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

MESSAGE I: Technological Investigation on Djebel K 81

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Abstract


At new conditions, the tobacco sector should completely be subjected to market demands, as regards its volume and its structure. As far as our country is concerned, this means market adaptation of the variety structure of tobaccos grown in the different regions. In this study a technological investigation of the variety of Djebel K 81 has been done, which is grown in the different sub-regions and regions of the origins of "Eastern Balkan" and "Nevrokop", as compared to the mass varieties for these origins. The routine indices for quality specification have been used: the chemical composition of tobacco and tobacco smoke; the spectral curves of tobacco water extraction (Taking of the "image"); the expert and smoking evaluation. In order to prove the authenticity of the results, the data have been processed by using the variation and statistical method. On the basis of the complex evaluation, grading of tobaccos investigated has been done in regions and sub-regions for their origins. It has been established that it will be purposeful to grow the investigated variety of Djebel K 81 in the region of Yambol (the origin of "Eastern Balkan"), and also in the region of Nevrokop (the origin of "Nevrokop" - the sub-region of Yaka), when market demand is greater.

Key words: Oriental type tobaccos, variety of Djebel K 81, quality, chemical composition of tobacco and tobacco smoke, expert evaluation, smoking evaluation, quality index

Introduction

Tobacco world market is a global, open and cyclic one. Its cyclic character has been determined by the ever-changing balance of "supply/demand" and the price fluctuations (Astutì, 2005). The new conditions, in which tobacco
sector is functioning in our country, as well as the forth-coming admission of R. Bulgaria into the European Union have imposed restructuring of the existing normative and legal order and actualization of a number of basic problems concerned with tobacco production and tobacco processing. Ahmedov (2003) in his publication characterizes the national strategy for tobacco production development, by means of which the governmental policy in the field of tobacco, for the period 2003-2007 will be realized. The author reviews the changes, which have been observed in the field of tobacco and tobacco products production in national and in international scale, concerning production and market structure.

The improvement of variety division into regions, as a market necessity for Oriental type tobaccos has been indicated by many authors (Slavova, 2002; Slavova and Drachev, 2004; Tabakova, 1997). Standardization, stabilization and enlargement of the market demanded varieties and origins should be done.

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

Recently, a tendency for searching for the origins of Krumovgrad and Djebel has been confirmed, as a result of which our attention has been directed to them.

The above-mentioned confirms the necessity for scientifically grounded investigation of the real possibilities for widening the production of market demanded tobaccos (varieties and origins) on the basis of technological evaluation of quality.

Purpose of Investigation: Comparative technological investigation on quality of the variety of Djebel K 81 and the mass varieties grown in different regions, respectively origins, with the purpose of studying the possibilities for widening their area of production.

Materials and Methods

This investigation refers to tobacco variety of Djebel K 81 grown in the regions of the origins of "Eastern Balkan" and "Nevrokop", of 2005 crop.

The material for investigation of these varieties has been taken in the form of tobacco strings from different tobacco producers and settlements in the respective regions and sub-regions. The samples have been formed on the bases of the so c. "third mother" (leaves bigger than the "kovalama"), the "kovalama" (leaves bigger than the "utches") and the "utches" (the smallest and the topmost leaves), i.e. the top quality and the most characteristic material for the Oriental type tobaccos, corresponding to the 1st standard grade. Tobacco has been precisely graded, the nontypical and defective leaves been taken away, with the purpose of forming a uniform quality group for investigation. Whenever the variety has been taken from different settlements of the region (sub-region), a single sample should be formed by blending equal quantities of tobaccos from the given settlements.

The mass varieties used for making the comparison have been as follows: For the first origin (Eastern Balkan) - Elenski 817 from the village of Maglen; for the second origin (Nevrokop) - Nevrokop 261 (N 261) and Nevrokop 1146 (N 1146). For the variety of N 261 a single sample has been formed from two settlements (Breznitza and Luky). For the variety of N 1146 tobaccos from four settlements.
have been taken (Tuhovishte, Debren, Hadji Dimovo and Banichan) and a single sample has been formed for the investigation.

The "new"** varieties, which should be evaluated and compared to the above-mentioned mass varieties for the different regions and sub-regions of the two origins have been formed in the following way:

For the origin of "Eastern Balkan" two samples have been formed from the given settlements of the region of Yambol: the sub-region of "Yaka" (Rechitza, Cheresha, Skalak and Zajchar) and the sub-region of "Balkan" (the village of Yasenovo).

