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Evaluation of Continuous Monitoring Of Peach [*Prunus persica* (L.) Batsch] Growth In Response To Vapor Pressure Deficit In Two Specific Time of The Last Vegetative Stage

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Introduction

Peach fruit growth management in Mediterranean areas, is determined by several physiological and biochemical factors, influenced by both environmental and agronomic factors. **Among the environmental variables the most influential, on the fruit growth is VPD.** In recent decades, continuously monitoring systems for fruit growing have been developed to allow constant measurement of fruit diameter, providing real-time information. In order to assess the health of fruits, it is necessary to monitor them at different phenological stages of growth, especially at the final stage when plants require large amounts of water. **Precision farming, through continuous monitoring of all factors affecting production, ensures better farm management.**

Objectives: To evaluate how VPD affects on the change in fruit diameter, on the day of beginning of the last peach tree growth stage and on the day before harvest.



Materials and Methods

The study was carried out at the experimental farm of CREA-AA located in Rutigliano (lat.: 40.590 N, long.: 17.010 E, alt.: 147 m asl), on 5-year-old peach trees [*Prunus Persica* (L.) Batsch], cv Calred, grafted on GF 677 with a 5m x 5m planting. **The last phase of fruit growth before harvesting (from 5 August to 7 September 2021) was continuously monitored by a system of custom-built fruit gauges diameter developed by Winet, Srl.** (Cesena, Italy). The trial was performed on the control (P0) and, on two treatments where **two 100 µm thickness mulch covers were present: C/902 Black White (P1, PolyEur Srl., Benevento, Italy) and C/820 Black Silver (P2, PolyEur Srl., Benevento, Italy).** Two days were selected for a detailed analysis: the first day after the assembly of gauges (06/08/21, DOY 218) and the day before the harvest (06/09/21, DOY 249). Subsequently, **the values of fruit gauges were standardized by using z-scores to compare the trends of the fruit gauge data in the two selected DOY with the VPD.**



Results

The results show (Figures 1-2) that z-scores and VPD ranging from negative to positive during the day (DOY 218 and 249). In DOY 218 (Fig. 1), fruit growth decreases during warmer hours, while VPD has an opposite trend, being highest in the morning (2.24 kPa). The dynamics were similar for all treatments. In Figure 2, however, the trend of fruit growth in the three treatments almost followed the trend of VPD, in this case the maximum value was reached in the early afternoon (VPD 1.87 kPa). The dynamics were different for the three treatments, although with similar trends. **The relationships between fruit development and VPD may be related to the evaporative demand of the atmosphere, which is strongly correlated with VPD dynamics at different times of the year.** Daily differences in fruit growth are due to water fluxes in and out of the fruit, thus related to the water status of the tree.

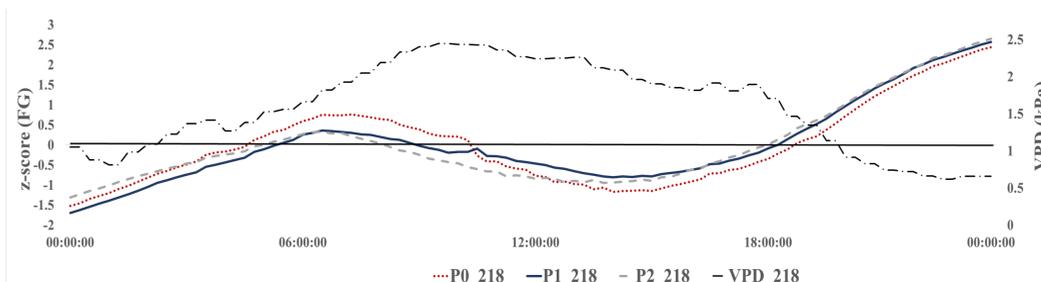


Fig. 1: z-score (FG-Fruit Growth-adimensional), at the DOY 218 in the three treatments P0 (control-in red dotted line), P1 (Black White-in blue), P2 (Black Silver-in gray dashed line), compared with VPD (Vapour pressure deficit-black dashed line).

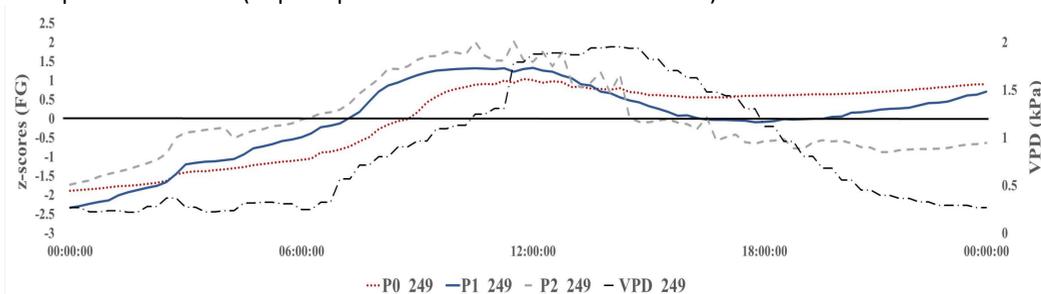


Fig. 2: z-score (FG-Fruit Growth-adimensional), at the DOY 249 in the three treatments P0 (control-in red dotted line), P1 (Black White-in blue), P2 (Black Silver-in gray dashed line), compared with VPD (Vapour pressure deficit-black dashed line).

Conclusions

The results showed that in these two days (DOY 218 and 249) the daily growth of the fruit is strongly influenced by the VPD. This comparison can be a tool for translating measured data into readily available data to coordinate the entire management of the orchard and to creating models for the growth of peach fruits useful for precision farming.