ABSTRAK

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ANALISIS MOTIF IMUNOREGULATOR DNA CpG, GEN PLANTARISIN, DAN GEN RESISTENSI *MUPIROCIN* PADA GENOM *Lactiplantibacillus plantarum* SU-KC1a

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(xv + 44 halaman; 10 gambar; 1 tabel; 5 lampiran)

Lactobacillus dikenal baik dalam penggunaannya pada makanan sebagai probiotik. Diketahui pada ASI, terdapat banyak bakteri jenis *Lactobacillus* yang dapat mempengaruhi kesehatan bayi yang mengonsumsinya, terutama pada sistem imun dalam melawan patogen. Penelitian ini bertujuan untuk menganalisis isolat SU-KC1a yang diperoleh dari ASI. Melalui hasil *Whole Genome Sequencing* (WGS), dapat dilakukan identifikasi dan analisis motif DNA CpG yang berperan sebagai imunoregulator; kemudian motif CpG SU-KC1a dibandingkan dengan spesies atau genus lainnya; serta gen-gen plantarisin dan gen resistensi terhadap antibiotik *Mupirocin* dapat dianalisis. Metode yang dilakukan adalah mengkarakterisasi isolat SU-KC1a; data hasil sekuensing 16S-rRNA dari isolat SU-KC1a diperoleh dengan ekstraksi DNA dan PCR, kemudian dianalisa dengan BLAST; data WGS dari isolat SU-KC1a diperoleh dengan ekstraksi DNA kemudian dilakukan sekuensing dengan alat GridION *sequencer*; data hasil WGS dilakukan perakitan (*assembly*) genom dengan program Flye; hasil perakitan dipoles dengan program Medaka; contig disusun (*contigs reordering*) dengan program Mauve; motif CpG pada genom SU-KC1a dilakukan identifikasi dan analisis dengan program Fuzznuc; anotasi genom dilakukan untuk mencari keberadaan gen bakteriosin dengan program RAST; serta gen resistensi terhadap *Mupirocin* dengan program CARD. Hasil yang diperoleh, isolat SU-KC1a tergolong bakteri Gram positif yang berbentuk batang. Identifikasi molekular dengan 16S-rRNA dan WGS menunjukkan isolat SU-KC1a identik dengan *Lactiplantibacillus plantarum*. Panjang genom *L. plantarum* SU-KC1a adalah 3.211.037 bp dengan persentase GC 44,66%, serta jumlah total motif CpG tipe satu dan tipe dua masing-masing sebanyak 13.779 dan 8.960. Selanjutnya ditemukan gen pengkode berbagai protein untuk biosintesis plantarisin dan juga gen resistensi terhadap *Mupirocin*. Dari hasil penelitian, menunjukkan bahwa *L. plantarum* SU-KC1a berpotensi sebagai probiotik, tetapi perlu dilakukan penelitian dan pembuktian lebih lanjut.

Kata Kunci: Probiotik, *Lactiplantibacillus plantarum*, bioinformatika, motif DNA CpG, *Whole Genome Sequencing*.

Referensi: 54 (1995 – 2021)

ABSTRACT

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ANALYSIS OF IMMUNOREGULATORY CpG DNA MOTIFS, PLANTARICIN GENES, AND MUPIROCIN RESISTANCE GENES IN *Lactiplantibacillus plantarum* SU-KC1a

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Lactobacillus is well known for its use as a probiotic in food. It is also known that in human breast milk, there are many species of *Lactobacillus* that can affect the health of the babies who consume it, especially on the baby's immune system against pathogen. This study aims to analyse the SU-KC1a isolate that obtained from human breast milk. Using result from Whole Genome Sequencing, identification and analysis of CpG DNA motifs that act as immunoregulators was carried out; the CpG motifs were then compared with other species and genera; plantaricin genes as well as Mupirocin resistance genes were also to be analyzed. The method used involved characterizing the SU-KC1a isolate; result data from SU-KC1a isolate 16S-rRNA sequencing were obtained by DNA extraction and PCR, then the result data was analysed by BLAST; genome assembly of the result data from WGS was carried out using Flye program; the assembly result was polished using Medaka program; contigs were reordered using Mauve program; CpG motifs in SU-KC1a genome were identified and analyzed using Fuzznuc program; genome annotation was performed using RAST program to search for the bacteriocin gene; Mupirocin resistance genes were also sought using CARD program. The result obtained showed that SU-KC1a isolate classified as being made up of Gram-positive rod-shaped bacteria. Molecular identification with 16S-rRNA and WGS showed that SU-KC1a identical to *Lactiplantibacillus plantarum*. The genome length was shown to be 3,211,037 bp with GC% 44.66%, and the total number of type 1 and type 2 CpG motifs were shown to be13,779 and 8,960 respectively. Genes that encode various proteins for plantaricin biosynthesis and Mupirocin resistance genes were found in the genome. The result showed that *L. plantarum* SU-KC1a has potential to be used as a probiotic, but further research need to be done.

Keywords: Probiotics, *Lactiplantibacillus plantarum*, bioinformatics, CpG DNA motifs, Whole Genome Sequencing.

References: 54 (1995 – 2021)