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INHERITANCE OF YIELD-RELATED MORPHOLOGICAL CHARACTERISTICS IN F_1 TOBACCO HYBRIDS

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Abstract: The aim of this work was to study the mode of inheritance of the number of leaves per stalk and the length, width and area of the leaves from the middle part of the stalk – traits directly related to the yield in the offspring of the first generation. The studies were made with four mother parent tobacco varieties of different types (three of the Prilep type: P-23, П 18-50/4, П 76/86 and one of the Basmak type – MC 8/1), one pollen donor parent Burley B-1-91, and their four F_1 hybrids. The crosses were made in 2018, 2019 and 2020, and the experiment with the parent genotypes and their hybrids was set up in 2019, 2020 and 2021, on a field trial at the Scientific Tobacco Institute – Prilep in a randomized block design with four replications. All appropriate cultural practices were applied during the growing season. The research data indicates that there was no heterosis in the hybrids for the studied traits. The partially dominant mode of inheritance is an indicator of good successive selection of individuals in future generations and quick fixation and stabilization of the traits. The hybrids MS 8/1 x B-1/91 and P 18-50/4 x B-1/91 represent very interesting material for future tobacco breeding activities.

Key words: *Nicotiana tabacum* L., tobacco crosses, hereditary traits, intermediance, dominance, heterosis.

Introduction

One of the most important places in the economy of the Republic of North Macedonia belongs to the production of Oriental aromatic tobacco. The largest part of the tobacco raw material is intended for foreign markets, which shows the importance of this agricultural crop for the country. The participation of our tobacco in the highest quality cigarette brands is a proof of its first-class quality and outstanding pleasant aroma.

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Taking into account the above, studies on tobacco genetics and selection are of great importance. Using the methods of these sciences, breeders try to create more productive and higher quality varieties, better in many traits than the existing ones.

The introduction of new superior varieties in tobacco production will mean an increase in the economic effect of this crop, which will result in an improvement in the standard of producers, as well as an increase in the flow of funds in the country.

The aim of this paper is to study the variability and mode of inheritance of the number of leaves per stalk and the dimensions of the leaves from the middle part of the stalk – traits, directly related to the yield of tobacco, in the F_1 progeny of different tobacco varieties, to reveal a possible heterotic effect, as well as to provide material for further successive tobacco breeding activities.

The inheritance of the number and dimension of tobacco leaves has been studied by many authors, because the value of this trait correlates with the yield. Partial dominance in the inheritance of leaf number per stalk was found in the following studies: Korubin – Aleksoska (2000), in the crosses of three Oriental varieties, Korubin – Aleksoska (2001), in ten Oriental genotypes, Gixhari and Sulovari (2010), in a one-way diallel of eight Oriental genotypes. A different way of inheritance and a weak heterotic effect were found by Aleksoski (2010), in a one-way diallel of three Oriental varieties and one Burley variety. Dyulgerski and Radoukova (2019) found dominance of the parents with a greater number of leaves in seven hybrids of the Burlay type in the F_1 and F_2 generations. Heterosis with a positive heterotic effect on the trait was found in the following studies: Butorac et al. (1999), in F_1 offspring of four Burley varieties, Lalitha et al. (2006), in crosses of six lines and six testers, Dimanov and Dyulgerski (2012), in ten crosses of local and introduced Burley varieties (high heterotic effect is detected), Aleksoski et al. (2013), in hybrids obtained from four parent genotypes of tobacco of different types (the heterosis had a weak heterotic effect), Ramachandra et al. (2015), in hybrids obtained from six lines of different types of tobacco and eight testers.

The partial-dominant and intermediate way of inheriting of the length and width of the leaves from the middle part of the stalk is most common in the studies of: Lee and Chang (1984), in crosses of Korean and Oriental varieties, Legg (1991), in crosses of Burley varieties, Gixhari and Sulovari (2010), in a diallel of eight Oriental genotypes, Dyulgerski and Radoukova (2015), in seven Burley-type crosses and seven Virginia-type crosses, in the creation of parental genotypes of local and introduced origin, etc. The heterotic effect in inheriting the length and width of the leaves was obtained in the following studies: Lalitha et al. (2006), in 36 F_1 hybrids obtained by crossing six lines and six testers (the resulting heterosis had a moderate heterotic effect in both directions), Dyulgerski and Dimanov (2012), in ten crosses of Burley varieties (the best heterotic effect was obtained by the width of the seventh and eighth leaves, which makes heterosis economically more important). Dyulgerski and Radoukova (2015), in seven Burley-type crosses

and seven Virginia-type crosses, of parental genotypes of local and introduced origin (heterosis had no economic significance), Ramachandra et al. (2015), in crosses with six lines of different types of tobacco and eight testers (hybrids had the longest leaf length).

