

THE STUDY OF QUALITATIVE POTENTIAL OF VIRGINIA TOBACCO TYPE GROWN IN OLTENIA REGION

STUDIUL POTENȚIALULUI CALITATIV AL TIPULUI DE TUTUN VIRGINIA CULTIVAT ÎN REGIUNEA OLTENIA

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Abstract. *The tobacco cultures in Oltenia are some with high technological and qualitative potential, which represented a real alternative in order to diversify the horticultural culture on the soils with a sandy or sandy-clay structure and also can cover in a the necessary of raw material for the tobacco industry in our country (I. Matei și col. – 1983, Aniția N. Și col.- 1974, Giurgulescu L.- 2002, etc). In south of Roumania, the Virginia type used in this study finds favourable edafic (soil) and climatic (temperature, light and humidity) conditions, having a high yield capacity and peculiar qualities of taste and flavour. The researches developed during 2006-2008 regarded Virginia 180 and Virginia 196 breeds, cultivated in Dolj county, Amărăști and Bratovoiești areas. This study establishes the impact of edafic factor over composition and texture of chemical characteristics (total reducing substances, total reducing sugars, albumines, total azote, total volatile basis and ash) of tobacco leaves, also the relationship between temperature, light, humidity and tobacco plant*

Key words: tobacco plant, soil, chemical characteristics

Rezumat. *Culturile de tutun din Oltenia sunt cu potențial tehnologic și calitativ ridicat, reprezentând o alternativă reală pentru diversificarea culturilor horticole pe solurile cu structură nisipoasă sau nisipo-lutoasă și pot de asemenea să acopere necesarul de materie primă pentru industria de tutun din țara noastră (I. Matei și col. – 1983, Aniția N. Și col.- 1974, Giurgulescu L.- 2002, etc). Tipul Virginia folosit în acest studiu găsește în sudul României condiții edafice și climatice prielnice pentru o productivitate ridicată precum și calități deosebite de gust și aromă. Cercetările întreprinse în perioada 2006-2008 au vizat soiurile Virginia 180 și Virginia 196 cultivate în zona Amărăști și Bratovoiești din județul Dolj. Studiul stabilește impactul compozițional și structural al factorului edafic asupra caracteristicilor chimice (substanțe reducătoare totale, zaharuri reducătoare totale, zaharuri reducătoare, albumine, azot total, baze volatile totale și cenușă) ale frunzelor de tutun precum și relațiile ce există între temperatură, lumină, umiditate și planta de tutun.*

Cuvinte cheie: planta de tutun, sol, caracteristici chimice

INTRODUCTION

The significance of tobacco in the agriculture in the south of the country is increased by the fact that some varieties of tobacco (Virginia, Oriental) reevaluate economically the soil with less productive potential, as the sandy soils or other

less productive soils (reddish brown, poor leached) (I. Matei and col.-1983, Căpruciu Ramona-2008).

The cultivation of the tobacco plant is influenced to a greater degree, mainly, by the climate through temperature and precipitations (soil moisture), the quality of the leaves is also defined by other climatic elements (relative moisture of the air, wind, luminosity) aspect that have been studied since 1968 by Gisquet and Hitier.

Beside climate conditions, the character of the cultivated soil exerts a decisive influence on the tobacco quality, although this is not an exigent plant.

Other profound studies, concerning physical, chemical characteristics, the impact of the climate and the soil on them, etc., that were realised during the years in Romania, by the great scholar in the field (Aniția N.-1962, 1983) etc., together other important collaborators, showed that the type of tobacco with the greatest weight of cultivation in the pedo-climatic conditions of Oltenia's district is Virginia.

MATERIAL AND METHOD

The determinations of this study had been realized on the plants cultivated in identical orographical conditions (plateau) on reddish-brown, poor leached soil (Bratovoiești), respectively on sandy soil (Amărăști), these had been obtained from seeds with a better degree of germination at 95% (harvest of the year 2007).

