

Conservation agriculture in the Maghreb

Farmers improve their practices

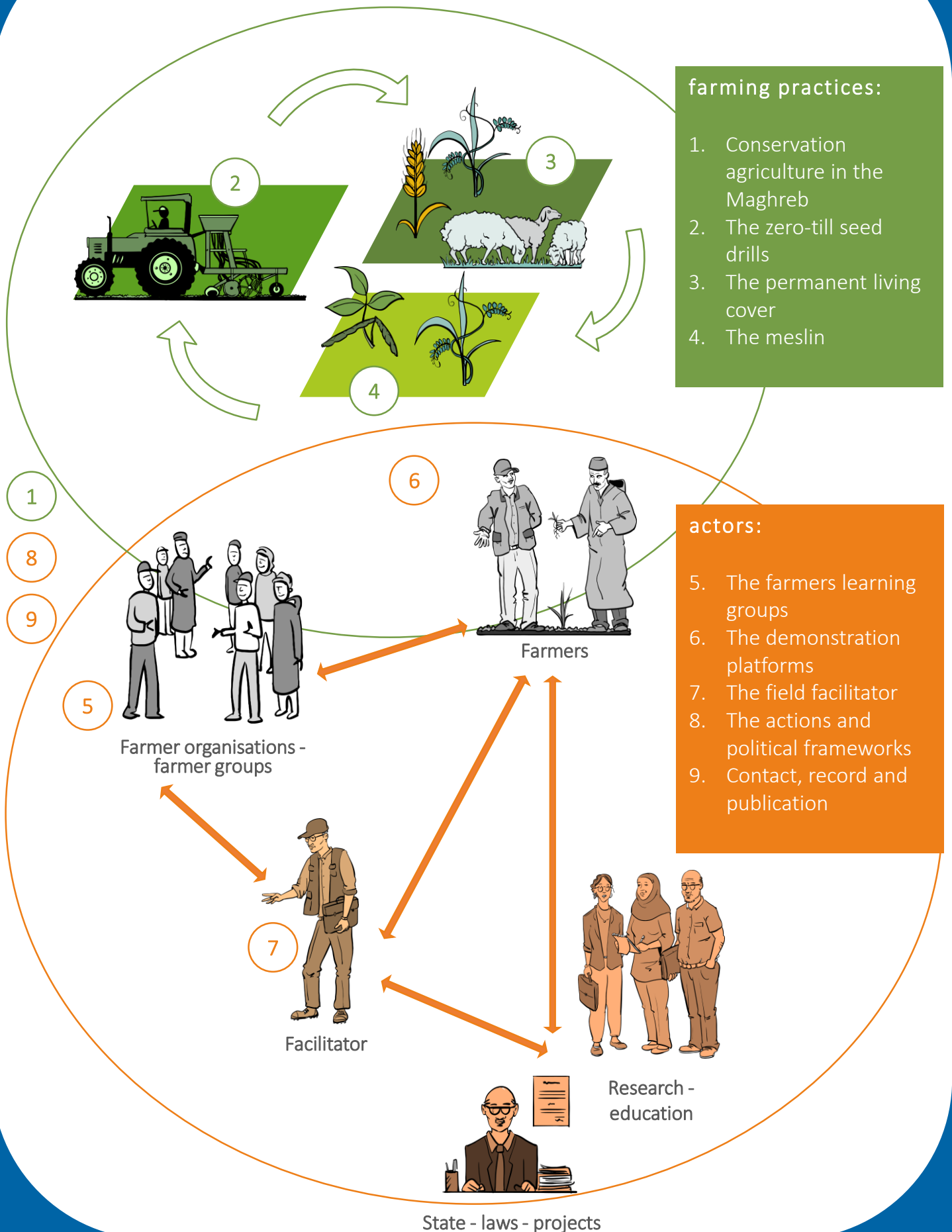


30 years of Fert's action

This dossier summarises the collaboration between Fert, farmers and other conservation-agriculture stakeholders in the Maghreb, which have been at the heart of discussion and action. They carry within themselves a wealth of experience ready to share.

Contents

An entry into the systemic dimension of conservation agriculture



Conservation agriculture in the Maghreb

Stakes and challenges in its development

In 2010, the FAO estimated that more than 100 million hectares were being cultivated using conservation agriculture (CA) across the world. Highly adopted on the American continent over large surface areas, it has been adopted to a far lesser degree in family farming on the African continent though.

In the Maghreb, where this practice has been introduced from the 1980s, its adoption remains limited, despite the responses that it can bring to the challenges of preserving the soil, yields, reducing production-cost and adapting to climate change.

A response to agronomic, ecological and economic challenges



In the Maghreb, over the last few decades, population growth has generated significant food needs, leading to an intensification of the agricultural use of soil. The region has experienced recurring droughts associated with periods of significant rain concentrated into very short periods affecting bare soil or soil with little cover. The high demand for cereals and the socio-economic constraints of farmers have also led to a simplification of cropping practices (restricted rotations or even mono-cropping, a reduction in fallow, decreased fertilizer and manure use) and have resulted in strong soil degradation: wind and water erosion and loss of soil fertility, resulting in a decline in yields and incomes. In an environment as exposed to the effects of climate change and composed largely of rain-fed agriculture, it becomes essential to adopt practices that better enhance water resources.

An agricultural practice based on three principles

Conservation agriculture is defined as a method of managing agro-systems, the purpose of which is to improve productivity while preserving and improving environmental resources (FAO).

It rests on three pillars:

1- Minimum soil disturbance

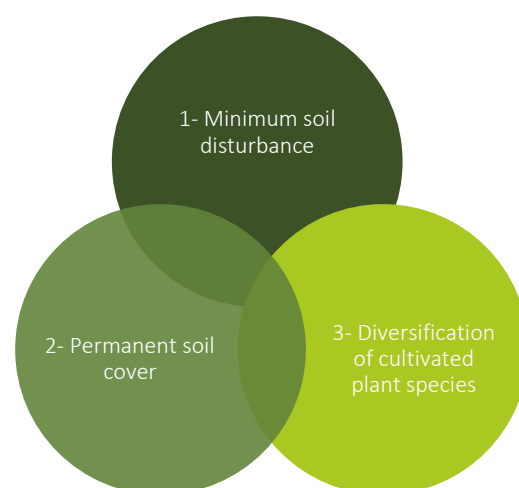
This means reducing or even eliminating tillage by replacing systematic deep ploughing with practices ranging from occasional ploughing to zero tillage or sowing under plant cover (this final one has been tested as part of Fert's actions in the Maghreb).

2- Permanent soil cover

Either by mulch, or by combining living cover. This cover is intended to protect the surface of the soil, retain moisture and contribute to enriching and structuring the soil.

3- The diversification of cultivated plant species

In combination and/or in long rotations. This rotation of crops helps to fight against weeds and plays an important role in soil fertility through the combination of pulses.



It is believed by the scientific community and practitioners that a **combination of these three principles** provides beneficial effects. Although it is easy to talk about, in practice, combining them is extremely varied and involves **new know-how among farmers** compared to conventional practices.

The benefits seen...