The most common way of inheritance for the area of the leaves is partially dominant and intermediate. Similar results were obtained by: Aleksoski (2010), in a one-way diallel of four parental genotypes of Oriental and Burley origin, Gixhari and Sulovari (2010), in a one-way diallel of eight Oriental genotypes, Aleksoski et al. (2013), in a diallel of four parent genotypes of tobacco of different types, Aleksoski (2018), in a diallel of four Oriental varieties, etc. Positive heterosis in inheriting of leaf area was achieved in the following studies: Korubin – Aleksoska (2000), in diallel of three Oriental and one semi-Oriental variety (a positive heterotic effect appeared in two crosses where one parent was the introduced variety Pobeda-2), Lalitha et al. **(**2006), in hybrids of six lines and six testers (the resulting heterotic effect was low to moderate in both directions), Aleksoski (2010), in a one-way diallel of four parental genotypes – three Oriental and one Burley (the weak heterotic effect was not economically justified), Gixhari and Sulovari (2010), in a diallel of eight parent Oriental genotypes, Aleksoski et al. (2013), in six diallel crosses of four parent tobacco genotypes of different types, Aleksoski (2018), in hybrids of four Oriental varieties.

Material and Methods

As working material, we chose five genotypes from the gene bank of the Science Tobacco Institute - Prilep: Prilep P-23, Prilep P 18-50/4, Prilep P 76/86, Basmak MS 8/1 and Burley B-1/91. As a father, we used the broadleaf variety B-1/91, so with its pollen in 2018, 2019 and 2020 we produced four F_1 hybrids: P-23 x B-1/91 (Photo 6), P 18-50/4 x B-1/91 (Photo 7), P 76/86 x B-1/91 (Photo 8) and MS 8/1 x B-1/91 (Photo 9). The parental varieties and their F_1 hybrids were planted in a randomized block system in four replications, in an experimental field at STI-Prilep, in 2019, 2020 and 2021, on a working area of about 291.6 m^2 or a total area of 655.2 m^2 (working surface and paths). The broadleaf variety and F_1 hybrids were planted at a planting distance of 90 cm (between rows) x 50 cm (between plants in a row), while the Oriental varieties were planted at a planting distance of 45 cm (between rows) x 15 cm (between plants in the row). The number of leaves per stalk and the dimensions of the leaves of the middle band of the stalk (length, width and area) were determined at the full development stage of the plant at the beginning of flowering.

The mode of inheritance of the components was determined by the test-significance of the F_1 generation in relation to the average of both parents, according to Borojevic (1981). Intermediate mode of inheritance (i) occurs when

the mean value of one trait in the hybrid is equal to the parental average. Partial-dominant mode (pd) occurs when the mean value of hybrid offspring approaches one of the parental varieties. Dominance in inheritance (d), positive or negative, occurs when the mean value of the hybrid matches the mean value of one of the parents (+d – when a parent with a higher mean value dominates, -d – when a parent with a lower mean value dominates). Positive heterosis (+h) occurs in a hybrid with a significantly higher value than that of the parent with a higher mean value, while negative heterosis (-h) occurs in a hybrid with a significantly lower value than that of the parent with a lower mean value.

Parental genotypes

Prilep P-23 – Kosta Nikoloski and Milan Mitreski are the authors of this variety. It belongs to the Oriental sun-cured tobacco type Prilep. It is characterized by fir-habitus, a stem 65 cm high, 45–50 seated leaves 20 cm long and 10.5 cm wide (Photo 1), and a semi-spherical, compacted inflorescence with pink flowers. The dried leaves have a golden yellow to light orange color, with an elastic and compact leaf plate. They have a strong, pleasant aroma. The dry leaf mass yield is 2000–2500 kg/ha (Korubin – Aleksoska, 2004).