The variety Virginia 180 is more precocious, having a capacity of production over 3000 kg/ ha compared to 2500 kg/ ha for the variety Virginia 196. Industrial quality of the variety Virginia 180 is good, obtaining for first two classes of quality over 80% tobacco (superior + I) compared to Virginia 196 with an industrial quality that passes over 70%. Both sorts are resistant to pest and illness, cold and have a good endurance to warmth. They present an equilibrate chemical composition of the dried leaves. The biological material used in determinations noticed in the leaves disposed in the middle layer, reached the technological maturity at the same time. These were harvested, stretched, submitted to the fermentation and drying processthrough the natural method (sun drying) and stripping. The chemical elements from the strips were determined at the Unit for Multiple Users (from the University of Craiova). Also, there have been effectuated analysis upon the two types of soil (sandy and reddish-brown, poor leached) in the purpose of determinating the suitability degree of tobacco cultivation in these areas. The drawing of the soil samples was achieved by a manual cylindrical well, for a depth comprised between 0-40 cm determinated according to the present methodology: the content of humus (the method of Walkle and Black), total azote (Kjeldahl method), phosphorus and potassium (helped by the Reflectoquant machine) and the soil ph with the digital Ph-metre Schott TitroLine. After drying, the tobacco had been selected on the first and second quality grades and waste, following the colour parameters, moisture, integrity and the surface of the tobacco leaves .

The supervision of the climatic data was achieved by means of the regional weather station.

RESULTS AND DISCUSSIONS

From the climatic point of view, although tobacco plant is a tropical plant, it is also cultivated in temperate zones, because a part of the vegetation period is

passed into hotbeds, however it is a pretentious plant from the warmth point of view.

Also the relative moisture of the air holds an important part in achieving the highest quality of tobacco. It is known, from expert literature that at a low humidity the perspiration is reduced, fact that determines the achievement of slim, frail leaves, low in essential oils. Increased air moisture provides a more compact velvety follicle tissue, richer in essential oils and resins. The climate conditions in the south of Oltenia, in the context of the analysed period (the vegetation and the maturation of tobacco) are presented in table 1. In the course of March, year 2008, have been registered days with air and soil temperatures that were restrictive to seed formation, fact that contributed to a damage of 20% percentage of the growing seeds. In April, the minimum temperature over 3°C, air maxim of 24,4°C and the average soil temperatures of 14,9°C contributed to a good display of the cultivation process in 90% percent of succes. Maximum and minimum temperatures in the course of May, correlated with a great number of insolation hours (230) and a good relative air moisture took to a adequate growth of tobacco plants, defining until now, the physical characteristics typical to the cultivated sorts.

Table 1

Climatic parameters registered in the year 2008 in the south of Oltenia

Month	Air temperature (°C)			Soil temperature (°C)			Precipitations (mm)	Air relative moisture (%)	Insolations (hours)
	Max.	Med.	Min.	Max.	Med.	Min.			
March	21,40	8,30	-3,50	40,00	9,80	-2,70	16,10	57,00	212,60
April	24,40	12,40	3,10	43,00	14,90	3,40	59,60	69,00	153,00
May	34,00	17,10	5,40	52,40	21,80	8,30	31,00	65,00	230,00
June	34,90	21,70	10,00	63,20	27,90	12,20	28,40	63,00	224,70
July	35,20	22,80	10,60	60,00	27,60	12,30	97,60	54,00	265,90
August	35,90	24,30	12,50	46,90	28,30	16,10	0,60	50,00	299,00
September	35,30	16,30	3,80	44,60	18,70	5,80	55,60	66,00	181,20

