

**THE STUDY OF THE PHYSICO-CHEMICAL PROPERTIES OF  
TEMPEH USING COWPEA AND CHICKPEA**

**SITI KHATIJAH BINTI SHAFIA**

**BACHELOR OF SCIENCE (Hons.)  
FOOD SCIENCE AND TECHNOLOGY  
FACULTY OF APPLIED SCIENCE  
UNIVERSITY TEKNOLOGI MARA**

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## ABSTRACT

### THE STUDY OF THE PHYSICO-CHEMICAL PROPERTIES OF TEMPEH USING COWPEA AND CHICKPEA

The physico-chemical properties of tempeh using cowpea and chickpea were determined. The tempeh from cowpea and chickpea were prepared by the same method to prepare tempeh from soybean. The *Rhizopus Oligosporus* was used as tempeh starter in this preparation of tempeh by using fermentation technique. The proximate analyses were done to investigate the nutritional value of these tempeh and the texture analysis by texture analyzer was carried out to check the firmness. The sensory acceptability of these tempeh was evaluated in terms of appearance, taste, texture and overall acceptability by using preference test based on hedonic scale. The nutritional value of these tempeh from chickpea and cowpea showed an increase when compared to raw beans in terms of their protein and fiber content. While this fermentation technique was formed to decrease the fat content of these tempeh. Besides, the texture of these tempeh also had become softer due to fermentation process when compared to the raw beans which were harder. The tempeh from cowpea was not significantly difference between tempeh from soybean in term of taste and the overall acceptability compared to tempeh from chickpea which were significant difference. But for texture and appearance acceptability, the three types of tempeh were no significant difference.

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background and problem statement

Tempeh is an Indonesian fermented product prepared by allowing *Rhizopus oligosporus* to grow on dehulled and cooked soybean cotyledons. Tempeh, fermented soybean preparations, has been used for centuries as a valuable and important food product in Indonesia. But there are a few studies reported on the potential of micro-organisms to grow in fermenting tempeh (Rusmin and Ko, 1974; Nout et al, 1987; Ashenafi and Busse, 1989). Evaluation of market tempeh and other soybeans products showed that a variety of micro-organisms could be isolated from the products (Samsons et al, 1897). Although the pathogens in tempeh are killed during frying and boiling, the risks of cross contamination, undercooking or persistence of heat stable toxins in the cooked products are matter of concerns. From the study of Ashenafi.M and Busse.M (1989), they found that, in fermenting tempeh, *Staphylococcus aureus* grew rapidly to a final count of  $10^8$  cfu-g<sup>-1</sup> or more. Other than that, soybeans also contain phytates, which prevent the absorption of minerals (Shurtleff et al, 1989). Besides,