

Do institutional arrangements influence the speed of adoption of laser-land leveller technology in the irrigated farmlands of Punjab, Pakistan? A discrete-time duration analysis

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Abstract

Governments and international donors are actively promoting laser-land leveller (LLL) technology to produce environmental benefits (i.e., avoid soil salinity, minimize soil erosion risk, and groundwater security) that could lead to sustainable agricultural production and averting land degradation. We investigate the adoption process of laser-land leveller (LLL) technology in Punjab, Pakistan during the period 1985–2018 using survey data from 504 farming households. A discrete-time duration model is used to investigate factors that could influence the speed of adoption of LLL technology and an endogenous switching regression (ESR) model to evaluate its impact on groundwater usage. It is found that about 70% of the surveyed households had adopted the technology. The key determinants of the speed of adoption include strong legal land entitlements, farm size, and farm location along the watercourse. Information acquired through formal and informal sources and exposure to the technology potentially reduce adoption time. The adoption of LLL reduces groundwater use by about 23% in wheat crop. These results highlight the need for improved institutional arrangements such as extension services, technology exposure, and establishing legal property rights over land to enhance uptake of LLL technology.

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ABSTRACT

Governments and international donors are actively promoting laser-land leveller (LLL) technology to produce environmental benefits (i.e., avoid soil salinity, minimize soil erosion risk, and groundwater security) that could lead to sustainable agricultural production and averting land degradation. We investigate the adoption process of laser-land leveller (LLL) technology in Punjab, Pakistan during the period 1985–2018 using survey data from 504 farming households. A discrete-time duration model is used to investigate factors that could influence the speed of adoption of LLL technology and an endogenous switching regression (ESR) model to evaluate its impact on groundwater usage. It is found that about 70% of the surveyed households had adopted the technology. The key determinants of the speed of adoption include strong legal land entitlements, farm size, and farm location along the watercourse. Information acquired through formal and informal sources and exposure to the technology potentially reduce adoption time. The adoption of LLL reduces groundwater use by about 23% in wheat crop. These results highlight the need for improved institutional arrangements such as extension services, technology exposure, and establishing legal property rights over land to enhance uptake of LLL technology.

Keywords: Laser Land Leveller, Land management, Discrete-time duration model, Endogenous switching regression, Propensity score matching

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