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Effect of short-term high CO₂ treatment on post-harvest quality of fruits

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Abstract: Postharvest management is critical for ensuring food security and minimizing wastage. This study investigates the impact of short-term high CO₂ treatment on the post-harvest quality of strawberries and raspberries. The research focused on evaluating weight loss, brix levels, and fruit firmness in treated and untreated samples. Additionally, visual appearance was assessed after 22 days of cold storage at 4°C. We conducted two experiments. In experiment 1, strawberries treated with 20% CO₂ exhibited less weight loss, higher fruit firmness, and comparable brix levels compared to untreated samples. Raspberries showed similar brix levels and fruit firmness but experienced less weight loss after storage. Although there was no statistically significant difference due to a small sample size and lack of repetition. By applying some modifications in experiment 2, different CO₂ concentrations (10%, 20%, and 30%) applied to strawberries. The 10% CO₂ treatment significantly affected brix levels compared to control samples. Fruit firmness also differed significantly across all CO₂ treatments when compared to control. During storage, CO₂ treated samples (10%, 20%, and 30%) maintained higher brix levels and fruit firmness by day 8 compared to control. Furthermore, our experiment suggested that untreated samples had a loose cell structure and thickness compared to treated ones, although further data is needed. CO₂ treated samples (10%, 20%, and 30%) exhibited superior visual appearance after 22 days at 4°C, as evidenced by reduced decay and maintenance of texture and color. Only one fruit treated with 20% CO₂ exhibited early signs of fungal infection. These results highlight the importance of optimizing CO₂ concentrations and treatment duration for fruits to enhance shelf-life and maintain quality during storage. Lastly, our experimental findings suggest practical benefits for small-scale farmers seeking to enhance the shelf life of soft fruits after harvest with limited resource.