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From burning to conserving residues: The role of machinery service providers in disseminating conservation tillage

ABDULLAH THASEEM MUHAMMED SHAH¹, ARSHAKH THAZHATHU VEETIL¹, KESAVANATH K. SREEKUMAR¹, ARCHANA RAGHAVAN SATHYAN¹, VIJAYALAXMI D KHED², A G ADEETH CARIAPPA², VIJESH KRISHNA²

¹*Kerala Agricultural University, College of Agriculture, Vellayani, India*

²*International Maize and Wheat Improvement Center (CIMMYT), India*

Abstract

The green revolution has boosted cereal production in South Asia by intensifying rice-wheat systems across the Indo-Gangetic plains. However, the increased intensity has resulted in limited turn-around time between rice harvest and wheat sowing, creating a challenge for farmers to sustainably manage rice residues. Alongside mechanisation of rice harvest, this time limitation has led to burning of residues, causing air pollution and serious health externalities for human beings. Conservation tillage technologies (CTTs), such as zero-tillage and minimum tillage, could help by minimising soil disturbance and provide an economically viable use of surplus rice residue as mulch. Despite proven economic and environmental benefits, adoption of CTTs is limited in Indian rice-wheat systems. For instance, around 7% and 34% of farmers use CTTs like Happy Seeders and Super Seeders, respectively, in Punjab. We postulate that providing adequate access to tillage machinery through service provision can speed up the diffusion process of CTTs among smallholder farmers.

Against this background, the present study examines the adoption of resource conservation tillage technologies from a service provider perspective in the Indian state of Punjab. Key informants and service providers from 122 villages in 8 districts were surveyed in 2021. Findings suggest that the availability of CTT machines, including zero tillage drill, Happy Seeder, and Super Seeder through service providers, positively and significantly affects farmer adoption rates. Interestingly, adoption rates increase when individual service providers offer multiple machine types. Factors such as male and female labour wage rates, machine rental charges, and service provider type (e.g., cooperatives vs. private individuals) also affect the adoption rates. These results have important policy implications for increasing CTT adoption and smallholder access to mechanisation services for sustainable agriculture. Targeting service providers alongside lead farmers as “change agents” appears to be a viable option but requires the development of a feasible business model for service providers.

Keywords: Crop residue management, mechanisation, service provision