



## SOIL HEALTH RELATED PROBLEMS ON SITE



Erosion



Pollution/  
Contamination



Compaction



Low soil  
organic matter  
content



Acidification



## SOIL-IMPROVING CROPPING SYSTEMS FOR INCREASING SOIL HEALTH IN CALDEIRAO, PORTUGAL

The following Soil-Improving Cropping systems (SICs) were tested in Caldeirao, Portugal to address the main soil threats identified above:

1. **Soil improving crops (organic rice in rotation with perennial lucerne and conventional grain corn in succession with legumes winter cover)**
2. **Integrated nutrient methods (conventional grain corn fertilised by urban sludge).**

The SICs above present important practices that might benefit soil health if widely taken up. The main aim of this study was to formulate policy alternatives and actions and to facilitate the adoption of SICs.

Evidence gathered through desk research, interviews and a stakeholder workshop show that different factors contribute to and undermine the uptake of SICs in general, and of the practices tested in Caldeirao, Portugal in particular. These include:

- Funding priorities
- Costs of adopting SICs
- Economic incentives mostly reward existing practices
- Lack of knowledge and technical support
- Policy instruments not flexible enough to take into account regional/structural differences
- Bureaucratic permitting procedures for sewage sludge application
- Unwillingness to give up traditional practices
- Limited influence of producer organisations
- Lack of monitoring and enforcement
- Market demands/pressures

## SOIL IMPROVING CROPS AND ORGANIC AMENDMENTS

### Factors encouraging the adoption of soil improving crops:

- Subsidies in place for rice cultivation
- Favourable climate and soil conditions
- New generation of farmers open and interested to try the organic rice in rotation with lucerne
- Technical support from cooperatives, open days (rice)
- Policy support for organic rice cultivation

### Factors preventing the adoption of soil improving crops:

- Lack of subsidies
- Cost of seeds and access to them
- Lack of farmer interest and supportive networks
- Lack of training in green fertilisation
- Difficult to access relevant information
- No political incentives to adopt the green manure technique
- Mild climate
- High cost of installing lucerne

### Factors preventing the adoption of organic amendment with sludge:

- Low cost for farmer
- Easy access to information

### Barriers preventing the adoption of organic amendment with sludge:

- Lack of knowledge about the sludge application and need for a specific machinery
- Bad smell of sludge
- High bureaucracy (administrative permits for the sludge application)
- Specific rules for sludge application (crop type, soil type, quantities, application dates, waiting times before sowing)
- Lack of knowledge about the environmental benefits
- Bad reputation of sludge application amongst the public and farmers



# POLICY SHORTCOMINGS AND OPPORTUNITIES FOR FACILITATING THE UPTAKE OF SICS

SICS adoption is already promoted through a range of existing regulatory, economic, and voluntary policy instruments and measures in Caldeirao, Portugal. The analysis shows that several policies regulate and incentivise the use of cover crops, crop rotations and integrated nutrient management, the SICS tested at the study site: direct payments, greening measures, and rural development plans under the CAP all provide financial rewards to farmers adopting crop rotation and cover crops. Nutrient input in agriculture is regulated through several pieces of legislation, mostly with a view to protecting water quality rather than soil, such as the national Water Law, regulations dealing with the sustainable use of pesticides, sewage sludge, and nitrates on agricultural land .

Blue circles= SICS tested in the study site; Red circles = Other SICS promoted through existing mandatory, economic, or voluntary policy instruments in Caldeirao, Portugal

	CROP ROTATION	COVER CROPS, CATCH CROPS, GREEN MANURES,	INTEGRATED NUTRIENT MANAGEMENT	EFFICIENT IRRIGATION	CONTROLLED DRAINAGE	REDUCED/NO TILLAGE	INTEGRATED PEST MANAGEMENT	SMART WEED CONTROL	SMART RESIDUE MANAGEMENT	CONTROLLED TRAFFIC MANAGEMENT	INTEGRATED LANDSCAPE MANAGEMENT
CAP - Complementary National Direct Payments Requirement (Greening included)	●	●				●					●
Cross compliance - Statutory Management Requirements (SMR) and standards of good agricultural and environmental condition (GAEC).	●	●				●				●	●
CAP - Rural Development Programme 2014 - 2020	●	●	●	●	●	●	●	●	●	●	●
National Water Law			●								
National Nitrates Directive - Law on the Protection of Water from Pollution Caused by the Use of Nitrates in Agriculture			●								
National Groundwater Law			●				●				
National legal framework for agricultural use of sewage sludge			●								
National sustainable Use of Pesticides Law							●				
National Action Program to Combat Desertification (PANCD)	●		●	●		●	●	●			



Based on the results of this study, the following policy recommendations can be made:

