

Physiological and Growth Responses of Five Rice (*Oryza sativa* L.) Cultivars to Soil Moisture Stress

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Abstract

Scarcity of water for irrigation is an alarming issue limiting crop production worldwide and it is increasing severely in Sri Lanka. The rice yield is highly susceptible to moisture stress especially during the 'Yala' Season. This study therefore was made to evaluate moisture stress tolerance of selected rice cultivars viz; 'Bg300', 'Bg357', 'Bg366', 'Bw367' and 'Bg370'. Randomized complete block design with ten treatments and four replications were used in this study. The treatments were arranged in 5×2 factor factorial manner. Moisture stress was imposed for the selected rice cultivars for a period of fourteen days during the panicle initiation stage. The control plants were watered once in two days. Moisture stress significantly ($p < 0.05$) reduced the Relative Water Content (RWC) of all the tested rice cultivars. The highest RWC (59.2%) was observed in 'Bg370' rice cultivar and the lowest (48.2%) was found in 'Bw 367' under moisture stress condition. Moisture stress significantly ($p < 0.05$) reduced Chlorophylls a, b and total Chlorophyll contents of the tested rice cultivars. The highest amounts of Chlorophylls a (9.1 mgg^{-1}), b (9.8 mgg^{-1}) and total Chlorophyll (13.3 mgg^{-1}) were observed in 'Bg370' rice cultivar and the lowest amounts (Chlorophylls a- 4.5 mgg^{-1} , b- 4.5 mgg^{-1} and total Chlorophyll- 6.3 mgg^{-1}) were recorded in 'Bw367'. Moisture stress significantly ($p < 0.05$) reduced the Leaf Area Index (LAI) of all the tested rice cultivars. The highest LAI (0.9) was observed in 'Bg370' and the lowest was found in 'Bw367' under moisture stress. Moisture stress significantly ($p < 0.05$) reduced the yield of all the tested rice cultivars. The highest yield ($2.1 \text{ tonnesha}^{-1}$) was observed in 'Bg370' rice cultivar and the lowest ($0.5 \text{ tonnesha}^{-1}$) was found in 'Bw367' under moisture stress. Hence, Cultivar 'Bg370' exhibited comparatively more tolerance to moisture stress with less reduction in various physiological and growth attributes and could be suggested for cultivation in the drought prone areas of the Batticaloa district.

Keywords: Leaf Area Index (LAI), Moisture stress, Panicle initiation, Relative Water Content (RWC), Yield

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