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SOME MANUFACTURING PROPERTIES OF SEMI-ORIENTAL TOBACCOS BRED IN THE REGION OF PRILEP, WESTERN MACEDONIA

SUMMARY

The need for this research was imposed by the increased interest of tobacco companies to restart production of semi-oriental tobacco in R. Macedonia. The aim of the research was to study the impact of agrotechnics on some manufacturing properties of semi-oriental varieties Otlja O9-18/2 and Otlja-Zlatovrv produced in agro-ecological conditions of the Prilep production region. Three-year trial was set up on deluvial-colluvial soil type in 12 variants with three replications. The trial was bi-factorial, with three rates of nitrogen (25, 30 and 45 kg N/ha), constant amount of phosphorus (80 kg/ha) and potassium (100 kg/ha) and two irrigation regimes (45 and 60% FC). The following characteristics were subject of investigation: dry tobacco yield per hectare, plant height, leaf number per stalk and average length/width of the fifth, tenth and fifteenth leaf. The obtained results confirm that fertilization and irrigation have positive impact on the manufacturing properties of both varieties. Compared to the check variety, the yield was increased by 86.89% in Otlja O9-18/2 and 89.98% in Otlja-Zlatovrv variety. Fertilization and irrigation have statistically significant impact on the increase of plant height in all three years of investigations. Regarding the character leaf number per stalk, the applied agricultural practices did not show statistical significance at 5% only in 2008. Fertilization and irrigation have positive impact on increase of the leaf length, width and their average relative surface. Based on the results it can be concluded that the manufacturing properties of semi-oriental tobacco can be managed by application of proper agrotechnics. It can be concluded that the yield and quality of semi-oriental tobacco can be improved by application of proper agrotechnics.

Keywords: Semi-oriental tobacco, fertilization, irrigation, manufacturing properties.

INTRODUCTION

Semi-oriental tobacco is characterized by fine leaf tissue, low midrib content and good yield. In fabrication, it is treated as neutral raw material with

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full, sweet to neutral flavour that does not burn and scratches the throat while smoking. Therefore, Otlja tobacco is marked as an additional type of tobacco (Uzunoski, 1985). Dry tobacco is used in cigarette manufacture to improve the taste and charge (Naumoski *et al.*, 1977). The same author highlights that, due to the great taste, very good thread, good combustion etc., the variety Otlja stands in front of Virginia tobacco variety's (Naumoski, 1985).

In R. Macedonia varieties Otlja O9-18/2 and Otlja-Zlatovrv are grown in Kumanovo, Tetovo and Skopje production area. Semi-oriental tobaccos are also grown in Kosovo (Prizren and Dzakovica region), South Serbia and Montenegro (Uzunoski, 1985). According to Klikovac (Klikovac, 1994), soil in most parts of Montenegro is suitable for production of semi-oriental tobacco variety's such as Ravnjak, Tanche, Krajina, as well as local varieties such as Lekichi, Momichishi, Cheginovac etc.

Semi-oriental tobacco Otlja accounts for 25% of cigarette mixture. In the Republic of Macedonia, Otlja tobacco has been produced for a long period of time on restricted areas. Morphological properties of semi-oriental tobaccos are closely related to their quality properties and use value (Bogdanceski, 1981).

Spasovski points out that Otlja tobacco is grown as an additional material (Spasovski, 1957). Its lower, middle and upper middle leaves are ranked as first-class material and by application of proper agrotechnics, irrigation and curing a high-quality tobacco material can be obtained. Patche reported that Otlja tobacco should be grown on slope, light, permeable and loose soils, which provide good conditions for watering (Patche, 1960).

The increased interest of tobacco companies along with rational production of this tobacco, its use value in fabrication and the ability to burn without removing the leaf midrib (which is not the case with large-leaf tobaccos) is yet another reason for increased production of the semi-oriental tobacco in R. Macedonia.

The main objective of our research was to study the influence of fertilization and watering upon manufacturing properties of the semi-oriental varieties Otlja O9-18/2 and Otlja-Zlatovrv and to make contribution to the prospects for production of these varieties in the producing region of Prilep.

