

**Title** Fruit starch degradation patterns in apple cultivars on-tree and off-tree at different holding temperatures

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### **Abstract**

When apples are placed in storage their deterioration rate and sensory quality after storage is very strongly influenced by their maturity and ripening status at-harvest. One important harvest parameter is starch degradation usually determined as the Starch Pattern Index (SPI), and specific for each apple cultivar. Starch hydrolysis continues during apple ripening on-tree and off-tree in storage, however, the speed of starch degradation in fruit on-tree and off-tree held at different temperatures is not known. This study evaluates the changes in SPI when four apple cultivars, 'Gala', 'Elstar', 'Jonagold' and 'Golden Delicious' were harvested at their respective optimal harvest date for long term storage and then held off-tree in air at different storage temperatures (1°C, 10°C and 20°C) for either 21 or 28 d. On-tree ripening samples were taken from representative trees to follow the changes in the SPI. Each week the flesh firmness in all treatments was measured. Fruit from 'Jonagold' and 'Golden Delicious' were also treated with 1-MCP at 20°C. Fruit held at 1°C showed no significant changes in SPI except 'Golden Delicious' at 23 d. The changes in SPI in fruit held at 10°C were similar to those observed on-tree. 'Gala' and 'Elstar' held at 10°C had higher starch hydrolysis after 3 weeks compared with fruit at 1°C. 'Gala' and 'Elstar' stored at 20°C had higher SPI after 2 weeks when compared with the other temperatures, while 'Golden Delicious' held at 20°C only showed clear differences after 3 weeks. 1-MCP treatment insignificantly slowed the changes in SPI, but it significantly reduced fruit softening in both 'Golden Delicious' and 'Jonagold'.