Title Superficial scald development and related metabolism is modified by postharvest light irradiation

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Abstract

Global metabolic profiling was used to evaluate compositional changes in diverse pools of peel metabolites extracted from 'Granny Smith' apples bagged on the tree then exposed to artificial UV-white light after harvest. Fruit were air-stored at 1 °C for 6 months and then held for 4 d at 20 °C. Scald was eliminated on the side of the fruit directly exposed to artificial light and reduced with increasing treatment time on the opposite side, where light was limited. Principal component analysis (PCA) of the peel metabolome revealed associations among scald status, light treatment duration, and individual metabolites from multiple pathways, including isoprenoids and phenylpropanoids. Regression analysis of metabolites selected using the PCA model was used to verify these associations. Hyperin, reynoutrin, avicularin, catechin, and (−) epicatechin levels increased in unexposed peel and decreased with increased scald severity. α-Farnesene and 2,6,10-trimethyldodeca-2,7(*E*),9(*E*),11-tetraen-6-ol (TMDtol) content diminished with light treatment duration on the exposed side while squalene levels increased. α-Tocopherol levels increased with light treatment duration on the unexposed side but decreased as scald severity increased. Given the antioxidant nature of these metabolites, associations indicate a number of light-enhanced metabolites that may impact scald incidence and severity.