CHAPTER I

INTRODUCTION

1.1 Introduction

Mango (*Mangifera indica* L.) is one of the most important tropical fruits worldwide in terms of production and consumer acceptance (FAO, 2005). Mango contributes to 17.5% of total tropical fruit production, making it the second most produced tropical fruit worldwide, topping pineapple (11%), papaya (6%), avocado (2,4%) while first being banana (51%) (PCAARRD, 2007). It is a rich source of antioxidants (Kauer and Kapoor, 2001; Ribeiro *et al*., 2008), including ascorbic acid (Franke *et al*., 2004; Manthey and Penelope, 2009), carotenoids (Godoy *et al*., 1989; Penelope, 2007), and phenolic compounds (Berardini *et al.*, 2004; Berardini *et al*., 2005; Schieber *et al*., 2000). Surinrut (2005) and Ali (2017) found that mango flesh has higher antioxidant capacity compared to few other fruits available in Thailand and Pakistan, including jackfruit, papaya, guava, grape flesh, mangosteen and apple. The lower concentration of polyphenols and other antioxidative groups in the flesh of mango is countered by few advantages over other sources (peel, seed kernel, tree bark skin). First, flesh of mango is available for direct consumption, compared to other sources that needs to be extracted before their functionality can be utilized. Second, it contains a wide range of other nutrient, including macronutrients (carbohydrate) and micronutrients (vitamins, mineral).

Amongst the phenolics content, flavonol and xanthone glycosides, as well as gallotannins and benzophenone derivatives, intervarietal differences have been thoroughly observed (Berardini *et al*., 2005b; Berardini *et al*., 2004, 2005; Hewavitharana *et al*., 2013; Luo *et al*., 2012; Manthey & Penelope, 2009; Ribeiro *et al*., 2007; Schieber *et al*., 2003). The presence of phenolic compounds in the human diet is associated with protective effects against some chronic-degenerative diseases related to oxidative stress, such as cancer, cardiovascular diseases and multiple sclerosis (Manach *et al*., 2005). Flavonols have potent antioxidant (Pannala *et al*., 2001), anticarcinogenic (Chen & Zhang, 2007), and antiatherogenic activities (Kim *et al*., 2006). For example, mangiferin, a xanthone-C-glycoside, has attracted intense interest for its variety of pharmacological properties, including analgesic; antidiabetic; anti-sclerotic; anticancer; antimicrobial and antiviral; anti-inflammatory; cardio-, hepato- and neuroprotective; anti-allergic; monoamine oxidase (MAO) inhibiting and memory improving; as well as radioprotective properties (Matkowski, 2013).

Indonesia is one of the main exporter of mango amongst South East Asian countries, producing roughly 2.4 million ton of mango, contributing to 30% of SEA's production and 5% of total world production in 2014 (FAO, 2005). Some of the cultivars that are economically attractive are Harumanis, Indramayu, Madu, Golek and Manalagi. These cultivars are some of the most well-known in the domestic and foreign markets for fresh consumption, as they present the quality attributes demanded by consumers. Other cultivars exhibit physical characteristics that are not desirable for immediate consumption, but since some of these

varieties show excellent sensorial properties, they are greatly valued for processed products such as juice, nectar and pulp.

Mean production of Harumanis cultivar in East Java, from 1990-2000, amounts to 216.994-ton, accounting for 35.5% of total production, followed by Manalagi (132.641 ton; 21.7%) and Golek (92290 ton; 15.1%). Madu cultivar is locally popular and is counted as an aggregate with other cultivars that is less known, amounting to 169.316 ton, or 27.7% of total production (Soemarno, 2011). Indramayu cultivar, or also known as Cengkir locally in Indramayu district (Fitmawati, 2009), has been appointed as a superior variety on Surat Keputusan Menteri Pertanian No. 305/Kpts/SR.120/4/2006, for its desirable sensory quality and large quantity of fruit-bearing trees. At 2008, 58.977,74 ton of Indramayu cultivar was produced (Handayani, 2012).

Considering the economic importance of Indonesian mangoes, the amount studies on their phenolic composition and antioxidant activities are rather limited. Studies found that difference in cultivar have significant differences in the total content of ascorbic acid, β-carotene and total phenolics in Brazil (Ribeiro *et al*., 2007). Therefore, the objective of this work was to characterize the profile of antioxidative compounds of extracts from flesh of five mango varieties cultivated in Indonesia and to determine the antioxidant properties using the DPPH assay.

1.2 Research Problem

In Indonesia, there are a wide various cultivar of mango is cultivated to be consumed. Research shows that different cultivar of mango has different level of potential antioxidant compounds, even though cultivated with same treatment.

Therefore, in this study, compounds that is known to exhibit antioxidative properties and its capacity in several popular local mango flesh (Harumanis, Indramayu, Madu, Golek and Manalagi cultivar) during consumption period will be measured and compared with each other and reported finding on other international cultivars.

1.3 Objectives

1.3.1 General Objectives

To measure potential antioxidative activity of various local mango cultivars by quantifying total phenolic, total flavonoid, total carotenoid, total titratable acid and in vitro antioxidant capacity content in mango flesh.

1.3.2 Specific Objectives

The specific objectives of this final project are:

1. To measure and compare the potential antioxidative activity of Harumanis, Indramayu, Madu, Golek and Manalagi cultivar and correlate it to the measured antioxidative compound group
2. To measure and correlate other physicochemical properties of the flesh, including sugar, organic acid and color profile to the potential antioxidative activity of the flesh.