



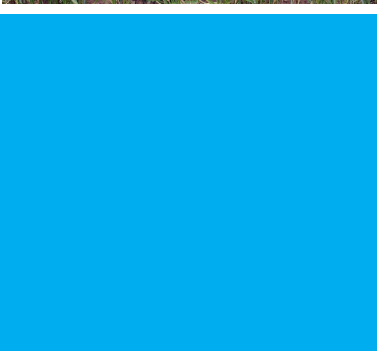
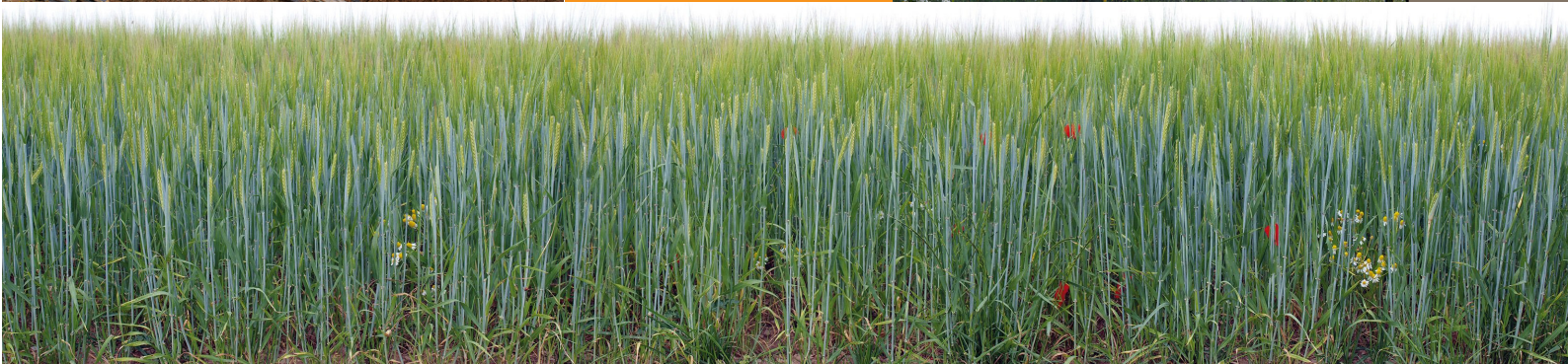
## FOSC

ERA-NET Cofund on  
Food Systems and Climate

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[www.foscera.net](http://www.foscera.net)



## About FOSC

FOSC is the European Research Area Network (ERA-Net) Cofund action on Food Systems and Climate. FOSC is built upon and supported by the experience from FACCE-JPI and LEAP-Agri. The consortium consists of 28 partners from Europe, Africa and Latin America. FOSC pulls together resources for a joint research programme and is supported by the European Commission (EC) through an ERA-Net Cofund grant.

### How to feed 10 billion people?

FOSC addresses one of our world's major challenges: How to feed 10 billion people by 2050. Ensuring food and nutrition security in the long-term while containing global warming within 1.5 or 2.5 °C, will require major changes on a societal-level and a systemic transformation of our food systems. Important aspects to acknowledge in this are:

- current patterns of food consumption and production increase pressure on already scarce natural resources;
- climate change undermines food systems and reduces food security;
- environmental degradation puts additional pressure on food production
- consumer behaviour patterns favour the predominantly short term vision of food systems; and
- availability of food is highly unequally distributed around the globe.

### FOSC ambition

The ambition of FOSC is to implement a range of joint activities to contribute to the creation of a strong and effective trans-national research and innovation network between Europe, Africa, and Latin America.

FOSC aims as well to contribute to the coordination and synergism between national and international research programmes that are relevant to food security under climate change.

The challenge of achieving food and nutrition security within the context of sustainable food systems calls for increased investment and collaboration. It is aspired that the partnership will increase investments in R&D&I through a coordinated regional mechanism aimed at reducing fragmentation.

### Activities of FOSC

FOSC initiates and organises additional activities to foster collaborations and enhance impact of research on food systems and climate in Europe and beyond:

- the preparation and implementation of a joint call for proposals (FOSC call 2019, 17 projects and FOSC-SUSFOOD2 joint call 2021, 5 projects);
- the deployment of innovative instruments for alignment and collaboration in R&D&I;
- a second call or alternative research funding activity for multi-actor research projects;
- capacity strengthening;
- stakeholder engagement;
- support to policy making;
- infrastructure development;
- organize trainings for researchers; and
- communication and dissemination of results emerging from activities.





