Report on demonstration activities in the study sites

Authors: Ioanna Panagea, Guido Wyseure
and Study Sites partners

Report number: **15**
Deliverable: **D5.2**

Report type: **Scientific Report**
Issue date: **27/04/2020**
Project partner: **KUL, Belgium**
Version: **1.0**

DOCUMENT SUMMARY	
Project Information	
Project Title:	Soil Care for profitable and sustainable crop production in Europe
Project Acronym:	SoilCare
Call Identifier:	H2020-SFS-2015-2b
Grant agreement no.:	677407
Starting Date:	01.03.2016
End Date:	28.02.2021
Project duration	60 months
Web-Site address:	www.soilcare-project.eu
Project coordinator:	Wageningen Environmental Research (WEnR)
EU project representative & coordinator of the project:	Dr. Rudi Hessel - (rudi.hessel@wur.nl) +31 317 486 530
Project manager(s):	Erik van den Elsen (erik.vandenelsen@wur.nl), Simone Verzandvoort (simone.verzandvoort@wur.nl), Falentijn Assinck (falentijn.assinck@wur.nl)
Report Information	
Report Title:	Scientific Publications
Principle Author(s):	Ioanna Panagea, Guido Wyseure
Principle Author e-mail:	Ioanna.panagea@kuleuven.be
Deliverable Number:	D5.2
Work Package:	WP5
WP Leader:	WEnR
Nature:	PU
Dissemination:	Document
Editor (s):	Rudi Hessel
E-Mail(s):	rudi.hessel@wur.nl
Telephone Number(s):	+31 317 486530
Report Due Date	01-05-2020
Report publish date:	27-04-2020
Copyright	©2020 the SoilCare project and Partners Copyright notice and disclaimer: http://tinyurl.com/soilcare-disclaimer

No.	Participant organisation name	Abbreviation	Country
1	Wageningen Environmental Research	WEnR	Netherlands
2	University of Newcastle upon Tyne	UNEW	United Kingdom
3	Katholieke Universiteit Leuven	KUL	Belgium
4	University of Gloucestershire	UoG	United Kingdom
5	University Hohenheim	UH	Germany
6	Research Institute for Knowledge Systems	RIKS	Netherlands
7	Technical University of Crete	TUC	Greece
8	Joint Research Centre	JRC	Italy
9	University of Bern	UNIBE	Switzerland
10	Milieu LTD	MLTD	Belgium
11	Norwegian Institute of Bioeconomy Research	NIBIO	Norway
12	Bodemkundige Dienst van België	BDB	Belgium
13	Aarhus University	AU	Denmark
14	Game & Wildlife Conservation Trust	GWCT	United Kingdom
15	Teagasc	TEAGASC	Ireland
16	Soil Cares Research	SCR	Netherlands
17	Instituto Politecnico De Coimbra	IPC/ESAC	Spain
18	National Research and Development Institute for Soil Science, Agrochemistry and Environmental Protection	ICPA	Romania
19	University of Padova	UNIPD	Italy
20	Institute of Agrophysics of the Polish Academy of	IAPAN	Poland
21	Wageningen University	WU	Netherlands
22	University of Pannonia	UP	Hungary
23	Swedish University of Agricultural Sciences	SLU	Sweden
24	Agro Intelligence Aps.	AI	Denmark
25	Crop Research Institute	VURV	Czech Republic
26	University of Almeria	UAL	Spain
27	Fédération Régionale des Agrobiologistes de Bretagne	FRAB	France
28	Scienceview Media BV	SVM	Netherlands

Executive summary

The SoilCare project aims at developing soil improving cropping systems. At 16 study sites dispersed over Europe experiments have been implemented. These were selected in collaboration with the stakeholders (WP3) and based on a literature review (WP2). The methodology for monitoring the experiments was compiled by WP4. The results are being compiled by WP5. In addition, all study sites had to organize demonstration activities and field days of the selected cropping systems. The combined findings by the study sites are an important input for the upscaling by WP6, the policy analysis by WP7 and the dissemination by WP8.

The demonstrations/field days for the stakeholders are an important tool for sharing experiences between the stakeholders and the researchers while inspecting and reflecting over the experiments in the field. A total of 31 demonstration events/field days took place in the 16 study sites over two years. Four out of the sixteen study sites organised three or more. Six out of the sixteen study sites organised two demonstration/field days and six organised one. In total, about 937 stakeholders attended the demonstration events. The average number of participants in the events was 30. The demonstration/field days are experienced by the stakeholders and researchers of the study sites as a very useful activity in combination with a more systematic consultation with the stakeholders.

The specific feedback by each study site is given in a table and can be found in more detail in the reports by the study sites in appendix I. Several points were discussed in different degrees: the need for machinery, the incentives by subsidies, the selection of crops, rotations and cover crops, the erodibility and the soil structure/quality. Also many participants stressed the need for communication and information on soil improving cropping systems. A major general concern for all stakeholders was the economic performance of the cropping systems. Also, weed infestation and weed control management was also a recurring theme.

Contents

Table of Tables

Table of Figures

Introduction

An important task for Work package 5 (WP5) is to overview the implementation, monitoring and evaluation of the experiments on the soil improving cropping systems at the Study Sites. The experiments were selected within WP3 in collaboration with the stakeholders. WP5 collects the observations and information from the experiments and stores them in a common database to enable comparison between the study sites. Another task for WP5 is to compile the information on demonstration activities and field days of the selected cropping systems. In this way, the monitoring and assessment results can be shared and discussed with the stakeholders. Demonstration activities/field days were used initially to inform the end-users about the extra value of the tested cropping systems and the progress of the experiments by directly observing these. Additional targets are to allow them to evaluate possible benefits, drawbacks, costs and outcomes on-field by direct observations and finally to activate them into a more active role in monitoring, evaluating, reflecting on and adopting of a novel soil-improving cropping system.

A guidance document for organizing and reporting the demonstration activities was written by WP5 to support the case study partners to effectively implement demonstration activities. Especially WP7 contributed to the guidance document to coordinate cross-reference activities for other WP's and structure the demonstration activities. The aim is that the demonstration activities /field days deliver useful information to other WP's. In this way, the workload of the study sites could be streamlined and the stakeholders are not overwhelmed with successive project activities.

Concise, semi-structured guidelines of demonstration activities/field days easily adaptable to the style and condition of each different study site were produced. The guidance document also contained generic guidelines and structure ideas and tips for organizing demonstration events and field days. A report template was included on the above-mentioned guidance document to harmonize the case study partners' contributions to this deliverable. The final version of the guidance document was sent to the study site partners in March 2019. It is included in Appendix II. The individual contributions of the case study partners are presented in Appendix I.

A short overview of the demonstration activities/field days at the study sites

Table 1 gives an overview of the total number of demonstration activities/field days that each Study Site has organised along with the dates. The individual study sites partners have reported the main demonstration events/field days (all the details for the reported events are mentioned in bold) and their contributions are presented in Appendix I. Many of the individual contributions include photographs and diagrams to illustrate the demonstration activities. A total of 31 demonstration events/field days took place in the 16 study sites over two years. Four out of the sixteen study sites organised three or more events with a maximum of four. Six out of the sixteen study sites organised two demonstration/field days and six organised one.

Table 2 gives the (estimated) number of participants that were reported to have attended the different demonstration activities /field days in the reported in Table 1 events. In total, about 937 people attended the demonstration events organized by the study sites. The number of participants varied from 3 to 140. The average number of participants in the events was 30. The largest number of participants were 140 followed with 115 and 104 in the same study site, with all these events reported as stakeholder workshop combined with field demonstration event.

Table 3 gives more information on the type of demonstration meetings that were held. Almost half of the 31 events focused on demonstration activities and field visits whereas the rest were either the main events combined with a stakeholder meeting or side event of a stakeholder meeting, stakeholder workshop organised for also fulfilling the tasks of WP3, WP6 or WP7. Organizing and integrating into multipurpose meetings was actively encouraged. We believe that this creates more in-depth participation.

Table 4 gives an overview of the main criteria or indicators that came into a discussion to evaluate the different cropping systems in terms of their performance, advantages or weak points. Among all the different indicators used in the study sites, it is observed that crop yield or similar economic criteria are present in almost all of them. Participants and stakeholders always take into account the economic performance of the land. Another common criterion discussed among many study sites is the weed infestation and generally weed control. It seems that weed management is an issue in many different cropping systems and participants consider that as an important aspect of their performance.

Table 5 gives an overview of the main feedback the participants are expecting to get from the project and Table 6 gives an overview of the main feedback received from the participants during the main demonstration activities or the main discussion message from the main events reported in Table 1 and reported by the study sites. These discussion messages are study site-specific and reflecting the

diversity of SICS being tested. Even so, in the vast majority of study sites, the discussions tended to focus on the effectiveness of the cropping systems, the ways to properly implement them to minimize the negative impacts and the economic implications.

General comments on the demonstration days/field days

- Stakeholders find it important to have days when they can learn in practice and by observing the different applications and cropping systems and get information and guidance from experts about new concepts.
- According to the study sites, it is more convenient in terms of organisation and content to combine the field day with any other event that involves stakeholders.
- It is difficult to get detailed information and feedback from the individual participants of a demonstration event organised as an open field day. The researchers can only notice the general image from the events and not the individual opinion of all the participants.
- Taking into account the reports from the partners the demonstration events used as a medium for both dissemination and bringing stakeholders together for other workshops or/and meetings rather than a direct demonstration of the cropping system.

Table 1: Dates of each reported event

Study site	Number demo events	Dates of the demonstration events/ field days (dd/mm/yyyy)			
		D_01	D_02	D_03	D_04
1. Flanders, BE	4	**20/06/2018***	19/03/2019	26/04/2019	15/05/2019
2. Akershus, NO	1	**25/06/2019***			
3. Keszthely, HU	1	**6/06/2019***			
4. Frauenfeld, CH	1	**20/06/2019***			
5. Viborg, DK	2	**27/06/2018***	**31/10/2018***		
6. Loddington, GB	2	**12/06/2018***	**29/06/2018***		
7. Tachenhausen, DE	3	**25/06/2018***	2/07/2019	**13/11/2019***	
8. Draganesti Vlasca, RO	1	**5/09/2019***			
9. Legnaro, IT	3	**19/04/2018***	**8/02/2019***	**19/02/2020***	
10. Szaniawy, PL	2	**15/04/2019***	**25/10/2019***		
11. Caldeirão, PT	1	**12/04/2019***			
12. Chania, Crete, GR	2	**3/12/2019***	**3/12/2019***		
13. Orup, SE	2	**17/06/2019***	**18/06/2019***		
14. Prague-Ruzyně, CZ	3	**21/02/2018***	**25/03/2019***	**11/02/2020***	
15. Almeria, ES	1	**13/11/2019***			
16. Brittany, FR	2	**10/10/2019***	12/11/2019		

*demonstration events/field days that the study sites reported and included in Appendix I

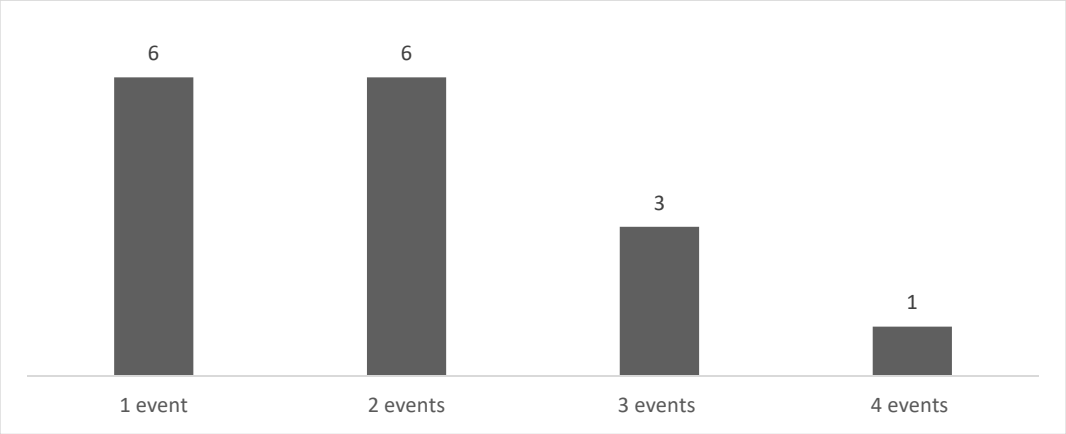


Figure 1: Number of events organised by each study site

Table 2: Number of participants in each event

Study site	Total number of participants	Number of participants per event/field day			
		D_01	D_02	D_03	D_04
1. Flanders, BE	73	**50**	8	8	7
2. Akershus, NO	30	**30**			
3. Keszthely, HU	46	**46**			
4. Frauenfeld, CH	14	**14**			
5. Viborg, DK	47	**22**	**25**		

6. Loddington, GB	14	**8**	**6**		
7. Tachenhausen, DE	60	**23**	18	**19**	
8. Draganesti Vlasca, RO	18	**18**			
9. Legnaro	28	**10**	**10**	**8**	
10. Szaniawy, PL	39	**10**	**29**		
11. Caldeirão, PT	30	**30**			
12. Chania, Crete, GR	7	**3**	**4**		
13. Orup, SE	44	**30**	**14**		
14. Prague-Ruzyně, CZ	359	**115**	**104**	**140**	
15. Almeria, ES	20	**20**			
16. Brittany, FR	108	**100**	8		

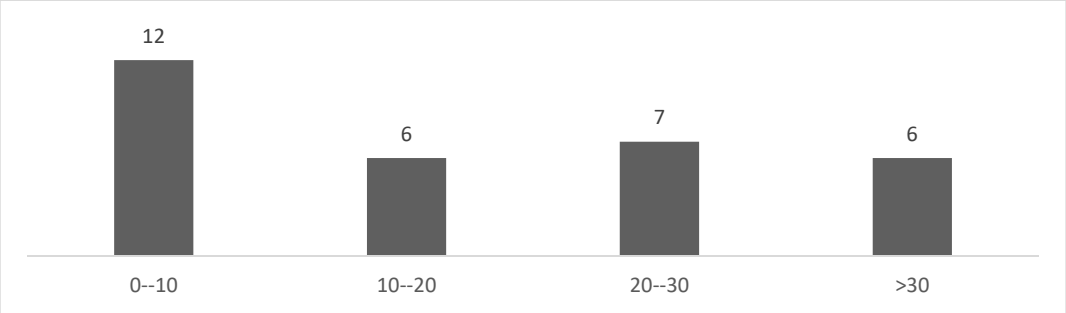


Figure 2: Frequency of events within each participant's number category

Table 3: Type of event and/ or combination of events

Study Site	Type of each demonstration event/field day			
	D_01	**D_02**	**D_03**	**D_04**
1. Flanders, BE	Open field day + stakeholder advisory panel meeting	Field workshop	Field demonstration: trial installation	Field visit
2. Akershus, NO	Demonstration day combined with a field day			
3. Keszthely, HU	Field day			
4. Frauenfeld, CH	Workshop on adoption and field day			
5. Viborg, DK	Field workshops	Workshops, field visit and stakeholder meeting		
6. Loddington, GB	Field visit +stakeholder meeting	Field visit + benchmarking stakeholder meeting		
7. Tachenhausen, DE	Demonstration event	Stakeholder meeting, adoption workshop, applicability layers and field trip	Demonstration event	
8. Draganesti Vlasca, RO	Stakeholder meeting + demonstration event			
9. Legnaro	Stakeholder meeting + field visit	Stakeholder meeting + field visit	Stakeholder meeting+ demonstration event	
10. Szaniawy, PL	Demonstration event	Demonstration event		
11. Caldeirão, PT	Demonstration event- open field day			
12. Chania, Crete, GR	Demonstration event	Demonstration event		
13. Orup, SE	Demonstration event + stakeholder workshop	Demonstration event + stakeholder workshop		
14. Prague-Ruzyně, CZ	Stakeholder workshop+ demonstration event	Stakeholder workshop+ demonstration event	Stakeholder workshop+ demonstration event	
15. Almeria, ES	Demonstration event			
16. Brittany, FR	Farm exhibition	Stakeholder workshop + field visit		

