

## **RATIO BETWEEN GREEN AND DRY MASS IN SOME TOBACCO VARIETIES OF THE TYPE PRILEP**

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### **ABSTRACT**

Investigations on the green/dry mass ratio were carried out in 2009 and 2010 in the trial field of Tobacco Institute-Prilep, with six varieties of the type Prilep: P-23, P 12-2/1, NS-72, 66-9/7, P-79-94 и Prilep Basma 82. The ratios for the two years ranged from 6.11:1 to 6.95:1, or 6,64:1 in average. Namely, the variety Prilep 66-9/7 had an average value of 6,11:1 and the Prilep Basma 82 variety achieved 6,58:1. The other varieties showed much higher average values compared to the check, in the following range: Prilep NS-72 - 6,77:1, Prilep P-79-94 - 6,86:1 and P 12-2/1 showed the highest average ratio - 6,95:1. The ratio between green and dry mass can be also expressed as plant productivity. In our investigations, the highest productivity among varieties was observed in P 66-9/7 and the lowest in Prilep P 12-2/1.

**Key words:** tobacco, Prilep, P-23, P-12-2/1, NS-72, P 66-9/7, P-79-94, Prilep Basma 82

## **СООДНОС НА КОЛИЧЕСТВО ЗЕЛЕН И СУВ ТУТУН КАЈ НЕКОИ СОРТИ ОД ТИПОТ ПРИЛЕП**

Истражувањата на соодносот зелен/сув тутун се вршени во 2009 и 2010 година на опитното поле од Институтот за тутун Прилеп, кај шест сорти на тутун од типот прилеп и тоа: прилеп П-23, П 12-2/1, НС-72, 66-9/7, П-79-94 и прилеп басма 82. Просечните двегодишни вредности се движат во мал сооднос од 6,11:1 до 6,95:1, или просечно 6,64:1. Имено сортата прилеп П 66-9/7 има просечна вредност од 6,11:1, сортата прилеп басма 82 од 6,58:1. Останатите сорти на тутун покажале малку поголеми просечни вредности од контролата и тоа прилеп НС-72 од 6,77:1, потоа сортата прилеп П-79-94 со 6,86:1 и со најголем просечен сооднос се карактеризира сортата П 12-2/1 со вредност од 6,95:1. Соодносот на зелен и сув тутун може да се презентира и како продуктивност на растенијата. При што со најголема продуктивност од испитуваните сорти на тутун се одликува сортата прилеп П 66-9/7, а со најмала сортата прилеп П 12-2/1.

**Клучни зборови:** тутун, прилеп, П-23, П 12-2/1, НС-72, П 66-9/7, П-79-94, прилеп басма 82

## INTRODUCTION

Water is specific chemical compound which is found in highest quantities in the composition of living plants. The quantity of water in young tobacco leaves and parts amounts from 80% to 94%. Uzunoski (1985) reported that in the leaves at technical maturity, the water amount reaches up to 75 - 90%, depending on the variety, conditions of growing and insertions. The quantity of water in cured leaves was 6 – 10% of the total weight of the leaf.

The amount of water declines from the lower towards the upper insertions. All biochemical processes taking place in tobacco leaves depend on water. It is a media in which all physiological processes of the living cell take place, i.e. formation of organic matter in the process of photosynthesis depends on the water content. The cell cytoplasm contains large amounts of water, which is not only a solvent of organic and inorganic substances but a highly important structural component.

According to Baylov D. and Popov M. (1965), tobacco leaves contain about 80% of water and 20% of dry matter. The highest percentage of water is found in the leaves from lower insertions (85-86%), and the lowest in the leaves of upper insertions (62-63%).

Boceski D. (2003) reported that the ratio between green and dry tobacco leaves ranges from 6.1 to 4.1, so that dry tobacco accounts for 17 – 25% of the initial green mass quantity.

Karajankov (1995), in his three-year investigations, found that the average content of water in the leaves of Macedonian oriental tobaccos P 10-3/2, YK 7-4/2 and Djebel N-1 was

77,43%. In relation to the water content by types, the author reported the following data: in variety Prilep P 10-3/2 (type Prilep) it achieved 74,14%, in variety YK 7-4/2 (type Yaka) – 71.34% and in variety N-1 (type Djebel) - 80.22%.

Filiposki (1986) reported that tobacco fertilization affects the total content of water in tobacco leaves, increasing it from 5.54% to 5.83%. Soil humidity level also affects the water content in tobacco leaves.

According to Dimitrov C. (1964), by increasing the nitrogen rates, the content of water in green tobacco leaves also increases. In the process of tobacco curing, the higher water content results in a lower quality of tobacco, and vice-versa: the lower the water content is, the better quality of tobacco leaves is obtained. It should be emphasized that water retention ability of plant tissues is affected by proteins, which content is increasing with the increased nitrogen rates in the soil.

