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Technological Investigation on Quality and Possibilities for Widening the Production of Market Demanded Oriental Type Tobaccos

MESSAGE II: Technological Investigation on Krumovgrad 90

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Abstract

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As far as market demanded tobaccos in our country are concerned, the greatest interest is paid in the ecotype of Krumovgrad because of its characteristic qualities demanded at the international market. This investigation refers to the variety of Krumovgrad 90, grown in different regions, respectively origins, as compared to tobacco from the typical region of Krumovgrad and the mass varieties for the respective origins. The main indices characterizing the quality have been investigated and a complex evaluation of tobaccos from the different regions and sub-regions of the origins has been made. It has been established that the quality of Krumovgrad 90 variety from the different regions and sub-regions of the origins investigated does not differ significantly from that of tobacco grown in the typical region. The differences can be found in the admissible limits of the type, which is due to the existing differences in the ecological conditions and the agricultural technique applied. It is completely possible to grow this variety in the regions of the origin of "Melnik", while as regards the origin of "Nevrokop" - its quality is inferior to that of the local N 261.

Key words: Oriental type tobaccos, variety of Krumovgrad 90, quality index

Introduction

The forth-coming admission of R. Bulgaria to the European Union has imposed

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the necessity of adequate policy, which will allow the introduction of the General Economic Policy in the tobacco sector in as adequate and corresponding to the social

and economical needs of R. Bulgaria way as possible (Ahmedov, 2003).

According to the report delivered by Schtangl (2005), R. Bulgaria possesses the unique chance to confirm itself as one of the leading countries producers of the best aromatic Oriental type tobaccos.

The investigation made by Zaprjanova (2006) is interesting. She states that there is at the same time similarity and dissimilarity among the different regions for growing Oriental type tobaccos in our country, as regards the soils, the relief and the climate. These dissimilarities can be overcome to a certain degree by implementing agricultural and technical measures.

The selection of suitable varieties and production technologies is of great importance for displaying the characteristic quality indices and smoking qualities of tobacco from the different origins (Dimanov, 2005).

As far as recently market demanded tobaccos in our country are concerned, the interest for growing the ecotype of Krumovgrad is the greatest one, because of its characteristic qualities, which are demanded at the international market.

This technological investigation refers to the variety of Krumovgrad 90 grown in untypical regions compared to tobacco from the typical region of Krumovgrad and the mass varieties for the respective origins.

Purpose of the Investigation: Comparative technological investigation on the quality of Krumovgrad 90 variety, grown in different regions, respectively origins and tobacco from the typical for its production region and the mass varieties from the respective origins.

Materials and Methods

The investigation has been done on Krumovgrad 90 variety grown in the regions of "Nevrokop", "Dupnitsa" and "Melnik" origins, from 2005 crop.

For the variety of Krumovgrad 90 (the origin of "Krumovgrad") from the *typical* region, respectively sub-regions, tobaccos for forming the control samples (**standard**) have been taken, as follows: The region of Krumovgrad: the sub-region of "Krumovgrad" - from six settlements (Vransko, Gorna Kula, Polkovnik Zheljaskovo, Rogatch, Gulijka and Krumovgrad); the sub-region of "Zvezdel" (Zvezdel, Karamfil and Slivarka).

The approach for the formation of the experimental samples corresponds to that one indicated in the Message I.

The mass varieties for the origin of "Nevrokop", used for making the comparison have been as follows: Nevrokop 261 (N 261) and Nevrokop 1146 (N 1146). Concerning the variety N 261, a single sample has been formed from two settlements (Breznitsa and Luky); Concerning the variety N 1146, tobaccos from four settlements have been taken (Tuhovishte, Debren, Hadji Dimovo and Banichan) and a single sample has been formed.

The "new" varieties, for which it is necessary to make an evaluation and comparison with the above-mentioned mass varieties and the control, have been formed in the following way:

The variety of Krumovgrad 90 (the origin of "Nevrokop") - four samples have been formed, as follows: the first sample refers to the sub-region of "Yaka" has been taken from four settlements (the villages

of Breznitza, Zhizhevo, Valkosel and Ablanitza); the second sample - the sub-region of "Balkan" (the villages of Kochan and Debren); the third sample - the sub-region of "Pole" (the villages of Musomishte and Ognjanovo) and the fourth sample - the region of Razlog, the sub-region of "Planinski" (the villages of Jurukovo and Gorno Kraishte).