Table 4: Criteria and indicators to evaluate cropping systems

Study Site	**Criteria discussed to evaluate the performance of the cropping systems**
1. Flanders, BE	Crop development, soil structure
2. Akershus, NO	-
3. Keszthely, HU	-
4. Frauenfeld, CH	Weed infestation, infiltration rates, earthworm density and size
5. Viborg, DK	Crop development incl. catch crops, soil structure and carbon content, nitrogen leaching.-
6. Loddington, GB	Profitability and economic performance of the land, infiltration during storm events for flood risk, weed infestation
7. Tachenhausen, DE	Number of earthworms, soil structure, erodibility and crop yields
8. Draganesti Vlasca, RO	Soil structure, weed infestation, nitrogen supply needs, crop yield
9. Legnaro, IT	Weed control, needs of the life cycle of the cover crop
10. Szaniawy, PL	The yield of crops, pH, organic matter content, plant diseases, Soil structure, earthworms presence
11. Caldeirão, PT	Good agronomic behaviour of the crop, weed control, crop yield
12. Chania, Crete, GR	Erosion indicators, yield and economic benefits
13. Orup, SE	Yields, compaction in the subsoil, organic material incorporation
14. Prague-Ruzyně, CZ	Mainly economic indicators- stability of yield and required quality of production, nitrates leaching, water-saving, workload, erosion rates
15. Almeria, ES	Erosion indication, cover crop emergence, economic indicators
16. Brittany, FR	The effective rate of seed emergence, weed infestation rate after sowing, crop yield

Table 5: Format and type of information the stakeholders expect to receive

Study Site	Feedback of format of information the participants expect from the project
1. Flanders, BE	Participants interested to learn about crop yield and quality, soil erosion and water infiltration capacity
2. Akershus, NO	-
3. Keszthely, HU	-
4. Frauenfeld, CH	Participants were interested to find out the results of the experiments and get a short and simple briefing about the different SICS and the measured impacts/ benefits.
5. Viborg, DK	-
6. Loddington, GB	Participants interested to find out the results of the experiments in the form of a leaflet and online pdf
7. Tachenhausen, DE	Regional, site-specific advice would help farmers to choose the right technique, appropriate crop rotations and time points for seeding actions.
8. Draganesti Vlasca, RO	-
9. Legnaro, IT	Experiments' results and main findings on a webpage (e.g., stakeholder platform) and possibly short guidelines for successful implementation of SICS.
10. Szaniawy, PL	Stakeholders want to be informed about SICS through training and conferences as well as real-life successful examples.
11. Caldeirão, PT	Positive feedback on the field day and is going to be repeated for the participants to receive more information about the results of the experiments
12. Chania, Crete, GR	Participants would like to be informed about SICS and new scientific methods and application through leaflets and social media. They need continual education program to make sure that recommendations are disseminated and followed as soil quality is a matter that concerns the whole producers' community, almost independent of the crop type.
13. Orup, SE	Participants are expecting to get information concerning data from experiments with both new and other SICS, summary papers explaining and presenting data as well as conclusions from the long-term field experiments
14. Prague-Ruzyně, CZ	Long-term results of experiments that confirm the positive effect of SICSs at various conditions (e.g. in favourable as well as extreme drought year) are needed. It is important to show SICS are not economically disadvantageous. Farmers need process recommendations for individual SICS in different soil and weather conditions, including nutrition and plant protection to optimize yields and production quality. Preferred form: field days, workshops, articles

	in professional press; preferably: face-to-face consultations directly in their fields.
15. Almeria, ES	-
16. Brittany, FR	The results are well communicated to the farmers' group through a periodic technical letter.

Table 6: Main message from the events

Study Site	**The main feedback from the events**
1. Flanders, BE	-
2. Akershus, NO	Concerns about the timing of the sowing period and the costs of the cover crop seeds. The cost could be a barrier but sufficient subsidies could help.
3. Keszthely, HU	Small-scale farmers have limited resources for investing in expensive new technology/machinery, so they pay less attention to promotions focusing on these equipment/technologies. Demonstration events are a win-win situation, as farmers need to be allowed to consult about their practices on their site and researchers become familiar with the existing situation and exchange knowledge.
4. Frauenfeld, CH	Positive feedback. Participants were very excited about the demonstration of methods to measure different soil properties. Appreciated that people who had knowledge and experience in the techniques were there to explain and collaborate. The event also helped the researchers to make stronger connections with the stakeholders and promote knowledge and new experiences necessary for the adoption of the innovative SICS within the same canton.
5. Viborg, DK	-
6. Loddington, GB	Positive feedback and agreement that is useful to share results not only within the group but also more widely.
7. Tachenhausen, DE	The SICS implementation is dependent on machine availability, site conditions, application of glyphosate, the crop rotation. Stakeholders appreciate discussing cropping systems from different points of view. The discussions among practical farmers, research, industry and extension service are helpful, produce new inputs and help to look for appropriate soil saving cropping systems.

	The demonstrated evaluation method of erodibility impressed the participants. Use of glyphosate and alternative options is an up to date issue.
8. Draganesti Vlasca, RO	To implement an appropriate cropping system by farmers on arable lands, most of the participants at the end of the event agreed that a longer time is needed to observe the significant positive effects of the tested SICS on soil quality evaluated by various soil indicators and crop production.
9. Legnaro, IT	Tillage radish is a valuable cover crop for its ecosystem benefits although participants still have some concerns about crop needs, such as sowing, irrigation and pesticide in case it does not winter-kill. Cost of seeds is not negligible
10. Szaniawy, PL	-
11. Caldeirão, PT	-
12. Chania, Crete, GR	The participants found realistic and not difficult the widespread implementation of the specific SICS, as long as they have the support and the encouragement of the experts for the proper implementation of the specific SICS.
13. Orup, SE	Many farmers' considered that in the end, it is the economic aspects that are driving the feasibility of adopting SICS; in that regard, the existing subsidies are not well adapted, e.g., only a few cover crop species are qualified for obtaining subsidies.
14. Prague-Ruzyně, CZ	After all events many farmers are interested in an evaluation of their soil condition, analysing soil samples from different depths and evaluation of their practices.
15. Almeria, ES	-
16. Brittany, FR	Minimum tillage is one practice that can be promoted to all farmers as a general objective of improvement of water quality. But other organic practices could be disseminated

APPENDIX I. Reports on demonstration activities/field days by the study sites

I.1 Bodemkundige Dienst van België (Belgium)

Report on Demonstration Activities / Field day(s)

Study Site number: 1

Country: Belgium

Author(s): Mia Tits

Affiliation (s): Bodemkundige Dienst van België

Demonstration / Field day date(s): 20/6/2018

Version: 1

Date: 18/02/2020

Purpose

As part of the European SoilCare project, the Soil Service of Belgium organized an open field day on Wednesday 20 June 2018 in “Zootechnisch Centrum” (ZTC) of KU Leuven in Lovenjoel. The following themes were covered:

- application of soil amendments
- tillage and soil cover in maize
- introduction of "novel" crops
- soil compaction and precision agriculture

These themes were explained during a tour of the SoilCare field trials and demonstration fields, which also covered other related research projects.

The SoilCare Open Field Day was organized by BDB, in collaboration with “Zootechnisch Centrum” (ZTC) of KU Leuven, Hooibeekhoeve, the Province of Vlaams-Brabant, Agrobeheercentrum Eco², “Centre indépendant de promotion fourragère” (CIPF), Hogeschool Gent Bottelare and Pöttinger.

Stakeholder participation

± 50 participants: farmers, soil scientists, consultants, policymakers

Demonstration activities undertaken

The participants visited the experimental site at 4 locations in the ZTC area, classified per theme. At each location, the explanation was given by experts from the Bodemkundige Dienst and colleagues from other organizations. Other relevant projects were also extensively discussed.

The first theme was the use of organic soil amendments to improve the organic matter content in the soil, soil life and soil quality in general. Expert in this field was Annemie Elsen (BDB), assisted by Mieke Vandermersch (province of Vlaams-Brabant) and Brecht Lammens (AgroBeheerCentrum Eco²).

At the second location, the theme soil cultivation (non-inversion tillage and strip-till, compared to conventional ploughing) and soil cover in maize (under sowing of grass) was dealt with. Invited expert Gert Van de Ven (Hooibeekhoeve) gave the necessary explanation. The machines used for strip-till and undersowing were exhibited and explained by Gilles Manssens (CIPF) and Dominique Emond and Danny De Boeck (Pöttinger).

At the third location, the introduction of "new" crops, in particular protein-rich crops such as soy, lupins and field beans, was explained by Kevin Dewitte (Ghent University). At this location, also a plot sown with an experimental seed batch of perennial wheat was shown and compared with traditional winter wheat. Perennial crops fit perfectly in the aims of the SoilCare project, since they are more robust, protect the soil against erosion, improve soil structure and water infiltration, retain

nutrient elements, improve the carbon storage in the soil and thus also contribute to reducing global warming.

At the fourth location, the themes of soil compaction and precision agriculture were discussed. At this location a field of the farmer Michel Hendrickx (Hoegaarden) was visited, where he has been spraying in fixed driving tracks for 10 years. On the site, the effects on the soil structure were shown in the soil profile. The technique was explained by Dieter Van den Berghe, an employee of Michel Hendrickx. Also, two other projects related to precision agriculture, Smart Soil and Potential, were explained by Jill Dillen (BDB) and Pieter Janssens (BDB).




Questions raised and discussed

What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control:

- Crop development, soil structure

What results and in which form would they prefer the project to provide them to realize if the SICS is working or not:

- Crop yield and quality, soil erosion and water infiltration capacity

I.2 NIBIO (Norway)

Report on Demonstration Activities / Field day(s)

Study Site number: 2

Country: Norway

Author(s): Frederik Bøe, Jannes Stolte and Till Seehusen

Affiliation (s): NIBIO

Demonstration / Field day date(s): 25-06-2019

Version: 1

Date: 25-11-2019

The demonstration day was combined with a field day arranged by the Norwegian Agricultural Extension Service. This was done to assure high stakeholder participation.

Purpose

The purpose of the field day was to inform farmers about activities/field experiments carried out in Øsaker, Østfold province, Norway. This activity was part of the annual open day of the research centre of the Norwegian Agricultural Extension Service, where the SoilCare experiment is carried out.

Stakeholder participation

There were approximately 30 participants representing researchers from NIBIO, advisors from the Norwegian Agricultural Extension Service and farmers.

Demonstration activities undertaken

The demonstration activities consisted of explaining the participants the objective of the different fields with the different treatments, and present/discuss preliminary results.

Questions raised and discussed

Since this activity was part of an open day, we did not perform the questionnaire but rather discussed with participants and answered their questions and concerns towards the use of cover crops in Norwegian climatological circumstances:

- There were some concerns regarding cover crops sown in autumn. The growth period could be limiting (light constraints, low temperatures). Important to sow "as early as possible" - in late summer/early autumn.
- Costs of seeds. Cover crop seeds sown in autumn are different from species sown in spring, and often more expensive. The cost could be a barrier. Sufficient subsidies could help.
- Subsidies for cover crops in Norway has been reduced over the years.

Photo 1. and 2. shows footage from drone filming of the participants.

Photo 1. Drone footage from the field day 25th of June 2019.

Photo 2. Footage from a drone filming

Photo 3. SoilCare placard with information regarding the cover crop trial.

I.3 University of Pannonia (Hungary)

Report on Demonstration Activities / Field day(s)

Study Site number: 3

Country: Hungary

Author(s): Tóth Zoltán

Affiliation (s): University of Pannonia

Demonstration / Field day date(s): 06-06-2019

Version: 1

Date: 24-03-2020

Purpose

The main purpose was the introduction of the main soil type and soil degradation processes in the region and experimental results based on soil tests and observations carried out in the project.

Stakeholder participation

Different groups of stakeholders were invited to the Field Day. Among them, there were small and large scale farmers, staff members of the Hungarian Chamber of Agriculture, consultants and staff members of the authorities dealing with agricultural and environmental affairs, as well as members of the Agricultural and Rural Youth Association. (Similar group of stakeholders were invited as in case of Stakeholder Forum).

Number of participants: 46 (12 female, 34 male)

Demonstration activities undertaken

A presentation about the Agricultural Management Practices applied in the demonstration field. Field trip to the demonstration farm of the University of Pannonia in Keszthely, Hungary. Round trip on farmers' land (arable and grazing lands of the local farmers, exchanging experiences, multilateral consultation, good and bad practices in Karmacs, Hungary).

Questions raised and discussed

The personal discussion was successful, both parties, farmers and scientists enriched with new information. It became clear that small scale farmers have limited resources for investing in expensive new technology/machinery, so they pay less attention to promotions focusing on this equipment/technologies.

Feedback

The event fulfilled its objectives. The reason for organizing the demonstration event this way was the recognition of farmers needs to be allowed to consult about their practices on their site. This way a win-win situation help to motivate farmers to visit events organized by the university and in return scientists and other stakeholders also visit their land to become familiar with the existing situation allowing consultation on the spot. This way there is an exchange of knowledge between the farmers themselves involving scientists and other stakeholders.

Figure 1. Multilateral consultation and discussion between farmers, scientists and other stakeholders

I.4 Centre for Development and Environment, University of Bern (Switzerland)

Report on Demonstration Activities / Field day(s)

Study Site number: 4

Country: Switzerland

Author(s): Alexandra Gavilano, Jérémie Loup, Abdallah Alaoui

Affiliation (s): Centre for Development and Environment, University of Bern

Demonstration / Field day date(s): 20/06/2019

Version: 1

Date: 20/06/2019

Purpose

The purpose of this workshop was to give the participants a better understanding of the benefits of one of the three SICS investigated within the SoilCare project in Switzerland. Therefore, one field visit at one farm was selected for the field day, but of course, the other farmers were invited to attend as well. We selected a farm located in canton Thurgau, where CULTAN technique was applied and considered as the most innovative and promising technique in our study site. This field day was conducted in combination with the adoption workshop (WP7) and therefore, enable the SoilCare research team to also bring together stakeholders that work on a national level, and discuss the potential for adoption, also during the field visit.

