

## ABSTRAK

Tyas Shabila Nurkamila. 2024. **Uji Aktivitas Ligninolitik dan Identifikasi Molekuler Jamur Pengompos Tandan Kosong Kelapa Sawit.** Di bawah bimbingan Wijanarka dan Susiana Purwantisari.

Tandan Kosong Kelapa Sawit (TKKS) merupakan limbah pengolahan kelapa sawit yang dapat dimanfaatkan kembali sebagai pupuk organik atau kompos. TKKS mengandung lignin yang sulit terurai. Lignin adalah salah satu komponen lignoselulosa penyusun dinding sel pada tumbuhan. Mikroba ligninolitik dapat ditemukan pada proses pengomposan TKKS ini. Mikroba ligninolitik merupakan mikroba yang mampu mengurai lignin melalui enzim pendegradasi lignin yang dimilikinya. Penelitian ini bertujuan untuk mengetahui aktivitas ligninolitik yang dimiliki jamur pengompos TKKS koleksi Laboratorium Bioteknologi BRIN melalui uji *in vitro*, mengetahui morfologi kompos TKKS dan unsur yang terdapat dalam kompos TKKS melalui uji *in vivo*, serta mengetahui spesies dari jamur pengompos TKKS yang diidentifikasi. Uji *in vitro* dilakukan secara kualitatif, yaitu menguji aktivitas isolat FA.2.8 dengan mengamati zona bening yang dihasilkan isolat FA.2.8 pada media uji. Uji *in vivo* dilakukan dengan cara preparasi kompos TKKS yang mengandung isolat FA.2.8 untuk diamati menggunakan *Scanning Electron Microscope* (SEM). Isolat FA.2.8 diidentifikasi secara molekuler berdasarkan gen ITS dan 28S rDNA. Hasil yang didapat yaitu isolat FA.2.8 mampu menghasilkan zona bening pada dua media uji, baik itu media Luria Bertani Agar + metilen blue maupun media formulasi menurut metode Sundman & Nase, yang menunjukkan bahwa isolat FA.2.8 mampu menghasilkan enzim ligninolitik yang mendegradasi lignin di sekitarnya. Kompos TKKS yang mengandung isolat FA.2.8 terdegradasi lebih baik dibandingkan kontrol negatif tanpa penambahan isolat, ditandai dengan kandungan C pada sampel FA.2.8 lebih rendah, kandungan zat hara (Mg, Si, K, O, dan Ca) pada sampel FA.2.8 lebih tinggi, dan serat-serat kompos TKKS sampel FA.2.8 terlihat lebih rusak atau lebih banyak serat putus dibandingkan kontrol negatif. Isolat FA.2.8 memiliki kemiripan dengan *Trichoderma ivoriense* CBS 125734 setelah diidentifikasi molekuler berdasarkan gen 28S rDNA yang didukung oleh nilai *bootstrap* 100%.

*Kata Kunci: Identifikasi Molekuler, Jamur Ligninolitik, Tandan Kosong Kelapa Sawit, Trichoderma ivoriense, Uji Aktivitas Ligninolitik*

## ABSTRACT

Tyas Shabila Nurkamila. 2024. **Ligninolytic Activity Test and Molecular Identification of Oil Palm Empty Fruit Bunch Composting Fungi.** Under the guidance of Wijanarka and Susiana Purwantisari.

Oil Palm Empty Fruit Bunch (OPEFB) is palm oil processing waste that can be reused as organic fertilizer or compost. OPEFB contains lignin which is difficult to decompose. Lignin is a component of lignocellulose that makes up the cell walls of plants. Ligninolytic microbes can be found in the OPEFB composting process. Ligninolytic microbes are microbes that are able to decompose lignin through the lignin-degrading enzymes they possess. This study aims to determine the ligninolytic activity of OPEFB composting fungi from the BRIN Biotechnology Laboratory collection through *in vitro* test, to determine the morphology of OPEFB compost and the elements contained in OPEFB compost through *in vivo* tests, and to determine the species of the identified TKKS composting fungi. *In vitro* test are carried out qualitatively, testing the activity of the FA.2.8 isolate by observing the clear zone produced by the FA.2.8 isolate in the test medium. *In vivo* test are carried out by preparing OPEFB compost containing FA.2.8 isolates to be observed using a Scanning Electron Microscope (SEM). The FA.2.8 isolate was identified molecularly based on the ITS and 28S rDNA genes. The results obtained were that the FA.2.8 isolate was able to produce clear zones in two test media, Luria Bertani Agar + methylene blue media and the formulation media according to Sundman & Nase method, which showed that the FA.2.8 isolate was able to produce ligninolytic enzymes that degrade lignin. The OPEFB compost containing the FA.2.8 isolate degraded better than the negative control without the isolate, indicated by the lower C content in the FA.2.8 sample, the higher nutrient content (Mg, Si, K, O, and Ca) in the FA.2.8 sample, and the fibers of the FA.2.8 OPEFB compost sample looked more damaged or had more broken fibers than the negative control. The FA.2.8 isolate has similarities with *Trichoderma ivoriense* CBS 125734 after molecular identification based on the 28S rDNA gene which is supported by a bootstrap value of 100%.

*Keywords: Molecular Identification, Ligninolytic Fungi, Oil Palm Empty Fruit Bunch, Trichoderma ivoriense, Ligninolytic Activity Test*