TECHNOLOGICAL STUDY ON THE QUALITY OF TOBACCO VARIETIES DZHEBEL K 81 AND KRUMOVGRAD 90 GROWN IN UNCONVENTIONAL REGIONS

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1. INTRODUCTION

The conditions under which the tobacco sector functions, as well as the forthcoming integration of the Republic of Bulgaria to the European Union acquire that a number of major issues related to the manufacture and processing of tobacco should be updated.

It gives rise of the need to change the variety structure of the tobaccos grown in different tobacco districts and regions, improve the quality, stabilize and enlarge the production of the market demanded variety groups, origins, correspondingly (8, 9). The market 'logic' requires more flexible and expedient solution of these issues, which will meet the interests of both growers and consumers (1).

The trends observed over the past years towards extension of the production of certain tobacco varieties (mainly Krumovgrad ecotype and less Dzhebel) in the non-typical (non-zoned) regions for them are not due to the fact that tobacco prices are less in these regions (origins respectively) at the operating least purchase prices, but rather to the need of production of Bulgarian Oriental tobaccos demanded on the international market and formation of bigger (enlarged) batches, as required by the big international companies. There are such opportunities in our country in the so-called 'similar' regions and sub-regions, having soil climatic and agrotechnical conditions to those of the typical ones to the relevant variety.

It confirms the need of a scientifically substantiated research on the real opportunities to grow market demanded tobaccos (varieties and origins) on the basis of their quality assessment.

The aim of the present study was to investigation on the quality of the tobacco varieties Dzhebel K 81 and Krumovgrad 90 grown in different regions, origins, correspondingly.

2. MATERIALS AND METHODS

This investigation refers to tobaccos of crop 2005. The material for investigation is taken by way of strings from different villages and from several tobacco growers of one village of the corresponding regions and sub-regions for each origin. In any case the test samples have been formed on the basis of the material of third mother, kovalama and uchove, i.e. the material of the best quality and typical for the Oriental tobaccos corresponding to standard class I.

Variety Dzhebel K 81 **(East Balkan origin).** Two samples have been formed of the region of Yambol, "Yaka" sub-region (Rechitsa, Cheresha, Skalak and Zaychar) and second sample for the same region from Balkan sub-region (Yassenovo Village).

Variety Dzhebel K 81 **(Nevrokop origin)**

- two test samples: "Yaka" sub-region from three villages (Breznitsa, Zhizhevo and Teshovo) and second sample for the same variety and origin - Balkan sub-region, also including three villages (Satovcha, Kochan and Vaklinovo).

Variety Krumovgrad 90 **(Nevrokop origin)** - four samples have been formed, as follows: the first sample, referring to "Yaka" sub-region, taken from four villages (Breznitsa, Zhizhevo, Valkosel and Ablanitsa); second sample - Balkan sub-region (Kochan and Debren); third sample - Razlog region, "Planinski" sub-region (Yurukovo and Gorno Kraishte).

Variety Krumovgrad 90 **(Dupnitsa region)** - Gorna Dzhumaya region, "Yaka" sub-region - one sample (Balgarchevo, Padesh and Dolno Osenovo).

Variety Krumovgrad 90 **(Melnik origin)** grown in two regions and different sub-regions: the region of Sandanski-Melnik one sample referring to "Yaka" sub-region from two villages (Levunovo and Kromidovo); second sample from ""oluyaka""sub-region of one village - Petrovo and third sample from "Planinski" sub-region (the villages of Gega and Dolna Krushitsa).

For the region of Petrich three sub-regions were investigated: "Yaka" sub-region - Karnalovo; "Poluyaka" sub-region (Klyuch, Kamena and Yavornitsa) and "Pole" sub-region - Parvomay Village.

The different samples were investigated with regard to basic indicators describing their quality:

Tobacco chemical composition: nicotine, % - by ISO 15152; reducing sugars, % - by ISO 15154; total nitrogen, % - by BDS 15836-88; mineral composition (ashes), % - by ISO 2817; potassium, % - BDS 17365-94; ratio of reducing sugars/nicotine.

Tobacco smoke chemical composition: nicotine, mg/cig and tars, mg/cig

The indicators for the composition of the tobacco smoke have been calculated through established regressive dependencies between tobacco and smoke composition. The results apply to a cigarette with a 21 mm long filter, denier of the filter 3/35000Y, at total length of the cigarette of 84 mm and d=7,9 mm (7).

