

TEMPE: A GIFT FROM INDONESIA TO THE WORLD

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Introduction

It is a sad paradox that the world still faces malnutrition although affordable food supply should be enough. As reported by FAO in 2012, 868 million people in the world (12.5% of the global population, or approximately one in eight), are estimated to be undernourished, with the vast majority (98%) of them, 852 million, live in developing countries, where the prevalence of undernourishment is at 14.9% of the population.

One of the major malnutrition problems in poor countries is kwashiorkor, a result of inadequate protein intake. Importing high-grade animal products could solve this problem but would cause economic strains due to the high cost.

Fermented soybean cake, or locally known as 'tempe' in Indonesia, is an excellent low-cost source of protein. Tempe contains an average of 19.5% protein, which compares very favorably with chicken (21%), beef (20%), eggs (13%), and milk (3%) (Shurtleff and Aoyagi 2001). With the action of protease enzyme produced by mould during the fermentation process, the soluble protein content in tempe increases sharply, making it more digestible than unfermented soybeans (Astuti *et al.* 2000).

Tempe is the first vegetarian food shown to contain nutritionally significant quantities of vitamin B12 necessary to fulfill US Recommended Daily Allowance (RDA). This vitamin B12 is produced by the natural contaminant in tempe, *Klebsiella pneumonia* (Liem *et al.* 1977). Given that vitamin B12 is normally only found in animal-derived food, tempe plays an important role as a non-animal source of vitamin B12, especially for vegetarians.

Tempe is not eaten raw, it can be boiled or fried, then served in a variety of dishes as well as applied as an enrichment ingredient for formulated foods (Vaidehi *et al.* 1996).

With its high nutritional value, tempe is definitely a precious cultural heritage of Indonesia. The world's earliest known reference to tempe appeared in Serat Centini in 1815, on the orders of Sunan Sugih in Surakarta, Central Java, Indonesia (Shurtleff and Aoyagi 2001). Dating back to 1895, there was also an early Dutch description of tempe in Java (Winarno and Reddy 1986). Some people say that tempe might even have saved lives of millions of poor people in Java by providing adequate nutrients during the hard time in the history of Dutch colonization in Indonesia.

Challenge

Indonesian people tend to look down on tempe as it is popular for its low price not for its nutritional value. Referring to its low price, in Bahasa Indonesia (Indonesian language) there is an expression: '*mental tempe*', which is used to address people who are mentally inferior. Furthermore, as a result of westernization, french fries, hamburgers, fried chicken ('junk food') are more popular among young generation. A well-founded concern in the country is that eating tempe is not considered something 'cool' compared to eating western food. It is such a pity that in Indonesia, tempe is not appreciated as much as it should be, while in other countries, like in Japan and the United States, people start to include tempe in their daily diet.

Projects

1. Comprehensive socialization

- More seminars should be performed in schools in Indonesia to make young people more aware of the nutritional value of tempe, so the existence of tempe in Indonesia will not be taken for granted.
- Restaurants that are specialized in serving a variety of tempe dishes should emerge, supported by government publication of how valuable tempe is.
- With media promotion and support from Indonesian government, the practice of eating tempe can spread to the rest of the world allowing all people to benefit from this nutritious food.

2. Tempe fermentation laboratory practice as an integrated part of school curriculum

The knowledge of making tempe should be taught obligatorily at all Indonesian schools (preferably junior high school or senior high school), in the form of a laboratory

practice (like in a biology class). Therefore, students can learn how fermentation works in making tempe and at the same time, the country heritage is preserved. Who else would preserve this indigenous practice if the young generation started to leave it behind? Learning how to make tempe is a knowledge that will definitely come into use for Indonesian young generation at the beginning and the whole world at the end.

The essential mould used for tempe fermentation is *Rhizopus* spp. (Nout and Rombouts 1990). For the fermentation of tempe, local people in Indonesia use a traditional inoculum called usar, consisting of heavily sporulated *Rhizopus* spp., of which the mycelium adheres to leaves of the waru tree (*Hibiscus* spp) (Nout et al. 1992).

Making tempe is a mix of art and science. As seen below, the process of making tempe is very simple.

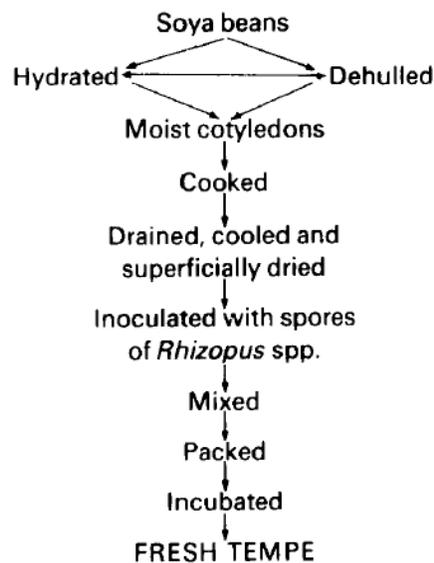


Fig. 1. Principle of tempe fermentation process (Ko and Hesseltine 1979).

Conclusion

It needs a strong effort to make tempe highly appreciated in the culinary world of Indonesia. Therefore, governmental policies should be made to support the socialization of tempe as a national heritage and food with high nutritional value. Starting from Indonesia, the practice of eating tempe can eventually spread to the rest of the world.

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