

COMPARATIVE TECHNOLOGICAL EVALUATION OF ZIHNA VARIETY AND BULGARIAN TOBACCO VARIETIES OF THE BASMA ECOTYPE

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INTRODUCTION

It is well established that the development of tobacco quality is strongly influenced not only by the inherent genetic features of the variety, but also by the specific factors of the environment. Under their influence territorial units are set up, wherein similar varieties are grown shaping up the respective ecotype of tobacco. Suitable agro-ecological conditions are an essential prerequisite for the complete disclosure of every variety's potentialities. The ecological factors (geographic situation, altitude, soil and climate) in the areas devoted to the Basma ecotype growing in the Dzebel tobacco region, together with the production technologies, implement a major impact on the differentiation of the ecotype, with its characteristic quality indexes (2,3,4). Within the Dzhebel tobacco region one of the world's finest and smallest-leaved tobaccos is grown – that of the Bulgarian Dzhebel Basma. Exposed to intensive sunlight and progressive drought during the summer period, the cured leaves form rich golden to copper-red coloration, sufficient body, delicate texture, richness of content, and distinguish themselves by a very pleasant, sweet taste and specific fine odor. Detailed descriptions of the characteristics of the Dzhebel varieties Sekirka and Mumunovo seme were compiled by GALABOV (1) and other authors (2,3,6).

Investigating the chemical and technological properties of Bulgarian Oriental tobaccos and the impact they had on quality, DRACHEV (5) established a significant degree of positive correlation between “Reducing sugars/Nicotine” ratio and the smoking characteristics of tobacco. He confirmed that the ratio could be applied as an objective index for

the evaluation of the quality, and in particular - the taste of Oriental tobaccos.

In a survey on the Greek tobacco market, YAZADJIAN (10) described the Oriental tobaccos grown in the country as golden-yellow to orange-red in colour, with intensive natural odor and excellent smoking qualities. A portrayal of Zihna variety, when grown in the classic production areas of Greece, pointed out its intensive reddish color and highly characteristic, pleasant, tangy aroma (11).

TOMOV and SHABANOV (9) investigated the biological and industrial potential of the Greek variety Zihna grown in Bulgaria, comparing it to the Dzhebel K81 variety as a positive control. The authors found out that the Greek variety under study had more nicotine, less soluble carbohydrates and almost identical protein content weighed against the control variety.

The most important requirement for any tobacco variety is its maximal correspondence to both growers' interests and market demands, i.e. the stress in the consolidation, production and processing of a certain tobacco variety should be put on its usability. The current state of the art in Basma production in Bulgaria implies the presence of certain disagreements between the character of the raw material produced in individual areas and the demands of market and industry. The improvement of the regional structure of the varieties as a market necessity for Oriental tobaccos was indicated by SLAVOVA and DRACHEV (8) in the light of the accomplished harmonization with the European Union in the tobacco segment.

The task of the current study was to

conduct a multi-step comparative assessment of the Greek variety Zihna and the local tobacco

varieties of the Basma ecotype, all grown in the Dzhebel region of Bulgaria.

MATERIAL AND METHODS

Tobacco varieties from the Basma group were analyzed – Sekirka, Mumunovo seme, Dzhebel K81 and Zihna, crop 2004, all grown in a typical production region – the Dzhebel tobacco region.

Tobacco leaves from the upper stalk positions (3rd mother (last ana), kovalama and outh), comprising of quality material were supplied for analysis. The samples from each stalk position were carefully specified so that each of them consisted exclusively of 1st grade material. A proportionate blending among the stalk positions within each sub-region followed. A second proportionate blending of the individual sub-regions derived the final analytical sample, representing the character of the upper-stalk quality material of the respective variety for the entire region.

All analytical samples were fermented in laboratory conditions, at 40°C for 7 days.

The tobacco varieties were characterized by determining the following parameters:

A) Chemical Composition of Tobacco:

- Continuous flow analyses on an auto-analyzer AA II C (“Technicon”, USA) were applied for the determination of:
 - Total alkaloids (as nicotine), % - ISO 15152;
 - Reducing sugars, % - ISO 15154;
 - Total nitrogen content, % - according to the Bulgarian State Standard (BSS) 15836-88.
- Mineral matter (Ash), % - ISO 2817;
- Potassium (as K₂O), % - BSS 17365-94.

The following indexes were **calculated**:

- Reducing sugars/Nicotine – as an objective index characterizing mainly the taste of tobacco;
- Reducing sugars/Ash – as an index aimed at a more precise categorization of the quality level, informative about the richness of content.

