

EVALUATING THE IMPACT OF DROUGHT STRESS ON GROWTH RESPONSES IN RICE

(Oryza sativa L.)



By

A.G.H. Prabhashwaree



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Main Library, Eastern University, Sri Lanka

Department of Biosystem Technology

Faculty of Technology

Eastern university, Sri Lanka

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ABSTRACT

Sri Lanka possesses over 2,000 traditional rice (*Oryza sativa* L.) varieties, many of which exhibit natural resilience to environmental stresses. The study aimed to identify drought-resistant accessions for future breeding and molecular analysis. A total of fourteen rice varieties, including improved high-yielding varieties (Ld 376, Bg 377, At 378, Bg 381 Bg 251, Bg 314, Bg 252), and Sri Lankan traditional varieties (*Niyan wee* [Ac 1370], *Dahanala* [Ac 627], *Suwandal* [Ac 579], *Kirimurunga* [Ac 340], *Masuran* [Ac 776], *Kahata samba* [Ac 327], and *Suduru samba* [Ac 903]), were evaluated under moderate drought stress conditions. The experiment used a completely randomized design (CRD) with five replicates per variety. Drought stress was applied at three growth stages by reducing water to 50% of field capacity. Morphological traits, leaf rolling, and leaf drying were assessed using a drought tolerance scoring system. Data analysis in Minitab 17 measured the relative increase (%) of all parameters before and after stress.

At the reproductive stage, plant height ($p = 0.020$), leaf length ($p = 0.001$), and the number of leaves ($p = 0.033$) showed significant variation, while the number of tillers ($p = 0.622$) was not significantly different. The tallest plant was *Kirimurunga* (101.4 ± 3.09 cm), and the shortest was Ld 376 (65.6 ± 2.85 cm). *Kirimurunga* had the longest leaf length (60.8 ± 4.32 cm), while accession Bg 251 had the shortest (22.6 ± 1.88 cm). The highest number of leaves was observed in Bg 252 (16.4 ± 2.06), whereas *Suduru samba* had the lowest (7.2 ± 1.35). The Bg 252 also had the highest number of tillers (5.6 ± 0.81), while *Suduru samba* recorded the lowest (2.3 ± 0.67). According to the drought tolerance scoring system, the highly drought-tolerant varieties identified at the reproductive stage were Bg 381, Suwadel, *Kirimurunga*, and *Masuran*. Additionally, we identified Bg 252 and Bg 381 as drought-tolerant at the seedling stage, and Bg 251, Ld 376, At 378, and *Dahanala* at the reproductive stage. At grain filling stage *Kirimurunga*, *Masuran*, Bg 252, and At 378 showed increased leaf number, panicle traits, and spikelet count, indicating drought tolerance. These results aid drought-tolerant rice breeding and suggest key accessions for molecular studies to reveal genetic traits, supporting marker-assisted selection and genetic engineering.

Key words: Breeding selection, Drought stress, Rice (*Oryza sativa* L.), Traditional rice varieties.

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