

**Title** Electron-beam irradiation of fresh broccoli heads (*Brassica oleracea* L. *italica*)  
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### Abstract

Broccoli is a popular item in the diet of the US population, commonly found in salads ready-to-eat. The recent recalls of fresh produce due to contamination with *Escherichia coli* and other pathogens emphasize the need to find effective means to treat minimally processed fresh foods. Our study assessed the effect of ionizing radiation using electron beams on the shelf-life, physicochemical properties, and consumer acceptability of broccoli florets. One-hundred broccoli heads were irradiated at 1, 2, and 3 kGy with a 10 MeV linear accelerator at 22 °C. We monitored pH, color, texture, respiration rate, weight loss, chlorophyll, total carotenoids, and vitamin C of irradiated and non-irradiated samples at 5-day intervals up to 14 days at 4 °C and 95% RH. Fifty consumer panelists scored the samples using a nine-point hedonic scale.

Irradiation did not affect color, firmness, pH, and weight loss of the samples. Both irradiated samples and controls showed a slight change in color during storage, though the effect was not dose-dependent. Irradiation affected ( $P < 0.05$ ) the respiration rates on the first 5 days of storage (higher CO<sub>2</sub> levels) but all samples, including the controls, attained the same equilibrium value. Vitamin C content of all samples decreased ( $P < 0.05$ ) with storage time. Chlorophyll and total carotenoids content followed the same trend. In terms of overall acceptability, color, odor, and texture, all irradiated samples were highly accepted by the panelists with scores of 5 and above. By the end of shelf-life, only the controls showed significant quality decline (yellow color, off-odor) due to microbial spoilage. In summary, electron-beam treatment up to 3 kGy maintains the overall quality of fresh broccoli.