

Understanding the key preharvest factors determining ‘Packham’s Triumph’ pear heterogeneity and impact in superficial scald development and control

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Abstract

Although superficial scald (SS) is well characterized on apples, there is still few information regarding the influence that initial fruit’s maturity heterogeneity may have on the development of this disorder on pears. In this study we aimed to understand the effect of growing season and site, harvest maturity, and their interaction with postharvest treatments on superficial scald development. Pears (*Pyrus communis* L.) cv ‘Packham’s Triumph’ were picked during three consecutive seasons at three harvest maturities (H1, H2, H3) from different commercial orchards. Different SS control treatments (DPA vs. 1-MCP; season # 2) and storage scenarios (RA, CA and RA + stepwise cooling (SWC); season # 3) were evaluated. Bioclimatic indices, superficial scald incidence, maturity indices and biochemical analysis associated with SS were carried out at harvest and periodically postharvest in all treatments. In general, bioclimatic indexes (GDA and HL10) were poorly correlated with SS incidence. Only in season #1, harvest maturity was positively correlated with SS after 140 and 180 d into storage ($r_s = 0.621^*$ and 0.620^* , respectively), the more mature fruit being more sensitive. The opposite was observed in season #3, and no pattern in season #2. There was a good and positive correlation between CTols dynamic ($\delta\text{CTols}/\delta t$) and SS development, with variation between seasons. DPA and 1-MCP effectively reduced SS up to 180 d regardless of years and orchard location. In contrast, the beneficial effect of CA storage was orchard dependent and SWC strategy did not control SS and affected fruit quality. Collectively our results suggest that initial fruit heterogeneity at harvest is an important factor that modulate SS development in ‘Packham triumph pears. Climatic and fruit maturity indexes are not reliable for a multi-year prediction of SS development. In contrast to CA storage that reduced the disorder in an orchard dependent manner, 1-MCP and DPA treatments effectively controlled SS independently of initial fruit heterogeneity.