

Title Improving quality and storability of apples, by a combination of aluminum groundcover, summer pruning and controlled nitrogen fertilization.

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Abstract

'Aroma' and 'Ingrid Marie' are the most important adapted apple cultivars to the Swedish conditions. Poor coloration at optimum harvest date and weak resistance to *Pezicula malicorticis* limit growers' ability to meet quality standards. In a three-year study at the Kivik research station, a novel orchard management model; of covering ground with aluminum (during 4 weeks before harvesting), thinning cut (to leave 6 fruits per cm² trunk cross-sectional area "TCSA" in July) and fertilizing according to leaf nitrogen-content, was applied to improve the quality and storage potential of these two cultivars. Tree yield and productivity were estimated. Apples were picked at pre-climacteric period and stored in three different storage methods (air: 21.0 kPa O₂ + 0.03 CO₂ kPa, ultra low oxygen atmosphere 'ULO': 1.0 kPa O₂ + 2.0 kPa CO₂; and control atmosphere storage 2.5 kPa O₂ + 2.5 kPa CO₂; and 2.0 °C, 90% RH) for 22 weeks, before they were held in shelf life on 18°C, 90% RH for an additional week. Fruit color, firmness, soluble solid concentration (SSC), titratable acidity and bioactive compounds (ascorbic acid, total phenols and anthocyanin) were investigated at harvest and after shelf life. The applied combined model increased light reflection into the crown. It may thereby intensify and saturate the red coloration of apples (a* and c* value) which significantly increased in comparison with the standard managed trees. The applied combined model caused higher yield (by 25% in 'Aroma' and 41 % in 'Ingrid Marie'), larger fruit (by 20%), better flesh firmness (by 10%) and higher acid/sugar content (by 20%) in comparison with classic management. The fruit storability of these two cultivars was improved whereas higher resistance to bull's eye rot (*Pezicula malicorticis*) (by 30%) was achieved and better quality maintain was showed, particularly in ULO storage. Effects of this novel model on bioactive compounds and the relationship between this model and skin anthocyanin content were also reported.