

**Title** Differential effect of ethylene treatments on non-structural carbohydrate composition in flesh and peel of six ukgrown potato cultivars

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#### **Abstract**

Long term storage of potato tubers allows year round availability of the crop. Storing potatoes under low temperatures causes high sugar accumulation in tubers, leading to undesirable darkening during processing caused by the Maillard reaction. As an alternative, continuous exposure to ethylene during storage has been shown to prolong storage life of potato by suppressing sprouting, yet there is still a dearth of information on the biochemical effects of ethylene in cultivars other than 'Russet Burbank', and indeed on whether continuous ethylene treatment is indeed required. In this study, 'King Edward', 'Maris Piper', 'Mayan Gold', 'Desiree', 'Sylvana' and 'Fianna' potatoes were stored at 6°C under four ethylene treatments (viz. continuous ethylene at 10  $\mu\text{L L}^{-1}$ ), continuous air, transfer from air to ethylene after first indication of sprouting and vice versa) for thirty weeks. Samples were taken after harvest and at four occasions during storage. Non-structural carbohydrates (fructose, glucose, sucrose and starch) were determined in both potato flesh and peel from all cultivars as ethylene has been reported to have some negative effects on sugar metabolism. Storage time and ethylene application resulted in greater sugar concentration in both flesh and peel in a treatment and cultivar-dependent manner. Chemometric analysis revealed clustering of samples according to all four ethylene treatments. Differences in sugar profiles were shown between flesh and peel tissues in all cultivars. Sufficient sprout control was achieved in cvs. 'Desiree' and 'Fianna' tubers which received ethylene after the trigger point of dormancy break was reached, whilst sugar accumulation was minimised.