



**CREDIBLE**  
EU carbon farming



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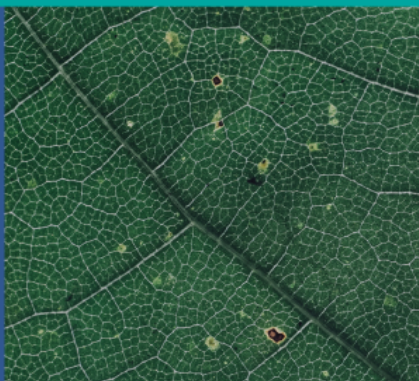
# How to avoid threat to food production and biodiversity and support positive synergies

**Project CREDIBLE: “Building momentum and trust to achieve credible soil carbon farming in the EU”.**

**Funded by the European Union under the Grant Agreement n° 101112951.**

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## Executive summary

This document is part of the EU-funded project CREDIBLE, Grant Agreement 101112951, and it captures the main outputs of the first round of conversations had within the Focus Group on “How to avoid threat to food production and biodiversity and support positive synergies?”.

The main goal of this Focus Group is to explore the issue and generate guidelines on how to build policies for carbon farming capable of generating climate, environmental and societal benefits. This document summarises the active participation of experts (details provided in Tables 1 and 2) in a number of activities (with the main ones listed in Table 3).

## 1. Focus Group participation and activities

**Table 1 - Partners of CREDIBLE who participated in the Focus Group.**

Name of the expert	Affiliation	Role	Country
Mathieu Mal	European Environmental Bureau	Member	Belgium
Julia Pazmino	Ecologic Institute	Member	Germany
Gerald Jurasinski	University of Greifswald	Member	Germany
Iryna Raïskaya	University of Greifswald	Member	Germany
Katri Salovaara	Baltic Sea Action Group	Member	Finland
Pilar Andrés	CREAF	Lead	Spain
Aleix Valls	CREAF	Co-Lead	Spain

**Table 2 - Members of the Focus Group external to CREDIBLE.**

Name of the expert	Affiliation	Role	Country
Antonio Delgado García	Universidad de Sevilla	Member	Spain
Ana Márquez	SEO/Birdlife	Member	Spain
Rosa Mosquera-Losada	EU Agroforestry Federation	Member	Spain



Andrea Casadesús	BETA Technological Centre	Member	Spain
Ralph Rosenbaum	IRTA	Member	Spain
Raul Zornoza Belmonte	Universidad Politécnica de Cartagena	Member	Spain
Robert Savé	IRTA	Member	Spain
Stefan Schrader	Thünen-Institut	Member	Germany
Katrina Kostic	EIT-Food	Member	Spain
Antonio José Manzaneda	Universidad de Jaen	Member	Spain
Gabriel Moinet	University of Wageningen	Member	The Netherlands
Miguel Wood	Data Dragon	Member	Australia
Christiana Oragbade	Climate-Kic	Member	Spain
Enrique Doblás	CREAF	Member	Spain

**Table 3 - List of main activities carried out to steer the conversations.**

General description of the activity	Date of execution
First Focus Group online meeting	January 08, 2024
Second Focus Group online meeting	February 02, 2024
Third Focus Group online meeting	February 23, 2024
Plenary session presentation + panel during the European Carbon Farming Summit	March 06, 2024
Breakout session during the European Carbon Farming Summit	March 06, 2024
Post summit information and summit summary	March 12, 2024

## 2. Introduction

Farmers' mobilizations all over Europe and the recent confrontation between Member Estates for the Nature Restoration Law alert about the importance of casting some light on synergies and trade-offs between, biodiversity conservation, food production and



restoration of environmental services of agricultural landscapes that should be the ultimate purpose of C farming.

Based on some important widely disseminated reports published in the past decade on effects of organic management on crop yield, it has been suggested that carbon farming will cause production losses of more than 20% which might put at the stake food security in the EU. This conclusion, however, is underpinned on misinterpretations that have been discussed in our focus group.

On the other side, there is a lively discussion about interactions between C farming and biodiversity, that operate in different directions and have contrasting sign depending on the territorial scale and biogeographical context. While there is agreement on positive effects of increasing diversity (plant diversity, pollinator diversity, soil biodiversity...) on crop yield at the farm scale, conflicts arise when extending the vision of the problem at higher levels. Most agricultural systems beneficial for environmental services (including biodiversity and C sequestration) have lower land-use efficiency than conventional systems. In this sense, if current food preferences were to be respected, large-scale conversion of agriculture and cattle raising might increase land take and will require bringing more natural habitats into agricultural production.