Results have been noted and a consensus reached (among the "adopters" of CA in the Maghreb, and more widely across the world):

- a reduction in working time, through less tillage;
- a reduction in fossil-fuel consumption;
- an improvement in the biology of the soil and its level of organic matter;
- an improvement of water retention;
- a decrease in erosion and slaking, by covering the soil and improving the structure and the life of the soil;
- a reduction in soil evaporation.

Yields can be improved or degraded depending on the context and years, but generally tends to be improved after several years of practice.

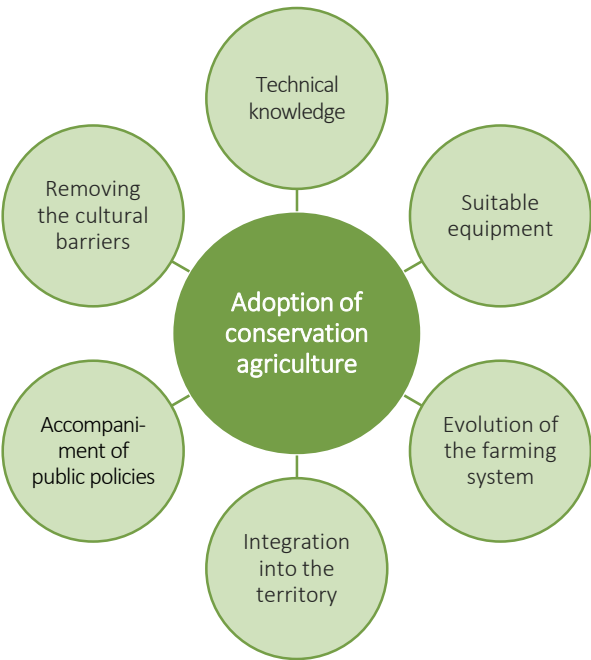


+ 8% to 20% yields noted by the farmers involved in CA in the Maghreb compared to conventional practices

The tests conducted in the Maghreb have shown very good resistance to droughts and a particularly relevant response to the advanced degradation of soils.

...but challenges to be addressed

It means a practice that, for the farmer, involves changes in every aspect of the farming system (equipment, seeds, crop systems, feeding livestock, commercialisation, etc.) and the territory. This innovation is also seen as “systemic”, which makes its wide scale adoption more difficult, and depends on a number of factors.



In the Maghreb, the stakeholders involved in the practice have sought to provide responses to some of the obstacles that are contributing to slowing down its dissemination. There are, in fact, several types of obstacle:

- a very strong cultural attachment to ploughing (an ancestral technique that is difficult to change);
- the lack of references in the Maghreb’s agro-ecosystems;
- the difficulty of accessing zero-till seed drills, suited to the context (typography, types of soil, limited power of the tractors);
- perceived uncertainty when taking the risk to modify the operational system;
- competition with crop-residue grazing practices;
- difficult weed-management without the use of chemical products;
- little knowledge from the public authorities but which tends to evolve.

This dossier summarises what has been learned from the long-term action led with farmers in the Maghreb. This shows that progress toward more resilient and economically viable agricultural practices is possible, but that it requires constant, coordinated effort, suited to specific localities.

The zero-till seed drill Accessing suitable equipment



One of the three pillars of conservation agriculture consists in disturbing the soil as little as possible. This principle is achieved through different practices such as occasional ploughing, minimum till (loosening or subsoiling), shallow work (covercrop, for example) or zero-tillage and sowing under plant cover without working the soil. These latest practices, tested in the Maghreb, require specialised seeders.

What are we talking about?



Direct seeding being practised on very large surface areas across the world, various models of zero-till seed drills are available on the international market. However, most of them are designed for large operations having high pulling power (greater than 110 horsepower). The soil conditions in the Maghreb (varied types of soil, significant stoniness, slopes, etc.) and the conditions of use by farmers (small and medium areas, pulling power of around 70-90 horsepower, limited lift capacity) require testing prototypes suited to these conditions, with the aim of supporting their development and small-scale or even industrial construction locally.

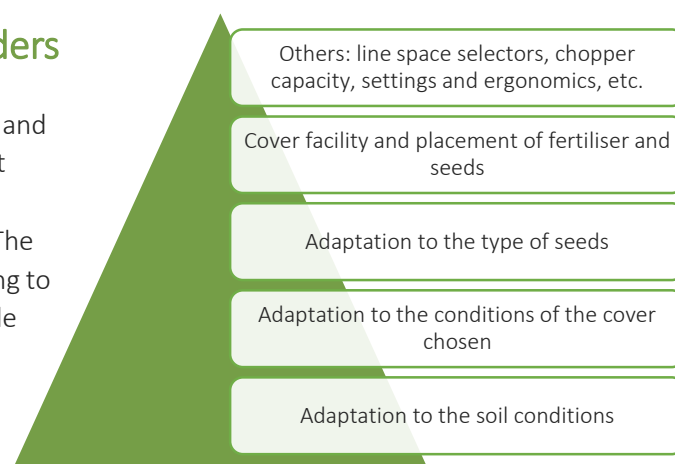
The technical choice proposed by Fert, in partnership with the Touraine AFDI and the IAV Hassan II (Morocco) has been the innovative model of angled-disc seed drill, the result of research by Irstea (ex-Cemagref). The principle of using discs is that they are ideal for use in sowing conditions under plant cover (living or dead). It differs from more widespread model already marketed, which use teeth but are functional only in the case of limited plant cover on the soil.

Experience and results

The direct seeding tests conducted in the Maghreb in farming conditions have confirmed that this practice, when the conditions are met, is possible and very beneficial. One of the conditions is access to a suitable seeder. Zero-till seed drill prototypes have been developed (2 rows and 12-rows in cereals and pulses) and successfully tested by farmers in Morocco and Tunisia. The development of the prototypes and their comparison with certain available seeders also help to highlight two important dimensions of access to specialised seeders for farmers wishing to use zero-tillage: the features of the seeder and its management method.

Criteria to be considered when choosing seeders

The choice of zero-till seed drill starts with knowing the features and the objectives of the farmer (types of crops, surfaces, equipment available, level of mechanical technology) and the environment (availability of suppliers and technicians for maintenance, etc.). The ideal seeder is not an addition of “a la carte” elements responding to realities and needs, but a compromise making it possible to tackle several, often contradictory, constraints.



Beyond the economic criteria (purchase and maintenance costs) or the capacity of the tractors available, the technical criteria presented on the back need to be analysed (by order of importance from bottom to top). These elements could be evaluated ideally with testing, by observing the behaviour of the seeder in the field: sensitivity to working on a slope or with obstacles, penetration of the seeding units, management of crop residues (blockages, etc.), how it holds its depth, placement of fertilizer, etc.

A management method to reflect on

The provision of seeders for research organisations or farmers raises the question of their longer-term access and management. There is no model; it is especially important for the promoters of the action to discuss, with the farmers and actors involved, options that may be considered in the future.

