



**ConServe  
Terra**

Towards Conservation Agriculture  
in the Mediterranean Area



## WP3 3.5 Farmer Field Schools Impact Report

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## Executive Summary

The ConServeTerra project ([www.conserveterra.org](http://www.conserveterra.org)) seeks to overcome the physical and mental barriers to the uptake of Conservation Agriculture (CA) in the Mediterranean. As part of this project, farmer field schools (FFS) have been conducted with dryland arable farmers in Morocco and Spain. The FFS provided the opportunity for farmers to share and exchange with scientific researchers and with each other on the topic of soil literacy.

The content of the FFS included soil ecology and function, how to improve soil quality, and the effect of different practices, such as tillage, on soil. In 2021, a baseline survey was conducted with participating farmers to document farmer characteristics, their soil knowledge, and their existing perceptions of soil conservation measures. In 2023, a follow-up survey was conducted with farmers, to explore their views on the FFS and to see how perceptions of soil and conservation techniques may have changed, following attendance of the FFS.

The response rate of the follow-up survey is not balanced (Morocco N = 31, Spain N = 8), and there has been turnover in participation, thus limited conclusions can be drawn about individual farmers' perceptions. Nevertheless, the data indicates that farmers have had valuable learning experiences during the FFS. Farmers found the material on minimum tillage, crop and weed management very useful. They intend to implement practices including minimum tillage and crop diversification onto their farms. Particularly surprising for farmers was information on correct sowing doses and fertilization rates. Their understanding of soil texture as an indicator for soil health has improved, as has their awareness of the role of soil for biodiversity and water storage. In future FFS they would like to see more information on new, drought-adapted crops and pest and weed management. The FFS have thus been successful in disseminating valuable knowledge on soil and CA to farmers in Morocco and Spain and advancing the uptake of CA across the Mediterranean.

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# 1. Introduction

In order to enhance soil health across the Mediterranean, it is vital to improve soil literacy among farmers. Farmers' activities determine the health of soil in both short and long-term time frames, and across both local and landscape scales. Farmers can therefore benefit from a better understanding of the links between their practices and the organic nature of soil, its composition and structure, and the outcome for crop yields. This is particularly important in regions where farming conditions may be challenging, due to drought or poor soils. These areas may often benefit from practices that improve soil health, such as conservation agriculture (CA) (Cicek et al., 2023; Devkota et al., 2022; Redlich et al., 2020).

The goal of the ConServeTerra Farmer Field Schools (hereafter FFS) was to improve farmers' basic understanding of soil and the impact that certain farming practices can have on its ecology and function. The FFS were based on the Food and Agriculture Organisation (FAO) FFS approach (<https://www.fao.org/farmer-field-schools>), adapted to the local context and agricultural calendar. The FFS took place in Morocco and Spain across the course of the ConServeTerra project (2020-2024). Several sessions per year were organised with different soil and CA related topics, such as soil analysis, tillage effects and weed and pest identification and management. Farmers were invited to attend the sessions, which were held at outreach facilities and on experimental fields. Materials about soil health were designed and disseminated, and a rainwater simulator was built to show farmers how rainwater is captured or released from soil following different levels of tillage (Figure 1).

The FFS provided the opportunity for farmers to learn from soil scientists, agricultural engineers and agronomists, and also to learn and exchange with each other. So-called social learning can enable the change of values and perceptions held by participants on a particular topic (Cundill & Rodela, 2012; Eriksson et al., 2019). To evaluate the farmers' understanding and perceptions, a baseline survey was conducted in 2021 with participating farmers, to document their soil knowledge and perceptions of particular CA practices. In 2023, a follow-up survey was conducted with participating farmers to document their learning outcomes and see if their perceptions had changed during the course of the FFS.

Given the turnover of participants, the number of farmers that were able to participate in the follow-up survey does not reflect the total number of farmers that have been engaged in the FFS throughout the ConServeTerra project overall. Nevertheless, the survey responses provide valuable insights into the farmers' experiences of the FFS, including suggestions for future improvements.

