Title: Resilient farm technologies in achieving sustainable development:
Performance and adoption of SRI under multiple constraints in Odisha, India

Rice yield under performance coupled with production instability in the Odisha state of India is primarily due to low irrigation potential, spatiotemporal disparity in rainfall pattern and relentless confrontation with biotic and abiotic stresses. The System of Rice Intensification (SRI) was introduced in the state during early 2000 with the promises of higher production horizon. However, the present scenario of patchy adoption pattern has necessitated this comprehensive study on dynamics and determinants of adoption of SRI. All together 520 sample farmers were chosen using multistage stratified random sampling method across 13 districts during the rice cropping seasons 2013-14 to 2015-16 and were interviewed personally using a pre-tested structured questionnaire. We found that 57 percent of farmers continued SRI, 28 percent discontinued and rest were practicing conventional methods. The focused group discussion among the farmers helped us to triangulate the determinants of SRI adoption. The increased SRI area allocation was observed at the expense of a reduced number of adopting farmers. The economic scarcity of skilled labor, difficulties in transplanting and mechanical weeding, low irrigation potential and poor on-farm water management were major constraints in SRI practice. Farmers’ compliance in following different resilient SRI components that also varied spatiotemporally has resulted in realized incremental yield. SRI was proved to be resilient to the 2015-16 severe drought and yielded 27 percent higher than conventional one (average state rice yield declined by 1.3 tons/ha over preceding years). The probit regression analysis to determine farmers’ decision on SRI adoption/discontinuation indicated that active social involvements of NGOs, on-farm training, and demonstrations, and realized incremental rice income influenced SRI adoption. On the other hand, SRI area expansion hindered mainly because of infeasible land topography, area saturation and lack of farmers’ interest. The sustainability index was developed to analyse SRI’s performance in comparison with other conventional methods at the farm level. Comparatively, SRI adopters benefited in terms of incremental net return by enhancing ecological balance and sustaining the productivity of soil, use of eco-friendly and own farm inputs. Nonetheless, higher women labor displacement observed under SRI practice can be curtailed by providing training to young farm women.