



**ConServe
Terra**

Towards Conservation Agriculture
in the Mediterranean Area



Policy recommendations

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Summary

Despite the known benefits of Conservation Agriculture (CA), it lacks widespread adoption in the Mediterranean region. The project ConServeTerra aims to facilitate wider acceptance and adoption of CA principles in the Mediterranean region by tackling the mental, cultural, and contextual realities surrounding farmers' soil management decisions. Through farmer interviews, field experiments, and attending conferences, we developed flexible CA principles suitable for the Mediterranean region, in contrast to the often-fixed CA principles of no-tillage, permanent soil cover, and crop rotations. For example, with the predominant crop-livestock system in Northern Africa, optimal stubble grazing can reduce the trade-off between using crop residues for feed and soil mulch. To enhance the adoption of CA, we recommend the implementation of policies that offer incentives for farmers. Policy recommendations include subsidies for sustainable agricultural practices, such as the inclusion of legumes in crop rotation, more collaboration between stakeholders, and the establishment of demonstration farms to show the impact of CA on yields and soil processes.

1. Introduction

Mediterranean farming systems are currently challenged by periods of drought, erratic and heavy rainfall and rising temperatures. Combined with extensive tillage and monoculture, there is a high risk of soil and water erosion, which reduces yields. Conservation agriculture (CA), with its three principles of no-tillage, permanent soil cover and diverse crop rotations, has been promoted as a promising alternative for dryland farming systems to cope with climate-induced water scarcity and to regenerate soils. By improving soil stability and structure, it can increase the resilience of farms to maintain future crop productivity and stabilise yields. Despite the clear benefits, CA is not yet widespread in the region. Policy support in the form of financial, technical and knowledge can play an important role in the further adoption of CA to cover external costs and increase the uptake of a sustainable agricultural system.

This deliverable presents the main findings of the ConServeTerra project: the approach and methods used to collect data, the barriers to CA adoption, the policy status in partner countries, and general policy recommendations for the Mediterranean region.

2. Approach and methodology

Despite the many benefits of CA, such as increased water availability, higher levels of soil organic matter and increased productivity due to greater resilience to drought, adoption rates are still negligible. ConServeTerra believes that key constraints are linked to mental and cultural attitudes, and that CA promotion initiatives often fail to consider the local context. In the initial phase of the project, we aimed to understand farmers' perceptions and values regarding soil (Figure 1). Based on these findings, we developed a curriculum for farmer field schools to enhance knowledge and appreciation of soils. Subsequently, pragmatic solutions to CA principles were formulated through field experiments, tailored to the Mediterranean conditions.

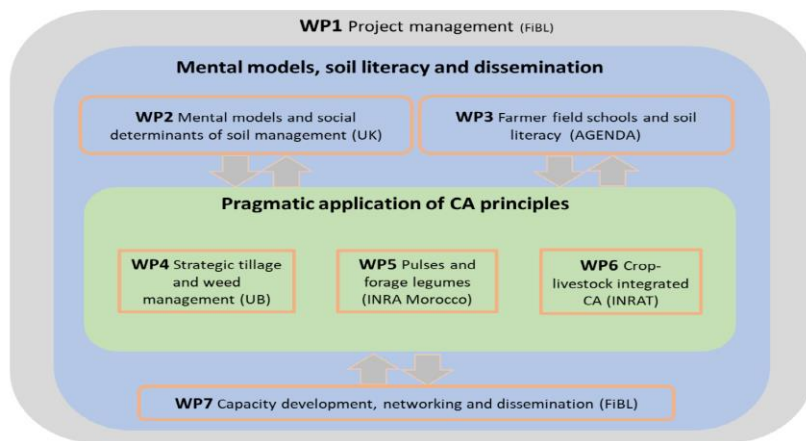


Figure 1. Overview of work packages and the general approach of ConServeTerra

Throughout the project, data was collected and analysed in four Mediterranean countries, including Türkiye, Spain, Morocco and Tunisia, using a variety of methods and involving a wide range of stakeholders:

Farmer interviews: Project partners interviewed more than 500 farmers in Morocco, Spain and Tunisia to explore the concept farmers associate with soil, how they perceive tillage and to understand the barriers to increasing CA uptake in the region (Figure 2). Results are presented in deliverables 2.2, 2.3, 3.2 and 3.5.

