INHERITANCE OF THE SIZES OF LEAVES IN BURLEY AND VIRGINIA TOBACCO HYBRID COMBINATIONS. I. LENGTH OF LEAVES

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ABSTRACT

Compares are the character of inheritance, inheritability coefficient, and expressions of heterosis and transgression referring to the length of the leves in Burley tobacco and Virginia tobacco. For this purpose, were investigated populations of P_1, P_2, F_1 and F_2 of seven hybrids Burley tobacco and seven hybrids Virginia tobacco, involving local and introduced varieties. Results showed that in a hybrid combination of Burley tobacco inheritance of the length of leaves is overdominantly, semidominantly and additively, while Virginia tobacco – overdominantnotly or semidominantly always in the direction of the parent with the higher values of research sign in both the type of tobacco. In the explored options large leaf tobacco Burley and Virginia, the manifestations of heterosis and transgression are no economic importance. The number of genes influencing the expression of the length of the leaves is much higher in Virginia tobacco, which makes it difficult for the selection in this type of tobacco. Obtained are low values of the coefficient of heritability in Burley tobacco and medium ones in Virginia tobacco. There are substantial differences in the nature of inheritance of the length of the tobacco leaves in both varietal groups.

Keywords: *tobacco, hybridological analysis, inheritance, hereditability*

Introduction

Sizes of the leaves in all tobacco are essential for the size of the yield (Risteski al., 2012). The length of the leaves in almost all types of tobacco is a major feature and for quality (Dimanov and Masheva, 2011; Kirkova, 2005).

Length of leaves is inherited overdominantly and dominantly towards the parent with longer leaves (Tchinchev, 1984). Metha, et all. (1985) reported for dominantly and overdominantnly inheritance in F1 for the length of the leaves. Number of authors (Moses et all., 1976; Ratel, 1976; Amarnath, 1987) reported for leading notaditive gene effects in this feature. Sastry and Rrasada Rao (1980) found that in crosses of Burley tobacco in inheritance of this trait are leading dominant gene effects. ccording to Espino and Gill, (1980) and Torrecila and Barroso (1980) inheritance to the length of the leaves is determined by the additive and dominant gene effects. In the hybrid combinations of varieties of Djebel group tobacco sign length 14th leaf, Petrova (1993) found that inheritance varies amending the environmental conditions of overdominantnly to semidominantly to the direction of the parent with higher values.

There is not much data on heritability of the length of the leaves. Peksuslu et al., (2002) found a high heritability in a broad sense - over 80%, and Nizam Uddin and Newaz, (1983) reported the ratios heritability in a broad sense - 83% of the length of the leaves.

The aim of the study is by hybridological analysis to determine and compare the nature and extent of genetic interaction, the number of genes that differ in parenting forms, heritability and effects of selection, and acts of heterosis and transgression on the length of the leaves in hybrid combinations Burley tobacco and Virginia tobacco, with a view to using the results to optimize the selection activity.

Material and methods

Experimental work was carried out in educational and experimental field of TTPI - Markovo the period 2010 – 2012. Studied are populations P_1, P_2, F_1 and F_2 of seven crosses Burley tobacco namely: Hybrid 1464 (L 1189 x Bt 102); Hybrid 1465 (L 1390 x Ky 908); Hybrid 1467 (B 1344 x 908 Ky); Hybrid 1468 (B 1317 x B 1344); Hybrid 1469 (B 1322 x Ky 907); Hybrid 1470 (L 1145 x Tn 90); Hybrid 1480 (Tn 86 x Ky 8959) and seven crosses Virginia tobacco: Hybrid 652 (L 607 x C 326); Hybrid 653 (L 607 x C 254); Hybrid 665 (V 250 x L 42); Hybrid 688 (V 250 x L 42); (L 843 x C 326); Hybrid 694 (L 607 x V 250); Hybrid 697 (L 843 x V 250). A subject of studies and analysis is the length of the leaves of middle harvesting belt, which is the most representative in large-leaf tobacco. Measured are 250 plants from option.

