

Analisis Ekspresi Famili Gen Ketahanan Penyakit Hawar Daun Bakteri pada Padi (*Oryza sativa* L.) Hitam Fase Reproduksi

Sutrisno

16/401976/PBI/01425

Intisari

Padi hitam mulai populer dikonsumsi oleh masyarakat sebagai bahan pangan seiring dengan peningkatan kesadaran masyarakat akan pentingnya mengkonsumsi pangan penunjang kesehatan. Namun demikian tanaman padi hitam memiliki suatu faktor pembatas produksinya yaitu penyakit hawar daun bakteri (HDB) yang disebabkan oleh *Xanthomonas oryzae* pv. *oryzae* (*Xoo*). Pengembangan kultivar tahan memerlukan informasi mengenai ekspresi gen ketahanan yang diantaranya adalah gen *xa5*, *Xa10*, *Xa21*, dan *RPP13-like*. Tujuan penelitian ini adalah untuk menganalisis ekspresi gen ketahanan yaitu *xa5*, *Xa10*, *Xa21*, dan *RPP13-like* pada padi hitam kultivar Cempo ireng fase reproduktif. Penelitian ini menggunakan padi hitam kultivar Cempo ireng sebagai tanaman perlakuan dan padi putih kultivar IR64 dan Java14 sebagai tanaman kontrol. Metode penelitian ini meliputi penanaman padi, inokulasi *Xoo*, uji ketahanan HDB, pengambilan sampel, isolasi RNA total, kuantifikasi konsentrasi dan kemurnian RNA, sintesis cDNA, uji kualitas cDNA, *quantitative Realtime PCR*, dan sekuensing DNA. Hasil penelitian menunjukkan kultivar padi hitam Cempo Ireng mempunyai tingkat ketahanan yang paling baik dibandingkan kultivar yang lain, yaitu dengan nilai intensitas penyakit (IP) 15,93% dan nilai AUDPC sebesar 85,55. Berdasarkan uji ANOVA dan uji Duncan, nilai IP dan AUDPC pada semua perlakuan dan interaksi antara kultivar dan minggu pengamatan mempunyai perbedaan yang nyata pada setiap kultivar padi. Kultivar padi hitam Cempo ireng menunjukkan fenotipe tahan terhadap penyakit HDB dan dapat mengekspresikan gen ketahanan *xa5*, *Xa10*, *Xa21*, dan *RPP13-like*. Ekspresi gen *xa5*, *Xa10*, dan *Xa21* bersifat *up-regulated* sedangkan ekspresi gen *RPP13-like* bersifat *down-regulated* setelah inokulasi *Xoo*. Hasil sekuensing mengkonfirmasi bahwa empat gen *R* yang dianalisis adalah *xa5*, *Xa10*, *Xa21*, dan *RPP13-like*.

Kata kunci : Ekspresi gen, gen ketahanan, penyakit hawar daun bakteri, *Xanthomonas oryzae* pv. *oryzae*, padi hitam.

Expression Analysis of Resistance Gene Family against Bacterial Leaf Blight in Reproductive Stage Black Rice (*Oryza sativa* L.)

Sutrisno

16/401976/PBI/01425

Abstract

Black rice started to be consumed by society due to the increase of public awareness of the healthy food consumption. However, black rice plants have a production limiting factor namely bacterial leaf blight disease (BLB) caused by *Xanthomonas oryzae* pv. *oryzae* (*Xoo*). The use of BLB resistant cultivars is considered effective in controlling the disease. The development of resistant cultivars requires information on resistance gene expression including *xa5*, *Xa10*, *Xa21*, and *RPP13-like* genes. The purpose of this study was to analyze the expression of resistance genes, included *xa5*, *Xa10*, *Xa21*, and *RPP13-like* in black rice of Cempo ireng cultivar at reproductive stage. This study used black rice of Cempo ireng cultivar as treatment plant and white rice of IR64 and Java14 cultivars as the control plants. Methods of this research included rice cultivation, *Xoo* inoculation, BLB phenotypic assay, leaf sampling, total RNA isolation, quantification of RNA, cDNA synthesis, cDNA quality test, quantitative Realtime PCR, and DNA sequencing. The results showed that Cempo ireng cultivar had the best phenotype of BLB resistance compared to the other cultivars with disease intensity and AUDPC value were 15.93% and 85.55 respectively. Based on the ANOVA and Duncan test, the disease intensity and AUDPC value had significant differences in each cultivar. Cempo ireng expressed *xa5*, *Xa10*, *Xa21*, and *RPP13-like* genes. The gene expression of *xa5*, *Xa10*, and *Xa21* was up-regulated whereas *RPP13-like* gene expression was down-regulated after *Xoo* inoculation. The sequencing results confirmed that the four analyzed resistance genes were *xa5*, *Xa10*, *Xa21*, and *RPP13-like*.

Keywords: Gene expression, resistance gene, bacterial leaf blight disease, *Xanthomonas oryzae* pv. *oryzae*, black rice.