

THE INFLUENCE OF THE IRRIGATION ON PEACH YIELD QUALITY IN THE CONDITIONS FROM PEACH TREE BASIN OF ORADEA

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Abstract

The paper is based on the research results obtained during 2007-2009 in Oradea in an experiment with drip and microsprinkler irrigation. The irrigation determined the yield gains very significant statistically every year. To maintain a soil water reserve between easily available water content and field capacity determined to use an irrigation rates of 2950 m³/ha in 2007, of 3320 m³/ha and of 4200 m³/ha in 2009. The irrigation determined the yield gains very significant statistically every years. In comparison with unirrigated variant, the weight index of peaches increased very significant statistically and the size of the peaches increased, too. The percentage of the peach stone decreased statistically significant. The research result emphasized the irrigation opportunity in peach tree from basin of Oradea.

Keywords: peach, yield, weight index, size index, stone percentage, irrigation

INTRODUCTION

Peach tree is an one of the very important crops from Romania. Oradea peach tree basin is the second peach tree basin from Romania after the Dobrogea and before 1990 Bihor county occupied the second place on the country regarding the quantity of peach exported (Sarca, 2003). The annual rainfall registered in Oradea (620 mm multiannual average) are bigger than the annual rainfall from Dobrogea, but their distribution are not according with peach water requirement and the researches made by Șcheau V. 2005, Șcheau et al 2006, emphasized the need of the irrigation in peach tree. On the other hand, the irrigation scheduling is very important in obtain the best quantity and quality of the yields (Domuta, 2003, 2005, 2009a, 2009b, Doorembos and Pruitt, 1992).

MATERIAL AND METHODS

The researches were carried out during 2007-2009 in an orchard planted in 1996. The cultivar used was Superb of Autumn. Three variants were studied: 1) Unirrigated; 2) Drip irrigation 3) Microsprinkler irrigated. In the irrigated variant, the soil water reserve on 0-150 cm was maintained between the easily available water content and the field capacity determining the soil moisture every ten days. The irrigation regime included an irrigation rate of 2950 m³/ha in 2007, of 3320 m³/ha in 2008, 4800 m³/ha in 2009. The annual rainfall during the studied period was of 556.1 mm in 2007, of 585.7 mm in 2008, of 501.4 mm in 2009.

The weight index, size index and the percentage of the peach stone were determined by usually methods (Șcheau et al, 2006). The results research was calculated by variance analysis (Domuța, 2006).

RESULTS AND DISSCUSIONS

The irrigation influence on yield peach quantity

The irrigation determined the yield gains very significant statistically both in the variant with drip irrigation and in the variant with microsprinkler irrigation in the all years of the researches. The relative differences in comparison with unirrigated variant were of 8.7% in drip irrigation and of 12.8% in microsprinkler irrigation in 2007, of 12.0% in drip irrigation and 15.3% in microsprinkler irrigated in 2008 and of 11.3% in drip irrigation and of 15.3% in microsprinkler irrigation in 2009; all the years the biggest yield gains were obtained in the variant with microsprinkler irrigation.

Table 1

The influence of the irrigation method on peach yield, Oradea 2007-2009

Variant	Yield		Difference		Statistically significant
	t/ha	%	t/ha	%	
2007					
Unirrigated	43.0	100	-	-	Mt
Drip irrigation	51.7	120.2	8.7	20.2	xxx
Mikrosprinkler irrigatio	55.8	129.8	12.8	29.8	xxx
LSD _{5%} = 0.7; LSD _{1%} =1.8; LSD _{0.1%} = 2.9					
2008					
Unirrigated	34.8	100	-	-	Mt
Drip irrigation	46.8	134.5	12.0	34.5	xxx
Mikrosprinkler irrigated	50.1	143.9	15.3	43.9	xxx
LSD _{5%} = 0.6; LSD _{1%} =1.1; LSD _{0.1%} = 2.3					
2009					
Unirrigated	36.6	100	-	-	Mt
Drip irrigation	47.9	130.8	11.3	30.8	xxx
Mikrosprinkler irrigatio	51.9	141.8	15.3	41.8	xxx
LSD _{5%} = 0.8; LSD _{1%} =1.7; LSD _{0.1%} = 2.9					

The irrigation influence on the weight index of the peaches

The values of the weight index of the peaches increased very significant statistically in the variants with drip irrigation and in the variant with microsprinkler irrigation in comparison with unirrigated variant. The differences from drip irrigation variant were of 46.5% in 2007, of 31.2% in 2008 and of 31.6% in 2009; the differences from microsprinkler irrigated are bigger: 49.6% in 2007, 46.7% in 2008 and 46.1% in 2009. (table 2)

Table 2

Influence of the irrigation method on the value of the weight index of the peaches, Oradea 2007-2009

Variant	Weight index		Difference		Statistically significant
	g	%	g	%	
2007					
Unirrigated	115.9	100	-	-	Mt
Drip irrigation	169.8	146.5	53.9	46.5	xxx
Mikrosprinkler irrigated	173.4	149.6	57.5	49.6	xxx
LSD _{5%} = 15.3; LSD _{1%} =20.7; LSD _{0,1%} = 28.1					
2008					
Unirrigated	93.1	100	-	-	Mt
Drip irrigation	122.1	131.2	29.0	31.2	xxx
Mikrosprinkler irrigated	136.6	146.7	43.5	46.7	xxx
LSD _{5%} = 14.7; LSD _{1%} =21.0; LSD _{0,1%} = 28.0					
2009					
Unirrigated	99.7	100	-	-	Mt
Drip irrigation	131.2	131.6	31.5	31.6	xxx
Mikrosprinkler irrigated	145.7	146.1	46.0	46.1	xxx
LSD _{5%} = 13.6; LSD _{1%} =18.1; LSD _{0,1%} = 26.3					

