Biological Activities of Fermented Soybean Products against Food – borne Microorganisms and Animal Diseases

by

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Botany Department

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الفاعلية البيولوجية لمنتجات فول الصويا المتخمرة ضد ميكروبات الغذاء و امراض الحيوان

إعداد

مى محمد مجدى نعيم

بكالوريوس علوم – جا معة القاهرة

رسالة مقدمة

إلى

كلية العلوم

كجزء من متطلبات الحصول على درجة

الماجستير

(الميكروبيولوجى)

قسم النبات

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جامعه القاهرة

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ABSTRACT

Fermented soybean products (miso) were evaluated for their antimicrobial activity against some microorganisms including Gram- positive bacteria, Gram-negative bacteria, yeast (*Candida albicans*) and filamentous fungi (*Aspergillus flavus, A. niger, Fusarium verticillioides, Rhizopus stolonifer* and *Sclerotinia sclerotiorum*) using agar plate diffusion method.Soy products are generally rice in its phenolic compounds. Isoflavone contents in miso were also determined using HPLC. The results revealed that the miso products have a remarkable inhibition effect on all the tested bacteria and only the two fungal species, *Candida albicans* and *Fusarium verticillioides*. Increasing the storage period of miso (0, 3 and 6 months), the antimicrobial activity increased. Total microbial populations, lactic acid bacteria and fungal counts (yeasts and moulds) were significantly decreased with increasing the storage period of miso. Amylase, lipase and protease activites of the tested pathogenic bacteria and fungi decreased in presence of miso – products.

In vivo experiment, the body weight gain of rats, total lipids, liver function, kidney function and estrogen hormone were determined under the effect of feeding on miso.

ACKNOWLEDGMENT

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Dedication

I would like to dedicate this work to *my parents* that seeded my curiosity and desire for knowledge and thanking them for their unlimited effort, patient and invocation that is unquestionable honored.

Mai Mohamed Magdy

Declaration

THIS THESIS HAS NOT BEEN PREVIOUSLY SUBMITTED FOR ANY DEGREE AT THIS OR ANY OTHER UNIVERSITY

MAI MOHAMED

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APROVAL SHEET

FOR

Submission of Thesis entitled

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CHAPTER I

INTRODUCTION

Soybean (*Glycine max* L.) is one of the most important crops available to human and animal and can be grown successfully under different climates. Over 4000 years ago, the Chinese discovered the value of the soybeans, a readily available source of edible protein.

The most fermented oriental soy foods in China and Korea is commonly known as jiang; miso in Japan; taucho in Indonesia; and taotsi in the Philippines. miso has been developed in China since 2500 years ago **(Shurtleff** and **Aoyagi, 1977).**

Japan produces approximately 600, 000 tons of miso annually and exports 18528 tons to the USA, 1476 tons to Canada and approximately 3000 tons to Europe.

Long time ago centuries, miso has been an important part of the Japanese diet, a culture that reverses food as medicine. Miso is a smooth paste made from soybeans and /or grains such as rice or barley, salt and mold culture, aged in cedar vats for one to three years. It is good source of protein, calcium and zinc **(Messina, 1999)**.

Soybean was introduced into Egypt in 1954 and was grown in the experimental station of ministry of agriculture. However, it becomes commercially known in 1970 **(El-Bedwy, 1984).**

In Egypt, in 1996 the cultivated area was about 37 thousand feddans which yielded about 40 thousand tons of seeds **(FAO, 1996).** There is shortage in edible oils and large amounts are imported to overcome this problem. The

governmental policy goal is to increase and expand the cultivated area with soybean which is considered the second oil crop in Egypt beside its high content of protein .Soybean products have attracted increased attention because of their potential to afford protection against a variety of disorders, including cancer, hyperlipemias, osteoporosis, cardiovascular diseases and various forms of chronic renal diseases **(Bhathena** and **Velasquez, 2002** and **Yamamoto *et al*., 2003).**

The antioxidative activity of fermented soybean products, inoculated with *Aspergillus oryzea*, *Rhizopus oligosporum* and *Bacillus natto,* respectively was significantly higher than in non – fermented steamed soybean **(Santiago *et al*., 1992** and **Berghofer *et al.*, 1998).**