Prilep P 18-50/4 – creation by Ana Korubin – Aleksoska. The variety belongs to the group of Oriental sun-cured tobacco of the type Prilep. It is characterized by a cylindrical to elongated-elliptical habitus, the height of the stalk with the inflorescence is 85–90 cm. There are about 45 sitting leaves, which are light green with curly edges. The length of the largest leaf is 20–23 cm, and the width is 11–12.5 cm (Photo 2). The inflorescence is spherical with bright pink flowers. The dried leaves are golden yellow to orange, with a moderately pronounced main rib and a thin weakly expressed secondary leaf veins. The yield of dry leaf mass is 2700–2900 kg/ha.

Photo 1. Prilep P-23.

Photo 2. Prilep P 18-50/4.

Prilep P-76/86 is an Oriental sun-cured variety of the Prilep type, created by Dimche Chavkaroski and his collaborators. It is characterized by an elliptic-conical habit. The average height of the stem is 90 cm. This variety has, on average, 60 sessile leaves, the largest of which is 23 cm long and 11.5 cm wide (Photo 3). There are dense hemispherical flower clusters with white to pale pink flowers. It is characterized by a long growing season (from planting to flowering – 85–95 days). The lower dry leaves are yellow, the middle ones are orange, and the upper ones are reddish-orange, with a specific pleasant aroma. The dry mass yield is 3500–4000 kg/ha (Korubin – Aleksoska, 2004).

Basmak MS 8/1 – created by a group of authors, headed by Dusko Boceski. It belongs to the Basmak sun-cured type, which was created from the Jakali type from Greece. The habit is cylindrical to elongated-elliptical with a height of about 110 cm. This variety has an average of 42 leaves with a length of about 21 cm and a width of about 12 cm (Photo 4). The color of the dry leaves is from yellow-orange to red-orange, with a specific pleasant aroma. The dry mass yield is 3500–4000 kg/ha (Korubin – Aleksoska and Ayaz Ahmad, 2016).

Photo 3. Prilep P-76/86.

Photo 4. Basmak MS 8/1.

Burley B-1-9 – Dimche Cavkaroski and his collaborators are the authors of this variety. It belongs to the group of broadleaf air-cured tobacco varieties. It is characterized by a conical habit, a tall stem (185 cm), 30–33 sessile leaves, the largest of which is 60 cm long and 35 cm wide (Photo 5). The flowers are scattered in a panicle with pale pink flowers. Dry leaves have a shiny brown color and a thin texture. The dry mass yield is 3500–4000 kg/ha (Korubin – Aleksoska, 2004).

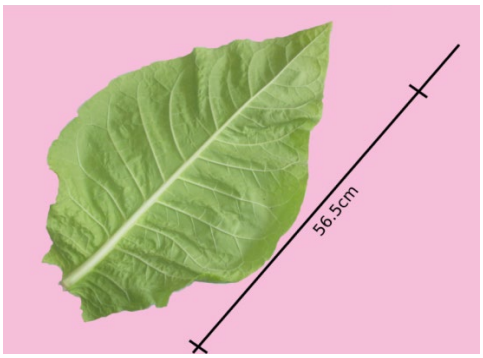

Photo 5. Burley B-1/91.

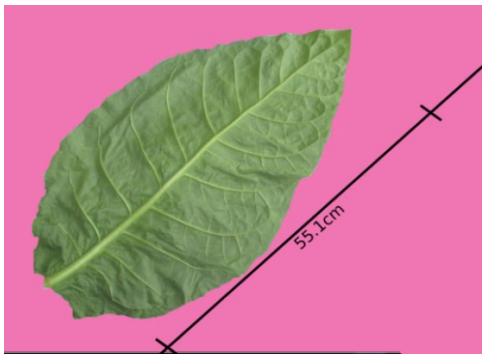

Photo 6. P-23 x B-1/91 (F_1).

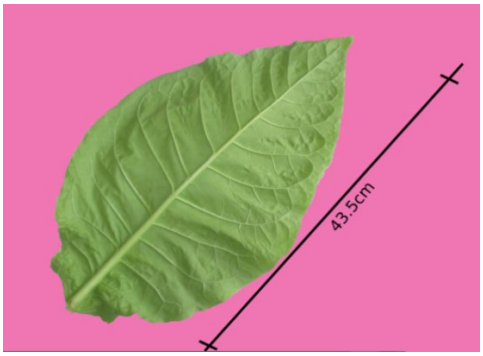

Photo 7. P 18-50/4 x B-1/91 (F_1).