This report contains the results of the follow-up survey, including farmer characteristics, reflections from farmers on their FFS participation, evaluating how farmers' soil knowledge and perceptions have changed following the FFS, and impressions from the FFS facilitators in each country.





**Figure 1.** Left: Rainwater simulator designed at INRA, Settat, Morocco. Right: Farmers observing composting techniques, Gallecs, Spain. Photos: E Topp.

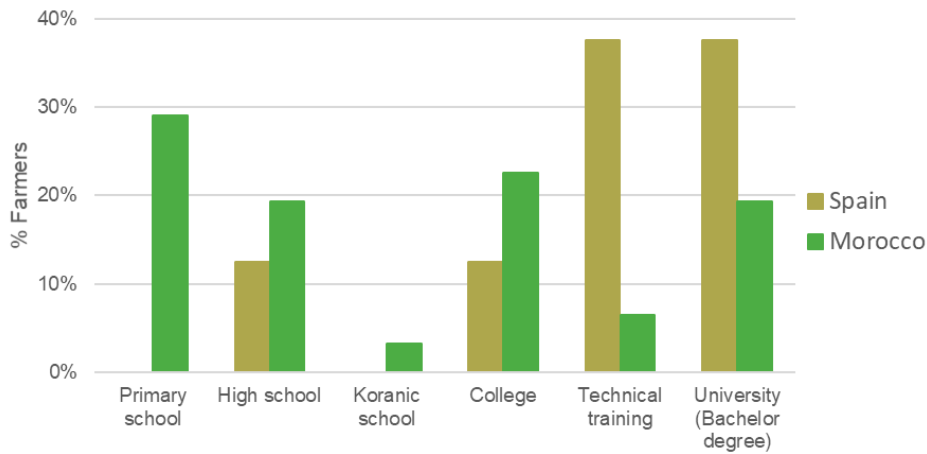
## 2. Participating Farmer Characteristics

### 2.1.1. Sociodemographic information and education

**Table 1.** Sociodemographic information on participating farmers in the FFS.

Baseline Survey Information	Morocco	Spain
Number of respondents	31	8
Gender	97% male, 3% female	88% male, 12% female
Age	3% 18-35, 29% 36-50, 55% 51-65, 13% >65	38% 36-50, 50% 51-65, 12.5% >65
Median years farming	29 (Min 5, Max 48)	26 (Min 7, Max 60)
Median farm size (ha)	50 (Min 1, Max 800)	36 (Min 10, Max 120)
% belonging to farmer association	65%	75%
Main crops	Wheat, barley, legumes	Cereals, legumes, vegetables
Livestock kept	42% no livestock 32% sheep 10% cattle 16% sheep and cattle	75% no livestock 13% (laying) hens
Type of farming	84% CA, 26% Conventional	75% organic, 25% Conventional

Participating farmers were mostly male with a median age of 29 and 26 years in Morocco and Spain respectively (Table 1). More participating farmers in Spain (%) stated technical college and university as their highest education level than any other, whereas more farmers in Morocco (%) stated their highest education level as primary school than any other (Figure 2).



**Figure 2.** Highest education level attained by farmers participating in the FFS.

### 2.1.2. FFS Participation

The majority of participating farmers in Morocco attended more than three FFS over the course of the project (84 %), while all farmers in Spain attended more than 3 FFS (100 %).

## 3. Reflections from farmers on the FFS

The following section contains feedback from the farmers on the FFS, including highlights and areas for improvement. This has been compared with some of the expectations and answers set out by farmers in the baseline survey.

### 3.1.1. What have you enjoyed about the FFS?

Farmers stated a wide range of factors that they enjoyed about the FFS. The most commonly mentioned was the opportunity to learn new things (Figure 3). Another factor was the chance for interaction and exchange with other farmers and scientific researchers. These responses correspond to the expectations stated by farmers in the baseline survey, where more than 60 % of Spanish farmers stated that they are attending the FFS because they are curious and would like to exchange with others, and nearly 80 % of Moroccan farmers stated that they would like to learn soil conservation measures. Additionally, nearly 60 % of farmers in the baseline survey wished to learn soil literacy and analysis techniques, which farmers in the follow-up survey identified as being a particularly enjoyable part of the FFS.

