

## LEAF NUMBER AND SIZE IN SOME VARIETIES OF PRILEP TOBACCO

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### ABSTRACT

Number and size of leaves are morphological properties that have a major role in determination of the type or variety of tobacco. They are varietal characteristics and also indicators of tobacco yield. The aim of this paper is to present data on these two properties in some varieties of Prilep tobacco currently produced in the Republic of Macedonia. Field trials were set in 2009 and 2010 at Tobacco Institute - Prilep, in four replications, with the following varieties: P-23 (check), P 12-2/1, NS-72, P-66-9/7, P-79-94 and Prilep Basma 82. The highest average leaf number was recorded in Prilep Basma 82 (92 leaves) and the lowest in P 12-2/1 (39 leaves).

Referring to leaf size (length and width of the middle belt leaves), the highest leaf length was observed in P 12-2/1 (27,6 cm), and the lowest in Prilep Basma 82 (20,8 cm); the highest leaf width was recorded in NS-72 (13,4 cm) and the lowest in Prilep Basma 82 (10,7 cm).

**Keywords:** Prilep tobacco, type, varieties, leaf number, leaf size

### БРОЈОТ И ГОЛЕМИНАТА НА ЛИСТОВИТЕ КАЈ СОРТИ ТУТУН ОД ТИПОТ ПРИЛЕП

Од морфолошките својства што го детерминираат типот на тутунот или сортата во еден тип, важно место имаат бројот и големината на листовите. Тие се сортни карактеристики, воедно и показатели на приносот кај тутунот.

Целта на овој труд е да ги прикажеме двете својства кај сорти од типот прилеп што се актуелни во производството во Република Македонија. Затоа, во 2009 и 2010 година во Научниот институт за тутун - Прилеп, поставивме полски опит во четири повторувања со следниве сорти: П-23 (контрола), П 12-2/1, НС-72, П-66-9/7, П-79-94 и прилеп басма 82.

Од испитувањата, утврдивме дека просечно со најголем број листови се карактеризира прилеп басма 82 (92 листа), а со најмал П 12-2/1 (39 листови).

Што се однесува до големината (должина и широчина на листовите од средниот појас), установивме дека со најдолги листови е П 12-2/1 (27,6 cm), а со најкуси е прилеп басма 82 (20,8 cm), односно најшироки листови има НС-72 (13,4 cm), а најтесни прилеп басма 82 (10,7 cm).

**Клучни зборови:** тип прилеп, сорти, број на листови, големина на листовите

## INTRODUCTION

Tobacco is a strategic crop in the agricultural sector of the Republic of Macedonia. It also has a major social importance, as a main economic activity of around 35000 families.

Tobacco is an industrial plant that is grown because of the leaves. In R. Macedonia, oriental aromatic types (Prilep, Yaka, Basmak and Djebel) are grown on over 95% of the area under tobacco, but the leading position belongs to Prilep tobacco.

The properties by which different varieties are recognizable and which determine their yield and quality are divided into three groups: morphological, biological and qualitative. Most important morphological properties are leaf number and size (length and width). These properties in some varieties of Prilep tobacco were the subject of our two-years investigation. Atanasov (1972) reported that the number of leaves in a select-

ed variety is a constant parameter. Uzunoski (1985) reported that leaf number varies depending on agro-ecological conditions and is important characteristic which largely determines the tobacco yield. According to the author, leaf number in different varieties varies from 10 to 70.

Leaf size (length and width) is another important characteristic in determination of tobacco quality. In assessment of dry tobacco, leaves which length exceeds 20 cm are classified as additional tobacco because they have very little or no aroma. According to Tomić (1973), the length of middle belt leaves in Prilep tobacco during the drying process is reduced by 10.73% and the width by 20.99%. The author points out that tobacco plants that are fertilized (especially with nitrogen fertilizers) and irrigated, show greater reduction (contraction) of leaves after drying.

