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Why Scattered Trees within Cereal Systems: Food Security or Environmental Sustainability or None?

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Abstract

Research and development efforts in developing countries have achieved great goals such as food security and environmental sustainability. However, there are tendencies to overromanticize some approaches over others while attempting to meet these goals. Tree-cereal systems, where tree-crop interactions usually involve trade-offs that need appropriate understanding, was the focus of our study. We explored tree-cereal systems in East Africa with the main theme of disentangling whether this system could be a promising framework in sustainable intensification of smallholder cereal systems of the region. We assessed the environmental, economic and social contributions of six scattered tree species within maize and wheat cereal systems. We carried out extensive on-farm experimentation supported with state-of-the-art equipment over four cropping seasons. Our results revealed that most trees in cereal systems are beneficial for environmental sustainability, although not all of them are equally beneficial. Economically, only few tree-cereal systems were found to result in positive economic return at farm scale. Interestingly, the negative effects of scattered trees on crops could be minimised through certain crop management practices. We also found that trees within cereal systems that have been maintained for their sole social roles, regardless of the significant yield reduction they inflict on the crops growing under their canopies. Therefore, the answer to the emphatic question on 'whether scattered trees can serve as a starting point in sustainable intensification of smallholder farming systems' may range from 'yes, but...' to 'it depends on...'. On the other hand, our evidences trigger questions over the 'wholesale' approach towards promoting trees within cereal systems. Promoting trees solely for their environmental value could be futile. So is advocating them on the sole basis of 'trees for food security'. Over-romanticizing and mythicizing scattered trees for what they are not, rather than for what they are, requires extra caution. While our evidences asserted that scattered trees buffer crops against climate change, improve water availability and nutrient use efficiencies in crops, trade-offs are conspicuous. Utilisation of these facilitative effects of scattered trees by minimising tree-crop trade-offs necessitates a pragmatic approach. Thus, 'process-based' rather than 'technology-based' approaches are required when promoting scattered trees.

Keywords: Adaptation, climate change, competition, complimentary, facilitation, sustainable intensification

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