

Khamir asal lebah madu Apis cerana fab dan perannya dalam pollen substitute untuk meningkatkan produktivitas koloni = Yeast from honeybee Apis cerana fab and its role in pollen substitute for improving colony productivity

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Abstrak

Penelitian bertujuan untuk memperoleh isolat-isolat khamir, memperoleh informasi spesies-spesies khamir yang berasal dari lebah madu Apis cerana dan substrat terkait, dan mengetahui pengaruh pemberian pollen substitute (PS) terhadap produktivitas koloni A. cerana. Khamir diisolasi dari telur, larva, pupa, lebah pekerja, lebah ratu, lebah jantan serta bee pollen, bee bread dan madu A. cerana, serta nektar dan serbuk sari dari bunga-bunga yang dikunjungi A. cerana. Khamir diisolasi menggunakan medium YMA dan YMA+sukrosa 50%.

Identifikasi khamir dilakukan berdasarkan data sequence daerah internal transcribed spacer ribosomal DNA (ITS rDNA), analisis filogenetik dilakukan dengan metode Neighbor Joining, serta karakter morfologi dan fisiologi-biokimia. Sebanyak enam variasi PS dibuat untuk menguji preferensi A. cerana terhadap jenis PS. PS dalam bentuk pasta diberikan setiap hari selama 20 hari. Pengujian pengaruh pemberian variasi PS lokal dan PS impor terhadap produktivitas koloni A. cerana dilakukan selama 13 minggu. Sebanyak 1.409 isolat khamir diperoleh dari A. cerana dan substrat terkait. Lima puluh isolat representatif diseleksi untuk diidentifikasi.

Hasil identifikasi menunjukkan bahwa 50 isolat khamir tersebut terdiri dari 12 genera dan 21 spesies. Sebanyak enam genera termasuk ke dalam phylum Ascomycota (class Hemiascomycetes, order Saccharomycetales), dan enam genera lainnya termasuk ke dalam phylum Basidiomycota (classes: Hymenomycetes, Urediniomycetes, dan Ustilaginomycetes).

Hasil penelitian mengindikasikan adanya asosiasi dan interaksi antara spesies khamir dengan lebah madu. Hasil uji preferensi terhadap enam variasi PS lokal menunjukkan PS yang mengandung Candida hawaiiensis CR015 asal bunga Brugmansia suaveolens (PS1) dan PS yang mengandung baker's yeast (PS4) lebih disukai oleh A. cerana dibandingkan PS lain. Hasil uji produktivitas menunjukkan pollen substitute yang mengandung Candida hawaiiensis CR015 asal bunga Brugmansia suaveolens (PS1) terbukti potensial dalam meningkatkan produktivitas koloni A. cerana setara dengan pollen substitute impor.

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The aims of this study were to obtain yeast isolates, to get species information from honeybee Apis cerana and related substrates, and to determine the effects of a pollen substitute (PS) on the productivity of A. cerana colonies. Yeasts were isolated from A. cerana eggs, larvae, pupae, workers, queens, drones, bee pollen, bee bread, honey, and nectars and pollens from flowers visited by A. cerana. The media used to isolate the yeasts were Yeast-Extract Malt-Extract Agar (YMA) and YMA+50% sucrose.

The yeasts were identified based on sequence data of internal transcribed spacer regions of ribosomal DNA (ITS rDNA). Phylogenetic analysis of yeasts based on ITS rDNA sequence data was performed by the neighbor-joining method. Morphological, physiological and biochemical characteristics of yeasts were observed. To determine the preference of A. cerana for pollen substitutes, honeybee colonies were fed daily

with six varieties of pollen substitutes in patty form for 20 days. To examine the effects of pollen substitutes on the productivity of *A. cerana*, honeybee colonies were fed on local pollen substitutes (PSs) and imported PS for 13 weeks. A total of 1,409 yeast isolates were obtained from various substrates. Fifty representative isolates were selected for identification. The identification results showed that those 50 yeast isolates consisted of 12 genera and 21 species. Six of these genera belong to phylum Ascomycota, and class Hemiascomycetes, while the other six genera belong to phylum Basidiomycota and classes Hymenomycetes, Urediniomycetes and Ustilaginomycetes.

This study indicated that there is an association and an interaction between yeast species and honeybee. The preference test result showed that a PS containing *Candida hawaiiiana* CR015 isolated from the flower of *Brugmansia suaveolens* (PS1) and a PS containing baker's yeast (PS4) were favoured by *A. cerana* colonies.

The productivity test result showed that a PS containing *Candida hawaiiiana* CR015. The preference test result showed that a PS containing *Candida hawaiiiana* CR015 isolated from the flower of *Brugmansia suaveolens* (PS1) and a PS containing baker's yeast (PS4) were favoured by *A. cerana* colonies. The productivity test result showed that a PS containing *Candida hawaiiiana* CR015 isolated from the flower of *Brugmansia suaveolens* (PS1) was proved to potentially increase the productivity of *A. cerana* colonies and could be considered as good as imported pollen substitute.