

## Quality parameters of applicant tobacco variety Virginia 0842

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### Abstract

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This scientific research was conducted in the period from 2019 to 2022, in the district of Plovdiv and Pazardzhik, under production conditions. All biological parameters were determined and assessment was made of the basic quality parameters of the tobacco raw materials, produced from the new line of large-leaf tobacco Virginia 0842. The basic physical parameters of raw tobacco were established. The basic chemical parameters of tobacco were determined: nicotine, soluble sugars, total nitrogen and ash. The results show high nicotine values (1.02 to 3.78) in Virginia 0842, in comparison with the reference variety Virginia 0514. Total sugar values in Virginia 0842 from the three crops are very high in both classes (11.10 – 25.52). Ash content is low – ranging from 8.01% to 15.09%; this shows high leaf content. Total nitrogen for Virginia 0842 ranges from 1.52 to 2.85 % and it is from 3.04 to 3.61 for the reference variety. The free burning rate of Virginia 0842 tobacco was determined (2.74 to 2.85 mm/min).

*Keywords:* large-leaf tobacco Virginia; biological parameters; quality parameters; chemical parameters

### Introduction

The tobacco of the variety group of Flue-Cured Virginia is the most grown tobacco in the world and the main ingredient, used for the production of cigarettes of the American Blend and Virginia Blend type (Apostolova, 1991, 1997; Blake Brown, 2004). Large-leaf tobacco of this variety group was first introduced in Bulgaria, in the region of Maglizh, in 1937. The results were quite promising and its production increased. In the 1940s, dryers of the Hansa type were used in the regions of Plovdiv, Stara Zagora, Vidin and Pleven (Ralovski & Chincev, 1991; Ralovski, 1993, 1996).

Because of the interest in this tobacco, production and drying technologies gradually improved. Large-scale production and bulk drying of tobacco started in the beginning of the 1970s.

Now, the following is grown in Bulgaria: several foreign varieties of the Virginia variety group (PVH-1, PVH-2023,

Hevesi) and only two Bulgarian varieties – Virginia 0454 and Virginia 0514, entered in the Official Variety List of Bulgaria (Kasheva et al., 2021).

There are regions in our country, where soil and climate make it possible to produce 4 – 5 thousand tons of high-quality Virginia tobacco with high nicotine content.

Growing tobacco of the Flue-Cured Virginia variety group is concentrated in the Thracian Plain in South and Central Bulgaria and in the Danubian Plain in the north part of the country. In the past several years, a large part (85%) of Virginia production came from the Thracian Plain (Bozuketov et al., 2018).

The various ecological conditions, climate and soil in our country allow the creation of many different varieties with specific quality parameters.

The tobacco of the Virginia variety group is the most grown one in the world and it is the main ingredient for the production of cigarettes of the American Blend and Virginia Blend type (Apostolova, 1991).

Virginia 0842 is a consolidated line created in the Tobacco and Tobacco Products Institute by prof. Boris Chincev by means of intervarietal hybridization between the Virginia D + Virginia 385 varieties. The height of the plant is 165-178 cm. The number of leaves is 28. The vegetation period from planting to mass flowering is 68-72 days. The line is resistant to PVY (Chincev & Stoyanov, 1987, 1989). The chemical composition of this tobacco is as follows: nicotine content – 1.43-2.77 %, soluble sugars – 6.18-20.20 %, total nitrogen – 1.65-3.02 % (Drumeva, 2020).

The new line Virginia 0842 was tested for a third year under production conditions by the Tobacco and Tobacco Products Institute and the line had good biological and quality parameters (Kasheva et al., 2021).

The main purpose of the study is to assess the basic biological, technological and quality parameters of the tobacco raw materials produced from the Virginia 0842 applicant-variety grown under production conditions in different regions of the country. The basic chemical parameters of dry tobacco should be determined.

## Materials and Methods

In the period 2019 – 2022, it was planned to grow and monitor Virginia 0842 tobacco under production conditions in country regions with different soil and climate – Figure 1.

Sample of applicant variety Virginia 0842 and cut tobacco from applicant variety Virginia 0842 are presented in Figure 2 and Figure 3.

To achieve the purpose of the study, the following was carried out:

- Determination of the basic biological parameters of tobacco;
- Determination of the stage of technical maturity of the tobacco from the two regions;
- Finding suitable drying regimes;
- Formation of mean tobacco samples necessary for technological and chemical analysis;
- Determination of the quality parameters of dry tobacco;
- Determination of basic chemical parameters of tobacco.

The chemical tests were carried out with representative mean samples in the accredited laboratory testing complex in the Tobacco and Tobacco Products Institute in Markovo vill. Nicotine and soluble sugars content were tested in standardized methods:

– ISO 15152 – Tobacco – Determination of the content of the total alkaloids as nicotine – Continuous-flow analysis method.



