Bulgarian Journal of Agricultural Science, 14 (No 1) 2008, 48-55
National Centre for Agrarian Sciences

TECHNOLOGICAL INVESTIGATION ON VIRGINIA VARIETY GROUP TOBACCO. MESSAGE II: TECHNOLOGICAL INVESTIGATION ON VIRGINIA TYPE TOBACCO FROM DIFFERENT REGIONS OF NORTH BULGARIA

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Abstract

NIKOLOVA, V., 2008. Technological investigation on Virginia variety group tobacco. Message II: Technological investigation on Virginia type tobacco from different regions of north Bulgaria. *Bulg. J. Agric. Sci.*, 14: 48-55

The central North and North-Western Bulgaria are the main regions in country for Virginia tobacco production. The soil-climatical conditions allow obtaining filling type Virginia with good quality and in some sub-regions - quality aroma raw. The possibility is established for quality raw production by choice of suitable variety and observing the necessary agro-technical practices. The aim of investigation is comparative technological assessment on introduced and local Virginia tobacco varieties quality from different regions of North Bulgaria. Tobacco is investigated by following quality indexes: tobacco and tobacco smoke chemical composition; physical indexes; spectrophotometric, expert and degustation assessments. The results are processed variation statistical. The grading is accomplished of investigated tobacco on the base complex assessment. The essential differences are not determined in total quality manifestation of introduced varieties in comparison to local. It is established that convincingly the results are better for PVH 19 variety from Opaka and Kozlodui regions in which it should to expand its production.

Key words: Virginia type, quality index, chemical composition, tobacco smoke, physical indexes, spectrophotometric, expert assessment, degustation assessment

Introduction

The central North and North-Western Bulgaria are the main regions in country for Virginia tobacco production. The soil-climatical conditions allow obtaining filling type Virginia with good quality and in some sub-regions - quality aroma raw. The micro regions around Byala Slatina, Belene etc. (Ralovski and Chinchev, 1991) have special favourable conditions for high quality. During period of 1990-1992 Ralovski (1993) accomplished the production investigation of introduced varieties in Byala Slatina and Pleven regions. He offers wider application of investigated introduced varieties for structure optimization in North-Western Bulgaria region on base obtained results. The necessity of optimum variety structure which to include a big set of varieties with different characteristics is underlined by author in other his investigation

(Ralovski, 1992). In this direction the investigations are carried out of introduced and local Virginia tobacco varieties in concrete soil-climatical conditions in different regions of North-Eastern Bulgaria (Chifudov, 1992). The possibility is established for quality raw production by choice of suitable variety and observing the necessary agro-technical practices. Every thing mentioned above put concrete for given region to investigate and introduced the suitable varieties. The present investigation is continuation of two years investigations in this direction (Drachev et al., 2004; Drachev and Nikolova, 2005; Nikolova and Drachev, 2005).

The **aim** of investigation is comparative technological assessment on introduced and local Virginia tobacco varieties quality from different regions of North Bulgaria.

Materials and Methods

The investigations are accomplished for crop 2005 with introduced variety PVH 19 in comparison to mass produced varieties (accepted for controls) in following regions:

- Kozlodui – V 0454;
- Byala Slatina – three controls: V 0514, V 0454 and V 0545;
- Opaka – V 0514.

The methodological approach and investigated indexes correspond to these indicated in Message I.

Results and Discussion

The obtained results for **chemical composition** of investigated tobacco are represented in Table 1.

***Kozlodui region*:** The essential differences not exist between chemical indexes of two compared samples (control and introduced variety). This refers to ratio total nitrogen/nicotine. A certain advantage has introduced PVH 19 variety for ratio reduced sugars/nicotine. There is not difference by the rest indexes.

***Byala Slatina region*:** The nicotine content of control samples is pointedly higher in comparison to introduced PVH 19 variety. The ratio total nitrogen/nicotine and reduced sugars/nicotine are more balanced (favorable). The essential difference has not by the rest indexes. As a whole the local varieties for this region have more favorable chemical composition.

