studied was close to 6: 2: 6: 2, in absolute numbers 12: 8: 12: 7, X^2=5,095, P=0,20-0,05. Evidence from this experiment showed that F_1 is a plant that controls three traits, plant color rp -rp^1, fiber color $Br^{Li} - br^{Li}$, and hair control genes $F_{t_1} - f_{t_1}$ and$\frac{F_{t_1}F_c}{f_{t_1}F_c}$(Abzalov, et al. 176) are tetrageterozygous, indicating that the characters are freely inherited in an unrelated state. Participating allelic and non-allelic genes interact- genes responsible for plant color ($r_p r_p$green), (${r_p}^1{r_p}^1$- yellow green) genes $r_p > {r_p}^1$, fiber color (Br^{Li}- dark brown, br^{Li}- fiber white), $Br^{Li} \geq br^{Li}$Hairs on and seeds F_{t_1}-$F_{b_1}F_{t_3}$- feathers develop in the micropyle part of the seed , F_c- feathers develop in the aunt and side of the seed, $F_3$and $F_c$in joining (25%, according to Usmanova, Abzalov), $f_{t_1}f_{t_1}\frac{f_{t_3}F_c}{f_{t_3}F_c}$- genotype seed 100% hairless, bare, L-105 ridge-like. Therefore, F_b, F_2 indicate the following genotype of the ridges involved in hybridization, even if the size of the plants is smaller. L-4- -${r_p}^1{r_p}^1Br^{Li}Br^{Li}F_{t_1}F_{t_1}\frac{F_{t_3}F_c}{F_{t_3}F_c}$, L-105also$r_p r_p br^{Li} br^{Li} f_{t_1} f_{t_1}\frac{f_{t_3}F_c}{f_{t_3}F_c}$

This mutant form is taken from the collection of the gene pool of the Research Institute of Cotton Breeding, Seed Production and Agrotechnology under the Ministry of Agriculture of Uzbekistan. (collection №011276) Representative Nanjing belongs to the American selection,In the "Laboratory of Private and Applied Genetics of Plants" of the Institute of Genetics and Experimental Biology of the Academy of Sciences of the Republic of Uzbekistan for several years by self-pollination separated the "viresent " mutant on the phenotype "xanthoviresens"and stored in the form of an L-4 ridge. According to the literature, this mutant is of a recessive nature (4). The second ridge L-3 is separated from the collection form №011233 Rowden Mavloni of the Research Institute of Cotton Breeding, Seed Production and Cultivation Agrotechnologies by self-pollination and has a distinctive anthocyanin color. Anthocyanin color is at the base of the plant, in the leaf veins, the flower is yellower, the pods are green. Both ridges have 5 lobes on the leaf shape, the fruiting branches are not limited. The fibers of the L-4 ridge are dark brown, while those of the L-3 are white. The L-3 ridge has the$r_p r_p R^v_{st} R^v_{st}$ genotype according to the literature evidence on anthocyanin color. [14]

The studies provide an analysis of the results obtained on the inheritance of plant color and chlorophyll content in F_2 plants

The 63 F_2 plants studied could be divided into three phenotypic groups according to plant color: anthocyanin - 9, green - 33 and yellow - 21, their ratio was close to 1:2:1, χ^2 = 6,102, P-

0,20-0,05. This suggests that parental forms differ in allelic states of a gene. The amount of chlorophyll in plants F_2 was as follows: “a”+“b” – X=0,79±0,04, “a”– 0,49±0,03, “b” – 0,32±0,04 was found to be high.