## The joint project seminar

FOSC, SUSFOOD2, and CORE ORGANIC jointly organized a Joint Project Seminar in Brussels from November 16th to 17th 2022. The seminar was held in a hybrid format. This seminar is a kick-off event for the five projects funded by the SUSFOOD2-FOSC Joint Call 2021 and a midterm event for the 12 projects funded by the SUSFOOD2-CORE ORGANIC Joint Call 2019.

### Day One

Annika Fuchs from BLE, Germany, opened the seminar by giving an overview of the objectives and scopes of both joint calls. The opening presentation was followed by the first session of the seminar. Titis Apdini from Wageningen University and Research, the Netherlands, chaired this session. Three projects funded by the 2021 Joint Call pitched their objectives and plans for the next three years: IPSUS, Olive3P, and AlgaeBrew. Subsequently, three projects funded by the 2019 Joint Call shared their updates: ALL-In, Poultrynsect, and Bio4Food. Those projects focus on sustainable feed production and the use of residual biomass to reduce food loss and waste.

An interactive session was organized between the first and second sessions of the seminar. Nikola Hassan from Research Center Jülich, Germany, facilitated the interactive session on day one. The participants were grouped according to their fields of expertise. The groups of food technology, crop and animal production, and social science, including economy, sociology, and human geography, were formed. Each group reflected upon experts with whom they seldom or often interact. Afterward, the groups were shuffled into three categories: Producers, Processors, and Systemics. Participants were allowed to select the category according to their interests to discuss potential research questions.

Nikola Hasan continued chairing the second session of the seminar. Five projects funded by the 2019 Joint Call presented their updates: Mi-WINE, HO-FOOD, PROVIDE, FERBLEND, and SPiwi. Those projects study the sustainable processing of food. Mi-WINE and SPiwi projects show innovative wine processing. HO-FOOD and MILDSUSFRUIT projects observe processing techniques to ensure nutritional

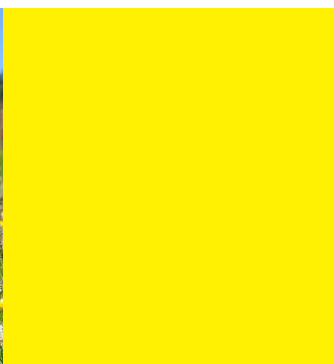
values in organic food products. PROVIDE project identifies by-products rich in nutrients for bakery.

### Day Two

The second day of the seminar began with sharing the mechanism of monitoring and communication for projects funded by the 2019 Joint Call. First, Annika Fuchs presented about the monitoring. It was followed by Marijke Hunninck from ILVO, Belgium, who explained about communication of project activities. In addition, Heather McKhann from INRAE, France, presented the FOSC Knowledge Platform. This platform aims to have a strong valorization of the knowledge generated by the FOSC-funded projects and an effective networking of researchers engaged in different projects.

Lena Krautscheid from BLE, Germany, moderated the third session of the seminar. Two projects funded by the 2021 Joint Call pitched their objectives and research plans: MedAgriFoodResilience and SmartDairy. In addition, three projects funded by the 2019 Joint Call presented their research: FOOD-DIVERSE, SysOrg, and FOODLEVERS. Those projects have a common aim of achieving sustainable and resilient food systems.

Another interactive session was chaired by Frank Hensgen from Research Center Jülich, Germany. The participants continued the discussion about potential research questions for the three categories. At the end of the discussion, every group decided on a spokesperson to present the research questions to the other two groups. The participants managed to cluster their research questions into various topics such as alternative protein, waste management, the energy crisis in food processing, and sustainable food systems.



## The 5 projects of the 2021 call

Five projects were selected for the 2021 Joint Call of SUSFOOD2 and FOSC. The projects receive funding to contribute to innovation solutions for resilient, climate-smart and sustainable food systems. The projects have starting dates from spring 2022 and will run for 3 years.

