ABSTRAK

AKTIVITAS ANTIBAKTERI EKSTRAK ETIL ASETAT DARI KO-KULTUR JAMUR SIMBION NUDIBRANCHIA DAN BAKTERI *Sinomicrobium* sp. PAP.21 TERHADAP *Mycobacterium smegmatis*

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Latar Belakang: Mikroorganisme berupa jamur yang berasosiasi dengan invertebrata laut seperti nudibranchia merupakan sumber senyawa bioaktif dengan keanekaragaman struktur kimia dan berpotensi sebagai antibakteri. Namun, klaster gen yang terlibat dalam biosintesis metabolit sekunder pada mikroorganisme seringkali tidak aktif pada kondisi kultur standar, sehingga diperlukan strategi ko-kultur. Penelitian ini bertujuan untuk mengidentifikasi jamur simbion nudibranchia, mengidentifikasi kandungan kimia ekstrak etil asetat (EtOAc) ko-kultur jamur tersebut dengan bakteri *Sinomicrobium* sp. PAP.21, dan menguji aktivitas antibakterinya terhadap *Mycobacterium smegmatis*.

Metodologi: Isolat murni jamur simbion nudibranchia diidentifikasi secara molekuler menggunakan pendekatan 18S rDNA. Jamur kemudian diko-kultur dengan bakteri *Sinomicrobium* sp. PAP.21 pada media beras padat. Selanjutnya, jamur diekstraksi dengan EtOAc menggunakan metode maserasi dengan *shaking* selama 24 jam. Kandungan kimia ekstrak ko-kultur, kultur tunggal jamur, dan kultur tunggal bakteri diidentifikasi dengan metode KLT, lalu diuji aktivitas antibakterinya terhadap *M. smegmatis* dengan metode difusi cakram.

Hasil Penelitian: Jamur simbion nudibranchia teridentifikasi secara molekuler sebagai *Penicillium citrinum*. Ekstrak EtOAc ko-kultur jamur *P. citrinum* dengan *Sinomicrobium* sp. PAP.21 mengandung senyawa golongan alkaloid, flavonoid, steroid, dan terpenoid. Ekstrak tersebut pada konsentrasi 1% memiliki aktivitas antibakteri terhadap *M. smegmatis* dengan diameter zona hambat 4 mm yang termasuk kategori lemah.

Kesimpulan: Strategi ko-kultur jamur dengan bakteri berhasil menginduksi keragaman metabolit sekunder *P. citrinum* dibandingkan dengan yang dihasilkan oleh jamur tersebut melalui kultur tunggal.

Kata Kunci: Antibakteri, ko-kultur, *Mycobacterium smegmatis*, *Penicillium citrinum*, *Sinomicrobium* sp. PAP.21

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ABSTRACT

ANTIBACTERIAL ACTIVITY OF ETHYL ACETATE EXTRACT FROM THE CO-CULTURE OF NUDIBRANCH SYMBIONT FUNGUS AND *Sinomicrobium* sp. PAP.21 BACTERIUM AGAINST *Mycobacterium smegmatis*

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Background: Microorganisms such as nudibranchs-associated fungi are a source of bioactive compounds with diverse chemical structures and potential as antibacterials. However, gene clusters involved in the biosynthesis of secondary metabolites in microorganisms are often inactive under standard culture conditions, so a co-culture strategy is needed. This study aims to identify nudibranch symbiont fungus, identify the chemical contents of ethyl acetate (EtOAc) extract of the fungus co-culture with *Sinomicrobium* sp. PAP.21 bacterium, and test its antibacterial activity against *Mycobacterium smegmatis*.

Methodology: Pure isolate of nudibranch symbiont fungus was molecularly identified using the 18S rDNA approach. The fungus was then co-cultured with *Sinomicrobium* sp. PAP.21 bacterium on solid rice media. Furthermore, they were extracted with EtOAc using maceration method with shaking for 24 hours. The secondary metabolite contents of the co-culture, single culture of fungus, and single culture of bacterium extract were identified by TLC method, then tested for antibacterial activity against *M. smegmatis* by disc diffusion method.

Results: The nudibranch symbiont fungus was molecularly identified as *Penicillium citrinum*. The EtOAc extract of the fungus co-culture of *P. citrinum* with *Sinomicrobium* sp. PAP.21 contains various secondary metabolites, that are alkaloid, flavonoid, steroid, and terpenoid compounds. The extract at a concentration of 1% has antibacterial activity against *M. smegmatis* with inhibition zone of 4 mm which is included in the weak category.

Conclusion: The fungal-bacterial co-culture strategy successfully induced the diversity of secondary metabolites of *P. citrinum* compared to those produced by the fungus through single culture.

Key Words: Antibacterial, co-culture, *Mycobacterium smegmatis*, *Penicillium citrinum*, *Sinomicrobium* sp. PAP.21

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