

Potential of UVC germicidal irradiation in suppressing crown rot disease, improving postharvest quality and antioxidant capacity of Musa AAA 'Berangan' during fruit ripening

ABSTRACT

Crown rot caused by fungal pathogen is the most prevalent postharvest disease in banana fruit that results significant economic losses during transportation, storage, and ripening period. Antifungal effects of ultraviolet C (UVC) irradiation at doses varied from 0.01 to 0.30 kJ m⁻² were investigated in controlling postharvest crown rot disease, maintenance of fruit quality, and the effects on antioxidant capacity of Berangan banana fruit during ripening days at 25 ± 2°C and 85% RH. Fruits irradiated with 0.30 kJ m⁻² exhibited the highest (i.e., 62.51%) reduction in disease severity. However, the application of UVC at all doses caused significant browning damages on fruit peel except the dose of 0.01 kJ m⁻². This dose synergistically reduced 46.25% development of postharvest crown and did not give adverse effects on respiration rate, ethylene production, weight loss, firmness, color changes, soluble solids concentration, titratable acidity, and pH in banana as compared to the other treatments and control. Meanwhile, the dose also enhanced a significant higher level of total phenolic content, FRAP, and DPPH values than in control fruits indicating the beneficial impact of UVC in fruit nutritional quality. The results of scanning electron micrographs confirmed that UVC irradiation retarded the losses of wall compartments, thereby maintained the cell wall integrity in the crown tissue of banana fruit. The results suggest that using 0.01 kJ m⁻² UVC irradiation dose as postharvest physical treatment, the crown rot disease has potential to be controlled effectively together with maintaining quality and antioxidant of banana fruit.

Keyword: Antioxidant; Cell wall; Crown rot; Peel browning; Physico-chemical quality; UVC