Phytosanitary Irradiation: Quality Studies

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The efficacy of irradiation as a phytosanitary treatment has led to a rapid increase in trade of irradiated fruit. To ensure sustained growth, it is imperative to have realistic expectations for shelf-life and understand the factors that might impact quality. Irradiation has been proposed as an alternative to methyl bromide fumigation as a postharvest phytosanitary treatment, but the comparative effects of the treatments on quality are not well documented. This study investigated the impact of irradiation at 400 Gy and methyl bromide fumigation (two hours at 21°C and 32 g/m^3) on the quality of blueberries and sweet cherries. Following either treatment, Sweetheart cherries were stored for 10 weeks and blueberries for 6 weeks at 0°C and evaluated for changes in quality and consumer liking. Irradiated cherries exhibited an immediate softening after treatment when compared to untreated control cherries, but were not significantly different in firmness after 6 weeks of storage. Titratable acidity, soluble solids content, and all color values remained fairly constant among treatments during storage. The percentage of decay and total plate counts were also similar between the treatments as well as the control. While there was no added benefit of irradiation on analytical or sensory measurements, low-dose irradiation also did not negatively affect sweet cherry quality. In contrast, fumigated blueberries had a shorter shelf-life as compared to control and irradiated blueberries. Loss of firmness, and decay, and weight loss were highest in fumigated blueberries. Damage of the methyl bromide treated samples increased significantly over time ($p \leq 0.05$), reaching up to ~90% by the end of the trial, this is likely due to the sensitivity of blueberries to the higher temperature required during fumigation. Damage and decay in the irradiated samples increased at a slower rate and this was reflected in sensory scores as well. In the case of blueberries, irradiation preserved quality better than methyl bromide fumigation. While both irradiation and fumigation can be considered physical stresses, irradiation appears to help preserve the quality of heat sensitive fruit.