

Testing and promoting the adoption of soil-improving cropping systems across Europe

Newsletter 4 April 2019

WELCOME to the fourth newsletter of the SoilCare project.

In this issue:

1. New Report: Review of Soil Advice
2. News from the field: Progress in the Spanish SICS trials in organic olive orchards and stone fruit plantations
3. News from the field: Progress on the woodchip trials in Belgium
4. SICS Focus: Organic matter decline
5. New SoilCare Film
6. New SoilCare booklet for farmers
7. New SoilCare publications
8. Past and Future events/presentations

Rudi Hessel, Project Co-ordinator
Rudi.hessel@wur.nl

Soilcare-project.eu

Keep up to date with SoilCare activities by following us on:



@Soilcare_eu



Facebook



LinkedIn



Vimeo

Subscribe to receive further SoilCare newsletters [here](#)

New Report: Review of Soil Advice

The need to provide appropriate information, advice and support to land managers about sustainable soil management is increasingly recognised at the international, European and national levels. Advice to farmers concerning soil management is complex as it can cover a number of topics, address a number of objectives, and be delivered by different providers using varying approaches, methods, tools. This diverse soil advice landscape reflects a context where farmers are having to deliver both marketable and environmental public goods combined with a typically diverse and fragmented advice landscape whereby farmers are influenced by multiple priorities, interests and people (environmental, agronomic, innovation, technological, food assurance etc).



A new SoilCare report, available [here](#), considers these multiple contextual factors when reviewing and assessing the effectiveness of advice about soil-improving cropping systems (SICS).

The review is structured around 5 key issues:

- soil management topics already being supported with advice
- advisory services and how farmers currently obtain information about soil management
- gaps in advice and dissemination
- examples of effective advice/best practice
- key principles for effective knowledge exchange of SICS

Cont. Pg 2 >

Both European and national support and advice is reviewed with particular reference to the SoilCare study site countries where information is available. As there are few/no academic papers that specifically examine advice for soil, the review draws on papers and reports that consider:

- advice and information in the context of adoption of broader best management practices (BMP);
- advice as it relates to policy measures relevant to soil in European countries, concerning all aspects of soil management in arable agriculture i.e. not just SICS;
- advisory systems and services in European countries primarily referring to the EU Proakis project
- recent relevant research and reviews conducted in the EU funded projects such as RECARE and SmartSOIL. The policy review conducted in WP7 (Deliverable 7.1) complements this assessment of the advice landscape for soil.

Drawing on the review, the report concludes with some key principles for advice and dissemination on SICS, structured around the three main elements of the dissemination strategy: the message (the what), the methods (the how) and the audience (the who). These principles are summarised below.

The Message (what)

- Does the land manager want to use the information and can they?
- Does it clash with other advice?
- Are there opportunities to link it to other advice?
- Does it fit with compliance and standards for AEM contracts?
- Is it limited by meeting cross compliance regulations?
- Is it holistic advice – several SICS combined across the farm?
- Emphasise SICS *principles*, not prescriptions
- How big is the change on farm - and is long-term support needed?
- Is the advice clear and were the principles and language used understood?
- Discuss trade-offs and short-term losses, as well as assurances of long-term benefits

The Methods (how)

- What differences are there between advisory service quality and capacity?
- Do these services need training in SICS?
- What viewpoints may advisors bring to SICS explanations? How does this sit within the wider advisory landscape?
- Who does the land manager trust and not trust in giving sound advice?
- Does advice need to be farm-specific, or broader? Are events or one-one conversations best?
- What networks exist to best reach land managers?

The Audience (who)

- Do land managers need training in SICS application?
- Is there anyone trained in SICS to give advice and training?
- Land managers may vary from small-holders to commercial farms with varying tenures, control over decisions and environmental commitment
- Some land managers may want to see case studies of SICS in practice, others research evidence behind them
- The same messages can be understood differently depending on the land manager
- How tailored can you make the advice depending upon the scale (local – regional / national)?
- Advice needs to be focused on farm business but set within the context of other influences

The review has also helped to inform a recent paper [Are advisory services 'fit for purpose' to support sustainable soil management? A review of advisory capacity in Europe](#) published in a Special Issue of Soil Use and Management "[Soil information-sharing and knowledge building for sustainable soil use and management: insights and implications for the 21st century](#)".