Stakeholder participation

In total 14 participants joined the field day, including other farmers and stakeholders from education, research, farming associations and agricultural policy institutions.

Demonstration activities undertaken

First, the farmer presented his farming activities and the different economic activities he or his family is dealing with. The visit of the farm consisted of the following:

i) Presentation of the different traditional management techniques he used so far and the different machines used for manuring.

ii) Presentation of the different treatments (control1 - organic manuring, control2 – mineral surface manuring, SICS – placed fertilization after CULTAN).

iii) First insights into the benefits and further expected data. A 1-page overview of each SICS studied in the SoilCare project was given to the participants, as well as further contact details for future collaboration.

Figures 1 & 2: Urs Dietiker presenting his farm, and the view over one of the experimental fields.

After this, the participants were invited for the following activities:

(i) Visual observations and identification of the differences between the experiment and the control plots,

(ii) Presentation of two measuring methods (earthworm density and infiltration characteristics with the participation of the stakeholders -> see point 4 for more details).

(iii) Discussion on the potential application of these simple methods for own activities,

(iv) to give a video interview for the SoilCare project,

Figures 3 & 4: The two measuring methods are presented: infiltration characteristics (left), and earthwork density (right).

Figures 5 & 6: The participants are proactively involved in both of the measuring activities.

What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control.

Fist, visual observations as in the monitoring plan were made to detect differences in the growth of the winter wheat between the SICS (placed fertilization after CULTAN), the control 1 (organic manure), and control 2 (mineral surface fertilization). There were no great differences visually, which the SoilCare research team explained on the specific focus on fertilization methods and first data insights on similar yield output and a reduced need for pesticide use. One obvious difference between the control 1 and the SICS was the great number of unwanted herbs and invasive species in the control field 1. This is due to the different fertilizing techniques, but also by the previous land management in the neighbouring field.

Second, two methods were introduced that are also used within the SoilCare project.

Earthworm density

Figures 7 & 8: Alexandra Gavilano and the participants count the earthworms emerging from the soil after the yellow mustard solution has been applied.

To see some differences between the soil health in general, the earthworm density was measured in the control fields and the SICS field.

Based on the scoring table both fields had a good score. But it became clear that the field with the SICS had a bit more and much bigger (thus older) worms, which can be explained by the fertilization with ammonium fertilization instead the nitrogen fertilization (as done in control 1 and 2)

This technique works well for all species of earthworms but only when the earthworms are active. If it has been very dry, very hot or very cold in the week before sampling, they may not

respond as very well since they may be in aestivation (earthworm version of hibernation). In contrast, if air temperatures have been moderate and it has rained recently they are likely to be active and respond well to the liquid extraction. An exception – if the soil is very compacted and/or has a poor structure (heavy clay, fields, roads, etc.) the extractant does not move well through the soil and the earthworms will not respond because the liquid does not reach them.

Infiltration characteristics

The infiltration experiment was carried out in the plot with SICS using a simple infiltrometer. The stakeholders were invited to participate actively in the experiment. A demonstration of new software developed by CDE was presented. It helps to evaluate the infiltration capacity and the hydraulic properties (e.g. saturated hydraulic conductivity and saturated water content). The main aim of this exercise was to involve the stakeholders in our research activities and to provide information on simple methods we are using to assess soil quality within SoilCare project activities.

Figure 9 & 10: Abdallah Alaoui explaining the infiltration characteristics experiment

Questions raised and discussed

- **How can they contribute or will they contribute to the monitoring/evaluation**

However, several discussions took place to enhance the visibility and share the experiences gained during this workshop. Two participants offered to co-organize events in 2020 to showcase the SICS and make the benefits accessible to more farmers and policy-makers in Switzerland. Unfortunately, no participant can contribute to the monitoring and evaluation of the SICS.

• What results and in which form would they prefer the project to provide them to realize if the SICS is working or not

In general, the participants were highly interested to learn more about the output of the data. A short and simple briefing about the different SICS and the measured impacts/ benefits would be very useful for them to evaluate how their institutions can promote them or also conduct further research in this area. Especially as some of the SICS are expected to even show a greater benefit in projects conducted over a longer period.

Feedback

The participants gave very positive feedback about the workshop and were especially very excited about the two presented methods to measure infiltration and earthworm density. They also the discussion on the different methods of techniques, especially the rather unknown method of placed fertilization using CULTAN. They appreciated that the project partner Guido Steiger (Expert for placed fertilization after CULTAN) was present during the field day, as he was responsible for the placed fertilization after CULTAN and was able to share more insights about opportunities for collaboration with other farmers in the canton of Thurgau.

During the Apéro, the participants were asked, if they would like to give a short feedback on what they have learned during the field day and what they appreciate about the overall project in general. Several interviewed participants mentioned their appreciation of brining scientific insights back to the practitioners and including efforts to enhance adoption of the SICS in the farming community in Switzerland.

The SoilCare research team perceived the field day as a success. Although it was rainy in the beginning, the main time of the field day was dry and enabled to conduct the field day under appropriate conditions (e.g. optimal to extract earthworms and to carry out infiltration experiment). It was a very positive experience for many reasons. The event allows us forging close ties with all stakeholders who manifested high interest to our measuring methods and their valuation for SoilCare project in general. Further, the participants enjoyed the intense exchanges with other stakeholders that promote the gain of knowledge and new experiences necessary for the adoption of the innovative SICS within the same canton.

Figure 11: Group picture of all participants.

I.5 Aarhus University (Denmark)

Report on Demonstration Activities / Field day(s)

Study Site number: 5

Country: Denmark

Author(s): Tommy Dalgaard, Chiara de Notaris, Chris Kjeldsen, Morten Graversgaard

Affiliation (s): AU-AGRO

Demonstration / Field day date(s): 27-06-2018, 31-10-2018 and 15-01-2020

Version: 1

Date: 07-04-2020

Field demonstration and workshops were carried out both at the site in Samsø (31/10 2018, and at several other occasions. Photo 1), and at the Danish SoilCare Row Cropping experiment, Aarhus University, Field Research Station Foulum, Viborg, Denmark (27/6 2018, and at similar other annual events in 2016, 2017 and 2019, and a special workshop in Foulum Oct 1 2018 (see photo 2-4 below). Moreover, field demonstration activities were carried out at Askov Field Experimental *Station with the participation of* farmers a*nd advisors (10/08*2017, see https://www.facebook.com/watch/?v=1645098305501202.

Purpose

The purpose of the field days was to inform farmers and other stakeholders about activities/field experiments carried out concerning the SoilCare study sites, in Central Denmark.

Stakeholder participation

There were approximately 30 participants participation in each field visit representing researchers, students, municipal stakeholders, advisors from the Danish Agricultural Extension Service and farmers.

Demonstration activities undertaken

The demonstration activities consisted of explaining the participants the objective of the different field experiments with the different treatments, and present/discuss preliminary results.

Questions raised and discussed

Workshops with empirical data collection and results from questionnaires were collected, and reported in publications from the project, and used as feed-in to related various WP activities.

The following photos illustrate the activities and participants involved:

Photo 1. Study site field visits and workshop at Samsø 31/10 2018, with 24 participants (see also short Video at https://photos.app.goo.gl/uUvX34Hvq8Z7HpCDA).

Photo 2. Field workshop and visits to the SoilCare Row Cropping experiment, Aarhus University, Field Research Station Foulum, Viborg, Denmark.

Photo 3. Inspection of the SoilCare Row Cropping experiment, Aarhus University, Field Research Station Foulum, Viborg, Denmark (Photo by Chiara de Notaris).

Photo 4. Soil Improving Cropping Systems workshop in Foulum Oct 1 2018, for farmers, farm advisors and researchers.

I.6 GWCT Allerton Project (UK)

Report 1 on Demonstration Activities / Field day(s)

Study Site number: 6

Country: UK

Author(s): Chris Stoate

Affiliation (s): GWCT Allerton Project

Demonstration / Field day date(s): 12-06-2018, Welland Resource Protection Group

Version: 1

Date: 05-12-2019

Purpose

Welland Resource Protection Group. This is a group of stakeholders concerned with meeting catchment management objectives for water quality, aquatic ecology and flood risk management across the agricultural Welland River basin.

Stakeholder participation

Eight. Participants included representatives from Anglian Water (water company), National Farmers Union, Catchment Sensitive Farming (government-run initiative), Hutchinsons (agronomic advice and supply), the Environment Agency, an agricultural advisor and a soil scientist.

Demonstration activities undertaken

Following a regular RPG meeting, a field visit to the compaction alleviation experimental plots to view the crop and discuss practical issues associated with the three management practices being tested (plough, low-disturbance sub-soiler and AMF inoculant) against the bare stubble control. Researchers described the background to the project, the preparation for the experiment, and the set of data being collected and then opened up the discussion to wider participation.

Questions raised and discussed

Effects on the profitability of arable rotations were agreed to be a key indicator of success. There was concern that the visibly larger blackgrass weed population associated with treatments other than plough could result in greater use of the herbicide 'propyzamide' which is a major problem in terms of exceeding the statutory 0.1 µg/L drinking water supply limit as it is very difficult and costly to remove from water.

There was considerable interest in the implications for water infiltration during storm events and subsequent impacts on flood risk management. There was discussion around the difficulty of measuring this because of natural variability within the plots, but it was agreed that this was an important aspect of the work. The results arising from the experiment could be used as input to hydrological modelling of local catchments to explore the potential of catchment scale land

management change for addressing flood risk although it was accepted that considerable caveats needed to be attached to such extrapolation.

There was a brief discussion about the grass ley experiment investigating deep-rooting cultivars. There was interest in this from a flood risk perspective. The question is, can the deep-rooting cultivars being tested produce sufficient volume and depth of roots to make a difference to water infiltration during storm events?

Feedback

There was positive feedback on the day and it was agreed that it would be useful to share results with the group and more widely, possibly in the form of a leaflet, but definitely as slides incorporated into presentations given as part of the Allerton Project's ongoing KE activities. Anglian Water suggested a visit to the Allerton Project for its team of catchment management advisors.

Report 2 on Demonstration Activities / Field day(s)

Study Site number: 14

Country: UK

Author(s): Chris Stoate

Affiliation (s): GWCT Allerton Project

Demonstration / Field day date(s): Welland Arable Business Group 29-06-18

Version: 1

Date: 05-12-2019

Purpose

Welland Arable Business Group. This is a local group of farmers who meet two or three times per year to benchmark the economic performance of their crops through 'Cropbench' a system managed by the national AHDB levy board.

Stakeholder participation

Six mainly arable farmers.

Demonstration activities undertaken

Following the benchmarking meeting, a field visit to the compaction alleviation experimental plots to view the crop and discuss practical issues associated with the three management practices being tested (plough, low-disturbance sub-soiler and AMF inoculant) against the bare stubble control.

Questions raised and discussed

There was a discussion around measures of success. Economic performance was the key driver, although there was a recognition that this might be across a rotation and not just in a single cropping year. This applied to negative implications of the management practices as well. On the day, there were very clearly lower blackgrass weed populations in the ploughed plots than in the other three sets of plots and there was concern that this would have yield and economic implications for subsequent years that needed to be offset against the additional cost of field operations associated with ploughing.

One farmer commented that it was possible to see compacted areas of a field from the combine at harvest, and mitigation measures could be subsequently targeted to these areas, with ploughing or sub-soiling (There was no clear benefit of AMF inoculant on the day and participants were interested in the concept but sceptical of this approach in principle). There was then a discussion about depth of sub-soiling. One farmer suggested 10 inches, but it was agreed that 1.) it was necessary to dig holes to identify the depth of the compacted layer, and/or 2.) to vary the depth of sub-soiling from year to year to avoid creating additional 'pans'

Participants said that they would be interested to learn about results from the experiment and to share their thoughts on them. A leaflet (and online pdf) would be a good way of sharing results, as would a presentation for farmers visiting the Allerton Project as part of its ongoing KE activities.

There was a brief discussion about the grass ley experiment investigating deep-rooting cultivars. Farmers felt that this was a 'good idea' in theory but didn't have any further comments.

Feedback

One criticism of the experiment was that the compaction created before the treatments were put in place was not representative of a real field situation as it was too even. Normally there would be a tractor or combine wheelings creating lines of compacted ground. The researchers explained that it had been necessary to create compaction as evenly as possible to gather meaningful data across the plots.

There was positive feedback on the day and it was agreed that it would be useful to share results with the group and more widely.

I.7 University Hohenheim (Germany)

Report 1 on Demonstration Activities / Field day(s)

Study Site number: 7

Country: Germany

Author(s): Moritz Hallama, Stefan Pilz, Paula Mayer-Gruner

Affiliation (s): University Hohenheim

Demonstration / Field day date(s): 25-06-2018

Version: 1

Date: 25-03-2020

Purpose

Field demonstration to policy and stakeholders, visualisation of soil erodibility in function of soil management (SICS: reduced tillage, no-tillage, cover crops)

Stakeholder participation

State secretary, farmers, extension service, agricultural administration, scientists. Altogether 23 people were present (18 male, 5 female).

Demonstration activities undertaken

Picture: Prof Pekrun informs the state secretary and the stakeholders

Reduced tillage can stop erosion and nitrate pollution. State secretary Gurr-Hirsch informed herself about the results of investigations in Großrinderfeld.

According to Professor Pekrun, the best is a system of crop rotations based on nature. A "stable system" is a prerequisite for successful agriculture, which is also economical. The aim is to establish good soil biology and exclude the use of pesticides.

The picture shows the erodibility of soils after the simulation of a heavy rainfall event. The soil from direct seeding system showed almost no signs of erodibility, whereas the ploughed soil showed weak aggregate stability and a high vulnerability to erosion.

The effects of different soil cultivation methods were demonstrated in practical trials. The simulation of a heavy rain event showed that a natural soil, which is held together by plants with their roots, can absorb water much better than a soil which has been ploughed. Gurr-Hirsch promised to incorporate the results of the field trials into the new agricultural guidelines, as soil erosion and nitrate content of the soil must be stopped.

Questions raised and discussed

It was also a matter of reducing the use of pesticides. The subject of glyphosate is on everyone's lips because of a major media campaign. At the meeting, the thesis emerged that modern agriculture would not be able to do without glyphosate altogether. Experience would have shown that with the use of glyphosate, superficial biodiversity even increased and more weeds were also added in the fields. A negative effect, as often misrepresented in the press is not to be observed. Anyone who demands less ploughing must simply use suitable means against the soil erosion work.

Where pesticides are reduced the cultivation of cover crops play a key role to suppress weeds. Unfortunately, this comes with extra costs for seeding and termination operations.

In addition to this raised the discussion about excessive nitrate pollution. although the area is still considered a nitrate remediation area, there was significant progress in the last few years. From the

original 70 milligrams per litre, it has now fallen below 40 milligrams per litre of drinking water, thanks to various measures implemented by the Grünbach Group.

