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CHEMICAL COMPOSITION OF TOBACCO OF THE VARIETY PRILEP 66 9 PRODUCED BY APPLYING THE MEASURES OF INTEGRATED PRODUCTION IN COMPARISON WITH THE TRADITIONAL PRODUCTION OF TOBACCO

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Abstract. In 2019 a field experiment by standard metodology was conducted on the surfaces of the experiment field of the one pilot farm , located in village Berovci (municipality Prilep) with oriental tobacco variety Prilep 66 9. Two variants were included in the experiment – Integral tobacco production in the comparison to Traditional tobacco production.

In this pilot farm, based on the values obtained from the analyzed chemical properties of tobacco variety Prilep 66 9 depending on the method and conditions of cultivation, we can conclude the following: Application of Integrated production and irrigation measures have a positive impact on the content of individual chemical components. They reduce the content of nicotine, total nitrogen, protein and minerals, and increase the values of soluble sugars, polyphenols and Shmuk' index compared to the traditional way of production under irrigation conditions.

Keywords. Oriental, tobacco, variety Prilep 66 9, chemical properties, Integral production.

Introduction

Oriental aromatic variety Prilep 66-9/7 is distinguished by its high biological potential which allows its successful growing either in irrigating or in non-irrigating conditions (Dimitrieski M., Miceska G., 2010). The high biological potential of this variety stems from a well developed and powerful root system. In both conditions of growing, this variety produces a competitive and good quality tobacco raw.

From the commercialized varieties in the last ten-year period (2010-2019), in the total production of tobacco we can say that the Prilep 66/9 variety is most represented with 78% (MAFWE, Strategy, 2019). It is also necessary to emphasize the fact that in the last three years only the variety Prilep 66/9 participates with 93% in the total production and it also represents 97-98% of the Prilep type production, the competition and demand of this renowned commodity on the market has increased with its production. This finding can be confirmed by the continued stable tobacco production (around 25.000,00 t) during this period and by the export of seed material from this variety to Serbia, Turkey, as well as by the interest in introducing the variety Prilep 66/9 into the production of other Balkan countries (MAFWE, Strategy, 2019).

Having in mind the previous knowledge, we decided to studyon the way of growing and its effect upon chemical characteristics of the three analised inserts

(Lugs, Middle leaves and Undertips) of oriental tobacco variety Prilep 66 9. Two variants were included in the experiment – Integral tobacco production in the comparison to Traditional tobacco production. The following chemical characteristics were studied: nicotine, Total N, albumens, soluble sugars, ashes and Shmuk's quality index. Thus, in Traditional tobacco production, the contents of chemical components in standard variety Prilep 66 9 were less favorable compared to the values obtained in Integral tobacco production.

Material and methods

In 2019 a field experiment by standard metodology was conducted on the surfaces of the experiment field of the one pilot farm , located in village Berovci (municipality Prilep) with oriental tobacco variety Prilep 66 9. Two variants were included in the experiment – Integral tobacco production in irrigating, in the comparison to Traditional tobacco production (in non-irrigating conditions). On the transplanted tobacco in field were applied optimal and timely modern agrotechnical and plant protection measures according to Integrated tobacco production:

- The most favorable time period for aplikation of the preparations, as well as the interval, the number of treatments and the optimal application rates are determined;
- Recommendations are given for increased application of integrated protection measures;
- Proper application of agro technical measures, (plowing, soil preparation and proper quantity of fertilizers, according to soil analysis).

The necessary morphological measurements and phenological observations were also carried out. The following chemical properties were analyzed: content nicotine, total nitrogen, soluble sugars, polyphenols, protein, minerals, and Shmuk' index. 150 g tobacco leaves from the insertions of Lugs, Middle leaves and Undertips leaves were taken for the studying of these properties (Photo 1 and. Photo 2). The analysis of the chemical properties is conducted with recognized standard methods in an accredited laboratory of the Scientific Tobacco Institute – Prilep.

Results and discussion

The chemical composition of tobacco is very complex and is expressed through the content of a number of components. In our research we have analyzed the most important chemical components on which the quality of tobacco largely depends. According to Baylov (1965), the quality of tobacco does not depend on the separate chemical components contained in them as much as on their interrelationship, as well as on the conditions of cultivation, harvesting, drying and processing.

Nicotine as the most typical representative of the alkaloid group containing tobacco is one of the most important indicators of its quality (Dimitrieski M., Miceska G., 2009). Nicotine is present in all parts of tobacco except for mature seeds, and is mostly present in the leaf (Gornik R., 1973). According to Shmuk (1948) the

favorable impact of nicotine content in quantitatively optimal ranges between 5% and 10%. The obtained results (Table), show that the lower nicotine content of the three analyzed insertions (1.15% undertips, 1.65%, true middle leaf and 1.67% in the lugs) is present in tobacco raw material obtained by Integral tobacco production, and with higher content (1.60% undertips, 1.78% true middle leaf and 1.68% the lugs), in traditional tobacco production. In this pilot farm, independently of production way, the nicotine content of tobacco is within optimal limits for the tobacco type Prilep.

