

**Title** Water status and quality improvement in high-CO<sub>2</sub> treated table grapes

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### **Abstract**

Unfreezable water (UFW) content in berry tissues (pulp, skin, seed) and rachis of table grape clusters stored at 0 °C has been studied using differential scanning calorimetry. The effect of short exposure to high CO<sub>2</sub> (20% CO<sub>2</sub> for 3 days) and the transfer to air were also studied. Water status of pulp tissues was related to the thawing behaviour and the structural characteristics, using low-temperature scanning electron microscopy (LT-SEM). The UFW content in all tissues increased rapidly in response to high CO<sub>2</sub> while it remained stable or decreased in untreated clusters. The strong potential of this beneficial gaseous treatment for increasing the UFW content was also evident after transfer to air. The metabolic adjustment caused by exposure to high CO<sub>2</sub>, which reduced the amount of water available to be frozen, improved stored fruit quality, thus minimising structural damage and reducing water leakage associated with the freezing–thawing process.