With this in view, this focus group has addressed the following topics and questions:

#### **Question1: What is meant by carbon farming in reports and literature?**

A preliminary concern has been the **correct definition of C farming** in practice. Many statements about the effects of C farming on crop yield or on biodiversity are based on data from “organic” farms, which is not necessarily related to C farming. The same applies to data informing about the effect of isolated practices that may or may not result in increasing C stocks in soil or vegetation (such as no tillage, or cover crops...) depending on the context. In this sense, C farming is **an integrated agricultural strategy** and should not be taken as a synonym of any of the many practices encompassed under this term.

#### **Question 2: Can we afford declines in crop yield?**

One of the most frequently used arguments against the appropriateness of implementing C farming at the European scale is the risk of yield loss. With the focus on food security, our experts agree that, at the European scale, **we can perfectly afford a reduction of crop yield** per unit area in return for maintaining environmental services deserved by agricultural lands. In fact, the harsh decline of these services already constitutes a major threat for sustained food production in the mid-term, and even in the very short term in the EU dry regions. The system is clearly becoming unsustainable and therefore, there is no choice between change and business as usual. A more adequate question would be how to make the transition occur.

Not less important is to underscore that crop yield is only one of the terms in the complex equation that describes food security, and that many other terms of the agri-food system can be modified to compensate for potential yield loss (i.e. food waste, competition from energy crops, etc).

Finally, since successful C farming is a knowledge-demanding strategy, it is likely that the average yield gap would decrease as an increasing number of farmers are educated, progressively adopt climate mitigation practices, and exchange experience.



### **Question 3: Are agrifood systems the most suited to achieve carbon neutrality in the EU?**

Agriculture's fundamental purpose is to provide food, and combining food production with C sequestration presents different limitations and specific challenges depending on local characteristics. Some of our experts consider that, under the restrictive conditions of arid and semiarid Europe, **forestry has notably higher mitigation potential than agriculture** and that efforts should be mostly concentrated on preventing erosion and on sequestering C in Mediterranean forests.

### **Question 4: Is crop yield a suitable indicator of C farming success?**

Losing production per area unit does not imply losing farm profitability, that can be much more decisive for farmers when it comes to adopt C farming. At the farm scale, it is not the production of a given crop that matters, but **global farm profitability (total gain) and its resilience**. In this sense, there is growing evidence that building-up soil organic carbon reduces drought losses and yield fluctuation over time, then reinforcing economic resilience. Finally, given the current climate uncertainty, even if C farming reduces production now, there is no evidence that this effect will not change its sign in a near future.

### **Question 5: Why would C farming reduce yield?**

C farming success is more knowledge demanding than conventional management. Cover crops can compete for water with productive crops, particularly in Mediterranean woody crops where production can decrease, at least in the short-term. Also, in poor and heavy soils, tillage cessation can cause soil compaction. Tillage must be progressively reduced in combination with cover crops and proper fertilization.

Appropriate fertilization is fundamental to avoid trade-off between plant production and C accumulation in soil. Some experts worry that **we do not have enough organic matter of good quality to implement C farming at the European scale**. First, peat extraction is being prohibited. Secondly, biomass production and destinies are geographically disconnected. Up to now, biomass is a resource, but will soon become a market product, and this will make prices soar to the point that OM becomes economically unavailable. Organic matter availability will thus depend on the complex evolution of C markets.

### **Question 6: What is the appropriate territorial level for implementing C farming?**

Implementing C farming while maintaining food production will have contrasting efficiency and will find disparate difficulties depending on EU bioclimatic zones, soil types and crops.

Two questions were raised: **(a) should efforts for C farming implementation be equally distributed across the EU** or should they be concentrated on the most favourable sites and crops? There is no agreement among our experts about pros and cons of prioritising crops. For some of us, strategic crops should be leveraged to stimulate C farming. If only looking for global efficiency in C sequestration, you should prioritize crops whose productivity under C farming is promising for success. But concentrating efforts on a few strategic crops is a dangerous choice under uncertain



climate conditions. For other, perverse incentives are an important point against crop prioritization: if farmers are rewarded for selected crops, this will strongly operate against food and environmental biodiversity; (b) **should rewards (or stimuli) be the same across the EU, or should they better be regionally tailored to fit farmers' efforts?** Farmers' difficulties to maintain production will be greater in regions with more potential for C sequestration. We agree that paying the same per unit of effectively sequestered C is not fair, because of farmers in environments adverse to C farming, or striving to avoid C emissions will not be rewarded for their supplementary effort.

