



CEPHaS²

Conservation Agriculture Perspectives

1. What are the main ways in which you have seen smallholder farmers adapting to climate change in southern and central Africa in recent years?

Farmers have adapted in the following ways:

- By using early-maturing varieties or stress-tolerant varieties
- Through crop diversification e.g. intercropping and intensification of tuber crop production
- By using climate-smart technologies like conservation agriculture, agro-forestry and tree regeneration, use of organic amendments (manure and compost)
- By Winter cropping — irrigation along the locally available water sources/ river

2. In what sets of circumstances (biophysical, socio-economic etc) are conservation agriculture practices most likely to be beneficial to rural communities, and in what circumstances are they least likely to be useful?

Conservation agriculture practices are most likely to be beneficial in the following circumstances.

a. Biophysical

- Where crop residues are retained as surface mulch to improve moisture retention, especially in drier years and dry places
- Where all the CA principles are practiced to achieve *soil fertility improvement* (Chemical, physical and biological) and *yield stability*
- Where optimum soil cover is practiced to achieve soil erosion control and reduced *soil temperature*

b. Social and economic

- Where optimum soil cover is practiced and herbicides are used *labour demand* is reduced
- Where practices result in increased crop yield and income
- Where crop diversification improves nutritional status
- Where biomass may be used for fodder

Conservation agriculture practices may not be beneficial in the following circumstances.



CEPHaS is interested in a broad perspective on conservation agriculture, in the context of the farming system, the constraints farmers face and the ways in which they are adapting to climate change. For this reason we have engaged with a range of partners, and in this series, *CEPHaS Conservation Agriculture Perspectives*, we invite them to respond to some questions.

The Department of Agricultural Research Services (DARS) is a technical department in the Ministry of Agriculture, Irrigation and Water Development in Malawi, mandated to conduct research and generate technologies for increased and improved agricultural productivity. DARS also provides regulatory, technology dissemination and specialist services on crops and livestock. The department has three agricultural research stations of which Chitedze Research Station is one, specialising in field crops. These answers to our questions were given by Dr Ivy Ligowe, pictured above, who manages the long-term conservation agriculture experiment at Chitedze.

a. Biophysical

- In the early stages of establishing CA where residue retention may influence nitrogen mobilization
- Where the principle of crop diversification, by rotation or cereal-legume intercropping, is not practiced, the retention of residues may promote the build-up of pests and diseases
- In high-rainfall conditions and in soils with poor drainage minimum tillage and retention may cause water logging

b. Social and economic

- Where CA principles are applied partially, so there is inadequate soil cover, but zero till, there can be increased labour costs for weeding

3. What components of conservation agriculture systems are most problematic from the perspective of farmers?

The following aspects may be problematic:

- Challenges with retaining residues when there are competing uses for them (e.g. livestock feed, fuel, construction and soil sterilization in tobacco farming)
- Crop rotation where land is limited
- Fertilizer use where a farmer has financial constraints
- Weed control where residue and herbicide use is limited
- Limited knowledge and practice of the best spatial and temporal arrangements of inter-cropping maize and legumes under variable conditions
- Limited use of improved crop varieties

4. What do you think are the main research questions that need to be addressed to support food security in sub-Saharan Africa under climate change?

Here are three key questions:

- What are the most feasible agricultural practices and technologies to address pest and disease outbreaks arising from climate change?
- Are there alternatives to crop residues as soil-cover materials which could be used in conservation agriculture as an adaptation to climate change?
- What are the best maize-legume intercropping/rotation strategies to achieve good yields, improve ecosystem services and ensure system resilience, reducing production risks under limited land holdings



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