### MedAgriFoodResilience

*Socio-environmental shocks assessment and resilience empowerment in Mediterranean agri-food heritage systems*

Traditional agri-food systems developed through the centuries by local communities and are still actively supporting the livelihood of local farmers, providing solutions for climate change mitigation and adaptation as well as contributing to the preservation of agro-biodiversity, traditional knowledge and cultural identity. The project will focus on studying traditional agri-food systems in three sites (i.e. Italy, Morocco, and Algeria) applying a multidisciplinary approach to identify the possible social and environmental shocks impacting agri-food heritage systems in the Mediterranean area, linking together landscape structure, climatological studies, social role and biodiversity assessment.

### IPSUS

*Climate smart food innovation using plant and seaweed proteins from upcycled sources*

Transitioning to diets that include more sustainable sources of protein is crucial. The IPSUS project will exploit inter-disciplinary and eco-innovative approaches to explore opportunities for upcycling plant and seaweed proteins from agri-food raw materials otherwise destined to food loss and waste (FLW). Upcycling FLW of six protein-rich commodities (pumpkin, hazelnut, grape, potato, brewers' spent grain, and seaweeds) will be investigated in the UK, Italy, Romania, France, Turkey, and Morocco. Exploration of consumer behaviours, preferences and the enabling regulatory and policy environment will reveal drivers and barriers of the sustainable protein shift. Ultimately, this project will contribute towards Net Zero through linking sustainable protein shift and FLW valorisation.

### Olive3P

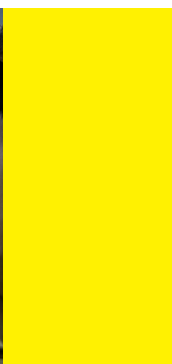
*Innovative sustainable food system for olive oil production converting solid and liquid by-products into edible yeast and biopesticide*

By-products and effluents generated by production of olive oil offer potential for valorisation. The Olive3P project aims at transforming conventional olive oil production into an integrated innovative food system through treatment of solid by-products along with treatment of olive mill effluents combined with the recovery of novel products comprising activated carbon, edible yeast, and biocontrol agents containing polyphenols. Solid by-products will be used to produce biochar, a material that can store carbon. While olive mill effluents can be applied for animal feeds. To achieve this goal, lab scale results will be transferred at a pilot scale for future commercial exploitation.

### AlgaeBrew

*Unlocking the potential of microalgae for the valorisation of brewery waste products into omega-3 rich animal feed and fertilisers*

Production of commercial Eicosapentaenoic fatty acid (EPA) that is essential for dietary supplementation for humans and animals relies on fish oil derived from wild-caught fish, thereby putting enormous strain on the fish stock and the ocean ecosystem. A group of microalgae known as Nannochloropsis produces EPA naturally and can be exploited as an alternative source of EPA. Meanwhile, beer production generates large amounts of nutrient-rich wastewater and spent grain. Algae-Brew aims to develop scalable processes that use Nannochloropsis to upgrade brewery wastewater and spent grain into high-value EPA for the feed industry. The residual Nannochloropsis biomass after EPA extraction will be developed into biofertiliser to achieve a zero-waste goal.





## SmartDairy

### *Climate-smart Dairy: Assessing Challenges, Innovations, and Solutions*

Dairy production is a significant contributor to greenhouse gas emissions. There is an urgent need to reduce emissions from this sector. The SmartDairy project aims to assess challenges, explore innovations, and create new solutions to achieve a climate-smart dairy system. Using a multi-actor, multidisciplinary approach across four European countries, the project will explore interconnections and consequences of climate smart innovations within the dairy system. The project will then use a living lab/stakeholder approach to co-design innovations in Ireland, Italy, the UK, and Finland. A clearer understanding of the functioning and acceptability of climate-smart innovations that can be implemented along the dairy supply chain can contribute to achieving a climate-neutral EU continent by 2050.



*Figure 1: Coordinators and researchers of the 5 projects funded by the SUSFOOD2-FOSC Joint Call 2021 and of the 12 projects funded by the SUSFOOD2-CORE ORGANIC Joint Call 2019.*



## FOSC midterm workshop

The Egyptian Ministry of Higher Education and Scientific Research (MHESR) organized the FOSC midterm workshop in collaboration with the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM-IAMB). The workshop was held in Cairo from November 30th to December 1st 2022. The FOSC consortium partners, funders, and project coordinators were invited. In total, 46 people attended in person and 63 people joined online. During those two days, the workshop was filled with project updates, discussions about monitoring, evaluation, and project communication, and the FOSC knowledge platform.



