Crop diversification cluster of Horizon 2020 funded EU projects

Multicriteria Assessment and Sustainability Indicators (MCA&SI) working-group
First meeting
Rome (Italy) 13-14 March 2019

Research Council for Agriculture and Agricultural Economy

Research Centre for Agriculture and Environment (CREA - AA)

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1. Venue

The First meeting of the Multicriteria Assessment and Sustainability Indicators (MCA&SI) working-group of the crop diversification cluster of Horizon2020 funded EU projects was held in Rome (Italy) at CREA Agriculture and Environment, on the 13-14 March 2019. It was organized by CREA. The list of attendees is included in Annex I.

2. Meeting content

The final content of the meeting (Agenda) was sent by email to all partners with some weeks in advance. The Agenda of the meeting was:

First day - Wednesday 13 March 2019

Time	Subject	Contribution
12.30 – 17.30	**Projects overview on MCA and SI**	
12.30 – 14.00	Arrival of participants: Registration and light lunch	
14.00 – 14.15	Welcome and meeting introduction	
14.15 – 14.30	Round table for presentation of each participant (1' each)	
14.30 – 15.50	Projects' presentation focusing on specific activities concerning MCA and SI (20' each + 5' questions)	
	TRUE	Luiza Toma, Aneta Trajanov, Marko Debeljak
	LEGVALUE	Elise Pelzer, Rèmy Ballot
	DIVERFARMING	Roman Hueppi, Roberta Farina, Claudia Di Bene, Heikki Lehtonen
15.40 – 16.00	Coffee break	
16.00 – 16.25	Projects' presentation continuation	
	DiverIMPACTS	Frédérique Angevin, Stefano Canali, Ileana Iocola
16.25 – 17.30	Plenary discusión	
17.30	End of the first day	

Second day - Thursday 14 March 2019

Time	Subject	Contribution
9.00 – 12.30	Differences, similitudes and synergies	
9.00 – 9.10	Start of the meeting and welcome coffee	
9.10 – 9.30	Main outcomes of the first day discussion	
9.30 – 11.00	Discussion on the following issues: - Differences and similitudes among projects - Methodological issues (i.e. alignment of indicators, spatial interpolation of indicators) - How to implement synergies among projects? How to exploit the cluster activities?	
11.00 – 11.20	Coffee break	
11.20 – 12.00	Next steps and action plan	
12.00 – 12.30	End of workshop and concluding remarks	
12.30	Light lunch and farewell coffee	
11.00 – 11.20	Coffee break	

The meeting ran according to schedule, with neither significant delays nor modifications of the Agenda. All coffee breaks were included, with a catering service in the room.

3. Welcome and meeting introduction

The meeting was opened by Stefano (CREA, DiverIMPACTS), in charge of the event organization, who welcomed all the attendees and shortly introduced the Research Council for Agriculture and Agricultural Economy (CREA) and, particularly, the Research Centre for Agriculture and Environment.

He recalled that in the 'Crop Diversification' cluster meeting of the six Horizon 2020 funded EU projects held in Geneva on August 2018, it was agreed to activate a working group on multicriteria assessment and sustainability indicators.

This first meeting of the group was therefore intended to facilitate contacts and interactions among the scientists involved in the research activities on Multicriteria Assessment and Sustainability Indicators in the frame of the six projects of the cluster, to share approaches and methodologies used within the different projects and to start the discussion aimed at identifying similarities and differences in the activities. This meeting will therefore pave the floor for the next activities of the working group.

4. Presentation of the projects of the cluster and their activity related to MCA&SI (Day 1)

LEGVALUE

The activities related to the indicators and the MCA tools carried out within the LEGVALUE project were presented by Elise Pelzer and Rémy Ballot. LEGVALUE aims to support EU self-sufficiency in vegetable protein production. The project started in June 2017 and it is a duration of 4 years. The consortium consists of 24 partners (both public and private sectors) and 6 different WPs are in the project. During the presentation only the activities of the WP1 (constituted by 4 tasks) were shown because they were more related to the issues of the cluster meeting. The goal of this WP is to assess the services (and disservices) of legumes from field scale to European level. Using data from available

national and international databases, surveys and data from on-farm networks, a multi-criteria assessment of current dominant cropping systems and prospective legume-based cropping systems will be carried out in each country. Scenarios will be co-designed in each country with local stakeholders, to assess the economic and environmental impacts of scaling out these legume-based systems at European scale.

