CHAPTER 1
INTRODUCTION

Khao Dawk Mali 105 (KDML 105) is a very popular Thailand's aromatic rice variety. Its common name in the commercial market is Khao Hom Mali, the name implies its pleasant aroma and color as jasmine flower has. Because of its superiority in flavour and texture characteristics, the demand for Khao Hom Mali is thus increasing in both domestic and international markets. According to the report of the Office of Agricultural Economics (2008), Thailand exported 3.068 million metric tons of KDML 105 rice to international market in year 2007 and earned 47,921.5 million Baht. The quantity and value progressively increased from the previous years. This report indicated the importance of this rice variety on Thailand's farmers and economic of the country as a whole.

World rice trade is now becoming more highly competitive and rice quality is a major determinant for consumers. Based on Juliano (1985b), the majority of Asian populations have a preference for stored rice which has harder and fluffier texture when cooked compared to that of freshly harvested rice (Chrastil, 1990a, 1992). This means that KDML 105 rice sales in Asian market have to be stored for a certain period to allow time for the formation of its quality. During storage, however, aroma quality of the rice as measured by the amount of 2-acetyl-1-pyrroline compound decreased (Laksanalamai and Ilangantileke, 1993; Widjaja *et al*., 1996a; Wongpornchai *et al*., 2004; Yoshihashi *et al*., 2005). Moreover, storage takes longer period of time and costly, and rice must be supplied continually to market throughout the year from the time of harvest. To solve this problem and to supply rice with good texture and aroma quality, a rice processing technique called accelerated aging may be employed.

Accelerated aging of freshly harvested paddy using wet heat treatment with suitable grain moisture content, had been reported to improve some rice quality attributes which resemble those of naturally-aged rice (Gujral and Kumar, 2003; Soponronnarit *et al*., 2008). However, in that study, no measurements were taken on some of the grain qualities which related to consumer preference such as milling quality, color and flavor of rice. Such practice on freshly harvested paddy rice may

result in lower head rice yield in the subsequent milling process. This is caused by fissures generated from dehydration of the incomplete-gelatinized starch in the paddy rice endosperm. Discoloration and alteration in the flavor could also occur due to the presence of husk and bran layer during moistening and heating (Lamberts *et al*., 2006). The husk is also a barrier of moistening, heating and drying process, hence accelerated aging of paddy rice requires more space, energy and time in processing.

The alternate accelerated aging is proposed in this study in which milled rice is used. This method induces aging in milled rice by dry heat treatment. It can be an attractive process since it has several potential advantages over that of paddy rice. However, limited work had been studied and reported on its effectiveness in improving rice physico-chemical properties and cooking quality, especially on its effect on aroma characteristic or 2-acetyl-1-pyrroline level of aromatic rice, and on its effect on amount of off-odor compound (*n*-hexanal), volatile components and starch and protein property changes. This research is therefore assigned to study the effectiveness of such technique on a popular aromatic rice cultivar, KDML 105. This is to verify that its physico-chemical properties and cooking quality can be modified or improved to meet the demand of different consumers in rice market.

Hypothesis and Objectives

This study is designed to test the hypothesis whether there are significant differences in physico-chemical properties that are related to cooking quality, 2-acetyl-1-pyrroline and *n*-hexanal quantity, volatile components, and starch and protein properties of KDML 105 freshly harvested milled rice that are subjected to accelerated aging factors, i.e., different temperatures, exposure durations and different milled rice grain moisture contents. Investigations will also be done over storage periods to verify whether the accelerated aging treatments may alter some important sensory characters of the stored milled rice and whether such treatments can contribute to better rice quality after storage.

The general objectives of this study are to:

1. Determine the effects of temperature, exposure duration and milled rice grain moisture content on changes in physico-chemical properties and cooking quality of freshly harvested KDML 105 milled rice as compared to changes in naturally-aged rice.

2. Investigate changes in starch granule morphology, thermal property, protein property and rice volatile components of freshly harvested KDML 105 milled rice after receiving accelerated aging treatments.

3. Determine storage stability in terms of color, textural property, pasting property, 2-acetyl-1-pyrroline quantity and relative amount of *n*-hexanal of freshly harvested KDML 105 milled rice after accelerated aging and being stored in different packaging materials.