For the origin of "Nevrokop" - two samples have been formed: the sub-region of "Yaka" from three settlements (the villages of Breznitza, Zhizhevo and Teshevo) and the sub-region of "Balkan", including also three settlements (the villages of Satovcha, Kochan and Vaklinovo).

The different samples have been investigated as regards the main indices characterizing their quality:

- **Chemical composition of tobacco:** nicotine, % - according to ISO 15152; reducing sugars, % - according to ISO 15154; total nitrogen, % - according to the Bulgarian State Standard 15836-88; mineral composition (ashes), % - according to ISO 2817; potassium, % - according to the Bulgarian State Standard 17365-94; the ratio of reducing sugars/nicotine.
- **Chemical composition of tobacco smoke:** nicotine, mg/cig - by means of already established regression dependencies between tobacco and tobacco smoke composition (Popova and Georgiev, 1998).
- **Spectrophotometric evaluation (Taking of the "image") of tobacco** - by means of determining the discrete values of tobacco water extraction absorption in UV - the spectral band within the range of 220-350 nm (Gjuzelev and Mohnacheva, 1982).
- **Statistical control for significance** has been done of the differences between the samples, by using Student’s criterion (Lakin, 1990).

**Expert evaluation.** It has been done by using the method of "direct comparison". We have determined the following: the coefficient of relative ranging, the range coefficient and the coefficient of concordation (concordation W) of Kendall. The criterion of Fischer (F�) has been used for evaluation of statistical significance (Borovikov and Borovikov, 1998).

In cases, when only two samples should be compared, the evaluation for authenticity should be done by using the so called RCN (Ratio Critical Number)

**Smoking evaluation.** It has been done by using the method of the 'direct" comparison among the varieties (in cases, when two and/or three samples should be compared). In more than three samples, the method of the "indirect" comparison has been used (by couples), at complete combination of the samples.

The statistical processing of the results has been done in the same way, as in the expert investigation.

**Complex evaluation.** For this purpose indices characterizing most expressively the high quality of the Oriental type to-
baccos should be applied. After establishing preliminarily the coefficients of significance of these indices, ranging on the basis of the values of the latter has been done depending on their positive or negative effect on quality.

The final evaluation has been formed by determining of the "quality index", the lower value of which corresponds to higher quality.

**Results and Discussion**

For analysis and interpretation of the results the following diagram has been applied: comparison of tobaccos from the "new" variety of Djebel K 81 to the mass varieties (divided into regions) for the given regions, respectively origins.

**Chemical composition:** The results obtained have been presented in Table 1.

In order to compare tobaccos investigated according to their chemical composition, we have had to specify preliminarily at what differences in their values there are or there are not differences. For that purpose, we have used the criteria for level and for difference in the chemical indices, indicated in our previous studies (Drachev et al., 2005).

**Origin of "Eastern Balkan"** (the region of Yambol). The results referring to the newly regioned variety of Djebel K 81 as compared to the variety of Elenksi 817 (mass), as regards nicotine have shown a higher value for the sub-region of "Yaka" and one and the same values, but lower for the mass variety and the newly divided into regions in the sub-region "Balkan". In all the remaining indices, no significant differences have been observed for the tobaccos from both sub-regions, as well as compared to the mass variety.

In all the remaining samples investigated, nicotine in smoke has close, but lower values of nicotine in smoke. Tobacco from the sub-region of "Yaka" has a higher value as regards tars.

**The origin of "Nevrokop"** (the region of Nevrokop). The results concerning nicotine content have shown some more significant differences in the "new" variety, grown in the different sub-regions of the origin, as compared to the two mass ones N 261 and N 1146. The nicotine and the total nitrogen contents are highest for the "new" variety from the sub-region of "Yaka", and the lowest for the mass variety (N 1146). The chemical composition of tobacco from the sub-region of "Yaka" is a more balanced one, regarding nicotine, reducing sugars and ashes contents. The remaining samples are close in chemical composition. The tars for the "new" variety from the sub-region of "Yaka" are the highest ones, and among the remaining ones there is no difference.

**Spectrophotometrical evaluation (taking of the "image") of the variety.**

The method serves exceptionally to make comparison between the degree of "acCORDance" and/or "difference" among the samples. As closer the discrete values of the separate samples absorption, as it will follow that the total character as regards quality will be closer. We cannot judge from the spectral curves for a higher or a lower qualitativeness of the variety concerned.