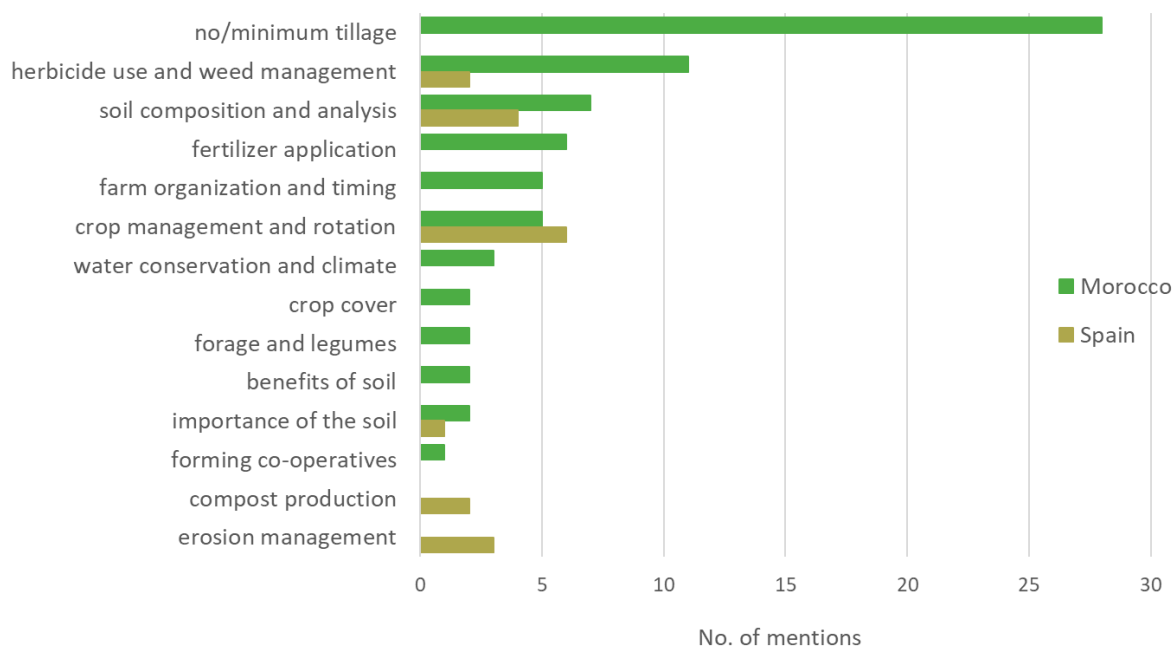


**Figure 3.** Word cloud of things farmers enjoyed most about the FFS. Size of term reflects frequency of mentions (min = 1, max = 19).

Some farmers were more specific about the opportunity for new knowledge that the FFS provided them, as demonstrated by this farmer from Morocco: *“Information, because we lack the time to obtain it ourselves”*. Here it appeared that the FFS explicitly changed perspectives of farmers, with some mentioning that they could *“learn about other ways of working the land”*, learn *“the right way to use herbicides”* and *“these trainings were an opportunity to correct errors in agricultural practices”*. The quality of the instruction was also highlighted by several farmers as a strong point of the FFS.

### 3.1.2. What are the most important and useful things you have learned from the FFS?

The most important lesson that farmers learned during the FFS was about no-till (Figure 4). This was mentioned by Moroccan farmers only, whereas the most important lesson mentioned by Spanish farmers was crop management and rotation. The FFS were tailored to the conservation agriculture context in each region. In Morocco, farmers are mostly conventional and using pesticides and fertilizers to manage their crops, whereas in the Spanish region, many farmers are practicing organic farming. Therefore, the content of the FFS differed. Interestingly, herbicide use and weed management was the second most important lesson learned according to participating farmers in Morocco. Some farmers stated that learning *“the proper way to deal with weeds”* was very useful for them.



