

INTISARI

Padi hitam Cempo Ireng dilaporkan berpotensi toleran terhadap cekaman salinitas berdasarkan respon gen antioksidan. Hasil skrining awal menunjukkan bahwa Cempo Ireng Pendek paling toleran terhadap cekaman salinitas. Penelitian ini bertujuan untuk mengetahui tingkat toleransi salinitas dan mekanisme toleransi yang terjadi pada padi hitam CI Pendek berdasarkan level ekspresi gen transporter dan metabolit *compatible solute*. Analisis ekspresi gen transporter (*OsSOS1*, *OsNHX1*, *OsHKT1*) dilakukan dengan metode *two step* RT-PCR, pengukuran konsentrasi ion (Na^+ , K^+) menggunakan AAS, dan analisis metabolit menggunakan $^1\text{H-NMR}$. Hasil skoring SES dan pengukuran nilai RWC dan berat kering tanaman padi hitam CI Pendek tidak berbeda nyata dengan padi toleran Pokkali. Gen *OsSOS1* terekspresi paling tinggi di akar padi hitam CI Pendek dan di daun padi toleran Pokkali. Level ekspresi gen *OsNHX1* tidak berbeda nyata di bagian akar, tetapi di daun terekspresi paling tinggi pada padi Pokkali. Gen *OsHKT1* terekspresi paling tinggi pada padi rentan IR64 baik di akar maupun di daun. Konsentrasi ion Na^+ meningkat akibat cekaman salinitas, kecuali pada padi hitam CI Pendek. Konsentrasi ion K^+ meningkat pada akar padi hitam CI Pendek dan IR64, tetapi menurun pada daun. Metabolit *compatible solute* *valine*, *proline*, *GABA*, *raffinose* meningkat lebih tinggi pada padi hitam CI Pendek, sedangkan *leucine*, *glutamine*, *tyrosine*, *ferulic acid*, *p-hydroxybenzoic acid*, *uridine*, dan *adenosine* meningkat lebih tinggi pada padi Pokkali. Penelitian ini menunjukkan bahwa padi hitam CI Pendek memiliki tingkat toleransi salinitas yang sama dengan padi Pokkali tetapi memiliki mekanisme toleransi yang berbeda. Toleransi salinitas pada padi hitam CI Pendek dengan mekanisme eksklusi ion di bagian akar dan meningkatkan senyawa *metabolit compatible solute* di bagian daun. Mekanisme toleransi pada padi Pokkali dengan meningkatkan sekuestrasi ion Na^+ dan meningkatkan senyawa *metabolit compatible solute* di bagian daun.

Kata kunci: padi hitam Cempo Ireng Pendek, toleransi salinitas, ekspresi gen transporter, konsentrasi ion, metabolit *compatible solute*.

ABSTRACT

Black rice cv. Cempo Ireng was reported potentially tolerant to salinity stress based on the responded of antioxidant genes. The result of initial screening showed that Cempo Ireng Pendek is the most tolerant of salinity stress. This study were to determined the salinity tolerance and tolerance mechanism on the CI Pendek based on the transporter gene expression level and compatible solute metabolites. Analysis of transporter genes expression (OsSOS1, OsNHX1, OsHKT1) was carried out by the two-step RT-PCR method, measurement of ion concentrations (Na^+ , K^+) using AAS, and metabolite analysis using ^1H -NMR. The results of SES scoring, measurement of RWC and the dry weight of black rice CI Pendek were not significantly different from Pokkali. OsSOS1 gene expression levels in root was highest in black rice CI Pendek. OsSOS1 gene expression levels in leaves was highest in Pokkali. The level of OsNHX1 gene expression was not significantly different in the roots, but in the leaves was highest expressed on Pokkali. The level of OsHKT1 gene expression was highest in IR64 both in roots and leaves. Na^+ ions concentration increased due to salinity stress, except in CI Pendek. K^+ ions concentration increased in the roots of CI Pendek and IR64, but decreased in the leaves. Compatible solute metabolites like valine, proline, GABA, raffinose increased higher in CI Pendek, whereas leucine, glutamine, tyrosine, ferulic acid, p-hydroxybenzoic acid, uridine, and adenosine increased higher in Pokkali. This study showed that CI Pendek had the same level of salinity tolerance as Pokkali rice but they had a different tolerance mechanism. Black rice CI Pendek performed ion exclusion mechanism in the roots and increasing the metabolites of compatible solutes in the leaves as respond to salinity stress. The tolerance mechanism in Pokkali rice by increased the sequestration of Na^+ ions and compatible solute metabolites in the leaves.

Key words: *black rice Cempo Ireng Pendek, salinity tolerance, transporter genes expression, concentration of Na^+ and K^+ ions, compatible solute metabolites.*