Feedback

The feedback was positive, the visualisation of erodibility of the same soil type under different cultivation systems was impressive to everybody. It would be nice to show this to a wider public. The visit of the state secretary led to two press releases: one in “FNdigital” and one in “Südwestdeutscher Rundfunk (SWR)” (see below)

GROSSRINDERFELD

Landwirte wollen Zuschüsse für Zwischenfrucht

Landwirte aus dem Kraichgau und dem Main-Tauber-Kreis fordern Zuschüsse für den Zwischenfruchtanbau auf dem Acker. Sonst sei das Risiko von Krankheiten und Unkraut groß, wenn der Einsatz von Glyphosat nicht mehr erlaubt ist, hieß es am Montag bei der Präsentation eines Feldversuchs in Großrinderfeld. Landwirt Helmut Banzet hatte dort in einem Bereich Glyphosat eingesetzt und in einem anderen Zwischenfrucht angebaut.

„Herausgekommen ist, dass ohne Glyphosateinsatz der Besatz von Gräsern, vor allem Fuchsschwanz und Problemunkräutern deutlich zunimmt. Die Zwischenfrucht hat absolut ihre Vorteile. Das Problem ist, es ist ein zusätzlicher Arbeitsgang. Und wir haben das Problem, dass wir in einem Trockengebiet sind und sich die Zwischenfrucht nicht immer sicher etabliert. Wir machen eine Vorleitung, wissen aber noch nicht, was kommt raus."

Report 2 on Demonstration Activities / Field day(s)

Study Site number: 7

Country: Germany

Author(s): Paula Mayer-Gruner

Affiliation (s): University Hohenheim

Demonstration / Field day date(s): 13-11-2019

Version: 1

Date: 12-12-2019

Purpose

The aim of the demonstration activity was the presentation of the field trial, the visual assessment of vegetation (cover crops), soil type, soil structure and a discussion with the stakeholders about yields and soil conditions under different tillage systems. The tillage trial contains the SICS no-tillage, reduced tillage, a strip-till system and cover crops.

Stakeholder participation

19 stakeholders of the German Study Site came together on November 13th 2019 and visited a tillage trial at Stifterhof, D-76684 Östringen.

Demonstration activities undertaken

Results 2019

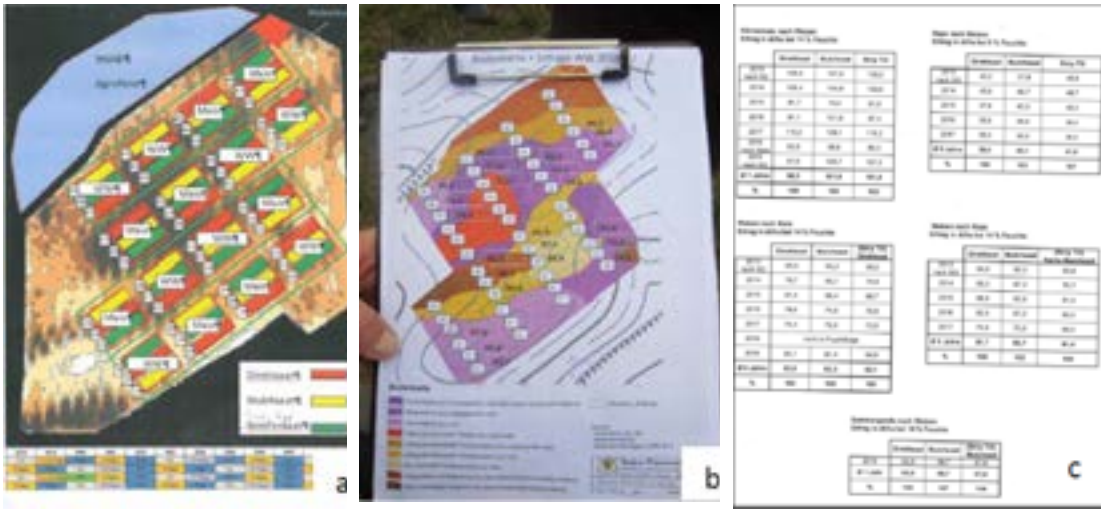


Fig. 1 a) Tillage systems (no-tillage, strip-till, reduced tillage) and crop rotation. 1 b) Soil types. 1 c) Yields of different crops: Winter wheat, rapeseed, maize, summer barley.

The experiment is built on heterogeneous soil conditions in gently rolling hills (Fig 1 & 2). The soil type had more influence on yields than the tillage system. The yields on eroded soils at the top of the hill were smaller than downhill, where colluvial material is accumulated. Winter wheat reacted more strongly to poor soil conditions than rapeseed and maize. Overall, yields stayed statistically unaffected by the tillage system. Therefore, the choice of tillage system could be adapted to the best protection of the soil.

Fig 2: Spade cut-outs from Plot No 30 - one Plot, two different soil types: A) „Pararendzina aus Löss“, B) „Pelosol aus Gipskeuper“

Visual assessment of the different tillage systems by soil samples cut out by spade (Fig 3).

Figure 3: Soil samples cut out by spade. I) Strip-tillage (Plot 33). II) No-tillage (Plot 32), the stratification of the aggregates may only disappear after several years when catch crops regularly root through the soil. The root exudates of the catch crops enhance the development of the soil fauna and by this recover the aggregate stability. III) Reduced tillage (Plot 31), residues were incorporated.

Questions raised and discussed

The field is cultivated since about 1000 years. Strong erosion events are first mentioned in years around 1100. Although **erosion** happens in this field for hundreds of years, the events strengthened in the last decades. Mechanization of agriculture, intensive crop production with crops that are sensitive to erosion (maize, sugar beet) and land consolidation leads to the effect that more than 2 m of soil has been eroded until today. On the hilltops and upper slopes the initial rock is standing (Loess, Keuper), fertile soils are accumulated at the bottom (colluvial material). Erosion not only happens in strong events but also in little every day, whenever the soil is not covered properly. A permanent soil cover is from high importance especially in Loess regions to protect the soils from erosion.

The implementation of a no-tillage system is quite difficult. It is influenced by the soil type, stone content and precipitation. Experience and motivation of the farmer play a key role in a good

functioning no-tillage system. The farmer has to find the appropriate technique and crop rotation. Direct seeding is, for example, possible for winter wheat after rapeseed with cover crops in between. Cover crops would suppress weed growth, on condition that the cover crops should be sawn max. 24 h after harvest of the rapeseed. This time point would guarantee to use the remaining soil moisture for a good field emergence of the cover crops. A good mixture for cover crops is the combination of Vicia Faba, Pisum, Phacelia and Guizotia Abyssinica. Most of the time, direct seeding machines with tines are more appropriate than those with discs.

No-Tillage systems are highly dependent on glyphosate application for weed suppression. The **abolition of glyphosate** by 2023 will most probably lead to the return of the plough in these systems and increase erodibility again. There is a need for no-tillage systems with the allowance of minimum invasive tillage strategies to preserve the soil aggregates as good as possible. In modified no-tillage systems, tillage would be allowed in low depth or once in several years.

In some cropping systems **ploughing might be unavoidable**. This might be the case in organic farming systems, where mineralization through ploughing is especially important as the use of easily available nutrients through synthetic fertilizers is not allowed. Ploughed soil gets warm earlier in springtime, this is important on sites with a short vegetation period. Where ploughing is unavoidable, it should be done only 7 cm deep.

Feedback

Stakeholders appreciate discussing cropping systems from different points of view. The discussions among practical farmers, research, industry and extension service are helpful, produce new inputs and help to look for appropriate soil saving cropping systems.

The number of earthworms, soil structure, erodibility and crop yields are the parameters to evaluate if the cropping system is a soil-improving or not.

The SICS implementation is dependent on machine availability, site conditions, application of glyphosate, the crop rotation.

Regional, site-specific advice would help farmers to choose the right technique, appropriate crop rotations and time points for seeding actions.

I.8 ICPA (Romania)

Report on Demonstration Activities / Field day(s)

Study Site number: 8
Country: Romania
Author(s): Irina Calciu
Affiliation (s): ICPA

Demonstration / Field day date(s): 05-09-2019

Version: 1
Date: 04-03-2020

Purpose

On 5th of September 2019, at the ICPA institute (address: 61 Marasti Blvd, sector 1, Bucharest 011464, Romania), the demonstration event "Soil Improving Cropping Systems implementation in practice" for demonstration of the selected SICS was held as a workshop.

Before the start of the workshop, the project's research team established an initial stakeholders group according to their levels of influence and interests to be invited. A group of 5 individuals were chosen and invited, the following interest groups being represented: agricultural research and development station, advisory service, individual farmers (households), land managers, local public services for agriculture. The agenda for the workshop was prepared in advance by the research team of the project.

The objective of the workshop was to disseminate the SICS implementation in practice among the stakeholders involved in the project. During the workshop, the tested SICS treatments were described in the experimental field and the progress done until now.

Stakeholder participation

At the event, 18 people attended from the 5 groups of invited stakeholders. People were invited by direct invitation and telephone calls made to 3-4 people from each group of interested stakeholders (agricultural research and development station, advisory service, individual farmers (households), land managers, local public services for agriculture).

Demonstration activities undertaken

The event was organized as a workshop between the study site team and invited participants which lasted for 2 hours at the institute's centre. The objective was to disseminate the SICS implementation in practice among the stakeholders involved in the project.

The event agenda contained the following presentations:

- SOILCARE project objectives presentation;
- description of the field experiment and the tested SICS;
- a presentation about the update of the SOILCARE project results within each of the tested SICS.

During the event, the following tested SICS treatments within the experimental field were described:

- main soil tillage by mouldboard ploughing (with furrow inversion at 25 cm depth);
- main soil tillage by subsoiling (at 60 cm depth);
- main soil tillage by chisel (without furrow inversion at 25 cm depth).

Also, a control treatment was described. This is:

- main soil tillage by disk, 2 times (done at 12 cm depth).

After these presentations, the participants were invited to visit the experimental field where SICS are tested.

Questions raised and discussed

During the event, the problems related to cultivation practices and their effect on soil within the study site area were discussed. The main question raised and discussed with the invited stakeholders was about soil degradation by natural subsoil compaction which is found within the study site area. Firstly, there were identified the causes of the natural subsoil compaction on clayey soils in the studied area. The invited stakeholders identified the following causes: heavy soil texture within the

soil profile, un-controlled traffic at the soil surface, soil tillage done in un-proper moisture conditions, use of equipment with high axle load and high tire pressure.

After that, there were identified the effects of soil compaction in the studied area. These were as follows: pore destruction, a decrease of water infiltration rate, obstruction of root development due to compacted soil layers, a decrease of biological activity, a decrease of production and profitability.

Also, it was discussed that mitigation of the natural subsoil compaction on clayey soils by subsoiling can be a measure used in practice by farmers. But applying the subsoiling every year it is time and energy consuming and the financial benefits are not significant for the farmers. Therefore, it is recommended that this type of tillage is done periodically at 3-4 years.

Other solutions discussed which may contribute to subsoil compaction mitigation were: soil tillage is done in optimum water range for workability and trafficability, use of low weight machinery and low tire pressure inflation, controlled traffic, use of deep rooting system crops/legumes in crop rotation.

Another result from the tested SICS raised by the invited stakeholders at the meeting was that use of minimum tillage (chisel treatment) may be a measure for soil quality conservation, but on clayey soils, as is the case of our study site, is not suitable to be applied. On such soils, the weed control cannot be realized properly and the use of deep rooting system crops in combination with minimum tillage does not result in high crop yields. Minimum tillage can give good results on looser soils.

Another aspect related to soil-improving cropping systems which were discussed during the event was the use of legumes in crop rotation. It was suggested by the invited participants that this may be an appropriate solution for nitrogen-fixing in soil, which results in decreasing the fertilizers doses for the next crop cultivated in rotation. The invited researchers from the agricultural research station pointed out that use of legume crops improves also soil quality by increasing the structural aggregation of soil and this can lead to a good soil aeration status and water regime.

Feedback

To implement an appropriate cropping system by farmers on arable lands, most of the participants at the end of the event agreed that a longer period is needed to observe the significant positive effects of the tested SICS on soil quality evaluated by various soil indicators and crop production.

Minimum tillage is a practice widely used in large farms but in suitable soil conditions. Further research action would be necessary to find the proper combination between minimum tillage and crop rotation.

For the study site area, most of the participants agreed that the cultivation of legumes in crop rotation is a good practice for farmers because it improves soil fertility by improving soil structure and soil nitrogen supply input. Also, the use of legumes in vegetal farms represents good agricultural practice for crop diversification which in the case of large farms (large cultivated area) is mandatory.

The event has achieved its objective to disseminate and inform the stakeholders about the results of the tested SICS which can be used in practice especially by farmers. Also, the results about the tested SICS can be used by professors to teach the students and by advisers about soil quality and degradation processes directly in the field, as practical field applications.


SoilCare

I.9 University of Padova (Italy)

Report 1 on Demonstration Activities / Field day(s)

Study Site number: 9

Country: Italy

Author(s): Antonio Berti, Ilaria Piccoli, Felice Sartori

Affiliation (s): University of Padova

Demonstration / Field day date(s): 19-04-2018

Version: 1

Date: 14-02-2020

Purpose

The main purposes of the first Soilcare stakeholder meeting were to 1) describe Soilcare project to stakeholders and, 2) discuss together the possible SICS to adopt in Legnaro study site.

Stakeholder participation

Participants: 10 (9 males, 1 female)

Demonstration activities undertaken

The demonstration started with the visit to Padova University experimental farm long-term experiments. At first, we visited the "Long-term rotation experiment" where from 1962 different rotation schemes are compared. In particular, we focused on the comparison between maize and winter wheat monoculture vs two-, three-, four and six-year rotation. Secondly, we visited the "Fertilization and crop residue incorporation" where from 1966 three different crop residue management (residue removal, residues incorporation, residue incorporation with the addition of 1 t ha-1 of dried poultry manure) combined with five levels of fertilization (0, 60, 120, 180 and 240 kg N ha-1). Then we visited the "Organic and mineral fertilization" experiment where from 1964 mineral and organic (i.e., manure) fertilization is compared with unfertilized lysimeters filled with three different soils (clay, peat and sand). Finally, we visited the "Nitrogen fertilization and crop residue" where from 1970 different residue managements (residue removal vs residue incorporation) are combined with different levels of N application (0-400 kg N ha-1). In this last experiment, particular attention has been given to the on-going cover crop, i.e., tillage radish (Raphanus sativus L.). The demonstration ended with an open discussion on selected SICS and possible benefits and drawbacks.

Questions raised and discussed

Bullet points of discussion:

- Tillage radish establishment in Veneto region silty soils: seeding and germination issues as related to different soil types
    - Need to seed very early (immediately after maize harvesting)
    - Good establishment in silty soil, acceptable results on clay soil, worse radish germination and successive development in sandy soil
- Tillage radish life cycle as related to maize one: obstacles and possible issues to deal with
    - Tillage radish seemed not to be killed by several days of frozen → need of herbicide to terminate the cover crop

- Tillage radish should be devitalized around January to guarantee optimal seedbed conditions for maize (March/April)

- Challenges of no-tillage management adoption and weed control in sub-humid climate
  - Weed control is one of the major drivers to get through the transition phase from conventional to no-tillage management
    - Need to have a clean seedbed before main crop seeding
    - Timeliness of weed control
  - Irrigation and no-tillage
    - The necessity to combine no-tillage management with irrigation to guarantee optimal management adoption
    - Fertigation system should be considered as well
  - Is it possible to apply no-tillage management without the use of glyphosate? What will happen if it will be banned?
    - At the moment, it seems very difficult to apply no-tillage management without glyphosate usage
    - There is an alternative pesticide? Pelargonic acid: very expensive, not very effective

Feedback

Stakeholders were very interested in better understanding tillage radish as cover crop despite some concerns about its growing cycle were raised. They will participate the next year to the SoilCare stakeholder meeting to see the first-year results.

