(Shared with others inside and outside the specialization – Published in national Journal).

High Nitrogen Fertilization Modulates Morpho-Physiological Responses, Yield, and Water Productivity of Lowland Rice under Deficit Irrigation.

Agronomy. vol. 11, no. 1291, pp. 1-15 (2021).https://doi.org/10.3390/agronomy11071291.

Nasr M. Abdou[1], Mohamed A. Abdel-Razek[1], Shimaa A. Abd El-Mageed[2], Wael M. Semida[3], Ahmed A. A. Leilah[4], Taia A. Abd El-Mageed[1] , Esmat F. Ali[5] , Ali Majrashi [5] ,Mohamed O. A. Rady[2]

[1]Soil and Water Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt;
[2] Agronomy Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt;
[3] Horticulture Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt;
[4] Agronomy Department, Faculty of Agriculture, Mansoura University, Mansoura 35516, Egypt;
[5] Department of Biology, College of Science, Taif University, P.O. Box 11099, Taif 21944, Saudi Arabia;

Article status	Shared with others inside and outside the specialization – Published in International Journal	Impact Factor:**3.417**

Abstract

Sustainability of rice production under flooding conditions has been challenged by water shortage and food demand. Applying higher nitrogen fertilization could be a practical solution to alleviate the deleterious effects of water stress on lowland rice (Oryza sativa L.) in semi-arid conditions. For this purpose, field experiments were conducted during the summer of 2017 and 2018 seasons. These trials were conducted as split-split based on randomized complete blocks design with soil moisture regimes at three levels (120, 100 and 80% of crop evapotranspiration (ETc), nitrogen fertilizers at two levels (N_1—165 and N_2—200 kg N ha^{-1}) and three lowland Egyptian rice varieties [V_1 ($Giza_{178}$), V_2 ($Giza_{177}$) and V_3 ($Sakha_{104}$)] using three replications. For all varieties, growth (plant height, tillers No, effective tillers no), water status (relative water content RWC, and membrane stability index, MSI), physiological responses (chlorophyll fluorescence, Relative chlorophyll content (SPAD), and yield were significantly increased with higher addition of nitrogen fertilizer under all water regimes. Variety V_1 produced the highest grain yield compared to other varieties and the increases were 38% and 15% compared with V_2 and V_3, respectively. Increasing nitrogen up to 200 kg N ha^{-1} (N_2) resulted in an increase in grain and straw yields by 12.7 and 18.2%, respectively, compared with N_1. The highest irrigation water productivity (IWP) was recorded under I2 (0.89 kg m^{-3}) compared to (0.83 kg m^{-3}) and (0.82 kg m^{-3}) for I_1 and I_3, respectively. Therefore, the new applied agro-management practice (deficit irrigation and higher nitrogen fertilizer) effectively saved irrigation water input by 50–60% when compared with the traditional cultivation method (flooding system). Hence, the new proposed innovative method for rice cultivation could be a promising strategy for enhancing the sustainability of rice production under water shortage conditions.