

## ABSTRACT

Difa Nuramalia Nuramalia Zakiya. 24020221140085. **Potential of Tempeh Producing  $\alpha$ -Amylase Inhibitor ( $\alpha$ AI) Using R1 Isolate from *Rhizopus* sp. as a Functional Food Product for Antidiabetes.** Supervised by Sri Pujiyanto dan Arina Tri Lunggani.

Diabetes mellitus is a degenerative disease that attacks the metabolic system, causing hyperglycemia. According to IDF data at the end of 2021, 45% of people worldwide were confirmed to suffer from type 2 diabetes, triggered by obesity, lifestyle, and an unbalanced diet. Tempeh is a functional food native to Indonesia, produced by the fermentation of soybeans by *Rhizopus* sp., which contains bioactive compounds that are beneficial for health as a dietary alternative, one of which is as an  $\alpha$ -amylase inhibitor ( $\alpha$ AI) in reducing blood sugar levels. Previous research found that *Rhizopus* sp. isolates from Bogor (R1) have high  $\alpha$ AI activity, thus opening up opportunities to investigate the potential of  $\alpha$ AI-producing tempeh as a functional antidiabetic food. This study aims to determine the effect of tempeh fermentation time using isolate R1 on  $\alpha$ AI activity, determine the IC<sub>50</sub> value of the ethanol extract of tempeh with the highest  $\alpha$ AI activity, and identify bioactive compounds formed from tempeh fermentation that have the potential to act as  $\alpha$ AI. Tempeh fermentation was carried out for 24, 48, 72, and 96 hours to analyze its characteristics based on SNI 3144:2015 standards.  $\alpha$ AI activity was tested using the DNS method on tempeh supernatant and tempeh with the highest  $\alpha$ AI activity was used to extract it.  $\alpha$ AI activity was tested using the DNS method again on tempeh ethanol extract with varying concentrations (100, 250, 500, 750, and 1000 ppm) to determine the IC<sub>50</sub> value. The best tempeh ethanol extract was also used for analysis of bioactive compound content using GC-MS. The results of physical characterization and  $\alpha$ AI activity tests showed that 96-hour tempeh (T4) was the best result because it met SNI standards and had the highest  $\alpha$ AI activity (63.41%), approaching the  $\alpha$ AI activity of acarbose as a comparison (63.50%). Ethanol extract of T4 tempeh showed very strong inhibitory ability against  $\alpha$ -amylase with an IC<sub>50</sub> value of 14.72 ppm. GC-MS analysis of ethanol extract of T4 tempeh revealed bioactive compounds from the fatty acid group in the form of palmitic acid, oleic acid, and linoleic acid working in  $\alpha$ AI activity as an antidiabetic agent.

**Keywords:**  *$\alpha$ AI, Antidiabetes, Isolate R1, Bioactive Compound, Tempeh T4*