*Figure 2: The FOSC consortium partners, funders, and project coordinators attended the midterm workshop in person and online.*

To begin the session of project presentations, Tarek El Arabi from MHESR welcomed all project researchers and the FOSC consortium. He expressed his excitement to learn about the research activities and wished pleasant interactions for all participants at the workshop.

The first presentation was by Martine Vernooij from WUR about the Green ERA-Hub. She presented the

backgrounds, ambitions, and future plans of the GEH. The GEH is a coordination and support action funded by Horizon Europe which aims to maintain and valorize the knowledge, experience, and community built during the last 20 years of joint research programming in the field of agri-food and biotechnology. After the presentation, project researchers and funders were invited to provide input to the GEH Roadmapping process.





Eight projects presented their updates on the first day. SALAD, BLUE-CYCLING, URBANFOSC, and SAFOODS, started the session. TRUSTFARM, CLIMAQUA, ThermoK, and CHIAM, presented at the last session of the first day. Those projects presented research about saline agriculture, aquaponics, food supply chain, climate-smart agriculture to adopt drought, upcycling side-stream for fish feed, feather degradation, and integration of chia, mushroom, and pig biogas for circular agriculture.

The second day was opened by a workshop about monitoring, communication, and dissemination. Nikki de Clercq explained the scope of monitoring and the tool to submit the project's midterm report. Then, Titus Apdini from WUR, the Netherlands, presented the strategy of communication and dissemination which is important not only for monitoring but also for impactful science.

Nine projects presented their updates on the second day. SECUREFOOD2050, CRRISP, BICEPS, and NutriGreen, shared their activities in the first session. Furthermore, C4C, CREATE, PHEALING, Bio-Belief, and Sus-Agri-CC, presented their research. Those projects investigated various topics, such as the use of biochars, climate-resilient crops, traditional plants to improve farmer's income and food security, mapping climate hazards of key crops exported to Europe, and reducing post-harvest loss. Besides research activities, the session also discussed various challenges the projects faced and the possible solutions.

## Knowledge Platform

The afternoon session on the second day was allocated for a workshop about the FOSC Knowledge Platform. Initially, the FOSC consortium intended to avoid redundancy with a website-based platform, for instance, FACCE-JPI Project Wheel. Therefore, the FOSC consortium agreed that the main features of the platform would be based on a series of workshops focused on thematic areas in the FOSC remit that will gather researchers, stakeholders, and funders.

Ophélie Bonnet from INRAE, France, moderated the workshop in a hybrid format. The moderator divided the projects into two thematic groups: 1) Techniques at farm level: needs, development, adoption; 2) Value chains and food system approaches. In this session, the projects searched for common topics within their research activities and looked for synergies, and possibilities for collaboration. The session was finalized with sharing the findings and highlighting common keywords based on their different research. Potential tools to valorize their results were identified, such as videos, policy and practice briefs, and training for extension services. The output of this first workshop will feed the second workshop about the FOSC Knowledge Platform in 2023.



## The Green ERA-Hub

The Green ERA-Hub (GEH) brings together networks in the Agri-food and biotechnology sector including all relevant ERA-Nets (Cofunds), their predecessors, self-sustained networks and EJP. FOSC is one of the ERA-Nets that is part of the GEH. The GEH represents most of the relevant national funders in Europe in the Agri-Food and Biotechnology sectors. The goal of the GEH is to maintain the momentum and experience gained over the last 20 years of trans-national research programming.

Since 2003 the ERA-NETs, JPIs, and EJPs aligned national research programmes and pooled national funds for joint calls, supported by (co-funding) instruments of FP6, FP7 and H2020, with significant impact. Networks in Agri-food and biotechnology funded more than 960 trans-national research projects. In Horizon Europe, a new instrument has been launched for Partnerships. The running networks in Agri-Food and Biotechnology decided to maintain and valorise the knowledge, experience and community that has been built by them by means of forming together a Hub and have the ambition to keep supporting their thematic areas and research projects, organised calls, as well as contribute to preparations for the new Partnerships. The GEH was launched on 1 September 2022 and will run for four years.

