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INFLUENȚA IRIGĂRII ASUPRA FERMITĂȚII FRUCTELOR ȘI A CONȚINUTULUI ÎN SUBSTANȚĂ USCATĂ SOLUBILĂ LA SOIUL DE PIERSIC 'ANDROSS'

EVALUATION OF THE IMPACT OF IRRIGATION ON FRUIT FIRMNESS AND TOTAL SOLUBLE SOLIDS CONTENT OF THE CLINGSTONE PEACH CV. 'ANDROSS'

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Abstract

The scope of this research was to evaluate the impact of irrigation on fruit firmness and total soluble solids content of the clingstone peach cultivar 'Andross'. In order to evaluate the effect of the irrigation on flesh firmness and total soluble solids content, the contribution of the 'number of irrigations' and 'number of days between last irrigation and harvest' was assessed. Both factors were tested at the following levels: number of irrigations: 4, 5 and 6 and 'number of days between last irrigation and harvest': 4, 10, 15 and 18. The results of the present study reveal that a) fruits harvested from trees irrigated 15 or 18 days before harvest were harder than those irrigated 10 or 4 days before harvest, b) the application of 4, 5 or 6 irrigations did not significantly affect the quality characteristics studied and c) there is no interaction between the two factors of irrigation studied.

Cuvinte cheie: calitate fructm mărime fruct, irigare, piersic.
Key words: fruit quality, fruit size, irrigation, peach.

1. Introduction

During the peach harvest, it was frequently observed that in some fruits of the cv. 'Andross', the flesh was not particularly firm, thus increasing the percentage of unsuitable fruits at various stages of canning processing. It was also observed that there were fruits whose sugar content was low. This phenomenon was mainly observed in peaches sized 55-60 cm, coming from different growing areas. The softening of the flesh, which is used as a criterion of maturity in many types of fruits, may be influenced by the nutritional status of the trees as well as the soil moisture, the rootstock, the physiological status of the tree, age and other factors that may interact (Fereres and Goldhamer, 1990, Girona et al., 2003, Sotiropoulos et al., 2010). In the canning industry, when processing peaches, the fruits are subjected, among other things, to seed subtraction and peeling. The ripening stage of the fruit plays an important role in the successful outcome of these two processes (Crisosto et al., 1994, Berman and Dejong, 1996). The cv. 'Andross' when harvested at the 'yellow to green-yellow' stage had an average flesh resistance to pressure, measured with a 7.9 mm penetrometer equal to 2, 0 - 4.0 kg and soluble solid content (%Brix), 10.0 - 11.8 and scored on the quality of the compost produced, on a scale of 0-10 with 8 (Vasilakakis et al., 1991). The scope of this research was to evaluate the impact of irrigation on fruit firmness and total soluble solids content of the clingstone peach cv. 'Andross'.

2. Material and methods

In order to investigate the distribution of quality characteristics of flesh firmness and total soluble solids content, and to evaluate the influence of irrigation, taking into account the climatic conditions prevailing at the time of harvest, 513 fruits were collected in one day. The fruit size ranged from 55 to 60 cm. The choice of fruits was done randomly. Three fruits were selected from each producer on a farm applying an integrated production management system at the time of harvest. The fruits selected were harvested on the same day, were macroscopically healthy and at the ideal maturity stage. In total, 513 fruits were selected from 171 growers.

Flesh firmness was measured with a penetrometer of 8 mm, and two measurements were done at the opposite sides of each fruit. Total soluble solids (^{0}Brix) were measured with a portable refractometer.

Minitab statistical package was used for graphical distribution and statistical data processing of the two quality characteristics.

Prior to statistical processing, it was found that the two quality characteristics follow the normal distribution. In order to evaluate the effect of the irrigation factor on the two fruit quality characteristics, the contribution of the 'number of irrigations' and 'number of days between last irrigation and harvest' was assessed. Both factors were tested at the following levels: number of irrigations: 4, 5 and 6 and 'number of days between last irrigation and harvest': 4, 10, 15 and 18.

Of the 513 fruit samples, 108 fruits were used for experimental design purposes. The experimental design was completely randomized of the 2 factors of 3 and 4 levels respectively and was chosen to be balanced. Then, the results were statistically analyzed using the ANOVA method.

3. Results and discussions

For the interpretation of the effect of the irrigation factor, from the analysis of variance (Fig. 1) we conclude that: a) the factor ‘days between last ‘irrigation’ and ‘harvest’ is statistically significant at significance level a = 0.05; b) the factor 'number of irrigations' is not statistically significant; c) there is no significant interaction between the two factors ('number of irrigations' and ‘days between last irrigation’).