All chemical analyses were carried out in a twofold repetition with two parallel samples.

B) Smoke Composition – tar and

nicotine, mg/cig.

The tar and nicotine yields were determined by applying regression correlations between tobacco and smoke constituents (7). Data refers to a cigarette with 21 mm filter length, filter denier 3/35000Y, total length 84 mm and diameter 7.9 mm.

C) Spectrometric assessment of tobacco (“image depiction”) – by registering the discrete absorption values of water extracts from tobacco in the UV spectrum – at every 10 nm wave length in the 220 – 350 nm range.

D) Expert assessment – by the method of direct sample rating according to the manifestation of exterior quality characteristics (Bulgarian State Standard 9271–85).

E) Smoking assessment – by the “profile description” method, completed by a smoking panel. Next to the verbal characterization of the smoking properties of the samples, a preference grading was carried out (Bulgarian State Standard 8389–85).

F) Complex evaluation and quality ranking of the compared varieties – completed on grounds of the summery of the results achieved from all the assessments. To manage with the task, “coefficients of importance” were pre-specified for the major (or: characteristic) indexes, depending on their relative contribution to tobacco quality. The panel of experts who conducted the expertise of the samples defined the weight values of the coefficients. Indexes that were most informative about quality were selected, i.e. those indexes that were considered as the most characteristic for the exact type of tobacco. Each sample was graded according to the results achieved for the respective index. When a positive correlation to quality existed, the sample with the highest value of the index was assigned the rank of 1 and the rest of the samples were arranged in descending order, and vice versa. In the case of expert and smoking assessment, the grading of the respective panels was directly applied. The final evaluation was shaped by generating a “quality index” for each of the varieties. The “best” sample scored the lowest total of index’s values.

RESULTS AND DISCUSSION

Data from the chemical analyses of the studied tobacco varieties are presented in Table 1.

Table 1 – Chemical composition of tobacco
Табела 1 Хемиски состав на тутунот

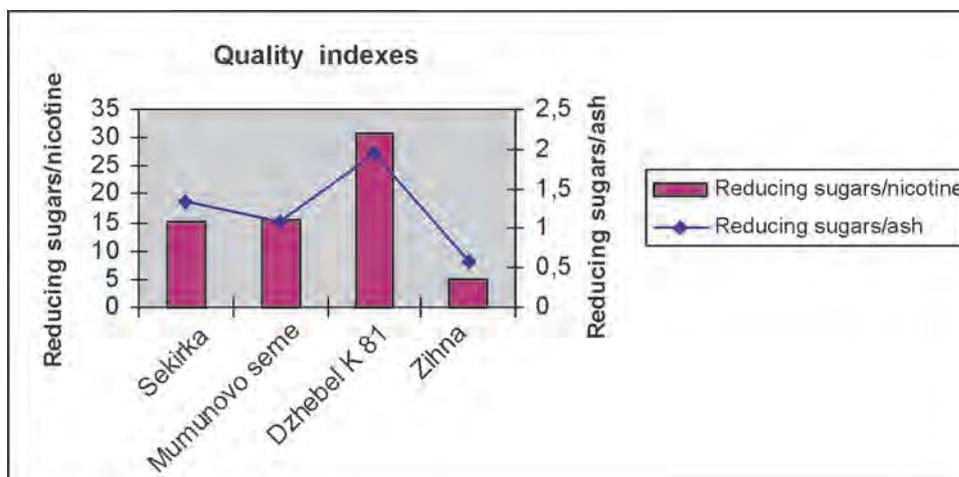
Variety Сорта	INDEXES - Показатели								
	Chemical composition of tobacco, % Хемиски состав на тутунот, %							Smoke composition, mg/cig Состав на чадот	
	Nicotine Никотин	Reducing sugars Редуцир. шеќери	RS/Nicotine РШ/Никотин	Nitrogen Азот	Ash Пепел	RS/Ash РШ/Пепел	K ₂ O	Nicotine Никотин	Tar Катран
Sekirka	0.98	15.00	15.31	1.36	11.10	1.35	2.34	0.84	19.52
Mumunovo seme	0.85	13.30	15.65	2.46	12.20	1.09	1.88	0.74	22.05
Dzhebel K81	0.60	18.40	30.67	1.84	9.44	1.95	1.23	0.56	26.59
Zihna	2.03	10.20	5.02	1.98	17.80	0.57	0.93	1.87	29.07

The results showed higher nicotine content in Sekirka and Mumunovo seme varieties when compared to Dzhebel K81, while the values for Zihna were markedly deviated, consequently resulting in the significantly elevated smoke nicotine level. The higher nicotine content and the lower level of reducing sugars observed in the case of Zihna variety reflected upon a substantially decreased value of the calculated reducing sugars/nicotine index (5.02 for Zihna compared to 30.67 for Dzhebel

K81). With the second quality index in consideration – reducing sugars/ash, significant deviations were also witnessed for Zihna variety alongside the other three samples (2 – 2.5 times lower).

