INHERITANCE OF THE SIZES OF LEAVES IN BURLEY AND VIRGINIA TOBACCO HYBRID COMBINATIONS. II. WIDTH OF LEAVES

***Tzenka Radoukova, **Yovko Dyulgerski, ***Lilko Dospatliev**
**Plovdiv University "Paisii Hilendarski", Faculty of Biology, Plovdiv 4000, Bulgaria,*
e-mail: kiprei@abv.bg
***Institute of Tobacco and Tobacco Products (ITTP), Markovo, Bulgaria,*
e-mail: yovko_dulg@abv.bg
****Thracian Universiti, Stara Zagora, Bulgaria*
e-mail:lkd@abv.bg

ABSTRACT

The comparative analysis on the inheritance parameters (inheritability coefficient, expressions of heterosis and transgression) are made. There are investigate the width of the leves in two populations and two generation of seven hybrid combination on local and introduced varieties tobacco Burley and Virginia. The results showed that in a hybrid combination of Burley and Virginia tobacco, inheritance of the width of leaves is overdominantly or semidominantly in the direction of the parent with the higher values of research sign. Acts of heterosis and transgression in Burley tobacco are more pronounced than in Virginia tobacco. Virginia tobacco show greater number of genes affecting the expression of the width of the leaves, which makes this type of tobacco difficult for the selection. Obtained low coefficient of heritability in Burley tobacco, and in such medium in Virginia tobacco, which indicates that the selection in Virginia tobacco with respect to the width of the leaves may be started in earlier hybrid generations in comparison with Burley tobacco.

Keywords: *tobacco, hybridological analysis, hereditability, heterosis, width of leaves*

Introduction

In studies of Metha, et all. (1985) in tobacco Virginia has been found to lead to the expression of the trait width of the leaves have to additive gene effects. Again according to the same authors inheritance to the width of the leaves is due to dominant and epistative gene effects. Several authors (Mirthy et all., 1972; Moses et all., 1976; Ratel, 1976) reported leading notaditive gene effects in this feature. Sastry and Rrasada Rao (1980) found that in crosses of Burley type inheritance of this trait leading to the expression of the trait gene effects are dominant. On the sign width of the leaves of all tested variants epistative gene are prevalent in the expression of the trait. In cigarillos tobacco is found that the inheritance of this trait with the largest share additive gene effects (Espino and Gill, 1980; Torrecila and Barroso, 1980).

There are sparse data on heritability of the width of the leaves. Shyu et all (1975) found high heritability in the broad sense of the width of the leaves - 84%. Nizam Uddin and Newaz, (1983) reported coefficients of heritability in the broad sense - 96% for the width of the leaves.

The aim of the study is to determine and compare genetic interaction, the number of genes, heritability, heterosis and transgression on the width of the leaves in parenting and selecting forms of Burley and Virginia tobacco hybrid combinations. The results can be use for the better organization of the selection practice on this tape of tobacco.

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 width of the leaves of middle harvesting belt, which is the most representative in large-leaf tobacco. Measured are 250 plants from option.

Regarding the width 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

Inheritance of the width of leaves, in studied hybrid combinations of Burley tobacco is semidominantly and overdominantnly in depending on the crossing as prevalent last. With exception of Hybrid 1468 (B 1317 x B 1344), where the direction of the parent with the lower values of the investigated parameters are dominant, in the rest of variants the direction of the parent with the greater width of the leaves are dominant (Table 1).

Table 1. Biometric data of width 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)	29.4 ±0.18	31.8 ±0.12	32.4 ±0.21	31.7 ±0.25	0.6	101.9	2.16
Hybrid 1465 (L 1390 x Ky 908)	30.4 ±0.14	31.4±0.11	32.8 ±0.23	32.4±0.26	1.4	104.5	1.22
Hybrid 1467 (B 1344 x Ky 908)	32.2 ±0.08	31.4±0.11	32.5±0.19	32.2 ±0.23	1.75	100.9	0.92
Hybrid 1468 (B 1317 x Б 1344)	29.7 ±0.20	32.2 ±0.08	32.1±0.22	31.7±0.24	-0,1	99.7	1.24
Hybrid 1469 (B 1322 x Ky 907)	29.8 ±0.18	31.2 ±0.13	32.8±0.20	32.0±0.23	2.6	105.1	2.43
Hybrid 1470 (L 1145 x Tn 90)	29.7 ±0.17	30.5 ±0.10	33.3±0.18	32.2±0.22	2.8	109.2	3.25
Hybrid 1480 (Tn 86 x Ky 8959)	32.0 ±0.16	30.3 ±0.14	32.3±0.20	31.8±0.24	1.35	100.9	1.55

On the width of the leaves is observed heterosis of significant figures in two of the crosses, while Hybrid 1469 (B 1322 x Ky 907) is the limit of significance. Is more pronounced in Hybrid 1470 (L 1145 x Tn 90). In all hybrid combinations the determine depression is manifested in the low to negligible extent (Table 1). In Hybrid 1469 and Hybrid 1470 with comparison with baseline parental forms in available homozygous offspring may be selected plants with 1 cm greater width of leaves. (Table 2). For the rest of the variants the coefficient of transgression are insignificant. The manifestations of heterosis and those of transgression are connected.