## MATERIAL AND METHODS

Investigations included the following six varieties of Prilep tobacco: P-23 Ø, P 12-2/1, NS-72, P-66-9/7, P-79-94 and Prilep Basma 82 (Fig. 1 - 6). They are listed on the National List of Varieties in the group of aromatic oriental type Prilep, which is highly esteemed on the world tobacco market. For a longer period they have been grown in a mass production in the country, some of them are grown on small areas even today and are still valued because of their quality and are used in the selection and breeding. In recent years, the most common variety of Prilep tobacco in the regions where oriental tobacco is produced is P-66-9/7 (over 90%).

The trial was set up in the field of Scientific Tobacco Institute - Prilep in 2009 and 2010, on deluvial-colluvial soil with four replica-

tions. Tobacco was planted manually, at a spacing of 40 x 12 cm and fertilized with 250 kg/ha of NPK fertilizer (8:22:20), using traditional cultural practices to ensure normal growth and development of plants. Tobacco was irrigated three times in n 2009 and twice in 2010 (due to heavy rainfall), with irrigation rate of 250 m<sup>3</sup> water per hectare. Investigations were performed at the stage of full flowering of tobacco, by standard methods, i.e. the average leaf number per stalk was determined on fifteen randomly selected plants of each variety from each replication, while leaf length and width were measured on the middle belt (the belt with the largest leaves). The length was measured from the base to the top and the width on the second third of the leaf because in this part it is the widest.



Photo 1. Prilep P-23



Photo 2. Prilep P 12-2/1



Photo 3. Prilep NS-72



Photo 4. Prilep P 66-9/7



Photo 5. Prilep P 79-94

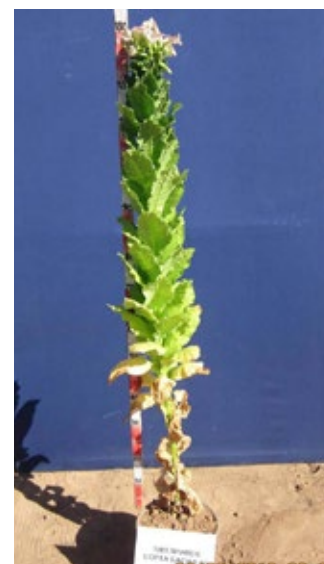


Photo 6. Prilep Basma 82

## RESULTS AND DISCUSSION

The investigation results are presented in tables, separately for each trait.

### Leaf number per stalk

The number of leaves on a plant varies from stalk to stalk, but not significantly, so that this is the most stable trait and it presents a variety characteristic.

Korubin-Aleksoska (2004) reported that the number of leaves in different varieties of Prilep tobacco ranges as follows: from 34 to 38 in P 12-2 /1, 38 to 42 in P-84, 45 to 50 in P-23

and 50 to 55 in P-79-94.

Dimitrieski and Miceska (2011) noted that the average number of leaves per stalk in variety P-66-9/7 was 52.

In our investigations both in 2009 and 2010, all varieties had almost the same number of leaves. The obtained results are presented in Table 1.

**Table 1. Leaf number per stalk**

Variety	Year	Average leaf number	Difference		Average 2009/2010	Difference	
			Abs.	Rel.		Abs.	Rel.
P-23 Ø	2009	56	/	100	55,5	/	100
	2010	55	/	100			
P 12-2/1	2009	39	-17	69,64	39,5	-16	71,17
	2010	40	-15	72,73			
NS-72	2009	43	-13	76,79	43,5	-12	78,38
	2010	44	-11	80,00			
P-66-9/7	2009	55	-1	98,21	55,0	-0,5	99,10
	2010	55	/	/			
P-79-94	2009	57	+1	101,79	58,0	+2,5	104,50
	2010	59++	+4	107,27			
P. Basma 82	2009	93+++	+37	166,07	92,5	+37	166,67
	2010	92+++	+37	167,27			

2009  
 0,05=3,6 leaves +  
 LSD 0,01=4,9 leaves ++  
 0,001=6,8 leaves +++

2010  
 0,05=2,7 leaves+  
 LSD 0,01=3,7 leaves ++  
 0,001=5,2 leaves +++

The table shows that each variety has its characteristic number of leaves which is almost the same in both years. It means that these are genotypically different varieties, i.e. that they have their own genetic code. The average number of leaves in the period of investigation ranged from 55.5 in the check, 55.0 in P-66-9/7, 58 in P-79-94 to 92.5 in Prilep Basma 82,

while lower leaf number compared to the check (P-23) was obtained in varieties NS-72 (43.5) and P 12-2/1 (39.5). Statistical analysis of the results showed highly significant differences in Prilep Basma 82 in both years of investigation, whereas P-79-94 showed highly significant differences compared to the check only in 2010.