The activities of the GEH are to:

- continue to build on previous achievements and further enhance cross-sector collaborations between Agri-Food and Biotechnology ERA-Nets, through implementation of new joint calls resulting in the funding of transnational collaborative projects;
- continue valorisation and implementation of other joint activities supporting the market, regulatory or societal uptake of results after the end of individual ERA-Nets;
- identify common research and innovation priorities, agreed upon by the participating national programmes, and address them via new joint calls;
- preserve best practice and managerial competences;
- contribute to the planning and complement the

implementation of the new HEU Partnerships and Missions

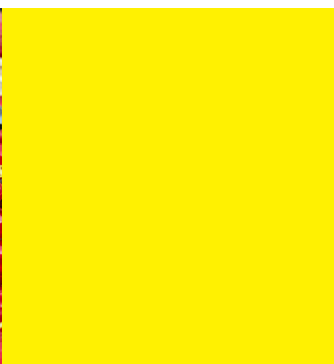
- broaden the actions and impact of initiatives towards stakeholders and in terms of geographical coverage;
- contribute to achieve the strategic goals of the SDGs, in particular zero hunger, industry innovation and infrastructure, responsible consumption and production, life on land, partnership for the goals, the Farm2Fork Strategy and EU's Green Deal.

Coordination: Research Center Jülich (FZJ), Germany.

Communications office: Institute for Agriculture, Fisheries and Food Research (EV ILVO), Belgium.



Website: <https://www.greenerahub.eu/>





## Project updates of the 2019 call

The FOSC projects of 2019 call have reached the mid-term phase. The research activities are well on track. The progress and the intermediate results of the 17 projects is presented below. New project updates are also available through the projects websites, social media channels and the FOSC social media channels.

### SALAD

*Saline Agriculture as a Strategy to Adapt to Climate Change.*

The SALAD Project has conducted many activities such as meetings, experiments, trials, attending conferences, and internship. The first physical meeting for the project partners occurred at the same time as Saline Farming Final Conference on April 5th and 6th in Groningen, the Netherlands. The experiments using rhizoslides to observe root growth for quinoa and New Zealand spinach are at a mature phase. Trials in the greenhouse and field performed by the project partners from Morocco and Egypt to observe the performances of quinoa and tomato in saline agriculture are progressing. Many students have successfully completed their research internship for the project thereby fostering knowledge exchange between students and scientist.

The project has published a report that highlights [saline agriculture initiatives in the Mediterranean and North Sea Region](#). Additionally, the project has adopted a framework for mapping innovation and scaling for saline agriculture. The second meeting for the project partners was held on October 17th at the University of Florence, Italy. At this occasion, the project organized a free webinar about saline agriculture. At the end of 2022, the project started several farmer's workshops to integrate the voices of different stakeholders into bottom-up research. The workshops are planned to continue in 2023.

All activities organized by the SALAD project are expected to produce not only academic outputs but also policy briefs, knowledge synthesis, value chain propositions, investment strategies, workshops, and recipes. In this way, the outputs can improve public acceptance and understanding of novel strategies and technologies for saline agriculture.

### BLUE-CYCLING

*Integrated aquaculture and agriculture for re-source-efficient food production.*

The BLUE-CYCLING project partners have started their experiments and modeling work. The experiments include investigations of (i) the effects of different concentrations of volatile fatty acids on the growth and physiological response of lettuce; (ii) optimization of the addition of iron via foliar fertilization; (iii) the effects of different light and nutrient solutions on lettuce growth; and (iv) the effect of partial and total replacement of fish meal with spirulina in diets for tilapia on the growth of the fish and basil. The project has built a fifty square meter of decoupled system for the experiments. Meanwhile, a pilot study has been conducted on the use of geothermal water.

The results of the modeling alternative aquaponic system designs in Indonesia and the Netherlands have been published in peer review journals. [For Indonesia](#), a brackish water system with barramundi and tomato and three freshwater systems (i.e., tilapia, rice and duckweed; tilapia and rice; tilapia and tomato) were modeled to investigate water and nutrient efficiency, and profitability. [For the Netherlands](#), a model was created to simulate a multi-loop aquaponic system stocked with Nile tilapia and lettuce or tomato. The model observes its water and nutrient use efficiency, energy use and the growing environment, in particular in the greenhouse. In addition, [the business framework of aquaponics](#) has been published containing a directory of possible considerations to plan for a viable commercial aquaponics system. The framework proposes a guide to evaluate the economic feasibility of the enterprise depending on the revenues, costs, and investments needed for the chosen system within its operations, market, and environment.