On-farm and off-farm trials: A total of 15 on-station and 21 on-farm experiments were conducted in Morocco, Spain, Tunisia and Türkiye. Experiments focused on the pragmatic application of CA and included studies on optimal stubble grazing, the impact of strategic tillage on soils, appropriate crop rotations and weed management under CA (Figure 3). Results are published in deliverables 4.2, 4.3, 5.2, 5.3, 5.4, 5.6, 6.1 and 6.3.

Expert meetings and conferences: The first Mediterranean Conservation Agriculture Conference in November 2023 in Tunis, Tunisia organized by the three PRIMA EU-funded projects ConServeTerra, CAMA and 4CEMED shared research findings, practical experiences and recommendations to overcome barriers and increase adoption in the region (Figure 4). Around 100 people joined the conference live and around 200 people joined virtually. The panel comprised farmers, scientists, and policymakers from countries in North Africa and Southern Europe. The participation of a wide range of stakeholders allowed for lively discussions on suitable strategies and a more in-depth understanding of current initiatives. As a result, recommendations for farmers, scientists and policymakers were jointly formulated.

In addition to the conference, the project partners participated in several international conferences to present their findings and participate in discussions, such as:

- 22nd World congress of soil science (Glasgow, 2022)
- International Scientific Symposium: Sustainable land management in arid and semi-arid regions (Kassel, 2023)
- The third African Congress on Conservation Agriculture (Morocco, 2023)

Participation facilitated enhanced networking with stakeholders and provided valuable input for developing the pragmatic approach and formulating policy recommendations.

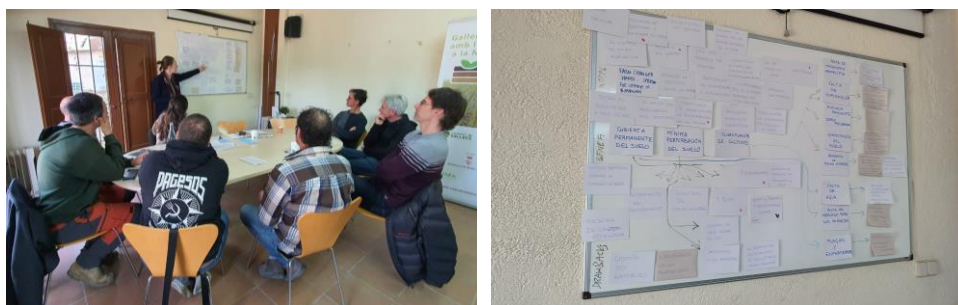


Figure 2. Impressions of a workshop on mental models organized by Gallecs in Spain



Figure 3. Impression of the experiment on the impact of tillage and crop rotation on wheat productivity in the Konya region in Türkiye.



Figure 4. Impressions of the CA conference

3. Policy status in partner countries

To formulate policy recommendations based on the project findings, we initially examine the current adoption of CA and the policy support in the partner countries.

Morocco is one of the largest practitioners of CA in the region. As part of the national Green Generation 2020-2030 strategy, the country aims to bring one million hectares of cereals under CA by 2030 (ICARDA, 2021). To achieve this, strategies have been formulated in a national programme. The initiatives are largely the result of long-term research by ICARDA and INRA, which identified CA as an alternative for dryland farming systems. Research has focused on crop rotation systems and alternating cereals with fodder crops and legumes to increase SOM, improve soil fertility and reduce the widespread monocultures of cereals, which play a major role in soil depletion.

In Türkiye, unofficial estimates suggest that approximately 100,000 hectares are dedicated to conservation agriculture, predominantly in dryland regions and primarily cultivated with cereals (Kassam, 2021). The Ministry of Agriculture and Forestry is responsible for the policies aimed at increasing production, food security and soil conservation through environmentally sustainable practices (Kassam,

2021). In 2011, a pilot project was initiated to mitigate erosion and combat desertification through subsidization and technical assistance to farmers adopting CA. This policy remains in place and is currently further developed.

