



Conservation Agriculture

Sustainable and profitable

Conservation Agriculture aims to achieve sustainable and profitable agriculture through the application of three principles: minimal soil disturbance, permanent soil cover and crop rotation. This methodology holds tremendous potential for all sizes of farms and agro-ecological systems, but its adoption is perhaps most urgently required by smallholder farmers, especially those facing acute labour shortages. It is a way to combine profitable agricultural production with environmental concerns and sustainability and it has been proven to work in a variety of agro-ecological zones and farming systems. It is because of this promise that the Food and Agriculture Organization of the United Nations (FAO) is actively involved in promoting Conservation Agriculture, especially in developing and emerging economies.

Loss of soil fertility means declining yields

Maintenance of soil fertility is the first condition of any permanent system of agriculture. Under normal, conventional agriculture, soil fertility is steadily lost - as crops and crop residues are removed, soil organic matter is ploughed and uncovered land oxidizes into carbon dioxide (one of the greenhouse gases) and water.

In southern Africa over the past fifty years, there has been a major drop in overall soil fertility, coupled with large-scale soil erosion. This is particularly the case in Lesotho, South Africa's Eastern Cape, Malawi and the intensively cultivated parts of Zimbabwe and Zambia. Intensively farmed and cultivated land leaves the soil bare for much of the year and the soil's organic matter declines sharply, taking with it the soil's water- and nutrient-holding capacity, such that even if sufficient artificial fertilizers were available, they could not be chemically held by soils and would be leached into the subsoil and ground water. The cost of artificial fertilizers to replace lost elements is beyond the budget of the majority of farmers, with the result that soil fertility continues to decline and with it crop yields. In Malawi maize yields have declined from over 2 tonnes/ha in the 1970s to 0.85 tonnes/ha in 2005.

Benefits of Conservation Agriculture in the region

Conservation Agriculture is relatively new to the southern Africa region. Using plough and harrow to cultivate the land - a worldwide agricultural tradition - is predominant. This conventional tillage method can be wasteful, resulting in erosion and loss of soil organic matter on a large scale. By not ploughing, farmers can save labour as well as reduce farming costs, such as tractor and equipment wear and tear or hire.



Weed wipers

Weed wipers, like Zamwipes, are relatively simple tools to apply herbicides by contact with the weeds. They are very handy for applying a herbicide called "Roundup." As there is no problem with drift, weed wipers can be used, with care, for inter-row weed control without danger to the crop. FAO provides beneficiaries with the equipment and training.

(Photo: FAO/B. Sims)

In southern Africa the HIV/AIDS pandemic is hitting the farming sector particularly hard. Conservation Agriculture savings in terms of labour, time and farm power is particularly important. Reduction of farming costs over time is also essential for affected families, as expenditures on medicines and patient care rise.

The region also suffers from erratic climatic conditions, such as floods and drought. Conservation Farming techniques help reduce erosion, allow more constant water flow into rivers and re-activate wells. For example, almost all farmers in the Karkloof Valley in KwaZulu Natal, South Africa practice Conservation Agriculture. As a result, the river running through the Karkloof Valley is reported to

be visibly clearer than rivers in neighbouring areas, and the number of fish species in the river has increased.

Challenges to implementation in the region

Communal land ownership is the primary form of land tenure in most countries in the region. In Angola, Mozambique and Zambia land is held on a 99-year lease. Land in these situations is undervalued as a resource, and the inability to borrow against, rent out or sell land leaves farmers without working capital. Farmers in the region usually do not fence their land, which allows cattle and other livestock to roam freely, grazing and destroying crop residues. This makes it more difficult for farmers to meet the year-round soil cover principle of Conservation Agriculture.

Questions and Answers:

What is Conservation Agriculture?

Conservation Agriculture is a system of integrated management of soil, water and biological resources combined with external inputs. As a concept of sustainable agricultural production, it is promoted by several organizations around the world, including FAO.

What is the objective of Conservation Agriculture?

Its objective is to improve agriculture production by adopting economically, ecologically and socially sustainable methods. Conservation Agriculture aims to conserve, improve and make more efficient use of natural resources. It contributes to environmental conservation as well as to enhanced and sustained agricultural production for farmers.

What are the main principles of Conservation Agriculture?

Conservation Agriculture is based on three main principles: minimal soil disturbance, maintaining soil cover throughout the year and improved crop rotations. A permanent organic soil cover is obtained by leaving crop residues on fields or growing cover crops. Minimal soil disturbance requires that rather than tilling, farmers use hoes to make planting basins or ox-drawn or tractor-drawn drills to plant seeds directly into the soil. To improve crop rotation, more legumes are grown which fix nitrogen and help succeeding crops.

What are its advantages?

- Building up the soil organic matter also retains nutrients and improves the micro-flora in the soil, a vital component of living soil.
- Soil organic matter can hold many times its weight in water, therefore building up the organic matter in the soil results in greater water retention. One farmer practicing Conservation Agriculture in KwaZulu Natal, South Africa found that his field can withstand irrigation at up to 20mm per hour, whereas fields under conventional tillage absorb 4-5 mm per hour of irrigation water without run-off. This reduces labour and fuel use and also reduces wastage of irrigation water.
- When soil organic matter is built up through Conservation Agriculture, applied fertilizers work better.
- Different crops have different root structures – some have deep tap roots and others have fibrous roots at the surface. Through crop rotation, organic matter is placed in different soil strata, thereby making the soil more fertile.

What are its disadvantages?

Conservation Agriculture is generally a win-win situation, but that does not mean there are no difficulties. It requires a major change in mind-set of farmers. In general, farmers need to be more careful about timing of agricultural operations under Conservation Agriculture. Special attention has to be paid to weed control, either through hand weeding or by judicious use of herbicides. Once the environment has been stabilized however, farm production tends to be more stable than under conventional agricultural methods. So far there have been no pest problems that cannot be overcome in Conservation Agriculture.

What benefits does it offer the farmer?

The primary advantage is increased and more stable yields. In Zimbabwe in 2005/06, Concern Worldwide, an Irish NGO, found that 133 farmers practicing Conservation Agriculture had an average maize yield of 2.8 tonnes/ha, with a range from 1.03 to 4.71 tonnes/ha, while other farmers in the same area had average yields of 0.8 tonnes/ha. Other benefits are reduced labour, time, farm power and lower costs. These factors all lead to higher profits.

Does Conservation Farming cost less?

Overtime there are cost savings as less labour, machinery and diesel for running tractors are required. Farm machinery will have a longer lifespan and need fewer repairs.

Where is Conservation Agriculture practiced?

Conservation Agriculture is practiced widely in Brazil, where the concept originally evolved by farmers themselves who faced erosion problems. It is also implemented on small and commercial farms in other parts of Latin America (primarily Paraguay and Argentina) and Africa. It is practiced widely on commercial farms in the United States and Australia, in the rice-wheat belt of Asia and the steppes of Kazakhstan.

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