***Opaka region*:** The nicotine content is significant higher for experimental variety (1.93%) in comparison to control (0.72%). The ratio sugars/nicotine and total nitrogen/nicotine are more favorable and balanced obviously underlined. The indexes are better of introduced PVH 19 variety for region and they correspond to characteristics of so called "typical" Virginia tobacco.

Nicotine in smoke follows the same dependence as nicotine in tobacco for all regions and for tars there are no expressed essential differences with the exception of V 0514 variety from Opaka what has the highest content of the same.

The obtained results show that essential differences no expressed between separate regions i.e. the comparative equalization exists. In separate regions are outlined differences between the control and introduced varieties without one-way priority of introduced one.

The introduced PVH 19 variety gives by chemical indexes pointedly better values in Opaka region as we can consider that they are entirely near or even corresponded to these accepted as typical for Virginia tobacco. The chemical indexes of PVH 19 are more unfavorable in Byala Slatina region in comparison to mass varieties what are better for this region.

Physical indexes (Table 2) of investigated tobacco show lack of essential differences.

Take the "image" of variety. The results of spectral analysis are represented on Figures 1, 2 and 3.

***Kozlodui region* (Figure 1).** Lack of reliable difference is determined between the control V 0454 and experimental sample PVH 19 (t_f=2.08) from made statistical check. Therefore two varieties not differ by

Table 1
Chemical indexes of Virginia type tobacco

Indexes	Region							
	Kozlodui		Byala Slatina				Opaka	
	V* 0454	PVH 19	V* 0514	V* 0454	V* 0545	PVH 19	V* 0514	PVH 19
	Tobacco chemical composition, %							
Nicotine	1.70	1.85	1.45	1.34	1.48	0.86	0.72	1.93
Red. sugars	9.94	15.40	17.60	21.40	21.40	25.40	27.50	20.80
Red. sug./nicotine	5.85	8.32	12.14	15.97	14.46	29.53	38.19	10.78
Total nitrogen	2.14	2.14	1.72	1.71	1.58	1.63	1.39	1.82
Total nitrogen/nicotine	1.26	1.16	1.19	1.28	1.07	1.90	1.93	0.94
Ash	15.29	13.99	12.97	11.76	12.23	11.10	11.29	12.77
Potassium	1.64	1.28	1.96	1.22	1.44	1.44	1.28	1.62
Hexane extract	4.60	4.16	5.68	4.63	5.03	3.98	2.71	4.67
Smoke chemical composition, mg/cig								
Nicotine	1.37	1.51	1.15	1.06	1.17	0.71	0.63	1.59
Tars	18.65	19.61	18.58	19.04	18.50	19.64	23.05	18.61

*-Control

Table 2
Physical indexes of Virginia type tobacco

Region	Variety	Indexes					
		L av., cm	B av., cm	L/B	Main stem, %	Cut tobacco density, g/cm^3	Conventional cig. yield, num. cig./kg tob.
Kozlodui	Control-V 0454	47.10	19.20	2.45	28.38	0.184	1610
	PVH 19	42.30	14.80	2.86	28.13	0.189	1567
Byala Slatina	Control-V 0514	49.40	20.20	2.45	33.30	0.220	1346
	Control-V 0454	45.70	18.00	2.54	24.24	0.219	1353
	Control-V 0545	46.80	19.00	2.46	22.86	0.230	1289
	PVH 19	48.70	18.50	2.63	24.44	0.241	1228
Opaka	Control-V 0514	43.60	20.50	2.13	22.86	0.267	1110
	PVH 19	45.40	17.80	2.55	25.00	0.237	1250

total quality manifestation.

Byala Slatina region (Figure 2). The reliable difference is proved for this region between controls and experimental PVH 19 variety as between controls is determined lack of difference with the exception of the two V 0454 and V 0545 (t_f=9.99).

For *Opaka region* (Figure 3) the analogous result is determined i.e. PVH 19 differs from control what is proved from statistical processing (t_f=2.65).

