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Evaluation of oriental tobacco of the variety group of Basmi upon organic production

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Abstract

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Bio agriculture as a whole, including tobacco cultivation, is more environmentally friendly. There is no doubt that the activity of organic tobacco production creates demand, which stimulates people to do better business and to cause less harm to the environment. Some tobacco products, however, which are advertised as natural, often are even more hazardous to the health of smokers due to the fact that a part of the tobacco elements – such as tar or nicotine – are actually contained in these products in a higher percentage than regular cigarettes. The objective of our study is to make a comparative evaluation of the quality and chemical indicators of the biological tobacco raw material of the cultivated 4 varieties of Oriental tobacco of the variety group of Basmi with those of their variety characteristics upon conventional cultivation.

Keywords: bio tobacco; Oriental tobacco; comparative evaluation; chemical indicators; nicotine; sugars

Introduction

Bio agriculture is an agricultural activity, which follows practices aimed at *minimizing the human impact on environment* by making all necessary at the same time for the agricultural system to function as naturally as possible. Bio agriculture restores and maintains soil fertility, ensures the balance of the agro-ecosystems, presumes the production of healthy and quality food products in ideal harmony with Nature. Bio agriculture provides an opportunity to examine the relations: soil – plant – animal – human as one living system. Over the last decade the area of the EU lands used for bio agriculture has increased at an average by half a million of hectares per year. Currently the EU has over 200 000 farms for bio production. Along with the term "bio agriculture", expressions such as "bio-dynamic" or "organic" agriculture have been also used (Raman, 1999; Taylor, 1999).

Bio production is based on preliminarily developed and recognized standards and principles of production – regional, national, EU and world standards (Linkova, 2013).

The latest updated data for the agriculture show that as at 2016 the EU areas with bio agriculture have reached 12 million hectares in all EU member states. Thus, they already have a share of 6.7% of all cultivable lands, as shown by the latest EC data. There has been significant growth of the biological segment – in the period 2010-2016 an increase of over 30% was registered with an annual rate of 4.4%.

The EC data show that Bulgaria is the country having the highest growth of bio production. In the period 2010-2016 the increase of the areas in the country was by 35%, as Croatia has also a similar but lower indicator. France and Cyprus are the next two countries characterized with the highest increase, which is approximately 10% there according to the EC data. The main focus in the production of biological products in Bulgaria is on perennials – apples, strawberries, raspberries, plums, hazelnuts, and rose oil are the products making up the main share of biological products exported from the country. Despite the growth marked, the

bio production areas in Bulgaria are still characterized with the lowest share as compared to all other EU member states, despite having over 80% of the cultivable land suitable for bio agriculture (Agricultural Report, 2017).

Most of the ecological production is exported abroad, as approximately 6-7% is also marketed in Bulgaria. According to statistical data over 90% of the currently manufactured and certified biological production in Bulgaria is exported mainly to Western European countries, the USA and Canada. These are mostly herbs, fruit, vegetables, honey, and nuts. And the most widespread biological wild products include mushrooms, herbs, and nuts. According to experts' evaluations (Slavova et al., 2017) this is a sector that is extremely suitable for Bulgaria – due to the Bulgarian Nature itself and not so dirty land, as well as due to the image of Bulgaria of a traditional manufacturer of quality agricultural products (Jabarova & Lulcheva, 2012; Little et al., 2008; Krasteva, 2017).

The areas on the territory of Bulgaria, which are occupied with technical cultures within a bio production control system were 22 998 ha in 2017, including oil-bearing rose, aromatic plant cultures, medical plants, and seasonings (Agricultural Report, 2018).

In 2016 the tobacco production in Bulgaria was 15 211 t, and the planted areas – 10 049 ha. In 2017 the production was 13 400 t, and the planted areas – 7756 ha. Until the year of 2016 there was not even one kilogram of tobacco manufactured in a biological/organic way in Bulgaria.

In 2016, after a transitional period of 4 years, the Institute of Tobacco and Tobacco Products – Markovo certified a bio production area of 4 ha at an Experimental Tobacco Station in the town of Gotse Delchev. In 2016 the very first 265 kg of bio tobacco in Bulgaria were produced at the Station, in 2017 – 340 kg, and in 2018 – 400 kg tobacco with a Certificate of Biological Product (Bozukov, 2018). Bio agriculture as a whole, including tobacco cultivation, is truly more environmentally friendly. There is no doubt that the activity of the organic tobacco production creates demand, thus stimulating people to do better business and cause less harm to the environment. Some tobacco products, however, which are advertised as natural, often are even more hazardous to the health of smokers due to the fact that a part of the tobacco elements – such as tar or nicotine – are actually contained these products in a higher percentage than regular cigarettes (Wechsler, 1999; Hight, 2001; Guo et al., 2009).