Physical indicators: density of cut tobacco, g/cm3.

Spectrophotometric investigation ("image" taking) of the variety. It was done by spectrophotometric definition of the discrete values of absorption of water extraction from tobacco within the range of wavelength from 220 to 350 nm every 10 nm (5). In the inspection for statistical importance of the differences (Student's criteria) the following case was applied - assessment of mean difference between samples from general sets connected by pairs. All

measurements have been made at n=14 at degree of freedom k=n-1=13. In this case the table value is the same, and it is equal to ttabl.=2,16 for level of reliability a=0,05 and 3,01 for a=0,01. We make conclusions about presence or absence of difference, based on the preliminary established values for tf and t tabl. for each single case in full combination of comparison by pairs (6).

Expert evaluation. It was done by application of the method of "direct comparison". It was determined "coefficient of relative arrangement" and "rank coefficient" (4).

In the comparison of more than two samples to establish the reliability of the results statistical processing of the data was done through determination of the coefficient of concord (agreement) of Kendal (W). To evaluate the statistic security (importance) of the coefficient the criteria of Fischer Ff was applied (2).

In the cases when only two samples are compared, the evaluation of reliability was done by the so-called Critical Relation Number (CRN).

Taste evaluation. It was conducted by the method of "direct" comparison on two and/or three samples. In case of more than three samples the method of "indirect" comparison (by pairs) in full combination between the samples.

Statistical processing of the results was made in the same way as the expertise.

Complex evaluation. It uses indicators describing the expressive quality of oriental tobaccos. Following preliminary established coefficients of importance of such indicators it was made an arrangement on the basis of the values of the same depending on their positive or negative impact on quality. The final evaluation has been made on the basis of the obtained "quality index" - summarized quality indicator by means of which the samples may be compared (graded) between each other by level of quality. The less value, the higher the quality is, and vice versa.

3. RESULTS AND DISCUSSION

Subject to the goal of investigation, we applied comparison between varieties Dzhebel K 81 and Krumovgrad 90, grown in the different "new" to them regions, origins, respectively. "New" regions - regions (origins, respectively), where the corresponding variety is not zoned, according to the governmental zoning.

Chemical composition. To compare the investigated tobaccos by chemical composition, we had to previously specify at which differences

in their values they differ or not. For this purpose, we used the criteria for level and difference in the chemical indicators, mentioned in our past investigations (3).

The obtained results for the chemical composition are presented in Table 1.

Variety Dzhebel K 81

In the "new" regions and subregions, respectively, for growing of variety Dzhebel K 81 the chemical composition in general corresponds

Table 1 - Chemical indicators of varieties, grown in the "new" regions (origins)
Таб.1 хемиски показатели за сортите одгледувани на "нови" реони

			INDICATORS Показатели							
			Tobacco composition, % Состав на тутунот во %						Smoke composition, mg/cg Состав на чадот, mg/cg	
Region Реон	Subregion Подреон	Origin Потекло	Nicotine Никотин	Red. sugars Ред. шекери	Red. sugars / nicotine Ред. шекери/ никотин	Total nitrogen Вкупен N	Ash Пепел	Potassium Калиум	Nicotine Никотин	Tars Катрани
Dzhebel К 81										
Yambol	Yaka	East Balkan	0.79	14.10	17.85	1.94	12.68	1.99	0.70	21.39
	Balkan		0.45	15.70	34.89	1.67	12.26	2.44	0.43	19.04
Nevrokop	Yaka	Nevrokop	1.71	12.30	7.19	2.43	12.18	1.42	1.52	25.14
	Balkan		0.81	19.60	24.20	1.80	10.50	1.80	0.71	22.54
Krumovgrad 90										
	Yaka		0.94	18.90	20.11	1.71	9.91	1.13	0.81	27.39
Nevrokop	Balkan	Nevrokop	0.68	21.40	31.47	1.51	8.91	1.15	0.62	27.23
	Pole		0.61	20.70	33.93	1.59	8.68	1.16	0.57	27.15
Razlog	Planinski	Nevrokop	0.58	18.60	32.07	2.00	9.53	1.25	0.55	26.43
G. Dzhumaya	Yaka	Dupnitsa	0.61	17.80	29.18	1.50	10.15	1.34	0.57	25.74
	Yaka		0.74	17.00	22.97	1.79	9.40	1.45	0.66	24.92
Sand.-Melnik	Poluyaka	Melnik	0.90	13.00	14.44	1.89	12.06	2.29	0.78	19.76
	Planinski		1.39	15.50	11.15	1.73	8.41	1.13	1.20	27.39
	Yaka		1.06	12.60	11.89	2.08	10.11	1.19	0.91	26.90
Petrich	Poluyaka	Melnik	0.88	13.40	15.23	2.19	9.52	1.71	0.77	23.12
	Pole		1.84	12.30	6.68	2.26	10.76	1.69	1.65	23.26

