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COMPARATIVE INVESTIGATIONS OF NEW VARIETIES OF THE TYPE BASMAK WITH POPULAR VARIETIES OF THE TYPES PRILEP, YAKA AND DJEBEL

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ABSTRACT

Investigations were carried out with ten oriental tobaccos of the types: Basmak (MB-2, MB-3, MK-1, MS-8/1, MS-9/3, YZ-7 and Dj-B-1), Prilep (P-23), Yaka (YV 125/3) and Djebel (Dj № 1), to study: height of the stalk with inflorescence, number of the leaves per stalk, length of the middle belt leaves and dry mass yield per stalk. The trial was set up in the Experimental field of Tobacco Institute–Prilep in 2013 and 2014, in randomized block design with three replications, using traditional agricultural practices.

The aim of the investigation is to study some more important quantitative traits of tobacco varieties from type Basmak and to make comparison with the popular varieties of Prilep, Yaka and Djebel types. This investigations will give precise knowledge of the new type Basmak in Macedonia from morphological and agronomic aspects.

The highest stalk among the investigated genotypes was recorded in the standard variety YV 125/3, while the highest number of leaves, length of the middle belt leaves and yield were measured in P-23. The highest stalk among the Basmak varieties was recorded in YZ-7, while leaf number, length of the middle belt leaves and yield were the highest in MS-9/3. All Basmak varieties are significantly higher than P-23 and Dj № 1 and lower than YV 125/3. Compared to P-23, all Basmak varieties are characterized by significantly lower leaf number, while highly significant differences in comparison with YV 125/3 were found in MB-2, MB-3, MK-1 and Dj-B-1. The leaf of Basmak varieties is significantly shorter compared to that of P-23 and significantly longer compared to Dj № 1. Basmak varieties have lower yield compared to P-23 and YV 125/3, but significantly higher compared to the variety Dj № 1.

Keywords: tobacco (*Nicotiana tabacum* L.); types: Basmak, Prilep, Yaka and Djebel; quantitative traits.

КОМПАРАТИВНИ ИСПИТУВАЊА НА НОВИТЕ СОРТИ ОД ТИПОТ БАСМАК СО ПОПУЛАРНИ СОРТИ ОД ТИПОВИТЕ ПРИЛЕП, ЈАКА И ЏЕБЕЛ

Испитувани се десет ориенталски сорти од типовите: басмак (МБ-2, МБ-3, МК-1, МС-8/1, МС-9/3, ЈЗ-7 и Џ-Б-1), прилеп (П-23), јака (ЈВ 125/3) и џебел (Џ № 1), за висина на стракот со соцветие, бројот на листови по страк, должина на листовите од средниот појас и приносот на сува маса по страк. Опитот беше поставен на

експерименталното поле при Научниот институт за тутун–Прилеп во 2013 и 2014 година, по случаен блок–систем во три повторувања, со примена на вообичаени агротехнички мерки.

Целта на истражувањата е да се проучат поважните квантитативни својства на тутунските сорти од типот басмак и да се направи споредба со популарните сорти од типовите прилеп, јака и џебел. Испитувањата ќе дадат точни сознанија за новиот тип басмак во Македонија од морфолошки и агрономски аспект.

Со најголема висина меѓу испитуваните генотипови се истакна стандардната сорта ЈВ 125/3, додека со најголем број на листови, најголема должина на листовите од средниот појас и највисок принос се издвои П-23. Со најголема висина меѓу сортите од типот басмак се окарактеризира ЈЗ-7, додека со најголем број на листови, најголема должина на листовите од средниот појас и највисок принос се истакна МС-9/3. Сите сорти од типот басмак се сигнификантно повисоки од П-23 и Ц № 1, и пониски од ЈВ 125/3. Споредбено со П-23 сите сорти од типот басмак имаат сигнификантно помал број на листови, додека споредбено со ЈВ 125/3 повеќе листови имаат МБ-2, МБ-3, МК-1 и Ц-Б-1, а разликите се високосигнификантни. Сортите од типот басмак имаат сигнификантно пократки листови споредбено со оние на П-23, а сигнификантно подолги листови од Ц № 1. Во однос на П-23 и ЈВ 125/3 сортите од типот басмак имаат понизок принос, а во однос на Ц № 1 имаат сигнификантно повисок принос.