## URBANFOSC

### *Urban Food Resilience under Climate Change Challenges.*

The URBANFOSC project is currently in the phase of research design, institutional ethics approvals, and data collection. The project partners conduct data collection at various stages. The Algerian partner, University of Constantine 3, conducted a survey for household's food security and purchasing behavior, and retailer's food supply chain. They also organized a focus group with farmers in Constantine, Algeria. Despite the delay in funding, the Kenyan partner, Moi University, started preparation for household survey and ethics approval in collaboration with Vrije Universiteit Amsterdam (VUA), the Netherlands, and University of the Western Cape (UWC), South Africa. Two master students from VUA conducted master theses on land suitability for agriculture given urbanization and climate change, and land competition between field crops and flower farming in Nakuru, Kenya. French Agricultural Research Center for The International Development (CIRAD) worked with Algerian and Kenyan partners to develop farm surveys in Constantine and Nakuru.

Simultaneously, UWC conducted a learning journey focusing on the food retail corridor, early child development centers, and municipality officials in Worcester, South Africa. As a result, the spatial mapping of food and nutrition security is complete, and the food system is currently being mapped. A manuscript is in progress based on the Worcester case study to examine the role of transport and food movement. VUA completed the preliminary climate change analysis for those three case study areas in Africa. In addition, VUA has been transforming the survey data into formats for Bayesian Network Modelling. VUA is preparing an abstract to be presented at the Health & Environmental Resilience and Livability in Cities (HERL) conference in March 2023.

## SAFOODS

### *Strengthening African FOOD Systems in the face of climate change and food insecurity.*

The SAFOODS Project has initiated activities to identify the impacts of climate change on the food systems of poor urban consumers. The project focuses on food systems of fruits and vegetables, such as mangoes, tomatoes, leafy vegetables, and green beans, in Senegal and Ivory Coast. For each country, two cities are selected as case studies. Those cities are Dakar and Ziguinchor in Senegal, Abidjan and Yamoussoukro in Ivory Coast. The first step to analyzing food systems in the four cities is understanding consumer behavior, including purchase and consumption of fruits and vegetables in precarious neighborhoods. In September, the project organized focus group discussions based on participatory mapping and photography with residents of one of the most precarious neighborhoods in Ziguinchor. Participants of the focus group discussions were asked to map their food environment collectively. At the same time, some of them voluntarily took pictures of their food environment and commented on the pictures in a collective debriefing. This approach is so-called photovoice methodology. A similar approach will be conducted in the other three cities.

An analysis of mango sector and its sub-sectors (e.g., fresh export, fresh local processing) is underway in Senegal and Ivory Coast. The project applied bibliographic analysis and conducted surveys of the various actors to understand the spatiotemporal functioning of the mango sector in both countries. Actors in the mango sector participating in this study are producers, trackers, millers, intermediaries, transporters, wholesalers, and exporters. In addition, this analysis aims to pinpoint the fragility of the mango sector due to climate change.

## TRUSTFARM

### *Towards Resilient and sUSTainable integrated agro-ecosystems Through appropriate climate-smart FARMing practices.*

The TRUSTFARM Project started with the kick-off meeting that took place online on July 1st 2021. Since then, several online meetings and one hybrid meeting have been organized. Through these





meetings, the project consortium established an overview of a work plan for the coming months. The project partners have been performing the intervention in the five case study countries: Italy, France, Egypt, Morocco, and Senegal. The project investigated grain varieties tolerant to heat and disease. The other interventions are effective irrigation strategy, the use of vermicompost made by a mix of vegetative and animal waste as an alternative to chemical fertilizers. The project begins to see preliminary results after one year of implementing the proposed interventions.

In Italy, research showed that quinoa and sorghum are more tolerant to drought and salinity than traditional crops. The research conducted in the French case study finds opportunities to improve the nitrogen flow in a sheep farm by increasing legume for sheep feed and using manure for compost. In the case of Egypt, best irrigation strategies combined with drought-tolerant maize potentially reduced water consumption and increased yield. In addition, compost made of animal and crop waste could replace chemical fertilizer by 25%. In Morocco, the researchers identified a drought-tolerant oat and durum wheat. The study in Senegal focused on groundnut and cowpea. The Senegalese researchers found that locally cultivated groundnut was not quite resilient to drought. They are working on the selection of new varieties to adopt drought. Meanwhile, different cowpea varieties resulted in similar yields.

