STUDY ABOUT CONTINUOUS DRIP IRRIGATION IN CHERRY SUMMARY 2020

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Abstract: *Proper irrigation is one of the≥key factors ofmaintaining a healthy and≥economical productive cherry orchard. Over irrigation can slow the growth of the roots and can induce excessive vegetative vigor, but applying the deficit irrigation method can result into drough stress. The reproductive response of a ten years≥old cherry trees orchard under the temperate continental climate to deficit irrigation was studied in a private and commercial orchard≥located in the East of Romania for 1 season. Three irrigation treatments were establish: 1) irrigation by control, 1 lateral, 2.3l/h dripper, 0.50 cm spacing, irrigation rate = 1.02; 2) irrigation by low flow, 2 laterals, 0.7 l/h dripper, 1.0 m spacing, irrigation rate = 0.62; 3) irrigation with 2 laterals per row, 2.3l/h dripper, 1.0 m spacing, irrigation rate = 1.02. The phenological phases of sweet cherry trees like flowering, fruit≥and vegetative growth is influenced by the different irrigation methods and after the evaluation these different irrigation strategies resulted reproductive response as fruit size, fruit yield, leaf. Observation indicate that exceedingly low flow irrigation throughout daylight hours may contribute to irrigation efficiency. In the market we can choose to use drippers with low flows that have not yet been introduced into orchards in significant scale wordwide. The purpose of the observation is to evaluate the effect of continuous irrigation method on cherry trees and the applicability of low flow dripper in orchards.*

Keywords: *cherry orchard, low flow dripper, irrigation rate, fruit size, fruit yield, lateral.*

INTRODUCTION

Water is becoming scarce not only in the arid parts or Romania, but even in the areas where the rainfall is abundant. Water deficit concerns, the quantity of resources available and the quality of them. The main of the agriculture industry orchards are under the drip irrigation, where irrigation water is pumped into the irrigation system from lakes, deep wells, surface channels, etc. Although the annual rainfall is this region is relatively high, most of it occurs in winter and early spring. During the summer when evapotranspiration is high, the farmers are taking in consideration drip irrigation with continuous water application. A good correlation was determined between the fruit development period and seasonal transpiration (BINGHAM ET AL., 1992). Additionally, a summer water deficit had a negative influence on the size of the cherries tries in Italy (BARBERIS ET AL., 1999).

Some scientist have reported that the wetted soil volume should be at least one third to obtain optimum crop yield in arid regions when drip irrigation is used. In order to provide enough wetted volume at root depth, it is recommended to use two laterals of drip irrigation pipes per row (BAARS, 1976; GOLDBERG ET AL., 1976; NIR 1982; PAPAZAFIRIOU, 1980).

Continuous irrigation can be a strategy which could be applied to utilize water more efficiently. The adoption of this method implies appropriate knowledge of crop transpiration, crop response to water appliance (PEREIRA ET AL., 2002). The use of a drip irrigation system applying water through an emitter on or bellow the surface at a small operation pressure and minimizing soil evaporation (DASBER AND OR, 1999; WALKER ET AL., 1999) has been popular for water saving (CAMP, 1998; LAMN ET AL., 1995; PHENE 1999) and water use efficiency (EL-GINDY AND EL-ARABI, 1996; BUCKS, 1995; PHENE ET AL., 1993). Drip irrigation is common in orchard, open field row crops, and greenhouse in Romania.

Application of drip irrigation for fruits trees has been studied from different aspects. The yield quality resulted from this kind of irrigation is higher than sprinkler irrigated trees (DRAKS ET AL., 1981). The concentration of nutrients is increased in higher branches of trees after fertilization (SMITH AND KENWORTHY, 1979).

MATERIALS AND METHODS

In the Vrancea orchard a Gizella cherry variety-plot was selected for the observation, planted in 2011 at planting spacing of 3X 4.5m (740 trees/0.1 ha).

Treatments:

1. Control: 1 lateral, 2.3l/h dripper, 0.5m spacing.
   Irrigation rate = 1.02
2. Low flow: 2 laterals, 0.7l/h dripper, 1.0m spacing. Irrigation rate = 0.62
3. 2 laterals: 2 laterals, 2.3l/h dripper, 1.0 spacing. Irrigation rate = 1.02

An independent head control unit was set up for the trial, irrigating and fertigating each treatment separately. The equipment was installed in the orchard in fall 2011 but initially operated only in spring 2012.

Harvest:

For the harvest, healthy trees of normative size were selected. In the control, 22 trees were harvested, in the continuous irrigation – 11 trees, and in the 2 laterals – 22 trees.
Calculation of yield/ ha was done by multiplying yield per tree by 740 trees per ha. First harvest was carried out on 22.6.2020 and the second on 28.6.2020.

