

EFEK ASAM SALISILAT TERHADAP PERTUMBUHAN DAN KETAHANAN OKSIDATIF *Oryza sativa* L. 'Cempo Ireng' PADA CEKAMAN SALINITAS

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INTISARI

Tanah salin merupakan salah satu permasalahan lingkungan yang sering terjadi pada dunia pertanian. Salinitas tinggi akan menyebabkan toksisitas ion yang berdampak terhadap produktivitas padi. Asam salisilat merupakan hormon tanaman yang berperan sebagai molekul pensinyalan dalam memperbaiki efek cekaman abiotik. Penelitian ini bertujuan untuk mengkaji respon pertumbuhan, fisiologis, anatomi akar dan tingkat cekaman serta pertahanan oksidatif tanaman padi hitam (*Oryza sativa* L.) 'Cempo Ireng' terhadap cekaman salinitas dengan aplikasi asam salisilat. Pada penelitian ini digunakan Rancangan Acak Lengkap faktorial 4x4, yaitu asam salisilat (0, 0,5, 1 dan 1,5 mM) dan salinitas (NaCl 0, 50, 100 dan 150 mM). Setiap kombinasi perlakuan dengan 3 ulangan. Biji padi disemai dalam tatakan berisi media tanah selama 21 hari, selanjutnya dipindahkan ke dalam pot plastik yang berisi media tanah : kompos (3:1). Asam salisilat diaplikasikan pada daun saat tanaman berumur 25, 50, 75 dan 90 HST, sedangkan NaCl diberikan saat tanaman berumur 30 HST sampai masa panen. Aplikasi NaCl didasarkan pada salinitas tanah yang diukur dengan *electric conductivity*. Parameter yang diamati yaitu pertumbuhan (tinggi batang, jumlah malai, jumlah anakan, luas daun bendera, panjang akar, bobot basah, bobot kering akar dan tajuk), anatomi akar (tebal epidermis, tebal korteks, diameter stele dan diameter akar), klorofil total, karotenoid, laju fotosintesis, konduktansi stomata, laju transpirasi, indeks stabilitas membran, proline, H₂O₂, peroksidasi lipid/MDA, katalase dan askorbat peroksidase. Data dianalisis menggunakan *Univariate* dan *Analysis of Variance* kemudian dilanjutkan dengan *Duncan's Multiple Range Test* pada taraf kepercayaan 95%, serta dilakukan analisis korelasi *Pearson*. Hasil penelitian menunjukkan bahwa aplikasi NaCl menurunkan klorofil total, konduktansi stomata, laju transpirasi, laju fotosintesis, indeks stabilitas membran dan menyebabkan kerusakan serta perubahan epidermis dan penebalan sel-sel korteks pada akar. Salinitas turut menyebabkan cekaman oksidatif yang ditunjukkan dengan tingginya kadar peroksidasi lipid (*malondialdehyde*/ MDA) dan H₂O₂. Aplikasi asam salisilat 1 mM mampu menurunkan efek dari cekaman salinitas dengan meningkatkan aktivitas antioksidan enzimatis (katalase dan askorbat peroksidase) dan meningkatkan karakter anatomis akar. Aplikasi asam salisilat 1 mM mampu meningkatkan kandungan klorofil total, laju fotosintesis, konduktansi stomata, indeks stabilitas membran dan laju transpirasi yang berkorelasi positif terhadap pertumbuhan (jumlah anakan, malai, luas daun bendera, panjang akar, bobot basah dan kering tajuk) tanaman padi hitam 'Cempo Ireng' pada kondisi cekaman salinitas.

Kata kunci: padi hitam, salinitas, NaCl, asam salisilat, cekaman oksidatif

EFFECT OF SALICYLIC ACID ON GROWTH AND OXIDATIVE DEFENSE RESPONSE OF *Oryza sativa* L. 'Cempo Ireng' ON SALINITY STRESS

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ABSTRACT

Salinity is one of the most common environmental problems in the agriculture sector. High soil salinity will cause ion toxicity which leads to decreasing in rice productivity. Salicylic acid is a plant hormone which is known to acts as signaling molecules to ameliorate effects of abiotic stress. The aim of this research was to evaluate growth, physiological response, the level of stress and oxidative defense of Black Rice (*Oryza sativa* L. 'Cempo Ireng') grown under salinity condition with application of salicylic acid. This study used a completely randomized design with 4x4 factorials. The first factor was salicylic acid (0, 0,5, 1 and 1,5 mM) and the second factor was soil salinity (NaCl 0, 50, 100 and 150 mM). Each treatment combination has 3 replications. The seeds were sown in plastic tray containing soil for 21 days, and then transferred to plastic pot containing soil: compost (3:1). Salicylic acid was applied to the leaves (foliar application) at 25, 50, 75 and 90 days after planting, while NaCl was applied at 30 days after planting until harvest. The application of NaCl is based on the content of soil salinity measured by electric conductivity. Observed parameters were growth characteristic (plant high, numbers of tillers, number of panicles, flag leaves area, root length, fresh weight & dry weight of canopy and root), anatomy (epidermal thickness, cortex thickness, stele diameter and root diameter), total chlorophyll, carotenoid, photosynthetic rate, stomatal conductance, transpiration rate, index stability membrane, proline, H₂O₂, lipid peroxidase/MDA, catalase and ascorbate peroxidase. Data were analyzed by Univariate and Analysis of Variance followed by Duncan's Multiple Range Test at 95% significant level, and tested with Pearson Correlation. The result showed that salinity stress decreased total chlorophyll, stomata conductance, transpiration rate, photosynthesis rate, membrane stability index, causing damage and changes the root epidermis and thickening of cortex cells. Salinity also contributes to oxidative stress. That is indicated by high levels of lipid peroxidation (malondialdehyde/MDA), and H₂O₂ levels. Application of 1 mM salicylic acid provides tend to ameliorate effect of salinity stress by increasing enzymatic antioxidant activity (catalase and ascorbat peroxidase) and root anatomy characteristic. Application of 1 mM salicylic acid provides tend to increase total chlorophyll, photosynthesis rate, stomatal conductance, membrane stability index and transpiration rate which determine growth characteristic (number of tillers, panicles, flag leaf area, wet and dry weight) grown under salinity stress.

Key words: Black rice, Salinity, NaCl, salicylic acid, oxidative stress.