Клучни зборови: тутун (*Nicotiana tabacum* L.); типови: басмак, прилеп, јака и џебел; квантитативни својства.

INTRODUCTION

Tobacco production in the Republic of Macedonia has a long tradition. It dates back to the Ottoman Empire. The introduced varieties had a long period of time for their adaptation, due to which they are stabilized and adjusted to the local conditions. Selection of new varieties started in 1924, with founding of the Tobacco Institute - Prilep. The newly created varieties of the oriental tobacco types Prilep, Yaka and Djebel and later of the semi-oriental type Otlia were released in production in 1930 (Korubin-Aleksoska, 2004). The above tobacco varietal structure remained unchanged until the large-leaf tobaccos Virginia and Burley were introduced in the mass production in 1975 and 1981, respectively. However, in 2002 the production of Virginia, Burley and Otlia tobaccos ceased, while the production of oriental tobacco varieties has continued. Later, in 2005, several new varieties of the oriental Basmak tobacco were included in regular production, at a request of tobacco purchasing companies founded with foreign capital. Basmak tobacco was created from the type Yaka, previously grown in large quantities in Greece. The total world production of oriental tobacco in 2006 reached 270,000 t, the greatest share of which belonged to Turkey -130,000 t, Bulgaria - 24720 t, Greece - 22 900 t (14,000 t of which is Basma tobacco) and Macedonia - 19640 t (mostly of the types Prilep - 12912

t and Yaka - 5054 t), (FAO, 2011). Today, the Tobacco Institute in collaboration with other companies - participants in the project for creation of new tobacco varieties has released seven varieties such as Basmak, two of which are already commercialized.

There are many studies related to Basma tobacco. The raw material of this type is highly estimated by the purchasers. For this reason, efforts have been made to expand and increase its production. Nikolova, Drachev and Nikolov (2005), in her studies of technological properties of some Basma tobacco varieties grown in different regions of Bulgaria concluded that the varieties grown in the regions where they are traditionally produced have a significantly better quality than the same varieties grown in other regions. Drachev, Nikolova and Popova (2006) made comparative trial with Bulgarian varieties of the ecotype Basma and the Greek variety Zihna, located in Djebelian tobacco producing region. In their investigation on the most important chemical parameters and degustational indicators of tobacco raw quality they observed significant differences that are the basis for a complex assessment of the average quality and rank of the studied varieties. Drachev, Nikolova and Nikolov (2007) made a comparative trial in the Yaka tobacco producing region to study the technological properties of some domestic varieties of the

oriental type Basma and Greek variety Zihna, in accordance with the emerging needs for changes in the varietal structure and placement of tobacco raw in the world market. Analyses were made using a qualitative index to estimate the quality of oriental tobacco, by which it was proved that the introduced varieties can be produce in the above regions. Masheva, Todorova and Dimanov (2009) studied the gene effect in the inheritance of plant height, leaf number per plant, leaf length and width and the period from planting to flowering in two hybrids obtained through interspecific hybridization: Krumovgrad 988 x Basma Xanthi 101 and Harmanly 134 x Basma Xanthi 101. The authors found additive and non-additive genetic effect and gave directions for further selection to obtain stable and uniform lines of Basma tobacco.

Nikolov (2009) in the research conducted in 2006 compared the chemical and technological traits of tobacco varieties Zihna and Komotini of Greek origin introduced in Bulgaria and the domestic variety Djebel K 81. He found that the quality of Zihna was lower than that of Djebel K 81 and the raw material obtained from The Djebelian tobacco producing region had a higher rank. Komotini and Zihna tobaccos grown in the region of Nevrokop were characterized by higher uniformity. Gixhari and Sulovari (2010) made three-years investigation (2007-2009) in two different environmental areas in Albania to study the inheritance of some major morphological and biological quantitative traits of eight parental genotypes and their hybrids. They found that the Greek variety Basma Xanthi had the

