

GOOD PRACTICE SHEET N° 7

CONSERVATION AGRICULTURE

What is conservation agriculture ?

Conservation Agriculture is a farming system that promotes minimum soil disturbance, maintenance of a permanent soil cover, and diversification of plant species and crops. It enhances biodiversity and natural biological processes above and below the ground surface, which contribute to increased water and nutrient use efficiency and to improved and sustained crop production. (FAO)



Which **impactful changes** can conservation agriculture bring to your business model transformation?



Production model



Requires medium commitment



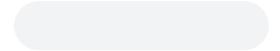
Competitiveness



Requires medium commitment



Revenue model



Not applicable

Why should you implement conservation agriculture?

In Mediterranean rainfed cropping systems, agronomic management practices try to use rainfall more efficiently. Most soils have low soil organic content, due to low water availability, the high temperature and tillage intensity. Conservation Agriculture could in these conditions reduce the risk of soil quality degradation and improve nutrient and water use efficiencies, while providing a more stable yield, supporting smallholder agriculture.

What are the environmental and agronomic needs addressed by conservation agriculture ?



Improve soil fertility and biodiversity



Improve soil structure and limit erosion



Increase soil water infiltration and water-holding capacity

What are the economic needs addressed by conservation agriculture ?



Reduce fertilizer costs



Maintain stable yields

What are the key figures for conservation agriculture?

AGRO-ENVIRONMENTAL IMPACTS

Compared to plowing, **shallow tillage reduces erosion in 83% of cases. Shallow tillage reduces erosion in 90% of cases and no-till in 85% of cases.** (Source: literature review based on 22 Mediterranean references)

A cover crop mixture with including three legumes (vetch, field pea, red clover) produces at least 80 kg of N/ha which can be used by the following crops.

The usable soil reservoir can be increased by 8-15% by practicing conservation agriculture. In addition, **it improves the degradation of phytosanitary products by 5 to 10%** and thus the quality of water. (Source: results of the French Bag'ages project)

SOCIAL IMPACTS

Time saving on tillage and crop establishment can represent 1 to 2 hours per hectare per year. However, this gain is very dependent on the level of simplification compared to the initial situation and will always be more important in heavy soils than in light soils. **This reduction in the need for labor is mainly positioned on peak periods, thus limiting overload situations.**

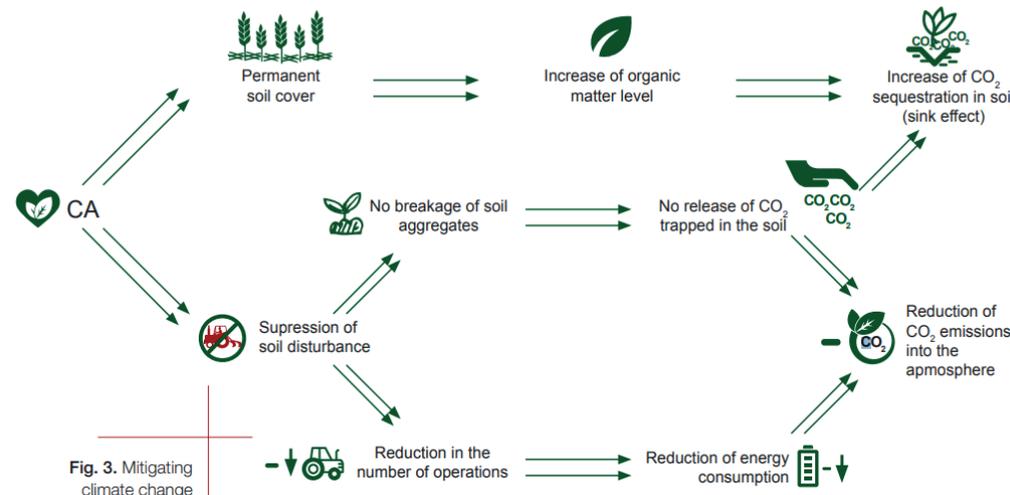


Fig. 3. Mitigating climate change

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ECONOMIC IMPACTS

The reduction of mechanization costs can represent a significant gain for the farm. Mechanization costs (including fuel costs) represent between 150 and 400 euros/ha depending on the crops and the production systems (Source : Arvalis).

