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PERMAMA

COMPARISON OF BIOACTIVE COMPOUNDS CONTENT OF AGLICONE ISOFLAVONES IN SOY POWDER AND TEMPEH POWDER

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Abstract

Soybeans and tempeh contain of bioactive beneficial for health. This study aimed to compare the content of bioactive isoflavones aglicone contained in soy powder to tempeh powder. The process of making soy powder as follows: milling, drying oven at 45 °C and 10% moisture content, powdering and sieving (60 mesh). Making tempeh in this study by following steps as: cleaning dried soy beans, washing and soaking, boiling first, stripping the skin, soaking, boiling second, draining and cooling, fermentation, packaging and incubation, and then processing into powder tempeh. The process of making tempeh powder as follows: incision tempe (1 x 2 x 0.5 cm^3), milling, drying oven at 45 °C and 10% moisture content, powdering and sieving (60 mesh). Analysis of isoflavone content of soy powder and tempeh powder performed using HPLC (High Performance Liquid Cromatography). The results of the analysis of soy powder and tempeh powder showed three kinds of major aglicone isoflavone, which are daidzein, genistein and glysitein. Daidzein and genistein are the most dominant in both soy powder and tempeh powder. Tempeh powder has a lot much more aglicone isoflavone content than soy powder.

Keywords: *Aglicone isoflavone, soy powder, tempeh powder*.

INTRODUCTION

Soybean (*Glycine max L.*) is the best source of protein as well as a source of fat, vitamins, minerals and fiber. It contains 30-40% of protein, carbohydrate 34.8%, fat 18.1% and still contains other nutrients that have good potential to meet the nutritional needs of the community, particularly the requirement of protein. Soybean isoflavones is a source of the high nutrients content (Heinnermen 2003).

Tempeh as a food product has been well known by the people of Indonesia and the outside community. Tempeh is one of refined products fermented soybeans. Components and the nutritional value of soy experience changes during fermentation into tempeh. The nutritional value of tempeh protein increased after the fermentation process because of the release of amino acids results of proteolytic enzyme activity of tempeh

(Cahyadi 2007). Benefits besides tempeh high nutritional content, the content of bioactive generated in the fermentation process soybeans into tempeh is very beneficial for health (Nakajima et al. 2005). Tempeh fresh perishable and not available all the time so it needs to be developed into processing technology for produce tempeh powder qualified to community development needs of the product that is practical and fast food. The research was interesting to study because bioactive compounds content in soy powder and tempeh powder has a positive effect on health. This study aimed to compare the content of bioactive aglicone isoflavones contained in soy powder and tempeh powder.

MATERIALS AND METHODS

Samples of imported soybean seed of americana varieties were made into soy powder. The process of making soy powder as follows: milling, drying oven at 45 ° C and 10% moisture content, powdering and sieving (60 mesh). Making tempeh in this study by following steps as: cleaning dried soy beans, washing and soaking, boiling first, stripping the skin, soaking, boiling second, draining and cooling, fermentation, packaging and incubation, and then processed into powder tempeh. The process of making tempeh powder as follows: incision tempe (1 x 2 x 0.5 cm^3), milling, drying oven at 45 °C and 10% moisture content, powdering and sieving (60 mesh). Analysis of isoflavone content of soy powder and soybean powder performed using HPLC (High Performance Liquid Cromatography).

Content analysis procedures soy isoflavone powder and soybean powder Soybean powder soybean powder and dried for 4 hours. Furthermore, the solution was extracted with methanol 99.8% 2 times, each 100 ml using a vacuum pump that has been coated dry paper, so the methanol was used to extract as much as 200 ml. Isoflavone compounds including polar compounds easily dissolve with polar solvents such as alcohol or methanol. Extraction performed 2 times to compound isoflavones in soybean powder and soybean powder extracted whole. The extract obtained is stored in a cold room about 0^0C for one night for a fat wad. The fat was separated by filtration vacuum pump lined through filter paper. The filtrate obtained further evaporated with rotary temperature 40^0C. The dried extracts were dissolved in 10 ml absolute methanol (pa), and then centrifuged at a speed of 4000 rpm for 5 min in order to obtain a clear filtrate and separate sediment formed.