Regarding the lenght of leaves were determined: the arithmetic mean ($\bar{x}$), the average error of the arithmetic mean ($S\bar{x}$ %), degree of dominance (domination extent) (d/a) in the formula of Mather and Jinks (1985), heterosis effect to better parental form (HP) and depression in Omarov (1975). Have been identified: an indicator of transgression (Tn), the number of genes that differ in parental forms (N), dominance (D), epiztaz (E) coefficient of heritability (H^2), coefficient of effective selection by genotypes in phenotypic expression of the trait (Pp) by Sobolev (1976).

Results and Discussion

In studies hybrid combinations of Burley tobacco inheritance of the length of the leaves is semidominanty, aditive and overdominantntly depending on the crossing as prevails the last. It is always in the direction of the parent with the greater length of the leaves (Table 1).

Table 1. Biometric data of length of leaves in Burley tobacco (average 2009-2011)

Parents/ Crosses	$P_1\ \bar{x} \pm S\bar{x}$	$P_2\ \bar{x} \pm S\bar{x}$	$F_1\ \bar{x} \pm S\bar{x}$	$F_2\ \bar{x} \pm S\bar{x}$	d/a	HP %	Depression%
Hybrid 1464 (L 1189 x Bt 102)	58.7 ±0.21	61.8 ±0.15	62.3 ±0.23	61.8 ±0.26	0.5	100.8	0.80
Hybrid 1465 (L 1390 x Ky 908)	60.8 ±0.17	61.6±0.16	61.9 ±0.21	61.1±0.23	1.3	100.5	1.29
Hybrid 1467 (B 1344 x Ky 908)	62.4 ±0.13	61.6±0.16	62.6±0.19	62.0 ±0.20	1.5	100.3	0.96
Hybrid 1468 (B 1317 x Б 1344)	59.5 ±0.24	62.4 ±0.13	62.4 ±0.22	61.7±0.24	0	100	1.12
Hybrid 1469 (B 1322 x Ky 907)	59.8 ±0.22	60.9 ±0.18	62.6±0.24	62.4±0.25	1.7	102.8	0.32
Hybrid 1470 (L 1145 x Tn 90)	59.2 ±0.26	60.7 ±0.14	63.8±0.18	62.5±0.27	3.1	105.1	2.04
Hybrid 1480 (Tn 86 x Ky 8959)	59.3 ±0.20	60.1 ±0.19	62.3±0.21	61.6±0.23	1.5	103.4	1.12

On the length of the leaves is observed heterosis of significant figures only at crossing Hybrid 1470 (L 1145 x Tn 90) as he is on the limit of significance. Depression is also manifested in the low to negligible extent in all hybrid combinations (Table 1). Coefficients of transgression are also insignificant values. Only in Hybrid 1470 in available homozygous offspring may be selected plants with 1cm greater length of the leaves in comparison with the starting parental forms (Table 2).

Table 2. Genetic characteristic of length of leaves in Burley tobacco

Crosses	Tn	N	D	E	H^2	Pp
Hybrid 1464 (L 1189 x Bt 102)	-0.17	2.37	2.02	-13.62	0.41	0.26
Hybrid 1465 (L 1390 x Ky 908)	-0.20	4.21	3.67	-15,83	0.37	0.23
Hybrid 1467 (B 1344 x Ky 908)	-0.08	4.74	4.22	-16.25	0.44	0.30
Hybrid 1468 (B 1317 x Б 1344)	0.28	2.83	2.31	-12.78	0.33	0.19
Hybrid 1469 (B 1322 x Ky 907)	0.37	3.15	2.80	-14.91	0.42	0.28
Hybrid 1470 (L 1145 x Tn 90)	0.66	3.59	3.14	-15.23	0.36	0.22
Hybrid 1480(Tn 86 x Ky 8959)	0.23	3.02	2.72	-12.95	0.38	0.23

From made hybridological analysis it is found that the number of genes affecting the expression of the trait length of the leaves is low and almost no varies - from 2 to 4 (Table 2). On phenotypic expression of studies indicator slightly influenced by dominant genes whose effects strongly reduce negative epistative interactions, making it difficult for the selection by this feature.

The values of coefficient of heritability and related coefficient for effective of selection received in respect of the length of the leaves range from low to medium (Table 2). As with any hybrid combination does not exceed 50% it is clear that there is a lower proportion of influence of genotype on the expression of research indicator. Assume that the selection for the number of leaves to be effective in the later hybrid generations (F_4 - F_5).