The reduction in mechanization costs is estimated **to be between 26% and 30% at the farm level.**

Fuel savings due to the implementation of conservation agriculture are **estimated between 15 and 35 euros/ha/year.**

Advanced Simplified Cultivation Techniques (SCT) and direct seeding with a reduction in traction costs make **it possible to reduce the investment in equipment by 400 to 600 euros/ha.**

POTENTIAL DEVELOPMENT

Global empirical evidence shows that farmer-led **transformation of agricultural production systems based on Conservation Agriculture (CA) principles is already occurring and gathering momentum worldwide** as a new paradigm for the 21st century. CA systems, comprising minimum mechanical soil disturbance, organic mulch cover, and crop species diversification, in conjunction with other good practices of crop and production management, are now **practiced globally on about 125 M ha in all continents and all agricultural ecologies**, including in the various temperate environments. While in 1973 CA systems covered only 2.8 M ha worldwide, the area had grown by 2003 to 72 M ha. **In the last years CA systems have expanded at an average rate of more than 7 M ha per year showing the increased interest of farmers and national governments in this alternate production method.** (Source: Friedrich and al., 2012)

How to implement conservation agriculture?



ON-FARM ISSUES

- 1 Impact on soil structure : erosion, flooding, mudslides...
- 2 Degradation of soil and water quality that reduces yields every year
- 3 Decrease in water holding capacity
- 4 High costs at a farm level : maintenance and mechanization costs
- 5 Decrease in crops water use efficiency



FIELD ADVICE

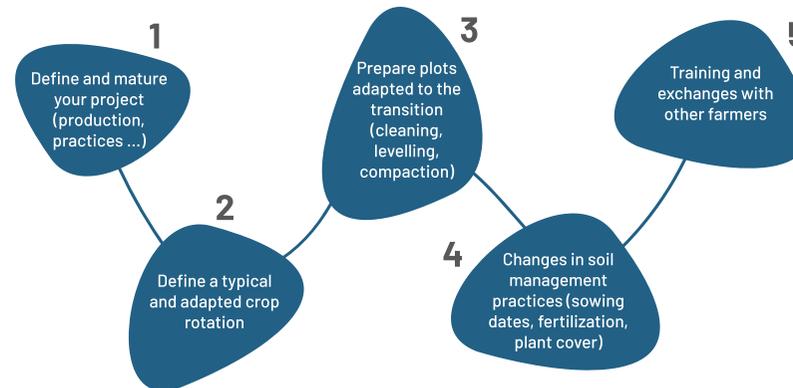
"I was in a mixed farming system with a milk quota of 300,000 liters. The work constraints were enormous. I realized that managing a farm of this type alone would be very difficult and that I had to commit myself to simplification to gain in work comfort. I made the choice to change my system to conservation agriculture in order to pass on a clean system to my children, a soil that is healthy, that can produce. The system I was in, was depleting my soils. Their structure was deteriorating." *Cyrille Ducat, French breeder*

"I took over my uncle's farm which was already no-till. I then introduced legumes in the crop to reduce the purchase of nitrogen fertilizers and increase autonomy. I replaced the oat-based cover crops with faba bean-based cover crops that are easier to destroy. I spread green waste, which nourishes my soil. All these changes, between 2008 and 2014, allowed me to install a coherent cereal system in conservation agriculture." *Raphaël Gardot, French cereal farmer*

"I made my first attempts at Soil Conservation Agriculture, following exchanges with members of a local association. It was also an advantage to reduce my mechanization costs and fuel mechanization and fuel consumption." *Laurent Dejean, French breeder*



KEY STEPS TO A SUCCESSFUL IMPLEMENTATION



IMPACTS AND BENEFITS

- 1 Reduces soil degradation and erosion
- 2 Increases soil organic matter
- 3 Increases soil water infiltration and water holding capacity
- 4 Reduces fertilization costs
- 5 Increase water use efficiency and maintain stable yields



KEY CHALLENGES

A potential decrease in yields

This transition may imply a **decrease in the productivity of the plots**, but this is to be put in perspective with the decrease in expenses.

