

4. When and Where is Conservation Agriculture an Appropriate Option for Smallholder Farmers in Southern Africa?

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Conservation agriculture (CA) has captured the imagination of an amazing array of organisations – including FAO, EU, international research organisations (CIMMYT, ICRISAT), and international (faith-based) NGOs – and is widely promoted to smallholder farmers in sub-Saharan Africa. In mechanized agriculture where herbicides are used, CA practices offer huge advantages for farmers – saving energy, allowing extra crops to be grown within a year. It is thus seen as a means to intensification that increases the use efficiency of land, energy, water and nutrients, and prevents soil erosion. Such CA practices have been adopted on a massive scale in large-scale farms in North and South America, Australia and Africa. Yet recent reviews of the scientific literature are equivocal in their support of some of the central claims made repeatedly for CA, such as increased yields and enhanced sequestration of carbon in the soil. Many authors, including some who represent the FAO, recognise the constraints and problems faced by smallholders with implementation of CA. So why do such organisations promote CA without questioning *if* modified tillage systems are the most appropriate and urgent approach to agricultural intensification?

Smallholder farming systems in southern Africa are diverse – and occur across a wide range of agroecological and socio-economic environments. There is a huge range in the abundance of land, (from areas where new land is being opened and shifting cultivation is practiced, to areas where farm sizes are critically small), in livestock ownership (from tsetse-infested areas where cattle are absent, to areas where the shortage of forage is ubiquitous in the dry season), and in dependence on agriculture (from a complete lack of local employment opportunities to predominant dependence on salaries, pensions or grants). But what smallholder farming systems have in common is poor access to external inputs, and poor markets for their produce, and a shortage of labour on farm.

So to what extent does CA address the critical constraints that farmers face? If herbicides and fertilizers are available and can be used profitably to intensify production, they can enhance returns to labour. In the absence of herbicides and fertilizers, tillage both helps to control weeds and stimulates the mineralization of N for crop growth. Not tilling saves labour at planting, but may increase weed problems – sometimes shifting work from men to women. A deep mulch smothers weeds and enhances infiltration of rainfall, but farmers prefer to feed residues to their livestock often resulting in sparse soil cover. No tillage without mulch can be disastrous as capping accelerates runoff and erosion, which may be overcome by tillage roughening the soil. In many smallholder farming systems the problems associated with reduced tillage approaches may outweigh the advantages, raising questions as to why CA receives so much attention from researchers and donors alike.

Currently there is far too little research that explores the suitability and relevance of CA across the diversity of smallholder contexts, between farming systems and between farmers differing in resource endowment. We explore this topic and provide suggestions on how the research and development community can better target their efforts.

Governments in Southern Africa, with strong donor support, have 'endorsed' CA as a pathway to food security. We argue they should rather focus on solving the institutional constraints of input and output markets to create incentives for smallholders to invest profitably in agriculture. Farmers would then be empowered to choose from the suite of options available and practice what they know best – farming!