Table 3. Biometric data of length of leaves in Virginia tobacco (average 2009-2011)

Parents/ Crosses	$P_1 \bar{x} \pm S \bar{x}$	$P_2 \bar{x} \pm S \bar{x}$	$F_1 \bar{x} \pm S \bar{x}$	$F_2 \bar{x} \pm S \bar{x}$	d/a	HP %	Depression%
Hybrid 652 (L 607 x B 326)	62.6±0.15	60.8±0.20	62.8±0.24	61.2±0.22	2.55	100.3	0.80
Hybrid 653 (L 607 x C 254)	62.6±0.15	58.7±0.17	63.0±0.21	61.3±0.20	2.70	100.6	1.29
Hybrid 665 (V 250 x L 42)	62.2±0.26	61.9±0.24	62.5±0.27	60.6±0.24	16.3	100.5	3.04
Hybrid 688 (V 250 x L 42)	61.5±0.17	62.2±0.26	62.6±0.25	61.1±0.23	0.4	100.6	2.40
Hybrid 690 (JI 843 x C 326)	61.1±0.21	60.8±0.20	61.7±0.22	60.8±0.24	5	101	1.46
Hybrid 694 (L 607 x V 250)	62.6±0.15	62.2±0.26	62.7±0.23	60.7±0.19	2	100.2	3.19
Hybrid 697 (L 843 x V 250)	61.1±0.21	62.2±0.26	62.4±0.24	61.6±0.25	0.2	100.3	1.28

In our study sample Virginia tobacco in the first generation inheritance of the length of the leaves is overdominantnly or semidominatnly in excess of the first and always in the direction of the parent with the higher values (Table 3).

With respect to the length of the leaves in Virginia tobacco not at all observed heterosis Depression also exhibited marginally in all hybrid combinations (Table 3). Coefficients of transgression are also insignificant values (Table 4).

Table 4. Genetic characteristic of length of leaves in Virginia tobacco

Crosses	Tn	N	D	E	H^2	Pp
Hybrid 652 (L 607 x B 326)	0.11	21.38	7.32	-24.50	0.69	0.45
Hybrid 653 (L 607 x C 254)	-0.08	17.44	5.68	-22.43	0.62	0.42
Hybrid 665 (V 250 x L 42)	0.15	27.80	9.33	-28.38	0.74	0.53
Hybrid 688 (V 250 x L 42)	0.04	32.47	10.27	-31.28	0.66	0.46
Hybrid 690 (Л 843 x C 326)	0.09	19.25	7.90	-25.82	0.63	0.43
Hybrid 694 (L 607 x V 250)	-0.20	25.25	8.21	-27.64	0.71	0.51
Hybrid 697 (L 843 x V 250)	0.13	23.61	7.72	-26.07	0.67	0.46

The results show that on the fully leaves heterosis and transgression are not promising in the selection of large leaf tobaccos in this respect.

The number of genes influencing the expression of the trait length of leaves is much greater than in Burley tobacco, ranging from 17 to 25. This makes it difficult for the team this feature in Virginia tobacco (Table 4). On phenotypic expression studies indicator influenced by dominant genes whose effects strongly reduce negative epistative interactions, which further hinders selection by this feature.

The length of leaf tobacco in Virginia are established higher values of the coefficient of heritability (Table 4). In all hybrid combinations are average values, indicating roughly equal shares of genotype and environmental conditions on the expression of the trait. In this case the team will be effective in earlier generations (F_3 - F_4).

There are differences in the nature of inheritance of the length of the leaves in tobacco both varietal groups.

Conclusion

In our study hybrid combinations of Burley tobacco inheritance of the length of the leaves is overdominantnly, semidominantly and additively, while Virginia tobacco - overdominantnly or semidominantly, and in crosses of the two varietal groups inheritance is always in the direction of the parent with the higher values of research sign.

In the explored options large leaf tobaccos Burley and Virginia, acts of heterosis and transgression on the length of the leaves are insignificant.

The results of hybridological analysis showed that the number of genes affecting the expression of the length of the leaves is much higher in Virginia tobacco.

Obtained are low values of the coefficient of heritability in Burley tobacco and medium ones at Virginia tobacco, indicating that selection for this feature will be more effective in different generations in hybrid crosses of the two groups of tobacco varieties.

There are substantial differences in character of inheritance of the length of the tobacco leaves in both varietal groups.

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