

Implementation

Conditions of Application and Constraints

Factors limiting agricultural production should be rectified before the full benefits from implementation of CA can be realized. This might refer to technical factors, such as soil compaction, insufficient drainage, soil chemical properties, as well as socio-economic factors such as availability of adequate technology, investment capital, land use rights, livestock pressure, customary practices or access to markets. These will have to be addressed in order to establish CA sustainably.

Transforming the Agricultural System

The transition phase usually takes about two years; however, the full benefits of the system often become visible only after five years. In CA, mechanical tillage is replaced by biological tillage (by crop roots and soil fauna) and soil fertility (nutrients and water) is essentially managed through soil cover management, crop rotations and weed management. Fertilizers, water harvesting technologies and irrigation can complement CA, and minimum tillage might be necessary in some cases particularly during the transition.



Biological tillage and soil fertility management through Conservation Agriculture

Changing mentalities

- The soil is a habitat for roots and soil organisms.
- Any damage to this habitat endangers soil fertility and leads to land degradation.
- The soil fauna creates a stable soil structure.
- Tillage creates a temporary soil structure but damages the stable habitat of soil life.

Promotion, Support and Capacity Building

Promotion of CA should be done simultaneously through policies, education Research, and extension institutions in the field. Adoption by farmers is supported most effectively through farmers' groups, study tours, networks and NGOs. Research and extension institutions and the private sector have a major role in providing farmers with appropriate and affordable technologies.

Policies and Incentives

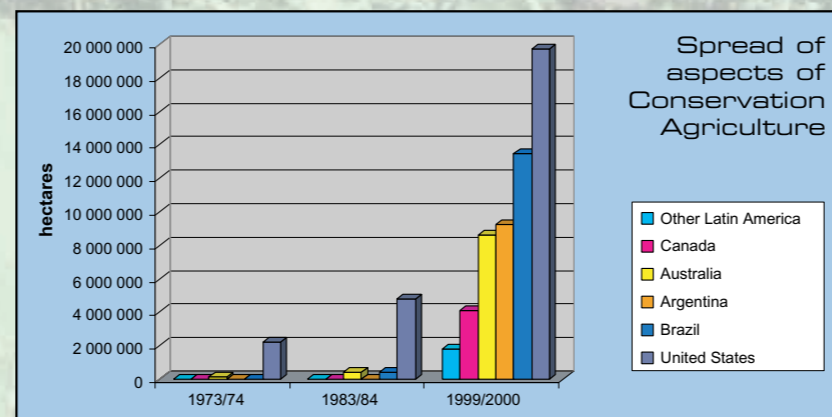
Policies should focus on access to market, credit and input supplies, and rural infrastructures. Policies should support the development of farmers' groups. Incentives should encourage diversification and CA practices, especially during the transition phase. Inadequate policies and subsidies that support conventional practices might constrain CA adoption. Land use and customary rights must also be taken into account and eventually adapted to favour CA adoption by farmers and rural communities.

FAO and other International Support

FAO is promoting the adoption of the CA concept at policy level as well as stimulating farmer-based movements and collaboration between the research sector and farmer groups. Due to its positive effects on food security, biodiversity, land and water resources, carbon sequestration and sustainable development, CA is a major opportunity to implement the International Conventions on combating desertification, on biodiversity and on climate change (UNCCD, UNCBD and UNFCCC).

Adoption of Conservation Agriculture around the World

CA is being practised in many agro-ecological zones and socio-economic contexts worldwide, such as commercial and small farms in tropical and subtropical areas of Latin America and Africa, commercial farms in the United States and Australia, the rice-wheat belt in Asia, the steppes of Kazakhstan.



For more information

FAO - Workgroup on CA:

www.fao.org/ag/ags/AGSE/Main.htm

This website provides information, references and links to many other Web sites, publications and databases on CA.

ECAF - European Conservation Agriculture Federation:

www.ecaf.org/

RELACO - Latin American Conservation Agriculture Network:

www.fao.org/ag/ags/AGSE/agse_e/6to/rel_pre.htm

ACT - African Conservation Tillage Network:

www.fao.org/act-network/



Conservation Agriculture

Profitable

AND

Sustainable

Definition and Principles

Conservation Agriculture (CA) is a win-win system based on the integrated management of soil, water and agricultural resources. Its main objective is economically, ecologically and socially sustainable agricultural production while the soil is being regenerated and soil degradation reversed.

CA relies on three principles, which must be considered together for appropriate design and application:

Permanent soil cover

Minimal soil disturbance

Crop rotations

The Benefits

To Farmers

- ❑ Savings on fuel, maintenance and replacement of implements
- ❑ Increased and more stable yields, resilience of crops to drought and climate hazards, increased and more stable benefits
- ❑ Saving time for other activities
- ❑ Less heavy work and drudgery, especially for women or weak people
- ❑ Diversification in crops and activities: less risks, increased income, improved diet, better livelihood of the farmer

To Communities and the Environment

- ❑ Food security and diet improvement for people and livestock, reduced out-migration
- ❑ Water resources: improved quality, quantity and availability throughout the year
- ❑ Land resources: increased soil fertility, soil regeneration, no erosion, no need to clear new land
- ❑ Air quality and climate change: less fuel used, no burning of crop residues or forest, carbon sequestration
- ❑ Biodiversity: agro-biodiversity through crop rotations, enhancement of soil biodiversity, less pressure on marginal lands, forests and natural reserves



Crop rotation and permanent soil cover: soybean (crop) after black oat (cover crop and residue cover)



Minimal soil disturbance: direct seeding through crop residues



Direct seeding through crop residues: example of a hand tool

Technologies

Many technologies, including traditional ones, can be adapted to CA principles.

Maintenance of a Permanent Soil Cover

The design of crop rotations and the choice and management of cover crops must ensure that the biomass production is sufficient to satisfy all the needs (food and other crops, livestock feed and residue cover on the soil) and that soil, water and nutrient resources are adequate for the crop. This implies that cover crops have multiple purposes.

Planting through the Soil Cover

This can be done through direct seeding, direct planting or broadcasting into the soil cover, depending on the specific conditions (soil, climate, seeds and cover properties). Suitable machinery and implements **are available** for manual, animal-drawn or mechanised agriculture.

Crop Residue Management and Weed Control

Crop residue management stimulates soil structure formation by soil fauna, improves soil fertility and helps to control weeds with less dependence on herbicides. Weed control in CA is based on an integrated set of techniques:

- agronomic (mulch cover, crop rotation and appropriate sowing date),
- mechanical (hand weeding, slashing and the use of knife rollers),
- chemical (use of desiccants or other rapidly decomposing herbicides only where needed, mainly during the transition to CA).

Pest and Disease Control

Pest and disease control are based on Integrated Pest Management (IPM) technologies.



Mechanical cover crop management