

The Effect of "drip" Irrigation on the Most Important Characteristics of Some Table Grapevine Cultivars

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Abstract : The data from the several- years observations were collected on the effect of "drip" irrigation on yield and quality of 11 table grapevine cultivars. The cultivars responded differently to the irrigation, but all of them resulted in increased yield. The size of the clusters and berries was increased as well, which led to an increase in quality and commercial value of the table grapevines.

Key words: "drip" irrigation, table grapevine cultivars, vine, yield, grape quality.

Introduction

Negotin vineyard is a famous district of east Serbia where vine is cultivated on over 3000 ha. It is well - known for the grape vine cultivars, but the table grapevine cultivars are grown to less extent.

One of the biggest public companies in this vineyard district is "Kraino vino"-Negotin, which owns 200 ha of vineyards, all of them "drip" irrigated.

The aim of this work was to emphasize the possibility and importance of successful cultivation of the table grapevine cultivars in this vineyard district, as well as to prove a beneficial effect of irrigation on the most important characteristics of the investigated cultivars.

Materials and methods

Experimental field with table grapevine cultivars was planted as a part of the commercial plantation for grape wine production at the location "Bukovsko zlatno brdo" in the vicinity of Negotin.

This location has the altitude of 118 m. Planting distance was 3 x 2 m with two plants in each planting space. The growing system was modified Casarsa, with the trunk height 150 cm, the length of the horizontal part 1m, 4 knots where mixed pruning was applied. The buds load per plant was $4 \times 10 + 4 \times 2 = 48$ buds or 16 buds per m^2 . All the cultivars were grafted on the same rootstock Kober 5 BB.

The following cultivars were investigated: Chabagyöngue, Demir kapija, Beogradska rana, Grocanka, Radmilovacki muskat, Muscat d' hambourg, Afuz-ali (Regina), Negotinski rubin, Antigona, Beogradska besemena and Italia (IP 65).

Each of the cultivars was presented with 2 rows counting 240 plants each. One row of each cultivar was irrigated and the other one was used as a control.

Table grapevine cultivars - Chabagyöngue, Black muskat, Afuz-ali (Regina) and Italia (IP 65) served as standards for other new Yugoslav cultivars differing in the ripening date, because they were used as parents for breeding new cultivars.

The irrigation was applied three times per year: during the period of intensive shoot growth, intensive growth of berries and at the beginning of ripening.

Several parameters were investigated in order to assess the effects of irrigation: yield per square meter unit of surface, average mass of cluster, average mass of berries, percentage of marketable grapes, sugar and total acids content in berries.

All the parameters were obtained, using the standard ampelographic methods. The data were expressed as average values for the investigated period.

Results and Discussion

Results of the investigations are presented in Tables 1. and 3. and Figure 1.

Grape yield per square meter (unit area) (Tab. 1) increased with irrigation comparing with control (non-irrigated plants) for all the cultivars. Among the cultivars, those with earlier ripening period had weaker response to the irrigation (10% yield increment) comparing with mid-late, late and very late cultivars (35% yield increment). Similar results were obtained from Avramov et al. (1992), Zunić (1992), Zunić (1994) under the same ecological conditions.

Tab.1. The Effect of "drip" Irrigation on the Yield of Table Grapevine cultivars (Negotin, average for 1988-1994)

Cultivar	Average yield in kg/m ²		
	Non-irrigated (control)	Irrigated	Increment (%)
Chabagyöngue	0,790	0,880	11
Demir kapija	0,960	1,106	15
Beogradska rana	1,000	1,240	24
Grocanka	1,160	1,416	22
Radmilovacki muskat	0,740	0,970	31
Afuz-ali (Regina)	1,675	2,140	27
Muscat d hambourg	1,907	2,100	10
Antigona	1,605	1,970	22
Negotinski rubin	1,702	2,185	28
Beogradska besemena	2,000	2,660	33
Italia (IP 65)	1,365	1,990	35

Positive effect of irrigation was pronounced on the mass of berries and clusters of the cultivars. The increment in the mass of clusters was 20-60% and in the berry mass 18-26%. (Tab. 2)

Tab. 2. The Effect of the "drip" Irrigation on the Average Mass of Cluster and Berry of Table Grapevine cultivars. (Negotin, average for 1988-1994)

