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Isolation and Identification of Airborne Bacteria Inside Swiftlet Houses in Sarawak, Malaysia

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Abstract

Air consists of such microorganisms as bacteria, fungi, and viruses. Exposure to these airborne bacteria indoors may cause infectious and noninfectious adverse health effects. However, the sources and origins of bacteria are not fully understood. The aim of this study was to isolate and identify the bacteria present in the air inside swiftlet houses located in Kota Samarahan, Saratok, Betong, Maludam, Miri, Kuching, Semarang, Sepinang, Sarikei, and Sibul in Sarawak, Malaysia. A total of 100 bacterial isolates from 20 samples were collected from swiftlet houses. The bacteria present in the air were collected using Plate Count Agar. Two plates were exposed at the front and back inside swiftlet houses for 15 sec and then incubated at 37 ± 1 °C for 24 h. The 16S rRNA analysis method was used to identify the isolates from the samples. The air inside the swiftlet houses had a total mean airborne bacteria colony count of $2.02 \pm 0.72 \log_{10}$ cfu/m²/sec; the highest was in Miri ($3.08 \pm 0.29 \log_{10}$ cfu/m²/sec), and the lowest was in Sibul ($1.05 \pm 0.85 \log_{10}$ cfu/m²/sec). Twenty-seven bacteria species were identified, and *Lysinibacillus* sp. B4 (16%) was most frequently isolated.

Abstrak

Isolasi dan Identifikasi Bakteri yang terdapat di Udara dalam Rumah Walet di Sarawak, Malaysia. Udara mengandung mikroorganisme seperti bakteri, jamur, dan virus. Paparan bakteri di udara dapat menyebabkan efek kesehatan yang merugikan. Namun, sumber dan asal bakteri tidak sepenuhnya dipahami. Tujuan dari penelitian adalah mengisolasi dan mengidentifikasi bakteri yang terdapat di udara di dalam rumah-rumah walet yang terletak di Kota Samarahan, Saratok, Betong, Maludam, Miri, Kuching, Semarang, Sepinang, Sarikei dan Sibul di Sarawak, Malaysia. Sebanyak 100 isolat bakteri dari 20 sampel diperoleh dari rumah-rumah walet. Bakteri diisolasi menggunakan medium Plate Count Agar. Sebanyak dua cawan petri dibuka di bagian depan dan belakang dalam rumah walet selama 15 detik, dan diinkubasi pada suhu 37 ± 1 °C selama 24 jam. Sequencing DNA gen 16S rRNA dilakukan untuk mengidentifikasi bakteri dari sampel. Udara di dalam rumah walet memiliki total rata-rata jumlah koloni $2.02 \pm 0.72 \log_{10}$ cfu/m²/detik dan CFU tertinggi diperoleh dari Miri ($3.08 \pm 0.29 \log_{10}$ cfu/m²/detik) dan terendah di Sibul ($1.05 \pm 0.85 \log_{10}$ cfu/m²/detik). Terdapat 27 species bakteri dari udara dalam ruangan di rumah walet, dan *Lysinibacillus* sp. (16%) paling banyak ditemukan.

Keywords: Swiftlet house, Air samples, Bacteria, Identification, 16S rRNA gene

1. Introduction

Air consists of tiny organisms such as bacteria, fungi, mycotoxins, and viruses. These small groups of organisms clump and survive in the air under high humidity [1]. Microorganisms are ubiquitous and can be transferred from the environment to everyday objects

especially humans. Pathogenic microbes can be transmitted through air, skin, food, water, and other interpersonal contact [2]. Researchers have reported that exposure to pathogenic microbes may cause respiratory disorders, infections, hypersensitivity pneumonitis, and toxic reaction in infected humans [3]. Bacterial infection has been receiving increased attention in recent years