Despite initiatives to promote CA in Tunisia, the adoption of CA is limited to a total of 16,000 ha in 2022 (M'hamed et al., 2022). The first initiatives to introduce CA started in the late 1990s and showed promising effects of no-tillage on cereal yields and soil moisture. However, legume yields remained poor because no alternative weed control to tillage had been found. Upscaling began in the 2010s facilitated by CA projects and increased support for research, as droughts and environmental challenges increased. To make CA more suitable for the traditional crop-livestock system, research since 2013 has focused on crop-livestock integration in CA systems to reduce the trade-off between using crop residues as fodder through grazing or as soil mulch, especially in arid areas where there is little additional fodder production. Overall, policy support in Tunisia is inadequate and there are calls for the government to provide support through the implementation of a national strategy.

Agricultural policies in EU Member States in the southern region of Europe are closely linked to the EU's Common Agricultural Policy (CAP), which is one of the main support mechanisms for farmers (EU, 2024). The 2023-2027 CAP, with its new eco-schemes instrument, subsidizes agricultural practices that benefit the environment and the climate, such as diverse crop rotations, soil cover and measures to reduce soil degradation, all in line with CA principles. In Spain, for example, farmers can participate in the eco-scheme "Carbon Farming and Agroecology: Crop Rotation and Direct Seeding". Here, direct seeding is strictly linked to diverse crop rotations and the inclusion of legumes. In addition, some regions offer additional support for the application of good agricultural practices aiming to conserve soil, such as the use of cover crops and direct seeding.

4. Adoption barriers

CA, although known to be among the best strategies to mitigate the effects of climate change and soil degradation, lacks large-scale adoption in the Mediterranean region. Despite policies to support the uptake of CA, reluctance remains by farmers. Below are some adoption barriers identified from the project findings:

- Limited inclusion of legumes in rotations due to limited access to seeds and marketing opportunities.
- Livestock grazing, which limits the ability to leave biomass on the ground as soil cover.
- Weed pressure due to no-tillage and limited access to affordable herbicides.
- Limited access to direct seeding machinery.
- Limited knowledge of soil processes and soil as a living entity.
- Insufficient promotion of CA for the Mediterranean context.

While in the southern Mediterranean countries low access to direct seeding machinery, weeds and stubble grazing are identified as the main constraints, in the northern Mediterranean countries lack soil knowledge and cultural misconceptions about soil management play a key role, given the availability of inputs.

5. The pragmatic approach

CA is often promoted as a package based on the principles of no-tillage, permanent soil cover and diversified crop rotations. The solution to overcoming barriers is a pragmatic and flexible approach to CA, which considers site conditions and socio-cultural aspects.