#### Length of the largest leaf on the stalk

The length of the leaves in oriental aromatic types of tobacco is an important parameter in assessment of quality of the raw tobacco. Measurement of size was performed on fresh (green) tobacco leaves. In the process of drying, the size of tobacco leaf (especially in irrigated and fertilized varieties), reduces up to 30%. Leaf length primarily depends on the type and variety of tobacco, but it is highly affected by soil and climate conditions and applied cultural practices during production.

Korubin-Aleksoska (2004) found that the average length of the middle belt leaf in Prilep tobacco varieties ranged from 20 cm in P-23 and P-84, 22,5 cm in P 12- 2 / 1 and 23 cm in P-79-94.

Mitreski (2005) reported the following average lengths of the largest leaf: 25,8 cm in P-10-3/2, 25,0 cm in P-23 and 24,7 cm in P-84.

The results obtained in our investigations on this trait are presented in Table 2.

**Table 2. Length of the largest leaf on the stalk in cm**

Variety	Year	Average leaf number	Difference		Average 2009/2010	Difference	
			Abs.	Rel.		Abs.	Rel.
P 12-2/1	2009	26,6	+2,9	112,24	27,7	+3,1	112,60
	2010	28,7+++	+3,3	112,99			
NS-72	2009	27,0	+3,3	113,92	26,1	+1,5	106,10
	2010	25,1	-0,3	98,82			
P-66-9/7	2009	25,1	+1,4	105,91	24,3	-0,3	98,78
	2010	23,4	-2,0	92,13			
P-79-94	2009	23,5	-0,2	99,16	22,8	-1,8	92,68
	2010	22,1	-3,3	87,00			
P. Basma 82	2009	20,8	-2,9	87,76	20,8	-3,8	84,55
	2010	20,8	-4,6	81,89			

2009  
0,05=n.s.  
LSD 0,01=n.s.  
0,001=n.s.

2010  
0,05=1,4 cm  
LSD 0,01=2,0 cm  
0,001=2,7 cm

According to Table 2, the length of the largest leaf in the check (P-23) was 24,6 cm (average of two years). Higher length of the middle belt leaves was obtained in NS-72 (26,1 cm) and P 12-2/1 (27,7 cm), which in this case could affect the assessment of tobacco during purchase. Shorter leaves compared to the check were measured in varieties P-66-

9/7 (24,3) and P-79-94 (22,8 cm), while the lowest length of the middle belt leaves was obtained in Prilep Basma 82 (20,8 cm). Statistically processed values for this trait in 2009 showed no significant differences, and in 2010 highly significant difference compared to the check was observed in P 12-2/1.

#### Width of the largest leaf on the stalk

The width and length of the leaves depends on soil and climatic conditions and agrotechnical practices applied in tobacco cultivation. In oriental aromatic tobaccos, too wide leaves are not desirable because they increase the percentage of stalk. It is considered that the length-width ratio in the middle belt leaves should be in the range from 1,8 to 2,3:1.

Korubin-Aleksoska (2004) reported that the width of the middle belt leaf in Prilep to-

bacco varieties ranged from 10 cm in P-84, 10.5 in P-23, 11 cm in P 12-2/1 to 12 cm in P-79-94.

Dimitrieski and Miceska (2005), in their investigations of Prilep tobacco lines and varieties, found that the width of the largest leaf in P-23 was 11,7 cm and in P 12-2/1 it was 12,4 cm. The average values obtained in our investigations are presented in Table 3.

