

Title Effect of X-ray irradiation on nutritional and antifungal bioactive compounds of ‘Clemenules’ clementine mandarins

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Citation Postharvest Biology and Technology. Volume 68, June 2012, Pages 47–53

Keywords *Citrus reticulata* Blanco; Postharvest; Scoparone; Scopoletin; Sodium carbonate; Green mold; *Penicillium digitatum*

Abstract

X-ray irradiation (510 and 875 Gy) of intact unwounded ‘Clemenules’ mandarins increased the rind biosynthesis of the phytoalexins scoparone and scopoletin after storage at 20 °C for up to 14 d, but not at 5 °C for up to 60 d. In general, irradiation did not affect the content of polymethoxyflavones in the rind and vitamin C and flavanone glycosides in the juice. Clementines that were wounded, irradiated at 510 Gy and inoculated with *Penicillium digitatum*, contained higher scoparone and scopoletin levels than non-irradiated ones. Sodium carbonate treatment (3% SC) increased scoparone but not scopoletin levels in inoculated fruit. SC treatment and irradiation at 510 Gy induced highest scoparone and scopoletin accumulation 3 d post-fungal inoculation at 20 °C (125.3 and 15.4 µg/g rind dry weight, respectively), and effectively inhibited green mold. However, phytoalexin levels declined and disease control failed 5 d after fungal inoculation. Irradiation at 875 Gy appeared to be phytotoxic and did not induce phytoalexin production nor prevented green mold in rind wounds.