

Title Combined postharvest X-ray and cold quarantine treatments against the Mediterranean fruit fly in "Clemenules" mandarins

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Abstract

In the present work, survival of the Mediterranean fruit fly *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae) on artificially infested "Clemenules" clementine mandarins (*Citrus reticulata* Blanco) was assessed on fruit subjected to integrated quarantine treatments consisting of irradiation with X-rays at doses of 0 (control), 30, 54, and 164 Gy followed by exposure to 1 deg C for 0 (control), 3, 6, 9, or 12 days. Additionally, physico-chemical (rind color, firmness, and physiological disorders, soluble solids concentration, titratable acidity, maturity index, juice yield, and ethanol and acetaldehyde content) and sensory (sweetness, acidity, sensory maturity index, off-flavors, and mandarin-like flavor) fruit quality of "Clemenules" clementines were assessed on X-irradiated fruit exposed to 1 deg C for 0 (control), 6, or 12 days. Complete insect mortality with no negative effects on fruit quality after 7 days at 20 deg C of shelf life was obtained on clementines firstly X-irradiated at 30 Gy and subsequently exposed to 1 deg C for 2 days. This combination of treatments considerably reduced quarantine time if compared to standard cold quarantine treatments (1.1-2.2 deg C for 14-18 days) and therefore showed promise as a potential commercial treatment for Spanish citrus exports.