When making the statistical significance control for the differences (Student’s criterion) then the case - evaluation of the average difference between excerpts from general sum totals linked in couples has been applied. All measure-
Table 1

Chemical indices of the “new” Djebel K 81 and the mass varieties, 2005 crop

<table>
<thead>
<tr>
<th>Indices</th>
<th>Origin</th>
<th>Eastern Balkan</th>
<th>Nevrokop</th>
<th>Nevrokop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yambol</td>
<td>Dj.</td>
<td>N*</td>
<td>K 81</td>
</tr>
<tr>
<td></td>
<td>El.* 817</td>
<td>Dj.</td>
<td>N* 1146</td>
<td>K 81</td>
</tr>
<tr>
<td>Nikotine</td>
<td></td>
<td>0.45</td>
<td>0.96</td>
<td>0.45</td>
</tr>
<tr>
<td>Red. sugars</td>
<td></td>
<td>14.6</td>
<td>19</td>
<td>15.7</td>
</tr>
<tr>
<td>Red. sugars/ nicotine</td>
<td></td>
<td>32.44</td>
<td>19.79</td>
<td>34.89</td>
</tr>
<tr>
<td>Total nitrogen</td>
<td></td>
<td>1.63</td>
<td>1.52</td>
<td>1.67</td>
</tr>
<tr>
<td>Ashes</td>
<td></td>
<td>13.67</td>
<td>10.11</td>
<td>12.68</td>
</tr>
<tr>
<td>Potassium</td>
<td></td>
<td>2.5</td>
<td>1.82</td>
<td>2.44</td>
</tr>
</tbody>
</table>

* - mass varieties.

The origin of the “new” Djebel K 81 and the mass varieties, 2005 crop

The results have shown that between the tobaccos compared (Elenski 817 and Djebel K 81) there is no a statistically authentic difference, because when comparing in couples $t_f = -3.75; -9.85; -1.85 \leq t_{st} = 2.16$ and $3.01$. Therefore, we can accept $H_0$, i.e. with probability of 99% no authentic difference exists between the general quality display of the "new" variety as compared to the local one.
The origin of "Nevrokop" (Figure 2). Tobaccos from the variety of Djebel K 81 in the two sub-regions of the origin are closer in between as compared to the local ones - N 261 and N 1146, which on their part are closer in between. The statistical processing has shown absence of authentic difference between N 261 and the "new" Djebel K 81 (Yaka) and presence of difference with the same variety from the sub-region of Balkan. Between the two mass varieties there is no authentic difference. As regards the couples N 261 and Djebel K 81 from the two sub-regions, as well as between the "new" variety from the two sub-regions, the difference is authentic. The conclusion is that the newly divided into regions tobaccos differ among themselves, and also that N 1146 is different from the latter.

The results from taking the "image" of the origin of "Nevrokop" have shown presence of definite differences between tobaccos investigated, which is a complete logical result from the fact that the quality display of a given variety depends on the ecological factor and on the agricultural technique applied.

The general conclusion, which has imposed itself is that the "new" variety of Djebel K 81 possesses a similar quality display to the local Elenski 817 for the origin of Eastern Balkan and respectively for the origin of Nevrokop - to the local N 261.

**Expert evaluation.** The origin of "Eastern Balkan". The results from the expert evaluation of the variety of Djebel K 81 and the mass variety of Elenski 817 have shown absence of difference (W=0.52; $F_\alpha=4.33$; $F_t=5.32$; $f_1=1.6$; $f_2=6.4$). There is no significance of the coefficient of concordance of the expert board evaluations and therefore among the three samples compared there are no authentic differences and that corresponds also to the results from the spectrophotometrical evaluation.

**The origin of "Nevrokop".** The statistical processing of the expert evaluation results, when comparing the local varieties with the newly introduced Djebel K 81 have shown that they have not been in concordance. Therefore, we cannot accept the presence of differences as regards this index (W=0.23).

**Smoking evaluation.** The origin of "Eastern Balkan". No difference in the smoking qualities has been established, when comparing the variety of Djebel K 81 (Yaka and Balkan) to the mass variety of Elenski 817, because of lack of concordance (W=0.33).

**The origin of "Nevrokop".** When comparing tobaccos from the mass va-
rieties for the origin to the "new" va-
riety of Djebel K 81 (Yaka and Balkan) according to their smoking qualities, we have found one and the same evaluation for the local variety of N 261 and the newly introduced one (Yaka), followed by the "new" variety of (Balkan) and finally the local variety of N 1146 (Table 2) at already proved authenticity of that grading (W=0.78; F=17.73; F=3.52; F=2.67; F=13.33).

The conclusion is that according to their smoking qualities, no differences have been established between the local (N 261) and the newly introduced variety, while N 1146 has demonstrated the most unfavorable smoking qualities as compared to all the rest.

