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Increasing rice yield and profitability through salt-tolerant rice varieties and nutrient management practices under salt-affected soils in irrigated rice systems in the Sahel

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Abstract

Soil salinity is one of the major constraints to irrigated rice production in the Senegal River Valley. Several technologies including salt-tolerant varieties and nutrient management practices have been developed but have not been widely adopted due to a lack of farmers’ participation in their development, testing, and dissemination efforts. The objective of this study was to assess the agronomic and economic viability of improved salinity management options compared to recommended management practice and farmers’ practices. A series of experiments were conducted in both Research Station and farmers’ fields using Farmer Participatory Approach over two years (2020–2021) in dry and wet seasons in the Senegal River Valley. There were five treatments including T1: Typical practices (Sahel 108, broadcasting and NP); T1 + potassium input (T2); T2 + Gypsum + Zinc (T3); NPK + Salt-tolerant variety (T4), and T4 + Gypsum + Zinc (T5) in on-station trials in saline soils with EC value 2 dS/m . Additionally, a total of 170 on-farm trials were conducted. Farmers were asked to choose the treatment (s) among those evaluated on-station, and these treatments were compared with their current practice. On-station results showed that improved management options T3, T4, and T5 outperformed T1 by an average of 1.1 t ha^{-1} (31%), 0.7 t ha^{-1} (20%), and 1.8 t ha^{-1} (49%), respectively. Compared with the current farmers’ practice (4.5 t ha^{-1}), average grain yield increased by 0.8 t ha^{-1} (16%) in on-farm trials. The net profit was about 107 USD ha^{-1} greater with improved salinity management option compared to farmers’ practice. These results suggest that there is a great opportunity for increasing rice yield and profitability under salt-affected soils through integrated management options.

Keywords: Farmer participatory approach, management options, productivity, rice, salinity