Analisis Perbandingan Profil Ekspresi Gen Ketahanan HbPAL terhadap Penyakit Gugur Daun Pestalotiopsis (PGDP) pada Tanaman Hevea brasiliensis (Willd. Ex A. Juss) Mull. Arg. Klon IRR 112 dan GT 1 = Comparative Analysis of HbPAL Resistance Gene Expression Profiles Against Pestalotiopsis Leaf Fall Disease in Hevea brasiliensis (Willd. Ex A. Juss) Mull. Arg. of IRR 112 and GT 1 clones

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Abstrak

Fenomena penyakit gugur daun Pestalotiopsis (PGDP) pada perkebunan karet yang disebabkan oleh Pestalotiopsis sp. menyebabkan penurunan area tutupan kanopi sebesar 75—90% diikuti penurunan produksi lateks hingga 45%. Patogen tersebut telah menginfeksi 383.000 ha perkebunan karet di Indonesia dan berdasarkan hasil lapangan, tidak teramati klon yang resistan terhadap PGDP. Pengendalian PGDP dengan fungisida memerlukan biaya yang besar sehingga diusulkan perakitan klon resistan untuk mengurangi dampak patogen terhadap produktivitas perkebunan karet. Oleh karena itu, diperlukan studi mengenai gen ketahanan pada tanaman karet. Gen HbPAL (Hevea brasiliensis phenylalanine ammonia lyase) diyakini dapat menjadi kandidat gen yang potensial sebagai kriteria seleksi terhadap ketahanan penyakit. Enzim PAL merupakan prekursor dalam sintesis asam salisilat yang berperan dalam aktivasi systemic acquired resistance (SAR). Penelitian ini bertujuan untuk mengetahui tingkat ekspresi gen HbPAL yang diduga merupakan salah satu gen ketahanan yang berperan dalam respons tanaman terhadap PGDP. Penelitian dilakukan dengan mengukur tingkat ekspresi gen HbPAL pada klon moderat (IRR 112) dan rentan (GT 1) dengan terlebih dahulu mempreparasi sampel daun sehat, perlukaan, dan perlukaan + infeksi. Sampel daun yang sudah dipreparasi diekstraksi RNAnya kemudian disintesis menjadi cDNA untuk selanjutnya dianalisis menggunakan real-time polymerase chain reaction (qPCR). Penelitian ini mengindikasikan adanya perbedaan ekspresi gen HbPAL antara daun sehat, perlukaan dan perlukaan + infeksi Pestalotiopsis sp. Hasil penelitian sesuai dengan hasil pengamatan lapangan yang menunjukkan keunggulan klon moderat IRR112 dibandingkan klon rentan GT 1. Meskipun demikian, diperlukan penelitian lebih lanjut untuk mengkonfirmasi validitas hasil penelitian, hal ini diakibatkan oleh adanya kelemahan dalam proses penelitian sehingga belum dapat disimpulkan adanya korelasi antara infeksi Pestalotiopsis sp. terhadap peningkatan ekspresi gen ketahanan HbPAL.

.....The phenomenon of Pestalotiopsis Leaf Fall Disease (PLFD) in rubber plantations caused by Pestalotiopsis sp. results in a reduction of the canopy coverage by 75—90%, followed by a decline in latex production of up to 45%. This pathogen has infected 383,000 hectares of rubber plantations in Indonesia, and field observations have not identified any clones resistant to PLFD. Controlling PLFD with fungicides involves a large cost, hence the proposal for the assembly of resistant clones to reduce the pathogen's impact on the productivity of rubber plantations. Therefore, studies on resistance genes in rubber plants are needed. The HbPAL gene (Hevea brasiliensis phenylalanine ammonia lyase) is believed to be a potential candidate gene as a selection criterion for disease resistance. The PAL enzyme is a precursor in the synthesis of salicylic acid, which plays a role in the activation of systemic acquired resistance (SAR). This research aims to determine the level of HbPAL gene expression, suspected to be one of the resistance genes that play a

role in the plant's response to PLFD. The research was conducted by measuring the level of HbPAL gene expression in moderate (IRR 112) and susceptible (GT 1) clones by first preparing samples of healthy leaves, wounded leaves, and wounded + infected leaves. The prepared leaf samples were extracted for their RNA, then synthesized into cDNA, and subsequently analyzed using real-time polymerase chain reaction (qPCR). This study indicates a difference in the expression of the HbPAL gene between healthy leaves, wounded leaves, and wounded + infected leaves with Pestalotiopsis sp. The results are consistent with field observations indicating the superiority of the moderate clone IRR112 over the susceptible clone GT 1. However, further research is needed to validate the findings of this research due to gaps in the research method thus it is not possible to determine the correlation between Pestalotiopsis sp. infection and the increase in the expression of the HbPAL resistance gene.