Institution/project availability	Common purchase by group	Individual purchase by farmer	Private provider
<ul style="list-style-type: none">Access conditions?Flexibility of use?Long-term access?	<ul style="list-style-type: none">Similar needs of the members?Organisational and management capacity?Competition on use (periods) ?	<ul style="list-style-type: none">Surface and ability to bear the costs?Possibility of work on order?	<ul style="list-style-type: none">Availability and flexibility?Tools adapted to the objectives?Price of the service?

Outlook and challenges

The prototypes developed within the context of Fert’s action in the Maghreb are managed in common by the farmers (Morocco) or by research institutes in close collaboration with the farmers (Tunisia). The members of the organisations involved have been confronted with the realities of collectively managing the equipment (technical point of contact, seedling programme, maintenance-repair, the role of tractor drivers, management costs, etc.). The regulations for using this equipment has been debated and applied within the organisations and are an indispensable tool for good collective management.

The challenges faced are as follows:

- if the prototypes developed within the context of this action present interesting technical results, they require further adjustments;
- the innovations brought about by these prototypes will be used by industry to spread them more widely;
- investment in expensive tools for farmer groups that are in the test phase of direct seeding requires technical support to ensure proper management and technical dissemination.



3 The permanent living cover

The “African” alfalfa, a variety suited to the Maghreb environment



The application of the second conservation-agriculture pillar (keeping soil covered) is essential but encounters numerous obstacles in practice. To succeed, farmers and researchers must innovate, taking into account the constraints of the Mediterranean environment and climate and, for those in the Maghreb, the pressure due to grazing sheep, goats and cows.

What are we talking about?



Covering soils presents numerous advantages for agricultural production systems. The aims are multiple: limiting the negative impact of heavy rain on the surface structure of the soil and the wind and water erosion which follows, reducing water evaporation from the soil (the mulch effect), preventing weed germination, providing organic matter to nourish the biological life of the soil and to help structure the soil through the root systems, etc. The combination of pulses also helps to enrich the soil with nitrogen.

The minimum feasible is to maintain the residues from previous crops on the ground, which are known as “dead” covers. In the Maghreb, this refers to straw and stubble residues on which all herds graze freely in summer, often only leaving few residues covering the soil during autumn sowing.

The “living” covers are, inversely, species chosen and sown for being partly or permanently combined with the main crops. But the dry climate from spring to autumn, and the competition for water the rest of the year, significantly limits the alternatives for farmers practising conservation agriculture in a Mediterranean environment and involves testing different varieties, seed rates and sowing periods to find the most suitable combinations.

Experience and results

Innovating with the African Alfalfa

Several perennial cover plants (sulla, Gabès alfalfa, African alfalfa) have been tested on two testing platforms in Tunisia (in connection with the INRAT and the INGC). African alfalfa has demonstrated the best behaviour in terms resistance to periods of drought and its combination with a straw cereal. This variety comes from a selection of common alfalfa (*Medicago Sativa*). Originally taken from Australia to Europe, and then North Africa, it was improved there by mass selection to be better suited to average to low rainfall conditions.

In practice, once the alfalfa is established, it is a matter of adjusting the conduct of the wheat that will be grown on this living and permanent cover plant. By coming up with judicious rotations, this type of crop combination can help farmers produce cereals, on the one hand, and forage for their herds, on the other.

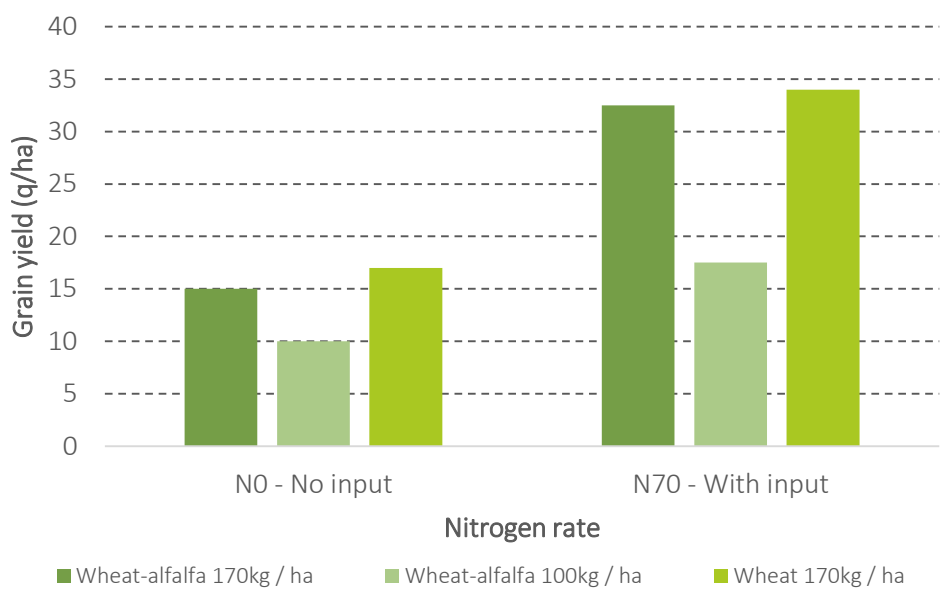


African alfalfa, contrary to other alfalfas, including oasis, seems to tolerate a long period of summer drought without irrigation.

Unexpected and promising results

The ability of African alfalfa to adapt to semi-arid environments (450 mm) has surprised farmers and technicians who came in 2017 from around the Mediterranean to visit the Tunisian platforms. Additionally, during the 2017 harvest, in Krib, for a dose of seedlings of durum wheat of 170 kg/ha, the presence of alfalfa did not significantly influence durum wheat yield: it was more or less the same (35 q/ha) with both methods of sowing (sowing on living permanent covers vs direct seeding on dead covers).

Weed control has largely been possible thanks to the presence of alfalfa. However, it has been necessary to use a herbicide at low doses to slow the growth of alfalfa and thus reduce its competition with the needs of the wheat. This point is difficult.



Outlooks and challenges



Confirming the results and producing references

Conservation agriculture stakeholders in the Maghreb (farmer groups, associations, research institutions) want to make progress in mastering the cereals/alfalfa combination. The first results are encouraging but must be confirmed. Within the framework of the technical relationships established with research, testing/demonstration platforms will be put in place among farmers on a range of diverse sites across Tunisia, Algeria and Morocco. They will be followed in close collaboration with that already set up in Oraison, Provence, with the Arvalis Institut du Végétal (France).

The challenges faced are as follows:

- the technical arrangements, and then managing the combination of alfalfa and cereals, particularly durum wheat or soft wheat, must be better identified before switching to this highly innovative practice;
- as in the case of meslin, access to adapted alfalfa seeds should be solved by imports and/or the multiplication of farm seeds;
- the combination of cereal/alfalfa still being relatively unstable and highly dependent on agro-climatic contexts, the practice of carrying out local trials and discussions must be promoted and supported.



One of the pillars of conservation agriculture, in addition to minimum tillage and covering, consists in putting in place of diversified crop rotations. This agronomic principle helps farmers to make production systems more resilient and results in interesting economic performance when these products are used for raising livestock on the farm or are commercialised. In these rotations, the introduction of grain pulses and meslin has encountered widespread support among farmers.

What are we talking about?