For more details about the report, please contact Julie Ingram, jingram@glos.ac.uk

News from the field: Spain Study Site Progress in organic olive orchards and stone fruit plantations

In our [second](#) newsletter (November 2017), we introduced you to the two [Spanish study sites](#), located in the South-East of Spain near Almeria – Area A in the Sorbas-Tabernas Basin and Area B in the Cabo de Gata Natural Park. Recently the SoilCare research team met in Almeria to discuss project progress and visit the two study sites.

Spain, Almeria

Area A: Sorbas-Tabernas Basin

Study Site leader [Julián Cuevas](#) introduced us to his research team and the farmer heading this trial. We were given a great overview into the uniqueness of Tabernas desert, the influence of the surrounding mountains for water and the calcareous, weak structured soil prone to erosion. We also learned about the evolving history of agriculture here – from livestock grazing to orange, almond and olive plantations – the result of a changing and expanding global market. Orange and lemon plantations still very much exist here, however, they are in decline due to strong competition from cheaper oranges from developing countries with lower production costs that has caused a price crisis in the last few years. The area of almonds grown in this region is expanding due to heavy demand from China and other countries. The variety grown here are more suited to this climate, are rain-fed and are lower yielding but higher quality than those grown in California.

Farmer Rafael Alonso Aguilera from the family-run [Oro del Desierto](#) organic olive farm and processing unit talked with us about his passion behind the business and practice, as well as the progress to date with his trial. As a family farm that has won several [awards](#) for their cold-pressed extra virgin olive oil and who work hard to be a part of both the local and global market, it was great to see them actively leading soil health research in the desert.



*Rafael Alonso Aguilera in organic olive orchard
Photo credit: Jane Mills*

Farm background

High quality organic olive oil has been produced on the farm since 1995. The olive variety grown is the 'Picual', maintained and harvested with machinery. The plantation is low density (7 x 7 m spacing of trees) due to the scarce availability of water. The flowering and fruit set in mid-May, therefore controlling irrigation and the status of the plants' water at this time of year is crucial. The focus of the business is to produce high quality rather than volume. The family sell oil to over 30 countries, bottling 90% of their production. There are very few pests and diseases due to the hot summers, cold winters and low humidity.

Here, organic is a practical choice since the market provides a more stable income than conventional due to the certification process and consistency in quality. Alternate bearing of olives causes high fluctuations in yields and consequently in price. This uncertainty in price can be difficult for farmers to manage. High olive oil quality has low acidity and is the farmers production target. This may depend on management, weather variation and resulting chemical use to control pest and disease. Overall organic is currently less than 5% of Spanish produce, although Integrated Pest Management (IPM) and reducing pesticides is gaining popularity.

Soil-improving Cropping System (SICS)



Woodchip compost and cover crops
Photo credit: Jasmine Black

The SICS experiment is on land rented by the family on a 10-year tenure, of which they are just 3 years in to. The owners converted the olives to organic 8 years ago, but they have been growing on the site for 30 years. Prior to this, it was used to graze livestock, which eventually became an unprofitable business. It is cheap to rent and as the family already have a near-by processing plant and established customer base it was an easy win to expand onto this grove. Their decision to test the SICS on this site was because they thought that they may see a bigger difference compared to the groves that they had been managing for a longer period.

The SICS that the family are testing are the additions of woodchip to the alleys with the new drip-feed irrigation pipes (8 l /hour) in the olive groves. This SICS has replaced the traditional method of burning or removal of the pruned material and flooding irrigation. Compost is also added and is home-made from waste olive paste after processing for oil, chicken and sheep manure, straw and iron. This is used after 1-2 years of maturing. The removal of woodchip is also expensive, so this has provided cost savings as well as organic matter to the soil.