The variety of Krumovgrad 90 (the origin of "Dupnitsa") - the region of Gorna Djumaya, the sub-region of "Yaka" - a single sample (the villages of Bulgarchevo, Padesh and Dolno Osenovo).

The variety of Krumovgrad 90 (the origin of "Melnik") grown in two regions and in different sub-regions: *the region of Sandanski-Melnik* - the first sample referring to the sub-region of "Yaka" from two settlements (the villages of Levunovo and Kromidovo); the second sample from the sub-region of "Poluyaka" from one settlement (the village of Petrovo) and the third sample from the sub-region of "Planinski" (the villages of Gega and Dolna Krushitza). Concerning *the region of Petrich*, three sub-regions have been investigated: the sub-region of "Yaka" - the village of Karnalovo; the sub-region of "Poluyaka" (the villages of Kljuch, Kamena and Javornitza) and the sub-region of "Pole" - the village of Parvomaj.

The basic indices characterizing quality: the chemical composition of tobacco, the chemical composition of tobacco smoke; the spectrophotometrical evaluation; the expert evaluation; the smoking qualities, and the complex evaluation have been done in the same way as in the Message I.

Results and Discussion

For analysis and interpretation of the results, the following schedule has been

applied: comparison of tobaccos from the "new" variety of Krumovgrad 90 with the same one from the typical for its production region (the region of Krumovgrad - the sub-region of Krumovgrad) and with the mass varieties (divided into regions) for the given regions, respectively origins.

Chemical composition. The results obtained have been presented in Tables 1 and 1A.

The criteria for chemical indices difference of tobaccos investigated, which we have used, have been presented in our previous investigations (Drachev et al., 2005).

The origin of "Nevrokop" (the regions of Nevrokop and Razlog). The nicotine content of the "new" variety from the sub-region of "Yaka" is the highest and closer to the typical one, as compared to the remaining three sub-regions. The nicotine content of the same variety from the sub-region of "Yaka" and the mass variety of N 261 is almost identical. N 1146 have the lowest content as compared to all the rest for this origin. Concerning the reducing sugars, the control sample has the lowest content, while the "new" variety from the sub-region of "Balkan" has the highest one, and among the rest there is no difference. Concerning the two basic indices (nicotine and reducing sugars) the standard is the most balanced, closest to it are N 261 and Krumovgrad 90 from the sub-region of "Yaka". There are no significant differences in the reducing sugars content among the local varieties and the "new" variety from the different sub-regions. Considerable differences have been established in the content of the latter between the typical and the "new" variety from the different sub-regions. Tobacco from the sub-region of "Planinski"

Table 1
Chemical indices of tobaccos from the origin "Nevrokop", 2005 crop

Indices	Nevrokop						Razlog
	K 90**	N 261*	N 1146*	Yaka ¹ K 90	Balkan K 90	Pole ² K 90	Planinski ³ K 90
Chemical composition of tobacco, %							
Nicotine	0.87	0.96	0.45	0.94	0.68	0.61	0.58
Red. sugars	12.80	19.00	19.50	18.90	21.40	20.70	18.60
Red. sugars/nicotine	14.71	19.79	43.33	20.11	31.47	33.93	32.07
Total nitrogen	1.83	1.52	1.42	1.71	1.51	1.59	2.00
Ashes	11.14	10.11	10.03	9.91	8.91	8.68	9.53
Potassium	5.66	1.82	1.97	1.13	1.15	1.16	1.25
Chemical composition of smoke, mg/cig							
Nicotine	0.76	0.83	0.43	0.81	0.62	0.57	0.55
Tars	22.11	22.42	21.51	27.39	27.23	27.15	26.43

*-mass varieties; **-typical variety (control)

¹-neck; ²-field; ³-mountain

Table 1A (Continuation)
Chemical indices of tobaccos from the origins of "Dupnitsa" and "Melnik", 2005 crop

