

Effect of gamma irradiation and other post-harvest treatments on ripening and postharvest defects in “Granny Smith” apples

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Superficial scald is a disorder that is manifested in stored apples when fruit is brought out of cold storage. This disorder has been associated with ethylene production. The objective of this study was to compare low dose irradiation treatment with other commercially used postharvest treatments on scald development in ‘Granny Smith’ apples and to explore the role of ethylene in scald development. Organic ‘Granny Smith’ apples were treated with gamma irradiation at 240 Gy, DPA at 2,200 $\mu\text{g L}^{-1}$, 1-methylcyclopropene (MCP) at 1.0 $\mu\text{L L}^{-1}$ and methyl bromide (MB) at 8.0 $\mu\text{L L}^{-1}$. Treated and control apples were stored at 1 °C for 1, 90 and 150 days plus 7 days at room temperature. Ethylene production, respiration rate, superficial scald index, color, firmness, TSS and TA were measured on fresh fruit. Our results showed that the irradiation and MCP treatments significantly reduced the production of ethylene, followed by DPA treated apples. Control and fumigated apples had the highest ethylene levels at every time point. The incidence of superficial scald was low after 90 days of storage and similar among all treatments. After 150 days of storage, scald intensity was low in DPA and MCP treated apples compared to control, irradiation and MB treated apples which exhibited moderate severity. In term of quality, we observed that irradiated apples were more yellow suggesting accelerated ripening while DPA and MCP treatments maintained a greener color in the apples. This observation was supported by

lower TA and higher TSS/TA ratio in irradiated apples although irradiated, along with MCP treated apples, had the highest firmness after 90 and 150 days in storage. Our results show that low ethylene production in DPA and MCP treated apples correlated with low superficial scald. However, in irradiated fruit, while ethylene production was reduced, the incidence of superficial scald was not impacted. Our results suggest that 240 Gy might be too low to affect superficial scald development, or that scald development might be influenced by factors other than ethylene. We will repeat this study to evaluate year-to-year variation in fruit and its response.

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