

Title Persistence of UV-C induced disease resistance and delayed ripening in tomato fruit on subsequent exposure to selected storage stresses

Author S. Bourget, R. Corcuff, J. Arul and M.-T. Charles

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Abstract

The induction of disease resistance and delayed ripening by hormetic doses of UV-C in postharvest crops has been well established. However, it is not known whether UV-C induced effects are preserved when the UV-C treated produce are transiently exposed to other abiotic stresses during storage. It was hypothesized that exposure of UV-C treated tissue to storage and handling stresses such as heat, cold, water stress, wounding and atmosphere (low O₂ and high CO₂) can modify UV-C induced effects. Mature green tomato fruit were treated with a hormetic UV-C dose of 3.7 kJ m⁻² and stored at 13°C and RH of about 95%. After 24 h, UV-C treated fruit were further exposed to various storage stresses then returned to regular storage at 13°C: heat (35°C, 60 h); cold (1°C, 7days); N₂ atmosphere (24 h); high O₂ atmosphere (24 h); high CO₂ atmosphere (8 h); water stress (75% RH, 7 days); and wounding. Fruit ripening was monitored by color measurement, and disease resistance was evaluated by inoculation of the fruit with *Botrytis cinerea* 12 days after treatment. Subsequent exposure of UV-C treated fruit to various stresses generally did not affect UV-C induced delay in ripening except wounding stress. The enhanced delay in ripening by cold stress or increased rate of ripening by heat stress were attributable to storage temperature history. Heat, hyper O₂, and water stresses did not affect UV-C induced disease resistance; whereas wounding, cold, and to a small extent hypo O₂ and CO₂ attenuated UV-C induced disease resistance. Results suggest UV-C is a dominant stress and that UV-C induced effects are typically preserved after UV-C generated signal path is fully transduced.