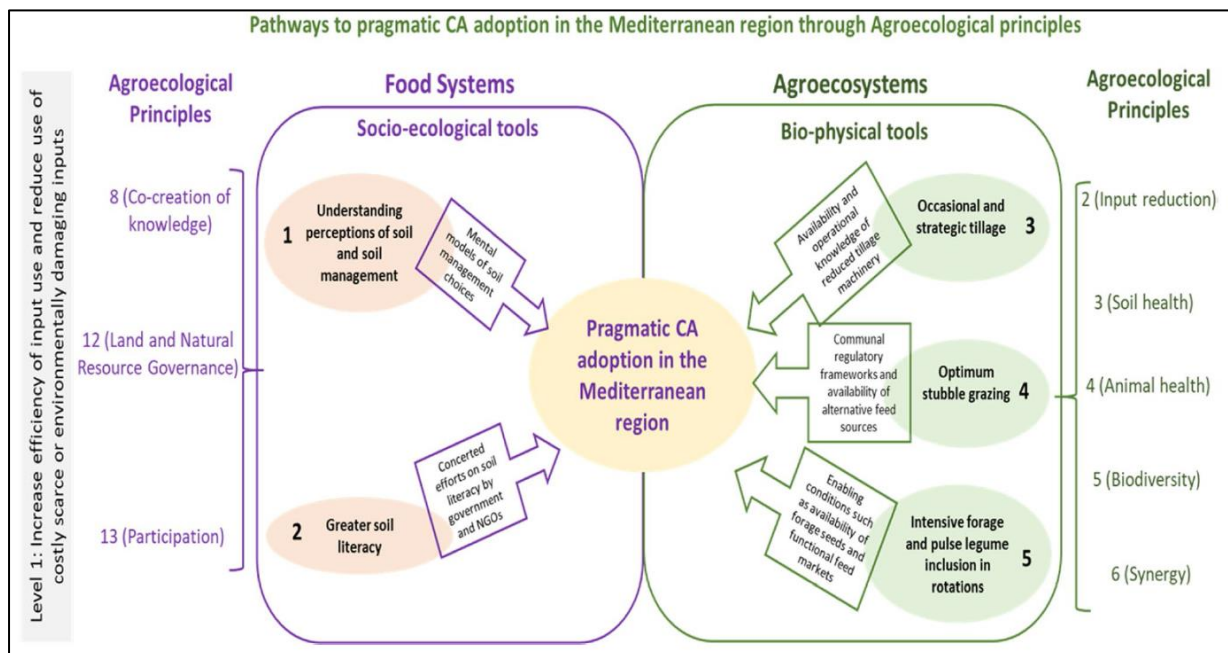


Figure 5. Pathways to a pragmatic CA adoption in the Mediterranean (published in Cicek et al., 2023)

In total the project identified five pathways (Figure 5):

- 1. Understanding perceptions of soil and soil management:** How farmers understand and perceive soil influences their land management choices and affects the extent to which soil is conserved. Understanding socio-cultural values, traditions and motivations can help develop Farmer Field Schools and farming practices appropriate to local conditions, rather than promoting CA as a package.
- 2. Soil literacy:** Next to agronomic principles, a basic understanding of soil processes is key to increasing farmers' appreciation of soil and their ability to practice CA. Farmer Field Schools (FFS) introduce farmers to soil processes using interactive tools such as a rainfall simulator and can act as a platform for co-learning and sharing experiences.
- 3. Occasional and strategic tillage:** A strict no-till approach contradicts the reality of Mediterranean farmers, as tillage is a common tool for weed control, especially when affordable herbicides are limited. Occasional, strategic and reduced tillage can be an alternative to the strict no-tillage principle and motivate farmers to adopt CA. Benefits include the reduction of animal driven soil compaction, disrupting pest cycles, incorporating organic matter, controlling herbicide-resistant weeds and encouraging weed seed germination before planting. The type of machinery, timing and number of tillage operations will depend on the application objective, soil type, tillage costs and erosion risk.
- 4. Optimum stubble grazing:** In CA, it is advised to leave crop stubbles on the field, which is difficult to implement due to the traditional grazing of crop residues. Intensive grazing with high stocking rates can have a negative effect on soil structure, leading to soil compaction and reduced water infiltration, resulting in more weeds and lower yields. However, these negative consequences are only seen in wetter areas in the globe. There is no scientific data from the Mediterranean region. Although excessive grazing is wrong, farmers should not be discouraged to apply CA if their fields are grazed beyond their control. An optimal approach would be a moderate grazing at lower stocking rates or grazing only immediately after harvest, when the nutritional value of crop residues is highest.
- 5. Diverse crop rotations with forage and pulse legumes:** Legumes are important for biodiversity, input reduction, soil fertility, soil structure and economic diversification. In particular, the

inclusion of forages in the farming system can increase the adoption rate of CA due to their ability to suppress weeds and reduce the trade-off between the use of crop residues for biomass or as soil mulch. Farmers should be encouraged to start CA conversion with mixed forages. Limited availability and high cost of forage seeds are major obstacle to forage cultivation. A concerted effort should be made by the government and seed companies to make forage seeds available and affordable. For pulse production under CA, in-row cultivation for weed control should be promoted, especially in areas where selective herbicides are expensive and/or unavailable.