Indices	Origin									
	Dupnitsa		Melnik							
	Gorna Djumaya		Sandanski-Melnik				Petrich			
	K** 90	Yaka ¹ K. 90	K** 90	Yaka K. 90	P-ka ⁴ K. 90	Pole ² K. 90	K** 90	Yaka K. 90	P-ka K. 90	Pole K. 90
Chemical composition of tobacco, %										
Nicotine	0.87	0.61	0.87	0.74	0.9	1.39	0.87	1.06	0.88	1.84
Red. sugars	12.8	17.8	12.8	17	13	15.5	12.8	12.6	13.4	12.3
Red. sug./nicotine	14.71	29.18	14.71	22.97	14.44	11.15	14.7	11.9	15.2	6.68
Total nitrogen	1.83	1.5	1.83	1.79	1.89	1.73	1.83	2.08	2.19	2.26
Ashes	11.14	10.15	11.14	9.4	12.06	8.41	11.1	10.1	9.52	10.76
Potassium	1.87	1.34	1.87	1.45	2.29	1.13	1.87	1.19	1.71	1.69
Chemical composition of tobacco smoke, mg/cig										
Nicotine	0.76	0.57	0.76	0.66	0.78	1.2	0.76	0.91	0.77	1.65
Tars	22.11	25.74	22.11	24.92	19.76	27.39	22.1	26.9	23.1	23.26

** - typical variety (control)

¹ - neck; ² - field; ⁴ - semi-neck

has the highest total nitrogen content, followed by the control.

Nicotine in tobacco smoke corresponds to nicotine in tobacco in all samples examined. The "new" variety of Krumovgrad 90 from the different sub-regions has higher values of tars, as compared at the same time with the typical one (the standard) and with the mass ones.

The origin of "Dupnitsa" (the region of Gorna Djumaya). The control has a little higher content of nicotine; the "new" variety (Yaka) has higher sugars content; however, tobacco from the typical region has a more balanced ratio reducing sugars/nicotine. Total nitrogen and ashes content in tobaccos compared do not differ considerably.

The origin of "Melnik" (the region of Sandanski-Melnik). Tobaccos from the sub-region of "Planinski" have the highest nicotine content for the origin, as compared to the standard and lower - in the "new" variety for the sub-region of "Yaka". The chemical composition of the standard and Krumovgrad 90 from the sub-region of "Poluyaka" is more favorable one, with no considerable differences between them.

The lowest is the tars content in the "new" variety from the sub-region of "Poluyaka", and the highest for the same variety from the sub-region of "Planinski", the differences between them being considerable.

The origin of "Melnik" (the region of Petrich). Tobacco nicotine content from the separate sub-regions of the origin do not differ considerably, with the exception of the sub-region of "Pole", where its content is considerably higher. The reducing sugars content is with no differences among tobaccos from the separate sub-regions and the standard. Concerning total nitrogen content there are no consider-

able differences among the samples compared. Ashes content data are analogical, too. Tars content is the highest one for the sub-region of "Yaka", while among the remaining one there are no significant differences.

Spectrophotometrical evaluation (Taking of the "Image") of the variety. The statistical significance control for the differences among the samples compared has been done in the same way, as in the message I. The conclusions we draw as regards the presence or the absence of any difference have been based on the preliminarily established values for the t-criterion for each separate case, when comparing by couples.

The origin of "Nevrokop" (Figure 1). The results from the statistical processing have shown that between the typical variety of Krumovgrad 90 and the "new" variety in the different sub-regions of the origin authentic difference has been established, i.e. tobaccos differ as regards the general quality display. Among tobaccos from the "new" variety of Krumovgrad 90 in the different sub-regions there is no authentic difference, i.e. they do not differ among themselves. When comparing the two local varieties - N 261 and N 1146, as well as when compared with the newly divided into regions, the case is analogical. We could not establish authentic difference when comparing the control with the two mass varieties - N 261 and N 1146.

The origin of "Dupnitsa" (Figure 2). Statistically significant difference ($t_0=5.23$) has been determined between the typical variety of Krumovgrad 90 and the same one from the region of Gorna Djumaya.

The origin of "Melnik" (Figure 3). When making a comparison between

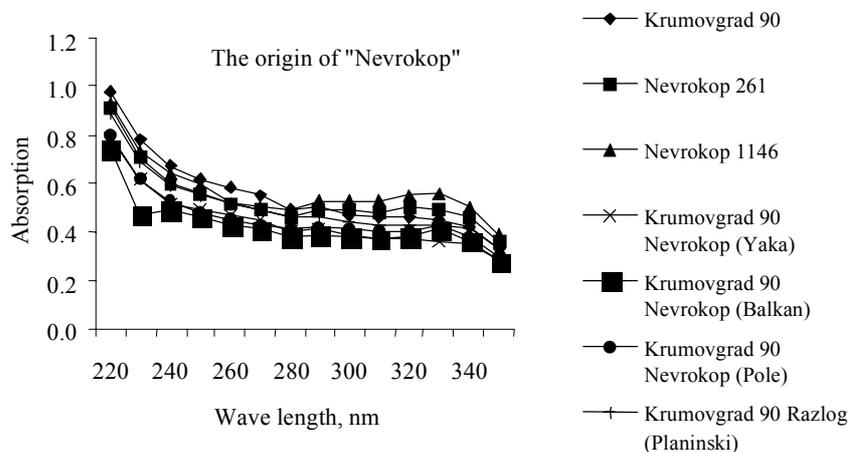


Fig. 1. Absorption spectra of the varieties from the origin of "Nevrokop", 2005 crop

