Abstract

The effect of ultraviolet radiation (200-280 nm) on the postharvest storage behaviour of mature-green tomato was investigated. A dose of UV-3.7 Merg/cm^2 was found optimal in delaying ripening and senescence of tomato fruits during storage. Higher doses caused abnormal browning of the fruits and impaired ripening. The optimal dose significantly reduced the peak respiration rate and ethylene production in addition to delaying the climacteric by 7 and 9 days respectively compared to the control group. The development of color and lycopene, chlorophyll loss and softening of tissues were significantly retarded during storage in response to UV treatment.

The levels of multifunctional polyamines (PAs) in response to UV radiation were determined because they are known to be antisenescence agents and free radical scavengers. Levels of free and conjugated (soluble and bound) PAs viz: putrescine, diaminopropane, cadaverine, spermidine, spermine, tyramine and agmatine were measured in pericarp, mesocarp and endocarp. Polyamines were found mainly in the pericarp tissue in the conjugated form. UV treatment with optimal dose generally produced higher levels of free and conjugated PAs particularly putrescine, when compared to the control group. A correlation was also observed between UV-C radiation and the maintenance of higher levels of Agm, Put andTyr (conjugated and free forms) in tomato when compared to the rest of PAs.

Levels of antioxidants, both enzymic (superoxide dismutase-SOD) and non-enzymic (total phenols, α-tocopherol, ascorbic acid, glutathione and cysteine) were analyzed in control and UV-treated pericarp to evaluate their potential implication as senescence retardants. The progress of senescence in non-irradiated tomato was correlated to increasing levels of total phenols, α-tocopherol, ascorbic acid, glutathione, cysteine and SOD activity. A significant increase in total phenols however was observed in the periclimacteric phase of UV-treated fruits, while reduced levels of the other antioxidants were noted.

The abundance of phenolic compounds in pericarp and mesocarp were investigated further as they are known to be antioxidants, antimicrobial and contribute to appearance and taste of fruits. Phenolic compounds were primarily located in pericarp. High levels of cinnamic acid, caffeic acid and naringenin were correlated to senescence of control fruits. The severe browning associated with

UV-24.4 Merg/cm^2 fruits was correlated to an increase in chlorogenic acid. The delay in senescence of UV-3.7 Merg/cm^2 irradiated fruits could be associated with significant increases in salicylic acid, vanillin, ferulic acid, 7-hydroxycoumarin and rutin when compared to the control group.

Thus UV-C treatment did not stimulate the accumulation of any specific antioxidants but did stimulate the accumulation of general non-specific antioxidants such as phenols and polyamines which may have contributed to extending the storage life of tomato. UV-C irradiation can be a potential technology for the preservation of fresh tomato and possible other horticultural crops.