Report 2 on Demonstration Activities / Field day(s)

Study Site number: 9

Country: Italy

Author(s): Antonio Berti, Ilaria Piccoli, Felice Sartori

Affiliation (s): University of Padova

Demonstration / Field day date(s): 08-02-2019

Version: 1

Date: 14-02-2020

Purpose

The main purpose of the second Soilcare stakeholder meeting and demonstration event was to show the preliminary results obtained during the first year of the experimentation

Stakeholder participation

Participants: 10 (9 males, 1 female)

Demonstration activities undertaken

During the 2nd Soilcare demonstration event, we visited the Soilcare study site. After a nice walk of ca. 5 min through the University experimental farm we reached the Soilcare experimentation. Stakeholders could walk on the field on which at the moment there was the three different soil covers: bare soil (the standard practice of the area), tillage radish cover crop and winter wheat cover crop. Stakeholders had the possibility to 1) see differences in cover crop growth according to the two different tillage management (tillage vs no-tillage) tested and, 2) evaluate possible benefit connect with deep-rooted cover crop adoption. The demonstration ended with an open discussion.

Questions raised and discussed

Bullet points of discussion:

- Tillage radish establishment in Veneto region silty soils
  - Expected seeding and germination issues were not observed in the first experimental year because we sowed in 18 cm rows
  - Tillage radish as cover crop should be more easily sowed. Is it possible to broadcast sowing?
  - We need to increase cover crop life cycles. A hypothesis may be to insert tillage radish in a winter wheat rotation instead of maize. Otherwise, maize has to be harvested as silage maize to anticipate cover crop sowing
  - We need to understand better which is the best sowing period in our environment. We would like to have another trial with different radish sowing date (e.g. July, August, September)
  - Tillage radish develop a long taproot that may mitigate soil compaction, but seeds price is not negligible

- Irrigation
  - We need to schedule irrigation event for the next main crop (maize). Which irrigation method? Drip irrigation may be the best solution
  - A radish early broadcast sowing could require additional irrigation on the cover crop. This can reduce the advantages of an early broadcast sowing.

Weed soil covering is never considered but it provides a not negligible soil protection (i.e. soil erosion, nutrient leaching) and C input

Feedback

Stakeholders were very interested to see how the tillage radish developed on silty soils. They consider tillage radish as a valuable cover crop for its ecosystem benefits despite they still have some concerns about crop need, such as sowing, irrigation and pesticide in case it does not winter-kill

Report 3 on Demonstration Activities / Field day(s)

Study Site number: 9

Country: Italy

Author(s): Antonio Berti, Ilaria Piccoli, Felice Sartori

Affiliation (s): University of Padova

Demonstration / Field day date(s): 19-02-2020

Version: 1

Date: 20-02-2020

Purpose

The main purpose of the third SoilCare stakeholder meeting and demonstration event was to show the development of the deep-rooted cover crop “tillage radish” at both our experimentation site and private farm.

Stakeholder participation

8 (6 males, 2 females)

Demonstration activities undertaken

During the 3rd SoilCare demonstration event, we visited at first a private farm where “tillage radish” has been adopted as winter cover crop. We discussed on the field the possible benefits and drawback of adopting such practice. Subsequently, we returned at Padova University experimental farm where we visited the two experiments related to SoilCare project. Firstly, we visited a trial where we study the radish life cycle as related to its seeding period. In particular, we discussed the possible relationship between seeding date and crop winterkill. Afterwards, we visited the SoilCare main experiment where the cover crop is combined with different tillage management.

The demonstration ended with an on-field open discussion

Questions raised and discussed

The main issues raised by stakeholders regarding tillage radish management. The cover crop is considered beneficial in terms of soil benefits if it is possible to sow it early. The most suited seeding time seemed September because the crop is sufficiently developed to generate soil improvements and it seems also susceptible to freezing

Feedback

Stakeholders will be happy to participate at the final SoilCare stakeholder meeting at the end of the next cropping season. They suggest i) to show experimentation results and main findings on a webpage (e.g., stakeholder platform) and ii) possibly to develop short guidelines for successful implementation of SICS.

I.10 Institute of Agrophysics, Polish Academy of Sciences (Poland)

Report on Demonstration Activities / Field day(s)

Study Site number: 10

Country: Poland

Author(s): Magdalena Frąc, Jerzy Lipiec, Bogusław Usowicz

Affiliation (s): Institute of Agrophysics, Polish Academy of Sciences

Demonstration / Field day date(s): 15-04-2019, 25-10-2019

Version: 1

Date: 04-12-2019

Purpose

On 15th April 2019, we organized the field day in two different fields (study sites) to show posters with the results of our study and explain advantages of soil-improving cropping system (SICS) used in our case study. The field days aimed to present the results of the study and to underline main soil threats that can be limited by the use of SICS.

On 25th October 2019, we organized a demonstration event connected with demonstrating soil-improving cropping system (SICS) used in our case study. This event aimed to underline the importance of soil organic matter and biodiversity for soil quality and to present SICS in our case study. The aim of this event was also a demonstration of simple measurements important for soil quality evaluation.

Stakeholder participation

15-04-2019: 10 people (researchers, farmers, PhD students)

25-10-2019: 29 people (farmers, agricultural companies, students, researchers, PhD Students)

Demonstration activities undertaken

In 15th April 2019, we prepared posters concerning results of the study and we also talked about main soil threats (such as acidity and loss of soil organic matter) that can be limited by the use of soil-improving cropping systems (SICS).

On 25th October 2019, we showed experimental fields, we underlined the most important factors influencing on quality of sandy soils such as cover crops cultivation including leguminous, manure and other exogenous organic matter sources (such as spent mushroom substrate) application and liming. During this event we presented two lectures:

- Prof. dr hab. Magdalena Frąc - The importance of biodiversity in the soil environment
- Prof. dr hab. Jerzy Lipiec - Soil quality - the impact of organic matter

We connected this event with visiting the modern mushroom farm of Mr Jerzy Kłopotek to show how the spent mushroom substrate is produced and to explain its importance for soil quality improvement.

We also demonstrated simple equipment and measurements for basic soil quality evaluation, such as pH, salinity, soil colour, soil structure, porosity, penetration resistance. Participants could make soil measurements in the field.

Questions raised and discussed

What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control

- Yield of crops
- pH
- Organic matter content
- Plant diseases
- Soil structure
- Earthworms presence

The differences between SICS and Control were the following:

- Higher yields, especially after manure application (~18%) and liming (~6%)
- Higher pH after liming

How can they contribute or will they contribute to the monitoring/evaluation

- It will be possible to collect soil samples/test soil parameters on the field from different farmers
- We can obtain yields from farmers used SICS

What results and in which form would they prefer the project to provide them to realize if the SICS is working or not

- They prefer to obtain results on the yield of crops

They want to know basic soil parameters SICS in comparison to Control, such as organic matter content, pH and nutrients content in the soil

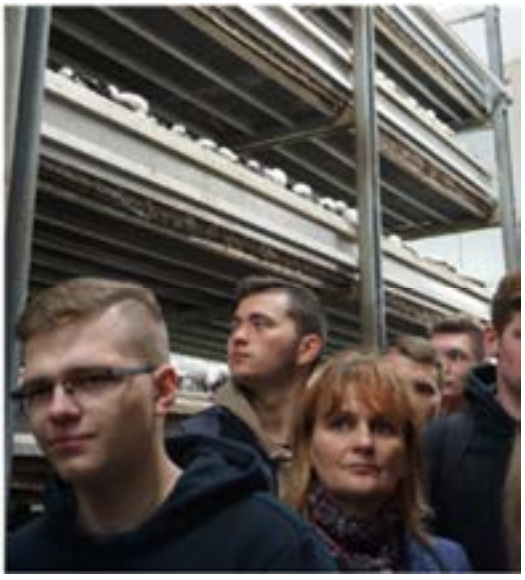
Feedback

- People need to be informed during training, conferences about SICS.
- It is important to have positive examples of farmers who use SICS in practice and they can say something about their positive impact on soil, crops, yield.
- Participants underlined that it was very interesting that they could visit mushroom production and see how spent mushroom substrate is produced, how mushrooms grow and they could ask questions about this kind of exogenous organic matter.
- This event was especially important for students of Agriculture, who has own farms or their parents have farms and therefore they can use SICS solutions in the future.

Photographs: 15-04-2019


GAP

Photographs: 25-10-2019



I.11 ESAC (Portugal)

Report on Demonstration Activities / Field day(s)

to be complied in D5.2_PT

Study Site number: 11

Country: Portugal

Author(s): Anne Karine Boulet

Affiliation (s): ESAC

Demonstration / Field day date(s): 12-04-2019

Version: 1

Date: 18-12-2019

Purpose

In the Ambit of the SICS 4, for which are testing 6 species of legumes, as winter intermediary cover crop destined to be used as green manure, was organized in collaboration with the DRAP Centro ("Regional Directorate of Agriculture and Fisheries") a field day to present the results of the experiment to the stakeholders.

Stakeholder participation

About 30 people participated in the demonstration day, principally technicians and researchers from the various research centres of the country. The adhesion by students and farmers was low and it was one the principal deception of the events. The event was planned on a Friday afternoon due to various constraints of the Loreto experimental centre and was not the better day to reach students and farmers.

Were represented at this divulgation day:

- National public entities with regional delegations;
- Agricultural teaching institutions: (i) "Agricultural High school of Coimbra" (ESAC);
- Farmers organizations;
- Seeds and fertilizers private companies;
- Farmers;

ESAC students

Demonstration activities undertaken

The program was composed by (i) an oral presentation of the various trials from the of the experimental centre by the regional director of the DRAP Centro and the leader of the Loreto experimental centre, (ii) a presentation of the SoilCare project by the professor Antonio Ferreira from the ESAC and more specifically from the SICS4 concerning legumes trials, (iii) a field demonstration presenting the results in the field of the trials. (iv) It was originally prevised to proceed to a demonstration of the cutting, trituration and burring of the legumes in the presence of the stakeholders, but previous intense rainfall events did not permit to enter with high machinery in the field.

It was elaborated a leaflet, that was affixed and also send by e.mail to the principal to organizations of farmers, high schools and research center from the region.

Figure 1 – Program, Figure 2 – Field Guide






Feedback

People that assisted in the events were very enthusiastic about the experiments. All the plots produced a large quantity of green matter and showed a good capacity for weed control. Besides that, some species tested in the trial had the reputation to not be well adapted to the soil type of the study region, they presented a good agronomic behaviour.

Even if the participation rate was lower than expected, particularly from farmers and students community, and the fact that the high soil moisture content did not allow the use of heavy machinery, the “Dia aberto das Leguminosas” was successful. Especially in term of appreciation of the scientific community that was well represented, and also allow exchanging many comments and point of view between the participants.

It was decided to repeat the event next year, with more insistence in the previous dissemination of the event near the farmer and student community. Next year, we also will be able to present results of vegetation and soil sampling that was not still available this year to the participants.

I.12 Technical University of Crete (Greece)

Report 1 on Demonstration Activities / Field day(s)

Study Site number: 12

Country: Greece

Author(s) Vozinaki Anthi Eirini, and Tsanis Ioannis:

Affiliation (s): Technical University of Crete

Demonstration / Field day date(s): 03-12-2019, in Astrikas, Kissamos

Version: 1

Date: 30-01-2020

Purpose

TUC acts as a link between the SoilCare project and the 'Biolea' olive producer in Astrikas (Chania Prefecture, Crete) by supporting field experiments on their farm, investigating and assessing specifically the impact of an integrated tillage agricultural practice within the field, on the quantity of deposition/erosion processes.

The participants were taken to the field to be actively involved in the demonstration process of the field experiment located there. The participants were motivated to participate within the experiments, to share their opinion, all their views, their experience and knowledge about everything that could concern the specific demonstration action, i.e. soil quality, crop quality etc. They were explained the importance of being well informed and motivated about the purpose of the SoilCare project, its progress and results for their sustainable crop production. The Study Site Researchers noted also the importance of discussing with them their needs, and their perceptions on the tested treatments.

Stakeholder participation

The involved stakeholders were three, two of them are actively involved with the olive production (woman and man), and the last one (man) is actively involved with the avocado crop.

Demonstration activities undertaken

At first, the participants were explained the main aim of the field experiments, which is to assess deposition/erosion processes within the field for erosion's model's calibration and soil loss results upscaling from farm to regional level. They were also explained that innovative Soil Improving Cropping System (SICS) techniques are assessed for their potential to improve soil quality and mitigate erosion, that is the SICS treatment (till) vers the Control treatment (no-till). The SICS treatment, implemented twice within the SoilCare project and the specific field (November 2017 and May 2019), represents an integrated tillage method that preserves the quality of the soil, whereas the Control (no-tillage) represents an area that has not been tilled at all. They were explained that the implemented tillage method is quite low in cost, however, it requires special attention during implementation since deep tillage may cause damage to soil's physical properties. The labour and machinery effort is also notable for the specific SICS since higher labour input is needed within the specific SICS along with machinery cost. The farmers were also demonstrated the two sediment traps (Fig. 1a) located within the field, which collect the deposited soil from extreme rainfall events in the specific agricultural study area.

The stakeholders were then encouraged to join the demonstration activities in a more active role (monitoring, experimenting, and evaluating), and they were properly guided into the upcoming demonstration process (Fig. 1b).

a. b.

Fig. 1. SICS trap demonstration (a) and guidance for the experiments to be implemented (b)

Fig. 2 presents their active involvement in the soil samples collecting process to be aware of how they can properly collect and send representative soil samples to the laboratory for their chemical analysis.

Figure 2. Stakeholder involvement in soil sampling demonstration process for laboratory analysis.

Continuously, the simple and interesting experiment of Earthworm density was selected from the SoilCare's monitoring plan and presented to the farmers as an indicator method of the good biological health and condition of their soils. In the specific demonstration point, they have noted the importance and power of pictures and keeping a record of their activities (Fig. 3).

Figure 3. Earthworm density experiment with mustard for soil health identification.

Finally, the process of the consecutive cross-sections measurement was demonstrated among two olive trees, to identify and/or measure soil deposition/erosion within the study treatment areas, and they were continuously asked to perform the specific process on their own (Fig. 4).

Figure 4. Cross-section measurements for the deposition/erosion identification.