**Table 3. Width of the largest leaf on the stalk in cm**

Variety	Year	Average leaf number	Difference		Average	Difference	
			Abs.	Rel.	2009/2010	Abs.	Rel.
P 12-2/1	2009	11,3	+0,2	101,80	11,9	+0,4	103,48
	2010	12,5	+0,6	105,04			
NS-72	2009	13,7	+2,6	123,42	13,4	+1,9	116,52
	2010	13,1+	+1,2	110,08			
P-66-9/7	2009	11,4	+0,3	102,70	11,5	/	/
	2010	11,6	-0,3	97,48			
P-79-94	2009	11,3	+0,2	101,80	11,1	-0,4	96,52
	2010	10,9	-1,0	91,60			
P. Basma 82	2009	11,0	-0,1	99,10	10,7	-0,8	93,04
	2010	10,4	-1,5	87,39			

2009  
0,05=n.s.  
LSD 0,01=n.s.  
0,001=n.s.

2010  
0,05=1,0 cm  
LSD 0,01=1,3 cm  
0,001=1,8 cm

The table shows that an average width of the largest leaf on the stalk (2009/2010) was 11,5 cm both in the check variety and in P-66-9/7. Wider leaves were measured in P 12-2/1 (11,9 cm) and NS-72 (13,4 cm), and narrower leaves compared to the check were measured in Prilep Basma 82 (10,7

cm) and P-79 -94 (11,1 cm).

No statistically significant differences for this trait were observed in 2009, while in 2010 significant differences compared to the check were determined in variety NS-72.

## CONCLUSIONS

The two-year investigations lead to the following conclusions:

The number and size of leaves in the oriental aromatic tobacco type Prilep are major morphological (quantitative) traits which determine the yield and quality.

The average leaf number in the investigated varieties ranged from 39 in P 12-2/1 and 55 in the check variety P 23 to 92 in Prilep Basma 82.

The length of the largest leaf on the stalk ranged from 20,8 cm in Prilep Basma 82 to 27,7 cm in P 12-2/1. Considering the contraction of leaves during the drying process (20 to 30%), we believe that varieties P 12-2/1 and NS-72 (with larger middle belt leaves) will be classified as oriental aromatic tobaccos.

The lowest leaf width was measured in Prilep Basma 82 (10,7 cm) and the highest width in NS-72 (13,4 cm). In the check variety, the width of the largest leaf was 11,5 cm, the same as in P-66-9/7; in P 12-2/1 the largest leaf width reached 11,9 cm and in P- 79-94 it was 11,1 cm.

Tobacco is a flexible plant which can, to some extent, modify its quantitative traits under the influence of soil and climate conditions and applied cultural practices, but nonetheless, it can be stated that the number and size of leaves are varietal characteristics. The investigated varieties are stable, different, with their own genetic constitution which makes them recognizable in the mass production, as representatives of Prilep tobacco.

## REFERENCES

1. Атанасов Д., 1972. Тютюнопроизводство. ИТТИ, Пловдив.
2. Димитриески М., Мицеска Г., 2005. Создавање, испитување и воведување на ориенталски сорти на тутун во одделни реони на Р. Македонија. Извештај за проектните задачи на научноистражувачката работа во 2004 година, Универзитет „Св. Климент Охридски“ - Битола, ЈНУ Институт за тутун - Прилеп, стр. 13-17, Прилеп.
3. Димитриески М., Мицеска Г., 2011. Нова и попродуктивна сорта од тутунот тип прилеп. Тутун/Tobacco Vol. 61, No. 1-6, pp. 59-62, Прилеп.
4. Корубин-Алексоска А., 2004. Сорти тутун од Институтот за тутун - Прилеп. ЈНУ Институт за тутун - Прилеп, Универзитет „Св. Климент Охридски“ - Битола.
5. Митрески М., 2005. Наследување на поважните морфолошки и биолошки својства и содржината на никотин кај F1 хибридите од некои сорти тутун. Магистерски труд, Универзитет „Св. Кирил и Методиј“ - Скопје, Факултет за земјоделски науки и храна - Скопје.
6. Tomić Lj., 1973. Tehnologija obrade duvana. Poljoprivredni fakultet, Beograd.
7. Узуноски М., 1985. Производство на тутун. Стопански весник, Скопје.