CHAPTER I
INTRODUCTION

1.1 Background and rationale

In Thailand, there are various rice varieties, more than 5,900 cultivars but a few varieties have been grown commercially (1). 'Chainat 1' rice, short grain Indica and high amylose type, is a great potentially economic rice variety of Thailand (2). Another variety, Khao Dawk Mali 105 (KDML 105), long grain Indica and low amylose type, is the most popular variety of rice in Thailand (3). Previous studies showed that after germination, germinated brown rice (GBR) of these rice cultivars contained higher nutrients than other ones (2). According to their high nutritional values, the germinated brown rice consumption has been increased among concerned health consciousness people (4).

Germinated brown rice (GBR) is produced by soaking the whole kernel of brown rice in water to induce the seedling germination, appeared root protuberance about 1-2 mm. During germination process, enzymes are activated for hydrolyzing or digesting the starch or non-starch polysaccharides, protein and lipids (5-9). These processes result in biosynthesis in germinated seedling and some phytonutrients have been increasing such as reducing sugar, peptides and amino acids (10, 11). Moreover, the bioactive compounds and antioxidants such as γ-aminobutyric acid (GABA), γ-oryzanol, inositols, tocotrienols and phenolic compounds, have been generated during germination process (12-13). Some studies reported that dietary fiber and vitamin B_1 have been increased but phytic acid was decreased (14). Not only the chemical properties but also the physical properties of germinated brown rice have been changed. The physical properties of GBR have been reported including the lower viscosity and less pasting temperature compared with its brown rice (15-20). However, the flour of GBR is not dissolved in water due to its unsuitable pasting temperature and viscosity.

Pregelatinization is a process which flour or starch suspensions are heated to cause gelatinization and dried products. There are many techniques used in pregelatinization i.e. extruder, drum dryer, spray dryer, spouted bed dryer and hot air oven (21-24). During pregelatinization, starch granules go through degradation, resulted in less rigidity. Swelling, rupture, crystallinity loss and amylose leaching are ease to occur, thus pregelatinized flour could absorb water and raise viscosity instantly (25). Mason (26) reported that temperature and amount of water is effective factors influencing gelatinization. High temperature (above 60-70 ℃) disrupts hydrogen bonds in the starch molecules and high amount of water (1:1 water:flour ratio) in flour suspension leads to the lower pasting temperature and viscosity of pregelatinized flour (27-30). During pregelatinization, heated flour suspension results in the change of chemical properties such as water-soluble vitamins (31). Killeit (32) reported a great loss over 60% of vitamin B1 when flour suspension was subjected to high temperature above 70 ℃. Although various researches reported the chemical and physical properties of pregelatinized rice flour, few are related to GBR flour. Therefore, the changes in chemical compositions and physical properties of pregelatinized flour of germinated brown rice cv. Chainat 1 and KDML 105 by single screw extruder, spray dryer, spouted bed dryer and hot air oven are investigated in this study.

1.2 Research Objectives

To evaluate the physico-chemical properties of pregelatinized germinated brown rice flour produced from different techniques of pregelatinization process.

1.3 Hypothesis

1.3.1   Pregelatinized unprocessed flour of two varieties has different physico-chemical properties.

1.3.2   Pregelatinized germinated brown rice flour cv. 'Chainat 1' and KDML 105 has different physico-chemical properties.

1.3.3   Pregelatinized germinated brown rice flour, produced from different techniques results in different physico-chemical properties.

1.3.4   Different water:flour ratio and temperature during pregelatinization give pregelatinized flour with different physico-chemical properties.

1.4 Scope of study

1.4.1   'Chainat 1' and 'KDML 105' brown rice are selected for germination.

1.4.2   Techniques for pregelatinization are single screw extruder, spray dryer, spouted bed dryer and hot air oven.

1.4.3   Chemical components analysis of pregelatinized flour is protein, GABA and vitamin B1.

1.4.4   Physical properties analysis of pregelatinized flour is pasting properties, thermal properties, rheological properties, swelling and soluble properties and morphological properties.

1.5 Expected outcome

1.5.1   Pregelatinized 'Chainat 1' and 'KDML 105' germinated brown rice flour results in the lowest loss of protein, GABA and vitamin B1.

1.5.2   Pregelatinized 'Chainat 1' and 'KDML 105' germinated brown rice flour with different physical properties could be used in food according to their purposes such as instant food and beverage powders.