MATERIALS AND METHODS

Three-year field trials (2007-2009) with semi-oriental tobacco varieties Otlja O9-18/2 and Otlja-Zlatovrv were performed on the experimental field of the Scientific Tobacco Institute – Prilep. The experiment was bi-factorial, with three different nitrogen fertilizer rates (25, 30 and 45 kg N/ha), constant amounts of phosphorus (80 kg/ha), potassium (100 kg/ha) and two irrigation regimes (45% and 60% FWC), set up in randomized complete block design with three replications. The following variants were included (Table 1):

Soil preparation was performed with one autumn (30 cm depth) and two spring ploughings (8-20 cm depth). Before the trial was set up, the soil was tested to determine its agrochemical and physical properties.

Table 1. Included variants of tobacco varieties Otlja O9-18/2 and Otlja-Zlatovrv

1.	Ø unfertilized, unirrigated control, (Ø)
2.	N ₂₅ P ₈₀ K ₁₀₀ (N ₁)
3.	N ₃₅ P ₈₀ K ₁₀₀ (N ₂)
4.	N ₄₅ P ₈₀ K ₁₀₀ (N ₃)
5.	Ø unfertilized + 45% of FC (Ø + W ₁)
6.	N ₂₅ P ₈₀ K ₁₀₀ + 45% of FC (N ₁ + W ₁)
7.	N ₃₅ P ₈₀ K ₁₀₀ + 45 % of FC (N ₂ + W ₁)
8.	N ₄₅ P ₈₀ K ₁₀₀ + 45 % of FC (N ₃ + W ₁)
9.	Ø unfertilized + 60% of FC (Ø + W ₂)
10.	N ₂₅ P ₈₀ K ₁₀₀ + 60% of FC (N ₁ + W ₂)
11.	N ₃₅ P ₈₀ K ₁₀₀ + 60% of FC (N ₂ + W ₂)
12.	N ₄₅ P ₈₀ K ₁₀₀ + 60% of FC (N ₃ + W ₂)

Fertilization was done using inorganic mineral fertilizer NPK 8:22:20 and 27% KAN. 50% of the nitrogen amount was applied in the last ploughing, prior to planting, together with phosphorus and potassium, and the rest 50% were applied on the first hoeing. Each elementary plot has 4 rows with 8 plants in a row, or a total of 32 plants in the plot. The total number of plants in the trial was 1152, with 50*25 cm spacing. All necessary agro-technical and plant protection practices were applied during the vegetation period of tobacco. Water amounts for maintaining the regimes of 45 and 60% of FWC were calculated depending on current soil moisture. Harvesting was done manually in 5 harvests. After the processes of yellowing and sun-curing, tobacco was graded and weighed. Morphological measurements were performed during the growing season on five tobacco stalks selected from each variant. Average relative leaf surface was calculated by the following formula:

$$ars=l*w*0.6354$$

where l - length, w - width, 0.6354 is Tso coefficient (Tso, 1972).

Agrochemical parameters of soil and chemical components of tobacco raw were determined by standard methods in accredited laboratories of the Scientific Tobacco Institute - Prilep. The obtained results were statistically processed with ANOVA-LSD test.

RESULTS AND DISCUSSION

Meteorological conditions during the three-year investigations are presented in Table 1. From the exposed data, we can see that average temperature of the air during vegetation is 20.9 °C in 2007, 18.6 °C in 2008 and 19.6 °C in 2009. The optimum temperature for the tobacco plant is considered the mean daily temperature from 22 °C to 25 °C, and the marginal equivalents of deficiency and excess are between 18 °C and 30 °C (Atanasov, 1972).

Normal quantity of precipitation for variety Otlja is considered 196.6 mm (Patche, 1979). According to the data obtain from meteorological station situated near to the experimental plot precipitation of 229.9 mm was recorded in 2007,

183.3 mm in 2008 and 196.0 mm in 2009. In all years there was irregular pattern of precipitation.

During the warmest months (July and August) when the tobacco need for water is at its peak, there were long periods without precipitation. Without irrigation, was impossible to secure normal growth and profitable yield. To eliminate the negative effect of drought, in all observed periods, 4 irrigations were set with different quantity of water for the variants with 45% and 60% of the PVK, depending on the current humidity in the soil.

Table 2. Meteorological data during the growing season

Month	Year	Average air temperature (°C)			Precipitations mm	Days with precipitations
		Daily	Min	Max		
Average/Total (V - IX)	2007	20.9	14.4	27.4	229.9	33
	2008	19.7	11.9	28.1	183.3	29
	2009	18.9	11.8	27.5	196.0	35
Annual average	2007-2009	19.8	12.7	27.7	203.1	32
	1999 -2008	19.9	13.4	26.5	205.7	34

According to the obtained data (Table 2), the soil is poorer and will not meet the needs of semi-oriental tobacco, so it can be expected that fertilization and irrigation will give a more pronounced effect. For the medium-leaf (semi-oriental) and for large leaf tobaccos, a richer in nutrition soils are needed, as they are expected to provide bigger organic production (Lazareski *et. al.*, 1982).