RESULTS AND DISCUSSION

Water consumption

Uniform water amounts of 1980m3/ha were applied until the first harvest and total irrigation applied until the second harvest was 2310m3/ha. Total water amounts applied throughout the season were: in the low flow – 5750m3/ha, in the control – 5310m3/ha and in the 2 laterals – 5530m3/ha.

Fertigation was relative and therefore similar in all treatments, applying a total of 150kg/ha N, and 300kg/h K.

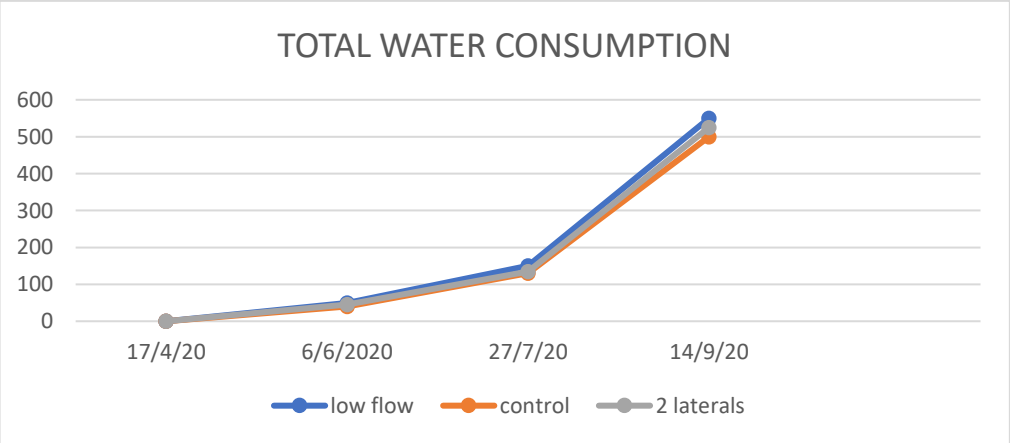

Figure 1 Total water consumption in the season in each of the treatments

Harvest

Yield in the plot was high to very high and considered too high for achieving quality yield. In the 2 lateral treatment (table 1, figure 1), yield was higher than in the other two treatments, which were quite similar in yield. Yet, the largest size fruit yield was higher in the continuous irrigation, while the medium size fruit yield was the highest in the control.

Apparently, the low quality fruit yield results in the 2 lateral-treatment were due to the exceedingly high yield in this treatment.

Table 1

Total yield from the two harvests

	Total yield	**Large fruit y.** (over 26mm) Ton/ha	**Medium fruit** (24-26mm) Ton/ha	**Other fruit** Ton/ha
Control	27.8	5.8	8.7	13.3
Continuous	26.2	9.6	5.2	11.4
2 laterals	**32.4**	**0.3**	**5.4**	**23.9**

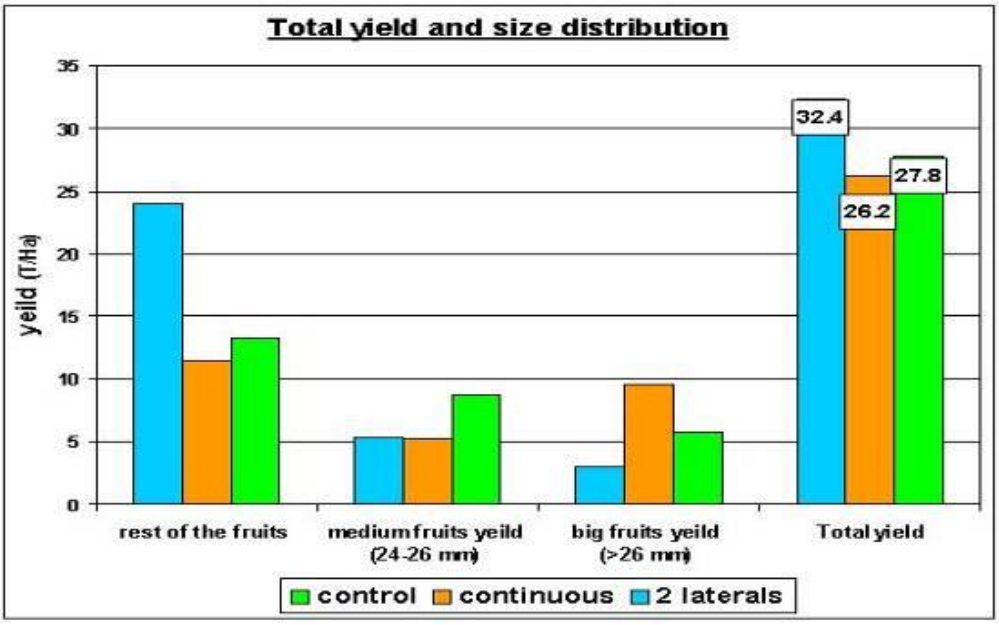

Figure 2: Total yield and size distribution in treatments

Fruit quality (Table 2, Figure 2) in the 2 lateral –treatment was poor in all parameters, possibly due to the excessive fruit load in these trees. Thus the desired "black" tint was not obtained in with the yield rate and percentage of the soft and cracked fruit higher than in the other treatments.