**Fig. 1. Applicant variety Virginia 0842**

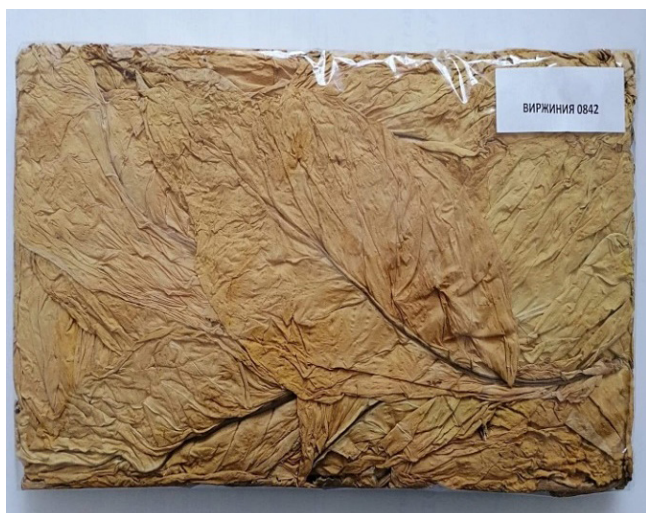


Fig. 2. Sample of applicant variety Virginia 0842



Fig. 3. Cut tobacco from applicant variety Virginia 0842 – ISO 15154 – Tobacco – Determination of the content of reducing carbohydrates – Continuous-flow analysis method.

## Results and Discussion

Table 1 and Table 2 present the mean values of the results for basic biological parameters of *Virginia* tobacco.

The results in Table 1 show that both varieties have very high resistance to overripeness. The total number of techni-

Table 1. Biological parameters of Virginia tobacco

Variety	Parameters		
	Resistance to overripeness	Total number of technically usable leaves	Plant height, cm
Virginia 0514-Reference	Very Good	32/27	162.0
Virginia 0842-Line	Very Good	34/31	163.0

cally usable leaves is a little higher for Line 0842. The reference variety and the line are characterized by almost the same plant height (162–163 cm).

Leaf size is a very important physical parameter that is determined during the organoleptic evaluation of tobacco. The length/width of a tobacco leaf shows the type it belongs to. In large-leaf tobacco, the larger size of a tobacco leaf shows that its variety is characteristic and typical (Blake Brown, 2004).

Leaves 7<sup>th</sup>, 14<sup>th</sup> and 18<sup>th</sup> of Line 0842 from harvests 2020, 2021 and 2022 have a length approximately equal to the one of the reference variety; the length is more than 50 cm, which is typical of the variety – Table 2. Because of high temperature and low humidity during the three years of study, line leaves have dimensions a little lower than the ones of the reference variety. The results in Table 2 shows that over 80% of the leaves of Virginia 0842 have a length ranging from 50 to 60 cm, which is a value typical of large-leaf tobacco.

Figure 4 shows the total results for the following parameters: number of leaves/kg tobacco, percent of tobacco leaf midrib and the technological parameter of conditional cigarette output by classes.

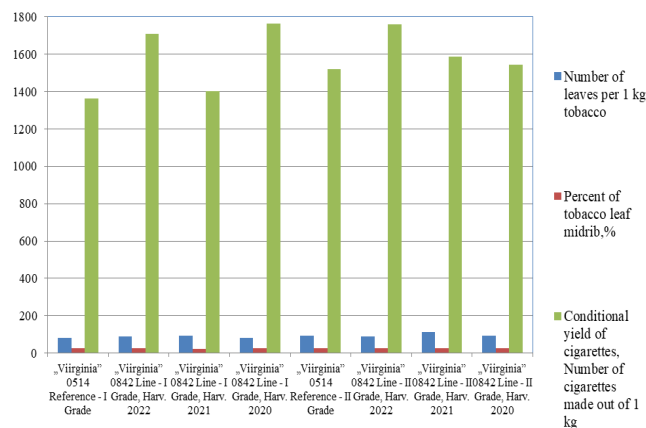


Fig. 4. Technological parameters of Virginia tobacco

The technological parameter of number of leaves in a kilogram of tobacco shows very good values in Virginia 0842 for the three years of testing the two classes. Midrib percent is approximately the same for the reference variety and the

**Table 2. Dimensions of Virginia tobacco leaves**

Variety	Length/width, cm		
	7 <sup>th</sup> leaf	14 <sup>th</sup> leaf	18 <sup>th</sup> leaf
Virginia 0514-Reference	57/35	59/35	54/29
Virginia 0842-Line, harvest 2022	51/33	56/35	50/28
Virginia 0842-Line, harvest 2021	50/34	56/34	49/27
Virginia 0842-Line, harvest 2020	52/35	58/37	53/29

line. In general, larger leaves have a higher midrib percent (Drumeva, 2020).

From an economic point of view, the technological parameter of conditional cigarette output (number of cigarettes from a kilogram of tobacco) is very important for each variety. The relationship between cigarette output and the physical parameter of leaf density is inversely proportional (Kasheva et al., 2021).