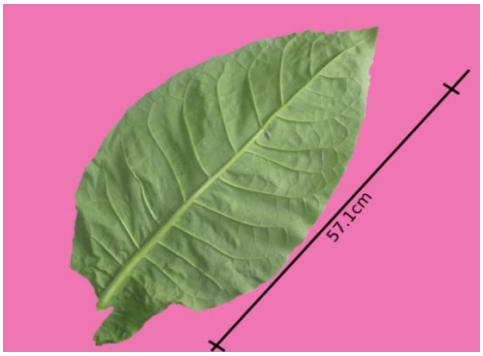

Photo 8. P-76/86 x B-1/91 (F_1).

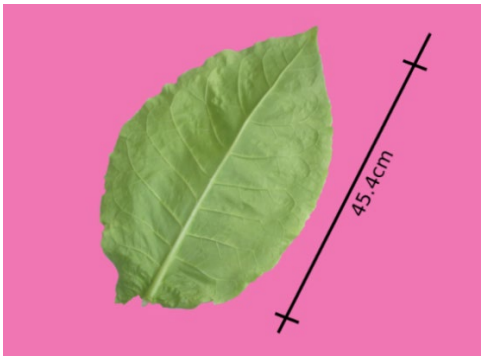

Photo 9. MS 8/1 x B-1/91 (F_1).

Climatic and soil conditions in the study area

As with all plants, environmental factors make changes in a large number of quantitative and qualitative traits in tobacco. However, these changes are differently limited, depending on the type of trait and the degree of its heredity. Therefore, during scientific research on morphological traits from the aspect of selection and genetics, it is necessary to take into account the environmental conditions in which the studies were conducted.

From the data in Table 1, it can be seen that the climate parameters were very close in 2019 and 2020, while they differed drastically in 2021. Basically, in 2021, the temperature was lower from May to September, the humidity was lower, and there was about 43% less rainfall.

Table 1. Weather conditions (by month and averages) – Prilep: 2019, 2020, 2021.

Year	Climatic parameters	May	June	July	August	September	$\overline{x}$
2019	Avg. temp. (°C)	15.77	22.77	24.26	27.39	21.97	22.43
	Min. temp. (°C)	8.00	16.00	14.00	22.00	14.00	14.80
	Max. temp. (°C)	20.00	28.00	29.00	32.00	27.00	27.20
	Humidity (%)	71.30	67.17	59.42	42.61	53.00	58.70
	Precipitation/ rainfall (mm)	124.10	139.90	91.80	9.50	39.50	∑ = 404.80
2020	Avg. temp. (°C)	16.97	20.3	24.77	25.48	23.23	22.15
	Min. temp. (°C)	9.00	14.00	20.00	20.00	15.00	15.60
	Max. temp. (°C)	25.00	27.00	31.00	31.00	30.00	28.80
	Humidity (%)	69.80	70.40	59.20	56.70	49.80	61.20
	Precipitation/ rainfall (mm)	64.90	73.00	97.40	133.90	32.40	∑ = 400.60
2021	Avg. temp. (°C)	14.50	19.00	22.00	22.20	16.80	18.90
	Min. temp. (°C)	8.80	13.00	15.90	16.20	11.60	13.10
	Max. temp. (°C)	19.60	24.20	27.30	27.50	21.90	24.10
	Humidity (%)	61.00	53.00	46.00	45.00	56.00	52.20
	Precipitation/ rainfall (mm)	57.00	34.00	26.00	22.00	35.00	∑ = 174.00

https://en.climate-data.org/europe/macedonia/prilep/prilep-37313/.

Our research was conducted in the experimental field of the Scientific Tobacco Institute in Prilep on a deluvial (colluvial) soil type, without carbonates, characterized by low humus and total nitrogen content, moderately acidic to neutral reaction, low to extremely low security with readily available phosphorus and medium to good potassium supply.

Results and Discussion

Number of leaves per stalk

The study of the number of leaves in tobacco is always present in programs for the creation of new varieties and breeding of existing ones, because it represents an important quantitative characteristic due to its direct connection with the increase in yield.

The lowest number of leaves among the parents was noted in B-1/91 (31.2), and the highest in P-76/86 (54.8), while in hybrids, the lowest number of leaves was observed in P-23 x B-1/91 (31.3), and the highest in P 18-50/4 x B-1/91 (35.6). The standard deviation ranged from 1.2 (P 18-50/4 and P-76/86 x B-1/91) to 2 (B-1/91). The coefficient of variability ranged from 2.2% (P-76/86 x B-1/91) to 4.5 (B-1/91). The fact that the coefficient of variability is low, despite the different environmental conditions of the years, indicates that this trait is highly heritable and it is a varietal characteristic. This coefficient had a value of less than 10, which means that the tested variants are stable and uniform.