TRUE

The activities related to the indicators and the MCA tools carried out within the TRUE project were presented by Aneta Trajanov, Luiza Toma and Marko Debeljak. The project (transition paths to sustainable legume-based systems in Europe) aims to increase sustainable legume cultivation and consumption across Europe. In particular, the project helps to determine a range of options for successful transitions that include a variety of legume species and processing approaches in three different pedo-climatic zones (Atlantic, Continental, and Mediterranean) and in a range of farm network types. It is a 4-years (April 2017 – March 2021) project. The consortium consists of 24 partners (public and private sectors). Sophisticated analysis and advanced modelling approaches combined with data generated from 24 Case Studies and transdisciplinary knowledge-exchange will lead to concrete innovations and to a final Decision Support Tool (DST) for primary producers, agronomists, processors, associated businesses and decision makers. During the presentation the activities of the WP6 (Economic Assessment of Sustainable and Profitable Legume Production and Consumption) and WP8 (Transition Pathways) were shown because they were more related to the issues of the cluster meeting. WP6 aims to determine the economic performance of legumes at the farm, regional, and EU scale, in conventional and in organic production systems. WP8 aims to to enable the leveraging of legume incorporation into further farming, co-operative, feed industries, food chains and supply chain businesses across Europe, by designing a web-based assessment tool for sustainability of legume–based farming systems. Data from Case Studies are used to derive economic and trade indicators (WP6) at a range of spatial scales for comparison with Sustainability Indicators (WP8) to give an overall appraisal of the potential for legume-based systems.

DIVERFARMING

The activities implemented and foreseen within DIVERFARMING and related to the focus of the cluster were presented by Roberta Farina, Claudia Di Bene, Roman Hueppi, and Heikki Lehtonen. The overall goal of DIVERFARMING is to increase diversification and biodiversity in Europe and fostering sustainable development of bioeconomy with the long-term view. The Diverfarming consortium come together to develop and deploy innovative farming and agribusiness strategies. Diverfarming will increase the long-term resilience, sustainability and economic revenues of agriculture across the EU by assessing the real benefits and minimising the limitations, barriers and drawbacks of diversified cropping systems under low-input agronomic practices that are tailor-made to fit the unique characteristics of six EU pedoclimatic regions (Mediterranean south and north, Atlantic central, Continental, Pannonian and Boreal), and by adapting and optimising the downstream value chains organization. This approach will provide: i) increased overall land productivity; ii) more rational use of farm land and farming inputs (water, energy, machinery, fertilisers, pesticides); ii) improved delivery of ecosystem services by increments in biodiversity and soil quality; iii) proper organization of downstream value chains adapted to the new diversified cropping systems with decreased use of energy; and iv) access to new markets and reduced economy risks by adoption of new products in time and space. The diversified cropping systems will be tested in field case studies for major crops within each pedoclimatic region. In the end, Diverfarming focuses on research and innovation for rural development, with emphasis on developing new framework systems and business models adapted to the rural context of each pedoclimatic area of the EU, to foster sustainable growth through adoption of diversification, sustainable practices and efficient use of resources. The project has a five-year duration (May 2017- April 2022), it is composed by 25 partners and it has 10 work-packages that turn around on 16 field

