

## ABSTRAK

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**ANALISIS BIOINFORMATIKA GEN DENGAN AKTIVITAS AMILOLITIK DARI ISOLAT JAMUR *Aspergillus sp.* TM3**  
Skripsi, Fakultas Sains dan Teknologi (2021)

(xiv + 44 halaman; 9 gambar; 5 tabel; 7 lampiran)

Enzim amilolitik banyak digunakan untuk berbagai proses dalam berbagai industri. Dalam berbagai aplikasi, jamur dipilih karena umumnya menghasilkan enzim yang tahan kondisi asam dan tidak toksik, terutama jamur *Aspergillus*. Sayangnya, penelitian terhadap jamur ini dari sisi bioinformatika masih terbatas. Pada penelitian sebelumnya, diisolasi jamur *Aspergillus sp.* TM3 dari tapai singkong madu. Makanan ini dipasarkan dengan nama 'madu' karena rasanya yang manis yang dihasilkan dari proses fermentasi. Analisis awal menunjukkan isolat memiliki aktivitas amilolitik dan merupakan spesies *A. welwitschiae*, spesies *Aspergillus* yang masih jarang diteliti. Maka dari itu, potensi enzim amilolitik isolat menarik untuk diteliti lebih lanjut. Pada penelitian ini dilakukan analisis bioinformatika terhadap gen dengan aktivitas amilolitik pada *Aspergillus sp.* TM3. Pendekatan bioinformatika dipilih karena tidak membutuhkan sumber daya dan biaya besar dibandingkan metode analisis gen konservatif. Perlengkapan teknologi informatika serta program bioinformatika juga tersedia secara luas. Data *whole genome sequencing* yang didapatkan dari penelitian sebelumnya disusun hingga tahap *assembly* untuk dilakukan identifikasi gen enzim amilolitik. Ditemukan tujuh gen  $\alpha$ -amilase, satu gen glukamilase, dan empat gen  $\alpha$ -glukosidase famili GH31. Sekuens protein dan karakteristik enzim dari gen-gen tersebut juga diprediksi.

Kata Kunci : tapai singkong madu, enzim amilolitik, *Aspergillus*, *Aspergillus welwitschiae*, analisis bioinformatika.

Referensi : 76 (1984-2021)

## ABSTRACT

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### **BIOINFORMATICS ANALYSIS OF GENES WITH AMYLOLYTIC ACTIVITY IN FUNGAL ISOLATE *Aspergillus* sp. TM3**

Thesis, Faculty of Science and Technology (2021)

(xiv + 44 pages; 9 pictures; 5 tables; 7 appendices)

Amylolytic enzymes are utilized in many industrial processes of different sectors. In many cases, fungi are preferred for its acid-tolerant enzymes and are generally regarded as safe, especially *Aspergillus* fungi. However, to this day the bioinformatics research of this fungi is still limited. In previous research, *Aspergillus* sp. TM3 was isolated from *tapai singkong 'madu'*, a fermented cassava dish that is popularized as 'honey' for its sweetness that is produced through fermentation. Early analysis showed amylyolytic activity by this isolate and it was identified as *A. welwitschiae*, an *Aspergillus* species that is not well studied yet. Thus, there is interest to investigate the potential for the produced amylyolytic enzymes. This study focuses on bioinformatics analysis of genes with amylyolytic activity in *Aspergillus* sp. TM3. The approach with bioinformatics analysis is preferred for its relative low cost compared to the resource intensive conventional gene analysis. The necessary tools and programs are also widely available. Whole genome sequencing data produced by previous study was processed to assembly level for identification of genes containing amylyolytic enzymes. Seven  $\alpha$ -amylase, one glucoamylase, and four GH31  $\alpha$ -glucosidase genes were found. Their predicted protein sequence and subsequently their enzyme properties were also described.

Keywords : fermented cassava, amylyolytic enzyme, *Aspergillus*, *Aspergillus welwitschiae*, bioinformatics analysis.

References : 76 (1984-2021)