**Figure 4.** Farmers’ most important and useful lessons learned from the FFS.

### 3.1.3. What is the most surprising thing you have learned from the FFS?

The majority of farmers found the benefits of no-till for the soil to be one of the most surprising things they learned during the FFS. One farmer explicitly stated how surprised they were to learn that tillage is more harmful than in their initial understanding. Farmers also stated that they were surprised by the information on sowing doses. Other surprising things farmers learned included: *“the importance of soil analysis to choose the right fertilizers”*; *“The impact seeding at the right moment has on productivity”* and *“The importance of rotations, fertilizers and composting”*. Farmer engagement with learning materials is shown in Figure 5.

### 3.1.4. What will you be most likely to put into practice on your own farm?

The majority of farmers in Morocco were already practicing direct seeding and minimum tillage to some extent, and stated that they would continue with this practice on their farms (78 % of all farmers). The other practices that farmers stated they would implement included crop diversification, including crop rotation (46 % of all farmers); correct herbicide and fertilizer doses (35 %); analysis of soil composition (16 %) and permanent soil cover, including leaving the stubble high (11 %).



**Figure 5.** Farmers at the FFS in Morocco (left) and Spain (right). Soil material for analysis (centre). Photos: N. El Hantoui and L. Rueda.

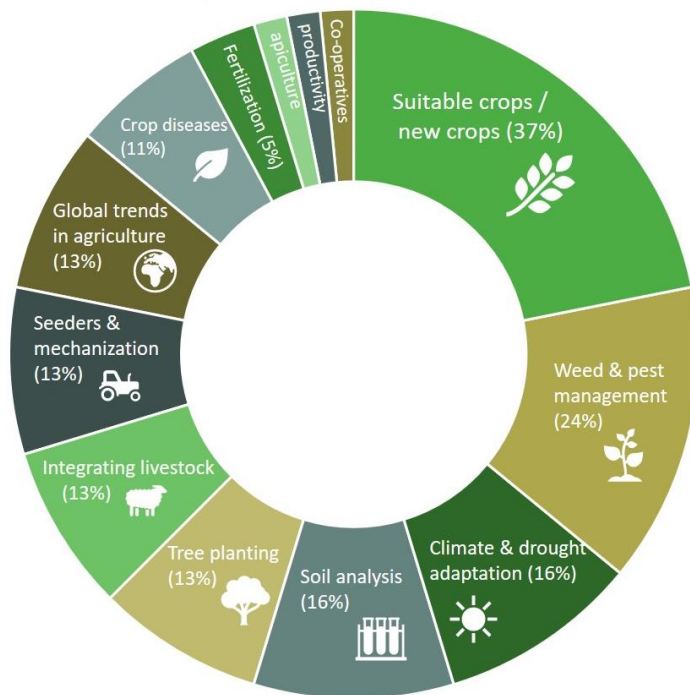
### 3.1.5. Is there anything you did not like about the FFS? What would you like to see more of in the future?

The majority of farmers stated there was nothing that they did not enjoy about the FFS. However, the following issues were identified by 11 farmers:

- Use of technical jargon,
- Lack of training on mechanization with suitable machines,
- Too much time in between FFS sessions, and not enough FFS sessions overall, and
- Lack of FFS practical exercises that take place on different types of soil, to show how the practices are applicable on a range of different farms.

Farmers stated several key topics that they would like to see more of in the future (Figure 6). The most frequently cited topic was new crops that were suited to local conditions, such as prickly pear cactus, green anise, and garlic. Farmers also wished to learn more about dealing with pests and diseases related to these crops and their current crops, in the context of implementing no-till. Several farmers also mentioned the wish to learn more about drought adapted crops and water conservation in the context of climate change (16 %). Five farmers in Morocco (13 % of all farmers) stated that they would like to learn about olive tree planting and cultivation in the future.