Unfortunately, in June, because of the absence of rainfall, of 35°C air temperature and maximum soil temperature over 63°C, also because of so many hours of insolation, the physiological processes of the plants were enhanced, a more obvious aspect was noticed to the varieties of plants that were cultivated on sandy soil of Amărăști, soil with a higher degree of permeability because of the lack of humus registered in the An profile (table 2). The fallen precipitations registered in July (97,6 mm) contributed, on the reddish-brown poor leached soil of Bratovoiești, to a weight growth of the follicle tissue also to the forming of a higher percent of nervures than the identical varieties cultivated at Amărăști. This fact constitutes a disadvantage in the tobacco industry because the leaves will become frail after the process of drying and a great percent of nervures declines the sorts quality. The next months' variations, mostly in moisture, but also the

minimum air temperatures and the number of the insolation days brought to a two weeks surpass of the harvesting term.

Table 2

The chemical proprieties of the reddish-brown less leached soil (Bratovoiești) and sandy soil (Amărăști)

Area	Horizon	Depth (cm)	Humus (%)	Nt (%)	P (ppm)	K (ppm)	pH (H ₂ O)
Bratovoiești	Ap	0-19	2,61	0,17	78,00	225,00	6,04
	Ao	19-38	1,42	0,09	17,00	87,00	6,20
Amărăști	Aa	0-23	0,62	0,04	45,00	13,30	6,50
	An	23-40	-	-	11,00	10,70	6,30

According to the understanding of the natural frame in which the tobacco plant grows and develops, analysing table 2, we may say that the reddish-brown, less leached soil of Bratovoiești is medium to poor in terms of total azote supply, a higher value is registered at the surface level (approximately 0,17% compared to 0,04% at Amărăști), after that the percent decreases until 0,09%, as for the An sandy profile it was not detected anymore. Also the mobile content in P and K, either for the reddish-brown poor leached soil, as for the sandy one, shows variations according to the depth. In the above table it is shown the significant difference between horizons in these elements, even on the same soil profile (the horizon Ap for the reddish-brown soil poor leached presents a content in P of 78 ppm and in K of 225 ppm, in horizon Ao shows smaller values (17 ppm for P respectively 87 ppm for K). The values of this elements in the profile of the sandy soil at Amărăști, from the valuable point of view, are by far under the values shown at Bratovoiești (table 2, figure 1).

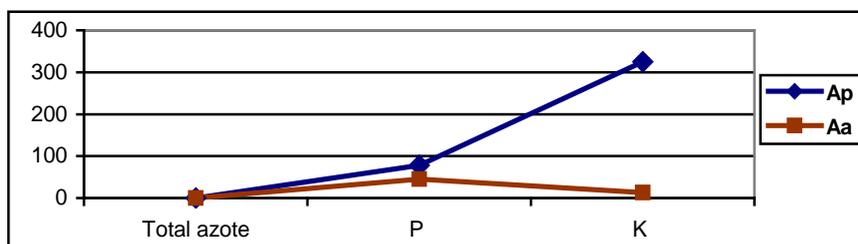


Fig. 1. The NPK content from the superior profile of the studied sorts

At Amărăști humus variation has been registered only in the surface horizon Aa on a depth of 23 cm showing values of maximum 0,62%, for the horizon An this element was not detectable (table 2). The profile analysis from the area of Bratovoiești distinguishes a reddish-brown poor leached soil that is medium to poor provisioned with humus. It is known from expert literature that the plant synthesizes the greatest part of chemical elements from the soil and if the soil is rich in azote, the tobacco plant leaves will maturate slowly, uniformly and late. We met this aspect in 2008, at Bratovoiești, the total azote found in the leaves of the variety Virginia 196, after drying

at second class, got at 3,18%, respectively at 2,78%, compared to Amărăști where the same varieties synthesized a smaller percent (2,13% total azote for Virginia 180 respectively 2,66% for Virginia 196)-table 3.