to the one pertaining to this variety. An exception is made for the nicotine content for the region of Nevrokop, subregion of Yaka, where it is relatively high, but in favourable ratio to the content of reducing sugars for the same subregion. Lower values of nicotine for the same variety are established with origin East Balkan, as the lowest is the content for subregion (Balkan).

The nicotine in the smoke is in full correlation with the nicotine in tobacco. The highest content of tars, correlated to the content of nicotine and reducing sugars is found in origin Nevrokop from subgerion of Yaka, which is an expression of higher content of this tobacco compared to the rest.

Variety Krumovgrad 90

Origin Nevrokop. The nicotine content in the discussed subregions of this variety shows relatively lower values than those typical for this variety. Yet, the values of the reducing sugars are relatively higher than those typical for the variety, which is also a prerequisite for possible biased taste feelings (biting), taking into account the relative high values of the ratio of reducing sugars/nicotine.

For the origin the best chemical indicators pertain to this variety in the subgerion of Yaka. The content of ashes for the discussed subregions does not differ.

Origin Dupnitsa and origin Melnik. Krumovgrad 90, grown in the different regions and subregions of Southwest Bulgaria, shows relatively higher values, at bigger variation of the nicotine for the different subregions of the origins

Melnik and Dupnitsa. Its value is the highest for the region of Petrich (Pole) and for Sandanski-Melnik (Planinski). In consideration of the content of reducing sugars and the ratio of reducing sugars/nicotine, respectively, the balance is the best in subregion Poluyaka for both regions – Sandanski-Melnik and Petrich of origin Melnik.

The content of tars varies significantly in the different subregions.

The evaluation of the chemical composition shows that the variety in the regions of origin Melnik (Sandanski-Melnik and Petrich) has the best indicators compared to the chemical indicators for the different subregions of the studied origins for variety Krumovgrad 90, which is generally acceptable.

Physical indicators. The indicators of the studied tobaccos do not show any significant differences in the values – density of cut tobacco and conditional cigarette yield (Table 2), respectively. It shows that in fact, no significant differences may be expected. Tobaccos have good filling capacity and cigarette yield, respectively, typical for the Oriental tobaccos.

Spectrophotometric evaluation ('image" taking) of the variety. The method serves exclusively to compare the extent of 'conformity" and/or "difference" between samples. The closer the discrete absorption values of the single samples, the closer the general nature in quality aspect should be. On the basis of the spectrum curves we cannot make conclusion about higher or lower quality of the variety.

Table 2 - Physical indicators of tobacco
Таб.2 - Физички показатели на тутунот

Region Реон	Subregion Подреон	Origin Потекло	Variety Сорта	Cut tobacco density, g/cm³ Дензитет на режен тутун g/cm³	Conditional cigarette yield, pcs. c/kg t Принос на кондиц. цигари парчиња
Yambol	Yaka	East Balkan	Dzh. K 81	0.245	1209
	Balkan			0.246	1205
Nevrokop	Yaka	Nevrokop	Dzh. K 81	0.260	1139
	Balkan			0.292	1114
	Yaka			0.248	1195
	Balkan		Kr. 90	0.310	956
	Pole			0.270	1096
Razlog	Planinski	Nevrokop		0.277	1070
Gorna Dzhumaya	Yaka	Dupnitsa	Kr. 90	0.292	1014
Sandanski-Melnik	Yaka	Melnik		0.252	1175
	Poluyaka			0.251	1181
	Planinski		Kr. 90	0.267	1110
Petrich	Yaka	Melnik		0.246	1205
	Poluyaka			0.244	1214
	Pole			0.220	1346

The conclusions we draw about the presence or absence of a difference are based on the previously established values of t-criterion in each specific case if compared by pairs. The evaluation approach (comparison of the same variety from the different regions) of the studied tobaccos in the spectrophotometric evaluation corresponds to the one in consideration of the chemical composition.