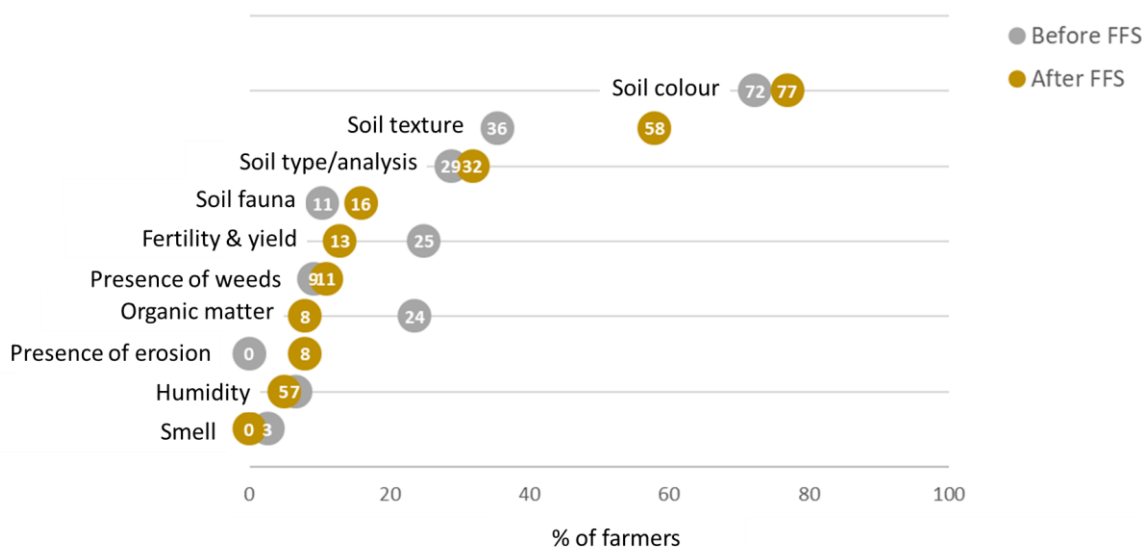
**Figure 6.** Topics that farmers would like to see addressed in future FFS.

## 4. Soil knowledge before and after the FFS

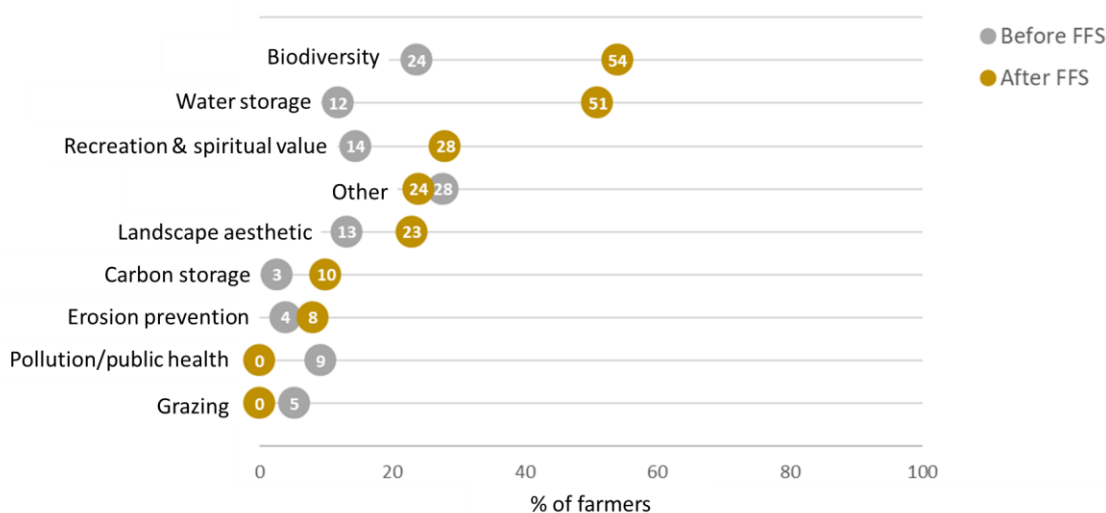
### 4.1. Soil quality indicators and ecosystem services

Part of the FFS program included teaching farmers how to recognize and analyse their soil. Farmers were asked which indicators they use to determine soil quality on their farms. Before the FFS, a high proportion of farmers noted colour as an indicator for soil quality (81 %). We can see that this is similar after the FFS (Figure 7). Broadly, the frequency of identified indicators was similar before and after the FFS, save for soil texture, which was stated more frequently in the follow-up survey (58 %). This may indicate that farmers learned more about observation and analysis of soil texture during the FFS. However, the number of survey responses differed between the baseline and follow-up surveys, and the sample of farmers also varied (i.e., number of organic farmers) so these figures are a suggestion only.

