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How to avoid threats to food production and biodiversity and support positive synergies?

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Key messages

- Water availability is the most limiting factor for reconciling carbon sequestration, biodiversity protection, and crop productivity.
- Farm profitability (instead of crop yield) is crucial for farmers to adopt carbon sequestration strategies. Profitability must be evaluated under a Nexus concept.
- Incentives to carbon sequestration should consider adverse conditions, in particular water limitations.

Introduction

One-year long academic and technical debate about relationships between carbon sequestration, crop yield and biodiversity and an intensive review of the available literature led to the conclusion that there is no evidence of the sign and direction of these relationships. Most existing scientific information is based on field trials that do not represent the reality at the farm level and, when this farm level is addressed, there is no clear definition of the agricultural practices applied. Problems arising from the confusing term “organic” also make it difficult to correctly select practices and combined strategies contributing to carbon farming.

Based on this review, our Focus Group decided to make an effort to recruit farmers that currently struggle to increase soil carbon in their soils in search of a large-scale inquiry. None of the agricultural cooperatives or associations consulted at the European scale agreed to respond to a brief survey, but delegates of some important agricultural associations attended two on-line meetings and provided the ideas presented here.

Regulatory framework

The opinion of farmers deeply engaged in carbon farming and biodiversity protection under contrasting European climates should be taken into account to make it possible for the adoption of the future CAP after 2027. In particular, the worrying shift of the CAP towards the intensification of agriculture that occurred in recent years can only be corrected if the demands of the most pioneering farmers are heard and addressed.

Recommendations

Recommendation 1

Carbon sequestration and regenerative agriculture are still viewed as strategies related to extra costs, which is a misunderstanding derived from an incorrect economic evaluation of the system. Our focus group strongly advocates for a holistic management plan before the implementation of carbon projects.

Recommendation 2

Carbon sequestration and biodiversity conservation are strongly linked. Both of them contribute to crop resilience in front of pests and drought and cannot be evaluated separately. The planning of ecological benefits should be viewed within the holistic financial health of the farm. Carbon programs need to contribute to increased economic sustainability, not through a further spread and subsidies, but through consolidation of the farm business.

Recommendation 3

Compensation for adoption of regenerative practices and carbon sequestration strategies should be higher (or should last longer) in dry (arid and semi-arid) regions, where the adaptation of the agricultural system is slower.

Recommendation 4

Subsidies or compensations for biodiversity conservation should complement those addressing carbon (C) sequestration. However, coordinated efforts of the scientific community should be stimulated in order to find measurable indicators applicable to the farm scale.

Background information

Great variation between farmers and also different limitations for maintaining production were evident from our conversations.

Where rainfall is not limiting (under Continental Mediterranean climates, in the Basque Country, Spain), high production horticulture is being implemented in the vicinity of the city while effectively sequestering carbon in the soil. This method (*Intensive market gardening*) seeks to maximize yield per unit area in very small production units, while protecting soil biodiversity. The small dimension of the production units facilitates land sovereignty and access to land for more people without them having to take loans and avoiding big investments in machinery. From the life cycle of the production, the

greenhouse gases (GHGs) balance (sequestration-emission) will depend on the availability of organic amendments imported from the city or peri-urban animal farms.

European regenerative farmers have endured great loss in production due to drought. But this effect is highly context-dependent with water availability being the most limiting factor.

In dry Mediterranean regions, moving from intensive to regenerative agriculture means losing crop productivity. Recovery to initial levels can take from 3-6 years with more than 600 mm of annual precipitation and 6-10 years with annual precipitation below 600 mm.

Livestock farmers and dairy producers that apply regenerative methods under Mediterranean and Atlantic conditions agree that they must reduce the number of livestock of their farms to adapt the stocking density to soil capacity. They must also allocate a part of their productive area to plant biodiversity. This reduction, however, is positive for the health of the remaining crop area.

Regenerative livestock farmers defend that they manage their farms following regenerative principles because of the conviction that this is the only way ahead for food production. Under increasing climatic adversity, the cost of compensating for soil and biodiversity degradation by upscaling intensification (increasing investment in energy and agrochemicals) will end up with their economy.

Regenerative farmers in areas of naturally high soil carbon content and high biodiversity, or that have been working to increase any of them since long, find it difficult to prove their efforts to conserve it. They also have problems demonstrating the positive effect of their efforts to conserve/increase plant and animal biodiversity on their farms, because this is greatly influenced by landscape structure and by the practices of their neighbours.

In organic soils, where peatlands must be kept flooded to preserve C stocks and reduce GHG emissions, agricultural cessation and rewilding may be the unique alternative. Most agricultural production in EU peatlands is animal-based (animals are grazing there, or grass is grown and harvested for them) or is oriented to energy crops. We should reduce both animal-based food and energy crops. To compensate for economic problems at the regional scale, a revitalized paludiculture (a regenerative form of agriculture) should be developed to allow production under wet conditions.