Variety Dzhebel K 81 (fig. 1). Statistically reliable differences are established between the variety grown in both origins, both regions (Yambol and Nevrokop), respectively. For the tobaccos grown in the region of origin East Balkan from both subregions (Yaka and Balkan) there is no reliable difference - tf=-1,85< tst=2,16 and 3,01. Therefore, H0 is accepted, i.e. with probability over 99% there is no reliable difference between the general expression of the quality of the variety from both subregions. For both subregions of origin Nevrokop (Yaka and Balkan) tobaccos differ between each other (tf=5,51). An important result in this case is that the tobaccos of both regions - Yambol and Nevrokop (the same variety of Dzhebel K 81) differ between each other.

Variety Krumovgrad 90

This variety for the different subregions of origin Nevrokop and Dupnitsa (fig. 2) demonstrates one-type quality in its general performance, i.e. there is no statistically reliable difference between the varieties except for the tobaccos from Razlog (Planinski) and Gorna Dzhumaya (Yaka) - tf=3,32.

Fig. 1. Spectrums of absorption of variety Dzhebel K 81 from the regions of Yambol and Nevrokop
Граф.1 Спектри на апсорпција кај сортата Џебел К-81 од реоните Јамбол и Неврокоп
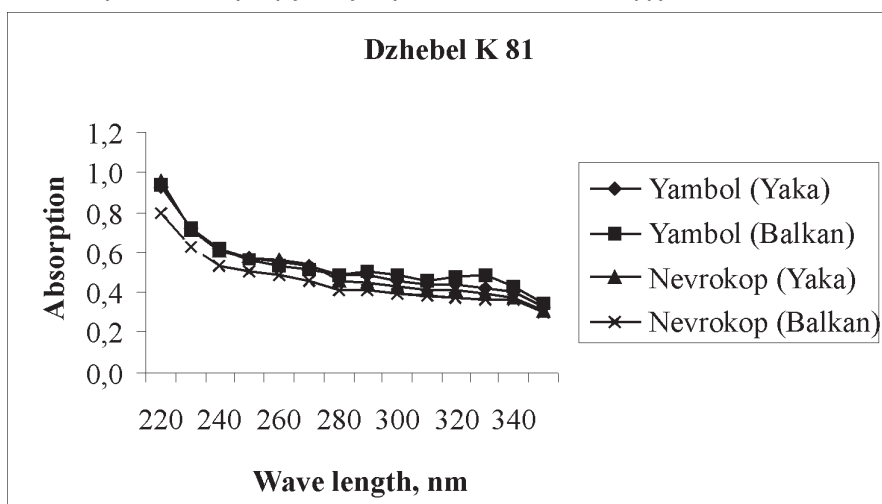
Fig. 2. Spectrums of absorption of variety Krumovgrad 90 from the regions of Nevrokop, Razlog and Gorna Dzhumaya.
Граф.2 Спектри на апсорпција кај сортата Крумовград 90 од реоните Неврокоп,Разлог и Горна Џумаја
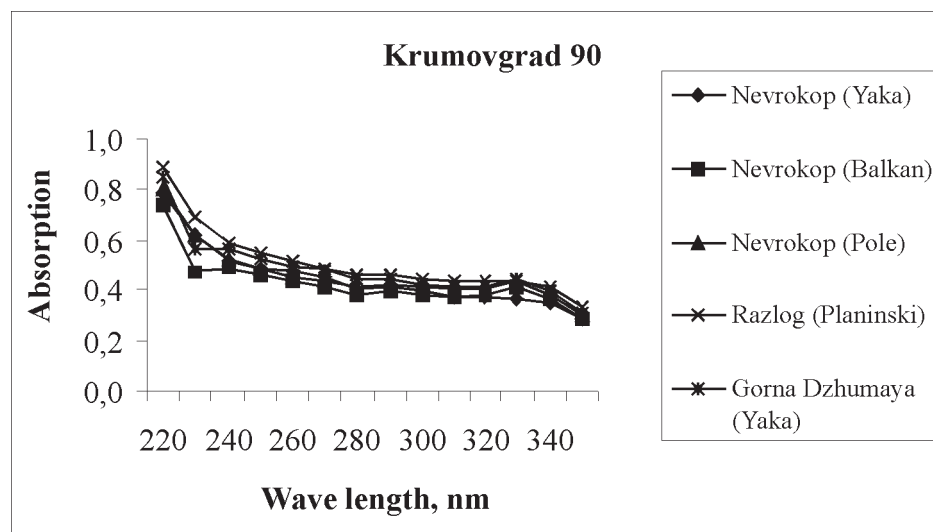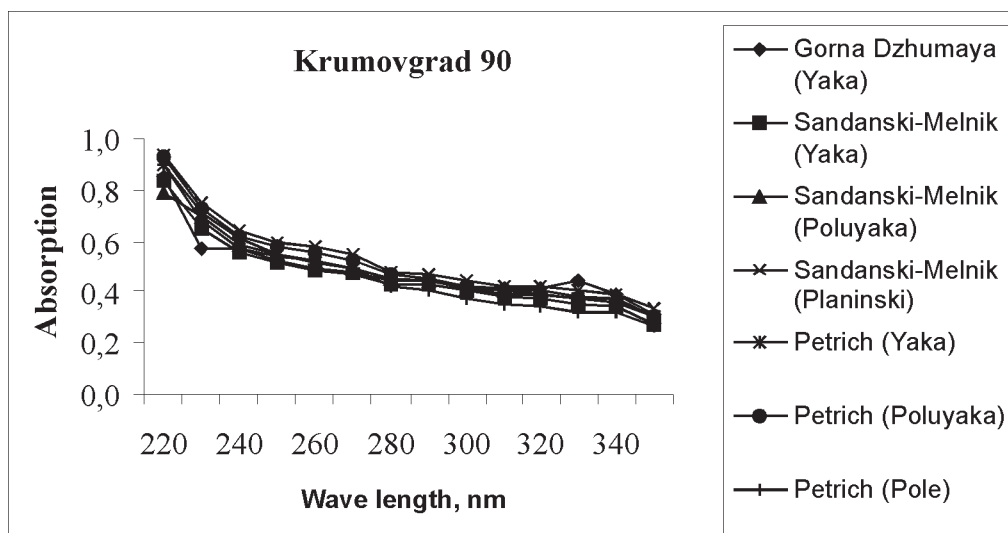