Table 3. Agrochemical properties of the soil

Depth (cm)	pH		Humus %	mg/100 g soil		Physical clay, %
	H ₂ O	KCl		P ₂ O ₅	K ₂ O	
0 - 30	6.64	5.98	0.81	15.69	13.30	24.5
30 - 60	6.46	5.78	0.65	11.81	12.22	26.8
Classification	Low acid	Moderately acid	Low	Medium	Medium	Light loamy

According to Risteski (Risteski *et.al.*, 2013), the yield is a very important segment in tobacco production which directly affects the production costs and net profit of the farmers Irrigation and fertilization as basic agro-technic activities have the purpose to increase yield and quality of the tobacco. Yield and quality of tobacco, with the genetic potential of cultivar, significantly depend on the current soil fertility, applied agricultural practices and climatic conditions during the vegetation period correlate with water and nutrition deficit in the soil (Turšić 2010, Pelivanoska 2012, Kochovska 2014). Tobacco yield mainli depends on leaves, their number and size (Risteski *et. al* 2017). Fertilization and irrigation, separately as well as their interaction had strong influence in yield growth compared to the control (Table 4).

From the results, it can be noted that increase in yield correlates with the increase of nitrogen quantities. Fertilized varieties with the highest quantity of nitrogen had yield increase of 29.35% and 26.68% respectively, as opposite to

the control. Irrigation without fertilisation increased the yield for 15%. Lower effects are due to lower nutritional values of the soil on which examinations were conducted.

Table 4. Average tobacco yield (kg/ha)

N ^o	Variant	O9-18/2					
		2007	2008	2009	\bar{X}	Difference	
						Aps	%
1	Ø	38.33	39.70	42.47	40.17	-	100,00
2	N ₁	41.33	48.80	44.41	44.85	+4.68	111.64
3	N ₂	42.67	55.37	45.37	47.80	+7.63	119.00
4	N ₃	49.33	60.47	47.00	52.27	+12.10	130.11
5	Ø+W ₁	69.33	58.33	64.00	63.89	+23.72	159.05
6	N ₁ +W ₁	69.33	61.67	66.00	65.67	+25.50	163.47
7	N ₂ +W ₁	75.77	65.00	68.33	69.70	+29.53	173.51
8	N ₃ +W ₁	76.90	76.67	79.40	77.66	+37.49	193.32
9	Ø+W ₂	74.67	62.33	65.67	67.56	+27.39	168.17
10	N ₁ +W ₂	73.67	70.00	69.03	70.90	+30.73	176.50
11	N ₂ +W ₂	81.00	73.33	67.34	73.89	+33.72	183.95
12	N ₃ +W ₂	82.67	76.67	79.33	79.56	+39.39	198.05
N ^o	Variant	Otlja-Zlatovrv					
		2007	2008	2009	\bar{X}	Difference	
						Aps.	%
1	Ø	78.33	51.00	78.67	69.33	-	100,00
2	N ₁	79.00	54.33	80.80	71.38	+2.05	102.95
3	N ₂	90.00	56.67	100.67	82.44	+13.11	118.92
4	N ₃	97.33	58.33	101.67	85.78	+16.45	123.72
5	Ø+W ₁	155.67	109.00	127.33	130.67	+61.34	188.47
6	N ₁ +W ₁	178.67	126.67	134.33	146.56	+77.23	211.39
7	N ₂ +W ₁	149.67	135.00	143.67	142.78	+73.45	205.94
8	N ₃ +W ₁	148.00	145.00	151.67	148.22	+78.89	213.79
9	Ø+W ₂	168.00	138.33	135.00	147.11	+77.78	212.19
10	N ₁ +W ₂	176.00	143.33	151.67	157.00	+87.67	226.45
11	N ₂ +W ₂	176.00	150.00	157.33	161.11	+91.78	232.38
12	N ₃ +W ₂	177.00	153.33	162.33	164.22	+94.89	236.87

Interaction effect from fertilization and irrigation is manifested with yield increase from 40.99% (var. 7) to 88.98% (var. 12) at O9-18/2 and from 5.17% to 89.99% respectively at variety Otlja-Zlatovrv. Based on the conducted statistical analysis on yearly yield it can be concluded that variants fertilized, irrigated as well as fertilized and irrigated have statistically significant influence at all three levels of probability, which indicated on total justification of the used agro-technical measures in cultivation of Otlja variety.