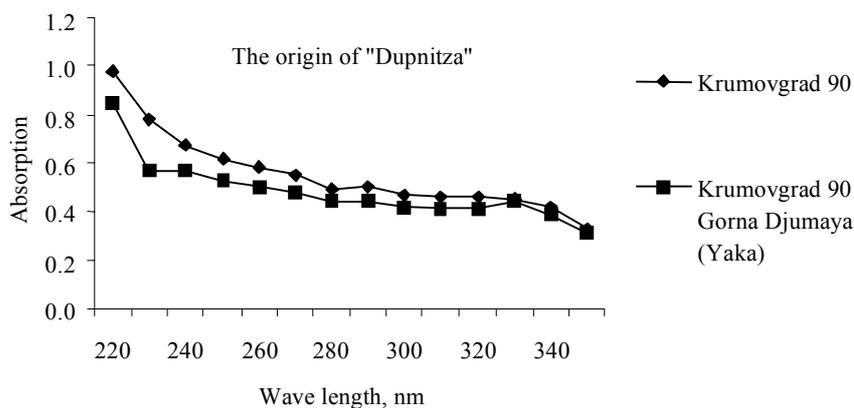


Fig. 2. Absorption spectra of the varieties from the origin of "Dupnitza", 2005 crop

Krumovgrad 90 (typical) and the "new" variety from the different sub-regions of Sandanski-Melnik and Petrich, an authentically established difference can be seen. Among tobaccos of the "new" Krumovgrad 90 from the different sub-regions of Sandanski-Melnik, difference can be seen only in the case of the sub-region of "Planinski", which cannot be explained in

other way but by the different ecological conditions and the agricultural technique applied. When comparing tobaccos from the region of Petrich, differences can be established for the sub-region of "Pole", the explanation of that being the same as in the above-mentioned.

The conclusion is that as far as the general quality display is concerned, to-

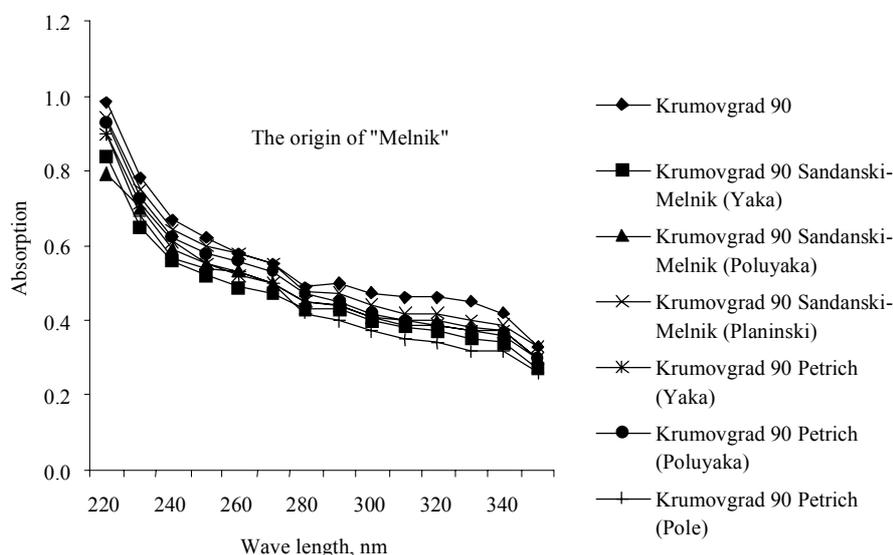


Fig. 3. Absorption spectra of the varieties from the origin of "Melnik", 2005 crop

baccos of the "new" variety for the region of Sandanski-Melnik and respectively Petrich do not display the respective differences, except the above-mentioned.

