

# STUDY ON THE MODE OF INHERITANCE OF LEAF NUMBER PER STALK AND SIZE OF THE MIDDLE BELT LEAF IN TOBACCO VARIETIES OF VARIOUS TYPES AND THEIR F1 HYBRIDS

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# INTRODUCTION

IMPORTANCE OF TOBACCO PRODUCTION IN THE ECONOMY OF THE REPUBLIC OF NORTH MACEDONIA

Tobacco production occupies one of the most important places in the economy of the Republic of North Macedonia. The most of tobacco raw material is intended for foreign markets, which shows the importance of this agricultural crop for the state. Our region is very suitable for production of small-leaf oriental aromatic tobacco, which is integral part of the highest quality cigarette brands.

IMPORTANCE OF INVESTIGATIONS IN GENETICS AND TOBACCO SELECTION

Keeping the above in mind, the investigations in genetics and tobacco selection are of great importance. Using the methods of these sciences, the breeders try to create more productive and better quality varieties, exceeding the existing ones in many traits.

AIM OF THE STUDY

The aim of this paper is to study the variability and mode of inheritance of leaf number per stalk and size of the middle belt leaf (traits that are directly related to tobacco yield) in tobacco varieties of diverse types, to detect possible heterotic effect in  $F_1$  offspring and to provide basic selection material for further successive breeding activity.

# MATERIAL AND METHODS OF WORK

Five varieties from the large assortment of the Scientific Tobacco Institute – Prilep were used as parental genotypes: Prilep P-23 (Photo 1), Prilep P 8-9/80 (Photo 2), Floria FL-7 (Photo 3), Samsun S-1 (Photo 4) and Virginia MV-1 (Photo 5).

The large-leaf flue-cured variety Virginia MV-1 was used as a paternal parent, so in 2017 four F1 hybrids were made with its pollen: P-23 x MV-1 (Photo 6), P 8-9/80 x MV-1 (Photo 7), FL-7 x MV-1 (Photo 8) and S-1 x MV-1 (Photo 9).

Parental varieties and F1 hybrids were tested in a randomized block design with four replications, in the experimental field of STI-Prilep, in 2018.

Leaf number per stalk and size of the middle belt leaves (length, width and area) were determined in the stage of full growth of the plant, at the beginning of flowering.

Mode of inheritance of the traits was determined on the basis of test-significance of F1 generation in relation to the average of both parents, according to Borojevic (1981).



Photo 1. P-23

Photo 2. P-8-9/80

Photo 3. FL-7

Photo 4. S-1

Photo 5. MV-1



Photo 6. P-23 x  
MV-1



Photo 7. P-8-9/80 x  
MV-1







Photo 8. FL-7 x  
MV-1



Photo 9. S-1 x  
MV-1

# RESULTS AND DISCUSSION

## NUMBER OF LEAVES PER STALK

-  The number of leaves in tobacco is an important quantitative trait, directly connected to the increase of yield, due to which attracts great interest among breeders and is always present in programs for creating new varieties and breeding the existing ones.
-  The lowest number of leaves among the parents was recorded in FL-7 (21.6) and the highest in P 8-9/80 (53.9).
-  Among F1 hybrids, the lowest leaf number was counted in P-23 x MV-1 (32) and the highest in P 8-9/80 x MV-1 (42.2).
-  No heterosis was found.




# RESULTS AND DISCUSSION

## SIZE OF THE MIDDLE BELT LEAF

- **The form of the leaves is varietal characteristic, but the size is very variable depending on the environmental factors and the applied agrotechnics.**
- **Among parental genotypes, the shortest length, the smallest width and area of the middle belt leaf was observed in variety P 8-9/80 (22.7 cm, 10.8 cm, 156 cm<sup>2</sup>), and the largest length, the greatest width and the biggest area in MV-1 (49.7 cm, 32.2 cm, 1017.2 cm<sup>2</sup>).**
- **Among F1 hybrids, P 8-9/80 x MV-1 is characterized with the shortest leaf length and width, and the smallest leaf area (41.6 cm, 24 cm, 635.2 cm<sup>2</sup>), and FL-7 x MV-1 with the largest leaf length (44.3 cm) and S-1 x MV-1 with the greatest width (30.1 cm) and with the biggest area (841.26 cm<sup>2</sup>).**



