

Yield gap bridging strategies, rainfall dynamics and water use productivity of selected rainfed rice (*oryza sativa* L) in Tanzania: a case study of Ifakara, Kilombero District

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Studies were conducted at Ifakara in Kilombero District to assess yields in farmers' fields provisioned with Good Agronomic Practice (GAP), moisture requirement of selected rainfed rice varieties, critical growth stages for maximum productivity under moisture stress and rainfall dynamics (onset and cessation changes) for adjusting rice sowing dates. The study on yields revealed that yields of selected rain fed rice varieties in farmers' fields increased concurrently with researchers' fields. It was concluded that, GAP and proper fields management enhanced rice productivity under farmer's fields and narrowed or bridged the yield gaps from 35-60% previously reported in lowland rice to 0% between farmers and researchers' managed fields. The study on moisture requirements of the selected rice varieties was conducted in pot trial at TARI Ifakara in a split plot design, with moisture saturation of 100%, 75%, 50%, and 25% levels in soils. The result revealed that all lowland rice varieties produced optimal grain yield at 100% soils moisture saturation. The critical growth stages and most tolerant rice varieties evaluated using a split plot design with three irrigation treatments (No stress, stress at vegetative and stress at reproductive), revealed the highest reduction in grain yield of between (58%-79%) occurred when moisture stress was imposed at reproductive stage and less reduction at vegetative stage of between 26%-46%. All NERICA rice varieties tested were tolerant to moisture stress are vegetative than the lowland rice varieties. NERICA2 and Tai varieties were the most tolerant during moisture stress at reproductive stages under upland and lowland respectively. Therefore the most critical growth stage among the varieties is the reproductive growth stage. Studies on rainfall dynamics revealed higher rainfall variability between years and seasons with a decreasing rainfall trend. Rainfall onset dates varied between years and seasons with a decreasing rainfall throughout the studied period, suggesting that farmers need to synchronize the rice reproductive growth stages with March-April rainfall regimes. Thus, sowing dates for short duration varieties like NERICA's, Tai and Komboka should be between the 2nd to 3rd weeks of February, while medium as long duration varieties like TXD306 and Supa India are 1st to 2nd weeks of January.