All farmers know the beneficial effects of pulses on the production of wheat that follows (atmospheric nitrogen fixed by the pulses and then released for the cereal). Introducing or developing these pulses (chick peas, broad beans, lentils, French beans) in the crop rotation system for cereal is therefore recommended from an agronomic point of view (nitrogen inputs and soil structuring through the root systems). In the Maghreb, these little-mechanised crops face problems of seed availability and labour costs and their sale price is very volatile. Livestock farming, however, opens up space for faba beans (mechanised, direct outputs) and for feed mixtures called "meslin".

Meslin is a relative complex blend of various species of pulses and cereals well suited to local contexts, with the objective of forage-crop production, grazing or harvesting. The plants are sometimes grown to maturity (going to seed) when the farmer wants to produce seeds.

Used as part of the conservation agriculture approach, the production of local fodder to feed herds helps to avoid grazing-crop residues on zero-tillage plots and to thereby maintain more crop residues on the soil.

Simple to cultivate and with little expense, blending several species makes it possible to adapt to various soils and climates. Meslin provides high quantities of very good quality fodder, which strengthens the autonomy and performance of livestock farmers. It is also an excellent precedent for cultivating cereals, whether using conventional or conservation agriculture.



In the Maghreb, the main fodder species used are: vetch, field pea, field beans, fenugreek, sulla, barley, oats and triticale.

Defining meslin and crop rotation according to its objectives

The farmer’s objectives guide his practises:

- 1. his operational methods (grazing, silage, hay, cereals);
- 1. the type of seedlings (winter, spring);
- 2. the blend (composition and number of species).

The blends presented here show different practices adopted after several tests to find the best compromise.

Farmer	Rate	Proportions by weight
Ali in Tunisia	150 kg/ha	Barley 20 % + Oats 20 % + Fenugreek 40 % + Vetch 10 % + Sulla 10 %
Aziz in Morocco	150 kg/ha	Field beans 20% + Vetch 20% + Oats 20% + Barley 20% + Field pea 20%
Adel in Tunisia	120 kg/ha	Triticale 50 % + Vetch 30 % + Oats 20%

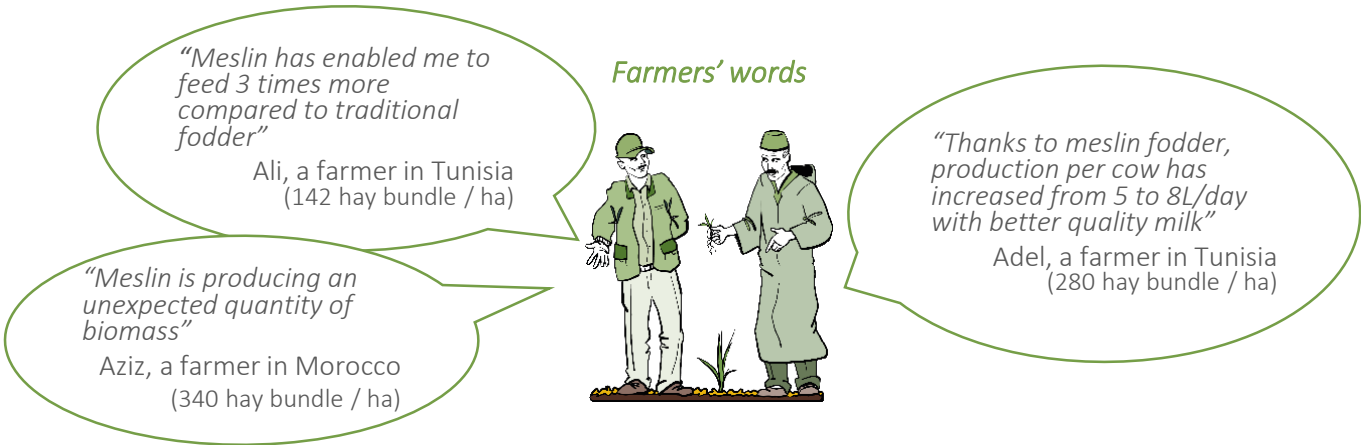
Farmers must effectively find the best responses to the following questions:

- Are the seeds available locally?
- What varieties are best suited to my soil and climate?
- Are the sowing tools that I have access to suited to my blend (heterogeneity of the size of the seed, etc.)?
- What quality fodder is desirable for my livestock (energy/protein) or my buyers?

The right balance is generally found after several tests and adjustments.

Rapid adoption by livestock farmers in conservation agriculture

Starting from small surface areas for testing, farmers/livestock breeders have noted the benefits of their meslin. Tested over the last few years of Fert action in the Maghreb, meslin surface areas have increased rapidly.



Outlook and challenges

Some farmer organisations involved in the action (SMSA of Tahent and Fernana in Tunisia, the cooperatives of Had Bouhssoussen and Had Kourt in Morocco, the ATU association in Algeria) have integrated and are now developing meslin production. The connections that they have established with applied research stakeholders will help clarify the most effective blends and their food quality according to the types of livestock farming targeted. Within the framework of these technical relationships between farmer organisations and research institutions, testing/demonstration platforms will take place among farmers on a diverse range of sites across Tunisia, Algeria and Morocco. This practice means stronger and more widespread promotion among farmer organisations and institutions in charge of training and education on livestock farming in the Maghreb.

The challenges are as follows:

- removing the limited access to seeds (import, networks for multiplying farm seeds, the involvement of private enterprises in commercial multiplication?);
- continuing to produce references on good practices in the field of meslin and ensuring its extension;
- promoting the sharing of practices and exchange networks (social networks, initial training etc.).

The farmers learning groups

Research applied to the co-construction of solutions for and with farmers



Initially identified as a means to guide and implement programmes for creating references and for sharing good practices, the first “farmers learning groups” were mobilised and associated with the actions of Fert in the Maghreb from 1997. From then on, they have gradually become the heart of this dynamic focused on seeking solutions in farming conditions and are representing a stakeholder interacting with development and research.

What are we talking about?



The learning groups are essentially made up of farmers meeting together, often informally at the start, to tackle common concerns and to find responses to their problems together. Their origins vary greatly. They can come from the actions of external stakeholders like Fert, or pre-exist in a formal or informal way (development groups, cooperatives etc.). Their aims are to improve the yields of farmers, to reduce production costs and to thereby improve their income.

They also aim to preserve natural resources (the fight against erosion and the loss of soil fertility, enhancing biodiversity etc.) and to improve the social well-being of farmers.

To do this, they fulfil the following purposes:

- encouraging participatory research between farmers and with their partners;
- focusing research on farmers’ priorities;
- experimenting and sharing the results of research among the farming community;
- facilitating the transfer of technologies and innovation in the farming community.

Their interest is based on common, concrete expectations shared by their members, as well as their close proximity, which allows them to manage their own actions.

These farmers learning groups are “tools” that prolong farming, allowing producers to question their production systems and to make decisions with the minimum technical and financial risk.

