

CHAPTER I

INTRODUCTION

One of the most significant causes of cancer occurs from inappropriate eating habit which is far away from the old traditional style. Studies of food against genotoxic carcinogen generally focus on the efficacy of the single substance extracted from the food which the result may be different from eating normal food in everyday life. There are several ways in which mutagenesis can be reduced or prevented. The use of antimutagens in everyday life might be the most effective procedure for preventing genetic disease. Thus, if antimutagens are to have any impact on human disease, it is essential that they are specifically directed against the most common mutagens in daily life.

Rice is a staple food and an economic crop of Thailand. There is not only white rice but also many special rice cultivars that contain color pigments, such as black glutinous rice (black rice), Hom Nil rice (purple rice) and Sung Yod Rice (red color). Vichapong *et al.* (2010) revealed that varieties of Thai pigmented rice such as black glutinous rice and Hom Mali Daeng had higher phenolic compounds, total flavonoid and antioxidant activity than normal white staple rice. Anthocyanins are commonly a group of pigment found in pigmented rice such as purple, black and red rices. These compounds have many biological properties such as scavenging free radicals (Wang and Jiao, 2000), prevention of DNA damage in cancer cells (Hou, 2003), activating glutathione-related enzymes and NAD(P)H:quinone reductase (Shih *et al.*, 2007; Singletary *et al.*, 2007).

Khao-Mak is a traditional fermented rice in Thailand that is made of white glutinous rice fermented with Look-Pang at room temperature for 3 days (Lotong, 1992). Look-Pang is a microbial starter containing a mixed culture of *Aspergillus* sp., *Rhizopus* sp. and *Mucor* sp., together with *Saccharomyces cerevisiae* and *Candida* sp. inoculum in rice flour mixed with herbs such as pepper, garlic and galanga as antibacterial agents (Manosroi *et al.*, 2011). Enzymes from the molds hydrolyse starch

in the rice to sugars, which are partially fermented to alcohol by the yeast. Organic acids e.g. lactic acid is also produced (Lotong, 1992). The product gives sweet taste, a little alcohol and lactic acid flavor, soft texture, lump of cooked glutinous rice and succulent grain (Wongpiyachon, 1995). Black glutinous rice is sometimes substituted for white glutinous rice to produce Khao-Mak since it is a rich source of phytochemicals such as anthocyanins (Sompong *et al.*, 2011). Interestingly, fermented black glutinous rice increased its antimutagenicity against *in vivo* formed nitrosomethylurea in somatic mutation and recombination test (SMART) (Vipassanatham *et al.*, 2012) and nitrite treated 1-aminopyrene on *S. typhimurium* TA98 (Sadabpod *et al.*, 2010) compared with that of its corresponding raw and cooked rice.

However, the information on the alteration of antimutagenicity and antioxidant activity of pigmented unpolished rice after being fermented is quite rare. Such information, a health benefit of fermented rice, will be the value-added of pigmented unpolished rice. There is no research and development using Khao-Mak as a component of any food product designed to lower the risk of dietary mutagens. Therefore, it is proposed to create a new functional food product using Khao-Mak made of different cultivars of pigmented unpolished rice as an ingredient.