The mode of inheritance of this trait was negatively dominant (there was partial dominance only in P 18-50/4 x B-1/91). There was no heterosis.

No heterosis in crosses of Oriental tobacco was found by: Korubin – Aleksoska (2000, 2001), Gixhari and Sulovari (2010).

Table 2 shows the mean values, mode of inheritance, standard deviation, and coefficient of variability for the number of leaves per stalk in parents and F_1 hybrids.

Table 2. Mean values, variability and mode of inheritance of the number of leaves per stalk in parents and F_1 hybrids.

S. No.	Parents and F_1 hybrids		Number of leaves per stalk					
			Years of research			$\overline{x}$	σ (±)	CV (%)
			2019	2020	2021			
			x	x	x			
1.	P-23	P1 (♀)	43.2	45.4	44.8	44.5	1.4	3.5
2.	P 18-50/4	P1 (♀)	45.5	46.3	47.4	46.4	1.2	3.6
3.	P-76/86	P1 (♀)	53.7	54.5	56.2	54.8	1.5	3.6
4.	MS 8/1	P1 (♀)	41.3	40.8	41.3	41.1	1.5	4.1
5.	B-1/91	P2 (♂)	30.4	32.2	30.9	31.2	2.0	4.5
6.	P-23 x B-1/91	F_1	29.5^{-d}	31.5^{-d}	32.2^{-d}	31.3^{-d}	1.5	2.4
7.	P 18-50/4 x B-1/91	F_1	35.0^{pd}	36.2^{pd}	35.5^{pd}	35.6^{pd}	1.5	2.3
8.	P-76/86 x B-1/91	F_1	31.5^{-d}	33.0^{-d}	33.8^{-d}	32.8^{-d}	1.2	2.2
9.	MS 8/1 x B-1/91	F_1	32.1^{pd}	34.5^{pd}	31.5^{-d}	32.7^{-d}	1.7	3.2

Legend: -d – negative dominance, pd – partial dominance.

Length of leaves from the middle part of the stalk

The shape of the leaves is a trait of the variety, but the dimensions are highly variable depending on the environmental factors and the applied agrotechnics.

Among the parental genotypes, the shortest length of the leaves from the middle part of the plant was noted in the variety P 18-50/4 (22.4 cm) and the largest was observed in B-1/91 (56.5 cm). As for hybrids, the shortest leaf length was found in P 18-50/4 x B-1/91 (43.5 cm), and the largest was observed in P-76/86 x B-1/91 (57.1 cm). The standard deviation ranged from 1.8 (P-23 and P 18-50/4 x B-1/91) to 5.4 (B-1/91). The coefficient of variability ranged from 2.8% (P-76/86 x B-1/91) to 9.1% (P-76/86). The coefficient of variability of the hybrids was lower than that of parental genotypes. CV-value was lower than 10, which attests to the stability and uniformity of the variants.

The mode of inheritance of this trait was intermediate, partially dominant and positively dominant. There was no heterosis.

Table 3 shows the mean values, mode of inheritance, standard deviation and coefficient of variability for the leaf length of the middle part of the stalk in parents and F_1 hybrids.

Table 3. Mean values, variability and mode of inheritance of length of the leaves from the middle part of the stalk in parents and F_1 hybrids.

S. No.	Parents and F_1 hybrids		Length of the leaves from the middle part of the stalk					
			Years of research			$\overline{x}$ (cm)	σ (±)	CV (%)
			2019	2020	2021			
			x (cm)	x (cm)	x (cm)			
1.	P-23	P1 (♀)	23.0	23.5	23.2	23.2	1.8	7.3
2.	P 18-50/4	P1 (♀)	23.1	22.2	21.8	22.4	2.0	8.3
3.	P-76/86	P1 (♀)	23.2	24.6	23.4	23.7	2.1	9.1
4.	MS 8/1	P1 (♀)	25.4	24.9	25.3	25.2	2.2	7.1
5.	B-1/91	P2 (♂)	57.5	55.4	56.7	56.5	5.4	6.5
6.	P-23 x B-1/91	F_1	55.3^{+d}	55.8^{+d}	54.2^{+d}	55.1^{+d}	2.7	3.5
7.	P 18-50/4 x B-1/91	F_1	44.3^{i}	43.9^{pd}	42.2^{i}	43.5^{i}	1.8	3.3
8.	P-76/86 x B-1/91	F_1	57.1^{+d}	56.8^{+d}	57.4^{+d}	57.1^{+d}	1.9	2.8
9.	MS 8/1 x B-1/91	F_1	45.2^{i}	46.2^{pd}	44.9^{i}	45.4^{pd}	2.7	2.9

Legend: +d – positive dominance, pd – partial dominance , i – intermediate.