In F_2 plants, it was possible to observe a specific pattern in heredity by chlorophyll content in phenotypic groups separated by plant color. The highest value for this sign is in green leafy plants “a”+“b” – X=0,99±0,02, “a” – X=0,62±0,03, “b” - X=0,40±0,02, the degree of variability is high. In second place are anthocyanins (similar to the L-3 ridge), "a"+ "b"-X =0.92±0.06, "a"-X =0.5±0.04 and "b"-X=0.42±0.03, in yellow plants the same index was recorded in the L-4 ridge, ie "a"+"b"- X=0.56±0.03, "a"-X=0.35±0.02, “b”-X=0.22±0.02, the variability V was found to be very high. Evidence obtained in the experiment suggests that in this hybrid combination, the parent forms were found to differ sharply from each other in terms of total chlorophyll content. The amount of chlorophyll was determined on anSF-16 spectrofotometer using 80% acetone. 633 nm, and 645 nm were used for chlorophylls. The first-generation plants of the L-4 and L-3 systems had a green plant phenotype, no yellow leaves, and the fiber color was found to be intermediate, i.e., novvot color. Hybridological analysis shows that xanthoviresens is a recessive mutation, that the fiber color is inherited in a state of incomplete dominance, and that there is no reciprocal difference in the traits studied in the F_1L-4xL-3 andL-3xL-4 hybrids.

L-4 and L-3 ridges differ greatly in the amount of chlorophyll. In the L-4 ridge, "a"+"b" chlorophyll - 0.54±0.06, "a"-0.36±0.04, "b"-0.18±0.02, in the L-3 system “a”+“b”-1.70±0.37, “a”-1.16 ± 0.11, “b” - 0.62 ± 0.15. First-generation plants in L-4xL-3 “a”+“b” –1,35±0,06, “a” – 0,89±0,04, “b” –0,56±0,04, dominance the coefficient was hp = 0.43, 0.1, 0.73, 0.40, 0.32, 0.23, respectively, and in both cases an incomplete superiority of the high-performance ridge was determined.

Thus, in F_1reciprocal plants, the dominance index hp was observed to be intermediate, with the L-3 ridge oriented to the side. However, it was found that the difference in the chlorophyll content of the leaves of F_1 reciprocal plants was not significant due to mutations in the L-4 system, mainly due to changes in the nuclear gene.

“Hanthoviresens” - hereditary mutation of yellowish green and its relationship to chlorophyll

№	Material	Chlorophyll	n	The average value of the classes, calculated as mg / g per wet leaf						X±m	Δ	V	Hp
				0,25	0,75	1,25	1,75	2,25	2,75				
1	L-4	“a”±”b”	10	3	7					0,54±0,06	6,53	11,9	
		“a”	10	10						0,36±0,04	4,85	13,2	
		“b”	10	10						0,18±0,02	2,21	12,3	
2	F_1(L3xL-4)	“a”±“b”	10			10				1,37±0,04	4,38	3,19	0,43
		“a”	10		10					0,80±0,02	1,63	2,02	0,1
		“b”	10		10					0,56±0,04	4,57	8,11	0,73
3	F_1(L3xL-	“a”±“b”	10			9	1			1,35±0,06	6,06	4,48	0,40

	4)												
		“a”	10		10					0,89±0,04	4,22	4,71	0,32
		“b”	10	8	2					0,45±0,04	4,45	9,78	0,23
4	L-3	“a”±“b”	10				10			1,70±0,37	0,14	8,31	
		“a”	10		5	5				1,16±0,11	0,27	7,44	
		“b”	10	7	3					0,62±0,15	0,12	4,21	
5	F_2(L3xL-4)	“a”±“b”	63	11	33	16	3			0,79±0,04	0,33	42,3	
		“a”	63	32	30	1				0,49±0,03	0,25	38,4	
		“b”	63	54	9					0,32±0,04	0,17	35,4	
6	Of which: anthocyanin	“a”±“b”	9		6	3				0,92±0,06	0,18	20,4	
		“a”	9	4	5					0,50±0,04	0,14	28,6	
		“b”	9	6	3					0,42±0,03	0,10	25,4	
7	Green	“a”±“b”	33	1	16	15	1			0,99±0,02	0,25	26,0	
		“a”	33	9	23	1				0,62±0,03	0,19	31,6	
		“b”	33	28	5					0,40±0,02	0,10	23,5	
8	Yellow	“a”±“b”	21	10	11					0,56±0,03	0,17	30,7	
		“a”	21	19	2					0,35±0,02	0,11	32,7	
		“b”	21	20	1					0,22±0,02	0,10	47,4	

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