Long-term soil evolution

Results on the soil are not immediate and the **benefits will only be visible after a few years**.

No specific label

Conservation agriculture does not benefit from a specific label that is well recognized by consumers, but it does **facilitate access to other certifications** such as HVE or the organic label.

How to go further?



MORE INFORMATION DOCUMENTS AND DATA

Hove, L. et al., 2011. Conservation Agriculture Research and Development in Southern Africa: a Review of Achievements and Challenges in the Past 20 Years. In Conservation agriculture regional symposium for southern Africa. Harare: FAO, pp. 1–20.

Johansen, C. et al., 2012. Conservation agriculture for small holder rainfed farming: Opportunities and constraints of new mechanized seeding systems. *Field Crops Research*, 132, pp.18–32. Available at: <http://dx.doi.org/10.1016/j.fcr.2011.11.026>.

Kassam A, Friedrich T, Derpsch R, Lahmar R, Mrabet R et al., 2012. Conservation agriculture in the dry Mediterranean climate. *F. Crop. Res.* 132, 7–17. doi: 10.1016/j.fcr.2012.02.023

Nyagumbo, I. et al., 2017. Planting date and yield benefits from conservation agriculture practices across Southern Africa. *Agricultural Systems*, 150(November), pp.21–33. Available at : <http://dx.doi.org/10.1016/j.agsy.2016.09.016>.

Peigné J, Lefevre V, Vian JF, Fleury P, 2015. Conservation agriculture in organic farming: experiences, challenges and opportunities in Europe, in *Conservation Agriculture (Switzerland: Springer International Publishing)*, 559–578. doi: 10.1007/978-3-319-11620-4_21



DISCUSS AND TEST PROJECTS, TOOLS AND NETWORKS

CAMA (Conservation Agriculture in the Mediterranean Area) : The CAMA project aims to identify the main barriers that hinder Conservation Agriculture adoption by smallholders of Mediterranean countries and to overcome them with a participatory research approach based on the use of field experiments and pilot case studies in several conditions and the development of an extensive program of dissemination and training.

European Conservation Agriculture Federation (ECAAF) is a non-profit international association. It is conceived to encourage any issue focused on maintaining the agrarian soil and its biodiversity in the context of sustainable agriculture. It aims to encourage development, teaching and investigation on any aspect related to Conservation Agriculture and the biodiversity of agrarian soil.

The International Center for Agricultural Research in the Dry Areas (ICARDA) is an international organization undertaking research for development. It provides innovative, science-based solutions for communities across the non-tropical dry areas. In partnership with research institutions, NGOs, governments, and the private sector, their work advances scientific knowledge, shapes practices and informs policy.



TAKE ACTION FUNDING SOURCES

The Partnership on Research and Innovation in the Mediterranean Area (PRIMA) offers various grants for consortia consisting of public and private actors in the Euro-Mediterranean region who are working in fields related to farming, agro-food systems and value chains, as well as water resources. It is a ten-year initiative (2018-2028), partly funded by EU's research and innovation program, Horizon 2020. Its main objective is to devise new research and innovation approaches to improve water availability and sustainable agriculture production in a region heavily distressed by climate change, urbanization and population growth. It supports sustainable farming systems under Mediterranean environmental constraints, including the development of conservation agriculture like the **ConServeTerra project**.

Horizon 2020 is the biggest EU Research and Innovation program ever, with nearly €80 billion of funding available, in addition to the private investment that this funding will attract. It supports research and innovation activities in the following areas: agriculture and forestry (food security, environmental sustainability and economic opportunities through agriculture), environment and climate action.