Width of the leaves from the middle part of the stalk

The width of the leaf is a trait of the tobacco variety, on which environmental factors have a limited impact.

The smallest width of the leaves from the middle part of the stalk among the parental genotypes was noted in the variety P-76/86 (11.7 cm), and the largest was observed in B-1/91 (33.6 cm). As for F_1 hybrids, the smallest leaf width was found in MS 8/1 x B-1/91 (29.8 cm), and the largest was noted in P-76/86 x B-1/91 (33.6 cm). The standard deviation ranged from 0.7 (P-23 x B-1/91) to 1.9 (P-23 and P-76/86). The coefficient of variability ranged from 3.3% (P-23 x B-1/91) to 9.5% (P 18-50/4). This coefficient was lower in the hybrids than that in the parental genotypes. In all variants, the CV-value was lower than 10, which is an indicator of uniformity and stability of the studied variants (Table 4).

The mode of inheritance of a trait was partially dominant and positively dominant and no heterotic effect was observed.

The absence of heterosis was found in these studies: Fan and Aucock (1974), in crosses of Meryland varieties, Espino and Gil (1980), in diallel in eight varieties of light tobacco, Lee and Chang (1984), in crosses of Korean and Oriental varieties, Legg (1991), in crosses of Burley varieties, Dyulgerski and Radoukova (2015), in seven Burley crosses and seven Virginia crosses, etc.

Table 4. Mean values, variability and mode of inheritance of the width of the leaves from the middle part of the stalk in the parents and F_1 hybrids.

S. No.	Parents and F_1 hybrids		Width of the leaves from the middle part of the stalk					
			Years of research			$\bar{x}$ (cm)	σ (±)	CV (%)
			2019	2020	2021			
			x (cm)	x (cm)	x (cm)			
1.	P-23	P1 (♀)	11.9	12.3	11.7	12	1.9	7.5
2.	P 18-50/4	P1 (♀)	11.5	12.5	12.3	12.1	1.4	9.5
3.	P-76/86	P1 (♀)	11.3	12.2	11.7	11.7	1.9	8.2
4.	MS 8/1	P1 (♀)	12.4	12.8	12.6	12.6	0.9	7.3
5.	B-1/91	P2 (♂)	33.1	34	33.8	33.6	1.7	5.8
6.	P-23 x B-1/91	F_1	29.6 ^{pd}	30.7 ^{pd}	31.4 $^{+d}$	30.6 ^{pd}	0.7	3.3
7.	P 18-50/4 x B-1/91	F_1	30.6 $^{+d}$	33.6 $^{+d}$	34.2 $^{+d}$	32.8 $^{+d}$	1.2	4.6
8.	P-76/86 x B-1/91	F_1	30.8 $^{+d}$	34.5 $^{+d}$	35.5 $^{+d}$	33.6 $^{+d}$	1.0	4.5
9.	MS 8/1 x B-1/91	F_1	28.1 ^{pd}	30.4 ^{pd}	28.1 ^{pd}	29.8 ^{pd}	1.1	5.4

Legend: +d – positive dominance, pd – partial dominance.

Leaf area of the middle part of the stalk

The smallest leaf area from the middle part of the stalk in the parental genotypes was found in the variety P 18-50/4 (170.38 cm^2), and the largest in B-1/91 (1210.54 cm^2), while in F_1 hybrids the smallest leaf area was noted in MS 8/1 x B-1/91 (801.68 cm^2), and the largest in P-76/86 x B-1/91 (1294.75 cm^2). The standard deviation and the coefficient of variability were not calculated for this

trait, because the values were obtained by applying the formula for the area, where the mean values of the length and width of the leaves by repetitions were entered.

The mode of inheritance of this trait was intermediate, partially dominant and positively dominant. There was no heterosis.

Table 5 shows the mean values and mode of inheritance for the leaf area of the middle part of the stalk in the parents and F_1 hybrids.

