

Chapter 1

Introduction

Mango (*Mangifera indica* L.) is one of the most popular fruits and an economic crop in Thailand which grows very well in almost all regions of the country. Mangoes are considered as one of the choice tropical fruit crops in the world due to their attractive color, delicious taste and nutritional value. The Philippines, Thailand, Mexico and India are major mango-exporting countries of the world (Mitra and Baldwin, 1997). Most producing countries export only a few varieties, for example, 'Alphonso' is exported from India, 'Carabao' from the Philippines, 'Haden', 'Keitt' and 'Zill' from South Africa, 'Haden' and 'Maya' from Israel, 'Julie' from Trinidad, 'Apple', 'Boribo' and 'Nqowe' from Kenya, 'Haden', 'Keitt' and 'Manila' from Mexico and 'Madame Francis' from Haiti. 'Tommy Atkins' and 'Keitt' are the two outstanding colored varieties from Florida (Anon, 2003), while Nam Dok Mai and Nang Klang Wan are the important varieties from Thailand (Betinez, 2004, Anon, 2008a).

Nakasone and Paull (1998) and Anon (2008b) reported that most of mangoes are marketed in the fresh state for consumption as a dessert fruit. Thailand is a home to many cultivars of mango, some cultivars can be eaten as mature green fruit such as Keaw Sewoey, Rad, Pim Sen Mun, Tong Dum, Pha Lan and Nong Sang etc., while some cultivars be eaten as ripening fruit such as Nam Dok Mai, and Nang Klangwan, etc. Besides, some cultivars are suitable for processing such as Kaew, Pim Sen and Sam Pee (Department of Agriculture, 2006). 'Nam Dok Mai' is the most important and all-time-favorite cultivar in Thailand (Benitez, 2004).

Vasquez-Caicedo *et al.* (2002) reported that Thai mangoes have not yet reached the same popularity as some mango cultivars from India or Florida due to their special characteristics and the lack of studies on their technological, nutritional and market potential. This fact, together with the elevated prices of some native varieties, reduces the chances of taking advantage of the local biodiversity and may affect, in the long run, the local farm as well. In Thailand, the consumption of fresh and processed fully-ripe mango is reduced to some varieties. It is necessary to be aware of the potential of alternative native mango cultivar which can open new perspectives to the

farmers and to the local industry, benefiting the consumer by offering a great source of vitamin A as well.

Kader (2003) reported that the maturity indices are important for deciding when a given commodity should be harvested to provide some marketing flexibility and to ensure the attainment of acceptable eating quality to the consumer. The flavor quality of fruits cannot be accurately determined by appearance factor alone. Consumers are also concerned about the nutritional quality of fresh fruits, which are not only colorful and flavorful components of our diet, but also a good source of energy, vitamins, minerals, dietary fibers and many phytonutrients which enhance human health.

Mangoes are classified as climacteric fruit and ripen rapidly after harvest. Disease problems, sensitivity to low storage temperatures and the general perishable nature of the fruit limit transport distances from the site of harvest. Technologies for quarantine, long-term storage and disease control are, however, being developed to expand the marketing of fresh mango fruit (Mitra and Baldwin, 1997).

Furthermore, the problem which many international traders are facing, is that the fruits are not evenly mature in a single consignment. Mango fruit have a short growing season and storage life. The fruit prices after the seasonal peak are very high so it is not affordable for its consumers. Storage is essential for extending the consumption period of fruits, regulating their supply to the market and also for long-distance transportation.

During ripening which is the composite of the processes that occur from the later stages of growth and development through the early stages of senescence results in characteristic aesthetic and/or food quality, as evidenced by changes in composition, color, texture or other sensory attributes (Kader, 2003). Ethylene is known to accelerate ripening and senescence in climacteric fruit. So the use of postharvest technology is necessary to delay ripening of fruit. Ethylene action inhibitors, 1-methylcyclopropene (1-MCP), suppressed ethylene-mediated ripening of many climacteric fruit including banana (Golding *et al.*, 1998), plum (Abdi *et al.*, 1998), apple (Watkins *et al.*, 2000) and mango (de Melo Silva *et al.*, 2004). Mango shows marked physiological changes during ripening such as the other climacteric fruit as banana. Ripening is initiated by either the natural evolution of endogenous ethylene as fruit reach full maturity or by using commercial exogenous ethylene ripening procedures (Jiang *et al.*, 1999). It

has been reported that 1-MCP delayed softening in mango when the fruit were treated with ethephon (de Melo Silva *et al.*, 2004). 1-MCP will protect plant products from both endogenous and exogenous sources of ethylene (Blankenship and Dole, 2003).

Keaw Morakot is a new cultivar in Thailand. This cultivar starts to ripen in early January and continues to be available until July to August. It grows very well in Baan Hong district, Lamphun province. Fruit weight is about 250-450 g. Fruit shape is round or kidney, like 'Kaew' mango fruit. In mature green stage, it has smooth and dark-green skin, starchy and crispy, sour taste, hard-firm and greenish-yellow pulp. When fruit ripe, it has green skin, small seed, about 59% pulp content, sweet taste, high sugar and yellowish-orange pulp. It can be eaten as mature green and ripen fruit (Department of Agriculture, 2006). However, the postharvest quality of this cultivar has not yet been reported. Therefore, it is necessary to investigate the physical, physiological and biochemical changes during fruit ripening of Keaw Morakot cultivar.

Objectives of the experiment

To study the changes in physical, physiological and biochemical properties during fruit ripening at different maturity stages in ambient condition and low temperature and the effect of 1-MCP on quality changes of 'Keaw Morakot' mango fruit.