

**Title** New degreening treatments to improve the quality of citrus fruit combining different periods with and without ethylene exposure

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### **Abstract**

In the Mediterranean area, early-season citrus fruit reach acceptable internal maturity standards for marketing, while the fruit are still green. A degreening treatment is widely used as a postharvest practice to improve the external color. Nevertheless, the application of ethylene during this treatment can be associated with calyx senescence. The aim of this study was to evaluate new degreening treatments in order to reduce this disorder. 'Clemenules' mandarins and 'Navelina' oranges, harvested at different external colors, were submitted to different degreening treatments, combining periods with and without ethylene exposure. In both cultivars, the periods without ethylene exposure during degreening reduced the incidence of calyx disorders. To obtain a typical 'Clemenules' variety color with the lowest incidence of calyx alteration, the optimum degreening treatment was based on 72 h with ethylene and 48 h without ethylene when fruit were harvested with a color index of between  $-9$  and  $-3$ . On the other hand, a treatment of 24 h with ethylene plus 48 h without ethylene is recommended for fruit with an external color index higher than  $-2$ . For 'Navelina' oranges, highly sensitive to calyx senescence during degreening, a treatment consisting of 24 h with ethylene plus 48 h without ethylene is recommended, which involves harvesting the fruit with a color index of over 0.