Table 5. Inheritance of the leaf area from the middle part of the stalk in F1 hybrids.

S. No.	Parents and F_1 hybrids		Leaf area from the middle part of the stalk			
			Years of research			$\overline{x}$ (cm^2)
			2019	2020	2021	
			x (cm^2)	x (cm^2)	x (cm^2)	
1.	P-23	P1 (♀)	173.909	183.662	172.473	175.421
2.	P 18-50/4	P1 (♀)	168.794	176.324	170.376	163.679
3.	P-76/86	P1 (♀)	166.576	190.696	173.96	170.166
4.	MS 8/1	P1 (♀)	200.126	202.515	202.553	198.55
5.	B-1/91	P2 (♂)	1209.33	1196.84	1210.54	1206.24
6.	P-23 x B-1/91	F_1	1040.07^{pd}	1088.48^{+d}	1081.37^{+d}	1071.32^{pd}
7.	P 18-50/4 x B-1/91	F_1	861.34^{pd}	937.24^{pd}	917.03^{pd}	906.59^{pd}
8.	P-76/86 x B-1/91	F_1	1117.46^{+d}	1245.13^{+d}	1294.75^{+d}	1219.05^{+d}
9.	MS 8/1 x B-1/91	F_1	807.03^{i}	892.41^{pd}	801.68^{i}	859.65^{pd}

Legend: +d – positive dominance, pd – partial dominance , i – intermediate.

Conclusion

Regarding our studies on the parental genotypes and their F_1 hybrids, as well as the mode of inheritance of the number of leaves per stalk and the leaf sizes from the middle part, we have drawn the following conclusions:

- The varieties that are the subject of these studies were characterized by a high degree of stability and uniformity, as a result of their homozygosity. The parents in the role of mothers and the parent in the role of father differed significantly in the investigated traits.
- The inheritance of the number of leaves per stalk was negatively dominant (it was only partially dominant in P 18-50/4 x B-1/91).
- Intermediance, partial dominance and positive dominance were found in the inheriting of the length of the leaves from the middle part of the stalk.
- There was partial dominance and positive dominance in the inheriting of the width of the leaves from the middle part of the stalk.
- The leaf area of the middle part of the stalk was inherited by intermediance, partial dominance and positive dominance.

- There was no occurrence of a heterotic effect in the F_1 population in all studied morphological traits in the three years of study.
- Within these investigations, we obtained F_1 hybrid offspring that will serve as material for further breeding activities.
- The results obtained within these studies are useful achievements in the genetics and tobacco breeding, and they are of utmost importance for science and practice in the process of creating new superior varieties.

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NASLEĐIVANJE MORFOLOŠKIH KARAKTERISTIKA KOJE SE ODNOSE NA PRINOS KOD F_1 HIBRIDA DUVANA

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R e z i m e

Cilj rada je bio proučavanje načina nasleđivanja broja listova po stabljici i dužine, širine i površine listova srednjeg pojasa – morfološke osobine direktno vezane za prinos kod potomaka F_1 generacije. Istraživanja su obavljena sa četiri sorte duvana u ulozi majke različitih vrsta (tri sorte vrste prilep: P-23, P 18-50/4, P 76/86 i jedna sorta vrste basmak – MS 8/1), jednim donorom polena – berlej B-1-91, i njihova četiri F_1 hibrida. Ukrštanja su rađena 2018, 2019. i 2020. godine, a terenski ogledi sa roditeljskim genotipovima i njihovim ukrštanjima postavljeni su 2019, 2020. i 2021 godine, na oglednom polju u Naučnom institutu za duvan – Prilep, prema randomizovanom blok sistemu u četiri ponavljanja. Tokom vegetacionog perioda primenjivane su sve uobičajene agrotehničke mere. Podaci istraživanja ukazuju na to da kod hibrida nema pojave heterozisa za proučavana svojstva. Parcijalno dominantan način nasleđivanja pokazatelj je dobre sukcesivne selekcije jedinki u budućim generacijama i brzog fiksiranja i stabilizacije osobina. Hibridi: MS 8/1 x B-1/91 i P 18-50/4 x B-1/91 predstavljaju veoma zanimljiv materijal za buduće aktivnosti selekcije duvana.

Ključne reči: *Nicotiana tabacum* L., hibridi duvana, nasledne osobine, intermedijarnost, dominantnost, heterozis.

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