The irrigation influence on the size index of the peaches

The irrigation determined the increase very significant of the size index of peaches. In drip irrigation the differences were of 13.9% in 2007, of 21.4% in 2008 and of 14.7% in 2009. The differences registered in the microsprinkler irrigated are bigger than the differences registered the drip irrigated variant: 15.2% in 2007; 26.1% in 2008 and 18.1% in 2009. (table 3)

Table 3

Influence of the irrigation method on the size index of the peaches, Oradea 2007-2009

Variant	Size index		Difference		Statistically significant
	mm	%	mm	%	
2007					
Unirrigated	61.7	100	-	-	Mt
Drip irrigation	70.2	113.8	8.5	13.9	xxx
Mikrosprinkler irrigated	71.7	115.2	9.4	15.2	xxx
LSD _{5%} = 2.7; LSD _{1%} = 4.4; LSD _{0.1%} = 7.3					
2008					
Unirrigated	49.9	100	-	-	Mt
Drip irrigation	60.6	121.1	10.7	21.4	xxx
Mikrosprinkler irrigated	62.9	126.1	13.0	26.1	xxx
LSD _{5%} = 2.5; LSD _{1%} = 4.3; LSD _{0.1%} = 6.9					
2009					
Unirrigated	52.4	100	-	-	Mt
Drip irrigation	60.1	114.7	7.7	14.7	xxx
Mikrosprinkler irrigated	61.9	118.1	9.5	18.1	xxx
LSD _{5%} = 2.7; LSD _{1%} = 4.6; LSD _{0.1%} = 6.1					

The irrigation influence on percentage of the peach stone

In the all years, the irrigation determined the decrease of the stone percentage of the peaches in the comparison with unirrigated variant. The differences were distingue significant in the variant with drip irrigation: 16.0% in 2007, 13.8% in 2008 and 14.8% in 2009. In the variant with microsprinkler irrigated variant the difference registered in 2007 (- 20.0%) was distingue significant and the differences registered in 2008 (- 17.3%) and in 2009 (- 22.3%) were very significant statistically. (table 4)

Table 4

Influence of the irrigation method on percentage of the peach stone, Oradea 2007-2009

Variant	Peach percentage		Difference		Statistically significant
	mm	%	mm	%	
2007					
Unirrigated	5.0	100	-	-	Mt
Drip irrigation	4.2	84.0	-0.8	-16.0	00
Mikrosprinkler irrigated	4.0	80.0	-1.0	-20.0	00
LSD _{5%} = 0.3; LSD _{1%} = 0.7; LSD _{0.1%} = 1.2					
2008					
Unirrigated	5.8	100	-	-	Mt
Drip irrigation	5.0	86.2	-0.8	-13.8	00
Mikrosprinkler irrigated	4.8	82.7	-1.0	-17.3	000
LSD _{5%} = 0.20; LSD _{1%} = 0.51; LSD _{0.1%} = 0.92					
2009					
Unirrigated	5.4	100	-	-	Mt
Drip irrigation	4.6	85.2	-0.8	-14.8	00
Mikrosprinkler irrigated	4.2	77.7	-1.2	-22.3	000
LSD _{5%} = 0.3; LSD _{1%} = 0.6; LSD _{0.1%} = 1.1					

CONCLUSIONS

The researches results carried out during 2007-2009 in the Research Station Oradea determined the following conclusions:

Both drip irrigation and microsprinkler irrigation determined the yield gains very significant statistically in comparison with unirrigated peach tree all the three years studied.

In the irrigated variants the weight of the peaches increased very significant statistically. The size index of the peaches increased very significant too.

The irrigation determined the decrease of the peach stone in comparison with unirrigated variant.

The microsprinkler irrigation determined the yield gains, weight index, size index bigger than the values determined in the drip irrigation variant; the percentage of the peach stone was smaller in the microsprinkler irrigation variant than in the drip irrigation variant.

REFERENCES

1. Botzan M., 1966 - Irigarea culturilor Ed. Agrosilvică București
2. Domuța C., 2003 - Oportunitatea irigațiilor în Câmpia Crișurilor, Ed. Universității din Oradea p. 165-196
3. Domuța C., 2005, Irigarea culturilor, Editura Universității din Oradea, 96-100
4. Domuța C., 2006, Tehnică experimentală, Editura Universității din Oradea, 75-120
5. Domuța C., 2009, Irigarea culturilor. Editura Universității din Oradea, 342-351
6. Domuța C. și col, 2009, Irigațiile în Câmpia Crișurilor Editura Universității din Oradea
7. Doorembos J, W O Pruitt, 1993, Crop water requirements. Irrigation and drainage paper FAO Rome.
8. Grumeza N., Merculiev O., Klepș Cr., 1989, Prognoza și programarea udărilor în sistemele de irigații Ed. Ceres București, p. 162-164
9. Sarca Gh., 2003, Piersicul, materie primă agroalimentară, Editura Universității din Oradea p. 115-125
10. Șcheau V., 2005, Influența irigației localizate asupra creșterii și fructificării piersicului. Teză de doctorat USAMV București p. 120-230
11. Șcheau V., C. Domuța, Șcheau Violeta, 2006, Irigarea localizată a piersicului, Editura Universității din Oradea p. 75-130