Expert assessment. The results of samples' ex-

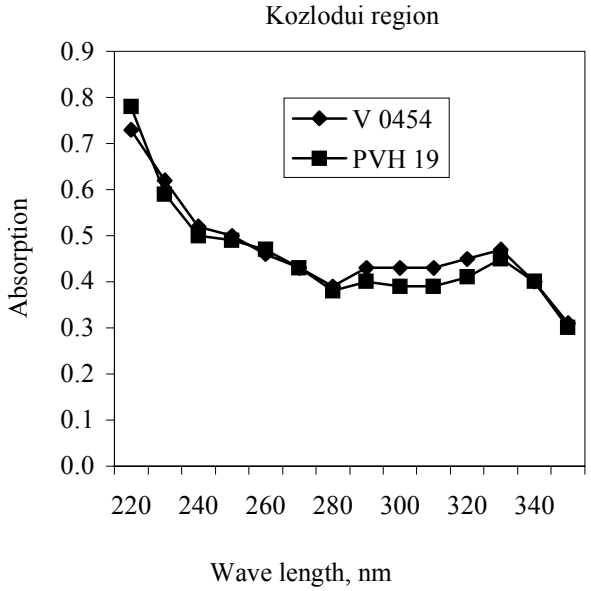

Fig. 1. Absorption spectra of Virginia type tobacco from Kozlodui region

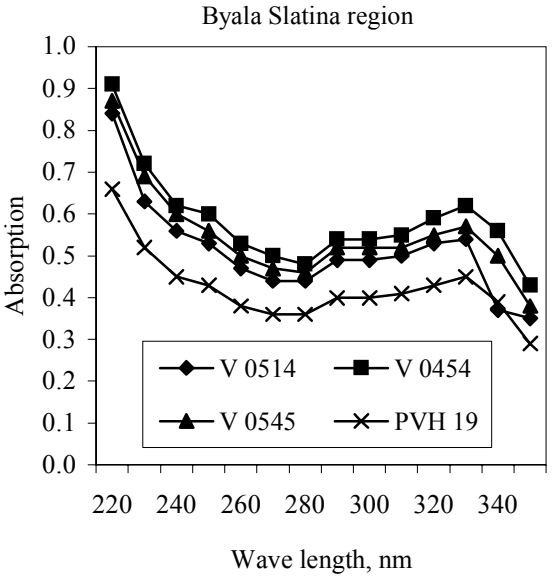

Fig. 2. Absorption spectra of Virginia type tobacco from Byala Slatina region

pert assessment for separate regions are represented in Table 3.

The statistical processing for reliability in comparison only two varieties for given region is accomplished by criterion "Critical number of ratio" (CNR) and for

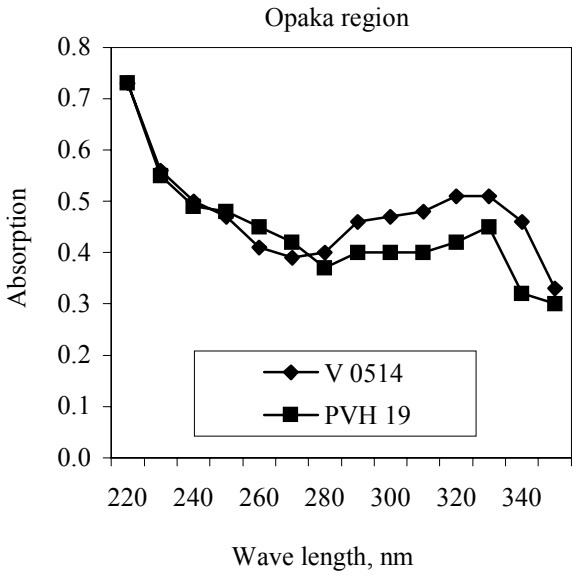

Fig. 3. Absorption spectra of Virginia type tobacco from Opaka region

more than two – by concordance coefficient of Kendal and Fisher criterion.

In comparison by two for Kozlodui region are determined differences between produced varieties as PVH 19 has better indexes (introduced variety). The reliable differences not exist (CNR=1.34) in following analogical case for Opaka region between control (V 0454) and introduced variety (PVH 19) by expert assessment.

