

# **Impact of Land Tenure Arrangements, Bt Cotton Adoption and Market Participation on Welfare of Farm Households in Rural Pakistan**

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Pakistan is the fourth largest cotton producing country in the world after China, USA and India. Cotton and cotton products contribute about 3.2 percent to GDP and 60-65 % to foreign exchange earnings of the country. Cotton production supports millions of farm families in Pakistan. Recently genetically modified (Bt) cotton varieties are grown by farmers in Pakistan. Due to highly skewed land distribution pattern in Pakistan, one third of the farmers are tenant farmers. Tenant farmers have few land rights and very less resources. Literature on farmers' market participation is mostly missing in the past, particularly in Pakistan. In this dissertation three important aspects of cotton production and marketing are focused, i.e. adoption and impact of Bt cotton, land rights' influence on farmers' decision to invest in land improvement measures and efficiency level, and cotton farmers' market participation.

For the study, cross sectional data set of 325 cotton farmers was collected in 2007 from seven highest cotton producing districts in the Punjab province of Pakistan. The study estimated the adoption and impact of Bt cotton on household welfare by employing the propensity score matching approach. Land rights' influence on farmers' decision to invest in land improvement measures is estimated by employing the multivariate Tobit model, while cotton producers' technical, allocative and economic efficiency are estimated by employing translog profit and cost frontier models. For the cotton marketing analysis, propensity score matching approach is employed for cotton net returns.

The results regarding adoption and impact of genetically modified cotton indicate that adopters of Bt cotton technology are getting 50-60 kg per acre higher yields, while the average households incomes are higher by rupees 16500-17000. The demand for pesticide is lower among adopter household in the range of 0.62-0.68 litres per acre. The probability of adopters being poor is found to be lower by about 13.5-14.3 percent, relative to non-adopters. The land rights results indicate that owner cultivated lands exhibit the higher levels of technical, allocative and economic efficiency compared to fixed-renters and sharecroppers. The results of farmer's market participation indicate that net returns are positive and significant for the farmers selling at market compared to farmers selling at farm gate.

The present study provides important policy implications. Since Bt cotton adoption have positive and significant impact among cotton growers, particularly targeting the small scale farmers with the new agricultural technology can help them a way out of poverty. Policies in this direction include increasing cotton farmers' access to information to reduce uncertainty about new technologies and formal credit for them to overcome the liquidity constraints. Since owners are technically, allocatively and economically more efficient as compare to tenants, hence tenants should be provided land rights through land reforms. Similarly, regarding farmers' market participation, small-scale farmers can be linked to the markets by investing in human capital, improving the village infrastructure and readdressing the formal credit programme.