Atanasov D. (1972) reported that green/dry mass ratio in oriental tobacco variety Ustina ranged 5.5:1 - 6.7:1 in the lower insertions, 4.8:1 - 5.5:1 in the middle insertions and од 3.9:1 – 5.0:1 in the upper insertions. The author also recorded that the ratio between green and dry mass in Burley tobacco ranges from 6.7:1 to 8.3:1, and in Virginia tobacco from 5.5:1 to 6.7:1.

Patce L. and Georgievski K. (1987) referred to the data obtained by Baylov D. and Popov M. (1965), according to which the ratio between green and dry mass ranges from 3.68:1 to 9.77:1 (6.26:1 in average), i.e. 8,64:1, 5,56:1 and 4,29:1 in the lower, middle and upper insertions, respectively.

## MATERIAL AND METHODS

The trial was set up in four replications, on a total area of 487 m<sup>2</sup>, with 6 rows per plot and 42 stalks in a row. During the growing season, tobacco was irrigated with water. Several primings, at technical maturity of the leaves were

made and curing was performed in traditional way, under transparent polyethylene. Green and dry tobacco mass was weighed on technical balance with 2 decimals precision. The green to dry mass ratio was assessed mathematically.

## RESULTS AND DISCUSSION

Results of our investigations show that the average green/dry mass ratio in 2009 was 6.98:1. Compared to the check variety P-23, it achieved lower values in varieties Prilep P 66-9/7 (6.23:1), Prilep Basma 82 (7.01:1) and Prilep P-12-2/1 (7.05:1). Expressed in percentages, the decrease ranges from 13.35% in P 66-9/7

to 1.95% in Prilep P-12-2/1. Higher ratio was obtained in varieties Prilep NS-72 (7.27:1) Prilep P-79-94, which is an increase of 1.11% to 3.34% compared to the check. Out of these data, it can be stated that in 2009 the variety Prilep P-66-9/7 achieved the highest productivity and the lowest productivity was recorded in Prilep P-79-94.

Table 1 Green to dry tobacco ratio in 2009

No.	Variety	Replications				Average	Index
		I	II	III	IV		
1	Prilep P-23 (Ø)	6,92 :1	7,64 :1	7,60 :1	6,61 :1	7,19 :1	100,00
2	Prilep P 12-2/1	7,09 :1	7,70 :1	7,09 :1	6,33 :1	7,05 :1	98,05
3	Prilep NS-72	8,01 :1	7,90 :1	6,87 :1	6,31 :1	7,27 :1	101,11
4	Prilep P 66-9/7	6,49 :1	6,82 :1	6,42 :1	5,21 :1	6,23 :1	86,65
5	Prilep P -79-94	7,80 :1	7,51 :1	7,70 :1	6,72 :1	7,43 :1	103,34
6	Prilep Basma 82	7,48 :1	7,27 :1	6,82 :1	6,46 :1	7,01 :1	97,50
	Average	7,27 :1	7,41 :1	7,05 :1	6,19 :1	6,98 :1	97,08

LSD

0,05 = 0,48

0,01 = 0,66

0,001 = 0,92

Table 2 Green to dry tobacco ratio in 2010

No.	Variety	Replications				Average	Index
		I	II	III	IV		
1	Prilep P-23 (Ø)	7,12 :1	6,18 :1	5,94 :1	6,06 :1	6,28 :1	100,00
2	Prilep P 12-2/1	7,17 :1	6,33 :1	7,01 :1	6,88 :1	6,85 :1	109,08
3	Prilep NS-72	7,26 :1	5,94 :1	6,42 :1	5,63 :1	6,28 :1	100,00
4	Prilep P 66-9/7	6,47 :1	6,08 :1	6,14 :1	5,33 :1	5,99 :1	95,38
5	Prilep P -79-94	6,18 :1	6,43 :1	6,59 :1	6,02 :1	6,29 :1	100,16
6	Prilep Basma 82	6,29 :1	6,31 :1	6,19 :1	5,89 :1	6,16 :1	98,09
	Average	6,75 :1	6,21 :1	6,38 :1	5,97 :1	6,31 :1	100,48

LSD

0,05 = n.s.

