Title	Physical, chemical, histological and microbiological changes in fresh green asparagus (Asparagus officinalis, L.) stored in modified atmosphere packaging
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Citation	Food Chemistry Volume 91, Issue 4, August 2005, Pages 609-619
Keyword	Asparagus; Modified atmospheres packaging; Quality attributes

Abstract

Modified atmosphere packaging (MAP) has been used to increase the shelf life of the green asparagus (*Asparagus officinalis*, L.), meeting the market demand for fresh high quality products available annually and without the use of additives whenever possible.

Green asparagus spears were stored under three different conditions until they were not fit for consumption: refrigeration at 2 °C, MAP at 2 °C, and MAP at 10 °C after 5 days at 2 °C. Gases (O_2 and CO_2), external appearance, weight loss, pH and acidity, vitamin C, texture and microbial quality, along with a microscopical analysis, were measured at regular intervals throughout the storage assays. Significant differences were found between packaged and non-packaged green asparagus in most of the parameters considered. Weight loss and hardening in the spears middle and basal sections increased markedly in refrigerated samples. Vitamin C contents decreased rapidly after storage in all treatments; however, this was more pronounced in refrigerated spears, while over the same time the ascorbic acid content was statistically higher in samples stored under MAP conditions. Also, MAP has a significant effect on the storage time, with the external appearance being the limiting factor for the shelf-life and reducing the microbial growth within the spears. Modified atmosphere, combined with refrigeration at 2 °C, showed the best results among the treatments in terms of retaining sensory and nutritional quality, increasing the safety and extending the shelf-life of green asparagus.