Farmers were also asked before the FFS about the benefits they perceive from soil, apart from growing crops. This question links to soil ecosystem services. Overall, the benefits of soil for biodiversity and water storage were mentioned more frequently after the FFS participation than before (Figure 8). This suggests that throughout the course of the project, farmers became more aware of the importance of soil for biodiversity and water storage. As before, due to the differing sample sizes and compositions, these figures are indicative only.



**Figure 7.** Indicators used by farmers to determine the quality of their soil, as stated in the baseline survey and in the follow-up survey. % is of all participating farmers in both Morocco and Spain.

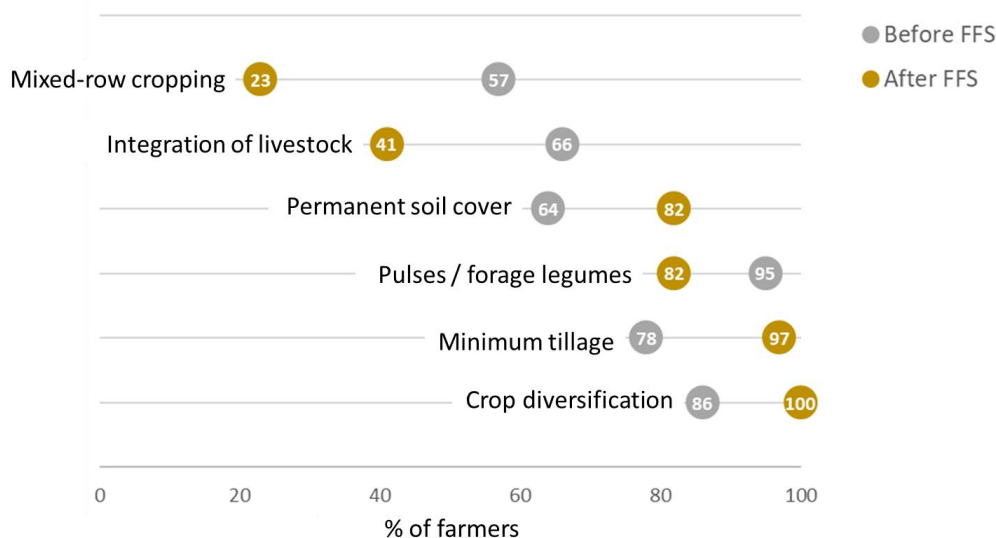


**Figure 8.** Benefits and ecosystem services associated with soil, except for growing crops, as perceived by farmers in the baseline and follow-up surveys. % is of all participating farmers in both Morocco and Spain.

## 4.2. Farmer perceptions of CA practices before and after the FFS

Before the FFS, farmers were asked their opinion on a range of practices related to CA. These practices and their effects on soil were discussed during the FFS. Perceptions of these practices were then compared after the FFS, to see if perceptions had changed. The proportion of farmers that perceived crop diversification, minimum tillage and permanent soil cover, the three pillars of CA, to have a positive effect on soil health, increased following the FFS (Figure 9). Farmers in Morocco stated that minimum or no-tillage was good for improving soil quality, for drought conditions, and for saving costs, whereas permanent crop cover was good for water retention and increasing organic matter. In Spain, two farmers mentioned that minimum tillage helps keep the structure of the soil intact.

For some practices, the proportion of farmers that perceived them to have a positive impact was lower following the FFS. For these practices, such as mixed-row cropping, most farmers stated that this perception was because they had not tried it or had little experience.



**Figure 9.** The proportion of participating farmers that see these practices as having a positive effect on soil health, compared before and after the FFS.

