

CHAPTER 1

Introduction

1.1 Introduction

Pineapple (*Ananas comosus* (L.) Merr) is an economically important fruit in Thailand. Domestically, Thai people are consumed more pineapples in a fresh form than in a canned form. In 2010, only 5 % of the pineapple product (3,294 metric tons) was exported as fresh fruit to England, Canada, Iran, Singapore, Ireland, Japan, and other countries. In spite of low volumes of export, the value of the exported fruit was about 75 million Baht (Office of Agricultural Economics, 2011).

The postharvest losses of pineapple products remain a substantial problem for international markets. Fungal decay is the main cause of pineapple postharvest loss. Fungal decay depends on weather conditions and the postharvest handling system. The prevalence of postharvest disease in pineapple is primarily due to the fungus *Ceratocystis paradoxa* and *Fusarium* sp. The fungus is likely to enter the wounds caused by de-crowning that occurs in the postharvest handling systems prior to export (Ballester *et al.*, 2006). Postharvest disease control methods of fresh fruit vary and depend on the requirements of target markets. Rinsing pineapples with clean water is recommended in many countries (Kader, 2009; Paull, 1992; Department of Agriculture Kuala Lumpur Malaysia, 2004).

In Thailand, harvested pineapples are distributed to markets without being rinsed. Therefore, washing pineapple with electrolyzed water combine with ultrasonic wave, as a physical disease control method, offers an attractive alternative to the use of fungicides. The objective of this research was to determine the effects of electrolyzed water in combined with US on the postharvest disease in pineapple.

1.2 Research objectives

- 1.2.1 To study the effectiveness of electrolyzed oxidizing (EO) water and ultrasonic (US) wave on the control of *Fusarium* sp. decay in pineapple cv. Phu Lae.
- 1.2.2 To determine the biochemical responses of pineapple after using electrolyzed oxidizing water and ultrasonic wave.

1.3 Usefulness of the research

- 1.3.1 Utilize the new knowledge of EO water and US wave to control of pineapple fruit decay.
- 1.3.2 Understand the mechanism of EO water and US wave in relation to enzyme response in *Fusarium* sp. decay of pineapple cv. Phu Lae fruit during storage.
- 1.3.3 This application could be a practical model for postharvest disease control in other fresh products.

1.4 Research scope

This research is mainly focusing on;

- 1.4.1 The effect of EO water and US wave for disease control on de-crowned pineapple fruits ((*Ananas comosus* (L.) Merr). Initially, de-crowned pineapple fruit spoilage fungi were isolated.
- 1.4.2 Checking the effect of EO water (100 ,200 and 300ppm) and US wave (108, 400, 700 KHz and 1 MHz) for 10, 30, 60 min on *in vitro* growth of fungi both of treatments were applied directly to the fungal mycelia or spores on petri dish and observed for their growth.
- 1.4.3 Confirm the effect of EO water and US wave on *in vivo* growth of fungi on the de-crowned pineapple fruit, treatments were applied to inoculated fruits,

some biochemical responses and quality changes of de-crowned-inoculated with fungi stored at 13 or 25°C were examined. Sampling of de-crowned pineapple fruits were done at different times after treated with treatments to assess the varying stage of fungal penetration examined under a scanning electron microscope.

1.5 Research location

1.5.1 Postharvest Physiology Laboratory, Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand.

1.5.2 Laboratory of Pomology, Graduate School of Life and Environmental Science, University of Tsukuba, Ibaraki, Japan.