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“Resilience of agricultural systems against crises”

Resilience of Organic *versus* Conventional Farming Systems in Tropical Africa: The Kenyan Experience

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Abstract

In Kenya, agriculture is largely carried out by smallholder farmers, in a mixed farming non-commercialised setting where application of synthetic fertilisers and pesticides is minimal. Agricultural production is low and constrained by declining soil fertility, pest and diseases and increasingly unpredictable weather due to global warming. This calls for more resilient farming systems. Conventional farming is widely advocated because it delivers more yields in the short-term, but it is less effective in combating climate change because of the high energy requirement during manufacture of fertilisers. Conversely, organic farming which is based on the use of natural soil biological cycles to boost nutrient cycling, enhancement of natural plant protection mechanisms, avoidance of pollution and use of nitrogen fixation systems and plants with a high carbon sequestration potential to fix nitrogen and carbon respectively is considered better suited at mitigating climate change. In 2007, a long-term project was established in Central Kenya to compare organic and conventional farming systems at commercial and local farmer input levels using agronomic, environmental and social economic data and to disseminate the findings to stakeholders. The trial features 4 treatments (Conventional High, Conventional Low, Organic High and Organic Low) in a Randomised Complete Block Design (RCBD). Nutrients in ‘Conventional’ treatments are supplied by farmyard manure, diammonium phosphate, calcium ammonium nitrate and compost, while *Tithonia diversifolia*, and rock phosphate supply nutrients in ‘Organic’ treatments. Pests are controlled using biopesticides and chemical products in ‘Organic’ and ‘Conventional’ treatments, respectively. A three-year, maize/baby corn based rotation system is followed. There were no treatment differences in yield ($p = 0.101$) in 2007, but stover weights in Conventional High were superior to Organic Low and indistinguishable from Conventional Low and Organic High ($p = 0.034$). Differences between treatments however were observed in 2011 yields ($p = 0.027$) and stover ($p = 0.003$). Dry matter yields in Conventional High and Organic High treatments were lower than in Organic Low and indistinguishable from Conventional Low. Whereas stover weights at the same input level were indistinguishable, they were higher at the higher input level. The results suggested that organic farming may be a viable option for tropical Africa.

Keywords: Baby corn, conventional, grain, maize, organic, stover