Figure 3 also demonstrates one-type quality of the variety from the different subregions of the origins Melnik and Dupnitsa, i.e. there are no statistically reliable differences between the varieties in the general quality expression. For the region of Petrich there is a proven difference between the subregions only for the subregion of Pole (tf=5,31; 19,36). For both regions of Sandanski-Melnik and Petrich there are statistical differences between Sandanski-Melnik (Planinski) and the subregions of Petrich (tf=12,27; 12,09; 20,96).

The general conclusion from the spectrophotometric evaluation that is prevailing is that variety Dzhebel K 81, grown in the different subregions of origin East Balkan has one-type quality expression, while the same variety in the subregions of origin Nevrokop shows quality differences. Also some reliable differences have been found between the two origins. For Krumovgrad 90, grown in the different regions (subregions), origins, respectively, there is close (one-type) quality expression.

Fig. 3. Spectrums of absorption of variety Krumovgrad 90 from the regions of Gorna Dzhumaya, Sandanski-Melnik and Petrich.
Граф.3 Спектри на апсорпција кај сортата Крумовград 90 од реоните Горна Џумаја, Сандански-Мелник и Петрич

Expert evaluation.

Variety Dzhebel K 81

The results from the expert evaluation of variety Dzhebel K 81 (Table 3), grown under the conditions of the "new" regions (origins) show reliable differences (W=0,94; Ff=62,67; Ft=3,82; f1=2,6; f2=10,4). The best quality expression is the one for the tobaccos grown in origin Nevrokop - Yaka and Balkan.

Table 3- Expert evaluation of variety Dzhebel K 81, grown in the "new" regions(origins)
Таб.3 Стручна процена на сортата Џебел К 81 одгледуван во "нови" реони

Expert-i - Експерт	Yambol		Nevrokop	
	Yaka	Balkan	Yaka	Balkan
1	3	4	1	2
2	3	4	1	2
3	4	3	1	2
4	3	4	1	2
5	3	4	1	2
Sum of ranks - Збир на рангови	16	19	5	10
Coefficient of relative arrangement Коефициент на релативен распоред	0.32	0.38	0.10	0.20
Rank coefficient - Коефициент на рангот	0.31	0.26	1	0.50
Grading - Оценка	**3**	**4**	**1**	**2**

The existing differences between the different subregions of the origin are probably due to factors (environmental and growing conditions), which will stay beyond our scope of investigations.