For the next phase, there are several activities planned, including: continuing to design farming agro-ecosystems based on conservation principles of and moving towards a circular economy. In addition, they are planning to conduct Life Cycle Assessment to understand the optimal use of agricultural inputs. They also aim to explore further involvement of the stakeholders in upcoming activities. Last but not least, the project partners are motivated to develop a business model and capacity building for farmers to implement their results.

## CLIMAQUA

*Establishing an innovative and transnational feed production approach for reduced climate impact of the aquaculture sector and future food supply.*

The CLIMAQUA Project has begun the development of feed production technologies based on the alga cultivation in the areas of aquaculture and fish processing. The algal biomass can treat low-value side streams and recycle nutrients from inorganic and organic wastewater, sludge, and fish residues from aquaculture and fish processing to generate feed. *Athrospira platensis* and *Galdieria sulphuraria* are selected alga to carry on the development. During the first year of the project, the cultivations of *A. platensis* and *G. sulphuraria* under heterotrophic conditions (i.e. alga use organic carbon source in the absence of light) were tested in side- and waste-streams. To do so, the project team prepared residue extracts from fish processing and sludge. The sludge consisted of unused feeds and feces. During the experiment, the streams were observed for their ability to provide nutrients for the cultivation of both alga. The results show that *A. platensis* inefficiently used organic nitrogen compounds from the tested stream. In contrast, *G. sulphuraria* utilized the tested stream well.

Data collected by the project so far will be used to upscale the cultivation of alga to produce feed for salmon. The effect of the feeds on salmon will be observed in the upcoming trials. Moreover, Life Cycle Assessment will be carried out to assess the environmental impact. The project plans to observe the cultivation of alga under photoautotrophic conditions (i.e. alga rely on light energy to perform photosynthesis). Therefore, they can provide insight into the effect of cultivation on greenhouse gas emissions from aquaculture under different climatic conditions. Ultimately, the approach taken by CLIMAQUA can contribute to regional development and reduction of greenhouse gas emissions.



## ThermoK

### *Thermophilic breakdown of keratin-laden biomass waste*

Different partners of the ThermoK project have been carrying out the activities according to the plan. University of Bergen (UoB) in Norway evaluated feather-degrading capability of *Fervidobacterium* species and strains. Out of 14 tested strains, seven were identified as highly active feather-degraders at 65-70°C. The French Alternative Energies and Atomic Energy Commission (CEA) in France conducted transcriptomics and proteomics analyses for *Fervidobacterium pennivorans* strain T grown in mineral medium supplemented with feather or glucose as sole carbon and energy sources. This activity has led to the identification of a number of genes that are upregulated during growth on feather which could play key roles in the breakdown process. In addition, CEA identified several proteases being secreted during growth of feather that provides candidate of keratinases to target for biochemical and structural analyses. University of Exeter (UoE) in England has successfully expressed various enzymes that have been identified from a thermophilic genome and metagenome DNA database. University of Free State (UFS) in South Africa has expressed and purified three different peptidases shown to be upregulated during growth on feathers. The project partners are conducting biochemical and structural analyses of additional enzyme candidates and keratinolytic bacterial strains. A post-doctoral researcher and a PhD student from UFS have visited UoE to create knowledge exchange between Africa and Europe. Thus far, results from the project activities allow identification of key factors for biological hydrolysis of feather keratin and initiate in-depth studies to understand the process. A good level of degradation can improve utilization of previously-discarded nutrients in feather for animal feeds and bio-fertilizers.

## CHIAM

### *Integrated CHIA and oyster Mushroom system for Sustainable food value chain in Africa*

The CHIAM Project organized a kick-off meeting on

November 16th 2021. Since then, many activities have been carried out by the project partners. The Algerian partner, Centre de Recherche Scientifique et Technique sur les Régions Arides (CRSTRA), focuses on chia cultivation and chemical characterization of chia seeds. CRSTRA gathers information about optimal conditions for chia seeds cultivation in six different sites from the east (Touggourt, El Outaya, M'Sila) to the west (Bechar, Naama, Sidi Belabbas) of Algeria. Those sites represent different climatic conditions that are beneficial to study the effect of climate on yield, nutritional value, chemical composition, and biological properties of chia seeds. In addition, a smart irrigation system has been installed for chia seeds cultivation. Simultaneously, the Kenyan partner, Deden Kimathi University of Technology, has established a chia demo farm to support research activities and farmer's capacity building. Another Kenyan Partner, Keyrio Farm, grows oyster mushroom. The two Kenyan partners have managed to execute their tasks despite funding delays.

