ABSTRAK

ANALISIS PROFIL METABOLIT JAMUR *Xylaria* sp. PENYEBAB PENYAKIT BUSUK AKAR DAN PANGKAL BATANG TEBU TERADAPTASI FUNGISIDA PROKLORAZ-Mn MENGGUNAKAN GC-MS

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Xylaria sp. merupakan penyebab penyakit busuk akar dan pangkal batang pada tanaman tebu. Penggunaan fungisida merupakan salah satu pilihan untuk mengendalikan penyebab busuk akar dan pangkal batang. Namun penggunaan fungisida secara intensif berpotensi menimbulkan resistensi sehingga menurunkan efektivitas pengendalian. Perubahan resistensi diduga berkaitan dengan perubahan metabolit sekunder yang dihasilkan jamur. Penelitian ini bertujuan untuk mengidentifikasi dan membandingkan profil metabolit sekunder *Xylaria* sp. isolat parental dan isolat teradaptasi fungisida prokloraz-Mn. Isolat *Xylaria* sp. ditumbuhkan pada media dengan penambahan fungisida prokloraz-Mn berdasar nilai EC_{50}. Media pertumbuhan disaring untuk memisahkan propagul jamur, dan kemudian dianalisis. Analisis metabolit sekunder *Xylaria* sp. dilakukan menggunakan metode *Gas Chromatography–Mass Spectrometry* (GC-MS). Hasil penelitian menunjukan bahwa nilai EC_{50} isolat parental sebesar 2,96 µg/ml dan teradaptasi sebesar 3,28 µg/ml. Analisis GC-MS berhasil didapatkan total 29 metabolit sekunder dari kedua isolat berdasarkan nilai waktu retensi (*retention time*). Sebanyak 7 metabolit sekunder ditemukan pada kedua isolat, sedangkan 18 metabolit sekunder terbentuk pada masing-masing isolat. Metabolit sekunder yang diduga berperan dalam mekanisme adaptasi meliputi senyawa 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, 5-Hydroxymethylfurfural (HMF), Cyclotetrasiloxane, octamethyl-, Furfural, dan Levoglucosenone. Perbedaan profil metabolit sekunder antara kedua isolat mengindikasikan adanya perubahan jalur metabolisme sebagai bentuk adaptasi fisiologi jamur terhadap cekaman fungisida prokloraz-Mn. Senyawa-senyawa yang terbentuk tersebut berpotensi menjadi penanda (marker) mekanisme resistensi jamur *Xylaria* sp. terhadap fungisida .

Kata kunci: GC-MS, profil metabolit, prokloraz-Mn, resistensi fungisida, *Xylaria* sp.

ABSTRACT

METABOLITE PROFILE ANALYSIS OF *Xylaria* sp., THE CAUSAL AGENT OF SUGARCANE ROOT AND BASAL STEM ROT, ADAPTED TO PROCHLORAZ-Mn FUNGICIDE USING GC-MS

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Xylaria sp. is a fungal pathogen causing root and basal stem rot disease in sugarcane. Fungicide application is one of the management options used to control this disease. However, intensive fungicide use may lead to the development of resistance, thereby reducing the effectiveness of disease control. The development of resistance is presumed to be associated with alterations in the secondary metabolites produced by the fungus. This study aimed to identify and compare the secondary metabolite profiles of the parental isolate and the prochloraz-Mn-adapted isolate of *Xylaria* sp. The isolates of *Xylaria* sp. were cultured on growth media supplemented with prochloraz-Mn fungicide based on their EC_{50} values. The culture media were subsequently filtered to separate fungal propagules, and the filtrates were subjected to metabolite analysis. Secondary metabolite profiling of *Xylaria* sp. was performed using Gas Chromatography–Mass Spectrometry (GC-MS). The results showed that the EC_{50} values of the parental and adapted isolates were 2.96 µg mL^{-1} and 3.28 µg mL^{-1}, respectively. GC-MS analysis successfully identified a total of 29 secondary metabolites from both isolates based on their retention times. Seven secondary metabolites were detected in both isolates, whereas 18 metabolites were uniquely produced by each isolate. Secondary metabolites presumed to be involved in the adaptation mechanism included 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, 5-Hydroxymethylfurfural (HMF), Cyclotetrasiloxane, octamethyl-, Furfural, and Levoglucosenone. Differences in the secondary metabolite profiles between the two isolates indicate alterations in metabolic pathways as a physiological adaptation of the fungus to prochloraz-Mn fungicide stress. These metabolites may potentially serve as markers of the resistance mechanism of *Xylaria* sp. to fungicides.

Keywords : Fungicide resistance, GC-MS, metabolite profile, prochloraz-Mn, *Xylaria* sp.