#### **Question 7: Matching C farming with biodiversity protection**

A key concept to keep in mind is that **soil organic carbon provides resilience to the global agroecosystem** and its environmental services, including biodiversity provision. Carbon farming is an EU mitigation strategy to fight climate change on the agriculture sector by capturing carbon in crops and soils. However, EU adaptation strategy is equally relevant, and biodiversity is a perfect ally to improve crops resilience to extreme climate phenomena.

At the farm scale, C farming based on integrated systems produce major improvements in above and belowground biodiversity (including cultivated and natural biodiversity) which in turn has a positive impact of fertility and pest prevention. **Therefore, there is proved positive relationship between biodiversity and productivity and resilience.** Recovering biodiversity will reduce the need to use external inputs, which contributes to improving agricultural profitability.

At the landscape scale, integrated farming systems favouring C farming (agroforestry, regenerative agriculture, polycultures, etc.) have lower land-use efficiency than conventional systems. In addition, crop rotations typically include crops that are not suitable for human consumption. Finally, extensive animal husbandry is characterized by longer production cycles and lower animal growth rates, meaning that larger quantities of fodder and more land for fodder production are required per unit of organic meat. Brief, greater agricultural extensions are required to maintain global agricultural production under integrate than under conventional management. Therefore, at the landscape scale, compensating reduced yield per area unit is meant to increase land take to maintain food production, and **large-scale conversion would likely require bringing more natural habitats into agricultural production if there are no changes in the European diet.** However, landscape dynamics are complex and must be considered in detail.

### **3. Short process report**

The debate within our focus group was interactive and free flowing. The working meetings were structured as brainstorming sessions. Consensus was not sought and disagreements, when they arose, were seen as complementary views of complex situations. Starting from the issues addressed in our work sessions, the following ideas



were transmitted to the attendees to the breakout session of the group in the First European C Summit to encourage discussion:

- C farming is only one indicator of the performance of a context-specific approach that should support social, economic, and ecological health of the European agriculture.
- There are no “C farming practices”, but practices that, when adapted to the appropriate context, can capture C.
- We are not talking about maintaining or increasing crop yield while sequestering C, but about increasing crop resilience to climate change, about reducing input costs, and about multi-crop productivity. C farming is about reinforcing long-term sustainability of the farm, and farmers are already trained for this.

From the interaction between members of the Focus Group and the attendees to the breakout session some interesting reflexions emerged:

#### **Scientific and technical issues**

1. A clear definition of biodiversity indicators and monitoring methods is required: what is the appropriate scale for biodiversity measurement? what is the most suitable temporal scale for biodiversity evaluation? how does biodiversity relate to farm resilience?
2. C farming success should not be only evaluated in terms of units of C sequestered. The global farm system must be evaluated within the framework of environmental services.
3. Costs of environmental and ecological damage by conventional agriculture are not accounted for in economic evaluations, which results in fake cost-benefit estimates of the transition towards C farming.

#### **Markets and economics**

4. There is too close a connection between C farming and business: farmers will choose business over C.
5. C farming certification is not context-appropriate. Biodiversity and environmental services should be included in already existing credits.

#### **Capacity building & Farmers' perceptions**

6. Important changes are required in the communication between technicians, scientists, farmers and citizens looking for transdisciplinarity and real open dialog. We should build up the future WITH farmers not FOR farmers.
7. There is a lack of qualified advisory/support for farmers to engage in a knowledge-demanding new strategy.

## **4. Summary of recommendations**

- Neither sequestered carbon nor crop yield alone are appropriate indicators of a successful C farming strategy: increasing farm profitability and resilience is what can stimulate farmers to engage in C farming.