Questions raised and discussed

Through the aforementioned demonstration field day, several questions were discussed about the specific SICS tillage method. Our involved stakeholders reported that nowadays many farmers apply minimized tillage and minimized removal of rocks from the fields. For example, in older olive orchards, mechanical equipment causes tillage erosion, reaching losses up to 40-50 cm. Also, they referred to the traditional olive tree cultivation, which can rely on little or no irrigation and minimum agricultural inputs. However, the man-farmer, involved in the specific demonstration day, reported

that irrigated groves may achieve higher yields of about 50% increase. They also have found realistic and not difficult the widespread implementation of the specific SICS, as long as they have the support and the encouragement of the experts for the proper implementation of the specific SICS. They seemed open to the specific tillage process and willing to apply it, as long as they feel the support and the help of the scientific community. They agreed on the importance of controlling the tillage depth, which seems a very important parameter since recently farmers observe extreme soil erosion phenomena within their fields that may be due to the intensification of tillage practices.

In terms of cross-section measurements results, the team discussed the soil erosion/deposition improvement after the specific SICS application and they seemed interested to a better information process about any future results raised from the specific measurement method.

They also declared themselves available in any event or presentation, where all the above results will be presented. They also mentioned that leaflets often provide significant information about their concerns. Finally, they declared that it is simple for them and they like to follow social media on agricultural issues and new scientific methods and applications.

Feedback

The feedback of the participants for the specific demonstration field day revealed several interesting aspects for the scientific team. The stakeholders seem willing to participate in such events, share their concern with scientists and they want to be taught from them about sustainable methods and applications for their production.

They also liked the way they were switched during their participation in the demonstration field day, that is the avocado orchard owner performed experiments for olive orchards and vice versa. In this way, they were allowed to learn new information about other crop types and practises, however they concluded that soil quality is a matter that concerns the whole producers' community, almost independent of the crop type.

They declared themselves available in any future event, or presentation of SoilCare methods and applications.

Report 2 on Demonstration Activities / Field day(s)

Study Site number: 12

Country: Greece

Author(s): Vozinaki Anthi Eirini, and Tsanis Ioannis

Affiliation (s): Technical University of Crete

Demonstration / Field day date(s): 03-12-2019 in Koufos, Alikianos, Chania

Version: 1

Date: 30-01-2020

Purpose

TUC acts as a link between the SoilCare project and the 'Marakas' orange and avocado producer in Koufos (Chania Prefecture, Crete) by supporting field experiments on his farm, investigating and assessing specifically the impact of crop switch treatment, where orange orchards are switched to avocado orchards, on the quantity of deposition/erosion processes and the sustainability of the production.

The participants were taken to the field to be actively involved in the demonstration process of the field experiment located there. The participants were motivated to participate in the experiments, to share their opinion, all their views, their experience and knowledge concerning the specific demonstration action, i.e. soil quality, crop quality etc. They were explained the importance of being well informed and motivated about the purpose of the SoilCare project, its progress and results for their sustainable crop production. The Study Site Researchers noted also the importance of discussing with them their needs, and their perceptions on the tested treatments.

Stakeholder participation

The involved stakeholders were four, two of them are actively involved with the olive production (woman and man), and two other (men) are actively involved with the orange/avocado crop.

Demonstration activities undertaken

At first, the participants were explained the main aim of the field experiments, which is to assess deposition/erosion processes within the field for erosion's model's calibration and soil loss results upscaling from farm to regional level. They were also explained that innovative Soil Improving Cropping System (SICS) techniques are assessed for their potential to improve soil quality and mitigate erosion, that is the SICS treatment (avocado orchards) vers the Control treatment (orange orchards). Although orange cultivation is still a major cultivation in Crete, and mainly in Chania, recently avocado farms gain ground and today avocado farms currently cover 590 ha. Of the production, 25% is exported, since the total avocado consumption in Greece is just 6.200 ton/year. The specific crop switch is proposed as a sustainable alternative not only for its financial benefits but also for its special characteristic to maintain superior overall soil quality. However, soil erosion for avocados has not been measured yet. Therefore, TUC's role is to quantify the amount of the erosion/deposition problem among the two areas (Control, SICS) along with their results.

At first, the farmers were demonstrated the two sediment traps (Fig. 1) located within the study field, which collect the deposited soil from extreme rainfall events in the specific agricultural study area.

Figure 1. The SICS sediment trap demonstration of the avocado orchard.

The stakeholders were then encouraged to join again the demonstration activities with a more active role (monitoring, experimenting, and evaluating), and they were once again involved in the upcoming demonstration process. Fig. 2a presents their active involvement in the soil samples collecting process, whereas in Fig. 2b they once more experimented with Earthworm density from the SoilCare's monitoring plan as an indicator method of the good biological health and condition of their soils.

a.

b.

Figure 2. Active involvement of stakeholders to the soil sample collection process (a), and the Earthworm density experiment (b).

It was a very nice moment when the farmer from the neighbour field was found during this demonstration activity with the mustard, at this place, observed the process and asked from the team to perform the simple Earthworm density experiment in his newly planted avocado farm, to indicate or not the good biological health and condition of the soil (Fig. 3).

Figure 3. Earthworm density experiment with the mustard performed also in the neighbouring newly planted avocado farm.

Continuously, the owner of the 'Marakas' avocado farm guided all the team to another point of interest within the field, to show them a recent and exceptional phenomenon of soil erosion, hard to face. After the extreme rainfall events and severe flooding of February 2019, he noticed the specific land change in his property (Fig. 4), which is a remarkable phenomenon and seems to be getting dangerously worse. All the team agreed that the specific point must urgently be furtherly investigated, discussed and analyzed with the scientific help of the team.

Figure 4. New erosion phenomenon within the field area reported by the stakeholder.

The farm owner shared also his worries about the orange trees, which seem to have introduced a black colour on their peel (Fig. 5). This new affection in the exterior morphology of the crop needs to be faced directly with spraying activities.

Figure 5. Black colour in orange crops' peel reported by the stakeholder.

Questions raised and discussed

Through the aforementioned demonstration event, several questions were discussed about the specific crop switch method to avocado orchards, such a profitable kind of crop with a high achievement rate of soil quality maintenance and upgrade.

The participants were agreed that the orange crop cultivation is no longer advantageous to the producer compared to avocado crop cultivation. To their view, this year, oranges and avocados are being sold for 0.70 euros/kg and 2.60 euros/kg, respectively. It is evident the financial benefit from the specific crop switch treatment to avocado crops.

However, the special effect of this kind of crop on maintaining a superior soil quality was separately denoted. The participants requested continuous feedback from the TUC research team on soil erosion/deposition quantification process, within SoilCare project.

However, they find quite difficult the implementation of the specific SICS. They think that avocado plantation should be accompanied with extensive scientific support along with necessary recommendations of an expert scientific team both before and after any crop switch implementation to the avocado orchard. We should not forget that this kind of decision includes high economic risks for farmers, who should take into account the high costs per avocado seedling, the high crop failure risk due to the high sensitivity of the avocado crop to extreme hydrometeorological events, the importance of the soil physical structure and drainage investigation before planting the specific crop since avocado crops present special needs in water and water drainage. Also, farmers should take into consideration that the first harvesting season of avocados takes place not earlier than the first 5 years after their plantation. All the above conclude that although the avocado crop seems a profitable and promising investment, it is also accompanied by a lot of risks for the farmer and should be adopted after serious investigations and analysis of the specific properties on the orchard soils and on the best ways to tailor their irrigation and fertilization practices.

The participant stakeholders, however, seemed willing to be involved in any event or open discussion or presentation, where the specific crop's results within SoilCare project, will be presented. They strongly supported the organization of workshops that aim to properly inform the farmer on crop switch treatment to avocado orchards.

Feedback

The stakeholders seem willing to participate in such demonstration events, share their concern with the scientists and other farmers. They declared themselves available in any future event, or presentation of SoilCare methods and applications, especially for avocado cultivation. They also agreed that they need a continuing education program to make sure that recommendations are disseminated and followed by avocado growers and avocado grove managers.

I.13 SLU (Sweden)

Report on Demonstration Activities / Field day(s)

Study Site number: 13

Country: Sweden

Author(s): Martin Bolinder, Gunnar Börjesson

Affiliation (s): SLU

Demonstration / Field day date(s): 17-06-2019, 18-06-2019

Version: 1

Date: 17-02-2020

This report gives a description and encloses the outcomes from the demonstration and field days (intended for WP5) as well as the second ("participatory") stakeholder workshop (intended for WP7) which we linked together. All these activities took place during three consecutive days in the *Skåne* County (southern Sweden) involving the following study site researchers; Holger Kirchmann, Gunnar Börjesson, Martin Bolinder, Thomas Kätterer and Gizachew Getahun.

The first day was covering SICS from a broader perspective while the second day focused specifically on the new and innovative SICS we are testing at our SS. A large number of stakeholders including farmers were invited and participated in these first two days. The third day, we as SS researchers had a separate meeting with a farmer recently adopting a series of different conservational management practices.

Field visits and seminar at Lönnstorp 2019-06-17

Purpose

The theme of this day was "What do we know about soil organic carbon today", addressing the effects of current and future management practices on the sequestration of atmospheric CO2 in the soil. This included the use of cover crops, aboveground crop residues management, perennial crops and agroforestry systems.

Stakeholder participation

For the first day, we used the platform SLU Partnerskap Alnarp to meet and discuss SICS with stakeholders. This is a platform where researchers from the Swedish University of Agricultural Sciences (SLU) can regularly meet with the most important stakeholders involved in agricultural research, education and development. A list of stakeholders and a description of this platform is available at http://partnerskapalnarp.slu.se/pub/. The initiative comes from the Alnarp Campus (Skåne County in southern Sweden) but researchers from other Campus of SLU also contributes and farmers' are welcome to participate (about 30 stakeholders).

Demonstration activities undertaken

Through our participation at this platform, Gunnar Börjesson presented two Swedish long-term field experiments in the field with about 30 stakeholders, and Thomas Kätterer was lecturing about the status of knowledge on soil organic carbon.

Fig. 1. Gunnar Börjesson from SLU explaining results from two long-term experiments at Lönnstorp to stakeholders. The experiments were initiated in the early 1980s, where the SICS involved the effect of nitrogen fertilization, perennial crops and aboveground crop residues removal on crop yields and soil properties including soil organic carbon dynamics.

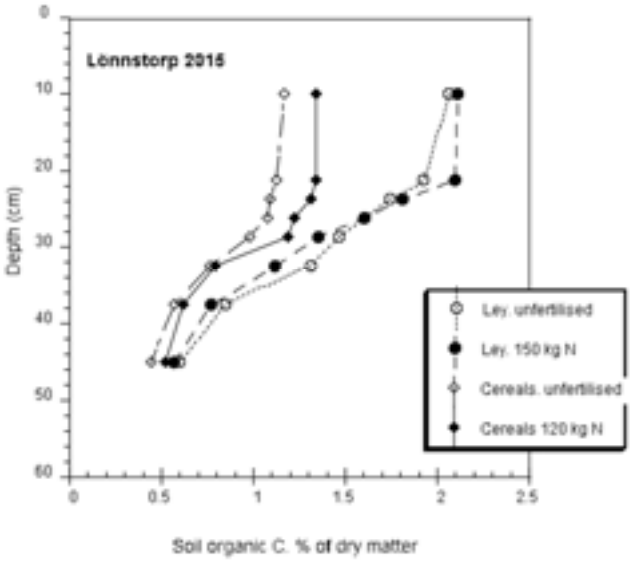


Fig. 2. Carbon in soil profiles at Lönnstorp. Each point represents n = 4 plots of the same treatment. (cf. Börjesson et al. 2018. Biol Fertil Soils 54:549–558. doi: 10.1007/s00374-018-1281-x)

Questions raised and discussed

Summary of main items that came up during the discussions:

- How do different grassland management practices like fertilization affect soil carbon?

- How do different cover crop species affect soil carbon?
- How is the harvesting of cover crops affecting soil carbon and N2O emissions?
- What is the impact of mineral NPK fertilization on soil carbon?
- Does crop diversity affect soil carbon?
- How do different tillage practices affect soil carbon? How does soil carbon affect crop yields and is there a threshold above which extra soil carbon does not result in yield increases?
- How does removal of crop residues affect soil carbon?
- How can we reduce the emission of greenhouse gases from drained organic soils?

Field day at the Swedish SS with the new innovative SICS 2019-06-18

Purpose

The second day was devoted to present and discuss the new and innovative SICS we are testing within the SoilCare project at Orup. Briefly, this SICS have two treatments, subsoil loosening and subsoil loosening combined with the injection of organic material (straw pellets), and that are compared to a control. Subsoil loosening takes place to a depth of about 50 cm with the added organic material located between depths of 30 to 45 cm. This also implies that some of the subsoils are coming up to the arable layer, while some arable soil is mixing into the subsoil. The purpose is to improve this naturally compacted soil, where rooting depth is restricted to the topsoil because of a highly compacted subsoil. By loosening the subsoil and creating a better soil structure deeper in the soil profile, we are expecting higher yields and possibly better resistance to periods of drought.

Stakeholder participation

In addition to us five SS researchers, the farm owner and the consultant who adapted the machinery we were using for implementing the treatments was present. Four extension scientists also participated and helped us organizing the field day. We were inviting 140 local farmers', whereof eight could join.

Demonstration activities undertaken

We were establishing treatments in the fall 2018 and the SS was seeded with winter wheat shortly thereafter. Consequently, no yield data are currently available. However, the effects of subsoil loosening and the incorporation of organic material are visible. For that purpose, we were preparing a soil profile in each of the treatments that we were showing to participants. Gizachew Getahun, a SS researcher investigating a similar SICS (using other equipment and other organic materials) at another site in Sweden was also presenting his results to the participants. A leaflet describing the general outline of the SoilCare project was distributed among the participants. The field experiments

with these SICS is located side by side with a Swedish long-term experiment, from which we also explained and presented results by showing posters.

Demonstration activities undertaken

Fig. 3. Holger Kirchmann (left) and Gunnar Börjesson (right) explaining and discussing results to stakeholders from the Swedish long-term field experiment located side by side with the trial testing the new and innovative SICS within the SoilCare project.

Fig. 4. Holger Kirchmann showing soil profile(s) to stakeholders explaining the trial testing the new and innovative SICS (effects of subsoil loosening and incorporation of organic material).

Questions raised and discussed

Summary of specific questions that the farmers' raised regarding the new and innovative SICS:

- Is it better or just as good using only irrigation rather than subsoil loosening?
- Is it better or just as good using deep-rooted crops such as red clover or lupine rather than subsoil loosening?
- Is it better or just as good only conducting a conventional ploughing but that is much deeper such as down to 60- or 80-cm depth rather than subsoil loosening?
- Is this SICS sustainable?
- How does this SICS affect the yields?
- Have you been thinking about using other organic materials for the treatment subsoil loosening plus incorporation of straw pellets?
- Have you been thinking about other aspects than soil fertility for this SICS such as greenhouse gas emissions - notably from nitrous oxide?

Is this SICS economically viable?

Feedback

Summary of other concerns and general perceptions (not only relating to this particular innovative SICS):

•Many farmers' were mentioning the fact that it is not well perceived, "traditionally", ploughing so deep and thereby having subsoil mixed with the topsoil.

•Many farmers' considered that in the end, it is the economic aspects that are driving the feasibility of adopting SICS; in that regard, the existing subsidies are not well adapted, e.g., only a few cover crop species are qualified for obtaining subsidies.

