

ABSTRAK

Wulan Kindangen (01113170013)

ANALISIS GEN-GEN ENZIM PEMECAH KARBOHIDRAT ISOLAT SU-KC1a

Skripsi, Fakultas Sains dan Teknologi (2021)

(xv + 42; 14 gambar; 3 tabel; 13 lampiran)

Pada ASI dapat ditemukan banyak bakteri jenis probiotik, salah satunya bisa berupa *Lactiplantibacillus plantarum* (*L. plantarum*). Diketahui bahwa *L. plantarum* dapat memfermentasi berbagai karbohidrat. Tujuan dari penelitian ini adalah mengetahui spesies isolat SU-KC1a; menganalisis gen-gen enzim pemecah galaktooligosakarida, laktosa dan galaktosa pada SU-KC1a; serta menganalisis sekuens enzim fosfoketolase pada SU-KC1a. SU-KC1a dari air susu ibu yang diisolasi pada penelitian sebelumnya ditumbuhkan kembali, lalu dikarakterisasi, dan diidentifikasi menggunakan 16S-rRNA *sequencing* dan *Whole Genome Sequencing* (WGS). Data 16S-rRNA *sequencing* diperoleh dengan, ekstraksi DNA, PCR, dan dilakukan *sequencing*, kemudian dianalisis dengan BLAST dan Clustal Omega. Data WGS SU-KC1a didapatkan dari ekstraksi DNA kemudian dilakukan *sequencing* dengan *Oxford Nanopore Technologies*. Program seperti Epi2me, Mauve, BLAST, RAST, dan CAZy, digunakan untuk perakitan genom, *polishing* genom, *re-ordering*, anotasi dan analisis gen-gen yang mengkodekan enzim pemecah laktosa dan galaktosa sekaligus menganalisis sekuens enzim fosfoketolase. Hasil karakterisasi dan identifikasi molekuler menunjukkan bahwa SU-KC1a identik dengan *Lactiplantibacillus plantarum*. *L. plantarum* SU-KC1a dapat memetabolisme galaktooligosakarida, laktosa dan galaktosa karena mengandung gen seperti LacS, LacA, LacL, LacM, LacR galM, galK, galT, dan galE. Kemudian, hasil analisis sekuens pengkode fosfoketolase pada SU-KC1a mirip dengan *L.pentosus* MD363. Tapi masih diperlukan uji lebih lanjut.

Kata Kunci : bioinformatika, *Whole Genome Sequencing*, *Lactiplantibacillus plantarum*, laktosa dan galaktosa, fosfoketolase.

Referensi : 47 (2021-1994)

ABSTRACT

Wulan Kindangen (01113170013)

ANALYSIS OF GENES ENCODING CARBOHYDRATE DEGRADING ENZYMES IN SU-KC1a

Thesis, Faculty of Science and Technology (2021)

(xv + 42; 14 figures; 3 tables; 13 appendices)

Probiotics can be found in human breast milk, for example, *Lactiplantibacillus plantarum* (*L. plantarum*). *L. plantarum* known for its ability to degrade many kinds of carbohydrates. The purposes of this study are; indicating the species of SU-KC1a; analyzing genes that encoded galactooligosaccharides, lactose, and galactose degrading enzymes in *L. plantarum*; and analyzing sequences that encoded phosphoketolase enzymes in *L. plantarum*. SU-KC1a from human breast milk that has been isolate in the previous research was cultured, characterized, and identified using 16S-rRNA sequencing and Whole Genome Sequencing (WGS). 16S-rRNA data was obtained from DNA extraction, PCR, and sequencing. Then, the data were analyzed using BLAST and Clustal Omega. WGS data of SU-KC1a was obtained from DNA extraction and sequencing with Oxford Nanopore Technologies. Programs such as Epi2me, Mauve, RAST, and CAZy, were used to assemble, annotate and analyze genes encoding lactose and galactose degrading enzymes. Whole Genome Sequencing analysis indicates that SU-KC1a shows a similar identity with *Lactiplantibacillus plantarum*. SU-KC1a can metabolize lactose and galactose because the SU-KC1a's genome contains genes such as LacS, LacA, LacL, LacM, galM, galK, and LacR. Also, the sequence that encodes phosphoketolase enzyme in SU-KC1a is similar to the phosphoketolase enzyme sequence in *L.pentosus* MD363. But further research is still needed.

Keywords: bioinformatics. Whole Genome Sequencing, *Lactiplantibacillus plantarum*, lactose and galactose, phosphoketolase.

References: 47 (2021-1994)