CHAPTER I

INTRODUCTION

Statement of problem

Rice is one of the world important cereals for human consumption (Luh, 1991, p.2). It is a major food corps in Thailand that has many unique functional properties such as ease of digestion, white color, bland taste, and hypoallergenic properties (Kadan, Bryant and Miller, 2008).

In Thailand the rice production is much higher than wheat due to climatic conditions. Rice is sold as milled rice and value-added products for domestic and exported consumptions. Many value-added rice products including snacks and bakery products are developed in order to meet consumer demands. Thereby the substitution of rice flour for wheat flour in snack or bakery products is highly reasonable for marketing and cost aspects (Lazaridou, et al., 2007).

Cracker is one of the popular products among the consumer market. Cracker is classified as a bread product or snack which is produced from wheat flour. The characteristic of cracker is a slice of rustle thin bread with square or round shape. Rice crackers are made of rice flour as a value-added snack product to increase rice flour usage. Unlike wheat cracker, rice cracker is crumbly with rough surface. Owing to its differences from Japanese-style rice crackers and wheat crackers, rice flour as wheat substitute is a unique product in the snack market. However gluten is the most important structure forming protein, since it could be help holding capacity and gas retention in cell (Sivaramakrishnan, et al., 2004; Ashwini, et al., 2009).

The absence of gluten in rice flour presents the technical difficulties for rice crackers from rice flour. In an attempt to solve this problem, the selection of suitable raw material may help improve structure forming of dough, which lead to improve texture of rice cracker. Jomduang and Mohamed, (1994) reported that fine flour provide better qualities of rice-based snack products than coarse flour. Chiang and Yeh, (2002) reported that the turbo mill yields final flour from grinding process that causes high temperature in flour, and thus it results in higher percentage of damaged starch than other dry-milled flours. The flour with high amounts of damaged starch generfally has

high water retention capacity. Wang and Flores, (2000) reported that particle size is an important factor in flour milling. Rice flour made from long-, medium-, and short-grain and waxy rice are available commercially. Since rice flour is made from broken milled rice, their chemical compositions are similar to those of whole rice. There are, however, differences in protein, lipid, starch contents and the amylose and amylopectin ratio in the starch.(Luh, 1991, p.10), which amylose and protein content of rice are considered to be the two most important criteria for eating qualities of rice, (Webb, 1985; Moldenhaur, et al., 2004; Kadan, Bryant and Miller, 2008). Keeratipibul, Luangsakul and Letsatchayarn, (2008) reported that amongst the physicochemical properties, amylose content is considered to be the principal property affecting the texture and gloss of cooked non-glutinous rice. The higher amylose content would result in less sticky texture and less glossy cooked rice.

In addition hydrocolloid are suggested to help increasing dough properties such as water absorption, gas retention and improving product properties such as texture and retarding starch retrogradation (Lazaridou, et al., 2007; Rosell and Barcenas, 2005). Some hydrocolloids such as xanthan gum, hydroxylpropylmethylcellulose (HPMC), and carboxymethylcellulose (CMC) have shown promising evidences in gluten-free formulations and rice bread (Lazaridou, et al., 2007; Therdthai, et al., 2007).

Hydroxypropylmethylcellulose provided the proper dough viscosity and film-forming characteristics so that the rice flour dough would retain fermentation gases during proofing and expand during baking to produce a crumb grain similar to that of typical white pan bread (Bean and Nishita, 1985, p.548). Addition κ-carrageenan or HPMC reduced the firmness of bread crumb, and could be improvers in the bread-making performance (Rosell and Benedito, 2001).

Despite the above results in cakes and cookies, none has yet explored these effects on crackers. Thus, this research is to determine the effects of primary processing of rice flour and its physical chemical properties as the impact on appearance and texture of products, and to determine the effect of using processing aids in order to improve viscoelastic of dough, puffiness and texture properties of rice cracker qualities. The research also includes evaluate the quality changes of product during storage and consumer acceptances of the chosen product as well as how practical the product is when producing in industrial scale.

Objectives of the study

1. Determine the effects of primary processing of rice flour and its physical chemical properties as the impact on appearance and texture of products.

2. Determine the effects of using processing-aid agents in order to improve viscoelastic of dough, puffiness and texture properties of rice cracker.

3. Determine the qualities change of product during storage time for 6 months.

Expected Benefits

Rice cracker is unique product in the snack market with high market potential and is practical for production in the industrial scale. The basic knowledge concerning the substitution wheat flour by using rice flour in rice cracker production would increase the usage of rice flour in the market, and product itself as a value-added rice cracker also has high market potential for Thailand baking industry because it is a new unique product. The knowledge acquired from this research could also be applied in the cracker manufacturing, Sinn Salee Snack & Biscuit Ltd., Part. Bangkok, Thailand.

Scope of the Study

1. To determine the effects of raw material such as rice cultivars, milling types and particle size of rice flour on the rice cracker qualities and the suitability for processing rice cracker. Detail of main factors were described as following;

1.1 rice cultivars including Chainat1, Phatumthanee1 and Surin1, which were high-, intermediate- and low-amylose contents rice flour,

1.2 milling types including wet milling and dry milling,

1.3 particle sizes including 63 μm, 103 μm, 139μm and 299 μm.

2. To determine the influence of hydrocolloids addition including xanthan gum (XN), carboxymethylcellulose (CMC) and hydroxypropylmethylcellulose (HPMC) [Methocel-K4M] added at 1.5%, 3.0% and 4.5% (rice flour basis) on improving rheological properties and microstructure of rice dough, and the physical chemical properties.

3. To determine the quality changes of product during storage for 6 months and consumer acceptances of selected rice crackers made of mixed-flour blends.