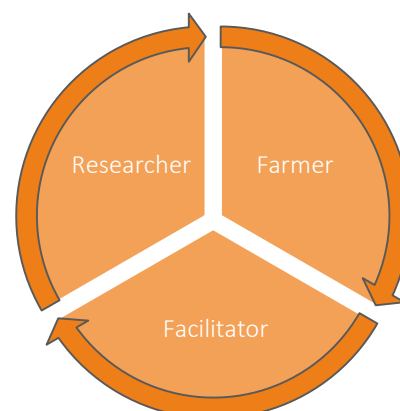


Experience and results

The learning groups have been places for testing, sharing and validating practices and techniques, such as zero-tillage, plant cover, weed management, rotations integrating livestock (meslin) or tools (prototypes of zero-tillage seeding tools).

In practice, to maintain its dynamic of dialogue and progress, the group (5 to 15 people at the start) depends on important factors:

- the emergence of “leaders” recognised by their peers and playing the role of catalysts internally and in their interactions with researchers;
- the active involvement of an outside facilitator, who stimulates group discussion and reflexion (analysis of the situation, needs, focus points) and opens them up to the outside;
- the exposure to the proposals of research and networking with other learning groups or stakeholders.



As such, the triptych “farmer-facilitator-researcher” is often used.

“ The main reasons behind farmers progress (...) resides in the ability of the group itself to create favourable conditions for observing and sharing what each of the members has learned. ”

Vadon et al., 2006

Beyond the dynamic of "action-research", certain learning groups can also provide common services: the production and exchange of forage seeds, the shared use of specialised equipment (zero-till seed drills etc.). When facilitation and support are effective, when the internal dynamic of the group works, and the project allows it, informal learning groups often evolve towards more structured forms of farmer organisation (farming development groups, mixed associations, cooperatives etc.). This group dynamic will also be strongly influenced by the environment of agricultural development and its structure (status of farmer organisations, policies etc.).

Outlook and challenges

Over the last few years of this action, Fert has supported, alongside research, 14 farmer groups and organisations in Morocco and Tunisia. These structures, after the end of this support, want to continue their action and engage in new demonstration platforms or common seed drill-acquisition projects. However, those with a more fragile dynamic will need to request new support.

The challenges are as follows:

- removing the pitfalls encountered by farmer organisations as a general rule (leadership, management, organisational capacity);
- finding long-term support to continue, and to pursue partnerships with research and development institutions;
- ensuring communication between these learning groups, on national scales and between countries of the Maghreb (multi-country programmes, stakeholder networks such as the RCM etc.).



Fert – September 2018 – Fert is an agrigency member of AgriCord

5- The farmers learning groups

actors

The demonstration platforms

An innovation tool in the farming community



Demonstration platforms implemented within the framework of Fert’s activities in the Maghreb have been inspired by the experiences developed in France in the middle of the 20th century through Centres d’Études Techniques Agricoles (CETA, farming technique research centres), movements such as the Jeunesse Agricole Chrétienne (JAC, Christian agricultural youth) or even action-research initiatives such as the “reference villages”, the Institut Technique des Céréales et des Fourrages (ITCF, now the Arvalis Institut du Végétal).

What are we talking about?

The discrepancy is often frequent between the expectations of farmers and the concerns of agronomic research. In numerous countries, the work carried out in research centres, in a controlled environment, does not reflect the realities of farming. Before adopting new practices, farmers prefer to see the results among one of their own, in similar conditions or close to those of their own farms.

This is the main objective of the demonstration platform. It is about both testing practices and allowing various stakeholders (farmers, technicians, researchers, students and decision-makers) to participate in days or field training.

It is not about putting in place real experimentation as it could be conducted in an experimental environment but setting up strips comparing different techniques or practices (varieties, dates and densities of seedlings, fertilisation, crop combinations, comparing between conventional and direct seeding etc.). The platform’s vocation is to be in place for several years. It is set up on a plot representing a territory, and easily accessible to visitors.

The results are observed and commented on at the end of the season and contribute to defining the tests desired or proposed for the following season.



Experience and results

Simple and modular systems

The platforms put in place within Fert’s action in the Maghreb have been chosen considering the principles of agro-climate representativeness, strong involvement and the legitimacy of the farmer who manage them.

Their set-up follows this sequence:

- identifying the site (surface area of approximately 0.5 to 1 ha) when it is a new platform;
- defining the variable principles to test, practices and protocols, in a concerted manner between the learning group and the agronomist in charge of monitoring;
- creating several strips (at least two - there and back - running the length of the plot). Each strip is well set up and sign-posted with informative signs during visits. The seeds and inputs are provided by the group or the project, depending on resources;
- maintenance of the plot by the farmer in charge and recording the operations.

Visit and facilitation area							
B1	B2	B3	B4	B5	B6	B7	B8
Alfaf1 8 kg + Durum	Alfaf2 10 kg + Durum	Alfaf3 12 kg + Durum	Sulla1 15 kg + Durum	Sulla2 20 kg + Durum	Sulla3 25 kg + Durum	Sulla 25 kg	Alfaf. 23 kg
Characteristics (example): <ul style="list-style-type: none"> - Strip width = 1 to 2 times the width of the seed drill - Strip length = 200 m - Separation between strips = 0,5 m - Previsionnal itinerary: total weedkiller at the beginning if necessary, basal fertilizer, etc. 							

The monitoring of the platform can be "light" through simple observations made by the farmers themselves or give rise to more precise measurements in connection with technicians and researchers.

For example, the agronomic monitoring of a platform made by an agronomist from an institute of applied research in Tunisia averaged 4 days per platform per year (programming, installation, monitoring and harvesting), to which must be added the days of facilitation / training mobilising researchers, facilitators and farmers.

Farmers and facilitation at the heart of the process

Without requiring significant means of research, the monitoring of the platforms over several consecutive years made it possible to validate certain practices in rural areas (meslin) and to initiate others (permanent cover). Driving it over several years is essential because it minimises the biases due to seasonal weather hazards.

A good facilitation is necessary to identify and get to know the farmer-leader hosting the platform, to accompany him in his follow-up, to stimulate the farmers learning group and to ensure the link with the research. One of the fundamental elements is to make live the platform thanks to facilitations during each cropping season (visits, exchange days, training, etc.).



“ During visits and group meetings, farmers participate in technical decisions taken at the plot scale. They find that the discussion among them on the plots is very useful and helps them to choose the best solution. ”

Larbi Amdouni, an agronomist researcher, Tunisia

Fert – September 2018 – Fert is an agri-agency member of AgriCord

Outlook and challenges

During the inter-country meetings organised in 2017 on the platforms in Tunisia, the farmers and some researchers who knew certain new practices only through writings or testimonies given remotely could see concretely in what they consisted of and how to test them at home. This practice of platforms is now considered as a fully integrated tool used by farmers and institutes of applied research.

The challenges are as follows:

- ensure quality mobilisation and facilitation so that research stakeholders embrace a horizontal approach with farmers;
- make such actions last: the duration of the projects (on average 3 years) is not adapted to the pace of experimentation / dissemination in rural areas; it is essential to explore the possibility of conducting actions over longer periods;
- strengthen the analysis and dissemination of results in rural areas, in particular through exchange between stakeholders.

