

**PHYSIOLOGICAL AND GROWTH RESPONSES OF
FIVE RICE (*Oryza sativa* L.) CULTIVARS TO
SOIL MOISTURE STRESS**



By

RAMAN DHARSHIKA



FAG607



Library.
Eastern University, Sri Lanka

**DEPARTMENT OF AGRICULTURAL BIOLOGY
FACULTY OF AGRICULTURE
EASTERN UNIVERSITY
SRI LANKA**

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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. Rice production in the Batticaloa district is thus being adversely hampered by the shortage of water. 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; 'Bg 300', 'Bg 357', 'Bg 366', 'Bw 367' and 'Bg 370' and to determine the one which can produce substantial yield when moisture stress was imposed during the panicle initiation stage. This experiment was conducted at the Agronomy farm of the Eastern University, Sri Lanka and was laid out in the Randomized Complete Block Design with ten treatments and four replications and 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.

There were significant ($p < 0.05$) differences between treatments in the measured physiological and growth attributes. 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 'Bg 370' 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 'Bg 370' 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 'Bw 367' rice cultivar.

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 condition. 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 condition. Moisture stress significantly ($p < 0.05$) reduced the 1000 grain weight of all the tested rice cultivars. The highest 1000 grain weight (19.1g) was obtained in 'Bg370' and the lowest (10.1g) was found in 'Bw367' under moisture stress condition.

There were also significant ($p < 0.05$) interactions between cultivars and moisture stress treatments in the RWC, 'Chlorophyll a', total Chlorophyll, plant shoot length, 1000 grain weight and yield of the tested cultivars. However, no significant ($p > 0.05$) interaction was observed in the plant dry weight and 'Chlorophyll b' content.

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.

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