highest stalk of 123,2 cm, with 36.4 leaves per stalk, 19,7 cm length and 12,1 cm width of the middle belt leaves, 91.9 days from planting to flowering and a yield of 259.6 kg/da. Dimanov and Masheva (2011) studied the new varieties of Basma tobacco selected in the Institute of tobacco and tobacco products – Markovo: Sekirka,, Djebel Basma 1, Djebel Basma 2, Basma 13, Plovdiv 380, Ustina 54, Kozarsko 339 and Srednogorska Yaka) in order to present the newly selected material. Darvishzadeha and Hatami Maleki (2011) made analysis on the genetic variance of 100 Iranian oriental and semi-oriental tobacco genotypes of local and foreign origin for the quantitative traits: days to 50% flowering, dry mass yield and leaf number per plant. The studied genotypes included varieties of tobacco types Samsoun, Izmir, Basma, Krumovgrad and Nevrokop, which can be grown in tobacco producing regions of Iran and in accordance with the needs of the world market. Kichukov (2012) reported that over 300 000 decares in Bulgaria are grown with oriental tobacco and that Basma varieties are grown in the most poorly productive regions. These are also the lowest-yielding varieties with about 120 kg/da and with the highest purchase price. The most suitable regions for growing Basma tobaccos are Goce Delchev, Haskovo and Kardzhali.

The subject of our investigation were some major morphological and agronomic traits of Basmak tobacco varieties selected in Tobacco Institute-Prilep and their comparison with known varieties of Prilep, Yaka and Djebel tobacco.

MATERIAL AND METHODS

These investigations include two-year study (2013 and 2014) on height of the stalk with inflorescence, number of the leaves per stalk, length of the middle belt leaves and dry mass yield per stalk. in seven varieties of the type Basmak: Basmak (MB-2 – Fig.1, MB-3 – Fig.2, MK-1 – Fig.3, MS-8 / 1 – Fig.4, MS-9 / 3 – Fig.5, YZ-7 – Fig.6 and Dj-B-1 – Fig.7), and one variety of

the types: Prilep (P-23 – Fig.8), Yaka (YV 125/3 – Fig.9 and Djebel (Dj № 1 – Fig.10) for comparison. The trial was set up in the Experimental field of Tobacco Institute-Prilep, in randomized block design with three replications, using traditional agricultural practices. Investigations were performed at the stage of full flowering of tobacco, by standard methods.



Fig. 1. MB-2



Fig. 2. MB-3



Fig. 3. MK-1



Fig. 4. MS-8/1



Fig. 5. MS-9/3



Fig. 6. YZ-7



Fig. 7. Dj-B-1



Fig. 8. P-23



Fig. 9. JV 125/3



Fig. 10. Dj № 1

During tobacco vegetation in field (May - September) in 2013, mean monthly temperature was 19,40C, number of rainy days 34 and total precipitation amount 153 mm. In

the same period in 2014 mean monthly temperature was 18,30C, number of rainy days 33 and total precipitation amount 223 mm.

RESULTS AND DISCUSSION

Popular varieties of the type Basma are ranked in the high-quality group of oriental aromatic tobaccos. Introduction and spread of Basma varieties in the Balkans require thorough quantitative and qualitative analysis of their adaptation to the conditions of the new areas of breeding. The name of this

tobacco in Macedonia is Basmak and it consists of the newly created varieties MB-2, MB-3, MK-1, MK-2, MS-8/1, MS-9/3 and YZ-7, owned by Tobacco Institute-Prilep and tobacco companies – participants in the selection project. Since the variety MK-2 was no longer uniform, Bulgarian variety Dj-B-7

was included in the trial. Results of investigation on the new varieties of Basmak tobacco are presented in this paper and comparison is made with standard varieties of other tobacco types traditionally grown in R. Macedonia.

The highest stalk with inflorescence was observed in the standard variety of Yaka tobacco YV 125/3 ($\bar{x}=123,5$ cm). Among the Basmak varieties, YZ-7 is the highest ($\bar{x}=118$ cm) and MK-1 is the lowest ($\bar{x} = 89$ cm). In relation to this trait, all Basmak varieties are significantly higher than P-23 and Dj № 1 and significantly lower than YV 125/3 (Table 1).