Farmers were also asked how easy or difficult they perceived the implementation of these practices to be for their farms. Overall, 79% of farmers perceived minimum tillage to be easy to implement on their farms, and 69% perceived crop rotations to be easy to implement. However, 56% of farmers perceived permanent soil cover to be difficult to implement. Mixed-row cropping and integration of livestock was more of a mixed picture, with 51% stating that the former would be easy to implement and 38% stating it would be difficult, and 46% of farmers suggesting that integrating livestock into their farming practices would be difficult. There may be different reasons for this in Morocco and Spain. One Spanish farmer stated that there are few sheep herds in the region, whereas in Morocco, farmers stated that livestock bring weed seeds into the soil and prevent them from having permanent soil cover. Overall, it may be surmised that the FFS helped farmers assess the practicality of implementing CA practices into their operations.

## 5. Reflections from FFS country leaders

### 5.1. Morocco

Regions: Beni Smir community at Oued Zem, Ain Arma and Agourai communities at Meknès

Country Leaders: Oussama El Gharas, Rachid Dahan, Najib El Hantaoui, Haddou Bouksirat

The FFS in Morocco have been a well-attended and publicized endeavour that has created a lot of opportunity for learning. The FFS approach is a learning process, not only for farmers, but for professional extension agents and researchers. The following points are based on our reflections.

### 5.1.1. What has worked well

- Smooth coordination with local extension personnel in the different agricultural regions, to ensure attendance and commitment from local farmers.
- Keeping farmer interest high – indeed, farmers are still asking for more information and to extend the information sharing.
- Sharing of FFS activities through websites and social media to generate interest to a wider national and international audience.

### 5.1.2. Challenges and areas for improvement

- The most challenging part was how to keep the FFS group interested and committed to the agenda of all sessions.
- Forage mixtures were introduced in one of the FFS sessions as an element of CA. These mixtures were included in the crop rotation that was demonstrated in the on-field classrooms. One of the main constraints that is hindering the adoption of this forage mixture rotation by farmers is seed availability and cost. This is not something that can be overcome by FFS themselves, but is a problem of infrastructure and economics. There is therefore a disconnect between what can be demonstrated and encouraged in the FFS, and what can actually be implemented by farmers in their own operations.
- Farmers consistently mentioned that there is a need to devote part of the FFS to mechanization, in particular the use of direct seeding machines. A good understanding of the use of direct seeders is closely linked to the success and know-how of direct seeding and conservation agriculture. There is plenty of scope therefore to develop this area of learning in future FFS.



**Figure 10.** Farmers in the field and in the classroom in Ain-Jemaa Meknès. Photos: Oussama El Gharras.

## 5.2. Spain

Regions: Gallecs, Catalonia

Country Leaders: Jordi Puig Roca, Laura Rueda, Gemma Safont

We are pleased to present a detailed evaluation of the progress and challenges we have experienced during the implementation of the project. The following points are based on our reflections.



### 5.2.1. What has worked well

- **Practical and participatory approach:** Actively involving farmers in learning through field practices and demonstration experiments has made it easier to transfer knowledge and techniques by showing them how to apply these in their specific contexts.
- **Adaptation to local needs:** We have tried to adapt the program as much as possible to the needs and local conditions of the farmers, especially from the second year of the project. This includes adjusting cultivation techniques, using local resources, and considering the most common or locally adapted crops. When we noticed a drop in participation, we adapted the training sessions to the interests of the farmers and ensured the applicability of the techniques shown. We modified the topics of some sessions, adjusted the schedules, and proposed visits to farms based on the feedback from the participants.
- **Promotion of collaboration and knowledge exchange:** During the sessions, we encouraged farmers to share their experiences. We also invited pioneering local farmers to share their knowledge and show us their farming methods.

Throughout the four years of the project, we have learned several valuable lessons for future training and knowledge transfer programs with farmers:

- Outdoor training sessions in the field attract more participation than those held in a classroom (Figure 11).
- Messages are usually more effective when delivered by someone who works in agriculture or when accompanied by the testimony of a farmer who has already implemented the demonstrated techniques.
- Simple actions like offering drinks or small snacks during the sessions not only increase attendance but also improve commitment and participation.
- Providing participants with a written summary of the topics and questions discussed during the session is very useful.



