

# STUDIES ON APPLICATION OF FUNCTIONAL ACTIVITIES OF DOUCHI (A TRADITIONAL FERMENTED FOOD OF CHINA) IN MEAT PRODUCTS

## I. STUDY ON ANTIOXIDANT ACTIVITY OF DOUCHI- A FERMENTED SOY BEAN PRODUCTS

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**Abstract – Douchi is a traditional fermented seasoning food, which is prepared by fermenting steamed soybeans in China. In this study, black beans were used to produce Douchi. Then, flavones, melanoidin, peptides and polysaccharides in black beans and Douchi were extracted for test. Their antioxidant properties including DPPH radical scavenging activity, hydroxyl radical scavenging activity and reducing power were evaluated and compared with ascorbic acid. The results showed the contents of extracts changed after the black beans were fermented into Douchi. Antioxidant activities of Douchi were higher than black bean. The melanoidin from Douchi had the highest in DPPH scavenging activity. The polysaccharides from Douchi had the highest hydroxyl radical scavenging activity. Flavones from Douchi had the highest reducing power. These results suggested that the antioxidant activities were increased by fermentation, and Douchi might be used as a potential source of the natural antioxidants in meat products.**

**Key Words – Douchi, Black beans, Fermentation, Antioxidant**

### I. INTRODUCTION

Douchi is a fermented soybean product and one of the favorite traditional foods made from the fermented steamed soybean in China [1]. It has been used as seasoning in foods and for pharmaceutical purposes. Some authors reported that flavones, melanoidin, peptides, and polysaccharides were found in Douchi extracts have antioxidant activity [2]. However, there are few reports on Douchi used as an antioxidant and flavoring agent in meat products. The aim of this

study was to evaluate the antioxidant activity of functional components such as polysaccharides, peptides, melanoidin and flavones in Douchi.

### II. MATERIALS AND METHODS

#### *Materials*

Douchi was fermented by the procedure described by Chen et al (2007) [3].

Black beans and Douchi were dried in oven at 70°C, respectively, and then they were ground in a high speed disintegrator into powder for extracting the functional components for testing. Polysaccharides, peptides, melanoidin, and flavones were extracted from the powders according to the methods described by Zhang (1987), Marting-Villaluenga et al (2009), Wang et al (2009), Kitryte et al (2012), He et al (2007), Zhang et al (2010), respectively [4-9].

Antioxidant activity determination of the extracts:

The DPPH and hydroxyl free radicals scavenging activities of extracts were assayed according to the methods described by Blois (1958) [10], Smirnoff and Cumbes (1989) [11]. Reducing power was determined according to the method of Oyaizu (1986) [12].

#### *Statistical analysis*

All tests were carried out in triplicate and the results were presented as means standard deviation (SD). The drawings were used by Origin (Version 8, Originlab Co., USA).

### III. RESULTS AND DISCUSSION

The contents of the antioxidant components in extracts from black beans and Douchi were showed in Table 1. The results showed there were significant difference ( $p < 0.05$ ) in the contents of polysaccharides, peptides melanoidin and flavones between black bean and Douchi. The contents of these components in the extracts of Douchi were higher than those in black beans. However, the contents of flavones were not changed significantly after fermentation. The changes of polysaccharides, peptides and flavones were mainly caused by the microorganisms during fermentation, and Maillard reaction could increase melanoidin content (Sun et al., 2006) [13].

Antioxidant activities of the functional components in the extracts of Douchi including DPPH and hydroxyl free radicals scavenging activity, reducing power were higher than those of black beans (figures 1,2,3).

Table.1 Contents of extracts from Black bean and Douchi (unit:g/100g)

	polysaccharides	peptides	melanoidin	flavones
Black bean	2.12±0.19 <sup>a</sup>	0.91±0.14 <sup>a</sup>	1.68±0.08 <sup>a</sup>	1.3±0.16 <sup>a</sup>
Douchi	2.20±0.16 <sup>a</sup>	2.43±0.09 <sup>b</sup>	4.34±0.12 <sup>b</sup>	1.52±0.21 <sup>a</sup>

The data was expressed as means ± SD, (n=3) and evaluated by one-way ANOVA; a,b presented significantly different at  $p < 0.05$  between black bean and Douchi.

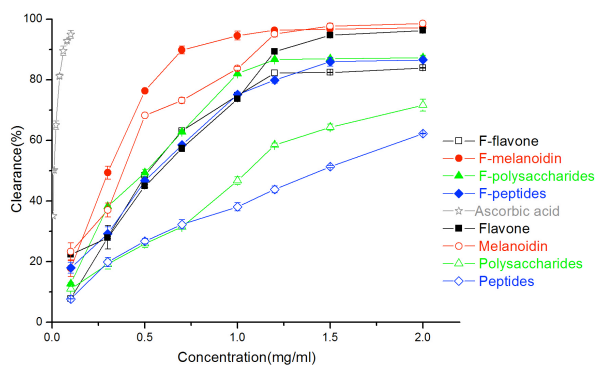


Fig.1 The capability of scavenging DPPH radical

Ascorbic acid, as a control; F-flavones, flavones extracted from Douchi; F-melanoidin, melanoidin extracted from Douchi; F-polysaccharides, polysaccharides extracted from Douchi; F-peptides, peptides extracted from Douchi;

Flavones, flavones extracted from black bean; melanoidin, melanoidin extracted from black bean; polysaccharides extracted from black bean; peptides, peptides extracted from black bean.

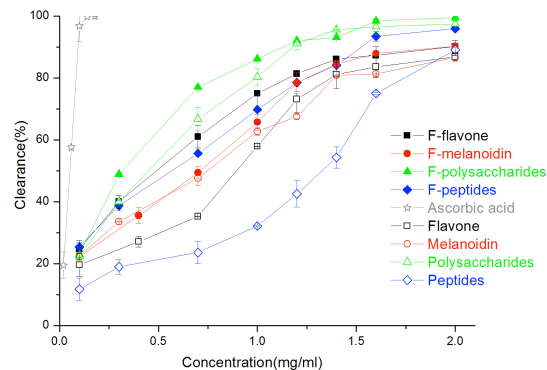


Fig.2 The capability of scavenging hydroxyl radical

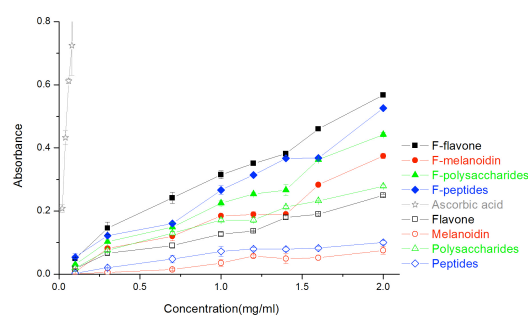


Fig.3 The deoxidizing capacity of  $Fe^{3+}$

### IV. CONCLUSION

The results indicated that the antioxidant activity of the functional components in the extracts of Douchi were higher than black beans. Thus, we suggest that Douchi can be added into meat products to prevent the fat oxidation. We will work on the antioxidant activity of Douchi added in the meat products in the future.

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