

MITIGATING DROUGHT IMPACT THROUGH HYDROGEL APPLICATION: A SUSTAINABLE WATER MANAGEMENT STRATEGY FOR PADDY CULTIVATION IN SRI LANKA

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Flash droughts due to changes in precipitation under changing climate have become a major threat to the rice production and food security of Sri Lanka. Application of hydrogel alongside field establishment rice crop is one approach to cope with flash droughts, which is yet to be effectively employed for rice crop in Sri Lanka. A study was conducted to investigate the effectiveness of using hydrogel as a sustainable water management solution for rice crop cultivation. A three-factor factorial experiment was conducted in a completely randomized design in glasshouse conditions from December 2023 to February 2024. Early growth and development of two ultra-short-age rice varieties, Bg250 (drought escape) and Bg251 (drought tolerant) were studied under simulated drought conditions to assess the impact of hydrogel in mitigating the impact of drought. Drought was induced by restricting irrigation at 2, 4, and 6 weeks after planting (WAP) and compared with a well-watered control. Growth and development of rice crops were measured for seven WAP using plant height, number of leaves, leaf area, shoot dry weight, relative chlorophyll content, root dry weight, and root partitioning to different soil depths. Variety Bg250 illustrated superior root characters, and a higher leaf number compared to Bg251, and the other growth attributes were similar among varieties. All growth parameters of hydrogel-applied treatments were similar compared to well-watered conditions for both varieties. The root dry weight and root partitioning were quantitatively similar between drought-simulated conditions and well-watered conditions, illustrating the potential of hydrogel treatments to mitigate the impact of drought even under severe water shortages. This study demonstrated the possibility of using hydrogel as a drought and water-saving mechanism for rice crops. The outcome emphasizes the potential of using hydrogel in field applications.

Keywords: Drought simulation, Restricted irrigation, Root dry weight, Root partitioning