6- The demonstration platforms

actors

The field facilitator

Supporting farmers and facilitating communication



Testing new and systemic agricultural practices such as conservation agriculture requires good management capacity on the ground. The facilitator - the interface between the needs of farmers, the expectations of research and the programmatic constraints of projects - is a central and sensitive pivot in the system. It facilitates the group dynamics, the intelligent mobilisation of partners and the dissemination of results.

The role of “catalyst”



The facilitators on the ground or local coordinators mobilised within the context of Fert action alongside farmers, learning groups and various research institutions in the Maghreb, carry out support and liaison roles essential to the progress of the actions.

Their tasks consist in:

1. facilitating effective communication within the group (emergence and formulation of needs, identification of options, planning, etc.);
2. providing the link with research and development institutions (communicating information from the field, identifying sites and groups, etc.);
3. supporting the implementation of the activities proposed by stakeholders and suited to local conditions.

Responsible for the general coordination and management of the action, the facilitators must also plan the activities, manage expenses, prepare reports, etc.

The facilitator’s role is based on the proximity that they have with the ground in order to know and gain the trust of farmers and to organise relevant activities that break the isolation of the stakeholders.

The facilitator is an advisor who ensures that the farmer is always at the centre of decisions concerning the practices being tested.

Throughout Fert’s actions, facilitators with different profiles have been mobilised: local agricultural technician (retired from a public education organisation, for example), farmer leader (agronomist by education) agronomy engineer coordinator or even researcher. Each profile has its advantages and disadvantages, but their attitude, posture and human qualities contribute greatly to the quality of the discussions and actions.



Multiple competences and qualities

The recruitment and mobilisation of a quality facilitator is as challenging as the role they need to play. Experience has shown us that there is no ideal facilitator and that it is often necessary to strengthen certain skills of the people recruited. The quality of the facilitator is based on a posture and competences that are both socio-organisational and technical:

Posture of advice	<ul style="list-style-type: none">✓ Proximity, adaptation to farmers’ constraints✓ Listening, dialogue, diplomacy, leadership✓ Non-prescriptive posture, focused on the expectations and proposals of farmers
Socio-organisational skills	<ul style="list-style-type: none">✓ Group facilitation / conflict management✓ Strengthening organisations, helping with planning✓ Interface: communication / mobilisation of partners✓ Programming / project management
Technical knowledge	<ul style="list-style-type: none">✓ General agronomic-technical knowledge (agriculture/livestock, conducting trials)✓ Conduct of technical-economic analyses (analysis, interpretation of results)

Facilitation tools

The facilitator mobilises facilitation tools, as opportunities to promote learning through practice, observation and discussion between peers:

- **exchange visits to farmers** are generally organised among the members of a learning group for an *in-situ* discussion on the theme chosen by a farmer or facilitator;
- **the trial plots and/or demonstration platforms, monitoring and exchanges that support them** make it possible to meet the same objective, in a way, however that is more structured around the proposed practice, its monitoring and analysis;
- **study tours**, within the countries of the Maghreb or in other countries of the Northern Mediterranean, help to mobilise specific experiences developed by peers;
- **external, ad hoc or iterative missions** allow stakeholders to take a step back and deepen their understanding of a specific theme. They play an important role in supporting the dynamic of progress within the group;
- **information and training days** help to enhance the knowledge of early adopters and to respond to questions from other farmers and stakeholders.

Additionally, these activities are all aimed at strengthening the sense of belonging, which will also help to inspire other ideas and initiatives such as mutual support, sharing equipment and exchanging seeds. They were, in practice, associated with other more targeted activities aiming, for example, to strengthen the organisational capacity of associations and learning groups. Flyers and films have also been produced as supporting tools for facilitators and leading farmers.

Outlook: the question of sustainability and transfer

Because it is limited in time and the pace often set by the projects, the function of facilitating and its central role among groups may be threatened. However, facilitators mobilised as part of Fert’s action, natives in the operational zones and passionate about these issues, are now still active among the groups, even though there is no more dedicated funding for their interventions.

The challenges are as follows:

- training facilitators on the issues of support for farmer organisations and on developing their services to contribute to their sustainability;
- anticipating the strengthening of endogenous competences (farming leaders) in functions performed by the facilitators to prolong these facilitation and interface functions.

The actions and political frameworks

Acting on several levels and over the long term for sustainable innovation



The systemic and complex dimension of the adoption of the principles of conservation agriculture (CA) necessarily mobilises various levers. The studies carried out as part of Fert's action in the Maghreb in 2016 and 2017 confirm that the practices of CA are essentially disseminated when "projects" are present. Promoting wider adoption requires mobilising public authorities and all interested stakeholders in each country (public and private institutions, farmer organisations, associations, etc.) and ensuring that coordinated and combined efforts are ensured in all projects and policies.

The following proposals, without being exhaustive, can help to question and guide the development of actions and support mechanisms in the field of conservation agriculture in the Maghreb. These are the proposals made by the farmers, practitioners and researchers involved in the action coordinated by Fert.



From the soil... to the operational system

- Strengthening the practice of observing surface and deep soil, as an effective tool for raising awareness and monitoring-evaluation of the actions (analysis of the compaction, in particular).
- Continuing research in farming conditions on the following aspects:
 - > suitable cover crops. For this reason, African alfalfa seems to bring good results, but research must continue to generate more references;
 - > reduction in the systematic use of chemical products for weeding;
 - > crop rotations, particularly by positioning at the head of the rotation plants with high weed-control potential such as vetch or meslin and by testing the re-introduction of crops such as flax...
- Understanding the work on conservation agriculture in the "farming system" dimension and, in particular, integrating the issues of animal feeding or the production/sale of fodder.
- Developing the references in terms of meslin fodder and promoting their dissemination through awareness initiatives.
- Supporting farmers in dialogue and negotiating compromises with their neighbours (livestock farmers without land etc.): swap manure for fodder, controlled grazing of sheep and goats...

Access to seeders and other collective equipments



- In projects and programmes, providing a fair access to seeders (multi-stakeholder steering committees including research and farmer organisations).
- Promoting the collective use of specialized tools (seeders, crushers, toothed roller-spreaders etc. and supporting farmer organisations in establishing regulations for use.
- Studying the feasibility of developing suitable farm equipment centres: zero-till seed drills for large and small surface areas, fixed and mobile crushers, toothed roller-spreaders, straw spreaders, adapted tractors, sprayers etc.
- Encouraging and continuing the development of locally-made seeders or at least adapting them to local conditions (soils, pulling power, price, etc.).
- Orienting public aid towards subsidising specialized tools and their collective use.



Farmers and farmer organisations: the conditions for sustainability

- Encouraging the organisation of farmers, the sharing of experience and the set-up of networks, on the principles of farmers learning groups and testing platforms.
- From the start of projects and in addition to field actions, utilising new technologies to share practices and thereby stimulate new forms of structuring (Facebook and Whatsapp are networks that are used more and more by farmers in the Maghreb).
- Founding the group dynamics on shared interests such as exchanging knowledge, using seed drills in common, shared seed production, researching outputs for pulses and fodder.
- Identifying, supporting and training technical farming leaders as sources of innovation and vectors for dissemination.

