

RESPONS FISIOLOGIS DAN ANATOMIS AKAR TANAMAN PADI (*Oryza sativa* L. 'INPARI 35') TERHADAP CEKAMAN SALINITAS DAN APLIKASI PUPUK SILIKAT

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INTISARI

Padi merupakan komoditas tanaman pangan penghasil beras yang menjadi makanan pokok di Indonesia. Perluasan areal tanam untuk meningkatkan produksi dapat dilakukan dengan memanfaatkan lahan-lahan marginal, salah satunya adalah lahan salin dan menggunakan media hidroponik. Selain itu, dibutuhkan kultivar padi yang toleran salah satunya adalah padi kultivar 'Inpari 35'. Penelitian ini bertujuan untuk mempelajari respons pertumbuhan, fisiologis, dan anatomis tanaman padi kultivar 'Inpari 35' terhadap aplikasi pupuk silikat dalam kondisi cekaman salinitas. Penelitian dilaksanakan pada bulan Desember 2020 hingga Maret 2021 di Laboratorium Fisiologi Tumbuhan, Fakultas Biologi, Universitas Gadjah Mada. Penelitian ini menggunakan Rancangan Acak Lengkap (RAL) dengan dua faktor. Faktor pertama adalah perbedaan konsentrasi garam NaCl terdiri dari N0: 0 mM; N1: 37,5 mM; N2 : 50 mM. Sedangkan faktor kedua adalah perbedaan konsentrasi pupuk silikat (CaSiO_3) terdiri dari S0 : 0 mM; S1: 1 mM dan S2 : 2 mM. Masing-masing kombinasi perlakuan dengan 3 ulangan. Perlakuan diberikan selama 21 hari setelah aklimatisasi selama 14 hari. Data pengamatan dianalisis dengan analisis varian dan *Duncan's multiple range test* pada tingkat kepercayaan 95%. Hasil penelitian menunjukkan bahwa perlakuan NaCl secara signifikan ($p \leq 0.05$) menghambat pertumbuhan padi kultivar 'Inpari 35' yang diindikasikan dengan penurunan jumlah daun, tinggi tanaman, berat basah dan berat kering akar dan tajuk. Perlakuan NaCl menyebabkan penurunan kadar klorofil, karotenoid, nilai ISM (Indeks Stabilitas Membran) dan nilai KAR (Kandungan Air Relatif). Interaksi antara perlakuan NaCl dan pemberian CaSiO_3 , menunjukkan hasil beda nyata pada parameter fisiologis dengan meningkatkan kadar klorofil, kadar karotenoid, nilai ISM, nilai KAR, dan kadar prolin. Aplikasi kalsium silikat pada perlakuan NaCl, mampu memperbaiki karakter anatomi akar padi kultivar 'Inpari 35' dengan meningkatkan tebal sel eksodermis, tebal jaringan korteks, diameter stele dan diameter akar.

Kata kunci: 'Inpari 35', salinitas, NaCl, CaSiO_3 , hidroponik

PHYSIOLOGICAL AND ANATOMICAL ROOT RESPONSE OF RICE PLANT (*Oryza sativa* L. 'INPARI 35') UNDER SALINITY STRESS AND APPLICATION OF SILICATE FERTILIZER

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ABSTRACT

Rice is a food crop commodity that produces rice which is a staple food in Indonesia. The expansion of planting areas to increase production can be done by utilizing marginal lands, one of which is saline land. In addition, it takes tolerant rice cultivars, one of which is rice cultivar 'Inpari 35'. This study aims to study the growth response, physiological response and anatomical response of 'Inpari 35' cultivar rice plants to the application of silicate fertilizer under salinity stress conditions. The research will be conducted from July to November 2020 at the Plant Physiology Laboratory, Faculty of Biology, Gadjah Mada University. This study uses a completely randomized design (CRD) with two factors. The first factor is the difference in NaCl salt concentration consisting of N0: 0 mM; N1: 37,5 mM; N2: 50 mM. While the second factor is the difference in the concentration of silicate fertilizer (CaSiO_3) consisting of S0: 0 mM; S1: 1 mM and S2: 2 mM. Each treatment combination was done with 3 replications. The treatment was given for 21 days after acclimatization for 14 days. Observation data were analyzed by analysis of variance and Duncan's multiple range test at the 95% confidence level. The results showed that NaCl treatment significantly ($p \leq 0.05$) inhibited the growth of rice cultivar 'Inpari 35' which was indicated by a decrease in the number of leaves, plant height, fresh weight and dry weight of roots and shoots. The NaCl treatment caused a decrease in the levels of chlorophyll, carotenoids, MSI (Membrane Stability Index) values and RWC (Relative Water Content) values. The interaction between NaCl treatment and CaSiO_3 showed significant differences in physiological parameters by increasing chlorophyll levels, carotenoid levels, MSI values, RWC values, and proline levels. Application of calcium silicate to NaCl treatment, was able to improve the anatomical character of rice cultivar 'Inpari 35' roots by increasing the exodermal thickness, cortex thickness, stele diameter and root diameter.

Key word: 'Inpari 35', salinity, NaCl, CaSiO_3 , hydroponic