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

Crosses	Tn	N	D	E	H^2	Pp
Hybrid 1464(L 1189 x Bt 102)	0.22	1.63	0,27	-21.31	0.23	0.20
Hybrid 1465 (L 1390 x Ky 908)	0.43	4.04	1.11	-18,45	0.26	0.22
Hybrid 1467 (B 1344 x Ky 908)	-0.03	3.25	0.56	-24.17	0.18	0.14
Hybrid 1468 (B 1317 x Б 1344)	-0.13	1.88	0.33	-20.73	0.34	0.27
Hybrid 1469 (B 1322 x Ky 907)	0.59	3.71	0.82	-19.14	0. 21	0.18
Hybrid 1470 (L 1145 x Tn 90)	1.23	2.42	0.65	-23.26	0.28	0.24
Hybrid 1480 (Tn 86 x Ky 8959)	-0.07	3.57	1.02	-22.28	0.31	0.25

The hybridological analysis show, that the number of genes affecting the expression of the trait width of the leaves is lower by Hybrid 1464 – 1.63 and reach to 4.04 by Hybrid 1465, but as a whole it is low for all variants. (Table 2). According to research of Metha et all. (1985) by tobacco Virginia and Dyulgerski and Radoukova (2014) by tobacco Burley, the width of the leaves slightly influenced by dominant genes on its phenotypic expression. This effects strongly reduce negative epistative interactions and maked the selection process difficult by this feature. The values of coefficient of heritability and related coefficient for effective of selection received in respect of the width of the leaves are low (Table 2). There is a small share 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 ($F_5 – F_6$).

Table 3. Biometric data of width of leaves in Virginia tobacco

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)	31.6±0.11	30.6±0.21	31.8±0.23	31.4±0.26	1.4	100.6	1.26
Hybrid 653 (L 607 x C 254)	31.6±0.11	29.8±0.16	31.9±0.19	31.1±0.22	1.33	100.9	2.51
Hybrid 665 (V 250 x L 42)	31.3±0.23	31.1±0.17	32.6±0.24	32.2±0.25	14	104.1	1.23
Hybrid 688 (L 842 x V 250)	31.2±0.17	31.3±0.23	32.4±0.25	32.1±0.28	1.2	103.5	0.92
Hybrid 690 (L 843 x C 326)	30.8±0.19	30.6±0.21	31.8±0.25	31.6±0.26	11	103.2	0.63
Hybrid 694 (L 607 x V 250)	31.6±0.11	31.3±0.23	32.3±0.26	31.7±0.25	5.67	102.2	1.86
Hybrid 697 (L 843 x V 250)	30.8±0.19	31.3±0.23	32.0±0.23	31.5±0.27	0.7	102.2	1.56

The inheritance of the width of the leaves in the first generation of study Virginia tobacco hybrid is overdominantnly and only in Hybrid 697 (L 843 x V 250) is semidominatnly. It is always in the direction of the parent with the higher values of width of leaves (Table 3).

With respect to the length of the leaves in Virginia tobacco not 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 width of leaves in Virginia tobacco

Crosses	Tn	N	D	E	H^2	Pp
Hybrid 652 (L 607 x B 326)	-0.09	8.83	8.21	-35.17	0.47	0.37
Hybrid 653 (L 607 x C 254)	-0.16	6.74	6.32	-29.51	0.43	0.32
Hybrid 665 (V 250 x L 42)	0.46	7.81	7.30	-37.39	0.52	0.42
Hybrid 688 (L 842 x V 250)	0.32	8.35	7.77	-31.72	0.48	0.40
Hybrid 690 (L 843 x C 326)	0.34	9.12	8.61	-28.94	0.50	0.43
Hybrid 694 (L 607 x V 250)	0.19	6.93	6.44	-30.66	0.39	0.30
Hybrid 697(L 843 x V 250)	0.15	7.68	7.19	-33.08	0.54	0.45

The number of genes affecting the expression of the attribute of width of leaves is much larger than in the case of Burley tobacco, as a slightly varies from 7 to 9, as they are primarily of the dominant effect (Table 4). On the phenotypic expression of the studies indicator have strongly impact negative epistative interactions, making it difficult for the selection in this feature.

Regarding the width of leaf tobacco in Virginia are set higher values of the coefficient of heritability (Table 4). In all hybrid combinations have averages around 50%, indicating roughly equal shares of genotype and environmental conditions on the expression of the trait. In this case the selection will be effective in earlier generations (F_3 - F_4).

Conclusion

In our study hybrid combinations Virginia and Burley tobacco, inheritance width of leaves is overdominantnly or semidominantly towards parents with higher levels of research sign.

In the options explored Burley tobacco manifestations of heterosis and transgression are more pronounced than in Virginia tobacco, with whom are insignificant.

The hybridological analysis showed that the number of genes affecting the expression of the width of the leaves is greater in Virginia tobacco, which hinders the team in this type of tobacco.

The coefficient of heritability are low in Burley tobacco and medium ones at Virginia tobacco, that is an indicator for the feature selection process. He will be more effective of crosses of Virginia tobacco in earlier hybrid generations.

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