Figure 2 presents part of the results obtained by Tukey's method. Because the range (0.0058, 1.702) does not include zero, we conclude that we are 95% confident that peaches irrigated 18 days before harvest are on average tougher than those irrigated 10 days before harvest. In no other case a statistically significant difference for the two quality characteristics was found. Dispersion analysis for the 'total soluble solids content' characteristic showed that neither of the two factors (days between irrigation to harvest and number of irrigations) were statistically significant.

In an attempt to further interpret the results of the experiment, air temperatures were recorded at harvest (Table 1). In Table 1, we observe that from September 7 and onwards, the minimum temperature had fluctuated to low levels, which may have adversely affected the behavior of the fruit trees that had been irrigated a few days earlier. Spread analysis showed that fruit trees watered 15 or 18 days before sampling (September 10) were harder than fruits irrigated 10 or 4 days before.

4. Conclusions

The results of the present study reveal that a) fruits harvested from trees irrigated 15 or 18 days before harvest were harder than those irrigated 10 or 4 days before harvest, b) the application of 4, 5 or 6 irrigations did not significantly affect the quality characteristics studied and c) there is no interaction between the two factors of irrigation studied.

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Tables and figures

Table 1. Air temperatures at harvest period

Date/time	Temperature min (^{0}C)	Temperature mean (^{0}C)	Temperature max (^{0}C)
25/8/2004	8.23	19.57	30.88
26/8/2004	11.94	20.64	29.42
27/8/2004	12.27	18.62	27.12
5/9/2004	10.40	17.50	24.93
6/9/2004	12.18	17.47	22.99
7/9/2004	5.33	13.73	21.78
8/9/2004	4.76	14.16	24.21
9/9/2004	4.04	14.08	24.21
10/9/2004	2.35	12.00	20.95
11/9/2004	2.11	11.89	22.02

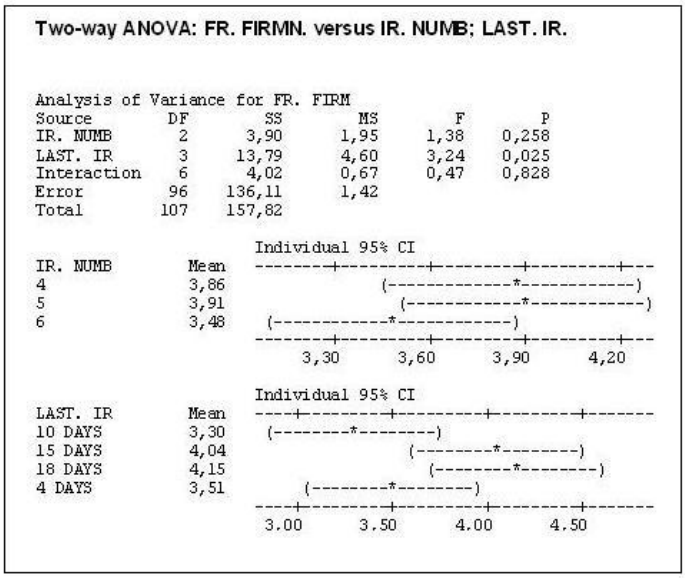

Fig. 1. Dispersion analysis and 95% confidence intervals for the mean values

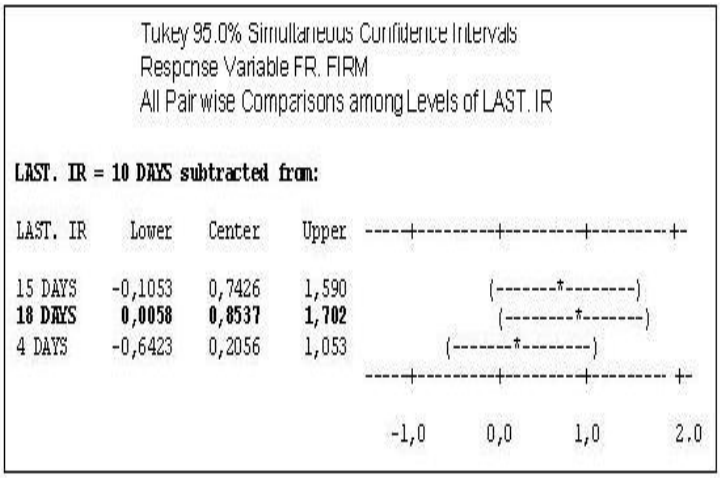

Fig. 2. Confidence intervals for the differences in mean values by the Tukey's method