Actions and systems: focusing action on the farmer and promoting horizontal collaboration



- Placing farmers at the centre of identification, implementation and action monitoring-evaluation processes.
- Promoting a three-fold farmer-researcher-facilitator dynamic and the long-term support of farmers and technicians.
- Developing and providing simplified reference tools that are verified and validated with farmers, such as:
 - > soil-condition diagnostic tools (field observation and soil profile, degree of compaction observed, degree of infestation etc.)
 - > questions to ask and advice for integrating meslin forage production into crop rotation etc.
- Investing in effective communication with farmers, particularly by involving them in analysing and sharing results (via groups, social networks, farming leaders etc.).



The role of the State: an essential political push

- Ensuring legislative and financial frameworks favourable to the development of services and mutual aid within farmer organisations (test/advisory groups, grouped equipment use etc.).
- Putting in place consultation and cooperation frameworks between stakeholders on the theme of conservation agriculture (research, education, farmer organisations, private organisations, national associations, NGOs etc.).
- Encouraging farmer organisations through incentives: seeder subsidies, financial incentives for soil covering.
- Integrating conservation agriculture into national research programmes.
- Expanding the curriculum of agricultural training to include the issues of climate change, soil degradation and conservation agriculture.
- Supporting the structuring and identification of outputs for pulses.



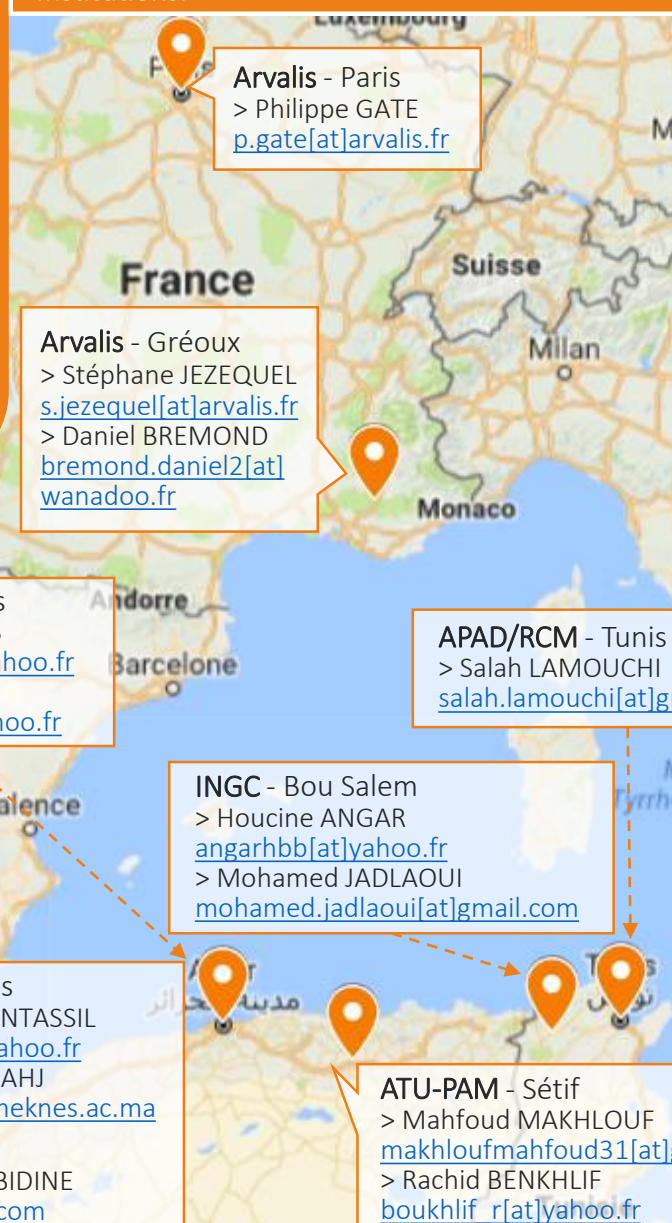
A wealth of experience borne by field people

Conservation agriculture cannot be summed up with simple and perfectly replicable techniques. Farmer adjusts its practices to the climatic conditions, the history of the soil, its technical features, to how it is worked and to many other factors.

Above all, conservation agriculture relies on a taste for progress, on its experience and that of those who support it.

Additionally, the wealth resides in the women and men who practice it and who are able to get involved in discussion, testing and education.

Institutions:

