

Characteristics of oriental tobacco lines ecotype Dupnitsa

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Abstract

The study was conducted in the period 2019 - 2021 in Experimental Field - Rila, at the Institute of Tobacco and Tobacco Products - Markovo. Three new lines of oriental tobacco and two varieties of high quality oriental tobacco Dupnitsa 160 and Katerini (Greece) and variety Rila 544 (standard) are included. Biometric measurements were performed on the following indicators: plant height (cm), number of leaves, length and width of the 14th leaf (cm). Yield (kg/da) and quality of dry tobacco were reported. Chemical analysis of basic chemical indicators was performed - nicotine, sugars (soluble carbohydrates), total nitrogen. Mathematical evaluation of morphological and economic features was made by analysis of variance. From the obtained data it can be concluded that lines 503 and 504 best meet the new requirements, forming a higher yield compared to the control and both varieties and quality similar to that of Dupnitsa 160 and Katerini. Valuable source material for the selection of oriental tobacco ecotype Dupnitsa has been created.

Key words: oriental tobacco; biometric indicators; economic indicators, chemical indicators

INTRODUCTION

The change of climatic conditions in recent years in Bulgaria and the increased requirements for technological and quality indicators of oriental tobacco have led to the need to create new quality varieties, high yield, with good chemical-technological indicators and high adaptability.

To achieve these goals, the research program of the Institute of Tobacco and Tobacco Products (ITTI) includes introduced varieties for research, in order to hybridize with representatives of the Dupnitsa ecotype, with very good quality of dry tobacco and with the sizes of the leaves from the middle harvest zone - up to 20 cm. A rich starting material was obtained, from which new lines of oriental tobacco with high quality indicators were derived.

The aim of the research is to characterize biological, technological and chemical indicators of perspective lines of oriental tobacco from Dupnitsa ecotype.

Establishing opportunities for the presentation of the best of them in the next selection stage and

presentation in IASAS for recognition as new varieties.

MATERIAL AND METHODS

In the period 2019-2021 in Experimental Field - Rila, three new lines of oriental tobacco ecotype Dupnitsa were tested in variety experiment. The Rila 544 and two high-quality varieties were used for the control- Dupnitsa 160 (Stankev, 2007; Stankev & Bozukov, 2015) and the variety Katerini (Greece). The lines are vegetatively and morphologically aligned. The field experiments were set up by the block method in three replications with the size of the experimental plot of 20 m² (Zapryanov & Marinkov, 1978).

Basic biometric and technological indicators have been determined: plant height (cm), number of leaves, 14th leaf size (cm), yield (kg/da) and percentage of classes.

A chemical analysis for the content of: nicotine, carbohydrates and total nitrogen was performed in

the Laboratory Test Complex (LTC) of ITTI. Experimental data were processed by analysis of variance (Zapryanov & Marinkov, 1978).

RESULTS AND DISCUSSION

1. Biometric indicators

Table 1 presents the average values of data on plant height, number of leaves and sizes of the 14th leaf for the period 2019 - 2021. They show that the observed lines have a lower plant height in comparison with the control. Only at line 504 the difference between the average values is well provided (--). This result corresponds to our selection program. The varieties Dupnitsa 160 and Katerini also form a lower stem compared to Rila 544 and the difference is significant at 1% and 0.1% probability.

In regard of the number of leaves, the new lines have a larger number than the control and both varieties Dupnitsa 160 and Katerini. Line 503 and 504 form 11 to 17 more leaves. The difference is proven at a high level of reliability (+++). The larger number of leaves is positively correlated with the yield (Masheva, 2009).

According to the minimum quality requirements for the quality of tobacco, the first class is defined as meaningful, mature leaves up to 20 cm long from all harvesting zones.

Based on these requirements, the selection program for the Dupnitsa ecotype, through hybridization, includes varieties with high quality of dried tobacco and 14-leaf sizes up to 20 cm. The consequence of this program are lines 502, 503 and 504 (Figures 1, 2 and 3). They are characterized by smaller leaf sizes from the middle harvest zone compared to the

varieties Rila 544 and Dupnitsa 160. The differences between the average values of the tested lines and the control are proved at a level of reliability of 1% for line 503 and 504. Line 503 best meets the size requirement of the 14th leave. It is characterized by 20 cm length and 10 cm width of tobacco leaf.

