

Title Nitrogen retards and oxygen accelerates colour darkening in faba bean (*Vicia faba* L.) during storage

Author S.M. Nasar-Abbas, J.A. Plummer, K.H.M. Siddique, P.F. White, D. Harris and K. Dods

Citation Postharvest Biology and Technology, Volume 47, Issue 1, January 2008, Pages 113-118

Keywords Modified atmosphere packaging; Carbon dioxide; Ethylene; Seed coat colour; Phenolics; Tannins

Abstract

Modified atmosphere packaging (MAP) techniques were applied in order to control seed coat (testa) colour darkening in faba bean during long-term storage. These techniques included flushing with carbon dioxide, nitrogen, oxygen or ethylene, and vacuum packaging. Seeds flushed with air were used as the control. After MAP treatments, samples were stored at 30 °C in dark for 1 year. Seed coat colour was measured at 0, 0.5, 1, 2, 3, 4, 6, 8, 10 and 12 months of storage using a chroma meter. Changes in chroma (C^*), hue angle (h°) and colour difference index (ΔE^*_{ab} values) calculated from L^* , a^* and b^* colour coordinates demonstrated that relative to controls, nitrogen was effective in reducing colour darkening by an appreciable level, whereas storage in oxygen accelerated the colour darkening process. Ethylene had some effect whereas the other MAP treatments were ineffective in reducing colour darkening in faba beans.

Analytical studies revealed that tannin compounds were the major constituents of total phenolics in faba bean of which proanthocyanidins were the predominant component group. Tannin concentration was negatively correlated with colour darkening in faba bean. Air, vacuum and ethylene treated samples showed similar changes in phenolic constituents after 12 months storage but samples flushed with CO₂ and especially those flushed with O₂ had much higher losses in phenolic constituents demonstrating that colour darkening is likely to be due to oxidative transformation of phenolic contents. Flushing with N₂, which reduced colour darkening and tannin losses, would be useful in maintaining quality and improving market opportunities and acceptance during long-term storage of faba beans. Nitrogen could be used to flush faba beans in airtight silos for bulk storage as well as in small individual packets that could go directly onto the supermarket shelf as a premium product.