In case of more than three compared varieties (Byala Slatina) also is determined results concordance in availability of significance of coefficients (W=0.89; F_f=32.36; F_1=3.82; f_1=2.6; f_2=10.4). The introduced PVH 19 variety is evaluated with the best indexes by expert assessment in comparison to controls. The control V 0514 variety is the most near to it and between the rests two no difference.

Degustation assessment. The results analysis of degustation assessment is accomplished by the same approach as for expert assessment. The data by regions are represented in Table 4.

For regions with two varieties by smoking properties is determined difference between local variety

Table 3
Expert assessment of Virginia type tobacco varieties

Expert - i	Kozlodui		Byala Slatina				Opaka	
	V* 0454	PVH 19	V* 0514	V* 0454	V* 0545	PVH 19	V* 0514	PVH 19
1	-	+	1	3.5	3.5	2	-	+
2	-	+	1	3.5	3.5	2	-	+
3	-	+	2	3.5	3.5	1		-
4	-	+	2	3.5	3.5	1	-	+
5	-	+	2	3.5	3.5	1	-	+
Sum of ranks	-	-	8	17.5	17.5	7	-	-
Relat. ranking coefficient	-	-	0.16	0.35	0.35	0.14	-	-
Rank coefficient	-	-	0.88	0.4	0.4	1	-	-
Grading	**2**	**1**	**2**	**3.5**	**3.5**	**1**	**1.5**	**1.5**

for region (control) and introduced PVH 19 variety for Opaka as introduced PVH 19 variety (CNR=2.45) has convincingly better smoking properties. For Kozlodui region difference by smoking properties has not between introduced (PVH 19) and local variety (V 0454).

For region with more than three varieties (Byala Slatina) the results of degustation assessment have not concordance i.e. the degustation commission can not determine differeneces in smoking properties between varieties (W=0.5) independently of samples grading shown in Table 4.

Complex assessment. Significance coefficients of indexes included in complex assessment as the approach for its accomplishment correspond to these indicated in Message I.

Because of one type of tables for quality indexes determination we represent in table mode data for tobacco from Opaka region (Table 5).

The complex assessment results of investigated tobacco are represented in a group on Figure 4 and they are as follow:

For two regions – Kozlodui and Opaka convicingly the quality is better of introduced PVH 19 variety in comparison to local (V 0454 and V 0514) as for Byala Slatina region – vice versa (it defers to local varieties).

For quality level determination of introduced variety (PVH 19) in comparison to mass spread varieties in respective regions is made Table 6 in what the assessments are represented generally in comparison by main quality indexes.

The reason for this assessment is made on the base general quality indexes of separate varieties. Commonly of 9 cases for comparison the lack of difference is determined in 4 from which 1 by chemical indexes, 1 by expert assessment and 2 by degustation assessment. With higher quality for local variety we have 1 case from which respectively 1+0+0. Better quality is determined for introduced variety in 4 cases respectively 1+2+1.

The differences are bigger in external quality indexes manifestation and less – in relation to smoking properties i.e. smoking properties equalization is confirmed of Virginia type tobacco analogical as it is indicated for South Bulgaria regions.

The lack of difference is determined in 4 of cases and 5 with availability of difference.

The obtained results show that the categorical conclusions can't make for essential differences in total

Table 4
Degustation assessment of Virginia type tobacco

Degustator - i	Kozlodui		Byala Slatina				Opaka	
	V* 0454	PVH 19	V* 0514	V* 0454	V* 0545	PVH 19	V* 0514	PVH 19
1	+	-	4	2	1	3	-	+
2	-	+	3	1	3	3	-	+
3	+	-	3	1	4	2	-	+
4	-	+	4	2	1	3	-	+
5	+	-	3	1	4	2	-	+
6	-	-	3	1	3	3	-	+
Sum of ranks	-	-	20	8	16	16	-	-
Relat. ranking coefficient	-	-	0.33	0.13	0.27	0.27	-	-
Rank coefficient	-	-	0.40	1.00	0.50	0.50	-	-
Grading	**1.5**	**1.5**	**4**	**1**	**2.5**	**2.5**	**2**	**1**