The general conclusion, which has been imposed, is that the control sample (Krumovgrad 90) differs from the newly divided into regions tobaccos. The "new" varieties of Krumovgrad 90 grown in the different regions and sub-regions (origins) are close in between.

Expert evaluation. The origin of "Nevrokok". When comparing the standard (Krumovgrad 90) with the local varieties for the origin and the "new" variety grown in the different sub-regions, the results have shown lack of concordance of the evaluations given by the members of the board ($W=0.25$).

The origin of "Dupnitsa". The results have shown lack of differences between the control and the "new" variety grown in the region of Gorna Djumaya ($RCN=0.45$).

The origin of "Melnik". In this origin definite differences between tobaccos compared (the standard and the "new" variety from the different sub-regions of Sandanski-Melnik and Petrich) cannot be reliably proved according to their external quality features ($W=0.24$).

Smoking evaluation. The origin of "Nevrokok" (Table 2). The statistical data processing of tobacco smoking qualities from the origin (standard, mass varieties N 261 and N 1146 and the variety of Krumovgrad 90 from the different sub-regions) has shown considerable differences between them ($W=0.73$; $F\hat{o}=16.22$; $Ft=2.11$; $f1=5.71$; $f2=34.26$). The control has emerged to be the best one, followed by the two local varieties, after which in the respective order are arranged the tobaccos from the different sub-regions of the origin. Therefore, the variety of Krumovgrad 90 grown in the different sub-regions of the origin of "Nevrokok" has comparatively more unsatisfactory smok-

Table 2
Smoking qualities of tobaccos from the origin "Nevrokop", 2005 crop

Taster-i	K 90**	N 261*	N 1146*	Krumovgrad 90			
				Nevrokop			Razlog
				Yaka ¹	Balkan	Pole ²	Planinski ³
1	1.5	1.5	3	4	6.5	5	6.5
2	1	2.5	4	5.5	7	2.5	5.5
3	1	4	4	7	6	2	4
4	2	2	2	4.5	6.5	6.5	4.5
5	1.5	1.5	3	5	7	5	5
6	2.5	2.5	1	4.5	6.5	4.5	6.5
7	3	1.5	1.5	5.5	5.5	5.5	5.5
Grades sum	12.5	15.5	18.5	36	45	31	37.5
Coeff.of relative ranging	0.06	0.08	0.09	0.18	0.23	0.16	0.19
Range coefficient	1	0.81	0.68	0.35	0.28	0.40	0.33
Grading	1	2	3	5	7	4	6

*-mass varieties; **-typical variety (standard)

¹-neck; ²-field; ³-mountain

ing qualities as compared to the control and the mass varieties (N 261 and N 1146).

The origin of "Dupnitsa". When comparing the control variety of Krumovgrad 90 with the "new" variety from the region of Gorna Djumaya (Yaka) no differences can be seen (RCN=1.62).

The origin of "Melnik". During the statistical data processing lack of concordance of the results has been established, i.e. between the samples no authentic differences in the smoking qualities exist (W=0.39).

Complex evaluation. The approach for data ranging as regards the chemical composition of tobacco has been stated in the Message I.

The complex evaluation of the typical

(control) variety, the local varieties and the "new" variety from the different sub-regions of the *origin of "Nevrokop"* (the region of Nevrokop) has been presented in Table 3. The standard has been evaluated with the best indices, followed by the local N 261. The "new" variety - Krumovgrad 90 in the sub-regions of this region has received lower evaluation as compared to the first two. Of them, this variety from the sub-region of "Yaka" has displayed the best quality indices.

For the remaining origins only the quality index of the respective sample has been presented in Table 4.

The origin of "Dupnitsa" (the region of Gorna Djumaya). The comparison between the typical variety of Krumovgrad 90 and the "new" variety in Gorna