6. Recommendations

Due to the heterogeneous production systems, climatic conditions, and socio-cultural values across Mediterranean countries, but with shared challenges, we have developed general policy recommendations. These should be seen as a first step towards formulating policies aimed at promoting CA in the region. As a next step, we encourage national governments, in collaboration with stakeholders including farmers and researchers, to jointly formulate policies tailored to regional conditions.

1. Offer supportive policies for farmers

- **Offer subsidies to farmers who implement CA practices:** Examples of practices include crop rotation, minimum tillage, cover crops and the inclusion of certain crops such as legumes. Such a system has been introduced by the EU under the second pillar of the Common Agricultural Policy, which aims to make the agricultural system more sustainable.
- **Subsidize specialist machinery at regional level:** The high cost and lack of local availability of direct seeders is often a barrier to adoption, especially for smallholder farmers. Subsidising machinery or establishing a government machinery park can make CA accessible to a wider range of farmers. Subsidizing hiring costs of external service providers could also increase access to machines.
- **Offer training to educate farmers on soil management and soil processes:** Understanding soil processes and soil risks can help farmers to value soil and adopt soil conservation practices. Including examples of cost-savings, based on a practical example to CA conversion, can further encourage farmers to adopt CA.
- **Strengthen advisory services and training for advisor:** Offering field days at best-practice farms and government research stations supports peer-to-peer learning, farmer-to-consultant interaction and allows consultants to familiarise themselves with CA. Subsidising initial consultancy sessions can make CA accessible to less financially stable farmers.

2. Strengthen collaborative efforts between stakeholders across all sectors

- **Set up state-owned demonstration farms:** Demonstration farms, featuring both conventional and CA plots, represent an effective tool for demonstrating CA practices and associated benefits. Moreover, they function as a valuable platform for knowledge exchange among diverse stakeholders.
- **Encourage collaboration between government agencies, advisory services, NGO's and farmer cooperatives:** CA is a multifaceted agricultural approach, whose success depends on diverse factors encompassing environmental and socio-cultural contexts. Effective implementation and spreading requires collaborative efforts among stakeholders to exchange best practices and to stay up to date with latest research results.

- **Support further research on legume cultivation under no-till and technical knowledge in the context of low-input smallholder farmers:** Weed management in legume crops remains a key challenge in CA. While ConServeTerra has produced some initial results, it has also been challenged by recurrent droughts. Further long-term studies under similar climatic conditions suitable for smallholder farmers are needed.

3. Monitor and evaluate policies

- **Avoid conflicting policies:** If subsidies are available for other agricultural practices, the farmer will choose the more attractive one in terms of finance, application and crops.
- **Adapt policies based on farmer feedback and developments:** Adjusting policies based on farmer feedback ensures that policies are relevant and practical. As challenges are dynamic, policies need to be flexible to remain effective and appropriate for farmers.
- **Track adoption rates of CA:** Tracking adoption rates helps to assess the effectiveness of policies and initiatives to promote CA, and to target resources where they are most needed. With good data, informed decisions can be made.

7. Deliverable output

The results of this deliverable are summarised in a practitioner's factsheet and a policy brief. The policy brief explains the pragmatic approach to CA and provides policy recommendations (Annex 1). The factsheet provides an executive summary of the pragmatic approach of CA with practical examples in the Mediterranean region (Annex 2). Both factsheets have been made available to the public through the project website, social media and project partners' newsletters.

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Annex 1: Factsheet for policy makers



Policy brief

A pragmatic approach to Conservation Agriculture in the Mediterranean region

Scientific evidence and policy recommendations



Conservation Agriculture: An alternative for dryland agriculture to tackle water-scarcity

Mediterranean farming systems are currently challenged by periods of drought, erratic and heavy rainfall and rising temperatures. Combined with extensive tillage and monoculture, there is a high risk of soil and water erosion, adversely affecting yields. Conservation agriculture (CA), with its three principles of no-tillage, permanent soil cover and diverse crop rotations, has been promoted as a promising alternative for dryland farming systems to cope with climate-induced water scarcity and to regenerate soils. By improving soil stability and structure, the resilience of farms can be increased to maintain future crop productivity and stabilize yields.