It is conclusively outlined that this variety under the conditions of origin Nevrokop there are better indicators compared to the two subregions of the region of Yambol.

Variety Krumovgrad 90

The approach in consideration of the results from the expert evaluation of the variety corresponds to the one applied in the evaluation of the chemical indicators, i.e. primarily the variety grown in the different subregions of Nevrokop, Razlog and Gorna Dzhumaya (Table 4) and second stage the same variety grown in the different subregions of Gorna Dzhumaya, Sandanski-Melnik and Petrich (Table 5).

Table 4 - Expert evaluation of variety Krumovgrad 90, grown in the "new" regions (origins)
Таб.4 Стручна процена на сортата Крумовград 90 одгледуван во "нови" реони

Expert-i - Експерт	Nevrokop			Razlog	Gorna Dzhumaya
	Yaka	Balkan	Pole	Planinski	Yaka
1	3	1	5	4	2
2	1	3	5	4	2
3	2	4	5	3	1
4	1	2	5	4	3
5	1	3	5	4	2
Sum of ranks - Збир на рангови	8	13	25	19	10
Coefficient of relative arrangement Коефициент на релативен распоред	0.11	0.17	0.33	0.25	0.13
Rank coefficient - Коефициент на рангот	1.00	0.62	0.32	0.42	0.80
Grading - Оценка	**1**	**3**	**5**	**4**	**2**

The results show in the first case a reliable proven difference between the compared tobaccos (W=0,78; Ff=14,18; Ft=3,18; f1=3,6; f2=14,4) in the following priority of grading: Nevrokop (Yaka), Gorna Dzhumaya (Yaka), Nevrokop (Balkan), Razlog (Planinski) and Nevrokop (Pole).

In the second stage the results are, as follows: Sandanski-Melnik (Yaka), followed by Gorna Dzhumaya (Yaka) and Sandanski-Melnik (Planinski) with the same evaluation, Petrich (Yaka), Sandanski-Melnik (Poluyaka), Petrich (Pole) and Petrich (Poluyaka). In this case, the differences and grading are statistically proven (W=0,59; Ff=5,76; Ft=2,58; f1=5,6; f2=22,4).

Table 5 - Expert evaluation of variety Krumovgrad 90, grown in the "new" regions (origins)
Таб.5 Стручна процена на сортата Крумовград 90 одгледуван во "нови" реони

Expert-i - Експерт	Gorna Dzhumaya	Sandanski-Melnik			Petrich		
	Yaka	Yaka	Poluyaka	Planinski	Yaka	Poluyaka	Pole
1	4	3	6	2	1	7	5
2	1	2	4	3	5	6	7
3	3	2	4	1	7	5	6
4	3	2	4	1	5	6	7
5	2	1	5	6	3	7	4
Sum of ranks - Збир на рангови	13	10	23	13	21	31	29
Coefficient of relative arrangement Коефициент на релативен распоред	0.09	0.07	0.16	0.09	0.15	0.22	0.21
Rank coefficient - Коефициент на рангот	0.77	1	0.43	0.77	0.48	0.32	0.34
Grading - Оценка	**2.5**	**1**	**5**	**2.5**	**4**	**7**	**6**

Taste evaluation.
Variety Dzhebel K 81
In the comparison of the tobaccos of this variety grown in the different regions no reliable differences are found in the smoke properties (W=0,37).
Variety Krumovgrad 90
The taste evaluation of variety Krumovgrad 90 grown in the different subregions of origin Nevrokop and the same for the regions of Razlog and Gorna Dzhumaya (Table 6) shows reliable differences between the tobaccos in these regions (W=0,57; Ff=6,63; Ft=3,02; f1=3,67; f2=18,35). The grading is, as follows: Nevrokop (Yaka), followed by the same origin of subregion Balkan, Razlog (Planinski), Nevrokop (Pole) and finally Gorna Dzhumaya (Yaka).

For the regions and subregions of Southwest Bulgaria (presented in Table 7) the results from the taste evaluation show the following grading: Gorna Dzhumaya (Yaka), Sandanski-Melnik (Yaka), Sandanski-Melnik (Poluyaka) and (Planinski) have the same evaluation (3,5), followed by the region of Petrich (Pole) and the same level for the tobaccos from the region of Petrich (Yaka) and (Poluyaka). The differences and grading are statistically proved (W=0,51; Ff=5,20; Ft=2,48; f1=5,67; f2=28,35). This grading, correspondingly, reports the quality level with respect of the smoking properties of this variety in the specified regions and subregions of growing.

