

Response of Different Rice Varieties to Water Stress under Different Nutrient Regimes

Rupasinghe W.H.S.V., Beneragama C.K., Suriyagoda B.M.L.D.B. and De Costa W.A.J.M.*

Department of Crop Science,
Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka

Nitrogen (N) is an essential but limiting plant nutrient. Optimal N supply with crop demand is a crucial factor. Water availability affected by climate change threatens rice production. Rice plant's ability to withstand drought by maintaining optimum functioning is a combined effect of drought tolerance at its growth stages. Recent policy changes and economic crisis has led farmers to limit N fertilizer. The objective of this study was to determine whether susceptibility to drought is greater when rice is grown under sub-optimal nitrogen. The experiment was employed at the plant house of the Department of Crop Science, Faculty of Agriculture, University of Peradeniya. The treatment structure was a three-factor factorial (two varieties \times three water regimes \times two N regimes) in a randomized complete block design. Three water regimes were well-watered, water-stressed at vegetative and reproductive stages. A standard variety (Bg250) and a drought-tolerant variety (Bg251) were used. Drought reduced grain yield at both 100%N and 50%N in both varieties, with stress at reproductive stage causing a greater reduction (29-66%) than at vegetative stage (15-45%). Yield reductions were lower at 50%N (17-38%) than at 100% (15-66%) and in the tolerant variety (15-46%) than in the standard variety (29-66%). Yield following vegetative stage drought was greater at 100%N than at 50%N. Yield following reproductive stage drought was greater (Bg250) at 50%N than at 100%N or similar (Bg251). After water stress at vegetative stage, nitrogen use efficiency (NUE), defined as the amount of biomass per unit N uptake, was greater under water stress than under well-watered conditions, at 50%N than at 100%N and in Bg251 than in Bg250. After water stress at reproductive stage, NUE did not differ between water or N regimes or varieties. It is concluded that susceptibility to drought in rice is greater at 100%N than at 50%N.

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*janendramg@agri.pdn.ac.lk