•All participants appreciated the field day and some were asking where they could find more information concerning data from experiments with both new and other SICS.

•Extensions scientists were mentioning it could be relevant to update summary papers explaining and presenting data as well as conclusions from the Swedish long-term field experiments.

I.14 Crop Research Institute, Prague (Czech Republic)

Report 1 on Demonstration Activities / Field day(s)

Study Site number: 14

Country: Czech Republic

Author(s): Helena Kusá

Affiliation (s): Crop Research Institute

Demonstration / Field day date(s): 21-02-2018

Version: 1

Date: 28-03-2018

Purpose

The purpose of this workshop was to introduce the participants the long-term field trial with different soil tillage carried out in Prague since 1995. The effect of soil tillage (conventional compare to SICS) and various nitrogen fertilization on soil properties and production yield and quality was given. Different emergence, development and overwintering of plants were demonstrated in a field trial.

Stakeholder participation

In total 115 participants joined the workshop, mainly farmers and agronomists (approx. 70%) using various soil tillage systems, but also representatives of producers of fertilizers, seeds, pesticides and agricultural machinery; accredited consultants, researchers or supervisors, editors of agricultural periodicals, students of agricultural universities.

Demonstration activities undertaken

The long-term field trial with standard CS "conventional tillage" (turning of stubble, mouldboard plough up to 22 cm) and two SICSs – minimum tillage (turning of stubble up to 10 cm) and zero tillage was demonstrated. Different emergence, development and overwintering of plants were shown in the field trial. Their causes have been discussed, especially the higher soil temperature and humidity at the SICS in autumn important for plant emergence. Our experience with used different soil tillage systems (e.g. nitrogen mineralization and availability, risk of nitrogen leaching) some soil characteristics (pH reaction, nutrient distribution in soil profile) and crop yields were presented. An extensive discussion with the participants took place.

Crop rotation is pea - winter wheat - oilseed rape – winter wheat. The trial consists of two fields: one with staple crop wheat, where various fertilizers area tested, and a second one with pea or rape.

Questions raised and discussed

- Water-saving on SICS - Reduced soil warming and water evaporation due to post-harvest residues on the soil surface
- Different CS and erosion: the effect of post-harvest residues and stubble
- Lower mineralization at a minimum and zero tillage (=SICS) in comparison with conventional tillage (CT) beneficial from the view of the risk of nitrate leaching (esp. during winter), but negative with a view to lower nutrient availability for plants
- Different approach to fertilization on SICS esp. at early spring, where soil temperature at SICS is lower than at CT (earlier fertilizers application, fertilizers with the mobile easily available form of nitrogen)
- Mobility and availability of the various forms of nitrogen and their transformation on soil
- Suitability of use of urease and nitrification inhibitors
- Application of pesticides in various tillage systems (weeds, diseases)
- Crop yield and quality (namely winter grain yield and protein content)

What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control:

mainly economic indicators; the ecological point of view as nitrates leaching limiting (esp. farmers with permeable soils or/and in the vulnerable zones according to "Nitrate Directive"); water-saving; working time-saving;

How can they contribute or will they contribute to the monitoring/evaluation:

Some of them use different tillage systems in their fields. They can provide their experience.

What results and in which form would they prefer the project to provide them to realize if the SICS is working or not:

The beneficial effect of SICS on soil properties does not appear immediately after their introduction. Long-term results of experiments that confirm positive soil changes are needed. It is important to show SICS are not economically disadvantageous. Farmers need process recommendations for individual SICS in different soil and weather conditions, including nutrition and plant protection to optimize yields and production quality. Preferred form: field days, workshops, articles in professional press; preferably: face-to-face consultations directly in their fields.

Feedback

The participants gave very positive feedback about the workshop. They appreciated the great amount of knowledge presented and our practical experience that they utilize on their farms. Many

farmers invited us to their fields. They wanted our assessment/evaluation of their soils and cropping systems.

Report 2 on Demonstration Activities / Field day(s)

Study Site number: 14

Country: Czech Republic

Author(s): Helena Kusá

Affiliation (s): Crop Research Institute

Demonstration / Field day date(s): 25-03-2019

Version: 1

Date: 25-03-2019

Purpose

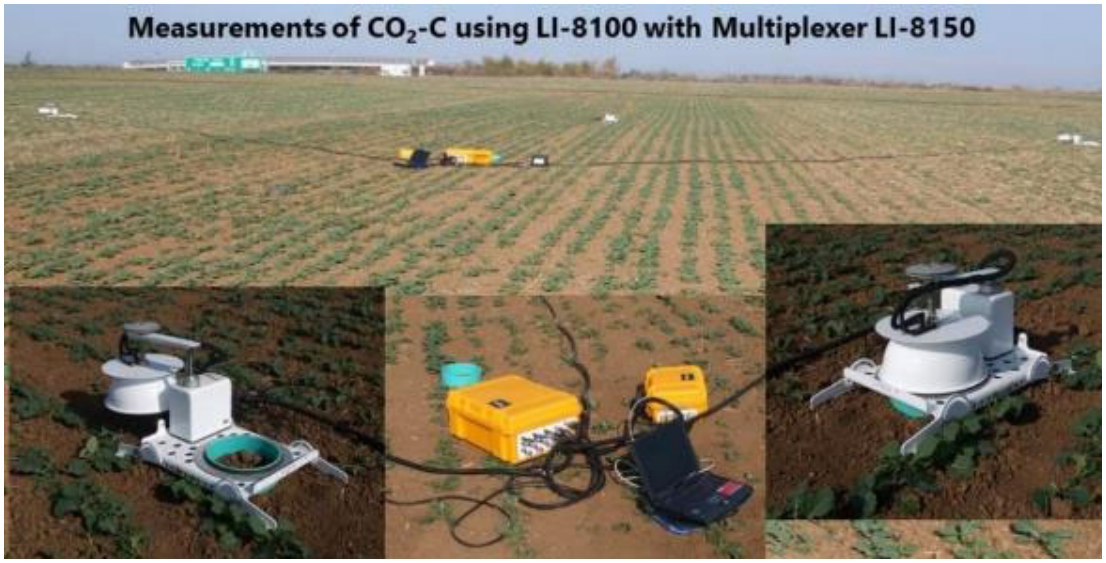
The purpose of this workshop was to provide the participants with new insights coming from the long-term field trial with standard (conventional tillage) and two SICSs (minimum and zero tillage). The main topic was the effect of soil tillage intensity of CO2 emissions and soil content of C_{org}.

Stakeholder participation

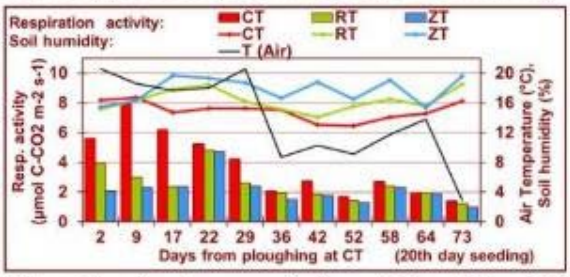
In total 104 participants joined the workshop, mainly farmers and agronomists (almost 60% of part.) using various soil tillage systems, but also representatives of producers of fertilizers, seeds, pesticides and agricultural machinery; accredited consultants, researchers or supervisors, editors of agricultural periodicals, teachers from secondary agricultural schools.

Demonstration activities undertaken

The CO2 emissions measurement at long-term field trial with conventional tillage and two SICSs – minimum tillage and zero tillage was demonstrated. The overwintering and spring regeneration of winter wheat plants was shown in the field trial. As in the previous year, the effect of different soil tillage on the soil properties and crop yields and quality were presented. An extensive discussion with the participants took place.

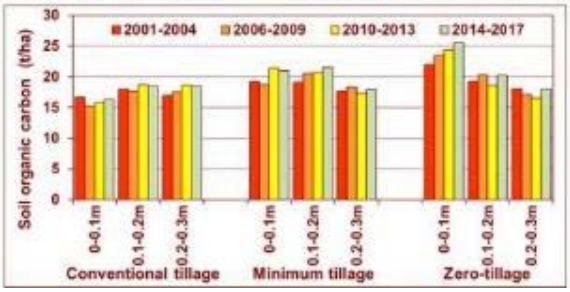


THE IMPACT OF DIFFERENT SOIL TILLAGE INTENSITY ON CO_2-FLUXES, SOIL ORGANIC MATTER,



lower tillage intensity = lower respiration activity = higher SOC (in upper soil layer)

The difference among CSs is growing with lasting of experiment



Questions raised and discussed

- - Soil organic matter losses after soil tillage, CO2 emissions from soil under various soil temperature and humidity,
- Saving of SOM with a decrease of soil tillage intensity and depth, organic matter
- Supplying organic matter to the soil (cultivation of intercrops with higher C: N ratio, extensive root system), decomposition of post-harvest residues (e.g. N application for support of straw decomposition in various fertilizers).
- The effect of SOM on aggregate stability and water infiltration into the soil
- Better water management on SICSs and its positive effect on yield achieved in the dry years, observed e.g. in 2018
- Fertilization systems in the period of climate change - earlier spring fertilizer application, when there is a greater chance of precipitation, the necessity to use fertilizers with mobile nitrogen forms, the suitability of urease inhibitors to be used on urea-based fertilizers, etc.
- Application of pesticides in various tillage systems (weeds, diseases), problems with weeds even in a dry year
- The future of the no-tillage system, depended on glyphosate application, in the condition of their abolition.

What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control: mainly economic indicators (stability of yield and required quality of production); the ecological point of view as nitrates leaching limiting (esp. farmers with permeable soils or/and in the vulnerable zones according to "Nitrate Directive"); water-saving; erosion reducing; working time-saving;

How can they contribute or will they contribute to the monitoring/evaluation: Some of them use different tillage systems in their fields. They can provide their experience, soil and plant samples, allow us to observe and measure in their fields with different tillage.

What results and in which form would they prefer the project to provide them to realize if the SICS is working or not: Long-term results of experiments that confirm the positive effect of SICSs at various conditions (e.g. in favourable as well as extreme drought year) are needed. It is important to show SICS are not economically disadvantageous. Farmers need process recommendations for individual SICS in different soil and weather conditions, including nutrition and plant protection to optimize yields and production quality. Preferred form: field days, workshops, articles in professional press; preferably: face-to-face consultations directly in their fields.

Feedback

The feedback that the participants gave for the demonstration activity/field day, including suggestions for future actions, as well as SSR feedback. Lessons learned. The participants gave very positive feedback about the workshop. They were highly interested in the problem with low content of organic matter in the soil. Many farmers were interested in monitoring organic matter in their soils and measuring the CO2 emissions in their fields after the various soil treatments they use.

Report 3 on Demonstration Activities / Field day(s)

Study Site number: 14

Country: Czech Republic

Author(s): Helena Kusá

Affiliation (s): Crop Research Institute

Demonstration / Field day date(s): 11-02-2020

Version: 1

Date: 01-04-2020

Purpose

The purpose of this workshop was to provide the participants with new insights coming from the long-term field trial with standard (conventional tillage) and two SICSs (minimum and zero tillage). In 2020 the main topic was the surface application of fertilizers without incorporation, low mobility of monovalent cations, its accumulation in the top layer.

Stakeholder participation

In total 140 participants joined the workshop, mainly farmers and agronomists (above 60 % of pat.)using various soil tillage systems, but also representatives of producers of fertilizers, seeds, pesticides and agricultural machinery; accredited consultants, researchers or supervisors, analysts from agricultural laboratories, editors of agricultural periodicals.

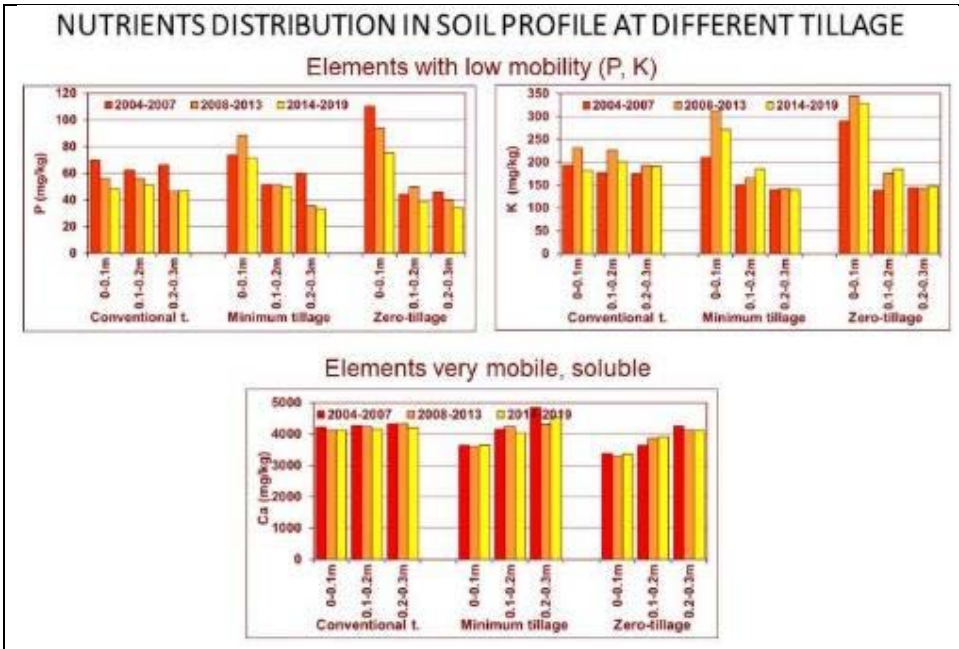
Demonstration activities undertaken

The effect of surface application of various nitrogen fertilizers on the top layer of soil was demonstrated. The effect of different tillage on macro-edaphone, its activity was shown. As in the previous years, the effect of different cropping systems on the soil properties and crop yields and quality were presented and extensively discussed.

Questions raised and discussed

- Accumulation of non-mobile nutrients in topsoil layer in soil conservation systems (esp. at no-till), negative impact on soil aggregate stability and water infiltration.
- Their poor distribution in the soil profile and availability for plants (deficiencies have not yet been observed in the field trial)
- The effectiveness of using N-tester type devices to determine the required fertilizer dose, taking into account the above-mentioned fact that nitrogen is in the soil but accumulated in the upper layer of the soil where there are no plant roots and therefore not utilized. Further application of N recommended by the N-tester then leads to over-fertilization and the risk of high content of residual N after harvest.
- Soil fauna, the role of pores after macro-edaphone on soil infiltration
- Water and nitrogen supply in soils after this “warm” winter, spring regeneration of plants
- Plant nutrition in (more frequent) dry years – the type of fertilizers, application methods, doses distribution; efficiency and utilization of foliar fertilizers
- Current problem: overgrowth of field-voles, possibilities of their disposal; the effect of soil cultivation on their population: ploughing destroys their corridors and natural habitats, while technology with post-harvest residues on the surface provides shelter from predators.

- The evaluation of 2019 and recommendations (soil treatment, plants nutrition and protection, etc.) for this season 2020 with a view to soil conditions and state stand.