# RESULTS AND DISCUSSION

-  The standard deviation for number of leaves per stalk ranges from 0.9 (MV-1) to 2.5 (P 8-9/80), for length of the middle belt leaf from 1 (P-23 x MV-1) to 2.5 (S-1 x MV-1) and 2.6 (MV-1) and for width of the middle belt leaves from 0.6 (P-23 x MV-1) to 2.5 (P 8-9/80).
-  The value of the coefficient of variation of investigated variants is less than 10, which is a good indicator of their uniformity and stability.
-  In inheritance of this traits all modes of inheritance are present and no heterotic effect is observed.

**Table 1. shows the average values for number of leaves and size of leaves from the middle belt of the parents and the F1 hybrids and the mode of inheritance, and Figure 1 shows the quantitative traits in the variants.**



# RESULTS AND DISCUSSION

**TABLE 1. MODE OF INHERITANCE OF QUANTITATIVE TRAITS IN TOBACCO GENOTYPES AND THEIR F1 HYBRIDS**

S.No	Genotypes and F1 hybrids		Quantitative traits			
			Number of the leaves per stalk	Middle belt leaf ( $\bar{X}$ )		
				Length (cm)	Width (cm)	Area (cm <sup>2</sup> )
1.	P-23	P1(♀)	46.0	24.7	12	188.3
2.	P8-9/8	P1(♀)	53.9	22.7	10.8	156.0
3.	FL-7	P1(♀)	21.6	33.7	21.3	456.6
4.	S-1	P1(♀)	41.9	25.0	13.9	221.6
5.	MV-1	P2(♂)	28.3	49.7	32.2	1017.2
6.	P-23xMV-1	F1	32.0 <sup>pd</sup>	43.1 <sup>pd</sup>	25.6 <sup>pd</sup>	701.0 <sup>l</sup>
7.	P8-9/80xMV-1	F1	42.2 <sup>i</sup>	41.6 <sup>pd</sup>	24.0 <sup>l</sup>	635.2 <sup>l</sup>
8.	FL-7xMV-1	F1	39.1 <sup>+d</sup>	44.3 <sup>pd</sup>	24.6 <sup>pd</sup>	692.4 <sup>l</sup>
9.	S-1xMV-1	F1	35.9 <sup>i</sup>	44.0 <sup>pd</sup>	30.1 <sup>+d</sup>	841.3 <sup>pd</sup>

