Objectives and Rationale

Superficial scald affects ‘Granny Smith’ after prolonged cold storage. This study aims to elucidate underlying biochemical and protein abundance (proteome) changes during superficial scald development and inhibition after prolonged storage treatments.

Methods

Apples were subjected to twelve storage regimes and evaluated after 4, 8, 16, 24, and 32 weeks (W)+6W regular atmosphere (RA) shipment period + 10 days at 20 °C (10D SL). Maturity and quality parameters were determined. Biochemical parameters ethylene, α-farnesene, 6-methyl-5-hepten-2-one (MHO), ethanol, and reactive oxygen species (ROS) were determined. 2D E was successfully used to detect and analyse the protein samples in 6 selected treatments. Descriptive sensory analysis (DSA) was applied to determine the fruit quality.

Key Results

1-MCP+DCA-CF, 1-MCP+CA+(1-MCP), and 1-MCP+CA+(1-MCP+DCA-CF) offered complete control against superficial scald development during 32W+6W RA+10D SL. In contrast, the 1-MCP+RLOS had the first incidence of scald after only 8W cold storage. During the pre-symptomatic period internal ethylene, α-farnesene, and MHO significantly increased followed by decrease as scald incidence and severity increased. DSA separated positive and negative sensory attributes according to storage treatments for each time, with treatments offering complete control not associated with negative sensory attributes. Clear differences in protein regulation across gels were noted.

Conclusion and Discussion

Ethylene and MHO are more closely associated with superficial scald incidence than α-farnesene. ROS levels did not coincide with superficial scald induction, but further investigation is required to determine the phenolic composition. DSA that treatments with no scald (1-MCP+DCA-CF, 1-MCP+CA+(1-MCP) and 1-MCP+CA+(1-MCP+DCA-CF)) up to 32W+6W RA+10D SL, had no negatively associated sensory attributes. Identifiction of regulated proteins during this time will give us a clearer understanding of these storage protocols on ‘Granny Smith’ superficial scald.