Table 6 - Taste evaluation of variety Krumovgrad 90, grown in the "new" regions (origins)
Таб. 6 Дегустациона проценка на сортата Крумовград 90, одгледуван во "нови" реони

Taster-i Дегустатор	Nevrokop			Razlog	Gorna Dzhumaya
	Yaka	Balkan	Pole	Planinski	Yaka
1	2	1	3.5	3.5	5
2	1	4.5	2.5	2.5	4.5
3	1	2	3.5	3.5	5
4	3	3	3	3	3
5	1	2	4	3	5
6	2.5	2.5	4	1	5
Sum of ranks - Збир на рангови	10.5	15	20.5	16.5	27.5
Coefficient of relative arrangement Коефициент на релативен распоред	0.12	0.17	0.23	0.18	0.31
Rank coefficient - Коефициент на рангот	1	0.70	0.51	0.64	0.38
Grading - Оценка	**1**	**2**	**4**	**3**	**5**

Table 7 - Taste evaluation of variety Krumovgrad 90, grown in the "new" regions
Таб. 7 Дегустациона проценка на сортата Крумовград 90, одгледуван во "нови" реони

Taster-i Дегустатор	Gorna Dzhumaya	Sandanski-Melnik			Petrich		
	Yaka	Yaka	Poluyaka	Planinski	Yaka	Poluyaka	Pole
1	1	4	2.5	2.5	7	5	6
2	3.5	1	2	5.5	5.5	7	3.5
3	1.5	1.5	4	3	5.5	5.5	7
4	1	3	6.5	4	5	6.5	2
5	1	2	3	5	7	4	6
6	2	3	6.5	4.5	4.5	6.5	1
Sum of ranks - Збир на рангови	10	14.5	24.5	24.5	34.5	34.5	25.5
Coefficient of relative arrangement Коефициент на релативен распоред	0.06	0.09	0.15	0.15	0.21	0.21	0.15
Rank coefficient - Коефициент на рангот	1	0.69	0.41	0.41	0.29	0.29	0.39
Grading- Оценка	**1**	**2**	**3.5**	**3.5**	**6.5**	**6.5**	**5**

Complex evaluation.

For the complex evaluation of the samples it is necessary to preliminary specify the approach in the arrangement of the data about the chemical composition of tobacco. Nicotine is graded by its absolute values, i.e. the highest value is ranked one etc. The reducing sugars are graded according to the optimal accepted rank of 10-16%, as the increase or decrease, in return, grades the tobacco in lower extent (smaller rank)

The same approach is accepted as an evaluation (arrangement) with respect of the ratio of sugars/nicotine, whose optimal value is accepted as 15 and the approach of grading is the same as in the reducing sugars.

Table 8 presents the complex evaluation of variety Dzhebel K 81 for origins East Balkan and Nevrokop. This variety shows better quality for the regionof Yambol (Yaka), followed by Nevrokop (Yaka), without any difference among the other investigated samples.

Table 8 - Complex evaluation of variety Dzhebel K 81, grown in the "new" regions
Таб.8 Комплексна процена на сортата Џебел к81 одгледуван во "нови" реони

Indicators Показатели	Dzhebel K 81								
	Arrangement of Samples Распоред на мострите				Coefficient of importance Коефициент на важност	Quality Index of the Variety Индекс на квалитет на сортата			
	Yambol Yaka	Yambol Balkan	N-p* Yaka	N-p* Balkan		Yambol Yaka	Yambol Balkan	N-p* Yaka	N-p* Balkan
Nicotine, % Никотин	2.5	4	1	2.5	0.20	0.50	0.80	0.20	0.50
Red. sugars, % Редуцирани шеќери	1.5	1.5	3	4	0.12	0.18	0.18	0.36	0.48
Red. sugars/nicotine Ред. шеќери/Никотин	1	4	2	3	0.18	0.18	0.72	0.36	0.54
Tars, mg/cig Катрани	2	1	4	3	0.10	0.20	0.10	0.40	0.30
Special volume, cm³/g Спец. волумен	1.5	1.5	3	4	0.05	0.08	0.08	0.15	0.20
Expertise Експертиза	3	4	1	2	0.10	0.30	0.40	0.10	0.20
Degustation Дегустација	2.5	2.5	2.5	2.5	0.25	0.63	0.63	0.63	0.63
						2.07	2.91	2.20	2.85
						1	**3.5**	**2**	**3.5**

*Nevrokop

For variety Krumovgrad 90 from the "new" regions, origins - Nevrokop, Dupnitsa and Melnik, correspondingly, we present the final results for the obtained quality index (Table 9).

