

**Title** Fruit thinning in ‘Conference’ pear grown under deficit irrigation: Implications for fruit quality at harvest and after cold storage

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### Abstract

Fruit thinning in pear is feasible for mitigation of water stress effects. However, it is not well known how fruit quality at harvest and after cold storage is affected by pre-harvest water stress. Even less is known about the effects of fruit thinning on quality under these circumstances. To elucidate these, we applied deficit irrigation (DI) and fruit thinning treatments to ‘Conference’ pear over the growing seasons of 2008 and 2009. At the onset of Stage II (80 and 67 days before harvest in 2008 and 2009, respectively), two irrigation treatments were applied: full irrigation (FI) and DI. FI trees received 100% of crop evapotranspiration (ET<sub>c</sub>). DI trees received no irrigation during the first three weeks of Stage II to induce water stress, but then received 20% of ET<sub>c</sub> to ensure tree survival. From bud-break until the onset of Stage II and during post-harvest, FI and DI trees received 100% of ET<sub>c</sub>. Each irrigation treatment received two thinning levels: no thinning leaving commercial crop load ( $\sim 180$  fruits tree<sup>-1</sup>), and hand-thinning at the onset of Stage II leaving a light crop load ( $\sim 85$  fruits tree<sup>-1</sup>). Under commercial crop loads, DI trees were moderately water-stressed and this had some positive effects on fruit quality. DI increased fruit firmness (FF), soluble solids concentrations (SSC) and acidity at harvest while no changes were observed in fruit maturity (based on ethylene production). Differences in FF and acidity at harvest between FI and DI fruit were maintained during cold storage. DI also reduced fruit weight loss during storage. But fruit size was reduced under DI. Fruit thinning under DI resulted in better fruit composition with no detrimental effect on fresh-market yield compared to un-thinned fruit. Fruit size at harvest and SSC values after five months of cold storage were higher in fruit from thinned trees than fruit from un-thinned trees. Fruit thinning increased fruit ethylene production, indicating advanced maturity. This may lead to earlier harvest which is desirable in years with impending drought. Fruit thinning is therefore a useful technique to enhance pear marketability under water shortage.