The cover crops grown have so far been spontaneous – too many would cause water competition to the trees. They are either mown or grazed during the spring and summer. The family have now agreed to trial incorporating a mix of legumes and grasses in order to increase nitrogen in the soil and improve rain infiltration. Existing stones are left on the soil surface which helps protect against erosion, whilst in conventional systems these are removed. They are hoping that the cover crops will also help to reduce soil erosion.

Initial observations

The family and researchers have already seen a big difference in the soil organic matter and structure after just a few years of woodchip and compost applications. The drip-irrigation has also reduced evaporation and saves 30% of the previous water use, whilst allowing the minerals to be taken up by the trees more slowly.



Examining the soil structure.
Photo credit: Jane Mills

Area B: Cabo de Gata Natural Park



Next, we headed to our Spanish partner's second study site, nearer to the coast with a greater wind speed which can erode the similarly weak-structured calcareous regosols. An average of 4 t / ha of soil can be lost every year to both wind and rain erosion, so the challenge here is similar – trying to increase organic matter in the soil.

This plantation of stone fruit – La Joya – is owned by the company Grupo de Ciruelo.

Company background

Grupo de Ciruelo owns several plantations around the south east of Spain and grows a range of fruit including grapes, nectarines, plum, apricots, oranges and lemons amongst some others. La Joya is an estate of 180 ha, although they also run sites up to around 400 ha. The company employs some permanent technical staff and, in the picking and pruning season, around 300 migrant workers who work between the different crops. They work to use Integrated Farm Management and are certified under Standard IFS, Standard BRC, GlobalGap, Tesco Nurture, M&S Field to Fork, LEAF Marque, Integrated Production and Sedex. These work to ensure good social and environmental standards are met.

Soil-improving Cropping System (SICS)

The SICS being carried out on this study site include trialling deficit irrigation against regular irrigation methods and growing cover crops. The company and researchers hope to reduce the water quantity and cost as well as increasing soil moisture, soil organic matter and biodiversity from these changes.

Initial observations

The cover crops were unfortunately eaten by a local population of rabbits. The group tried to grow these again but were eaten. Despite this, they are keen to try in the following year and will monitor progress and are considering ways to biologically control the rabbit population.



Nectarine orchard with pruning residues Photo credit: Jane Mills

The group began monitoring soil moisture and CO₂ emission levels from the soil between standard and deficit irrigation in February 2019. Initial early data from just one month of measurements are hinting that soil moisture may be higher in the deficit irrigation sites, whilst CO₂ emissions may be higher in the regular irrigation. There are many more months of monitoring to be undertaken before this can be verified.

For more information about the SoilCare study site in Spain please contact Julián Cuevas jcuevas@ual.es

News from the field: Belgium Study Site Progress - Ramial woodchip as soil amendment



Piling up woodchip to be spread over the trial fields.

Photo credit: BDB

In our third newsletter, we introduced the Belgium study site in Flanders, which is running two different SICS trials. We now have some interesting preliminary findings from their first trial which uses ramial woodchip incorporated as a soil amendment to increase organic matter, soil biodiversity and soil quality in general. Initial results of woodchip applications are being compared to others including manure, food waste and bought-in compost.

Promising outlook...

Nitrogen movement through soil: In the autumn following woodchip applications, there has been a significant amount of nitrogen immobilised in the soil – meaning less is being leached away into groundwater as pollution.

Yield: It's positive that although there has not been a yield increase, there haven't been any decreases either! The team are looking forward to seeing if this changes over the next years of trialling.

Organic matter (OM) & water infiltration: After one year it is yet too soon to measure changes in OM levels. However, in other trials that the researchers are undertaking which started in 2016, there is a trend towards higher levels of organic matter in the soil after 3 years of incorporation, as well as enhanced infiltration compared to chemical inputs.



Woodchip being spread over the field. Photo credit: BDB

Challenges ahead...

Labour: There are also challenges still to be met – the time and cost of labour involved in making woodchip can be a barrier for farmers – it can take up to 40 hours per hectare to make enough woodchips! The incorporation itself requires twice as much labour as the incorporation of other amendments, such as solid manure.

