Effect of Active Packaging on Quality of Chinese Kale

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ABSTRACT

The aim of this work was to study the influence of passive MAP, perforated polyethylene package and three different oxygen transmission rate active packaging on the quality of fresh Chinese kale (Brassica oleracea L. var. alboglabra) stored at 5°C. Chinese kale was trimmed off defects and undesirable parts, then packaged 500 grams in each type of packaging, namely unperforated polypropylene package, four perforated polyethylene package (Doi Kham Brand) and active packaging with different oxygen transmission rates (OTR): 10,000-12,000, 12,000-14,000, 8,000-13,000 and 14,000-16,000 cc/m²-day then sealed. Five packaging treatments together with passive atmosphere within the package were applied. Weight loss, wilting, physiological disorders, bacterial decay, visual appearance, color change, total soluble solids, chlorophyll, vitamin C content and shelf life were monitored. Yellowing of leaves in a short time was a major problem of Chinese kale. The amounts of vitamin C and chlorophyll tended to decrease with storage time, which correlated with the diminishing green color. Chinese kale packaged in active packaging had longer storage life compared to passive MAP polypropylene package and perforate PE package, which differed significantly (P<0.05) from each other. High oxygen transmission rate of film was generally related to a high quality product. Active packaging with OTR of 8,000-13,000 cc/m²-day was the best treatment for overall visual quality.

Key words: Active packaging, Chinese kale, Quality, OTR, Storage life

INTRODUCTION

Chinese kale (Brassica oleracea L. var. alboglabra) is among the 10 most important market garden vegetables in some Southeast Asian countries. For Thailand, Chinese kale is a popular leafy vegetable among Thai consumers. The area under Chinese kale in 1994 was 81,619 rai and had steadily increased during the last five-year period by 38.9 percent to reach 113,336 rai in 1998. Production areas are widely distributed in all regions of Thailand, with 31,524 rai in the Central region, 21,130 rai in the North, 15,894 rai in the East, 24,505 rai in the Northeast, 26,342 rai in the West and 7,095 rai in the South (FAO, 2011). Chlorophyll degradation during storage is a major postharvest problem of Chinese kale which rapidly occurs within a few days. In addition, Chinese kale undergoes rapid quality changes after harvest, e.g. discoloration, toughening and water loss, and thus has a short shelf life. Prompt deterioration after harvest can be triggered by high temperatures in the field during harvest (Kader et al., 1974).

Selection of packaging with essential importance to develop a gas composition able to maintain quality and assure a long shelf life to the packaged product is very important (Martines-Romero et al., 2003). Packaging commonly available for commercial is non-perforated and perforated polyethylene and polypropylene. Del Nobil et al. (2009) also stated that the selection of the appropriate packaging system is very important to maintaining quality of horticultural crops. Different head