Table 5
Complex assessment for Opaka region

Indexes	Samples ranking		Significance coefficient	Variety quality index	
	V 0514	PVH 19		V 0514	PVH 19
Nicotine, %	2	1	0.20	0.40	0.20
Total nitrogen/nicotine	2	1	0.18	0.36	0.18
Red. sug./nicotine	2	1	0.12	0.24	0.12
Tars, mg/cig	2	1	0.10	0.20	0.10
Sp. volume, cm^3/g	2	1	0.05	0.10	0.05
Expert's report	1.5	1.5	0.10	0.15	0.15
Degustation	2	1	0.25	0.50	0.25
				1.95	1.05
				2	**1**

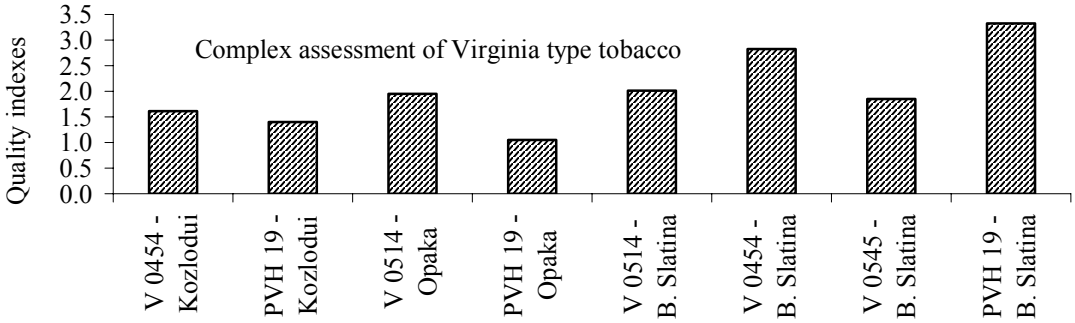

Fig. 4. Complex assessment of Virginia type tobacco from different regions of North Bulgaria

Table 6
Tobacco comparative assessment by main quality indexes

Region	Chemical composition	Expert assessment	Degustation assessment
Kozlodui	=	+I	=
Byala Slatina	+C	+I	=
Opaka	+I	=	+I

Note: C - control variety; I - introduced variety (PVH 19);
Determined difference +; No difference =

quality manifestation as by objective indexes (chemical composition), as by organoleptical (expert and degustation assessment) between introduced PVH 19 variety and local (control) varieties for respective regions.

Conclusion

The obtained results from technological investigation of introduced and local Virginia type tobacco varieties from North Bulgaria regions give the reason to make the following conclusions:

It is determined that in relation to chemical composition of different Virginia type tobacco varieties not exist on the whole essential differences between varieties grown in different regions with little exception in levels values of separate components characteristic for Bulgarian Virginia tobacco.

The introduced PVH 19 variety has chemical composition most near to quality so called "typical" Virginia tobacco for Opaka region as the local varieties have more favorable chemical composition in comparison to experimental for Byala Slatina.

The expert assessment by external quality indications shows better results for experimental variety from Kozlodui and Byala Slatina and the lack of difference for Opaka.

The differences between introduced and local varieties are significant slighter expressed i.e. equalization exists in respect of smoking properties (degustation assessment). The introduced variety from Opaka region is outlined with better qualities.

In complex variety assessment – the one-way of grading (ranking) of different varieties in respective regions is not determined namely:

Kozlodui region: PVH 19=V 0454

Byala Slatina region: V 0545, V 0514, V 0454 and PVH 19

Opaka region: PVH 19 and V 0514

The categorical results have not for essential differences in total quality manifestation of introduced varieties in comparison to local. The results are better convincingly for PVH 19 variety for Opaka and Kozlodui regions in which it should to expand its production.

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Received October, 12, 2007; accepted for printing January, 12, 2008.