diversification case studies and 8 long-term field experiments around 6 European pedo-climatic regions. The activities of WP7 and WP8 were shown at the meeting. Briefly, WP7 is designed to develop and evaluate models to upscale the findings from other WPs and previous projects, and provide a decision support tool (DST), SusDiver. WP7 is composed by 4 tasks aimin to: a) develop mathematical models to explore how diversified cropping systems tested previous WPs influence soil-water-atmosphere-plant system from farm to landscape level; b) identify farm indicators that define sustainability of different diversified cropping systems; c) implement a simple DST to select the most appropriate diversified cropping systems and agricultural practices to improve farm productivity and sustainability, and to provide guidelines for adaptation and optimization of value chains for high resource-efficiency. The WP8 (Economic assessment at farms and value chains) focused on the economic assessment of the selected diversified cropping systems in WP2 (Selection of sustainable diversified cropping systems), from crop production in field to the final value chain, on the basis of results from previous WP. This WP aims to: a) provide an integrated estimate for the direct benefit-cost to farmers associated with each diversified cropping system; b) provide an integrated estimate for the environmental gains with regard to benefits and costs associated with cropping systems linked to value chain cases within reference pedoclimatic areas; c) provide farmers and actors in the value chain with economic information on the economic benefits and risks associated with diversified cropping systems – including quality, feasibility, usability aspects; and d) find robust approaches to achieve long-term sustainability accounting for sensitivity to future prices.

DiverIMPACTS

The activities implemented and foreseen within DiverIMPACTS and related to the focus of the cluster were presented by Frédérique Angevin, Stefano Canali and Ileana Iocola. The overall goal of DiverIMPACTS is to achieve the full potential of diversification of cropping systems for improved productivity, delivery of ecosystem services and resource-efficient and sustainable value chains. The project has a five-year duration (June 2017- May 2022), it is composed by 34 partners and it has 8 work-packages that turn around on 25 multi-actor case studies - CSs (build on existing experiences of crop diversification) accompanying them in their dynamic transition and reinforcing co-innovation processes. The activities of WP4 were shown at the meeting. Briefly this WP is composed by 4 tasks aiming to: a) develop an adapted analytical framework of indicators sensitive to crop diversification and able to evaluate potential synergies and trade-offs at different spatial scales (field, cropping system, farm, value chain, territory). This framework, co-designed with the involvement of actors and stakeholders, will be used to monitor the evolution of the 25 CSs; b) capture the added value of crop diversification, from field to value chain, through a system analysis (life cycle analysis, risk management indicators, additional socio-economic indicators); c) evaluate the farm-level benefits linked to crop diversification with proper MCA tools (SMART approach); and d) assess the benefits and the impacts of crop diversification at value chain level and at territory level (in rural areas) by using the agent-based model MAELIA.

5. Disussion (Day 2)

The second day of the meeting was dedicated to deepen the discussion on indicators and indicator-based tools developed/foreseen in the projects

Indicators

The following issues were identified and discussed within this category in order to proceed with a comparison among projects and analyse potential synergies and differences:

- *Which are the indicators identified and used in each project? Which scale do they work at? Which sustainability pillar do they address?*

In order to be able to do a proper comparison, all participants agree with the fact that a common procedure to describe indicators has to be used and applied among projects. Furthermore, the indicators have to be inserted into a well-defined and common hierarchical structure to understand their specific objective, the criteria at which they answer and the pillar at which they belong. As all the cluster project have mentioned sustainability assessment approach of SAFA-FAO (http://www.fao.org/nr/sustainability/sustainability-assessments-safa/en/) during their presentations the day before, a proposal could be to use the SAFA sustainability framework (composed by four overarching sustainability dimensions and their embedded themes, subthemes) to "locate" the indicators in a shared and common vision of sustainability.

The cluster coordinator suggested to use the descriptive factsheet developed in the DiverIMPACT to describe the indicators. This simple factsheet was developed according to the factsheet structure used in the multi-criteria tool MASC (Craheix et al., 2011) where indicators are classified using SAFA themes and subthemes. Moreover, other relevant information are reported in the factsheet such as: the objective of the indicator, the spatial and temporal scales, the formula of the computation, the needed input data, the reference values and thresholds, the literature references.

All the people present in the meeting agree in the use of this descriptive factsheet even if the final decision will be taken after everyone has spoken with own project coordinator.