Farmer views - availability of ramial wood chips



Spreading wood chips. Photo credit: BDB

The research team have been working with farmers in the field and asking them about their practices. Farmers of different generations seem to be convinced of woodchip as a key resource for improving their soil quality and resilience, as well as making residual waste more valuable. They are trying to find different sources of woodchips if they don't have access to their own on-farm – this poses a potential risk around bringing in weeds, diseases and pests. Could this be an incentive for more holistic farm-landscape management, e.g. the re-introduction of small landscape elements such as trees and hedgerows, similar to an agroforestry system, with policy to back it?

Policy views - working together

One of the main questions that arises when farmers want to use ramial woodchip from the maintenance of small landscape elements (e.g. hedgerows), is whether it is considered to be an organic amendment or waste, and can it be applied to agricultural soil?

Current policy in Belgium means that farmers cannot easily use woodchip from sources other than their own farm due to the risk of contamination by pests and disease. They need to be proven to be clean and from a sustainable source before use.

According to the Flemish Public Waste authority, farmers are currently allowed to apply woodchips from the maintenance of small landscape elements, provided that these are “managed in a sustainable way”. This means that there should be an approved management plan as well as a so-called “commodity statement” for each application of woodchip. These rules make it very complicated and cumbersome for farmers to apply woodchip on their fields.

Despite this, after a positive consultation with the authorities, the research team are preparing a scientific report on the use of ramial woodchips, specifically based on the results of the SoilCare trial. This report will then be used by the authorities to make a “generic commodity statement” so that farmers can use ramial woodchips from sustainable small landscape elements.

A great step towards more holistic farm and landscape management!

For more information about the Flanders study site, please contact: Annemie Elsen aelsen@bdb.be or Mia Tits mtits@bdb.be

SICS Focus: Organic matter decline-specific SICS

Each issue of the SoilCare newsletter focuses on soil threat-specific SICS. In this newsletter the focus is on organic matter decline-specific SICS.

Decline of soil organic matter (SOM) refers to a loss of organic matter mass (and quality) in soils over time, which may lead to a deterioration of soil structure, a loss of water and nutrient retention and biological activity, and in the end to a reduction in crop productivity and water and nutrient use efficiency. Land use change (from forest and pastures to arable land) and intensive soil cultivation are major causes of a loss of soil organic matter. There is some evidence that climate change also contributes to a decline in SOM.

The SoilCare review of SICS ([see Newsletter 2](#)) has identified SICS that prevent organic matter decline. These SICS relate to measures that decrease mineralization of soil organic matter and/or increase inputs of organic matter. Organic matter-specific SICS may involve 3 mechanisms: (i) changes in inputs, (ii) substitution, and (iii) redesign.



Perennial wheat demonstration in Belgium study site

The first mechanism relates to (increased) inputs of compost, crop residues, and animal manures. The second mechanism involves reduced soil tillage, direct seeding in untilled soil instead of intensive soil cultivation, and controlled drainage. The third mechanism involves the growth of crops with large biomass production and a relatively low harvest index, straw and crop residues return to soil, and the growth of perennial crops, cover crops, leys and green manures.

The most promising organic matter-specific SICS have been identified as:

- reducing net soil organic matter mineralization (minimal tillage, drainage)
- enhancing the organic matter input into the soil (through crop residues, manures, composts) (see the Table).

Components of cropping system	Components of organic matter decline-specific SICS	Change in profitability
Crop rotations	Deep-rooting crops and/or +large % cereals in rotation +cover crops, green manures	-/+
Nutrient management	Application of manure and compost	+/-
Irrigation management	optimal	
Drainage management	Reduced drainage of organic-rich soils and peat soils	-
Tillage management	Reduced tillage	+/-
Pest management	optimal	+
Weed management	optimal	+
Residue management	Residue return	-/+
Mechanization management	optimal	+

For more information about these different SICS, please visit the SoilCare website