According to Uzunoski (1985) height of plants from the standard variety Otlja O9-18/2 is in the range from 50 cm to 70 cm, and that of the Otlja-Zlatovrv variety from 80 cm to 100 cm. In conducted research height of the control plants (unfertilized, unirrigated) was lower. Height of the Otlja O9-18/2 plants, with inflorescence was 40.17 cm, and the height of the Otlja-Zlatovrv was 69.33 cm.

Fertilization and irrigation had significant positive effect on the plants heights within all examined varieties. Highest plants were measured within variant 12, where height of Otlja O9-18/2 was increased by 98.05%, and height of the Otlja-Zlatovrv was increased by 136.87%. Applied agro-technics produced better effects within the newer Otlja-Zlatovrv variety compared with the standard Otlja O9-18/2 variety.

Table 5. Height of the stalk with inflorescence (in cm)

N°	Variant	O9-18/2					
		2007	2008	2009	\bar{X}	Difference	
						Aps	%
1	Ø	21.00	21.33	21.00	21.11	-	100,00
2	N ₁	23.67	22.33	23.33	23.11	+2.00	109.48
3	N ₂	24.67	23.33	23.33	23.78	+2.67	112.64
4	N ₃	25.33	23.33	24.00	24.22	+3.11	114.74
5	Ø+W ₁	22.33	23.67	23.33	23.11	+2.00	109.48
6	N ₁ +W ₁	24.33	24.00	25.33	24.56	+3.45	116.32
7	N ₂ +W ₁	25.33	25.00	26.33	25.56	+4.45	121.06
8	N ₃ +W ₁	24.67	25.00	27.00	25.56	+4.45	121.06
9	Ø+W ₂	24.67	23.00	23.00	23.56	+2.45	111.58
10	N ₁ +W ₂	26.33	23.33	25.00	24.89	+3.78	117.90
11	N ₂ +W ₂	26.67	23.67	25.33	25.22	+4.11	119.48
12	N ₃ +W ₂	27.33	23.67	26.33	25.78	+4.67	122.11
N°	Variant	Otlja-Zlatovrv					
		2007	2008	2009	\bar{X}	Difference	
						Aps.	%
1	Ø	30.33	30.00	30.00	30.11	-	100,00
2	N ₁	32.33	31.67	31.00	31.67	+1.56	105.17
3	N ₂	32.67	31.67	33.33	32.56	+2.45	108.12
4	N ₃	33.00	32.67	32.33	32.67	+2.56	108.49
5	Ø+W ₁	33.33	31.33	29.67	31.44	+1.33	104.43
6	N ₁ +W ₁	34.00	32.33	31.67	32.67	+2.56	108.49
7	N ₂ +W ₁	35.00	33.67	31.00	33.22	+3.11	110.34
8	N ₃ +W ₁	35.33	34.67	31.33	33.78	+3.67	112.18
9	Ø+W ₂	32.67	30.67	29.67	31.00	+0.89	102.96
10	N ₁ +W ₂	35.33	31.00	32.00	32.78	+2.67	108.86
11	N ₂ +W ₂	35.00	32.33	33.00	33.44	+3.33	111.07
12	N ₃ +W ₂	36.00	34.00	33.67	34.56	+4.5	114.76

According the obtained results (Table 6) and according classification by Uzunoski (Uzunoski, 1985), examined semi-oriental tobacco varieties, belongs in the middle group based on the number of leaves (23-35 leaves). The number of leaves by plant varies according to the growth conditions and applied agro-technical measures, and is in the boundaries of genetic potential. The number of leaves at Otlja O9-18/2 is ranges from 22.11 (control) to 25.78 (variant 12), where applied agro-technical measures increased the number of leaves by

22.11%. The number of leaves at Otlja-Zlatovrv ranges from 30.11 (control) to 34.56 (variant 12) and applied agro-technical measures increased the number of leaves by 14.76%. This characteristic does not show statistically significant results at a 0.05% level, only in 2008. Mitreski (Mitreski, 2012) point out that number of leaves on stalk is variable from stalk to stalk but this qualitative attribute is variety characteristic. According to Atanasov (Atanasov, 1972) number of leaves within a selected variety is mostly constant.