- *Data requirement and their retrieval*

Different strategies were implemented in the various projects for the retrieval of the data needed for the computations of the indicators. In fact, accordingly to the analysed spatial scale, some projects are more focused on the use of data provided by public and European databases, others will collect and produce data within the project from case studies and field experiments. A description of the different procedures and methodologies applied for data retrieval in each project could help to organise this information in a systematic way to identify strengths and weaknesses, compare and share experiences among projects. Shared procedures on the exchange of useful information (i.e., knowledge on existing databases, information on where these data could be found, who are the persons to contact to access to the data, etc.) could be also put in place.

- *Potential data exchange among cluster project*

The idea to put in place also some procedures to share the data collected during the duration of the project was instead seen as very sensitive and difficult issue and the consistency with the data management plans of each project has to be verified. If the cluster decides to follow this path, the cluster has to communicate with people who are responsible of the data management plans and with the project coordinators in order to formalise this procedure because in each project there are not only public data but also private data and information coming from involved actors and stakeholders.

- *Terminology*

Looking at the presentations of the cluster projects shown the previous day, it was evident that the terminology must be aligned. For example, even if the cropping system is a combination of spatial and temporal scales, it is used by some projects (i.e. DiverIMPACTS) as a "functional" spatial scale because it allows better to capture the effects of the implemented crop diversification strategies. Considering the semantics of the term "spatial scale", not all the people involved at the meeting agreed with this vision because the cluster projects will have to provide sustainability outcomes that will have to be clear and understandable by a large audience of actors and stakeholders.

- *Qualitative and quantitative indicators*

All people agreed with the use of both qualitative and quantitative indicators for the sustainability assessment of a system even if the qualitative ones could be more subjective and related to the

perceptions of the interviewed actors. Anyway, quantitative and qualitative indicators could complement each other, and they could be used together to extract more information for developing a more complete understanding of the system.

- *Process used for the identification/selection of the indicators*

The projects of the clusters used different approaches in the selection and identification of the indicators. Some projects used a scientific driven approach, others strongly involved the actors and stakeholders in the process of selection. Anyway, even if the stakeholders were not directly involved in the process of the identification of the indicators, the partnership of the all projects is composed by partners from the academic and non academic sector (such as private companies). Moreover, in all the projects workshops and meetings that are oriented to the communication with the stakeholders (both directly and indirectly involved in the projects) are foreseen. During these workshops the involved actors will see the scientific results and they will be able to express their opinions.

A recommendation that raised from the discussion during the meeting was that the projects of the cluster have to provide results not only for the scientific community (such as scientific papers) but also in a form that could be useful and comprehensible for other actors and stakeholders in order to strengthen their engagement and the dissemination of the main outcomes and results.

- *Target end-users*

Another relevant issue to consider for understanding similitudes and differences among the projects of the cluster is the identification of the target end-users. This aspect is essential because the indicators (or the evaluation tools based on the aggregation of the indicators) were selected/designed in each project in order to meet the own end-users needs and requirements. There are projects that are more farmer oriented, others where different user groups have been identified such as advisors and policy makers or even scientists. Moreover, in some cases the target groups will be the direct users of the evaluation tool, in other cases they will be just the end-users of the results.

Furthermore, another aspect that should not be underestimated is that these indicators and tools could also be used for educational purposes.

Indicator-based tools

Under this second category, it is important to have a clear picture of:

- the projects where the design and the creation of these multi-criteria assessment tools are foreseen;
- the principle and the approaches used to define the aggregation rules of the indicators.

In order to generate results that are comparable, a same method of aggregation that is based on a common hierarchical structure of sustainability should be used. In this way the projects of the cluster will be able to "speak the same language" and to provide clear answers. Even if all participants agree with the idea to converge to a similar structure of aggregation to allow comparison among the results, the weights used could be different because they are related to each specific project target. Moreover, the use of a hierarchical structure can allow to address general and larger objectives and to move in a feasible way from specific aspects to overall sustainability issues. Furthermore, the indicator-based tools and the framework of the indicators should not have only to assess the sustainability of a system but, in case of a system that is no sustainable, they should provide suggestions and practices to manage and improve the results.