Variety Krumovgrad 90, grown in the regions of origin Nevrokop, respectively, Razlog and Gorna Dzhumaya, shows better results for Nevrokop (Yaka) compared to the other regions and subregions. In the comparison of the latter better appear the results for the variety in the region of Gorna Dzhumaya (Yaka). As for the other samples, the differences are smaller, regardless of the specified grading.

For the regions of Southwest Bulgaria - Gorna Dzhumaya, Sandanski-Melnik and Petrich, and the different subregions therein the same variety for Sandanski-Melnik from the two subregions "Poluyaka" and "Planinski" is of the best quality, followed by subregion "Yaka" of the same region, and the rest of them coming next.

Table 9 - Quality index and grading of variety Krumovgrad 90 from the "new" regions
Таб. 9 Индекс на квалитетот и оцена за сортата Крумовград 90 одгледуван во "нови" реони

Region Реон	Subregion Подреон	Origin Потекло	Quality Index Индекс на квалитет	Grading Оценка
Nevrokop	Yaka		1.48	**1**
	Balkan	Nevrokop	3.29	**4**
	Pole		4.08	**5**
Razlog	Planinski		3.22	**3**
G. Dzhumaya	Yaka	Dupnitsa	2.93	**2**
G. Dzhumaya	Yaka	Dupnitsa	4.73	**6.5**
	Yaka		3.84	**3**
Sandanski-Melnik	Poluyaka		3.30	**1.5**
	Planinski	Melnik	3.28	**1.5**
Petrich	Yaka		4.71	**6.5**
	Poluyaka		4.12	**4.5**
	Pole	Melnik	4.06	**4.5**

The obtained results confirm the fact, mentioned so far, that variety Krumovgrad 90 gives convincing good indicators describing the quality for the regions of Southwest Bulgaria.

As a whole, in the comparative evaluation of the same variety in the "new" regions, origins, correspondingly, the results show that the general nature of ecotype Krumovgrad has been preserved with some admissible differences under the influence of the different factors and the nature of the crop over the different years.

4. CONCLUSION

1. The differences in the chemical composition of the tobaccos from variety Dzhebel K 81 grown in the different regions are within the admissible limits typical for the type. The same also refers to variety Krumovgrad 90.
2. By general assessment of the quality, the tobaccos grown in the different subregions of the origin have close qualities (properties) in both investigated varieties (Dzhebel K 81 and Krumovgrad).
3. In the assessment of the tobaccos by external indicators of quality in the different cases of
4. Reliable differences have been established in the smoking properties of variety Krumovgrad 90 grown in the "new" origins and lack of difference for variety Dzhebel K 81.
5. The grading on the basis of a complex assessment of quality shows that the tobaccos from the following regions (subregions) have the best indicators:
For variety Dzhebel K 81: the regions of Yambol and Nevrokop - subregions of Yaka.
For variety Krumovgrad 90: the regions of Nevrokop (Yaka) and Sandanski-Melnik (Poluyaka and Planinski).

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ТЕХНОЛОШКО ПРОУЧУВАЊЕ НА КВАЛИТЕТОТ НА ТУТУНСКИТЕ СОРТИ ЏЕБЕЛ К 81 И КРУМОВГРАД 90 ОДГЛЕДУВАНИ ВО НЕТРАДИЦИОНАЛНИ РЕГИОНИ

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РЕЗИМЕ

Тенденциите набљудувани последниве години за ширење на производството на одделни сорти тутун (главно екотипот крумовград и, во помал степен, џебел) во за нив нетипични региони (нереонирани) го наложија спроведувањето на ова технолошко проучување. Целта беше да се проучи квалитетот на тутунските сорти Џебел К 81 и Крумовград 90 одгледувани во различни "нови" реони. Одредени се основните објективни показатели на квалитетот. Крајната оценка за квалитетот и класите е добиена врз база на комплексна евалуација.

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