ESTABLISH MECHANISMS  
FOR INFORMATION  
SHARING BETWEEN  
FARMERS



EFFECTIVE  
KNOWLEDGE  
DISSEMINATION  
EXCHANGE OF PRACTICES

DESIGN TARGETED  
INCENTIVES THAT  
REWARD UPTAKE OF  
APPROPRIATE  
PRACTICES



PRIORITY GIVEN TO  
CONSERVATION  
FARMING TECHNIQUES

STRENGTHEN POLICY  
ENFORCEMENT



MECHANISMS FOR  
COMPLIANCE  
CHECKING TO BE  
STRENGTHENED AND  
EXPANDED

SUBSIDISE TRANSITION TO  
PRACTICES BENEFITING SOIL  
HEALTH



REVISION OF  
CERTIFICATION COSTS  
LAND REPARCELING  
NATIONAL SEED  
MULTIPLICATION PROGRAM

SIMPLIFY PERMITTING  
PROCEDURES FOR SEWAGE  
SLUDGE APPLICATION



LESS BUREAUCRATIC  
COMPLICATIONS FOR  
FARMERS

INVEST IN AND BUILD  
CAPACITY OF FARM  
ADVISORY SERVICES



STRENGTHENING  
TECHNICAL SKILL OF FAS  
SETTING UP MECHANISM  
FOR CONTINUOUS  
LEARNING

COMMUNICATE  
ENVIRONMENTAL BENEFITS  
GENERATED BY SICS



PROSPECT OF A FAIR PRICE  
EDUCATING CONSUMERS



ESTABLISH MECHANISMS  
FOR INFORMATION  
SHARING BETWEEN  
FARMERS



EFFECTIVE  
KNOWLEDGE  
DISSEMINATION  
EXCHANGE OF PRACTICES

## **Establish mechanisms for effective knowledge dissemination and exchange between farmers:**

Some of the practices benefitting soil will require farmers to learn about these techniques, their application to different conditions as well as their benefits (and risks) to change their misconceptions about these methods. To this end, research findings should be systematically compiled, and widely disseminated and educational activities should be encouraged. Knowledge should be disseminated via multiple channels, through the provision of guidance document but also farms visits, demonstration days, and social media. Since farmers tend to place a lot of trust in their peers, establishing a network of model farms demonstrating how to use and adapt different SICS in the region would effectively support farmers in learning and sharing experiences about these practices

DESIGN TARGETED  
INCENTIVES THAT REWARD  
UPTSKE OF APPRIOPRIATE  
PRACTICES



PRIORITY GIVEN TO  
CONSERVATION  
FARMING TECHNIQUES

## **Design targeted incentives that reward uptake of appropriate practices:**

As mentioned above, subsidies and other economic incentives play a large role in Portuguese agriculture, however, evidence suggests that financial measures might finance practices already in place or which are not appropriate in specific locations. At the same time, regional and local policies must be flexible enough to allow for regional differences. A financial measure on cover crops may well be appropriate in the south of the country, but less appropriate in the north. Financial incentives need to be more targeted, both tied to specific actions and region (or environmental/geographic conditions) to result in the desired change. Priority should be given to conservation farming techniques that are also able to be a source of food production that is both profitable and sustainable.

STRENGTHEN POLICY  
ENFORCEMENT



MECHANISMS FOR  
COMPLIANCE CHECKING  
TO BE STRENGTHENED  
AND EXPANDED

## **Strengthen policy enforcement:**

While it was found that there are several policies already in place that – directly and indirectly - regulate and incentivise different SICS, stakeholders report that outcomes on soil health are limited due to weak implementation and enforcement mechanisms. It is clear mechanisms for checking compliance with existing regulations need to be strengthened and expanded. With the post-2020 CAP, new funding rules funding rules will be introduced. The Good Agricultural Environmental Conditions (GAECs) now offer a greater chance for soil protection. New conditions with the potential to improve soil health have been added, e.g., the new GAEC 7 requires “No bare soil in most sensitive period(s)”. Cover crops will be an important strategy for meeting this requirement. The payment agencies should seek to ensure that these conditions are complied with and verified through, e.g., more frequent inspections and farmer reporting (including for example images of the implemented practices).



SUBSIDISE TRANSITION  
TO PRACTICES  
BENEFITING SOIL  
HEALTH



REVISION OF CERTIFICATION  
COSTS  
LAND REPARCELING  
NATIONAL SEED  
MULTIPLICATION PROGRAM

### **Subsidise transition to practices benefitting soil health:**

The uptake of certain SICS might require upfront investments, such as the purchasing of seeds or new machinery. Grants should be made available to farmers buying new equipment to implement these practices or groups of farmers. A revision of certification costs might encourage a move to organic production, such as organic rice cultivation tested at the study site. Land reparacling and the establishment of a national national seed multiplication program were identified as actions which could facilitate a transition and reduce costs in the long run.

SIMPLIFY PERMITTING  
PROCEDURES FOR  
SEWAGE SLUDGE  
APPLICATION



LESS BUREAUCRATIC  
COMPLICATIONS FOR  
FARMER

### **Simplification of permitting procedures for sewage sludge application:**

A simplification of permitting and management plan approval process is necessary, as currently, many farmers prefer to avoid bureaucratic complications related to the use of sludge, even if it is free.

INVEST IN AND BUILD  
CAPACITY OF FARM  
ADVISORY SERVICES



STRENGTHENING  
TECHNICAL SKILL OF FAS  
SETTING UP  
MECHANISM FOR  
CONTINUOUS LEARNING

### **Invest in and build capacity of Farm Advisory Services:**

Like framers, farm advisors also need to learn about new practices, their practical application, costs, and benefits to support farmers they assist. Strengthening the technical skills of farm advisory services and setting up mechanisms for continuous learning are therefore crucial.

COMMUNICATE  
ENVIRONMENTAL  
BENEFITS GENERATED  
BY SICS



PROSPECT OF A  
FAIR PRICE  
EDUCATING  
CONSUMERS

### **Communicate environmental benefits generated by SICS:**

High-quality products need to be sold at fair process which compensate farmers for the benefits they generate for the environment and society as a whole. The prospect of a fair price for a product stemming from sustainable practices will make their uptake more appealing to farmers. It will be equally important to continue to educate consumers about the advantages and disadvantages of conventional farming practices vs. sustainable practices to ensure increased demand for sustainably produced products and encourage the retail sector to make these more widely available to all sections of society. To this end, cooperatives or producer associations play a major role in marketing these products, explaining production methods – especially important for practices such as sewage sludge application which might perceived as a high-risk technique – and negotiating prices with retailers.

