Application of Vacuum Cooling Technology and Active Packaging to Improve the Quality of Chinese Kale

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ABSTRACT

This research studied the effect of vacuum cooling combined with active packaging on the quality of Chinese kale from an initial core temperature of 22-25°C to a final core temperature of 4±1°C. The study results illustrate that the optimum condition for Chinese kale under the vacuum cooling process is obtained with the best parameters at a holding time of 5 minutes. The total cycle time was 17 minutes and the electrical energy consumption was 0.017 kWh, with a resulting electricity cost of THB 0.06 per kilogram of Chinese kale. Precooled Chinese kale was then packaged in six different types of packaging material, namely perforated polyethylene, polypropylene and active packaging with different oxygen transmission rates (OTR): 10,000-12,000, 12,000-14,000, 8,000-16,000cc m^{-2} day^{-1} and stored at 4±1°C. Subsequently, the effect of vacuum cooling with active packaging on the quality of Chinese kale was investigated. The results showed that the Chinese kale precooled under vacuum cooling process with the best active packaging (M1) had a longer storage life of 14 days compared to the normal storage life of non-precooled Chinese kale packaged in perforated polyethylene (Doi Kham bag) of 3 days.

Keywords: Precooling, Vacuum cooling, Quality, Storage life, Active packaging

INTRODUCTION

Vacuum cooling technology is a proven technology widely applied in post-harvest processing of agricultural products (Chen, 2006). Vacuum cooling is achieved through boiling part of the moisture of the product under vacuum conditions. The major characteristic of vacuum cooling is that the product can be quickly cooled, at speeds unsurpassed by conventional cooling methods. Traditionally, it has been used to remove field heat of leafy vegetables after harvest in order to prolong product shelf life (Zheng and Da Weng, 2005) (Anon, 1981, cited in Food Processing Industry). The benefits of vacuum cooling have been