Filtrate formed taken 1.5 ml and purified in column chromatography 12 ml volume containing the MN-Polyamide CC6 0:05 to 0:16 mm particle size. Before pouring the filtrate into the column, MN-Polyamide CC6 soaked overnight in chromatography with a solution of 25% methanol. Elution in a column was done in stages with 25% methanol, 50%, 70%, 50 ml respectively. Obtained elution from the

elution of 70% methanol (fraction 70%) collected and dried with a rotary evaporator at a temperature of 40 ^{0}C to dry. The residue (dry deposition obtained) was dissolved in 1 ml of absolute methanol and centrifuged at 4000 rpm for 5 min to separate the sediment, and then filtered. The clear filtrate is ready to be analyzed using HPLC.

RESULTS AND DISCUSSION

The results of the analysis of soy powder and tempeh powder showed three kinds of major isoflavone compounds as shown in Table 1. Compound is the sum of total isoflavone content of soy isoflavones, daidzein, genistein and glysitein. HPLC chromatogram isoflavones of soy powder and tempeh powder can be seen in Figures 1 and 2.

Table 1. The results of quantitative analysis of compounds isoflavones soy powder and tempeh powder

Components	soy powder (mg/kg)	tempeh powder (mg/kg)
Daidzein	113.63	555.55
Glysitein	27.59	95.04
Genistein	65.15	250.65
Total isoflavones	**206.37**	**901.24**

