



## **Karakterisasi dan Identifikasi Molekuler Bakteri Asam Laktat Penghasil *Edible Biofilm* dari *Kimchi***

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### **INTISARI**

Bakteri asam laktat (BAL) memiliki kemampuan untuk membentuk *edible biofilm*. Pemanfaatan *edible biofilm* pada BAL dapat diaplikasikan dalam bidang industri makanan dan kesehatan. *Kimchi* merupakan sumber BAL dan bermanfaat untuk kesehatan. Penelitian ini bertujuan untuk mendapatkan isolat BAL penghasil *edible biofilm* dari *kimchi*, mengetahui tekstur permukaan dan komposisi unsur *biofilm*, menganalisis daya hambat *biofilm* BAL terhadap pertumbuhan bakteri patogen, menganalisis hubungan kekerabatan genetik BAL penghasil *edible biofilm* berdasarkan gen *16S rRNA*. Dua puluh satu isolat bakteri diperoleh dari isolasi bakteri *kimchi*, 17 diantaranya memiliki karakter fenotipik BAL. Seleksi BAL penghasil *biofilm* secara makroskopis dan mikroskopis menunjukkan bahwa *biofilm* dihasilkan oleh 17 isolat BAL dan evaluasi produksi *biofilm* tertinggi pada waktu inkubasi 48 jam dengan rata-rata nilai OD 1,479 dan rata-rata jumlah sel  $5,36 \times 10^7$  CFU/ml. Daya lekat bakteri penyusun *biofilm* 11 isolat tergolong kuat dan 6 isolat tergolong lemah. Daya hambat tertinggi terhadap pertumbuhan *Staphylococcus aureus* FNCC 0091 yaitu isolat KA2 dan terendah yaitu KC7. Daya hambat tertinggi terhadap pertumbuhan *Escherichia coli* FNCC 0049 yaitu isolat KB1 dan terendah yaitu KB4. Tekstur permukaan dan komposisi *biofilm* melalui SEM-EDS menunjukkan *biofilm* isolat KA2 dan KB1 memiliki tekstur permukaan halus dengan morfologi sel berbentuk *rod* dan komposisi unsur *biofilm* KA2 terdiri dari karbon, oksigen dan nitrogen. Berdasarkan sekuen gen *16S rRNA*, isolat KA2, KA5, KB1 dan KC4 teridentifikasi sebagai *Lactobacillus brevis*.

Kata kunci: *Edible biofilm*, gen *16S rRNA*, *Lactobacillus brevis*, SEM-EDS

## **Characterization and Molecular Identification of Lactic Acid Bacteria Producing Edible Biofilm from *Kimchi***

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### **ABSTRACT**

Lactic acid bacteria (LAB) can form edible biofilms. The utilization of edible biofilms on LAB can be applied in the food and health industries. *Kimchi* is a source of LAB and it is beneficial for health. This study aims to obtain LAB isolates that produce edible biofilms from *kimchi*, to determine the surface texture and composition of biofilm elements, to analyze the inhibition of LAB biofilms to the growth of pathogenic bacteria, to analyze the genetic relationship between LAB producing edible biofilm based on *16S rRNA* genes. Twenty-one bacterial isolates were obtained from kimchi bacterial isolation, 17 isolates had the phenotypic character of LAB. The selection of LAB producing biofilm showed 17 isolates can form biofilm and the highest biofilm production was at 48 hours incubation with an average OD value of 1.479 and an average cell number of  $5.36 \times 10^7$  CFU/ml. The eleven isolates showed strong of the adherence biofilm and 6 isolates were classified as weak. The highest inhibition against the growth of *Staphylococcus aureus* FNCC 0091 was KA2 isolate and the lowest was KC7. The highest inhibitory effect on the growth of *Escherichia coli* FNCC 0049 was KB1 isolate and the lowest was KB4. The surface texture and biofilm element composition through SEM-EDS showed that the KA2 and KB1 had a smooth surface texture with rod-shaped cell morphology and the biofilm element consisted of carbon, oxygen, and nitrogen. Based on *16S rRNA* gene, the KA2, KA5, KB1 and KC4 isolates were identified as *Lactobacillus brevis*.

Keywords: Edible biofilm, *16S rRNA* gene, *Lactobacillus brevis*, SEM-EDS