

# Analisis kandungan ergosterol dalam biomassa kering rhizopus dan tempe kedelai, serta potensi ergosterol dalam menurunkan kadar lemak darah tikus = Analysis of ergosterol content in dry biomass of rhizopus and soybean tempe; and the potency of ergosterol to decrease blood lipid level in rat

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## Abstrak

### <b>ABSTRAK</b><br>

Blood lipid is one of the factors which might cause atherosclerosis especially if hyperlipidemia occurs (blood total cholesterol > 200 mg/dl and triglyceride a 150 mg/dl). Consumption of foods with low lipid content can prevent hyperlipidemia. Soybeans and products made from them, such as soybean tempe, were reported to have a hypolipidemic effect. Those foods can decrease the human blood cholesterol and triglyceride level.

Ergosterol is a sterol in cell membranes of microorganism, especially fungi and was found in the hyphae and spores of fungi. Ergosterol in *Rhizopus* spp. has not yet been studied, while *Rhizopus* moulds are used in the fermentation of soybean cotyledons into soybean tempe, a product which is widely consumed by all strata of the Indonesian community. The University of Indonesia Culture Collection (UICC) has a number of *Rhizopus* species, which are most isolated from Indonesian soybean tempe. Morphologically two groups of *Rhizopus* moulds can be distinguished according to length of

hyphae, measurements of the sporangiospores, and growth temperatures. The groups are macro-*Rhizopus* and micro-*Rhizopus*.

This thesis consists of two parts. Part I is on the ergosterol content of the dry biomass of each UICC *Rhizopus* strain and in the soybean tempe. In Part II is studies the potency of ergosterol to decrease the blood lipid level in rats. The studies were carried out at the Laboratory of Microbiology and Laboratory of Plant and Animal Reproduction Departement of Biology, Faculty of Mathematics and Natural Sciences University of Indonesia; at the Laboratory of Clinical Chemistry, Medical Technologies, of The Ministry of Health; Jakarta III College; and also Laboratory of Chemical Analysis LIPI Bandung, on June 2006 - April 2007.

The aim of this study was to analyse the ergosterol content in the dry biomass of *Rhizopus* and in the soybean tempe obtained. Five UICC *Rhizopus* strain respectively UICC 52 (*Rh. arrhizus*), UICC 128 (*Rh. oryzae*), UICC 531 (*Rh. microsporus* var. *microsporus*), UICC 550 (*Rh. microsporus* var. *oligosporus*), and UICC 551 (*Rh. microsporus* var. *oligosporus*); and to know the potency of ergosterol to decrease the blood lipid level in rats which were fed with the respective biomass of the five *Rhizopus* spp. and compared with the rats fed with the soybean tempe using the five mentioned *Rhizopus* spp. as inoculum the respective fermentation processes. The rats (*Rattus norvegicus* strain Wistar) were obtained from the Laboratory of Animal Drug Testing, Gunung Sindur, Bogor. The rats were males and 2 - 3 months old.

Analysis of the ergosterol content was carried out using HPLC. The Diagnostic Liquicolour

Cholesteroloxidase 4-aminophenazone (CHOD-PAP) method was used for the measurement of blood total cholesterol level, and Gliserophosphoxidase Paraaminophenazone (GPO-PAP) for measurement of triglyceride level of the rats. Soybean tempe was prepared using an inoculum of each *Rhizopus* strain, and then powdered. The rats were given palm oil orally during 7 days to boost up the blood lipid level. Then they were fed with the fungal biomass or with the soybean tempe powder.

The results obtained were : the ergosterol content in the dry biomass of the five UICC *Rhizopus* spp. studied varied between (278,8 - 673,17) mg/g, while in the soybean tempe (3,3 - 8,1) mg/g. Both were able to decrease the blood lipid level in rats. However, soybean tempe gave a higher decrease (58 %) in comparison with the results of the dry biomass of the *Rhizopus* spp. (51.6 %).