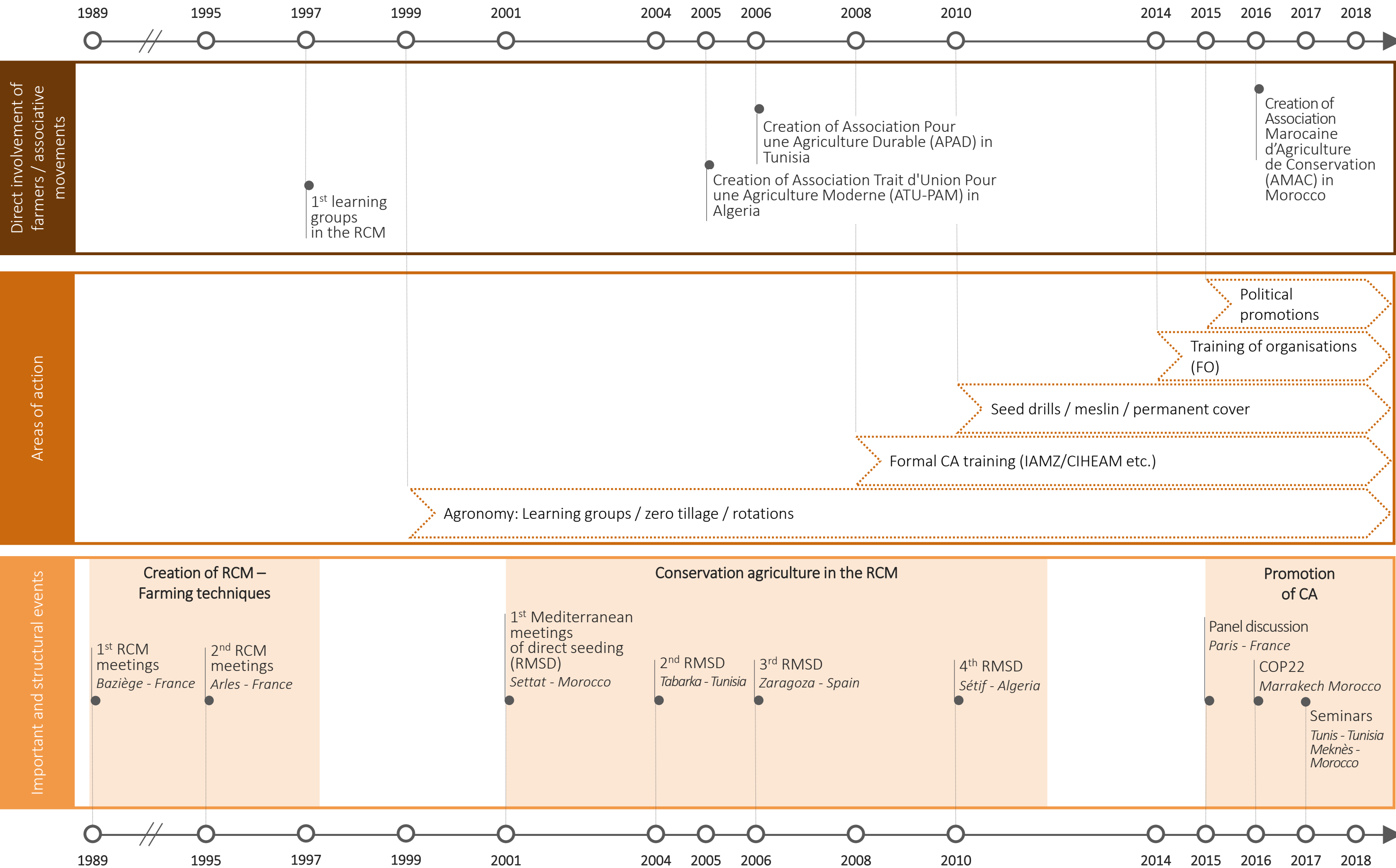


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30 years of commitment and cooperation for farmers in the Maghreb

With the birth of the Réseau Innovations agro-systèmes Méditerranéens (RCM, Mediterranean network of agro-system innovation) in 1989, a dynamic of farming experimentation and discussion for farmers has been created. The theme of conservation agriculture (CA) in the Maghreb became central in 1999 through direct seeding trials in Tunisia and Morocco. From then on, the spheres of action, at the start purely agronomic, expanded to include the challenges of accessing suitable equipment and to the promotion/dissemination of CA practices among educators, the wider community and public-policy makers.



Some publications to go further...

Farming practices	Options Méditerranée n°69 : « Troisièmes rencontres méditerranéennes du semis direct » – CIHEAM 2006	http://om.ciheam.org/option.php?IDOM=370
Farming practices	Faire du semis direct une réalité de l'agriculture marocaine – Fert / INRA Settat 2009	https://www.fert.fr/faire-du-semis-direct-une-realite-de-lagriculture-marocaine/
Actors	Conservation des sols et sécurité alimentaire : une préoccupation commune pour les agricultures paysannes du Maroc et du Mali – Afdi Touraine / Fert 2010	https://www.fert.fr/projet-innovant-agriculteurs-agriculteurs-agriculture-groupe/
Actors	Organisations paysannes : un levier pour développer l'agriculture de conservation au Maghreb – CIHEAM 2011	http://om.ciheam.org/om/pdf/a69/06600089.pdf
Actors	Options Méditerranée n°96 : « Quatrièmes Rencontres Méditerranéennes du Semis Direct » – CIHEAM 2011	http://om.ciheam.org/option.php?IDOM=397
Farming practices	Un semoir semis direct innovant pour petite mécanisation et traction animale – Afdi Touraine / Cemagref / Fert 2012	https://www.fert.fr/semoir-semis-direct-cemagref-fert-afdi/
Actors	Adaptation de l'agriculture de conservation aux zones de montagne du Maroc – Afdi Touraine / Fert 2013	https://www.fert.fr/adaptation-agriculture-conservation-zones-montagne/
Farming practices	 L'agriculture de conservation en zones de montagne au Maroc – Fert 2014	https://www.fert.fr/film-maroc-sensibilisation-a-lagriculture-de-conservation/
Actors	Capitalisation du réseau RCM : « Des groupes témoins au réseau sur les innovations, 25 ans d'une dynamique paysanne sur la méditerranée » – Fert / F3E 2015	https://www.fert.fr/rapport-de-capitalisation-sur-le-reseau-innovations-agro-systemes-mediterraneens/
Actors	 Intervention : Pascal Bergeret - Directeur Ciheam-IAMM – Fert 2015	https://vimeo.com/147474338
Farming practices	 Intervention : Salah Lamouchi - APAD Tunisie, agriculteur – Fert 2015	https://vimeo.com/147474339
Actors	 Intervention : Luc Guyot - besoin de co-développement Sud/Nord et de coopération recherche / agriculteurs – Fert 2015	https://vimeo.com/147474351
Actors	 Intervention : Daniel Bremond - agriculteur, Arvalis, expérimenter avec les agriculteurs, les plateformes d'expérimentation – Fert 2015	https://vimeo.com/147474343
Farming practices	Le semis direct en Tunisie, situation actuelle et perspectives – Fert / APAD / ATAE / INGC 2016	https://www.fert.fr/le-semis-direct-en-tunisie-situation-actuelle-et-perspectives/
Actors	 Agriculture de conservation en milieux méditerranéens : entretien avec Bruno Vadon – IAMZ / CIHEAM / Fert / 2016	https://www.youtube.com/watch?v=TgZUGqOfdpQ
Actors	 Agriculture de Conservation : l'expérience marocaine : entretien avec Aziz Zine El Abidine, agriculteur au Maroc – IAMZ / CIHEAM / Fert 2016	https://www.youtube.com/watch?v=US3GbvCNpk4
Farming practices	Etude de capitalisation sur l'expérience marocaine en agriculture de conservation depuis 1980 – ENAM / Fert 2017	https://www.fert.fr/etude-de-capitalisation-sur-l experience-marocaine-en-agriculture-de-conservation/
Farming practices	Le méteil (mélange fourrager), plus d'autonomie et de résultats pour les éleveurs (FR/AR) – Fert 2017	https://www.fert.fr/le-meteil-plus-dautonomie-et-de-resultats-pour-les-eleveurs/
Farming practices	Semis sous Couverture Végétale vivante permanente (SCVP) (FR/AR) – Fert 2017	https://www.fert.fr/semis-sous-couverture-vegetale-vivante-permanente/
Farming practices	 Le semis direct sous couvert végétal permanent (Tunisie) FR/AR – Fert 2017	https://www.fert.fr/agriculture-de-conservation-semis-direct-sous-couvert-vegetal-vivant-permanent-tunisie/
Farming practices	 Agriculture de conservation: sols vivants, des bénéfices pour les paysans (Tunisie) FR/AR – Fert 2017	https://www.fert.fr/agriculture-de-conservation-sols-vivants-des-benefices-pour-les-paysans-tunisie/
Farming practices	 Agriculture de conservation: Le méteil, performance et autonomie pour les éleveurs (Tunisie) FR/AR – Fert 2017	https://www.fert.fr/agriculture-de-conservation-le-meteil-performance-et-autonomie-pour-les-eleveurs-tun/
Actors	Accompagner une démarche de structuration ascendante avec les agriculteurs : Agriculture de conservation au Maghreb – Académie de l'eau / IPEMED 2017	http://academie-eau.org/force_document.php?fichier=doc_426.pdf&fichier_old=EauAgriClimat28042017.pdf
Farming practices	Guide pratique de choix des semoirs directs – IAV Hassan II / Fert 2017	https://www.fert.fr/guide-pratique-de-choix-des-semoirs-directs/



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9- A wealth of experience borne by field people

actors



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