School of Agriculture, Policy & Development

European Synergies for Soil-Related Training Provisions

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Introduction to CSA

Climate smart agriculture (CSA) is a concept recently developed by the FAO to simultaneously achieve food security and agricultural development goals by adapting to climate change and by lowering greenhouse gas (GHG) emissions. It relies on 3 pillars:

1. **Sustainable increase of productivity and income**
2. **Adaptation and resilience to climate change**
3. **Reduction and/or elimination of GHG emissions**

CSA is an approach requiring site-specific assessment to identify suitable technologies and practices, rather than being a universally applicable answer.

Holstein calf © Marie Dittmann

Soils, Climate and Agriculture

A forest is the best CO_2 pump on Earth, able to rapidly absorb atmospheric carbon by photosynthesis. This process, common to all vegetation, leads to accumulation of organic matter in the soil which allows it to function and to support biological activity on which we all depend. Forest clearance, usually to grow crops or create pasture, results in a large loss of carbon both from plant biomass and from the soil. Over time, loss of soil organic matter leads to a degradation of soil function with negative impact on its fertility.

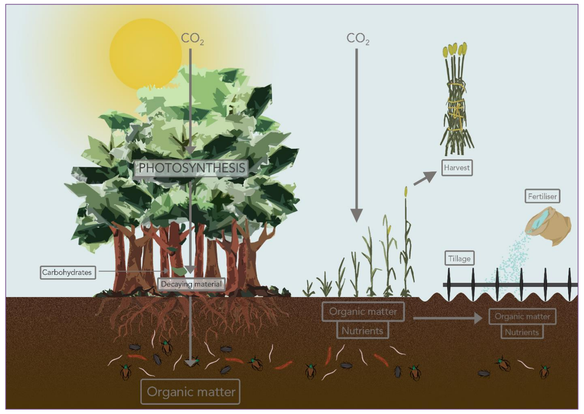
There are 2 options to remedy this situation:

1. Use fertilisers: usually manufactured using fossil energy, releasing CO_2 in the process
2. Increase soil organic matter: more environmentally and economically appealing in the long run, but not always possible

Wine Production and Soils

Climate and soils are the most important factors for growing grapes, with an optimal combination known to result in high quality wine. Many vines growing on comparatively dry and unproductive soils produce excellent wines, however the balance between optimal stress conditions and those damaging the crop is very fine. Predicted increase of high temperatures and lack of water will be exacerbated in such poor soils.

Currently, the soils of many vineyards contain only small amounts of organic matter. Greening the areas between vines not only improves soil quality and water retention capacity, it also leads to increased CO_2 fixation. Plant cover can also help reduce the surface temperature and thus cools the environment for the vines. The management challenge is to create inter-row cover delivering these benefits, while not competing with the vine for water and nutrients.



Carbon cycle © University of Reading

Minimising carbon losses in farming

- Decrease the amount of ploughing ('no-till' or 'lo-till' farming)
- Avoid bare soils as plants increase soil carbon content and stabilise the soil
- Limit fertiliser use to minimise losses ('precision agriculture')
- Use of site-adapted crop rotation and/or legumes to fix nitrogen
- Return crop residue to the ground

Dairy Farming and Soils

This sector is responsible for 4% of human-induced GHG emissions, directly through methane loss from enteric fermentation and indirectly by land use change. Dairy is highly dependent on forage; existing ryegrass and maize monocultures, as well as over-fertilisation with slurry are a challenge. One approach to decrease climate impact is more efficient nutrient cycling (e.g. nitrogen), or an increase in soil health through diverse forage mixes (various depths of roots ensuring better nutrient cycling, soil structure, etc.). Introduction of permanent and diverse forage mixtures is likely to increase soil carbon content, thus contributing to climate change mitigation.

Camel Valley vineyard, Cornwall, UK © University of Reading

MOOCs: Raising Awareness

Online education materials, such as the MOOC "The Future of Farming: Exploring Climate Smart Agriculture" hosted by the University of Reading and FutureLearn, offer an opportunity to raise awareness of issues surrounding farming, climate change, and the role that soils can play in sectors such as dairy and wine production. After a successful launch in January 2017, the MOOC will run again in September 2017 and will also be translated in French and German in order to reach a wider audience.

Agreenium and the 4‰ Initiative

Online educational activities are an excellent opportunity to expand impact of existing specialist initiatives. The principles of CSA will be explored in a MOOC dedicated to soils and their role in the fight against climate change.

The French 4‰ Initiative sets out to bring together all willing public and private contributors under the framework of the Lima-Paris Action Agenda. The aim is to demonstrate that agricultural soils can play a crucial role by developing and implementing practical programmes for carbon sequestration, and the types of farming methods used to promote it (e.g. agroecology, agroforestry, conservation agriculture, landscape management). A 4‰ annual growth rate in the soil carbon stock would make it possible to stop the present increase in atmospheric CO_2.

The University of Reading, INRA and Agreenium will design a MOOC to bring educational dimension to the 4‰ Initiative. The objective is to train the existing community of partners to consider climate change goals in their activities, from policy to field level.

In this context, partnerships between current international dynamics is crucial. Accordingly, the participation of INRA (Agreenium member) and the University of Reading, both Climate-KIC partners, appears as an excellent opportunity to mutualize and co-design digital resources on climate change.

Acknowledgements

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https://eit.europa.eu/ http://csabooster.climate-kic.org/

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