# RESULTS AND DISCUSSION

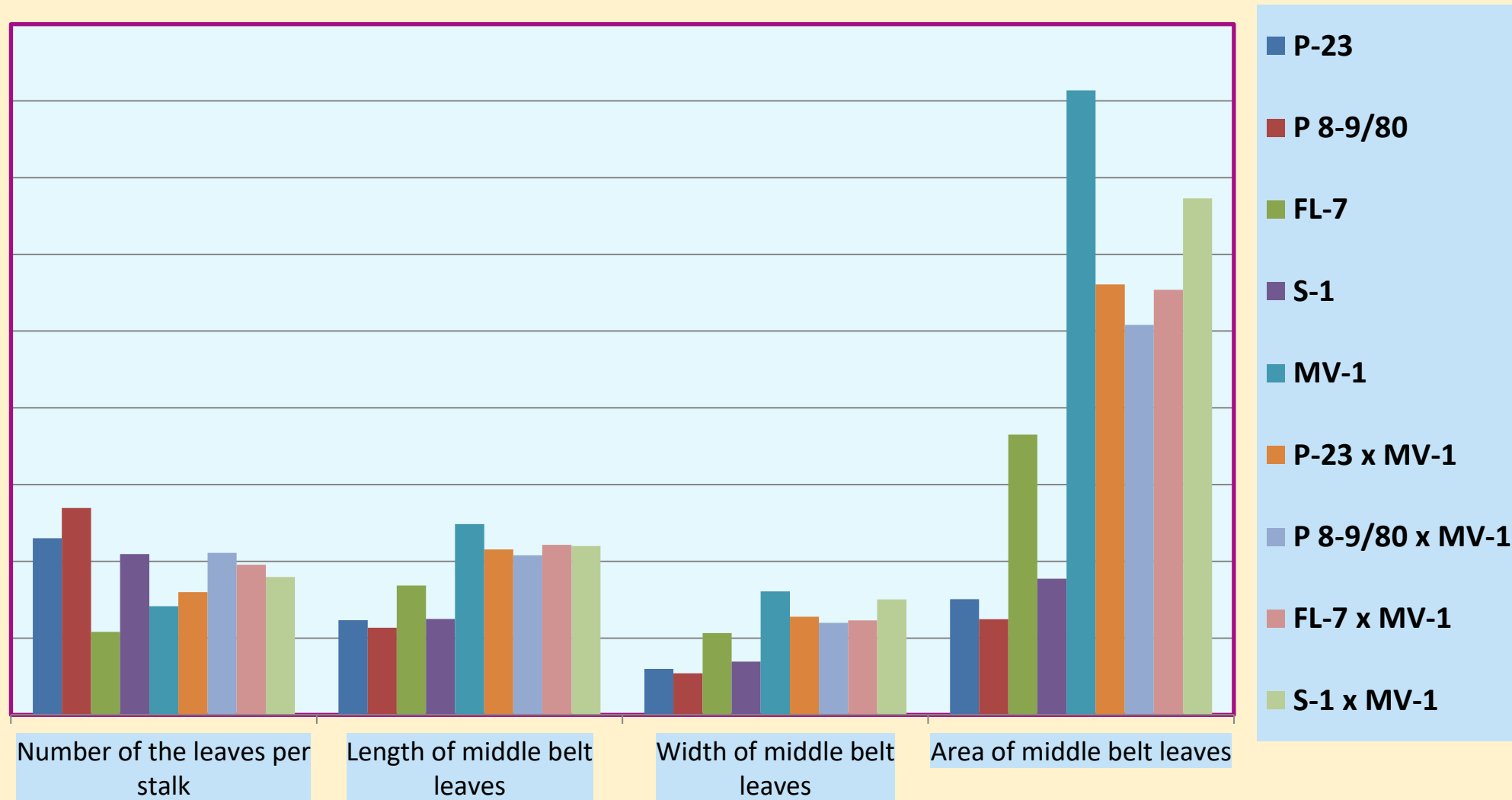


FIGURE 1. DISPLAY OF THE NUMBER OF LEAVES PER STALK AND SIZE OF THE LEAVES FROM THE MIDDLE BELT IN PARENTAL GENOTYPES AND THEIR F1 HYBRIDS

# CONCLUSIONS

From our investigations on parental genotypes and their F<sub>1</sub> hybrids, as well as the mode of inheritance of number of leaves per stalk and size of the leaves from the middle belt, the following conclusions can be drawn:

- The varieties included in these investigations differ significantly from each other and are characterized by a high degree of stability and uniformity, as a result of their homozygosity.
- Inheritance of the trait leaf number per plant is intermediate, partially dominant and dominant. In the hybrid FL-7 x MV-1, the parent with a greater number of leaves is dominant.
- In inheritance of the length of middle belt leaf, partial dominance is observed in both directions of dominance.
- For the trait width of the middle belt leaf, all modes of inheritance are present (intermediate, partial dominance and dominance). In the hybrid S-1 x MV-1 the parent with broad leaves is dominant.

# CONCLUSIONS

- Intermediate mode prevails in inheritance of the area of the middle belt leaf, with the exception of S-1 x MV-1 where partial dominance occurs.
- No heterotic effect occurs in  $F_1$  population in all morphological traits studied.
- In this investigation we obtained  $F_1$  hybrid offspring, by which we provided material for further selection activity.
- The results obtained in the study present a useful achievement in the field of genetics and tobacco selection and they are of primary importance for science and practice in the process of creation of new superior varieties.