CHAPTER 1

Introduction

1.1 Rationale

Statement and significance of problems

Nowadays, the number of elderly in Thailand was increased steadily. Changing has impacted the population demography and led Thailand into the aging society. In 2005, the population aged 60 and over was 10.3% and expected to reach 20% by 2025 (National Statistical Office, 2007). With an increasing healthcare cost, growing number of active elderly are interested in maintaining their health through exercise and daily consumption of healthy diet in order to avoid risk of diseases; especially, non-communicable diseases (NCD). Healthy food consumption; especially, in elderly has become more prominent as many consumers are eating more fruits and vegetables. It is proven that bioactive compounds in those foods can help reduce the risk of many severe diseases such as cardiovascular diseases, diabetes and cancers (Crozier *et al*., 2009). One of the most acknowledged bioactive compounds are isoflavones. They are plant secondary metabolites with limited taxonomic distribution. Isoflavones are genistein, daidzein and glycitein that belong to the class of isoflavones and are found in the soy germ (Eliana *et al*., 2004) which were a hormone-like substance, estrogen. It is classified in the phytoestrogen group. It also found that isoflavone is a substance that reduces the sticking of fat in the blood, cardiovascular disease and osteoporosis (Ohta *et al*., 2002). It can reduces the activity of carcinogens such as breast cancer and prostate cancer

The isoflavones found in soybeans which are generally in the form of glucosides, acetyl glucoside and malonyl glucoside compose with daidzin, genistin, glycitin, acetyldaidzin, acetylgenistin, acetylglycitin malonyl daidzin, malonylgenistin, malonylglycitin, which were large molecular size of structure, resulting in a relatively slow absorption in the human body. The studied of Wiriyacharee *et al*. (2011 and 2012)

found that soybean fermentation process reduced the molecular size of glucoside by β-glucosidase from *B. coagulans* PR03. Isoflavone glucosides convert from glucosidase acetylglucoside and malonyl glucoside to aglycones form compose with daidzein, genistein and glycetein which structure were absorbed in the small intestine. Their ability is act more like hormone estrogen than isoflavone glucoside. So, isoflavone aglycones are more interested than glucosides structure. The fermented soybean products are high isoflavones aglycone, such as Tua-nao (Thailand), Nutto (Japan), Chungju (Korea), Dava (Nigeria) and Kenema (Nepal) (Steinkraus, 1995). However, fermented soybeans were produced protease to digest protein of smaller molecules until they are amino acids. Then, bacteria use amino acids as a nitrogen source and the source of energy by deamination reaction and the release of ammonia (Macko and Estep, 1984). The fermented soybean (Steinkraus, 1992) increased the pH value and release bad odor from deamination. However, fermented soy products usually produced ammonia by hydrolysis of protein with protease. As a result, many consumers dislike the products because of the unwanted odor from ammonia. Hence, this research aimed to produce isoflavone aglycone using optimize isoflavone glucoside extraction condition from soy germ by enzymatic technology and apply to beverage product for elderly.

1.2 Research objecttives

1.2.1 To study isoflavone glucoside extraction by supercritical fluid to be used as β-glucosidase substrates.

1.2.2 To study β-glucosidase production from *B. coagulans* PR03.

1.2.3 To optimize processing condition of β-glucosidase for isoflavone aglycones production.

1.2.4 To develop beverage product for elderly using the isolated isoflavone aglycones.

1.3 Education/application advantages

1.3.1 Introduce isoflavone aglycone as a new functional ingredient for food applications.

1.3.2 Production of safe high nutritional foods from biotechnology.

1.4 Research design, scope and method

Isoflavone glucosides were extracted by optimal extraction. Then, the extract was used as a substrate for isoflavone aglycone production using β-glucosidase from *B. coagulans* PR03. β-glucosidase was used to hydrolyze the glucoside substrate to produce isoflavone aglycones. Finally, the resulted isoflavone aglycones will be used to develop a beverage product for elderly (Figure 1.1).

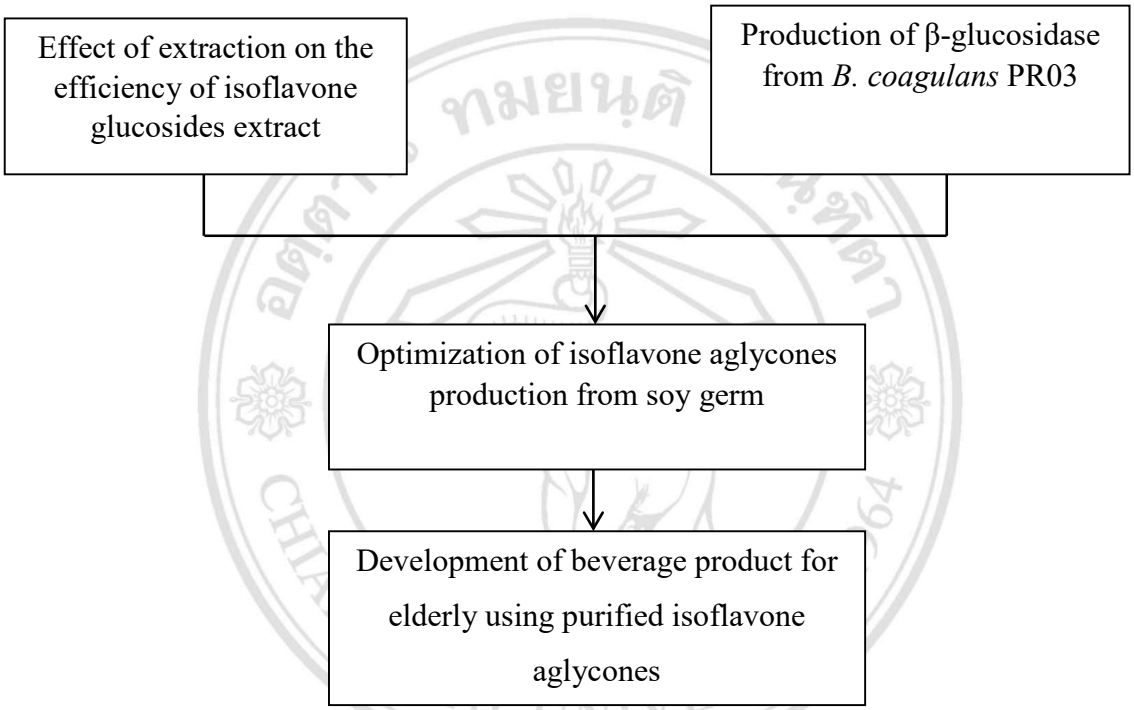

Figure 1.1 Scope of isoflavone aglycone production using β-glucosidase