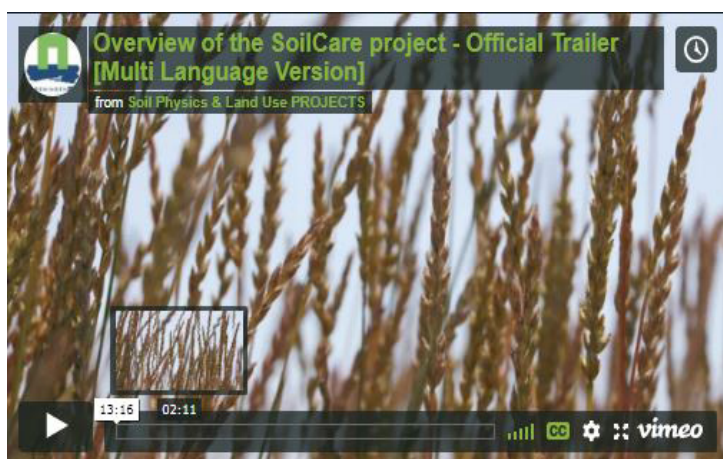
<https://soilcare-project.eu/soil-improving-cropping-systems>

New SoilCare Films

A new SoilCare film has been released. The 13 minute film provides an overview of the SoilCare project. It opens by explaining the importance of soil-improving cropping systems (SICS) and then visits some of the SoilCare study sites around Europe. In particular, the film focuses on the trials conducted in the Belgium study site and also the experiences of a Danish organic farmer who is working with SoilCare to reduce his reliance on ploughing.

The film can be viewed using the link below and is currently available in English, Danish, Dutch and Greek. Other languages will be available shortly.

<https://vimeo.com/channels/1049881/331219095>



Another film has been produced that provides a description of the study site in Denmark and can be viewed [here](https://vimeo.com/channels/1049881/288239575). <https://vimeo.com/channels/1049881/288239575>



New SoilCare Booklet for Farmers

A new SoilCare booklet for farmers has been produced by the project partners from France. The booklet titled, **10 common practices and their harmful impact on soil** aims to help with 10 common problems that often happen on farm. Management mistakes are identified and solutions are provided that are tested by farmers and researchers as part of the SoilCare project. The handy tips are intended to improve the quality of the soil, save unnecessary expense and develop the sustainability of the farm.



The 10 common practices are summarised as:

1. Making observations of your soil at a plot scale exclusively without considering the landscape and the local environment
2. Causing involuntary soil compaction by unsuitable agricultural practices
3. Not applying lime
4. Ploughing the organic matter too deeply
5. Storing manure under conditions which allow nutrient leaching
6. Leaving soil exposed in a bare uncultivated field
7. Ploughing organic matter just before sowing
8. Betting on a miraculous soil amendment
9. Composting manure: a good solution but best done quickly to avoid nutrient loss
10. Your own field-based observations are important – compare these with laboratory results

The booklet can be downloaded [here](#)

New Publications

New project reports

[Report 11: Review of Soil Advice](#)

New Journal articles

Hemkemeyer, M., Dohrmann, A.B., Christensen, B.T. and Tebbe, C.C., 2018. Bacterial preferences for specific soil particle size fractions revealed by community analyses. *Frontiers in microbiology*, 9, p.149.
doi.org/10.3389/fmicb.2018.00149

Thomas, R., Reed, M., Clifton, K., Appadurai, N., Mills, A., Zucca, C., Kodosi, E., Sircely, J., Haddad, F., Hagen, C. and Mapedza, E., 2018. A framework for scaling sustainable land management options. *Land Degradation & Development*, 29(10), pp.3272-3284.
doi.org/10.1002/ldr.3080

O'Sullivan, L., Wall, D., Creamer, R., Bampa, F. and Schulte, R.P., 2018. Functional Land Management: Bridging the Think-Do-Gap using a multi-stakeholder science policy interface. *Ambio*, 47(2), pp.216-230.
doi.org/10.1007/s13280-017-0983-x

Ingram, J.A. and Mills, J., 2018. Are advisory services 'fit for purpose' to support sustainable soil management? An assessment of advice in Europe. *Soil Use and Management*, 35(1), pp. 21-31. [doi: 10.1111/sum.12452](https://doi.org/10.1111/sum.12452)