Table 3 The average green to dry mass ratio

No.	Variety	Year		Average	Index
		2009	2010		
1	Prilep P-23 (Ø)	7,19 :1	6,28 :1	6,73 :1	100,00
2	Prilep P 12-2/1	7,05 :1	6,85 :1	6,95 :1	103,27
3	Prilep NS-72	7,27 :1	6,28 :1	6,77 :1	100,59
4	Prilep P 66-9/7	6,23 :1	5,99 :1	6,11 :1	90,79
5	Prilep P -79-94	7,43 :1	6,29 :1	6,86 :1	101,93
6	Prilep Basma 82	7,01 :1	6,16 :1	6,58 :1	97,77
	Average	6,98 :1	6,31 :1	6,64 :1	98,66

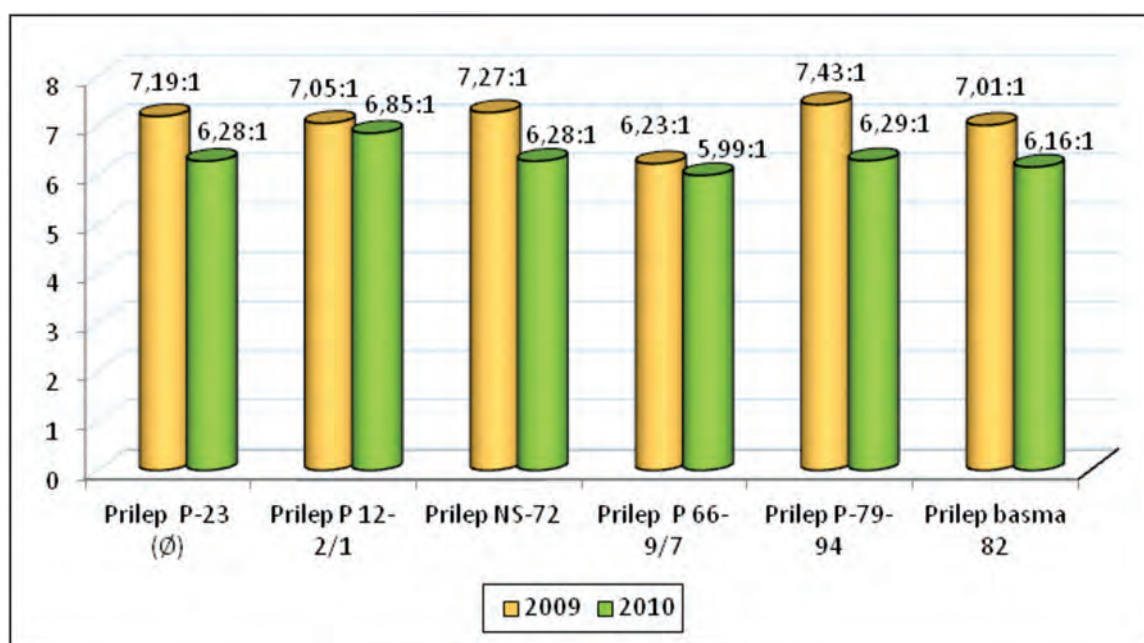


Figure 1 Graphical presentation of the green to dry mass ratio

In 2010 again, the lowest green to dry tobacco ratio was calculated in the variety Prilep P 66-9/7 (5.99:1), followed by Prilep Basma 82 (6.16:1). The same value as that of the check variety was achieved by Prilep NS-72, while in Prilep P-79-94 the achieved value was insignificantly higher than the check (6.29:1), and the highest ratio for this year was calculated in Prilep P 12-2/1 (6.85:1).

The two-year values of the green to dry tobacco ratio range in close limits from 6.11:1 to 6.95:1 and the average ratio for all tobacco varieties is 6.64:1. Namely, Prilep P 66-9/7 had an average ratio of 6.11:1, Prilep Basma 82 – 6.58:1, and the ratios of the other varieties were somewhat higher than the check, increasing from

6.77:1 in Prilep NS-72 to 6.86:1 in Prilep P-79-94 and up to 6.95:1 in P 12-2/1.

Expressed in relative figures, the average values for the green/dry mass ratio in investigated tobacco varieties show little variation. The largest decrease of the ratio in relation to the check variety was calculated in Prilep P 66-9/7 variety – 9.21%, followed by Prilep Basma 82 with 2.23%. The values for this ratio were somewhat higher in the varieties Prilep NS-72 (0.59%) and P-79-94 (1.93%), and the highest value was achieved in Prilep P 12-2/1 (3.27%).

Our data are in accordance with references data at the beginning of this paper. In literature data, the ratio between green and dry mass of tobacco is presented as plant productivity.

## CONCLUSIONS

From the data obtained in our investigations, it can be stated that the green/dry mass ratio is a variety characteristic of tobacco.

The green/dry mass ratio ranges from 6.11:1 to 6.95:1 in tobacco varieties Prilep P 66-9/7 and Prilep P 12-2/1, respectively, which is

an average of 6.64:1.

It can be also stated that the highest productivity among the investigated varieties was achieved in Prilep P 66-9/7 and the lowest in Prilep P 12-2/1.

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