

# Chlorine dioxide and sodium diacetate treatments in controlled atmospheres retard mold incidence and maintain quality of fresh walnuts during cold storage

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## Abstract

Fresh walnuts deteriorate and develop mold rapidly during cold storage. The effects of chlorine dioxide ( $\text{ClO}_2$ ) and sodium diacetate (SDA) in controlled atmosphere (CA) storage on deterioration of fresh walnuts have been investigated. 'Xifu No.1' fresh walnuts were treated with air (Control), air +200  $\text{mg kg}^{-1}$  sodium diacetate (SDA), air +50  $\text{mg L}^{-1}$  chlorine dioxide ( $\text{ClO}_2$ ), 2 %  $\text{O}_2$  + 25 %  $\text{CO}_2$  (CA), CA + SDA and CA +  $\text{ClO}_2$  and then stored at  $0 \pm 1$  °C for 135 d. Mold incidence, nutrient quality, oil quality and physiological indices of the walnuts were analyzed. The results showed that CA, CA + SDA, CA +  $\text{ClO}_2$  treatments delayed the development of mold, increased POD activity while decreasing PPO activity, and maintained quality of fresh walnuts in comparison to air treatments. CA + SDA and CA +  $\text{ClO}_2$  maintained higher melatonin content and lower peroxide and carbonyl values of fresh walnuts than CA treatment alone, but no difference in mold incidence were detected between CA and CA + SDA treatments. Overall, CA +  $\text{ClO}_2$  was the optimal treatment and kept quality of fresh walnuts for 135d at  $0 \pm 1$  °C, with the lowest mold incidence (5 %), the highest firmness and contents of fat and melatonin, as well as the maximum POD activity.