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“Reconcile land system changes
with planetary health”

The adoption and impact of direct seeded rice in eastern India

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Abstract

Rice is a major staple for 70 % of India's population. Motivated by strong domestic as well as global demand, Indian farmers extensively engage in rice production across 43 million hectares of area. Rice production is typically carried out through a water intensive process that requires transplanting seedlings into puddled soil. However, with 63 % of India's districts threatened by declining groundwater levels, practicing this method of rice cultivation puts immense pressure on existing resource stock and poses a significant challenge to sustainable rice production, ultimately threatening food security of a growing population. Alternative to puddled transplanted rice (PTR) is the method of direct-seeded rice (DSR) which involves seeds to be sown directly in the main field. The method reduces labour requirements, minimises drudgery, shortens cropping cycle, and demands less water by eliminating the need for seedling, uprooting, and transplanting- thereby making a case for economic gains for farmers. However, the adoption levels remain low as DSR brings its own set of agronomic challenges including poor weed control, poor seedling establishment, soil-borne pathogen infestation and nutrient disorders. Using data from a primary survey covering over 2500 farmers, the study attempts to determine the factors affecting the adoption of DSR in the Eastern India region- a major producer and consumer of rice. Next, addressing the ambiguity surrounding economic viability of DSR, we evaluate the impact of DSR adoption on farmers' yield and economic returns using Coarsened Exact Matching (CEM) method. Findings indicate that farmers' social group, participation in agricultural trainings and demonstrations along with networking within the village strongly influences DSR adoption, which in turn has a positive impact on yield and economic returns from rice farming. The results are confirmed by performing robustness checks using Endogenous Switching Regression. The findings have strong policy implications for Eastern India, where farmers operate under resource constraints and tend to display risk aversion while switching from PTR to DSR.

Keywords: Direct-seeded rice, Eastern India, environment, water conservation