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Economic profitability of organic vs. conventional cotton-based production systems in a long-term field trial in India

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The debate on the relative benefits of conventional and organic farming systems is more topical than ever. The achievements of conventional high-input agriculture were largely brought about at the cost of deteriorating soil fertility; furthermore, they were based to a large extent on fossil fuels. Developing more sustainable farming practices on a large scale is of utmost importance. However, information about the performance of agricultural production systems under organic and conventional management in tropical and subtropical regions is largely lacking. This study aimed to assess agronomic and economic data from a long-term farming systems comparison trial under semi-arid conditions in central India.

Four two-year crop rotations comprising cotton-soybean-wheat under biodynamic, organic and conventional management were investigated, including one conventional system with and one without transgenic *Bt* cotton, between 2007 and 2010 (Figure 1).

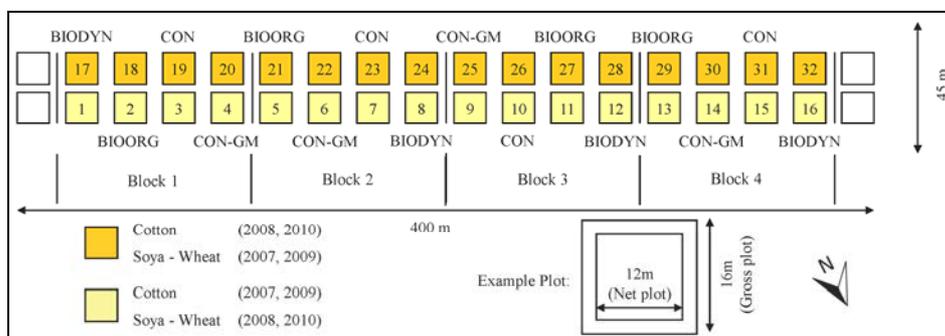


Figure 1: Experimental layout of the long-term farming system comparison trial.

Systems: BIODYN: biodynamic, BIOORG: bioorganic, CON: conventional, CON-GM: conventional with *Bt*-cotton

Results showed 13% lower yields in organic compared to conventional systems. Yields in cotton, soybean and wheat were on average 14%, 7% and 15% lower, respectively. However, production costs of organic systems were on average 32% lower than those of conventional systems, which led to similar gross margins in all systems.

To our knowledge, this is the first long-term field trial comparing the agronomic and economic performance of organic, conventional and conventional+*Bt* cotton-based farming systems. The results of our study suggest that organic farming is a promising alternative to conventional farming in cotton-based production systems in central India. The less capital intensive nature of organic systems may be particularly interesting for smallholder farmers as it decreases dependence on loans for farm inputs. Therefore, our findings have the potential to be useful for decision-making and in turn may lead to a redirection of agricultural policies.

Keywords: Economic analysis, *Bt* cotton, systems comparison, organic agriculture