

COMPARATIVE INVESTIGATION OF SUPERFICIAL SCALD DISORDER IN 'GRANNY SMITH' AND 'LADINA' APPLE VARIETIES

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Low storage temperature, generally used to promote fruit security and limiting fruit over-ripening and decay, can also be responsible, in specific apple cultivars, of the onset of a physiological disorder known as superficial scald. The genesis of this physiopathy and the mechanisms of action of specific post-harvest strategies, including the exogenous application of 1-methylcyclopropene (1-MCP) and storage at low oxygen concentration, were investigated in "Granny Smith" and "Ladina" apple varieties, both susceptible to superficial scald but with a different magnitude. Despite those storage conditions are effective in preventing superficial scald in 'Granny Smith', 'Ladina' displayed a reduced sensibility to the treatments, being prone to develop severe scald symptoms. The metabolite assessment was correlated with the whole transcriptome assessed by RNA-seq, revealing specific expression pattern between the two varieties. Four distinct clusters were identified through the transcriptome analysis. In 'Granny Smith', treatments can effectively regulate the expression of different genes involved in the browning

process, such as polyphenol oxidase and fatty acid related genes, as confirmed by the KEGG pathway and GO enrichment analysis. The metabolomic signature revealed as the accumulation of specific secondary metabolites, flavan-3-ols (catechin, epicatechin and procyanidin B) and unsaturated fatty acids (oleic acid, linoleic acid and linolenic acid), are induced by treatments in 'Granny Smith', playing a central role a role towards the prevention of scald symptoms, enhancing antioxidant activity and membrane fluidity respectively. Whereas in 'Ladina', we observed increase accumulation of chlorogenic acid and very long saturated fatty acid (behenic, arachidonic and lignoceric acids).