



KARAKTERISASI BAKTERI SIMBION PADA NYAMUK KEBUN (*Aedes albopictus*)

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INTISARI

Nyamuk Kebun atau *Tiger mosquito* (*Aedes albopictus*) hidup bersimbiosa dengan bakteri sebagai flora normal pada alat pencernaan (*midgut*) atau sebagai simbion. Hampir sebagian besar simbion bersifat parasit. Beberapa jenis bakteri (*Bacillus* sp., *Xenorhabdus* sp., *Photorhabdus* sp., *Serratia* sp dan *Wolbachia* sp) hidup bersimbiosis dengan nyamuk Kebun (*Aedes Albopictus*), dan berperan dalam berbagai fungsi biologis pada tubuh serangga tersebut. Tujuan penelitian adalah Mengkaji keanekaragaman bakteri yang berasosiasi dengan alat pencernaan (*midgut*) *Aedes albopictus*, mendeteksi dan menyeleksi isolat berdasarkan aktivitas antibakteri terhadap model bakteri patogen dan pengaruh isolat bakteri terpilih terhadap perkembangan larva nyamuk; serta mengidentifikasi bakteri isolat terpilih.

Penelitian diawali dengan pengambilan spesimen nyamuk Kebun (*Aedes Albopictus*) dari pekarangan rumah di Kecamatan Depok, Yogyakarta. Nyamuk kebun dikembangkan melalui pemeliharaan (*rearing*), sebagai sumber bakteri. Bakteri simbion diisolasi secara langsung dari nyamuk dewasa yang telah disterilkan melalui pengenceran seri, dan ditanam secara taburan pada medium nutrient agar (NA) yang diperkaya dengan ekstrak nyamuk, diinkubasi pada temperatur ruang, sampai terjadi pertumbuhan bakteri. Koloni bakteri yang tumbuh terpisah dihitung dan diambil dipindahkan ke media NA miring. Isolat bakteri diseleksi berdasarkan pada aktivitas antimikrobia terhadap mikrobia patogen dan kemampuan tumbuh bakteri isolat pada medium nutrient cair (NB). Pengaruh bakteri simbion terhadap perkembangan larva nyamuk dilakukan melalui Percobaan pertumbuhan isolat bakteri pada habitat larva nyamuk. Semua bakteri isolat diidentifikasi berdasarkan metoda standard Bergey's untuk determinasi bakteri, sedangkan isolat bakteri terpilih dikarakterisasi secara molekular.

Hasil penelitian menunjukkan bahwa sepuluh isolat bakteri hidup berasosiasi dalam tubuh (*midgut*) *Aedes albopictus* terdiri dari kelompok bakteri yang dapat dikulturkan (*culturable*): yaitu Kelompok Firmicutes terdiri dari *Staphylococcus* (strain BAA-A1, BAA-A2 dan BAA-A3) dan *Bacillus* (strain BAA-A7, BAA-A8 dan BAA-A10) serta kelompok Proteobacteria terdiri dari *Pseudomonas* (strain BAA-A4, BAA-A5, BAA-A6 dan BAA-A9). Sebagian besar isolat bakteri simbion (isolat BAA A1, BAA A2, BAA A3, BAA A4, BAA A5, BAA A6 dan BAA A7) memiliki aktivitas anti bakteri terhadap *S. aureus* dan *E. coli*; isolat bakteri BAA-A7 diduga menghambat perkembangan *Aedes albopictus*, dan BAA-A8 diduga memacu perkembangan larva *Aedes albopictus*. Bakteri simbion *Aedes albopictus* memiliki karakter spesifik didominasi oleh kelompok Proteobacteria (gram negatif) dan bacillaceae (Gram positif).

Kata kunci: patogen, Interaksi simbion , *Aedes albopictus*, bakteri simbion



CHARACTERIZATION OF SYMBIOTIC BACTERIAL IN TIGER MOSQUITO (*Aedes albopictus*)

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ABSTRACT

Tiger mosquito (*Aedes albopictus*) have symbiotic relationship with bacteria as normal flora on the digestive system (midgut) or as symbionts. Most symbionts are parasitic. Several types of bacteria (*Bacillus sp.*, *Xenorhabdus sp.*, *Photorhabdus sp.*, *Serratia sp* and *Wolbachia sp*) live in symbiosis with the Tiger mosquito (*Aedes Albopictus*), and play a role in various biological functions in the insect's body. The aims of the study were to analyze the diversity of bacteria associated with the *Aedes albopictus* digestive (midgut), to detect and select isolates based on antibacterial activity against pathogenic bacterial models and their effects on mosquito larvae development; and identification of selected bacteria.

Research began with the collection of Tiger mosquito (*Aedes Albopictus*) specimens from home yards in Depok, Yogyakarta. Tiger mosquitoes are bred through rearing, as a source of bacteria. Symbiotic bacteria are isolated directly from adult mosquitoes that have been sterilized through serial dilution, and sprinkled on nutrient agar (NA) enriched with mosquito extracts, incubated at room temperature, until bacterial growth occurs. Separately grown bacterial colonies were counted and taken to be moved to agar slants. Bacterial isolates were selected based on antimicrobial activity against pathogenic microbes and the ability to grow bacteria isolates on liquid nutrient medium (NB). The effect of symbiotic bacteria on mosquito larvae development was carried out through the growth experiment of bacterial isolates in mosquito larvae. All bacterial isolates were identified based on Bergey's Manual Determinatives of Bacteriology, while selected bacterial isolates were molecularly characterized.

The results showed that ten *Aedes albopictus* (midgut) associated bacterial consisted culturable groups of bacteria: the *Firmicutes* group consisted of *Staphylococcus* (BAA-A1, BAA-A2 and BAA-A3 strains) and *Bacillus* (BAA-A7, BAA-A8 and BAA-A10 strains). Proteobacteria group consisted of *Pseudomonas* (BAA-A4, BAA-A5, BAA-A6 and BAA-A9 strains). Most of the symbiotic bacterial isolates (BAA A1, BAA A2 isolates, BAA A3, BAA A4, BAA A5, BAA A6 and BAA A7) had anti-bacterial activity against *S. aureus* and *E. coli*, isolates BAA-A7 allegedly inhibits the development of *Aedes albopictus*, and BAA-A8 was allegedly stimulate the development of *Aedes albopictus* larvae. Symbiotic bacteria in *Aedes albopictus* dominated by the Proteobacteria group (gram negative) and bacillaceae (Gram positive).

Keyword: pathogen, symbiotic interactions, *Aedes albopictus*, symbion bacteria