Based on the results it can be concluded that fertilization and irrigation have positive impact on height increase of the plant and the number of leaves on ply within both varieties.

Table 6. Leaf number per stalk

N°	Variant	O9-18/2					
		2007	2008	2009	\bar{x}	Difference	
						Aps	%
1	Ø	21.00	21.33	21.00	21.11	-	100,00
2	N ₁	23.67	22.33	23.33	23.11	+2.00	109.48
3	N ₂	24.67	23.33	23.33	23.78	+2.67	112.64
4	N ₃	25.33	23.33	24.00	24.22	+3.11	114.74
5	Ø+W ₁	22.33	23.67	23.33	23.11	+2.00	109.48
6	N ₁ +W ₁	24.33	24.00	25.33	24.56	+3.45	116.32
7	N ₂ +W ₁	25.33	25.00	26.33	25.56	+4.45	121.06
8	N ₃ +W ₁	24.67	25.00	27.00	25.56	+4.45	121.06
9	Ø+W ₂	24.67	23.00	23.00	23.56	+2.45	111.58
10	N ₁ +W ₂	26.33	23.33	25.00	24.89	+3.78	117.90
11	N ₂ +W ₂	26.67	23.67	25.33	25.22	+4.11	119.48
12	N ₃ +W ₂	27.33	23.67	26.33	25.78	+4.67	122.11
N°	Variant	Otlja-Zlatovrv					
		2007	2008	2009		Difference	
						Aps.	%
1	Ø	30.33	30.00	30.00	30.11	-	100,00
2	N ₁	32.33	31.67	31.00	31.67	+1.56	105.17
3	N ₂	32.67	31.67	33.33	32.56	+2.45	108.12
4	N ₃	33.00	32.67	32.33	32.67	+2.56	108.49
5	Ø+W ₁	33.33	31.33	29.67	31.44	+1.33	104.43
6	N ₁ +W ₁	34.00	32.33	31.67	32.67	+2.56	108.49
7	N ₂ +W ₁	35.00	33.67	31.00	33.22	+3.11	110.34
8	N ₃ +W ₁	35.33	34.67	31.33	33.78	+3.67	112.18
9	Ø+W ₂	32.67	30.67	29.67	31.00	+0.89	102.96
10	N ₁ +W ₂	35.33	31.00	32.00	32.78	+2.67	108.86
11	N ₂ +W ₂	35.00	32.33	33.00	33.44	+3.33	111.07
12	N ₃ +W ₂	36.00	34.00	33.67	34.56	+4.5	114.76
LSD		2007	2008	2009	2007	2008	2009
0.05		2.02	n.s.	2.10	2.32	n.s.	1.94
0.01		n.s.	n.s.	n.s.	3.15	n.s.	n.s.

Table 7. Length and width of the 5th, 10th and 15th leaf of the variety O9-18/2

N ^o	Variant	5 th leaf				10 th leaf				15 th leaf			
		Length cm	Width cm	ratio L:W	Average relative surface cm ²	Length cm	Width cm	ratio L:W	Average relative surface cm ²	Length cm	Width cm	ratio L:W	Average relative surface cm ²
1	Ø	17.70	12.00	1.48	134.95	18.70	12.20	1.53	144.96	16.90	11.00	1.54	118.12
2	N ₁	19.70	12.70	1.55	158.97	20.30	12.70	1.60	163.81	20.50	12.00	1.71	156.31
3	N ₂	21.30	13.30	1.60	180.00	19.30	12.00	1.61	147.15	18.30	11.30	1.62	131.39
4	N ₃	21.80	13.70	1.59	189.76	21.20	12.70	1.67	171.07	20.30	11.70	1.74	150.91
5	Ø+W ₁	23.00	13.30	1.73	194.37	24.10	15.30	1.58	234.29	22.30	12.00	1.86	170.03
6	N ₁ +W ₁	25.70	15.70	1.64	256.37	28.70	17.00	1.69	310.01	24.80	13.70	1.81	215.88
7	N ₂ +W ₁	26.00	14.00	1.86	231.28	29.00	17.00	1.71	313.25	27.30	13.70	1.99	237.64
8	N ₃ +W ₁	27.10	14.70	1.84	253.12	28.00	16.70	1.68	297.11	26.70	14.33	1.86	243.11
9	Ø+W ₂	22.70	14.70	1.54	212.02	25.30	15.30	1.65	245.96	22.50	14.30	1.57	204.44
10	N ₁ +W ₂	26.30	17.70	1.49	295.78	27.70	17.00	1.63	299.21	26.10	16.00	1.63	265.34
11	N ₂ +W ₂	27.70	17.00	1.63	299.20	29.30	17.70	1.66	329.52	27.80	16.70	1.66	464.26
12	N ₃ +W ₂	28.00	18.00	1.56	320.24	31.50	18.00	1.75	360.27	28.00	17.30	1.62	484.40

