Analisis Ekspresi Gen OsDREB2A dan Keragaan Empat Varietas Padi dengan Perlakuan Cekaman Kekeringan = Analysis of OsDREB2A Gene Expression and Performance of Four Rice Varieties under Drought Stress

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Abstrak

Padi yang dapat dibudidayakan di lahan kering diperlukan untuk meningkatkan ketahanan pangan. Analisis morfologis dan molekuler merupakan salah satu cara untuk mengetahui toleransi tanaman terhadap kekeringan. Penelitian ini bertujuan menentukan varietas padi yang tahan kekeringan melalui analisis morfologis serta molekuler. Sampel yang digunakan terdiri dari INPARI 32, INPARI 42, Pare Bakato Kaka, dan Pare Lambem yang ditumbuhkan pada dua perlakuan yaitu kontrol dan kekeringan (germinasi pada PEG 6000 20% dan modifikasi penyiraman). Hasil penelitian menunjukkan bahwa persentase perkecambahan, bobot radikula, dan rata-rata jumlah daun (35 HST) pada tiap varietas tergolong toleran, sementara itu untuk skor kelengkungan daun diketahui bahwa Pare Lambem menunjukkan kondisi daun yang tergolong agak peka (skor 5), sedangkan tiga varietas lain tergolong kategori toleran (skor 1). Data tinggi tanaman serta panjang daun pada 7 HST dan 35 HST menunjukkan pola hasil yang sama, yakni Pare Lambem berbeda signifikan pada perlakuan kontrol dan kekeringan berdasarkan uji t (kategori peka), sementara varietas lain termasuk kategori toleran. Berdasarkan tujuh parameter uji, diperoleh kategori toleransi total. Pare Lambem tergolong kategori agak toleran (42,8%), sedangkan varietas lain tergolong kategori toleran (85,7%). Hasil analisis molekuler menunjukkan bahwa fragmen OsDREB2A terdapat pada varietas uji serta memiliki homologi 100% dengan sekuens DREB2A dari kultivar Pokkali. Mutasi sekuens tidak ditemukan pada urutan nukleotida maupun asam amino dari sampel varietas uji terhadap spesies pembanding. Struktur protein pada sampel uji menunjukkan kemiripan dengan model protein dari kultivar Pokkali. Varietas Jawa (peka) menunjukkan perbedaan sekuens nukleotida, asam amino, dan struktur protein terhadap kultivar Pokkali dan sampel uji.

.....Rice that can be grown in dry land is needed to increase food security. Morphological and molecular analysis are mechanisms to determine the drought tolerance level of plants. This study aims to determine drought-resistant rice varieties through morphological and molecular analysis. The samples used consisted of INPARI 32, INPARI 42, Pare Bakato Kaka, and Pare Lambem grown in two treatments (control and drought treatment (PEG 6000 20% and water modification)). The results showed that the percentage of germination, radicle weight, and the average number of leaves (35 DAP) in each variety belonged to the tolerant category, while for the leaf curvature scores, it was known that Pare Lambem showed a leaf condition that was classified as sensitive category (score 5), while the other three varieties belonged to the tolerant category (score 1). Data on plant height and leaf length at 7 DAP and 35 DAP showed the same yield pattern, namely Pare Lambem was significantly different in the control and drought treatment samples based on the t-test (sensitive category), while other varieties were in the tolerant category. Based on the seven test parameters, the total tolerance category was obtained. Pare Lambem was classified into the slightly tolerant category (42.8%), while other varieties were classified as tolerant (85.7%). The molecular analysis results showed the presence of OsDREB2A in all tested varieties also had 100% homology with

DREB2A sequences from the Pokkali. Sequence mutations were not found in the nucleotide or amino acid sequences of the tested samples against the comparison species. The protein structures of the tested samples showed similarities to the protein model of the Pokkali cultivar. The Java variety (sensitive) showed differences in nucleotide sequences, amino acids, and protein structure against Pokkali and tested samples.