The best values of cigarette output are observed in the Virginia 0842 line for harvest 2022 for the first grade and for harvest 2022 for the second grade.

The values of the three technological parameters are within the range typical of Virginia large-leaf tobacco.

The results in Table 3 show that the tobacco of the Virginia 0842 line for the three harvests has a very high percent of first grade (35–40%). Grade ratio values in the Virginia 0842 line are a little higher in comparison with the reference variety.

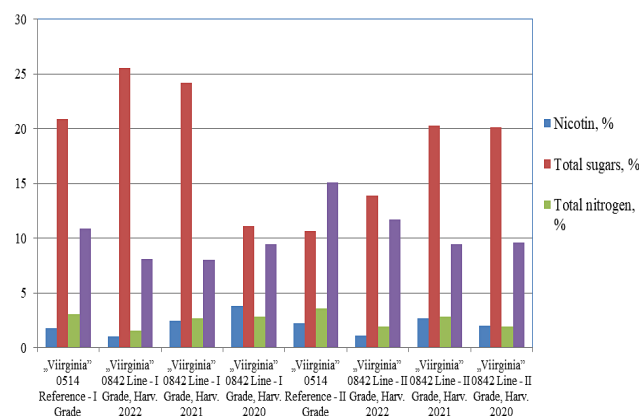
Yield is an important economic parameter when growing tobacco. With an average yield of 220 – 240 kg/da (kg/1000 m<sup>2</sup>) for the Virginia 0514 reference variety, the new Virginia 0842 line has higher yield (265 – 300 kg/da) for all three years of study.

Nicotine is the basic alkaloid in tobacco *N. tabacum*. The typical Virginia contains about 2 – 2.5% of nicotine. In addition to its physiological effects, nicotine also affects tobacco smoke taste. The chemical composition of Virginia tobacco is mostly characterized by high total sugar content varying within a broad range (12 – 28%). Total sugar values in Virginia 0842 from the three harvests are very high for both grades (11.10 – 25.52) – Figure 5.

The quantity of nitrogen-containing substances in tobacco is defined as total nitrogen. Total nitrogen values are in a negative correlation with tobacco quality. Low-quality tobacco contains more nitrogen. (Kasheva et al., 2021). The

**Table 3. Quality parameters of Virginia tobacco**

Variety	Classes, %			Yield, kg/da
	I	II	III	
Virginia 0514-Reference	30	55	15	220-240
Virginia 0842-Line, harvest 2022	35	50	15	265
Virginia 0842-Line, harvest 2021	40	50	10	283
Virginia 0842-Line, harvest 2020	35	55	10	300

**Fig. 5. Chemical parameters of Virginia tobacco**

results in Figure 2 show that total nitrogen for Virginia 0842 has relatively low values from 1.52 to 2.85% and the reference variety has values from 3.04 to 3.61.

Tobacco burning rate is expressed in mass burned per minute. Better combustibility is characterized by higher burning rate. Free burning rate depends on the following factors: chemical composition, density and moisture of tobacco (Apostolova, 1991).

**Table 4. Free burning rate of Virginia tobacco, harvest 2021-2022**

Description of sample	Free burning rate, mm/min
Virginia 0514-Reference, I grade	2.66
Virginia 0514-Reference, II grade	2.80
Virginia 0842-Line, I grade, harvest 2020	2.74
Virginia 0842-Line, II grade, harvest 2020	2.82
Virginia 0842-Line, I grade, harvest 2021	2.76
Virginia 0842-Line, II grade, harvest 2021	2.85

The cigarettes produced in laboratory conditions were analyzed for the purpose of determining free burning rate in mm/min pursuant to BSS 12976-93.

The results in Table 4 do not show a significant difference in this parameter between the reference variety and Virginia 0842 line for harvest 2020 and 2021.

## Conclusions and recommendations

The effect of sharp climate changes on dry tobacco quality shows that selection of new tobacco varieties is necessary.

Large-leaf tobacco Virginia 0842 from harvests 2020, 2021 and 2022 has relatively short vegetation and the necessary quantitative and qualitative parameters that are similar to the parameters of the reference variety Virginia 0514 or better than them.

Virginia 0842 tobacco from the three harvests has very good qualitative and technological values – better than the ones of the reference variety Virginia 0514.

The values of basic chemical parameters are directly affected by the technology of tobacco processing and treatment.

The best ratio between chemical indicator values is observed in first grade tobacco for the three harvests.

The specific smoking properties of each tobacco type and variety depend on certain chemical indicators of tobacco.

The data on basic chemical parameters of tobacco for the three years of testing and the slight variations between the values of biological and agricultural parameters give us a reason to make the conclusion that the Virginia 0842 line may be presented at the Patent Office in order to be recognized as a promising new tobacco variety of the Virginia variety group.

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