The interrelationships between the studied tobacco varieties with respect to the quality ratios applied – reducing sugars/nicotine and reducing sugars/ash – are graphically depicted on Figure 1.

Fig. 1. Quality indexes of the studied Oriental varieties
Графикон 1 Показатели на квалитетот



The reducing sugars/nicotine ratio is considered an objective criterion primarily for the balance of taste elements (5). The lower values obtained for Zihna were indicative of a not quite balanced smoke, but of a rather intensified physiological and flavour perception during smoking. The higher values of the reducing sugars/ash ratio suggested a better "absolute" quality of the respective tobacco samples.

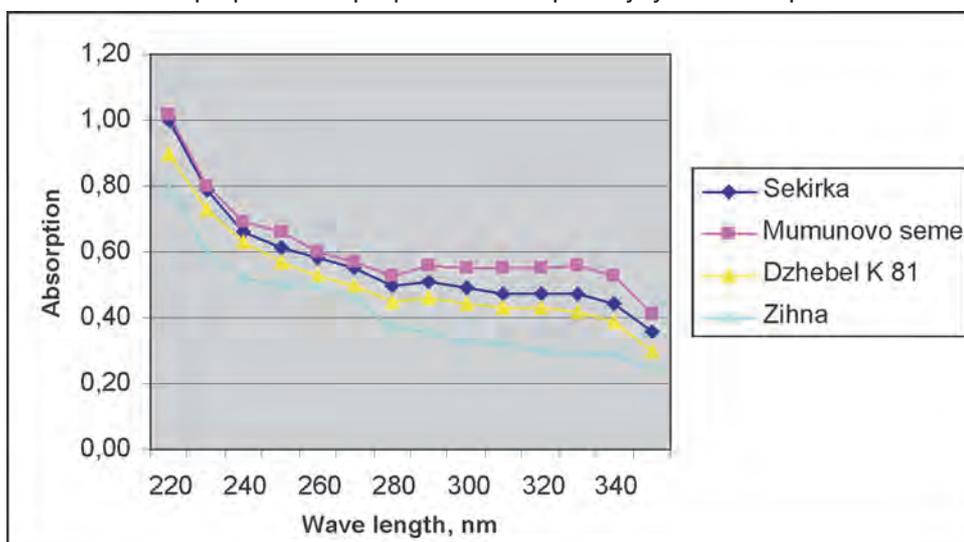
Potassium content of tobacco, especially in the form of organic salts, is a factor determining to a great extent its combustibility. The results from our study showed considerably lower potassium content in Zihna tobacco, thus distinguishing it from the recognized for their excellent burning properties Sekirka and Mumunovo seme varieties. Zihna's chemical composition and the related to it technological parameters define the elevated smoke tar yield, which generally is a common trend in all Oriental tobaccos. According to EU commission directives on tobacco smoke control tobaccos that yield less tar are generally preferred, regardless of the various techniques for tar modification (reduction) widely present in contemporary cigarette production. From this point of view, tobacco quality should be judged by taking into consideration the potential tar yields, as well. It should be noted, however, that the nicotine/tar ratio was highest for Zihna variety (0.06 as opposed to 0.02 - 0.04 for the other varieties studied). Recently, special attention is paid to the additives incorporated in

the cigarette blends to amplify the intensity and specificity of taste, odor and flavor perception, which are all considerably reduced as a consequence of the high ventilation levels. For long has been known now the special role that high-quality Oriental tobaccos play as natural spices integrated in world's most renowned cigarette brands. So, the more distinctive smoking, the more substantial contribution of Oriental tobaccos from the Basma variety group - both as physiological impact and as flavor perception - has its logical place in the design of the modern cigarette, especially in the light of the latest concepts for "a less hazardous cigarette" with improved nicotine/tar ratio (12).

