



Assessment of the Shelf-life of Cucumber under Three Low Cost Storage Methods

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Abstract Cucumbers, harvested from Saang district, Kandal province, Cambodia were wrapped with low density polyethylene (LDPE) or high density polyethylene (HDPE) or in the open before they were stored in two types of storage conditions (evaporative cooling system (ECS)(80 USD), designed in the faculty of Agro-Industry, Royal University of Agriculture and in ice foam box (2.375 USD) filled with an amount of ice for cooling the cucumbers or in ambient condition (1.5 USD) in order to seek for appropriate and low cost methods to maintain the quality and enhance shelf-life of cucumbers. The shelf-life of cucumbers were determined based on weight losses, fruit shriveling, changes in color, titratable acidity (TA) and total soluble solids (TSS). Of the storage treatments, keeping fruit in both type of polyethylene film in ice foam box filled with husk-covered ice was the most effective way in reducing weight loss, maintained higher TA, TSS and the color changes as well as retarding fruit shriveling than that of the other treatments. Fruit stored in the open at ambient condition had the highest weight losses and shortest shelf-life due to rapid yellowing and shriveling. Regarding the cost of storage, ice foam box was significantly reasonable accepted in term of gaining better quality (benefit) comparing to the higher weight losses and unmarketable quality of other treatments.

Keywords cucumber, shelf-life, quality, evaporating cooling system, ice foam box

INTRODUCTION

Cucumbers (*Cucumis sativus*) of Cucumbitaceae family are one of the famous vegetable consumed freshly and as processed food in Cambodia. The fruits were harvested in immature stage based on the fruit size and skin color. They are used as salad, fresh slicing vegetable and pickling for daily diet (New Guyana Marketing Corporation, 2004). These fruits normally suffer high moisture losses, rotting, and change color quickly from green to yellow during storage. They are also bruised or injured under mechanical forces in case of improper handling which cause of short shelf-life and unmarketable quality after harvesting. Improper storage condition of cucumbers both at low temperature (below 10°C) and at ambient temperature rapidly results in water loss, decay, and yellowish color in several days that lead to unacceptable quality in the market (Mikal, 2010).

So far, to improve the storage condition of many vegetables to recast in Cambodia, evaporating cooling system (ECS) has been set up and introduced to the vegetable grower for

preserving the vegetables quality. The system has shown the effectiveness in many aspects since its temperature is decreased lower than the ambient at least 3 to 5°C while its RH is higher than ambient from 20 to 40%. It is very effective to extend the color changes and decay during storage time of vegetable such as chili, eggplant and leafy vegetables (Buntong, 2010). However, the combination treatment with film wrapping or other modified packaging materials were not fully tested for such kind of cucumber vegetable. It is known whether vegetables stored in low or high density polyethylene can maintain the shelf-life and quality of vegetable better than those stored in ambient temperature because of polyethylene films that can acts as moisture and oxygen barrier and delay the respiration of the vegetables (ITDG, 2010). As a result, cucumbers can be stored longer than those in the ambient condition for a few days (Buntong, 2010).

In this study, in order to seek for appropriate and low cost methods to maintain the quality and enhance shelf-life of cucumbers, cucumbers harvested from Saang district were wrapped with either low density polyethylene (LDPE) or high density polyethylene (HDPE) or left in the open before they were stored in two types of storage conditions (evaporative cooling system (ECS), designed in the faculty of Agro-Industry, Royal University of Agriculture and in ice foam box filled with an amount of ice for cooling the cucumbers) or in ambient condition.

OBJECTIVE

The objective of this study was to find out the appropriate and low cost methods that effectively maintain the quality and prolong self-life of cucumbers.

METHODOLOGY

Fruit sampling

Cucumber (*Cucumis sativus*), for the age about 45 days after planting, were harvested from Saang district and immediately brought to the postharvest laboratory located in the faculty of Agro-Industry, Royal University of Agriculture, Phnom Penh, Cambodia.

Storage materials and conditions

Initially, they were washed with the 100 ppm concentration of chlorine for eliminating microbial contaminations and preventing fungal infections; then sorted only for uniform size, maturation, color and non-injured cucumbers (FAPRT, 2011). Before storing the fruits in different containers (evaporating cooling system, ice foam box and the ambient condition), they were wrapped with low density polyethylene (LDPE) or high density polyethylene (HDPE) or in the open.

Evaporating cooling system (ECS), made from zinc and iron film and covered by wet tissues along with dropping-water system, to conduct heat that kept the temperature between 24-28 °C with relative humidity between 76-94%.

Ice foam box designed in faculty Agro-Industry is the low cost materials that can be used as storage equipment for maintaining cucumber quality. The ice foam box was filled with 21kg of ice and covered with rice husk to reduce ice melting with the temperature between 17-21 °C and relative humidity 60-70%. Husk rice is traditionally used for keeping ice from melting and easily find in local area. It is a good material to reduce the interaction between heat and cool air of ice in box that decrease melting and stabilize temperature cold (17 to 21 °C) and RH (60 to 70%). The husk rice have low water and moisture permeability, low value of equilibrium moisture content, low value of the coefficient of temperature conductivity (below 0.036 W.m⁻¹.k⁻¹), high resistance to damage of fungi (Valche et al, 2009). Ice foam box is the well-organized and effective equipment used for reducing moisture loss, color changes and decay as polyethylene was used in ECS condition for this study. In addition to storing cucumbers in ECS and ice foam box, fruits were also stored in ambient condition at (temperature at 28-29°C and relative humidity at 80-86%).