Mills, J., Reed, M., Skaalsveen, K. and Ingram, J., 2018. The use of Twitter for sustainable soil management knowledge exchange. *Soil Use and Management*, 35 (1), pp. 195-203.
doi.org/10.1111/sum.12485

Hallama, M., Pekrun, C., Lambers, H. and Kandeler, E., 2019. Hidden miners—the roles of cover crops and soil microorganisms in phosphorus cycling through agroecosystems. *Plant and Soil*, 434(1-2), pp.7-45.
doi.org/10.1007/s11104-018-3810-7

Past Events/Presentations

- **27-28th Sept 2018** SoilCare demonstration area at organic agricultural show, Brittany, France
- **16-18th Oct 2018** Association of Applied Biologists Conference, UK "Soil improvement; impact of management practices on soil function and quality"
- **21st-23rd October 2018** Polish Soil Science at the International Forum, Wroclaw, Poland. "The influence of soil improving cropping systems on microbial diversity"
- **29th Nov 2018**, workshop in Prague, Czech Republic "Drought 2018 and the sustainability of land management systems in changing climate"
- **4th Dec 2018** Field visit on soil quality, Flanders, Belgium
- **6th Dec 2018** Drought 2018 workshop "The innovation of cropping systems in a changing climate", Lukavec, Czech Republic.
- **28th Jan 2019** Bodemlevendag (Soil Biology Day), Flanders, Belgium
- **20th Feb 2019**, Ruzyne's day of plant nutrition and agro-technics, Czech Republic
- **13th -15th March 2019** Jahrestagung der AG Biologischer Pflanzenschutz, Stuttgart, Germany.
- **19th April 2019**. Demonstration day of legume field trials, Caldeirão, Portugal

Future Events

27th August 2019 Masterclass with LANDMAK project "[Applying a participatory approach in understanding soil functions](#)" Wageningen Soil Conference.

The SoilCare project has brought together a transdisciplinary team of 28 different organisations to identify, test and promote the adoption of soil-improving cropping systems across Europe.

PROJECT PARTNERS

- | | | |
|--|--|---|
| 1 Wageningen Environmental Research (Alterra), The Netherlands | 12 Bodemkundige Dienst van België, Belgium | 21 Wageningen University & Research, The Netherlands |
| 2 University of Newcastle upon Tyne, United Kingdom | 13 Aarhus University, Denmark | 22 University of Pannonia, Hungary |
| 3 KU Leuven, Belgium | 14 Game & Wildlife Conservation Trust, United Kingdom | 23 Swedish University of Agricultural Sciences, Sweden |
| 4 University of Gloucestershire, United Kingdom | 15 Teagasc Research Institute, Ireland | 24 Agro Intelligence ApS, Denmark |
| 5 University Hohenheim, Germany | 16 SoilCares Research, The Netherlands | 25 Crop Research Institute, Czech Republic |
| 6 Research Institute for Knowledge Systems, The Netherlands | 17 Escola Superior Agrária de Coimbra, Portugal | 26 University of Almeria, Spain |
| 7 Technical University of Crete, Greece | 18 National Research and Development Institute for Soil Science, Agrochemistry and Environmental Protection, Romania | 27 Fédération Régionale des Agrobiologistes de Bretagne, France |
| 8 Joint Research Centre, Italy | 19 University of Padova, Italy | 28 Scienceview Media B.V., The Netherlands |
| 9 University of Bern, Switzerland | 20 Institute of Agrophysics of the Polish Academy of Sciences, Poland | |

Participants at the SoilCare 2nd Plenary meeting 13th - 17th March 2017 in Crete, Greece
(Photo: Erik van den Elsen)



The SoilCare project is funded by the European Union's Horizon 2020 research and innovation programme, under grant agreement No. 677407. Project officer Isabella Ferrari.

For further details about the project please email rudi.hessel@wur.nl

Newsletter editor: Jane Mills, www.soilcare-project.eu