The objective of our Study is to make a comparative evaluation of the quality and chemical indicators of the biological tobacco raw material of the cultivated 4 varieties of Oriental tobacco of the variety group of Basmi with those of their variety characteristics upon conventional cultivation.

Material and Methods

Bio production of tobacco and tobacco seeds (Stage "Comparative Generation Testing") has been set at the "Experimental Tobacco Station" Department – Gotse Delchev at the Institute of Tobacco and Tobacco Products. There have been 4 varieties of Oriental tobacco pricked out, namely: *Dupnitsa 733*, *Kozarsko 339, Nevrokop 1146, and Krumovgrad 58* (Fig. 1, 2, 3, 4). Seedlings were grown; the areas have been pricked out, the respective agrotechnical events have been performed – fertilization with organic fertilizer and treatment with biopesticides against pests.

The respective events have been carried out according to the "Technology for organic tobacco production" developed at the Institute of Tobacco and Tobacco Products (Bozukov, 2018):

1. Processing of seedbed areas:- autumn and spring ploughing, seedbed picking and cutting, levelling;

2. Seedbed sowing:

– Variety of Dupnitsa 733,variety of Kozarsko 339, variety of Nevrokop 261, and variety of Krumovgrad 58, each of which cropped in a seedbed of 10 m^2;

3. Seedling cultivation – watering, weeding, airing;

4. Plant protection events in seedbeds:

– the fertilization cover of the seedbeds is with natural fertilizer and fertilizer from Californian worm LUBMBRICAL – 1 l/m^2;

– feeding – liquid organic fertilizer Lumbrex;

– treatment with Bordeaux mixture;

5. Processing of the areas designated for tobacco, before transplanting – autumn and spring ploughing, disking, cutting, ploughing;

6. Tobacco transplanting – 22-30 May:

– variety of Dupnitsa 733 – 0,056 ha;

– variety of Kozarsko 339 – 0,054 ha;

– variety of Nevrokop 261 – 0,028 ha;

– variety of Krumovgrad 58 – 0,048 dcha;

7. Earthing-up – double earthing-up – machine and manual, application of natural fertilizer from an organic stock farm;

8. Plant protection events in the field:

– Double treatment of the crop with the biological preparation Nim Azal T/S at a dose of 3.0 l/ha (after pricking out and on 21.06.).

– Treatment of the crop with Helicovex – 200 ml/ha against Cotton bollworm (*Heliotis obsolete*) and Cabbage armyworm (*Barathra brassicae*).

Results and Discussion

Oriental tobacco of 4 varieties has been cultivated and harvested, and their seeds have been isolated and collected at

Fig. 1. Dupnitsa 733 – organic

Fig. 3. Krumovgrad 58 – organic

Fig. 2. Kozarsko 339 – organic

Fig. 4. Nevrokop 1146 – organic

the Stage "Comparative Generation Testing". During vegetation the following was established in the plants: cutting of the tobacco seedlings in the seedbeds, limited display of the Potato Virus Y (PVY) and local spots with poor sporulation of Blue Mold (*Peronospora tabacina)*, which were overcome by treating the seedbeds with 1% Bordeaux mixture and by treating the plants in the field with the biological preparation with fungicidal and antiparasitic activity *Nim Azal T/S* at a dose of 300 ml/dca. Before formation of the seed boxes, the plants selected for seed extraction were treated with *Helicovex* – 20 ml/dca against Cabbage armyworm (*Barathra brassicae*) and Cotton bollworm (*Heliothis obsolete*).

The weed control was performed with multiple manual earthing up and mechanized processing. After harvesting and drying the tobacco, leaf samples were taken from all 4- varieties for the purpose of a technological and chemical analysis of the bio raw material.

Based on the data presented in Table 1, it is evident that there was a relatively high yield of the Oriental varieties of tobacco per hectare (1360-1420 kg/ha), which approached the yield levels obtained upon their conventional cultivation, as for the multi-leaf variety of Dupnitsa 733 the yield reached 2080 kg/ha. As regards the quality of the tobacco of all four varieties, the highest percentage was achieved for the IInd class (50-57%), and the percentage of the low-value IIIrd class was only from 6.0 to 9.0%. The above showed a good opportunity for production of organic tobacco at the "Experimental Tobacco Station" Department – Gotse Delchev.