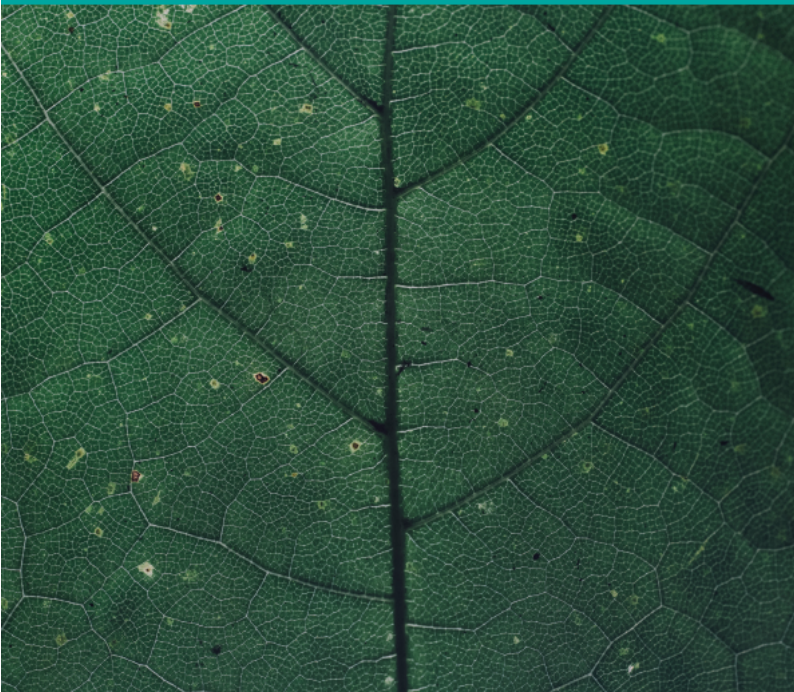
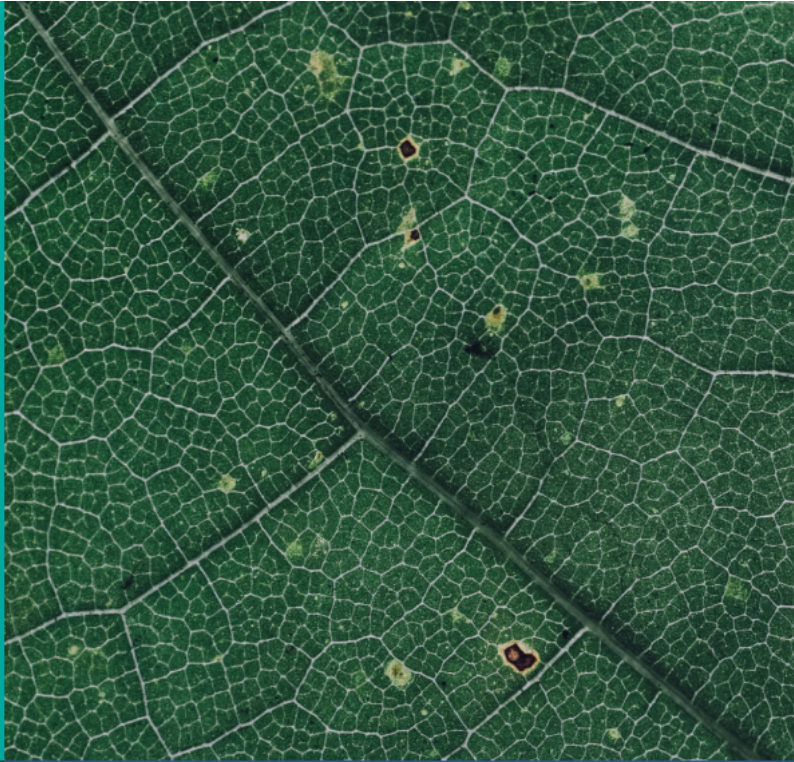




- Wide-range EU protocols are not useful in supporting agricultural conversion. Tailoring C farming practices at the lowest possible local scale in terms of soil and climate characteristics is vital.
- Dry regions should be prioritized to increase their resilience to climate change and to take profit of their high capacity for C sequestration in their carbon depleted soils.
- Given the great European (social, economic and environmental) heterogeneity, we should better pay for selected practices per region, and the results in C terms should be continuously monitored.
- Rewards for C sequestration must be conditioned to the “no-harm” principle applied to environmental services, including biodiversity.
- Rewards and incentives should be proportional to farmers’ efforts to sequester carbon and should include payment for additional effort in improving environmental services (including biodiversity).
- Fostering agroecology and other holistic approaches to agricultural production can guarantee large-scale production of basic grains and cereals at affordable prices and crop diversification while cooperating to C sequestration.
- Recovering integrated traditional systems, with agriculture embedded within natural areas, could increase the available area for crop production while reducing wildfire risk and increasing biodiversity.
- Facilitate interaction between conventional farmers and farmers engaged in the transition. Farmers follow the path of other successful farmers. Do not forget farmers that have no access to information.
- Verify that Member States design and implement high-quality AKISs to support farmers in the transition. Facilitate monitoring by public organisms at fair price: they are operating with (often European) public resources.







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