2. Economic indicators

Yield is a determining economic factor in tobacco (Stoyanov, 1983). It is a set of many indicators and is an important component of the characteristics of varieties (Masheva et al., 2004)

The average values for yield and quality for the period of the experiment are shown in Table 2. With the highest yield of 302 kg/da is line 504, followed by line 502 with 288 kg/da and line 503 - 279 kg/da. The differences between the average yields of the studied variants and the control variety Rila 544 were proved at a significance level of 1% and 5%. The control and varieties Dupnitsa 160 and Katerini formed a lower yield by 11% to 30%.

The percentage of the classes in the new lines is comparable to that of the high-quality varieties Dupnitsa 160 and Katerini, with the exception of line 502, which is characterized by 23% first class, compared to 32-35% for the others. The control has the lowest percentage of first class - 25% and 9% third class.

3. Chemical indicators

In LTC of ITTI - Markovo, an analysis was performed for the content of nicotine, carbohydrates and total nitrogen.

Nicotine is the most typical alkaloid in the tobacco plant. It determines the physiological power of smoking, which manifests itself when its content

Table 1. Biometric indicators, average for the period 2019 - 2021

Variety / Line	Height, cm	Number of leaves	Proportion of 14 th leaf, cm	
			Length, cm	Width, cm
Line 502	131	36	23	15
Line 503	130	48 +++	20 --	10 ---
Line 504	122 --	46 +++	22 --	13
Dupnica 160	120 --	32	26	16
Katerini	78 ---	31	19 --	11 -
Rila 544 (control)	140	35	27	15
GD 5%	11,6	4,2	4,1	2,2
1%	16,5	6,02	5,9	3,1
0,1%	23,9	8,7	8,5	4,5

is certain limits. Typical values for oriental tobacco are: soluble sugars 10.00% - 16.00%, nicotine - 0.50% - 1.50% and total nitrogen - 1.50% - 2.00% (Guzelev, 1983).

Climatic conditions during the vegetation of tobacco affect the percentage of chemical indicators. Higher soil moisture leads to lower percentages of nicotine and total nitrogen and higher carbohydrates (Guzelev, 1983).

For the chemical index nicotine, the highest values for both years of testing are observed at line 503, which determines its physiological strength as strong (over 1.6%). The ratio of carbohydrates / nicotine is very good, with a negative correlation i.e. as the percentage of nicotine increases, the level of sugars decreases. This trend is also observed in the research of Nikolov et al. (2004).

Soluble carbohydrates are one of the most important components of light tobacco, determining their characteristic pleasant taste (Guzelev, 1983). For a large part of the studied lines and varieties the car-

bohydrates are higher than 16%, which is also present in the experiments with Krumovgrad 58 variety of Kusheva et al. (2021). Only for line 502 and Rila 544, the values are below the minimum requirements (2019).

The amount of total nitrogen is negatively related to the quality of tobacco (Guzelev, 1983). Its content varies from 1.27 to 1.89% in the observed lines. Total nitrogen has the lowest values at line 503 for 2019 and line 504 for 2021.

CONCLUSIONS

The studied lines form plants with a lower stem, a larger number of leaves and smaller sizes of the 14th leaf compared to the Rila 544 control.

The three lines form a higher yield compared to the control, with better quality of the dried tobacco.

The best ratio of chemical parameters for the two years of the study was observed at line 503.

Table 2. Yield and quality of dry tobacco, average for the study period

Variety / Line	Yield, kg/da	Relative yield %	Classes, %		
			I	II	III
Line 502	288 +	124	23	71	6
Line 503	279 +	120	35	63	2
Line 504	302 ++	130	34	64	2
Dupnica 160	251	108	33	65	2
Katerini	225	97	32	65	3
Rila 544 (control)	232	100	25	66	9
GD 5%	41,03				
1%	58,3				
0,1%	84,5				

Table 3. Chemical composition of the studied lines, 2019 and 2021

Variety / Line	Nicotine, %		Carbohydrates, %		Total nitrogen, %	
	2019	2021	2019	2021	2019	2021
Line 502	1,37	0,76	15,80	22,95	1,89	1,48
Line 503	2,27	1,73	19,30	21,76	1,49	1,40
Line 504	1,85	0,67	17,8	28,81	1,88	1,27
Dupnica 160		1,71		21,72		1,65
Katerini		1,82		21,47		1,63
Rila 544 (control)	0,76	1,19	13,8	19,09	1,94	1,56



Figure 1. Line 502 - Experimental field of Rila



Figure 2. Line 503 - Experimental field of Rila



Figure 3. Line 504 - Experimental field of Rila

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