IX.II.O83. Apples from Monalisa: biological variation of firmness behaviour in storage and shelf life

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Apples are long-term stored in quite similar CA conditions, expecting the behaviour during that storage to be the similar for all apples, only affected by cultivar and picking time. The aim of this study, within the Monalisa project, is the effect of growing conditions on the firmness behaviour of apples during postharvest CA storage and shelf-life. Apples of two cultivars (Braeburn, Kanzi) were harvested from four orchards at different altitudes and with different crop loads and stored in commercial CA storage for nine months. Samples of 30 apples were taken from CA storage every one or two months and subjected to storage at room temperature. Apples were assessed on firmness during fourteen days of shelf-life. Firmness measurements were carried out using the (destructive) puncture test and the (non-destructive) Aweta firmness meter. The first and overwhelming outcome of this study is the huge variation in firmness and the almost absence of firmness decrease of 'Kanzi' apples both during CA and shelf-life. The huge variation was tackled by novel statistical analysing techniques (probelation, quantile regression) and assuming plausible logistic behaviour. Datasets were analysed including the biological variation between individual fruit with explained variation (R^2_{adj}) often over 90%. Only minor effects of the CA duration on the rate of firmness loss during shelf life could be indicated. Altitude has a major effect on the level of firmness while crop load has less effect. Likely, higher altitudes result in lower growing temperatures and therefore in a lower rate of cell division during the early growth phase, which results in smaller and firmer apples. Crop load likely affects the amount of available photo assimilates per fruit. Higher crop load results therefore in smaller and firmer apples. These results clearly show that, up to now, the huge biological variation in the orchard prohibited progress in orchard dependant storage management.

Keywords: *Malus domestica, biological variance, firmness, CA storage, altitude, crop load, shelf-life*