Complex evaluation. In order to make a complex evaluation of the samples, we should specify in advance, in a more particular schedule, the approach in ranging the tobacco values, i.e. chemical composition data. Nicotine should be graded according to its absolute the highest value has a grade of one, etc. Reducing sugars should be graded as regards the gap 10-16%, accepted as optimum, having in mind that the increase or vice versa the decrease grades tobacco to a lower degree (lower grade). The same approach has been accepted for evaluation (ranging) of the ratio reducing sugars/nicotine, the optimum value of which we have accepted as 15 and the approach for grading has been the same as with reducing sugars.

Because of the uniformity of tables for getting the quality index of tobaccos investigated, we present the complex evaluation for the origin of "Eastern Balkan" only (Table 3). As regards tobaccos from the origin of "Nevrokop", the quality index is presented on Figure 3.

The origin of "Eastern Balkan" (the region of Yambol). According to its complex evaluation, the "new" variety of Djebel K 81 (Yaka) has better quality characteristics as compared to the mass variety of Elenski 817, the last position being occupied by tobacco from the sub-region of "Balkan". The difference between Djebel K 81 (Balkan) as compared to the local variety is more significant.

The origin of "Nevrokop" (the region of Nevrokop). The "new" variety of Djebel K 81 (Yaka) has received one and the same evaluation with the local variety of N 261, the other local variety of N 1146 being on the last position (Figure 3).
Table 3

Complex evaluation of tobaccos from the origin of “Eastern Balkan”, 2005 crop

<table>
<thead>
<tr>
<th>Indices</th>
<th>El. 817 Yambol</th>
<th>Dj. K 81 Yaka</th>
<th>Dj. K 81 Yambol Balkan</th>
<th>Coefficient of significance</th>
<th>Quality index of the variety El. 817 Yambol Yaka Dj. K 81 Yambol Balkan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine, %</td>
<td>2.5</td>
<td>1</td>
<td>2.5</td>
<td>0.2</td>
<td>0.5 0.2 0.5</td>
</tr>
<tr>
<td>Red. sugars, %</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.12</td>
<td>0.24 0.24 0.24</td>
</tr>
<tr>
<td>Red. sugars/nicotine</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>0.18</td>
<td>0.36 0.18 0.54</td>
</tr>
<tr>
<td>Tars, mg/cig</td>
<td>-</td>
<td>1.5</td>
<td>1.5</td>
<td>0.05</td>
<td>- 0.08 0.08</td>
</tr>
<tr>
<td>Specific vol., cm³/g</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.1</td>
<td>0.2 0.2 0.2</td>
</tr>
<tr>
<td>Expert evaluation</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.25</td>
<td>0.5 0.5 0.5</td>
</tr>
<tr>
<td>Tasting</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1.9 1.7 2.26</td>
</tr>
</tbody>
</table>

Complex evaluation of tobaccos from the origin of “Nevrokop”

Fig. 3. Quality index of tobaccos from the origin of “Nevrokop”, 2005 crop

Conclusions

The chemical composition of the variety of Djebel K 81 (Yaka) is a more favorable and balanced one as compared to the local varieties (Elenski 817, Nevrokop 261 and Nevrokop 1146). The spectrophotometric evaluation (taking of the "image") has shown that the "new" variety of Djebel K 81 has a close quality display to the local Elenski 817 for the origin of Eastern Balkan and respectively for the origin of Nevrokop - with the local N 261, while the differences with the other mass variety are significant.

When making evaluation of tobaccos according to outer quality characteristics, no differences have been observed.

It has been established that the smoking qualities of the variety of Djebel K 81 do not differ from those of the local Elenski 817 for the origin of "Eastern Balkan". For the origin of "Nevrokop" no differences between the mass variety of N 261 and Djebel K 81 have been established, while N 1146 has given in to all the other varieties from this origin.

When grading tobaccos from the different origins (regions and sub-regions) on the basis of quality index,
the best indices have been shown by:
- origin of "Eastern Balkan" (Yambol) - Djebel K 81;
- origin of "Nevrokop" (Nevrokop) - Djebel K 81 (Yaka) and the local variety of N 261 - with one and the same evaluations;

It has been established that it is purposeful to grow the investigated variety of Djebel K 81 in the region of Yambol (the origin of "Eastern Balkan"), as well as in the region of Nevrokop (the origin of "Nevrokop" - sub-region of Yaka), when market demand is greater.

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Received July, 12, 2006; accepted September, 12, 2006.