The chemical indicators of the produced organic tobacco (Table 2) were of interest. The nicotine level in the raw material and in the three varieties were untypically low for these Oriental varieties (Table 3) and varied from 0.08 in the tobacco of the variety of Dupnitsa 733 to 0.62% in the tobacco of the variety of Krumovgrad 58. At the same time, there was

Table 1. Extraction and quality of organic/biological tobacco

№	Varieties	Yield (kg/da)		Quality by classes (%)		
		Organic production	Conventional production	I	II	III
1	Dupnitsa 733	208.0	180-220	44.0	50.0	6.0
2	Kozarsko 339	142.0	130-170	42.0	51.8	7.2
3	Krumovgrad 58	141.4	120-140	34.0	57.0	9.0
4	Nevrokop 261	136.0	140-170	39.8	52.2	8.0

Table 2. Chemical indicators of organic / biological tobacco

№	Varieties	Indicator (%)			
		Nicotine	Sugar	Total nitrogen	Chlorine
1	Dupnitsa 733	0.08	20.0	1.44	0.63
2	Krumovgrad 58	0.62	19.55	1.53	1.00
3	Kozarsko 339	0.35	15.3	1.63	1.01
4	Nevrokop 261	0.49	15.4	1.45	1.53

Table 3. Chemical characteristics of conventional tobacco according to the variety characteristics

№	Varieties	Indicator (%)			
		Nicotine	Sugar	Total nitrogen	Chlorine
1	Dupnitsa 733	1.5 – 1.9	14 – 16	1.8 – 2.0	9.0 – 9.9
2	Krumovgrad 58	1.7 – 2.0	14 – 16	6 – 7	30.4 – 35.8
3	Kozarsko 339	0.9 – 2.0	6.5 – 18.5	1.57 – 2.3	29.7 – 33.4
4	Nevrokop 261	0.62 – 1.0	12 – 22	1.5 – 2.0	31.7 – 34.3

a high percentage of sugars. The indicator chlorine was of normal values of 0.5 to 1.5 %.

With these indicators the flavor of the tobacco smoke is characterized with insufficient fullness, distinctive burning and excessive lightness. *The low percentage of nicotine, however, makes these tobaccos corresponding to the considered requirements of the World Health Organization for input of low nicotine tobaccos (with content of less than 0.5 % nicotine) into the production of cigarettes and the production of organic cigarettes.*

As regards conventional tobacco, the nicotine values are in the interval of 1-2%, except for Nevrokop 261 (less than 1%), and the soluble sugars are less than 16-18% (for Nevrokop 261 – up to 22%). The value of the coefficient of sugars/nicotine is in optimum limits of 7-9. Those coefficient values determine the balanced flavor when smoking, fullness and smoothness of the flavor with some burning and sharpness.

The consumption of organic cigarettes is a new trend originated from the USA and slowly entering Europe.

Of course, there is no such thing as a safe cigarette, but except for the bad additives and the avoidance of chemical fertilizers and pesticides, the tobacco production process should result in a "better" cigarette and less poisons in organic cigarettes. And this is true to a certain extent. However, let us eliminate these hazardous and ecologically unwanted smoke elements and this will still not mean that our smoking is now non-toxic or non-carcinogenic. Nicotine itself is not carcinogen. Tobacco, however, when burning – even in its clearest form, forms carbon oxide and tar, which are carcinogenic. Nitrosamines are natural ingredients upon canning some foods and in the processes of tobacco fermentation – a type of chemical carcinogen also present in a number of foods.

Organic tobacco agriculture seems to be the life-saving step for agricultural producers in order for them to keep on the surface and even to grow under the conditions of a though industry subjected to overall pressure.

Conclusions

In Bulgaria there is realized actual bio production of Oriental tobacco with a Certificate of Biological Production.

The yield obtained from four varieties of Oriental tobacco set for production is close to the yield specified in the variety characteristics of the respective varieties.

The obtained biological tobacco raw material is characterized with very good quality indicators, as the percentage ratio of the I^{st}/II^{nd} classes varies from 34.0 % to 57.0 % for the variety of Krumovgrad 58, and from 44.0 % to 50 % for the variety of Dupnitsa 733.

The nicotine content in the biological production is very low and varies from 0.08 % for the variety of Dupnitsa 733

to 0.62 % for the variety of Krumovgrad 58. There is a high content of sugars, which varies from 15.3 to 20.0 %, thus determining the flavor of the tobacco smoke of these tobaccos as too soft, with insufficient fullness and a feeling of burning.

The low nicotine percentage makes these tobaccos corresponding to the considered requirements of the World Health Organization for input into the production of cigarettes of low nicotine tobaccos (with content of less than 0.5 % nicotine) and production of bio cigarettes.

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