Cultivar	Average mass of the cluster (g)			Average mass of the berry (g)		
	Non-irrigated (control)	Irrigated	Increment %	Non-irrigated (control)	Irrigated	Increment %
Chabagyöngue	124	142	20	1,1	1,30	18
Demir kapija	140	170	22	1,2	1,42	19
Beogradska rana	196	235	20	1,2	1,42	19
Grocanka	210	264	26	1,3	1,53	18
Radmilovacki muskat	210	252	20	1,4	1,65	18
Afuz-ali (Regina)	246	332	35	1,7	2,04	20
Muscat d hambourg	218	292	34	1,5	1,83	22
Antigona	220	286	30	1,8	2,20	22
Negotinski rubin	270	335	24	1,6	1,98	24
Beogradska besemena	200	294	47	1,4	1,76	26
Italia (IP 65)	196	314	60	1,9	2,28	20

Sugar and total acids content in grapes for all the cultivars (on average) was somewhat lower than in non-irrigated (control) plants, although during the dry years it was higher than in the control plants.

In general, the quality of grapes (Tab.3.) was not significantly impaired with irrigation, but it was in yield.

Tab 3. The Effect of "drip" Irrigation on Sugar and Total acids Content in Mast (Negotin, average for 1988-1994)

Cultivar	Sugar content in mast (%)		Total acid content in mast (g/l)	
	Non-irrigated (control)	Irrigated	Non-irrigated (control)	Irrigated
Chabagyöngue	13,8	13,6	4,6	4,8
Demir kapija	14,2	13,9	4,9	5,2
Beogradska rana	16,3	16,0	5,0	5,1
Grocanka	16,0	15,2	4,9	5,0
Radmilovacki muskat	16,6	16,0	4,7	4,9
Afuz-ali (Regina)	17,0	16,4	5,0	5,2
Muscat d hambourg	18,3	17,3	6,2	6,4
Antigona	16,4	16,0	6,0	6,1
Negotinski rubin	16,1	15,9	6,4	6,4
Beogradska besemena	18,4	18,0	7,2	7,3
Italia (IP 65)	14,2	14,1	4,9	5,1

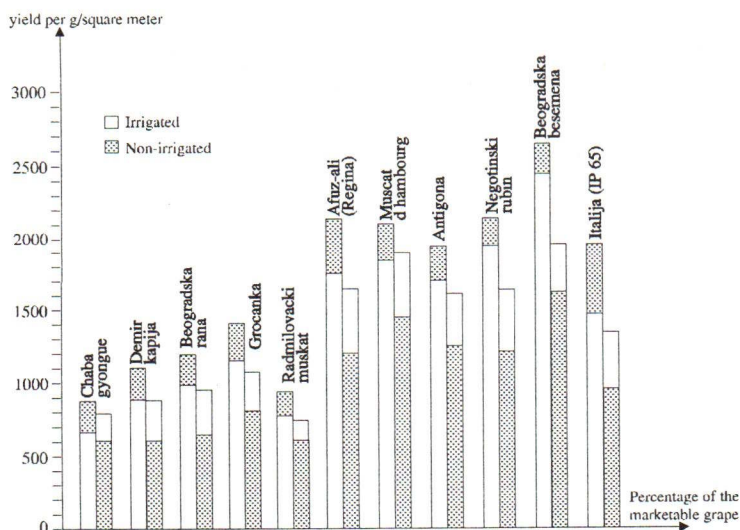


Fig.1. The Effect of "drip" Irrigation on the Percentage of Extra Class in the Total Grape Yield

In contrast, the percentage of the extra class grapes was significantly increased in all the cultivars with irrigation in comparison with non-irrigated plants. Thus, the share of the extra class grapes in the total yield was increased in the irrigated treatment, which proved to have a great economic significance for all the cultivars (Figure 1.).

Conclusion

With "drip" irrigation, yield, cluster and berry size of the table grapevine cultivars, were increased. At the same time, the quality which expressed in sugar and total acids content was not negatively affected, and during dry years, it was even improved by irrigation.

The most important effect of the "drip" irrigation in table grapevine cultivars is the increase in the percentage of the extra class and, the decrease in the percentage of unmarketable grapes. Therefore, irrigation is an agricultural practice, which helps better cultivation of the table grapevine cultivars and enables better economical effects, too.

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UTICAJ DUBINSKOG ĐUBRENJA NA PRINOS I KVALITET KOD 11 SORTI GROŽĐA

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Rezime

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