Key messages

- CA is an alternative dryland farming system to cope with water scarcity.
- To increase adoption, a more pragmatic approach to CA is needed that reflects the reality of Mediterranean farmers.
- Support policies for farmers must be strengthened.
- Collaborative efforts between different stakeholders needs to be improved.

Scope


This factsheet is based on interviews, on-field and on-station research in Morocco, Spain, Tunisia and Türkiye carried out as part of the ConServeTerra project between 2020 and 2024. The project aimed to facilitate wider acceptance and adoption of CA principles in the Mediterranean area by understanding constraints and developing best management strategies under local conditions.

Barriers to adoption

Despite the benefits, the uptake of CA in the Mediterranean remains negligible. Key constraints are

- Limited inclusion of legumes in rotations due to limited access to seeds and marketing opportunities.
- Livestock grazing, which limits the ability to leave biomass on the ground as soil cover.
- Weed pressure due to no-tillage and limited access to affordable herbicides.
- Limited access to direct seeding machinery.
- Limited knowledge of soil processes and soil as a living entity.
- Insufficient promotion of CA for the Mediterranean context.

1



Policy brief

Results: A pragmatic approach to CA

Standard CA	Pragmatic CA
No-tillage through direct seeding	Occasional and strategic tillage
At least 30% permanent soil cover with crop residues and cover crops	Optimum stubble grazing
Diverse crop rotations with at least three different crops	Diverse crop rotations with forage and pulse legumes
	Soil literacy




For CA in practice, have a look at the factsheet for practitioners

FRAO (2024), Conservation Agriculture. <https://www.fao.org/conservation-agriculture/>. Accessed: 11.06.2024

CA is often promoted as a package based on the principles of no-tillage, permanent soil cover and diversified crop rotations. The solution to overcoming barriers is a pragmatic and flexible approach to CA, which considers site conditions and socio-cultural aspects:

- Occasional and strategic tillage:** A strict no-till approach contradicts the reality of Mediterranean farmers, as tillage is a common tool for weed control, especially when affordable herbicides are limited. Occasional, strategic, and reduced tillage can be an alternative to the strict no-tillage principle and motivate farmers to adopt CA. Benefits include the reduction of animal driven soil compaction, disrupting pest cycles, incorporating organic matter, controlling herbicide-resistant weeds and encouraging weed seed germination before planting. The type of machinery, timing and number of tillage operations will depend on the application objective, soil type, tillage costs and erosion risk.
- Optimum stubble grazing:** In CA, it is advised to leave crop stubbles on the field, which is difficult to implement due to the traditional grazing of crop residues. Intensive grazing with high stocking rates can have a negative effect on soil structure, leading to soil compaction and reduced water infiltration, resulting in more weeds and lower yields. However, these negative consequences are only seen in wetter areas on the globe. There is no scientific data from the Mediterranean region. Although excessive grazing is contrary to
- Diverse crop rotations with forage and pulse legumes:** Legumes are important for biodiversity, soil fertility, soil structure and economic diversification. In particular, the inclusion of forages in the farming system can increase the adoption rate of CA due to their ability to suppress weeds and reduce the trade-off between the use of crop residues for biomass or as soil mulch. Farmers should be encouraged to start CA conversion with mixed forages. Limited availability and high cost of forage seeds are major obstacles to forage cultivation. A concerted effort should be made by the government and seed companies to make forage seeds available and affordable. For pulse production under CA, in-row cultivation for weed control should be promoted, especially in areas where selective herbicides are expensive and/or unavailable.
- Soil literacy:** Next to agronomic principles, a basic understanding of soil processes is key to increasing farmers' appreciation of soil and their ability to practice CA. Farmer Field Schools (FFS) introduce farmers to soil processes using interactive tools such as a rainfall simulator and can act as a platform for co-learning and sharing experiences.

