

UNIVERSITI TEKNOLOGI MARA

**GROWTH AND PHYSIOLOGICAL
PERFORMANCE OF AEROBIC AND
LOWLAND RICE GROWN UNDER
VARIOUS WATER REGIMES**

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ABSTRACT

Rice is the heavy user of water and sensitive to moisture stress. Therefore, water scarcity can be a major factor that can threaten the rice productivity especially under irrigated production system. Thus, aerobic rice was developed to ensure the sustainability of rice production under water scarce environment. Aerobic rice technology is still new in Malaysia, and the information on performance of first local aerobic rice variety MARDI Aerob 1 under various environmental conditions are still lacking. A field study was carried out to compare the performance of MARDI Aerob 1 with MR 253, the lowland variety under water stress at selected growth stages. The experiment consisted of four treatments and three replications arranged in randomized complete block design. The treatments were; (T1): No water stress-control (T1), water stress at selected stages; panicle initiation (T2), flowering (T3) and ripening (T4). Water stress periods in T2, T3 and T4 were terminated and rewatering was resumed when plants showing symptoms of water deficit such as leaf wilting and rolling. Water stress at the panicle initiation stage greatly affected growth, phenological development, panicle nutrient content, biomass production and assimilate partitioning of certain plant parts, yield and yield components in both varieties. The stomatal conductance (g_s) and leaf relative water content (leaf RWC) for both varieties reduced with depletion of soil moisture content (SMC) in all treatments. Other parameters such as chlorophyll a fluorescence (F_v/F_m), maximum root length, specific leaf weight of top three leaves, nutrient concentrations and contents of selected parts were not severely affected by water stress. Water stress at flowering and ripening stages were less pronounced as compared to the effects at the panicle initiation stage. This is reflected in maximum root length, biomass production and partitioning of certain plant parts, specific leaf weight, nutrient concentrations and contents which could be due to efficient recovery after rewatering. The reduction in g_s with depletion of SMC in both varieties might be due to reduction in photosynthesis and transpiration rates that lead to yield reduction. Panicle initiation stage was the most sensitive period to water stress for both varieties. In general, the MR 253, the lowland flooding variety seemingly performed better and well adapted to aerobic condition with better tolerant to water stress condition than MAI the aerobic variety.

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