Table 3
Complex evaluation of tobaccos from the origin "Nevrokop", 2005 crop

Indices	Ranging of samples										Coeff. ***	Quality index of the variety					
	K		N		1146*		Krumovgrad 90		Nevrokop			Razlog	Krumovgrad 90		Nevrokop		Razlog
	90**	261*	N	N	1146*	Yaka	B-n ²	Pole	Pole	Plan. ³			Yaka	B-n	Pole	Plan.	
Nicotine, %	3	1	7	2	4	5	6	2	0.20	0.60	0.20	1.40	0.40	0.80	1.00	1.20	
Red. sugars, %	2	4	5	2	7	6	2	0.12	0.24	0.48	0.60	0.24	0.84	0.72	0.24	0.24	
Red. sug./n-e ¹	1	2	7	3	4	6	5	0.18	0.18	0.36	1.26	0.54	0.72	1.08	0.90	0.90	
Tars, mg/cig	2.5	2.5	1	6	6	6	4	0.10	0.25	0.25	0.10	0.60	0.60	0.60	0.40	0.40	
Sp. vol., cm ³ /g	3	-	2	1	6	4	5	0.05	0.15	-	0.10	0.05	0.30	0.20	0.25	0.25	
Expertizat	4	4	4	4	4	4	4	0.10	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Tasting	1	2	3	5	7	4	6	0.25	0.25	0.50	0.75	1.25	1.75	1.00	1.50	1.50	
	2.07	2.19	4.61	3.48	5.41	5.00	4.89	1	2	4	3	7	6	5			

*mass varieties;

** - standard, *** - coefficient of significance;

¹ - Reducing sugars/nrcotine;

² - Balkan; ³ - Planinski

Table 4
Quality index and grading of tobaccos investigated,
according to their origins, 2005 crop

Region	Sub-region	Origin	Variety	Quality index	Grading
Krumovgrad			Kr. 90*	1.18	1
Gorna Djumaya	Yaka ¹	Dupnitsa	Kr. 90	1.83	2
Krumovgrad			Kr. 90*	3.69	3
Sandanski-Melnik	Yaka ¹		Kr. 90	5.56	7
	Poluyaka ⁴	Melnik	Kr. 90	3.59	1
	Planinski ³		Kr. 90	3.87	5.5
Petrich	Yaka ¹		Kr. 90	3.93	5.5
	Poluyaka ⁴	Melnik	Kr. 90	3.72	3
	Pole ²		Kr. 90	3.65	3

*-typical variety (standard)

¹-neck; ²-field; ³-mountainous; ⁴- semi-neck

Djumaya (Yaka) has shown a higher qualitiveness for the former (Table 4).

The origin of Melnik (the regions of Sandanski-Melnik and Petrich). When making a complex evaluation of the tobaccos from that origin, the separate sub-regions of the above-mentioned regions have been included in one and the same group for comparison. The results obtained on the basis of quality index of the variety (Krumovgrad 90) have shown that the latter has the best indices for Sandanski-Melnik (Poluyaka). The control and the "new" variety from the region of Petrich (Poluyaka and pole) have obtained identical evaluations, and after them the remaining samples investigated have been arranged. There are comparatively small differences in the quality index value, according to which the grading has been done, and this shows uniformity and a general character in quality display of the va-

riety in these regions and sub-regions, respectively. Therefore, the quality of Krumovgrad 90, grown in this region (Petrich-Sandanski) is not inferior and stands closest to the same variety from the typical region (control), i.e. this variety has proved to be completely suitable for the regions and sub-regions of South-Western Bulgaria, which has been confirmed by our previous studies (2004's crop).

Conclusions

The chemical composition of tobaccos from the variety of Krumovgrad 90 studied, which are grown in the regions investigated does not differ considerably from that of the typical (control) variety and the mass varieties. The differences are within the admissible limits characteristic for the type.

The spectrophotometric evaluation (Taking of the "Image") has shown that tobaccos from the variety of Krumovgrad 90 investigated *grown in the different sub-regions* of the origin have closer characteristics and differ from the local varieties in these regions and from the standard.

When making evaluation according to external quality features no statistically authentic differences have been established in all tobaccos investigated.

It has been established that the smoking qualities of the variety of Krumovgrad 90 grown in the different regions of the origins of "Dupnitsa" and "Melnik" do not differ from the standard. For the origin of "Nevrokop" the newly divided into regions variety gives in to the control as well as to the two local varieties.

When grading according to regions and sub-regions (origins), the best indices have been shown by:

- The region of Nevrokop (the origin of "Nevrokop") - Krumovgrad 90 (typical), followed by N 261 (local);

- The region of Gorna Djumaya (the origin of "Dupnitsa") - Krumovgrad 90 (typical);

- The regions of Sandanski-Melnik and Petrich (the origin of "Melnik") - Krumovgrad 90 (poluyaka).

It has been determined that the variety of Krumovgrad 90 grown in the different

regions (sub-regions, respectively), according to the general quality evaluation has been suitable for growing in the regions of Sandanski-Melnik and Petrich (the origin of "Melnik") and its growing has not been very successful in the sub-regions of the origin of "Nevrokop".

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