

Produksi Mikoprotein *Lentinus* sp. dan *Heimioporus* sp. Menggunakan Medium Kedelai Secara *Solid State Fermentation*

Pembimbing :

Sari Darmasiwi, S.Si, M.Biotech, Ph.D

Prof. Rina Sri Kasiamdari, S.Si., Ph.D.

INTISARI

Mikoprotein merupakan protein yang dihasilkan dari biomassa jamur, baik khamir maupun kapang. Seiring perkembangan teknologi, jamur *Lentinus* sp. dan *Heimioporus* sp. mulai digunakan sebagai sumber mikoprotein karena kandungan nutrisinya yang tinggi. Namun produksi mikoprotein dengan kedua jamur belum pernah dieksplorasi. Kedelai dipilih sebagai medium kultivasi, karena kandungan protein nabati, oligosakarida (seperti rafinosa, stakiosa dan glukosa), vitamin, serta mineralnya, dan juga karena umum digunakan sebagai bahan baku tempe. Penelitian ini bertujuan mengetahui potensi *Lentinus* sp. dan *Heimioporus* sp. yang dikultivasi dengan medium kedelai secara SSF (*Solid State Fermentation*) serta mengetahui karakteristik fisikokimia dan mikrobiologis dari mikoprotein yang diproduksi. Identifikasi *Lentinus* sp. dan *Heimioporus* sp. dilakukan secara molekuler pada daerah ITS rDNA menggunakan primer ITS-1 dan ITS-4. Produksi mikoprotein secara SSF (*Solid State Fermentation*) menggunakan kedelai dengan aquadest (1:3) w/v, diinkubasi pada suhu 24°C selama 15 hari. Analisis proksimat meliputi uji kadar protein dengan metode Kjeldahl, lemak dianalisis dengan metode Soxhlet, aktivitas antioksidan dengan metode DPPH (2, 2-difenil-1-pikrilhidrazil), protein dan asam amino dengan metode HPLC (*High Performance Liquid Chromatography*). Analisis mikrobiologis dengan TPC (*Total Plate Count*) *Escherichia coli*. Hasil penelitian ini menunjukkan bahwa *Lentinus* sp. memiliki kekerabatan yang dekat dengan *L. squarrosulus* sedangkan *Heimioporus* sp. tidak dapat teridentifikasi molekuler, Produksi biomassa oleh *Lentinus* sp. (24,72 g) dan *Heimioporus* sp. (28,20 g) menunjukkan peningkatan dibandingkan substrat kedelai (pertumbuhan jamur selama proses fermentasi). Analisis proksimat menunjukkan variasi kandungan nutrisi, *Lentinus* sp. mengandung kadar air (11,37%) dan abu (5,74%) tertinggi, sedangkan *Heimioporus* sp. menunjukkan kandungan lemak (19,85%), protein (44,75%), dan karbohidrat (34,25%) tertinggi. Profil asam amino esensial menunjukkan bahwa *Heimioporus* sp. memiliki kandungan tertinggi dibandingkan *Lentinus* sp. dan substrat kedelai, terutama pada leusin (2,63%), lisin (2,56%), dan fenilalanin (2,05%), yang sejalan dengan tingginya kandungan total protein tertinggi. Aktivitas antioksidan yang diukur berdasarkan nilai IC50 menunjukkan aktivitas tertinggi pada substrat kedelai (25,10 µg/mL), diikuti oleh *Heimioporus* sp. (29,33 µg/mL) dan *Lentinus* sp. (32,05 µg/mL). Analisis mikrobiologis terhadap produk mikoprotein *Lentinus* sp. menunjukkan ketiadaan koloni mikroba yang terdeteksi, sedangkan produk mikoprotein *Heimioporus* sp. menunjukkan total koloni yaitu $1,57 \times 10^7$ CFU/mL. Tidak terdeteksinya keberadaan *Escherichia coli* pada seluruh perlakuan mendukung keamanan mikrobiologis dari proses fermentasi yang dilakukan.

Kata kunci : Mikoprotein, Kedelai, *Solid State Fermentation*, *Lentinus*, *Heimioporus*

Mycoprotein Production of *Lentinus* sp. and *Heimioporus* sp. Using Soybean Medium by *Solid State Fermentation*

Supervisor:

Sari Darmasiwi, S.Si, M.Biotech, Ph.D

Prof. Rina Sri Kasiamdari, S.C., Ph.D.

ABSTRACT

Mycoprotein is a protein produce from fungal biomass, both yeast and mold. Along with the development of technology, fungi *Lentinus* sp. and *Heimioporus* sp. start to use as a source of mycoprotein due to its high nutritional content. However, mycoprotein production with both fungi not yet explore. Soybeans were chosen as a cultivation medium, due to their vegetable protein, oligosaccharides (such as raffinose, stachyose and glucose), vitamins, and minerals, and also because they are commonly used as raw materials for tempeh. This study aims to determine the potential *Lentinus* sp. and *Heimioporus* sp. which was cultivate with soybean medium using SSF (*Solid State Fermentation*) and to know the physicochemical and microbiological characteristics of the mycoproteins production. Identification *Lentinus* sp. and *Heimioporus* sp. with molecularly in the ITS region of rDNA using the primers ITS-1 and ITS-4. Production of mycoprotein by SSF (*Solid State Fermentation*) using soybeans with aquadest (1:3) w/v, incubation at a temperature of 24°C for 15 days. Proximate analysis includes protein content testing using the Kjeldahl method, fat was analysis using the Soxhlet method, antioxidant activity using the DPPH method (2, 2-diphenyl-1-picrylhydrazyl), proteins and amino acids by HPLC method (*High Performance Liquid Chromatography*). Microbiological analysis with TPC (*Total Plate Count*) *Escherichia coli*. The results of this study indicate that *Lentinus* sp. shows a close relationship with *L. squarrosulus* whereas *Heimioporus* sp. cannot be identified molecularly, Biomass production by *Lentinus* sp. (24.72 g) and *Heimioporus* sp. (28.20 g) shown increase compare to the control (growth of the fungus during the fermentation process). Proximate analysis shown that variations in nutrient content, *Lentinus* sp. contains the highest amount of water (11.37%) and ash (5.74%), whereas *Heimioporus* sp. shown the highest fat (19.85%), protein (44.75%), and carbohydrate (34.25%) content. The essential amino acid profile shown that *Heimioporus* sp. had the highest content compared to *Lentinus* sp. and control, especially in leucine (2.63%), lysine (2.56%), and phenylalanine (2.05%), which is in line with the highest total protein content. Antioxidant activity measure based on IC50 values shown the highest activity in soybean substrate (25.10 µg/mL), followed by *Heimioporus* sp. (29.33 µg/mL) and *Lentinus* sp. (32.05 µg/mL). Microbiological analysis of mycoprotein products *Lentinus* sp. indicates the absence of detectable microbial colonies, whereas mycoprotein products *Heimioporus* sp. show a total colony count of 1.57×10^7 CFU/mL. The presence of *Escherichia coli* in all treatments supports the microbiological safety of the fermentation process carried out.

Keywords: Mycoprotein, Soybean, *Solid State Fermentation*, *Lentinus*, *Heimioporus*