The DEXi environment (Bohanec et al., 2015) which manage this type of aggregation for decision-making could be a valid method that could be used by the projects of the cluster to develop their indicator-based assessment tools. An example of design and implementation of an assessment DEXi-

based develop by INRA and applied in the Boigneville Municipality, in the Essonne department in Île-de-France (northern France) was presented.

6. Next activities (action plan) and conclusions

On the basis of the outcomes of the discussion, the following next activities have been identified and planned:

1. to collect and upload on a shared Google Drive folder accessible by all the components of the MCA&SI WG of the cluster the presentations of the meeting and the documents used so far (Stefano, DiverImpacts, April 15th);
2. to set up of a comparative table of indicators across the project of the cluster. Indicators will be first organized according to the SAFA scheme as entry-point. The table will allow to classify indicators by themes/subthemes (sustainability criteria) and operating scale. It will provide the base for the next analysis on differences and similitudes across projects. A share folder in Google Drive will be created to upload the draft table (Stefano & Ileana, DiverImpacts, by April, 15th) the structure of which fill be finalised by April, 30th. The table will be then filled in with the proper information by the WG participants (June, 30th);
3. to describe the indicators using the factsheets used by DiverIMPACTS (hereabove mentioned). The factsheets are needed to get insights of the indicators used/developed by the different projects. The draft format of the factsheet will be uploaded in the WG shared folder (Stefano and Ileana, April 15th) for comments. Once finalised (April, 30th), the factsheet format will be used and filled in by the WP participants of each project (June 30th);
4. to develop a glossary regarding MCA & SI specific for the needs of the WG. The SAFA-FAO Glossary will be used as basis and it will be adapted/expanded for the specific WG aims. Roberta Farina & Claudia Di Bene (DiverFarming) will upload a first draft version of the WG MCA&SI glossary (May , 15th) to be modified for adaptation;
5. to organise a next meeting to be held in September, as a side meeting of the European Conference on Crop Diversification in Budapest. Stefano will take contact with the Organising Committee of the Conference to check the feasibility (April, 15th). As alternative, Marko and Aneta (True) offered to host the WG in Ljubljana (Slovenia) in October. The final decision will be taken by April the 30th.

7. Closure

The meeting ended at 13:00. Stefano and Roberta thanked the all partners for their participation and contribution.

Annex 1. List of participants

Project	Name	Surname	E-mail	Institution
DiverIMPACTS	Stefano	Canali	stefano.canali@crea.gov.it	CREA
DiverIMPACTS	Ileana	Iacola	ileana.iocola@crea.gov.it	CREA
DiverIMPACTS	Frédérique	Angevin	frederique.angevin@inra.fr	INRA
DiverFarming	Roberta	Farina	roberta.farina@crea.gov.it	CREA
DiverFarming	Claudia	Di Bene	claudia.dibene@crea.gov.it	CREA
DiverFarming	Alessandro	Marchetti	alessandro.marchetti@crea.gov.it	CREA
DiverFarming	Emanuele	Blasi	e.blasi@unitus.it	UNITUS
DiverFarming	Roman	Huppi	roman.hueppi@usys.ethz.ch	ETH
DiverFarming	Heikki	Lehtonen	heikki.lehtonen@luke.fi	LUKE
LegValue	Elise	Pelzer	Elise.Pelzer@ inra.fr	INRA
LegValue	Rémy	Ballot	remy.ballot@inra.fr	INRA
True	Luiza	Toma	luiza.toma@sruc.ac.uk	SRUC
True	Aneta	Trajanov	aneta.trajanov@ijs.si	IJS
True	Marko	Debeljak	marko.debeljak@ijs.si	IJS

Annex 2. Group photo

From right to left: Remy, Elise, Roman, Stefano, Alessandro, Heikki, Luiza, Frédérique, Marko, Ileana, Aneta, Claudia, Emanuele and Roberta.