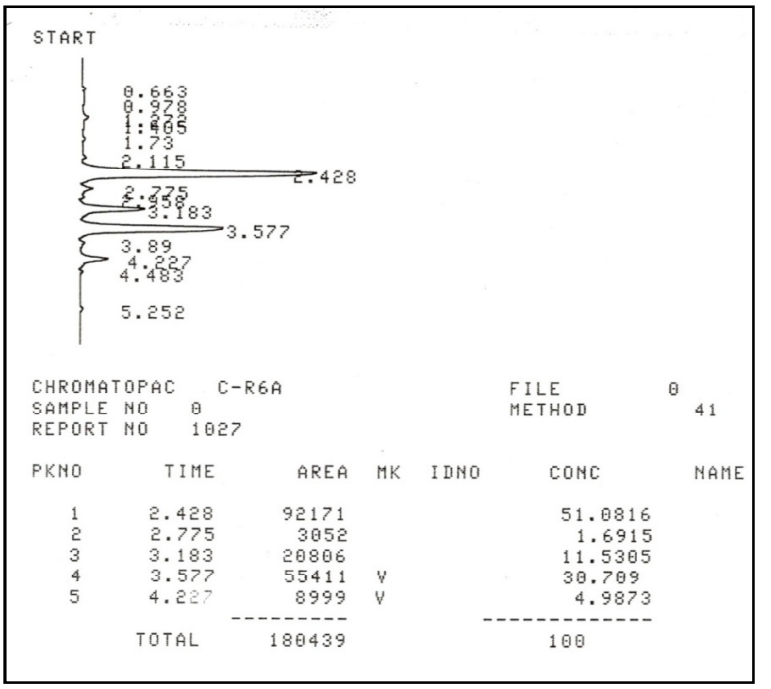

Figure 1. HPLC chromatograms of Soy Powder

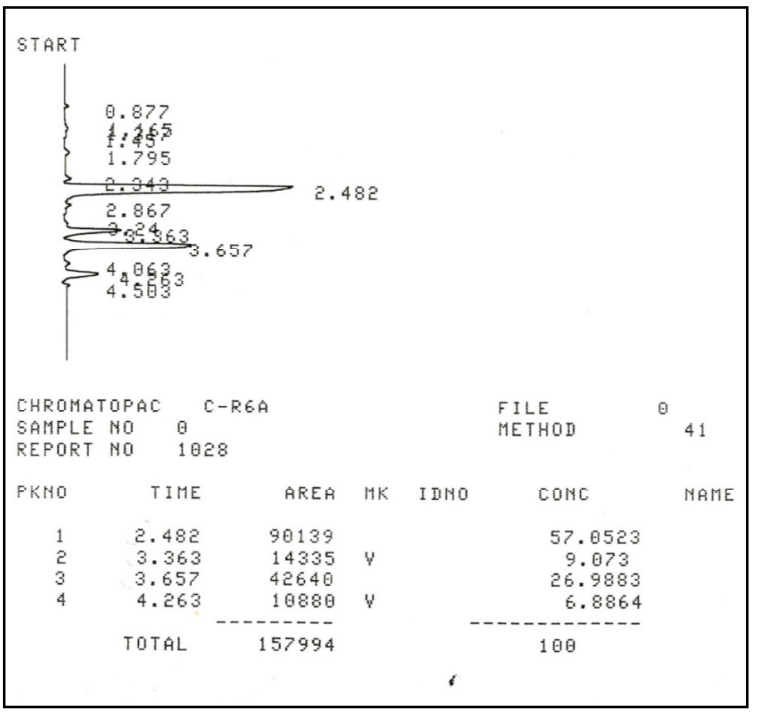

Figure 2. HPLC chromatograms of Tempeh Powder

Cromatrogram analysis results showed that daidzein and genistein are the most dominant compound isoflavones in both soy powder and tempeh powder. According to Zhang *et al.* (1999) genistein has estrogenic effects 100% greater than daidzein. This study used 10 kg of soybeans, after being processed into powder produce 8:33 kg of soy powder. While 20 kg of soybeans is processed into tempeh producing 34.60 kg. Furthermore, 34.60 kg of tempeh processed into powder produces 9.68 kg of tempeh powder. This means that 20 kg is equivalent to 9.68 kg of tempeh powder. Tempeh powder has more isoflavones than the soy powder, because powder-making process needs more soy tempeh. The more soy isoflavons the more content, this can be seen in table 1.

Total isoflavone content of soy powder compound of 206.37 mg / kg (20 637 mg/100g), while the tempeh powder amounting to 901.24 mg / kg (90 124 mg/100 g). This means that the isoflavones contained in tempeh powder more than in the soy powder. Tempeh powder and soy powder contain genistein, a type of amino acid that serves as phytoestrogen isoflavones. The content of genistein in tempeh powder is 250.65 mg / kg that has more genistein than soy powder 65.15 mg / kg, so the powder tempeh is better than soy powder. According Cahyadi (2007) if the receptor is blocked by genistein, the endogenous estrogen is not likely to stick to the receptor. Structural similarity of isoflavones genistein with endogenous estrogen, demonstrates its ability to bind to the

estrogen receptor (Setchell and Cassidy 1999). According to Winarsi (2005) the amount of isoflavones in soy content depends on the type, geographical location, cultivation, harvesting and processing process age. Some isoflavones are mainly found in the urine, feces, serum and plasma (Adlercreutz 1995). Isoflavones as antioxidants against the free radicals (free radical scavenger) that directly prevent against cancer formation, regulate the biological function of reproductive hormones, as well as cell proliferation and differentiation (Qiju 2003). Various studies suggest that isoflavones are beneficial to health such as antioxidants, antiosteoporosis, and anticarcinogenic (Cornwell *et al.* 2004, Lajolo *et al.* 2005). Isoflavones may provide new insight into the mechanisms of physiological regulation and increase the possibilities for medical intervention (Pilsakova *et al.* 2010).

CONCLUSION

The most dominant aglicone isoflavones in both soy powder and tempeh powder are daidzein and genistein. Tempeh powder has much more aglicone isoflavone than soy powder.

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