In the quality parameters, "soft fruit" and "cracking", the percentage in the continuous irrigation was slightly lower than that in the control, but overall the results were similar in both treatments. The color tint was darker in the control.

Table 2

Fruit quality of total yield from both harvests

	Soft fruit		Cracking		Red tint	**Black tint**
	Ton/ha	%	Ton/ha	%		
Control	1.31	4.7	1.16	4.2	10%	61%
Continuous	0.92	**3.5**	0.74	**2.8**	41%	31%
2 laterals	**6.23**	**19.2**	**5.26**	**16.2**	**48%**	**5%**

Evaluation of the first harvest may indicate the influence of irrigation method on fruit ripening. In the continuous irrigation (Table 3, Figure 3) the yield in the first harvest was higher than in the other two treatments, and its relative percent of the total yield was also higher (Figure 4). The large fruit-yield in the continuous irrigation was also significantly and relatively higher than in the other treatments (~40% of the first harvest vs. 28% in the control and 2 laterals).

Table 3

Yield on the first harvest

	Total yield		Large fruit size (over 26mm) Ton/ ha	Medium fruit (24-26) Ton/ha	Other fruit Ton/ha
	Ton/ha	%of total yield			
Control	17.84	64%	5.02	5.72	**7.10**
Continuous	22.60	**86%**	9.14	4.57	**8.89**
2 Laterals	**11.71**	**36%**	1.12	1.69	**8.91**

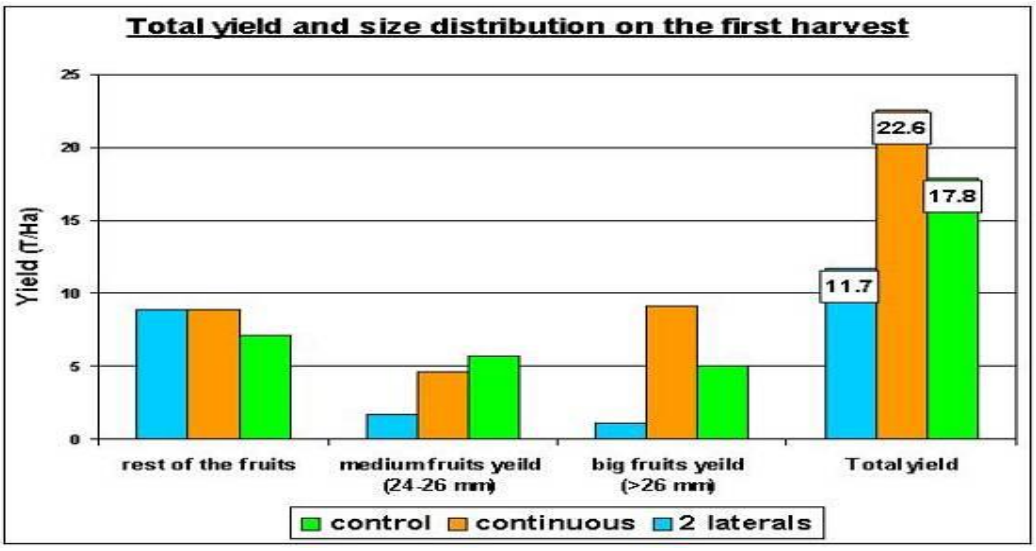

Figure 3: Total yield and size distribution on the first harvest

Table 4

Yield on second harvest

	Total yield Ton/ha	Large fruit (over 26mm) Ton/ ha	Medium fruit (24-26mm) Ton/ha	**Other fruit Ton/ha**
Control	9.94	0.79	2.98	**6.17**
Continuous	3.60	0.47	0.59	**2.53**
2 laterals	20.67	**1.96**	3.66	**15.05**

CONCLUSIONS

The first year of the observation clearly shows that the trees irrigated with 2 laterals produced yield that was much too high thus significantly affecting all quality parameters. The yield in the continuous irrigation and the control were quite similar (Table 1, Figure 1) but in the continuous irrigation the total yield was with larger and better color quality fruit (Table 1, 2), with a greater percent harvested on the first harvest. It is difficult to conclude from a first year mainly because the great variation in the plot. This variation did not enable to pick all the trees in the rows of the various treatments. Tree selection evidently reduced variation between the trees but made conclusions difficult to draw.

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