Table 3

The main chemical characteristics of the sorts Virginia 180 and Virginia 196 directly dried at sun

Variety of tobacco / Area	Class quality	S. r. t. (%)	Sugars r. t. (%)	Sugars reducing (%)	Albumines (%)	Total azote (%)	B. V.T (%)	Ash (%)
Virginia180/ Bratovoiești	I	7,80	6,61	5,40	6,74	2,45	0,67	16,32
	II	6,51	4,51	4,21	7,31	3,18	0,60	16,15
Virginia196 /Bratovoiești	I	7,16	5,33	5,08	7,90	2,50	0,51	18,03
	II	6,23	3,12	4,14	8,14	2,78	0,42	17,15
Virginia180 / Amărăști	I	7,14	6,16	5,20	6,86	2,18	0,86	16,70
	II	6,46	5,76	4,48	7,38	2,13	0,51	16,56
Virginia196/ Amărăști	I	6,25	4,87	4,88	7,02	2,33	0,98	16,96
	II	4,89	4,09	3,84	7,53	2,66	0,85	16,23

The sugars in normal quantities form by burning acid products which make the smoke soft and sweet. It is noticed a content of total diminishing sugars superior at Bratovoiești (6,61% at first class for Virginia 180), also recording significant values at Amărăști (6,16%). The variations between the classes on cultivation areas and varieties are important (5,33% for the variety Virginia 196, first class at Bratovoiești compared to 4,87% for the same variety and class at Amărăști). In the two studied areas the smallest values have been achieved at first grade, the area Amărăști (Virginia 180 with 6,86%) and higher values at second class quality for the both varieties. The leaves whose albumine content passed the admitted line for superior cigarettes belonged to the variety Virginia 196, second class cultivated at Bratovoiești (8,14%) giving to the finished product when lighted a piquant, bitter taste and an unpleasant smell similar to the smell of burnt feathers (table 3).

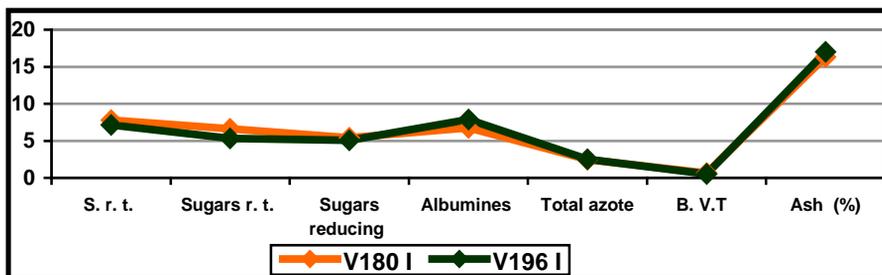


Fig. 2. Chemical analysis of the cultivated sorts in the same climatopedological conditions

The total volatile bases contributes to the forming of tobacco flavour. The tobacco leaves that were collected from the middle of the plant and dried directly to the sun registered a total of essential substances that was enough for

an equilibrated flavour both for the variety Virginia 180 and the variety Virginia 196 (figure 2).

CONCLUSIONS

Restrictive climatic conditions of tobacco cultivation registered in the year 2008, correlated with the soil low content of certain necessary elements for the growth and forming of the plant brought, according to the supervision of the physical and chemical parameters, to the loss of the Superior class (specific to Virginia type) resulting two important classes (first and second).

Both the variety Virginia 180 and the variety Virginia 196 cultivated at Bratovoiești registered superior values of total azote compared to the same sorts cultivated at Amărăști because of the higher content of this element of the reddish-brown poor leached soil contrary to the sandy one, with effects on the yellow colour and the taste of tobacco.

The same sorts cultivated on the sands of Amărăști, mainly the ones classified at second quality class, gave atypical products both organoleptical and chemical, conducting to their distribution for the achieving of couplings with the purpose of manufacturing mass consumption cigarettes.

The supervision of the climatic factors, the establishment of the realization the structural and compositional influence of the soil on the chemical composition from the leaves of the studied varieties, the realization of the comparing frame between the cultivation areas and the analysed varieties, allows an exact evaluation of their productive and qualitative potential.

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