2



Policy brief

Benefits of Conservation Agriculture

Improved water infiltration

Water accumulation in the soil layer between 100 and 180 cm is 46 mm higher in CA

Increased yields

In a wheat-lentil rotation wheat yield can be 60% higher in CA

Higher profit and reduced production costs

Production costs are on average 13,4% lower in CA

Reduced soil erosion

Through reduced exposure to water run-off and wind

Improved soil fertility and structure; more soil organic matter

Through the addition of crop residues

Policy example: Morocco to convert 1 million ha to Conservation Agriculture

Morocco is the largest practitioner of CA in the region. As part of the national Green Generation 2020-2030 strategy, the country targets one million hectares of cereals under CA by 2030. To achieve this, strategies have been formulated in a national program. The initiatives are largely the result of long-term research by ICARDA and INRA, which have identified CA as an alternative for dryland farming systems. Research has focused on crop rotation systems and alternating cereals with fodder crops and legumes to increase soil organic matter, improve soil fertility and reduce the widespread monocultures of cereals, which play a major role in soil degradation.

Policy recommendations

Farmers have different preferences and motivations when it comes to their choice of agricultural practices. Not all farmers will adopt CA practices in the same way and to the same extent. Policies need to provide a range of options to cater for farmers with different interests and to encourage wider adoption.

Offer supportive policies for farmers

- Offer subsidies to farmers who adopt CA practices such as crop rotations, minimum tillage, cover crops and the inclusion of certain crops like legumes.
- Subsidize specialist machinery at regional level.
- Offer training to educate farmers on soil management and soil processes.
- Strengthen advisory services and training for advisors through e.g. offering field days.


Strengthen collaborative efforts between stakeholders across all sectors

- Set up state-owned demonstration farms to demonstrate CA practices and its benefits. Encourage collaboration between government agencies, advisory services, NGOs and farmer cooperatives.
- Support further research on legume cultivation under no-till and technical knowledge in the context of low-input smallholder farmers.

Monitor and evaluate policies

- Avoid contradicting policies as farmers will choose the more attractive ones.
- Adjust policies based on farmer feedback and developments.
- Track adoption rates of CA.

3



Policy brief

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Annex 2: Factsheet for practitioners



Factsheet for practitioners

Conservation Agriculture in the Mediterranean region

Practical recommendations for a pragmatic approach to CA









This factsheet outlines the benefits of Conservation Agriculture (CA) and what to consider when applying CA for the first time. It shows that CA can be adapted to your own farm's context. Best practice examples show how other farmers in the Mediterranean have successfully integrated CA practices on their farms.

The information is based on research from on-farm and station experiments conducted between 2020 and 2024 as part of the ConServeTerra project. The project aimed to facilitate wider acceptance and adoption of CA principles in the Mediterranean region by understanding constraints and developing


Mediterranean farming based on monoculture, intensive tillage and intensive grazing is at high risk of erosion and soil degradation, which is further intensified by climate change.

Conservation agriculture directly addresses these challenges: by increasing water-use efficiency, improving soil structure and fertility through the addition of organic matter, diverse crop rotations and no-tillage.

Benefits of Conservation Agriculture

<p>Improved soil fertility and structure; more soil organic matter</p> 	<p>Increased profit and reduced production costs</p> 	<p>Higher yields</p> 
<p>Improved water infiltration</p> 	<p>Reduced soil erosion</p> 	<p>Biodiversity increase</p> 




1



Factsheet for practitioners

A pragmatic approach towards Conservation Agriculture

Conservation Agriculture has three main principles: No tillage, permanent soil cover and diverse crop rotations. Barriers to the adoption of CA in the Mediterranean include high weed pressure, limited access to seeds and marketing opportunities for legumes, and a trade-off between using crop residues as fodder or as soil mulch. Also, CA is often promoted as a package, without regard to the local context. A pragmatic and flexible approach to CA, considering local conditions and socio-cultural aspects, ensures the benefits of CA while being more practical for your farm.

