Effect of enriched O_2 and CO_2 atmospheres on the overall quality and the bioactive potential of fresh blackberries

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Abstract

This work aimed to study the effects of the refrigerated storage of blackberries in high O_2 and high CO_2 atmospheres (70 kPa O_2 + 20 kPa CO_2 and 90 kPa O_2 + 10 kPa CO_2) on the quality and bioactive potential. Fruit stored in 90 kPa O_2 + 10 kPa CO_2 controlled the microorganism growth better than in 70 kPa O_2 + 20 kPa CO_2 until the end of storage (18 and 15 d, respectively). Both atmospheres were better than air that only controlled microorganisms for 8 d. Vitamin C retention of samples stored in air was close to 40 % at 8 d, being equal to those registered for the enriched O_2 and CO_2 atmospheres samples, but in the double of time. The retention of the total phenolic compounds of blackberries treated with 70 kPa O_2 + 20 kPa CO_2 experienced a transient increase (around 10 %) on 1 d and then decreased with time, being 90 % at the end of storage (15 d). The antioxidant capacity of fruit stored under air and O_2- and CO_2-enriched atmospheres generally accompanied the evolution of phytochemicals during storage. The refrigerated storage of blackberries in 70 kPa O_2 + 20 kPa CO_2 is recommended based on longer maintenance of fruit quality (compared to fruit stored in air), synthesis of phenolic compounds and the increase in the antioxidant capacity, which offers fruit with enhanced bioactivity. The changes in the blackberry quality attributes and in the antioxidant capacity were better fitted with first order kinetic, and the changes in the phenolic compounds were adequately fitted with a consecutive reaction mechanism kinetic model. Meanwhile, the microbiological evolution was satisfactorily evaluated by the Baranyi-Roberts model.