IDENTIFICATION AND CHARACTERIZATION OF BACTERIA FROM THE SKIN OF JACKFRUIT

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To my beloved family

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ABSTRACT

Fresh-cut fruits industry is developing extensively in this global era due to busy lifestyle. However, the fresh-cut processing could be contaminated by microorganisms; resulting in food poisoning outbreaks. This study presented about the characterization and inhibition of bacteria isolated from the fresh skin of jackfruit. The isolation of single colonies was done by spread plate and streak plate method. The isolates were identified by 16S rRNA analysis. Gram staining, growth profiling and 15 biochemical tests were carried out to characterize each isolates. Lastly, the isolates were treated with various antimicrobial agents by disc agar diffusion technique and the fresh skin of jackfruit was treated with antimicrobial agent, XY-12 with different conditions by spread plate technique to study the effects of antimicrobial agents on microbial growth. Experimental results demonstrated that four types of bacterial single colonies were isolated with different morphology and designated as CE1, CE2, CE3 and CE4. The 16S rRNA analysis showed that the isolates of CE1 and CE4 were *Bacillus* sp. strain CY-b33. Isolates of CE2 and CE3 were identified as *Bacillus pumilus* strain SBTBP-008 and *Bacillus thuringiensis* strain EA26.1 respectively. All the isolates were Gram positive and in rod shaped. The growth kinetics of CE3 was highest (0.2280 h^{-1}) compared to CE1 (0.1317 h^{-1}) which was the lowest. Bacteria CE1 and CE2 have the highest sensitivity against XY-12 (0.6 mL/L) and Kanamycin Sulfate respectively. Bacteria CE3 and CE4 have the highest sensitivity against Ampicillin Trihydrate and Tetracycline Hydrochloride respectively. The fresh skin of jackfruit treated with XY-12 (0.6 mL/L) and incubated at 4°C revealed high efficiency in microbial reduction at day 2 (100%) and 4 (99.72%).

KEYWORDS: 16S rRNA analysis, isolates, Gram staining, XY-12, *Bacillus* sp., *Bacillus pumilus, Bacillus thuringiensis.*

ABSTRAK

Industri buah-buahan hirisan segar telah membangun maju dalam era global ini disebabkan oleh gaya hidup yang sibuk. Walau bagaimanapun, pemprosesan hirisan segar boleh menyebabkan kerosakan oleh mikroorganisma; mengakibatkan wabak keracunan. Kajian ini membentangkan tentang pengenalan, pencirian dan seterusnya perencatan bakteria yang diasingkan daripada kulit segar nangka. Pengasingan bakteria koloni tunggal telah dilakukan dengan kaedah piring sebaran dan piring garis jalur. Bakteria yang diasingkan dikenal pasti melalui analisis 16S rRNA. Pewarnaan Gram, profil pertumbuhan dan 15 ujian biokimia telah dijalankan untuk mencirikan setiap koloni. Kesemua bakteria telah dirawat dengan pelbagai agen antimikrob menggunakan teknik penyebaran disk agar dan kulit segar nangka telah dirawat dengan agen antimikrob, XY-12 dengan syarat-syarat yang berbeza melalui teknik piring sebaran untuk mengkaji kesan agen antimikrob pada pertumbuhan mikroorganisma. Keputusan eksperimen menunjukkan bahawa empat jenis koloni bakteria tunggal telah diasingkan dengan morfologi yang berbeza dan ditetapkan sebagai CE1, CE2, CE3 dan CE4. Keputusan 16S rRNA menunjukkan bahawa bakteria CE1 dan CE4 adalah *Bacillus* sp. jenis CY-b33. Manakala, CE2 adalah *Bacillus pumilus* jenis SBTBP-008 dan CE3 menunjukkan *Bacillus thuringiensis* jenis EA26.1. Semua bakteria yang diperoleh adalah Gram positif dan berbentuk rod. Kinetik pertumbuhan CE3 adalah tertinggi (0.2280 h^{-1}) berbanding CE1 (0.1317 h^{-1}) yang paling rendah. Bakteria CE1 dan CE2, masing-masing mempunyai sensitiviti yang tertinggi terhadap XY-12 (0.6 mL/L) dan Kanamycin Sulfat. CE3 mempunyai sensitiviti yang tertinggi terhadap Ampicillin Trihydrate manakala CE3 terhadap Tetracycline Hydrochloride. Kulit segar nangka dirawat dengan XY-12 (0.6 mL/L) dan disimpan pada suhu 4°C mendedahkan kecekapan tinggi dalam pengurangan mikroorganisma pada hari ke-2 (100%) dan ke-4 (99.72%).

KATA KUNCI: analisis 16S rRNA, koloni tunggal, pewarnaan Gram, XY-12, *Bacillus sp, Bacillus pumilus, Bacillus thuringiensis.*