CHAPTER 1

Introduction

Pak-choi (*Brassica rapa* var. *chinensis*) belongs to the Brassicaceae family (previously Cruciferae). It is widely cultivated in China, Philippines, Malaysia, and to a lesser extent in Indonesia and Thailand. In recent years, it has increased in popularity in North America, Australia and Europe (Dixon, 2007). Pak-choi is rich in vitamin A, vitamin C and glucosinolates. Glucosinolates can reduce the activity of carcinogens, and the risk of cancer and coronary heart diseases (Chen *et al*., 2008; Higdon *et al*., 2007; USDA, 2016 and Verkerk *et al*., 2009). Zhu *et al*. (2013) reported that pak-choi harvested at 20-25 days after transplanting had high levels of beneficial glucosinolates.

Pak-choi is a popular vegetable among farmers because of its short crop duration (harvesting time at 39-42 days after sowing). Rapid yellowing of pak-choi leaves indicates senescence within 2-3 day after harvest (Boonyakiat *et al*., 2008). The change of color relates to consumer perception of visual quality especially with leafy vegetables. The observation of farmers' practices showed that each farmer used different time in a day to harvest organic pak-choi during sunrise to sunset. In general, it was found that production conditions or the environment at harvest that including temperature, light intensity, relative humidity, etc., affected produce quality (Mahmud *et al*., 1999; Weston and Barth, 1997; Paull, 1999; Xiangyang and Bagshaw, 2001). So our questions are:

1. What factors are involved in pak-choi senescense?
2. How does production season and harvesting time of the day affect the quality of pak-choi?

The harvested produce are also subjected to physiological and other processes that cause rapid damage to vegetables when expose to the high temperature. Preventing loss of vegetables is associated with proper temperature management. Controlling vegetable temperature and reducing the time that the vegetables are under an unsuitable temperature is critical to maintaining the long-term quality of vegetables (Boonyakiat, 2015). In addition, temperature control is also an important factor in maintaining vitamin C content in fruits and vegetables. Vitamin C loss is most likely to occur at high temperatures and prolonged storage (Lee and Kader, 2000). Therefore, after harvesting, the temperature of the produce should immediately be reduced. Vacuum cooling is the fastest and the most stable for reducing heat. The produce will cool down rapidly compared to other precooling methods and vacuum cooling is popular with leafy vegetables (Boonyakiat and Ratanapanon, 2005). In addition, vacuum cooling also extends the shelf life of Chinese cabbage (Kamon *et al*., 2013), pak-choi (Chinnapun, 2009), chinese kale (Poonlarp and Boonyakiat, 2015), cauliflower (Alibas and Koksal, 2015) and broccoli (Ding *et al*., 2016).

We hypothesize that the harvest season and harvesting time of the day influence the quality of organic pak-choi. It is also expected that the use of vacuum cooling will be able to delay senescence, reduce postharvest loss and extend shelf life of organic pak-choi. The knowledge from this research can be extended to farmers and those involved in the suitable handling of organic pak-choi.

Propose of study

1. To study the effect of season (winter, summer and rainy season) and harvesting time on the senescence of organic pak-choi
2. To study the effect of vacuum cooling for delaying senescence of organic pak-choi in the winter, summer and rainy season