

**Title** Effect of storage temperature and age after harvest on the accumulation of the phytoalexin 6-methoxymellein in UV-C treated carrots

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### **Abstract**

UV-C induces disease resistance in carrots and the accumulation of the phytoalexin, 6-methoxymallein (6-MM), is likely the most significant resistance mechanism. The objective of this work was to determine the effect of post-treatment storage temperature and carrot physiological age at the time of treatment on accumulation of 6-MM in treated carrots. Carrots roots (cultivar ‘Sun255’) were exposed to a UV-C dose of  $5.4 \text{ kJ m}^{-2}$ . To assess the effect of storage temperature, treated carrots were stored at 4, 14 or 24°C under high relative humidity (about 95%) and 6-MM was assayed every 14 days (4°C), 7 days (14°C) and 3 days (24°C). To determine the effect of carrot age, carrots were treated 0, 56 or 112 days after harvest; and 6-MM levels were determined 28 days after treatment. Regardless of the storage temperature, the level of 6-MM reached a certain maximum, followed by a decrease, and thereafter, it remained steady. Although the rate of 6-MM accumulation was higher at 24°C compared with lower temperatures, the highest level of 6-MM ( $120.0 \text{ mg kg}^{-1}$ ) was observed 14 days after treatment at 4°C. The rate of decrease was also higher at 24°C compared with lower temperatures. A steady level of about  $60.0 \text{ mg kg}^{-1}$  was observed at 4°C compared with 24°C (about  $10.0 \text{ mg kg}^{-1}$ ). The accumulation of 6-MM was higher (about  $150.0 \text{ mg kg}^{-1}$ ) when the carrots were treated immediately after harvest, and it decreased with age of the harvested carrots. Results indicate that carrots not only accumulate 6-MM in response to UV-C, but 6-MM is degraded when a phytotoxic level is reached. It appears that carrot is highly sensitive to 6-MM at 24°C where degradation occurs at a fast rate, whereas at 4°C a higher accumulation of 6-MM was possible. It is concluded that the physiological age of harvested carrot and post-treatment storage temperature have significant impact on the accumulation as well as the maintenance of inhibitory levels of 6-MM, and hence, these factors may very well affect the observed UV-C induced disease resistance.