Table 8. Length and width of the 5th, 10th and 15th leaf of the variety Otlja-Zlatovrv

N ^o	Variant	5 th leaf				10 th leaf				15 th leaf			
		Length cm	Width cm	ratio L:W	Average relative surface cm ²	Length cm	Width cm	ratio L:W	Average relative surface cm ²	Length cm	Width cm	ratio L:W	Average relative surface cm ²
1	Ø	21.33	12.00	1.78	162.64	21.33	12.67	1.68	171.71	20.33	12.00	1.69	155.01
2	N ₁	22.67	12.67	1.79	182.50	23.00	13.67	1.68	199.78	22.67	13.00	1.74	187.26
3	N ₂	22.00	13.33	1.65	172.36	22.00	13.67	1.61	191.09	21.00	12.33	1.70	164.52
4	N ₃	23.67	13.33	1.78	200.48	23.33	14.33	1.63	212.43	23.00	13.33	1.73	194.80
5	Ø+W ₁	25.67	13.00	1.97	212.04	26.00	15.33	1.70	253.25	22.33	12.00	1.86	170.26
6	N ₁ +W ₁	28.67	15.67	1.83	285.46	30.00	17.00	1.76	324.05	25.33	14.67	1.73	236.11
7	N ₂ +W ₁	29.00	14.67	1.98	270.32	30.33	17.00	1.78	327.62	25.67	15.00	1.71	244.66
8	N ₃ +W ₁	29.33	15.33	1.91	285.70	30.67	17.67	1.74	344.35	26.00	15.67	1.66	258.87
9	Ø+W ₂	26.00	14.67	1.77	242.35	27.67	15.33	1.80	269.52	23.33	12.67	1.84	187.81
10	N ₁ +W ₂	28.11	17.67	1.59	315.60	30.67	18.00	1.70	350.78	25.00	13.33	1.88	211.74
11	N ₂ +W ₂	30.00	17.00	1.76	324.05	31.33	18.00	1.74	358.33	26.00	16.67	1.56	275.39
12	N ₃ +W ₂	30.66	18.00	1.70	350.66	31.33	18.67	1.68	371.66	27.33	17.33	1.58	300.94

The analyzed leaves (the 5th, 10th and 15th leaf) represent the middle harvesting belt. Importance of this belt comes of the fact that this leaves represent nearly 70% of the total leaf mass, and it is the area where highest quality leaves are concentrated. Applied agro-technics have increased of the leaves length and

width in both examined variety's (Table 7 and Table 8) which lead to enlargement of average relative leaves surface.

These leaves are important for the fabrication process because they have good thread which improves the tobacco connection in the cigarette. Also, this parameter combined with the data of total leaf number for the variety, can be used for roughly assessing the yield.

The results clearly show that highest average relative leaf surface is achieved at variant 12, at the both examined varieties. Variety O 9-18/2 have highest average relative surface on the 15th leaf (484.40cm²), and variety O. Zlatovrv on the 10th leaf (371.66cm²).

CONCLUSION

Based on the obtained results, it can be concluded that fertilization and irrigation are indispensable measures in breeding of semi-oriental varieties O9-18/2 and Otlja-Zlatovrv in tobacco producing region of Prilep.

- Fertilization and irrigation considered separately and in interaction have a strong impact on increasing the tobacco yield, compared to the check variant.

- Compared to the check variety, yield has been increased by 86.89% in Otlja O9-18/2 and 89.98% in Otlja-Zlatovrv variety.

- Statistical analysis of the achieved yield by years reveals that all three variants (fertilized, irrigated and fertilized-irrigated) have statistically significant impact at all three levels of probability, confirming the justification of all agro-technical measures applied in cultivation of tobacco varieties O9-18/2 and Otlja-Zlatovrv.

- Fertilization and irrigation have a positive effect on other manufacturing properties as stalk height, leaf number per stalk, length/width of the 5th, 10th and 15th leaf and average relative surface.

- According to the obtained results, the newly created variety Otlja-Zlatovrv has better manufacturing properties compared to the standard variety O9-18/2.

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