The highest number of leaves per stalk in the investigated genotypes was recorded in P-23 ($\bar{x}=54$), while in Basmak varieties the highest leaf number was found in MS-9/3 ($\bar{x}=43.6$). The lowest leaf number was recorded in MK-1 ($\bar{x}=28.1$) and Dj-B-1 ($\bar{x}=28.25$). Compared to P-23, all varieties of Basmak tobacco have significantly lower leaf number. Compared to YV 125/3, highly significant differences were observed in MB-2, MB-3, MK-1 and Dj-B-1, i.e. these varieties have significantly higher number of leaves per stalk (Table 1).

The longest middle belt leaf among the in-

vestigated genotypes was recorded in P-23 ($\bar{x}=24,33$ cm) and the shortest in Dj № 1 ($\bar{x} =18,52$ cm). The longest leaf among Basmak tobaccos was measured in MS-9/3 ($\bar{x}=22,65$ cm) and the shortest in MB-2 ($\bar{x}=20,35$ cm). The length of the middle belt leaf in Basmak varieties is significantly lower compared to P-23 and significantly higher compared to Dj № 1. Compared to YV 125/3 no highly significant differences were observed, but in MB-2, MK-1 and MS-9/3 a difference at 5% level of significance was estimated (Table 1). The highest yield among the investigated genotypes was achieved in P-23 ($\bar{x}= 2558,5$ kg/ha) and the lowest in Dj № 1 ($\bar{x}=999,5$ kg/ha). The highest yield among Basmak tobaccos was recorded in MS-9/3 ($\bar{x}=2397,5$ kg/ha) and the lowest in Dj-B-1 ($\bar{x}=1345,5$ kg/ha). Compared to P-23, all varieties of Basmak tobacco have significantly lower yields. Compared to YV 125/3 lower yield was observed in all the varieties except for MS-9/3, the yield of which was similar to that of the standard variety. All of the investigated varieties showed significantly higher yields compared to Dj № 1 (Table 1).

Table 1. Quantitative traits in tobacco varieties from types Basmak, Prilep, Yaka and Djebel

Tobacco varieties	Quantitative traits							
	Height of the stalk with inflorescence (cm)		Number of leaves per stalk		Length of the middle belt leaves (cm)		Dry mass yield per stalk (g)	
	2013	2014	2013	2014	2013	2014	2013	2014
1. Basmak – MB-2	93	94	29,5	30	19,95	20,76	1486	1507
2. Basmak – MB-3	98	97	33	34	21,22	21,35	1533	1652
3. Basmak – MK-1	88	90	27,7	28,5	20,73	20,56	1528	1581
4. Basmak – MS-8/1	105	110	41,5	42,8	21,95	22,35	2184	2282
5. Basmak – MS-9/3	111	115	43	44,2	22,24	23,06	2360	2435
6. Basmak – UZ-7	116	120	41	40,4	21,88	22,30	2105	2124
7. Djebel-Basma-1 – DJ-B-1	95	97	28,5	28	21,13	21,02	1299	1392
8. Prilep – P-23	68	68	53	55	24,59	24,07	2550	2567
9. Yaka – YV 125/3	122	125	41,7	42,6	21,57	21,77	2382	2465
10. Djebel – Dj № 1	79	80	28	29,8	18,45	18,59	994	1005
LSD 0,05	4,37	4,17	1,82	1,55	1,08	0,93	147,90	136,32
0,01	7,72	7,51	3,28	2,80	1,95	1,68	266,21	245,39

CONCLUSIONS

The highest stalk among the Basmak tobacco varieties was recorded in YZ-7, while the highest leaf number, leaf length and yield were measured in MS-9/3. The lowest stalk height was recorded in MK-1 and the lowest leaf number in MK-1 and Dj № 1. Variety MB-2 was characterized by the lowest length of the middle belt leaf and Dj-B-1 variety by the lowest yield.

All varieties of Basmak tobacco were significantly higher compared to P-23 and Dj № 1, but significantly shorter than YV 125/3.

Significantly higher leaf number compared to YV 125/3 was counted in MB-2, MB-3, MK-1 and Dj-B-1, but the number of leaves in all varieties was significantly lower compared to P-23. All the varieties had significantly shorter leaves compared to P-23 and significantly longer leaves compared to Dj № 1. The yield of the investigated varieties was significantly lower compared to P-23 and YV 125/3 and significantly higher compared to Dj № 1.

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