A day after calcareous ammonium nitrate application, fertilizers residues on the soil surface two weeks later

Macropores formed by macro-edaphone at conventional tillage

Macropores formed by macro-edaphone at zero tillage

What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control: mainly economic indicators; the ecological point of view as nitrates leaching limiting (esp. farmers with permeable soils or/and in the vulnerable zones according to "Nitrate Directive"); water-saving; erosion limiting; maintaining soil fertility and stability of yields.

How can they contribute or will they contribute to the monitoring/evaluation: Some of them use different tillage systems in their fields. They can provide their experience, soil samples, information about their management, yields (and quality) of production.

What results and in which form would they prefer the project to provide them to realize if the SICS is working or not: Long-term results of experiments that confirm the positive effect of SICSs at various conditions (e.g. in favourable as well as extreme drought year) are needed. It is important to show SICS are not economically disadvantageous. Farmers need process recommendations for individual SICS in different soil and weather conditions, including nutrition and plant protection to optimize yields and production quality. Preferred form: field days, workshops, articles in professional press; preferably: face-to-face consultations directly in their fields.

Feedback

.The participants gave very positive feedback about the workshop, they found the topics discussed very interesting. They were usually surprised by the large difference in nutrient concentrations in

the surface layer (0-2 cm) and below. The participants discussed their experiences and observations with the use of different fertilizers. They promised more to notice the condition of the soil surface. They limit, if necessary, the application of fertilizers with monovalent cations. Many farmers are interested in the evaluation of their soil condition, analysing soil samples from different depths and recommending further procedures. In several farms, soil sampling has already been made before the introduction of quarantine due to covid-19.

I.15 University of Almeria (Spain)

Report on Demonstration Activities / Field day(s)

Study Site number: 15
Country: Spain
Author(s): J Cuevas & V Pinillos
Affiliation (s): University of Almería

Demonstration / Field day date(s): 13-11- 2019

Version: 1
Date: 08-03-2020

Purpose

To show students of Agronomy the study site orchard, understand management in a large private company and see how collaboration with research centres can bring some help and increase profitability to the owners

Stakeholder participation

Students attended and took notes on the problems stone fruit orchards face in semi-arid zones (desertification, salinization, low organic matter content, erosion…) and on the solutions proposed in the context of SoilCare project (cover crops, deficit irrigation strategies, adding pruning residues to the soil…).

Demonstration activities undertaken

Visit to the orchard sited in Aguamarga by bus. Demonstrations of mechanical pruning. Performing some additional pruning by hand.
Visit to the experimental plot. Checking on the soil erosion consequence of previous storms. Cover crop emergence.

Questions raised and discussed

Discussing the benefits of enhancing soil organic matter by cover crops and pruning wood residues.
Discussing better mix for a cover crop in semi-arid zones.
Limits to deficit irrigation, and management of cover crops for avoiding competition with peach trees for water.
The economy of the actions taken.

Feedback

Students present a report after the visit

Students getting information in the study orchard

Tractor shredding pruning residues

Erosion problems in the orchard with herbicide complete weed control as a soil managenemt.

I.16 FRAB (France)

Report on Demonstration Activities / Field day(s)

to be complied in D5.2_FR

Study Site number: 16

Country: France

Author(s): Antonin Le Campion, Goulven Maréchal

Affiliation (s): FRAB

Demonstration / Field day date(s): 10-10-2019

Version: 1

Date: 27-02-2020

Purpose

The objective of this on-farm exhibition day was the promotion of agricultural practices that reduce erosion and limit the use of pesticides. Soils in Ille-et-Vilaine (Brittany) are mainly dominated by silt and the repeated use of tools which reduced the size of soil particles foster compaction. The main goal of this trial is the sowing of winter cereals in a living cover, in maintaining a good soil levelling to allow mechanical weeding. Different alternatives methods were presented: soil preparation and sowing, after a plant cover or a stubble ploughing. These methods adapted to organic management conditions allow the sowing of cereals in living soils while managing soil conditions acceptable for mechanical weeding.

Stakeholder participation

This action was set up in partnership with a river basin organization, to disseminate several organic practices (permanent soil cover/conservation tillage) which played an important part in the improvement of water quality. There were about 100 participants, mainly farmers but also river basin organization employee, CUMA (cooperatives for the use of agricultural equipment) employee and a few farm work firms and agricultural companies

Demonstration activities undertaken

Different sowing methods and sowing machines were presented and discussed (cf test-pattern below):

- ITK 1, 2 : control = tillage + combined machine
- ITK 3, 5, 6, 9: different sowing machines in minimum tillage
- ITK 4: shallow plough + ploughing + sowing
- ITK 7: mulch sowing.
- ITK 8: shallow plough + direct sowing

A triticale-pea mixture was sown at the rate of 190kg/ha (86% triticale, 14% pea). The previous crop on the plot dedicated to the trial was wheat. The crop rotation on the farm is dominated by crops in rotation with alfalfa.

To provide a first evaluation of the different sowing methods, the effective rate of seed emergence was estimated 15 days after sowing. Seedling rates were heterogeneous amongst modalities. The emergence of pea was particularly variable. The best seeding rates were estimated with tillage before sowing. For other methods, and focusing on sowing in minimum

tillage, seeding rates were lower but acceptable (about 185 triticale seedlings/m² and 7 pea seedlings/m²). Another indicator to evaluate these methods is weed infestation rate after sowing. This indicator is particularly important under organic conditions. Considering the same sowing machine tested for different soil preparations, the suppressive effect of tillage against weed can be observed. The evolution of this criteria would be informative during crop development. The evaluation of the number of ear per m² during spring and yield estimation after harvest would be informative for this trial.

Questions raised and discussed

There was a consensus between participants and SSR on the indicators to evaluate the different sowing combinations. Preliminary results provided by the first evaluation was quite disappointing because tillage modality was more efficient than others. Different bias was pointed out by participants:

- the germinating capacity of triticale was unknown
- as the adjustments of sowing machinery are difficult, some differences could be explained by differences in adjustment (sowing rate). For a future trial, a better attention should be paid to this point.

These results were communicated to a farmer group followed by Agrobio35 (periodic technical letter).

Feedback

These trials are conducted in partnership with a river basin organization (Bassin Versant Vilaine Amont Chevré) to promote organic management practices which are favourable to water quality.

Minimum tillage is one practice that can be promoted to all farmers in a general objective of improvement of water quality. But other organic practices could be disseminated:

- inter-crop management to extend soil covering period
- permanent soil covering
- mixed crop
- diversification and extension of crop rotations
- mechanical weeding
- preservation and expansion in the grass area

The specific thematic of cereal sowing is one agronomical priority established by the Loire-Bretagne water agency in his 11th programme.

APPENDIX II. Guidance document on Demonstration Activities

Guidance and input for Demonstration activities/field days for study sites

Work Package 5 of the EU-project SoilCare

Ioanna Panagea[a] & Guido Wyseure[a]

[a]KU Leuven, Leuven, Belgium

Foreword

This document aims to guide the Study Sites partners about how to effectively implement demonstration activities and field days.

Outputs of the demonstration workshop will feed into the deliverable 5.2 detailing the demonstration activities and results. The general findings will also be used for producing monitoring outputs targeted to different audiences.

We would like to thank the SoilCare partners for their comments and support.

Ioanna Panagea, Guido Wyseure,

March 2019

Please feel free to mail: ioanna.panagea@kuleuven.be, guido.wyseure@kuleuven.be if you have questions, comments and suggestions and/or you need further support.

Guidance for demonstration/field days

1. Introduction

Next to investigating the sustainability and profitability of the SICS, the SoilCare project also has a task to demonstrate to the Study Sites stakeholders their experiments on SICS. These demonstration days help to evaluate possible benefits, drawbacks, costs and outcomes using the experience of the field trials in discussion with the stakeholders. The demonstration activities should focus on gathering the opinion of the stakeholders on each study site, informing about the cropping systems innovation and extra value, and if possible activating the stakeholders into a more active role (monitoring, evaluating, reflecting on and adopting of a novel soil-improving cropping system).

As the Study Sites are very diverse in their timing of activities and have different levels of stakeholder engagement, this guidance aims to produce simple semi-structured guidelines of demonstration activities/field days and can be adapted to each case. It is encouraged to combine the demonstration days with other activities so that the stakeholders are not overloaded with different demands from different WP.

2. Purpose of the demonstration/field days

The purpose of the demonstration activities/field days is to inform and motivate the participants about the progress made by experiments on the cropping systems by directly observing them. The participants during a field day visit the experiments, observe the fields, reflect on the benefits and requirements for implementation. They discuss their impressions, perceptions and judgement with the Study Site Researchers.

The idea of the demonstration is to show a group of participants:

- SI cropping systems as compared to control treatments and what is the added value of the SICS (what are the differences, why we think that the SICS is Soil-Improving).
- What is happening and how it could be implemented in real life. How the SICS would work in practice. To appreciate in a field environment, what the differences, drawbacks and benefits are of the SICS compared to the control or common practices
- How the findings could be presented to the more general public.
- Whether results are visible and significant enough to convince farmers visiting Study Sites and encourage farmers to try the SICS themselves.
- How they can be actively involved in the work to be done e.g. monitoring.

3. Scheduling the demonstration activities/ field days

It is recommended to link field demonstrations/days to the stakeholder meetings or workshops organized by the other relevant WPs [1](e.g. Adoption Workshop-WP7). In this way, overload for the SS partners and stakeholders can be avoided. Probably field visits/demonstration could best be followed by the stakeholder meeting and integrated as much as possible towards higher efficiency.

So, ideally, the field demonstrations would start before the meeting/workshop, so that stakeholders and researchers are better prepared for discussing.

Important is to provide enough time for the participants in the demonstration activities to discuss with you and share their views, experience and knowledge. They are the experts of their area, land, and field. We can learn from all different stakeholders and visitors to the field, especially about practical implementation.

If possible the demonstration/ field days should be scheduled so that the stakeholders can distinguish the differences in the field between the treatments. The visits should be documented by photos and videos so that demonstration/field days deliver supporting material for posters, press releases and fact sheets. These can also be placed on the SoilCare stakeholder web platforms and newsletters.

Useful Tips

Demonstration events / or field days can be open to a wider audience than only the stakeholders participating workshops. There could be wider publicity to the event in the local press, social networks, farmer unions. If you combine the demonstration with the stakeholder meeting you can continue afterwards with a selected group of stakeholders in specific workshops.

The demonstration could be a continuing activity rather than a structured meeting

Some SS could organize more continuous access for farmers and other stakeholders to the experiments and place some poster information at the border of the field with contact information. Neighbouring farmers could be invited inspect at their convenience the experiments. They could also be invited to send a regular comment to the SSR. In this way, they participate more continuously and can feed their observations to the SSR concerning the SICS. A group of neighbouring farmers could also receive occasional information on the experiments and give feedback. This can be relatively informal provided it is documented and notes are made.

If your SICS include different tillage methods you can invite the interested stakeholder group (farmers, technicians, companies which produce machinery, etc.), to see live the tillage operations

[1] By workshop/ stakeholder meetings we refer to all the activities that include the stakeholders and have to be organized on the scope of dissemination (WP8), policy analysis and support (WP7) or/and upscaling and synthesis (WP6), as long as the time schedule and program of these activities will not change if combined with WP5 demonstration activities.

and evaluate it (they will have a better insight about the workload differences, required machinery, costs etc).

If you do not see something you do not believe it or understand it!

Most SS have their traditions and practices for demonstrations and field days, which could be maintained. So, the timing should be decided by each SS according to their normal practice. Important is that the visits are documented and useful information is communicated within the entire SoilCare project.

4. Demonstration days steps/structure ideas

-In the demonstration days, there could be new and more participants as compared to the consulted stakeholders. You might need to briefly explain to the new participants the project's concept. **Important is that all the participants understand what SICS and what the Control treatments are. Explain and demonstrate the different treatments in the field**. Give some details about the objectives, expected extra value, difference in managements practices between control and SICS, added material needed to implement the SICS.

In case you have an experiment on a real farm, or a farmer is managing the field, you can **motivate, help and support the farmer to give the practical information and demonstrate the details.**

- **Prepare simplified supporting materials** such as posters and fact sheets with information about any results, yield changes or any other important information you believe will help them to understand the cropping systems value. Photos with the different stages of the cropping system can be a good tool. Some rain-proof plasticised posters could be exhibited permanently next to the field.

-**Try to motivate the participants to identify the changes in the quality of the soil and crop between the SICS and the control** before you point them out (if any visible changes) to them. The participants could observe visually some interesting characteristics. It is useful that they report to the SSR how they evaluate and monitor from their perspective.

- Demonstrations may explain the scientific monitoring procedures involved in the experiment, this may help encourage **the active involvement of and ownership by stakeholders**. If feasible, show or explain how they can collect soil samples and give them to your laboratories, explain to them the importance and power of pictures and keeping a record of their activities etc. You can select any other of the activities from the monitoring plan you think are simple and interesting for them to contribute to your monitoring work.

-**Give time to the participants to discuss and share their views, experience and knowledge.**

-**Take plenty of photos**, at all stages of the demonstration, to help document your SS-experiment. If feasible a short **video with an interview** of one of the participants would be nice, also a **video showing the SS experiments** is welcome. The photos and possibly videos can serve for Soilcare material.

5. Reporting

Inform the project management, other SS's and the relevant WP's **on beforehand with sufficient anticipation** the upcoming demonstration events.

After the demonstration event/ field day a **short** report should be prepared. In the case that you have already done any demonstration activities/ field days please also include those in the report briefly. In the short report please include:

- the purpose/objective of the event the number and types of stakeholders present
- the demonstration activities are undertaken
- the questions that were discussed and the main conclusions/messages from the demonstration
- feedback on the effectiveness of the event

Questions to be addressed in the report:

- How do the stakeholders try to evaluate if the cropping system in how far a soil-improving is or not?
- How realistic and difficult is the widespread implementation of SICS, which looks successful in the experiments?
- How did the stakeholders think they can or they will contribute to the monitoring/evaluation?
- What results would they like to receive from SICS tested in the experiment and in which form?

Any lessons to be learned from the field/demonstration activities should be included.

Share your experience of demonstration activities that have worked (or not) well for you with the other study site partners.

SUCCESS!

D5.2 template for report on Demonstration Activities/Field day(s)

Study Site number:

Country:

Author(s):

Affiliation (s):

Demonstration / Field day date(s): dd-mm-yyyy

Version:

Date: dd-mm-yyyy

1. *Purpose* (≤ 0.5 pages): Short description of the purpose and scope of the demonstration event/ field day.

2. *Stakeholder participation*: Description of the number and type (if possible) of the participants.

3. *Demonstration activities undertaken* (≤1 page): Description of the demonstration activities/ field day that took place.

4. *Questions raised and discussed* (0.5-1 page): Description of the questions that were discussed and the main conclusions drawn from both the participants and the SSR point of view.

    - What "indicators" the participants used to evaluate the cropping system, the differences pointed out between the SICS and control
    - How can they contribute or will they contribute to the monitoring/evaluation
    - What results and in which form would they prefer the project to provide them to realize if the SICS is working or not

5. *Feedback (0.5-1 page):* Feedback that the participants gave for the demonstration activity/field day, including suggestions for future actions, as well as SSR feedback. Lessons learned.