A Comparative Assessment of SRI and Conventional Rice Production in Mwea Irrigation Scheme, Kenya

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ABSTRACT

Rice (*Oryza sativa* L.) is an important food crop in Kenya's drive to attain food security and the alleviation of hunger. Yet the productivity of the crop remains low, leading to a huge national deficit. An exploratory field study was conducted to evaluate a system of rice intensification (SRI) that would increase water and crop productivities relative to the conventional production system. The effects of SRI on total water input and the yield of three rice varieties were investigated at the Mwea Irrigation Scheme (MIS) of Kenya.

The experiment was a randomized complete block design (RCBD), laid out as a split plot with production system as the main plot factor (conventional, modified conventional, and SRI) and variety (Basmati 370, BW 196 and NERICA1) as the subplot factor. The component practices of the conventional system were: transplanting of 25 day-old seedlings, multiple seedlings per hill, 10 cm x 10 cm interplant spacing, continuous flooding, and hand weeding. In the modified conventional system interplant spacing was 25 cm x 25 cm, with all the other practices being similar to those of the conventional system. SRI was defined by: transplanting 14 day-old seedlings, single seedling per hill, 25 cm x 25 cm interplant spacing, intermittent irrigation by alternate wetting and drying (AWD), and a combination of hand weeding and use of a pushed rotary weeder. In all production systems, manure, basal nitrogen, phosphorus, potassium, and N-topdressing were applied at the rates of 400 kg/ha, 60 kg/ha, 60 kg/ha, 40 kg/ha and 70 kg/ha respectively. Data collected included rice grain yield and total water input per production system.

Average grain yield was higher in SRI (14.85 t ha^{-1}) compared to conventional production system (8.66 t ha^{-1}) at P=0.006. Differences in yield between the modified conventional system and SRI were not statistically significant at α=0.05. Compared to the conventional system, grain yield under SRI was increased by 70%, 80%, and 61% for Basmati370, BW196 and NERICA1 respectively. Total volume of irrigation was 111.02 m^3, 94.7 m^3 and 84.24 m^3 for conventional, modified conventional and SRI systems respectively. SRI increased crop and water productivity in the MIS by 71% and 90% respectively.

The production practices of SRI had potential to improve rice productivity while saving on water. SRI improved the overall performance of rice regardless of the genetic characteristics, indicating that the production practices of the system were beneficial to plant growth. Reducing plant density through wider spacing as a modification of the current conventional practice has potential to increase yields in Mwea, as the yields under SRI and a modified conventional system were comparable. Further research to determine the optimum levels of SRI components for higher crop yields is recommended.