The spectral profiles of the water extracts from tobacco were applied for a comparison between the analyzed tobacco varieties grown in the Dzhebel region. This approach is implemented in situations when parallels between different tobacco samples (varieties) are made. The method could principally be used in weighing up the degrees of similarity and/or difference existing among the samples. The closer the discrete absorption values of individual samples are situated, the more similar the overall character in quality aspect should be, without making general conclusions about quality levels, i.e. spectral curves do not allow for decisions about a higher or a lower class of the respective variety.

The results from the spectral series are presented on Figure 2.

Fig. 2. Absorption spectra of the tobacco varieties
Граф. 2. Абсорпциони спектар на тютунските сорти



The parallel between the spectral curves of Sekirka, Mumunovo seme and Dzhebel K81 varieties disclosed similar patterns in the covered range, suggestive of a similar manifestation of the overall quality. Besides, the differences were more expressed in the range above 270 - 280 nm, i.e. the range where the absorption of polyphenols and alkaline compounds occurred, while in the preceding range the three Bulgarian varieties were very close. The spectral profile of Zihna significantly fluctuated from those of the other varieties, analogously to the observations about tobaccos' chemical composition.

In order to build up a more comprehensive concept about the total quality of the analyzed tobaccos, a complex evaluation and ranking was conducted. The samples were rated with respect to the pre-defined key parameters (both objective and sensory) -

nicotine and reducing sugars content, reducing sugars/nicotine ratio, tar yield, expert and smoking assessment. As target functions in the process of grading were considered the more intensive expression of physiological strength and the balance in taste and odor. For each of the parameters coefficients of importance (of impact, of weight) were settled, and quality indexes were calculated, thus allowing for the general quality ranking of the varieties to be made.

The results are presented in Table 2.

The sum total of quality indexes' values led to the following arrangement of the varieties according to their overall quality manifestation: Zihna ranked first, followed by Sekirka and Mumunovo seme, and in the last place - Dzhebel K81.

Table 2 – Complex evaluation of tobacco
Табела 2 Комплексна проценка на тутунот

Parameter	Samplegrading				Importance coefficient	Quality index			
	Sekirka	M. seme	Dzhebel K 81	Zihna		Sekirka	M. seme	Dzhebel K 81	Zihna
Nicotine, % Никотин %	2	3	4	1	0.25	0.50	0.75	1.00	0.25
Reducing sugars, % Редуцирачки шеќери %	2	3	1	4	0.05	0.20	0.30	0.10	0.40
Sugars/ Nicotine Шеќери/ Никотин	2	3	4	1	0.15	0.30	0.45	0.60	0.15
Tar - Катран	1	2	3	4	0.15	0.15	0.30	0.45	0.60
Expert assessment Експертска оцена	2	3	4	1	0.15	0.30	0.45	0.60	0.15
Smoking assessment Оцена на пушење	3	1	4	2	0.25	0.75	0.25	1.00	0.50
						2.20	2.50	3.75	2.05
						2	3	4	1

CONCLUSION

The comparative analysis determined that the Greek variety Zihna grown in the Dzhebel region of Bulgaria significantly differed from the Bulgarian Basma varieties. The variety has a potential for growing in Bulgaria targeted at intensified flavor-physiological smoking characteristics of the Basma variety group, which

proves important in the new market situation facing Bulgarian Oriental tobaccos and the demands of the up-to-date cigarette blends. The results from the study could readily serve the future region differentiation of the varieties forming the Basma ecotype from a market-oriented point of view.

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КОМПАРАТИВНА ТЕХНОЛОШКА ПРОЦЕНКА НА СОРТАТА ЗИНА И БУГАРСКИТЕ ТУТУНИ ОД ЕКОТИПОТ БАСМА

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РЕЗИМЕ

Цел на ова проучување е да се изведе компаративна карактеризација на грчката сорта зина и традиционалните бугарски сорти од екотипот басма, одгледувани во џебелскиот тутунопроизводен реон. Одредени се најважните параметри и показателите на квалитетот од хемискиот состав на тутунот и дадена е стручна и дегустативна проценка на проучуваните сорти. Забележани се сигнификантни разлики во хемискиот состав помеѓу зина и бугарските сорти (на пр., никотин, растворливи шрќери, содржина на пепел), што уште повеќе доаѓа до израз кај разликите во кривите на апсорпција на водениот екстракт. Добиените резултати служат како основа за комплексна проценка на просечниот квалитет и конечното рангирање на проучуваните сорти.

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