Standard CA	<p>No-tillage through direct seeding</p> <p>↓</p> <p>Occasional and strategic tillage</p>  <ul style="list-style-type: none"> • Occasional tillage helps to reduce (herbicide-resistant) weeds and animal driven compaction. • Inter-row tillage can be another alternative to chemical weed control. • The timing and number of tillage operations depends on the application objective, soil type, tillage costs and weed pressure. • Avoid tillage in months prone to wind and water erosion, or when the soil is wet. 	<p>At least 30% permanent soil cover with crop residues and cover crops</p> <p>↓</p> <p>Optimum stubble grazing</p>  <ul style="list-style-type: none"> • Allow grazing for a short period after harvest when the nutritional value is the highest, to reduce the trade-off between plant biomass for soil and forage. • Find an optimum stocking rate that allows 20 to 30% of the crop residues to be left as mulch on the soil surface to improve soil properties and alternatively feed forage crops with a higher nutritional value. • Project results in Tunisia showed an optimum stocking rate of up to 30 sheep/ha for 30 days.
Pragmatic CA	<p>Diverse crop rotations with at least three different crops</p> <p>↓</p> <p>Diverse crop rotations with forage and pulse legumes</p>  <ul style="list-style-type: none"> • Include perennial and annual forages and pulses in your crop rotation to enrich the soil with organic nitrogen, suppress weeds and reduce pests and diseases. • Incorporate forage to reduce the trade-off between crop residues for feed or as soil mulch. • Examples include chickpeas, lentils, Hungarian vetch, forage peas/barley or triticale and oat mixtures. 	

How to start with conservation agriculture on your farm

- Attend **courses and field days** focusing on soil processes, management and conservation.
- **Talk to extension workers and other farmers** who are already practising CA and share your experiences.
- Start with an **experimental trial on your farm**, for example to find the optimum stocking rate and suitable crops for a diverse crop rotation.
- **Start with forage mixtures** of vetch, forage peas, barley and triticale. Best practice is to use forage mixtures for two years to improve soil conditions and reduce weed pressure.
- **Hire machinery**, such as a direct seeder, from extension agents or farmers' organisations.

2



Factsheet for practitioners




Implementation of forage mixtures in a no-till system

Forage mixtures are a must in any no-till system to reduce weeds, improve soil biology, produce high quality forage and improve soil moisture holding capacity. ConServeTerra results show that the best mix is 30% cereals and 70% forage legumes, hayed at the end of flowering before seed formation. The mixtures should be applied once implementing no-till, to eliminate resistant weeds that may have established in fields. After cutting the forage mixture, livestock can graze it as an alternative to using herbicides. Incorporating forage into the management system can reduce stubble grazing as a barrier to CA adoption.

Successful livestock integration for weed control in a no-till faba bean system

The West Maroc family farm in the Meknes region of Morocco, characterised by a hot Mediterranean climate, is one of the few farms in the country to adopt conservation practices. Today, they practice no-till on 400 ha since 2012 to better manage water, regenerate soils and reduce the erosion risk.

One challenge with no-till is weed control. As an alternative to the limited supply of herbicides, they integrated livestock into the faba bean crop. This involves planting two rows of faba beans and leaving three rows, totalling 60 cm, empty. The sheep then graze the weeds until the faba bean flowers at a height of about 30 cm. Up to this point, the plants are too bitter for the animals to graze. However, as the sheep do not remove the roots, in some cases herbicides may be applied at later stages, and the plants are manually weeded in rows if necessary. The integration of livestock reduces the use of herbicides and tillage.

Visit the project website www.conserveterra.org or contact the project partners for more information:

- **Practice abstracts** with more detailed practical recommendations for implementing CA
- **Policy recommendations** for the promotion of CA in the Mediterranean region
- **A practical guide** to CA in different languages (English, Arabic, Spanish)
- **Videos** on implementing CA in practice.

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Factsheet for practitioners

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