Table. Chemical composition of the tobacco, in the v.Berovci – 2019

Variey/Variant	Nicotine Total N Proteins				Soluble Polyphenols sugars		Mineral Shmuk' matters index	
	Inserti-on	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Prilep 66 9 Ø (traditional tobacco production)	Undertips leaves	1,60	2,39	8,23	18,25	2,49	10,59	2,22
	Middle leaves	1,78	2,13	6,14	20,86	4,53	10,40	3,40
	Lugs	1,68	1,80	5,97	23,95	3,46	12,37	4,01
Prilep 66 9 Ø (integral tobacco production)	Undertips leaves	1,15	1,96	7,04	23,90	3,22	9,37	3,39
	Middle leaves	1,65	1,77	5,71	23,00	6,32	10,31	4,03
	Lugs	1,67	1,89	6,01	27,87	5,28	9,94	4,64

Total nitrogen content varies from 1.77% to 2.39%. The tobacco raw material obtained by Integral tobacco production is characterised with lower total nitrogen content of the three analyzed insertions (1.96% undertips, 1.77% true middle leaf and 1.89% lugs) than tobacco of traditional tobacco production who has higher content (2, 39% undertips, 2.13% true middle leaf and 1.80% lugs).

Proteins are organic compounds that play the most important role in the nitrogen complex for smoking - the flavor properties of tobacco raw material. According to Timov et al. (1974) the favorable impact of proteins occurs in quantitatively optimal ranges between 5% and 10%. The lower optimum protein content of the three analyzed insertions (7.04% undertips, 5.71% true middle leaf and 6,01% lugs) has tobacco raw material obtained by Integral tobacco production and higher content (8, 23% undertips, 6.14% true middle leaf and 5.97% lugs), traditional tobacco production.

Soluble sugars are the only chemical component that has a positive effect on the taste, they burn up the tobacco forming the соκе with acidic reaction, thus neutralizing the alkaline reaction produced by the proteins and other compounds in the leaf. According to Veselinov (cited by Uzunoski, 1985), high-quality oriental tobacco should contain more than 14% soluble sugars, with good quality 10-11%, and poor quality less than 9%. The content of soluble sugars (Table), is more suitable in Integrated tobacco production under irrigation conditions i.e it is higher for the three analyzed insertions (23.90% undertips, 23.00% true medium leaf and 27.87% lugs, than lower –in the three insertions (18.25% undertips, 20.86% true middle leaf and 20.86% lugs) in traditional production in non-irrigated conditions.

Polyphenols are essential for the color of tobacco and the aroma of tobacco smoke. According to several authors, in Macedonian varieties of tobacco polyphenols range in average from 2.55 to 6.50%. Slightly higher polyphenol content in the three analyzed insertions (3.22% undertips, 6.32%, true middle leaf and 5.28% lugs) has tobacco raw material obtained by Integral tobacco production and lower (2.49%) % undertips, 4.53% true middle leaf and 3.46% lugs), in Traditional tobacco production.

Smaller and more favorable content of mineral matters in the three analyzed insertions (9.27% undertips, 10.31%, true middle leaf and 9.94% lugs) has the tobacco raw material obtained in the Integrated tobacco production, and higher content (10.59 % undertips, 10.40% true middle leaf and 12.37% lugs) in Traditional tobacco production.

In addition to using the values for the presence of certain chemical components of the chemical composition of tobacco, the so-called quality coefficients are used to represent the interrelationships of these components. In our research we decided to analyze the Shmuk number because of its frequent use in the world and in our country. The higher Shmuk coefficients of the three analyzed insertions (3.39 undertips, 4.03 true middle true leaf and 4.64% lugs), as well as better quality, there are in the raw tobacco obtained by Integral tobacco production, and lower coefficient (2, 22 undertips, 3.40 true middle leaf and 4.01 insertion) there are in Traditional tobacco production.

Conclusion

Based on the values obtained from the analyzed chemical properties of the three analised inserts (Lugs, Middle leaves and Undertips) of tobacco variety Prilep 66 9 depending on the method and conditions of cultivation, In this pilot farm we can conclude the following:

Nicotine content of ranged from to 1,15 to 1,67% in Integral tobacco production, as well as from 1,60 to 1,78% in Traditional tobacco production.

Protein content of ranged from 5,71 to 7,04% in Integral tobacco production, as well as from 5,97 to 8,23% in Traditional tobacco production.

The content of soluble sugars in ranges from 23,0 to 27,87 % for Integral tobacco production, and from 18,25 to 23,95% for Traditional tobacco production.

The Shmuk's index of the three analyzed insects ranges from 3,39 to 4,64 for iIntegral tobacco production and from 2,22 to 4,01% for Traditional tobacco production.

Application of Integrated production and irrigation measures have a positive impact on the content of individual chemical components.

They reduce the content of nicotine, total nitrogen, protein and minerals, and increase the values of soluble sugars, polyphenols and Shmuk' index compared to the traditional way of production.

Figure 1. Premise in which the tobacco from the experiment is kept

Figure 2. Separated sample for analysis of chemical properties

References

1. Горник Р. Облагородување на туутнот. Прилеп, 1973.
2. Байлов Д., Попов М. Производство и првична обработка на тютюна. Земиздат – Бугария, 1965.
3. Dimitrieski M., Miceska G. Genotype and way of growing- key factors for developing tobacco raw typical for the type priep in relation to its chemical content Tutun//Tobacco. 2009. Vol.59, No 9 -10. P.207-212.
4. Dimitrieski M., Miceska G. A new and more productive variety of Prilep tobacco // Tobacco reporter. 2012, January. P.58-59.
5. Ministry of Agriculture, Forestry and Water Economy (MAFWE). Tobacco production strategy for the period 2020-2026. Скопје, 2019.
6. Тимов А., Веселинов М., Атанасов К., Димитров Ц. Ориенталският тютюн в България. Софија: Издателство на Бъгарската академиъя на науките, 1974.
7. Узуноски М. Производство на тутун. Скопје, 1985.
8. Шмук А.А. Химия табака и махорки. Москва, 1948.