**Figure 11.** Farmers checking the crops at the FFS in Gallecs, Spain. Photos: Laura Rueda

### 5.2.2. Challenges to farmer attendance

Despite the positive feedback from the participating farmers in the follow-up survey, it is clear that interest and participation declined over the years of the project. The stable group reduced from the initial 18 farmers to 7-8 who remained in the last years, and even fewer in the final sessions. Several reasons explain the difficulty of working with the same group of farmers for more than three years:

- **Difficulty Maintaining Motivation:** It is important to manage expectations and provide continuous incentives and support to keep participants committed over such a long period.

- **Balancing Personal and Professional Factors:** Most farmers work alone, so they have to manage emergencies or unexpected issues by themselves. Often, even if they plan to attend training sessions, any unexpected problem on the farm can disrupt their plans and make it difficult to attend.
- **Socioeconomic Context:** Drought and consequent crop loss, along with the constant increase in raw material prices, have increased farmer dissatisfaction in recent years, peaking this year with agricultural protests across Europe. Additionally, in the specific case of the natural reserve area of Gallecs, recent efforts to regularize leased agricultural lands through public tenders, while a historic step for the region, have not been without controversy and discontent among local farmers.

### 5.2.3. Areas for Improvement

- **Follow-up and evaluation:** It would have been beneficial to conduct follow-up and opinion surveys at the end of each project year (June). Although we tried to gather feedback from the farmers throughout the program and had an effective communication system, quantifying the interest and continuation prospects of the participants would have been very useful.
- **Early planning:** The session calendar created and shared with the farmers in September 2022 should have been implemented in previous years. This would have given the farmers a clear understanding of the topics to be covered and the session dates.
- **Farm visits:** Conducting farm visits earlier, near the start of the project, and replicating them throughout the project would have generated more interest and improved group cohesion and interaction.
- **Project promotion:** More efforts should have been made to promote the FFS among local farmers and those in neighbouring regions to reach as many people as possible.

In summary, the Farmer Field School of the ConServeTerra project in Spain has made significant progress in implementing sustainable agricultural practices and improving the lives of local farmers. Although we have faced challenges and identified areas for improvement, the lessons learned will help us strengthen future initiatives and continue promoting sustainability and collaboration in agriculture.

## 6. Future outlook

The results from the evaluation show that the FFS have successfully provided knowledge and learning about soil literacy and CA to farmers across Mediterranean regions. Participating farmers demonstrated understanding of soil and related indicators, benefits, and practices. For example, how tillage is related to soil structure, and how fertilization is related to soil chemical composition and the presence of weeds in the field.

It is important to reflect on what worked and what could be improved for future FFS programs in the Mediterranean region. This process should consider farmers' feedback and wishes for the future. Farmers identified crop varieties and weed and pest management as of particular interest to them for future FFS. This supports the notion that farmers' chief concerns and expertise lie with crops and above-ground ecology, rather than below-ground ecology. However, some participating farmers also stated that they would practice soil analysis on their own farms in future, and would like to learn more about soil analysis in future FFS.

Repeating sessions on distinct topics could reinforce learning for those who have already participated, and could also give other farmers the chance to attend. Including different farm settings could provide

the chance to discuss what works for different soil types at the local scale, another aspect that farmers were keen to see developed.

One of the main aspects of the FFS that farmers appreciated was the chance for mutual exchange with other farmers, as well as scientists. The FFS provides a forum for farmers to find out what their neighbours are doing, to get ideas and inspiration for innovation. This exchange can build stronger local social networks, a key influence in the uptake of sustainable farming practices, including no-till (Albizua et al., 2021; Skaalsveen et al., 2020). With CA practices, these networks can often consist of farmers that share common mindsets but may not be close neighbours. A goal for future FFS would be to invite local farmers who have no experience with the FFS or with CA, to encourage wider dissemination.

Worldwide, soil is becoming a hot topic and the push for soil literacy and soil policy is gaining momentum (van der Putten et al., 2023). This creates a window of opportunity for advancing FFS programs and equipping farmers with the knowledge and skills they need to improve the soil on their farms. The lessons learned from the ConServeTerra FFS program can contribute to this advancement and brighten the outlook for Mediterranean soils and agricultural sustainability.

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- For more information on the content of this report and the ConServeTerra project, please see [www.conserveterra.org](http://www.conserveterra.org)