

How Do Organic and Conventional Production Systems Perform: Evidence from Long-term Study in India

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Background

Organic agriculture has gained a reputation for being ecologically sustainable, however, knowledge gaps regarding its performance in tropics remain. Through the 'long-term farming systems comparison (SysCom) program', FiBL together with local partners, runs a network of field experiments in the tropics, which aims at obtaining solid scientific evidence on the performance of organic and conventional production systems.

SysCom Long-term Experiment (LTE)

- Located in the Central Indian cotton belt.
- Semi-arid climate with annual precipitation of 800 mm in a single peak monsoon season (mid-June to September) and mean annual temperature of 30°C.
- Fertile Vertisols at about 250 m a.s.l.
- Two year crop rotation with cotton, soybean and wheat
- Four management systems (treatments) namely (a) organic, (b) biodynamic, (c) conventional and (d) conventional farming with genetically modified (GM) cotton
- Two strips to grow all crops each year
- Four replicates



Fig. 1: Field site of the Long-term Farming Systems Comparison Trial at bioRe Research Station, Kasrawad, Madhya Pradesh, India

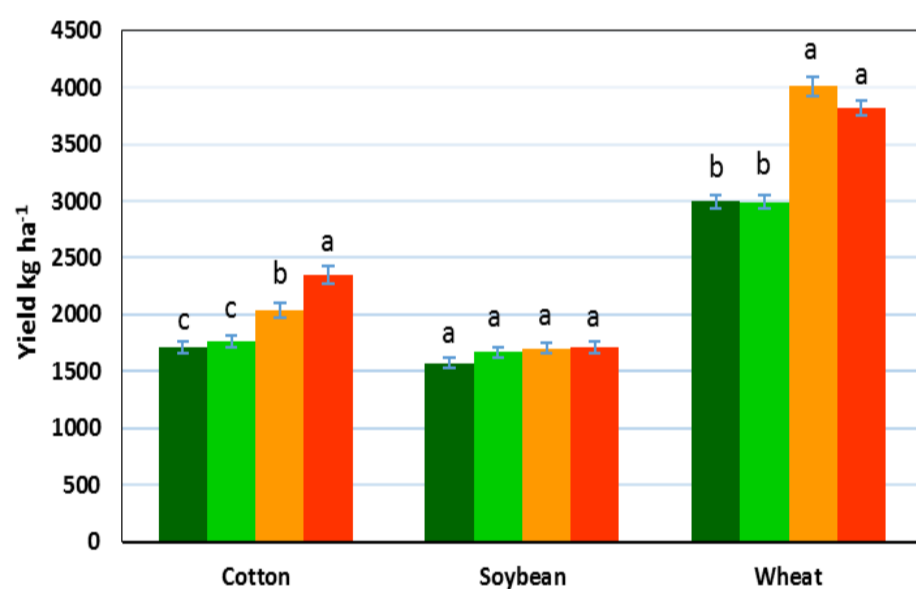


Fig. 2: Yield of Cotton, Soybean and Wheat (average of 2008-2014)

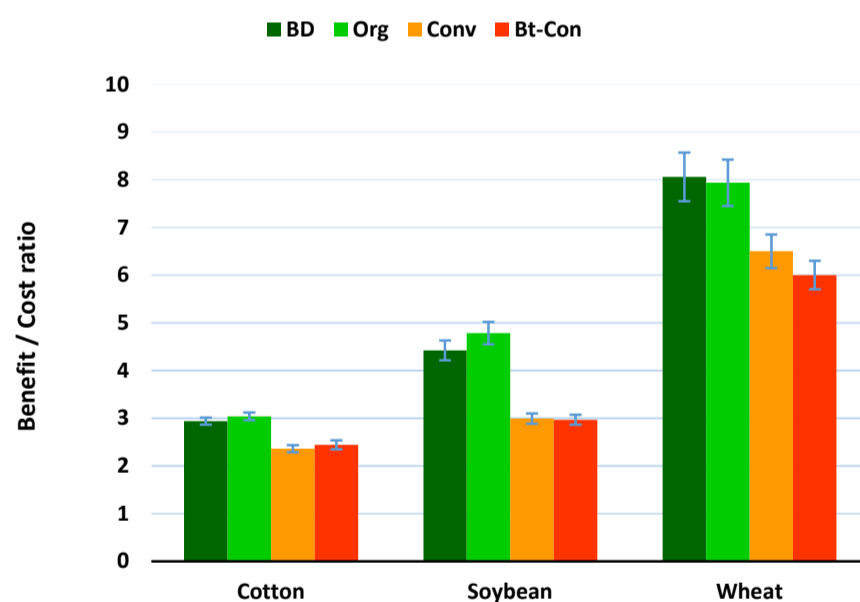


Fig. 3: Benefit/cost ratio in Cotton, Soybean and Wheat (average of 2007-2014)

Results

- Considerable yield variation across years and systems
- Yields of Soybean consistently comparable in all systems in all years
- Cotton yields on an average around 25% lower in organic systems compared to Bt-conventional system
- Wheat yield on an average around 20% lower in organic systems

Conclusions

- Legume crops such as Soybean are capable of equal performance in organic or conventional systems as they are capable of symbiotic assimilation of nitrogen and thus do not rely on external N inputs
- Poor availability of nitrogen from organic inputs at key crop growth stages limits the productivity of crops like wheat and cotton
- Despite lower yields, the return on production costs (benefit/cost ratio) is higher in organic systems making them a suitable choice for resource poor smallholder farmers
- Improving the nutrient content and timing of fertilization can improve yields in organic systems

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