In the case of oyster mushroom production, the Hungarian partners, Pilze-Nagy Kft., performed tasks to assess the cultivation technique and market possibilities of oyster mushroom in Kenya. This partner designed an automatic substrate production system that can be placed in a small container and provides high production security based on agricultural by-products of small Kenyan farms. The agricultural by-products are rice straw, banana leaves, corn stalks, corn leaves, elephant grass, and including chia seed hull. They are potential biomass to grow oyster mushroom. Another Hungarian partner, Bay Zoltan Nonprofit Ltd. for Applied Research, evaluates the suitability of these biomass for oyster mushroom cultivation. Furthermore, the German partner, University of Hohenheim, has started the fortification of maize gruel as the staple food in Kenya with chia and oyster mushroom. The fortification is expected to improve its protein, dietary fiber, mineral contents.





## SECUREFOOD2050

*Improving resilience and food security in 2050 climate through soilless precise agricultural techniques and irrigation with wastewater properly treated by innovative technologies to ensure food safety*

The SECUREFOOD2050 Project held a kick-off meeting on September 13th and 14th 2021. The project has developed a [webpage](#) to promote the activities. Some activities have been carried out by the project partners in Italy (i.e., University of Florence and University of Turin) and Morocco (i.e. University of Cadi Ayyad) to study biochar, charcoal made of plant material, and dissemination of research results. Production and characterization of biochar were done for wastewater treatment and agriculture. Specifically for agriculture, the biochar is made from woody waste and tested for the cultivation of strawberry, tomato, and olive.

Furthermore, the project has been developing analytical methods to determine polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and their nitro-derivatives (e.g. NO<sub>2</sub>-PAH) compounds in tomato, olive, and rocket. This method is vital to ensure the level of those compounds within the food safety standard. The project has published [a scientific article](#) about the optimization and validation of methods to determine PAHs and PCBs in olive fruits irrigated with treated wastewater. The optimization of a method to assess PAH nitro derivatives in tomatoes is ongoing. In addition, the project has published an article in the newsletter of University of Florence and participated in the “Meeting of Separation Science 2022” on November 17th and 18th 2022, which allowed a female young scientist from one of the project partners to present the optimized method to determine PAHs, PCBs, and NO<sub>2</sub>-PAH in tomato.

## CRRIsP

*Climate Resilient and Responsible Innovations in Potato*

The starting point of the CRRIsP project was postponed due to the COVID-19 restriction and delay

in funding for the Kenyan partner, Kenya Agricultural and Livestock Research Organization (KALRO). Nonetheless, the project held a kick-off workshop in November 2021. During this workshop, the project consortium selected promising technologies to be tested and determined respective participation of relevant stakeholders.

KALRO and the Agriculture and Food Development Authority (TEAGASC), Ireland, perform a genetic selection of potato parental lines, analysis of past performance and phenotyping data. These activities aim to establish a climate-resilient potatoes for smallholder farming conditions in East Africa. The South African partner, University of Johannesburg, and the German partner, Bingen Technical University of Applied Science, have established cooperation with the local extension services to conduct field trials on drought-tolerant potatoes and water saving practices. These trials show that potato yield for different varieties increased from 15% to 250% due to irrigation, compared to potatoes cultivated in a rainfed system. This result helps the identification of drought-tolerant potatoes. A long dry phase and high temperature in Germany this year enabled the spread of heat-loving diseases that caused premature death of some potato varieties. Surprisingly, there were potatoes that are somewhat tolerant to those diseases.

The project also observed the effect of mulching on potatoes. Potatoes covered with alfalfa-hay mulch significantly showed fewer symptoms and less water stress than potatoes without mulch. As a result, the potato yield increased from 20% to 40% compared to the yield of potato without mulch. However, mulching with alfalfa-hay did not increase the yield of potatoes in South Africa. The project will continue the trials for two more seasons to identify potential practices to adapt climate change. The South African partner and the Dutch partner, Wageningen University and Research, started investigating perceptions of potato industries about the impact of climate change and required measures to face the impact.



## BICEPS

*Biochar Integration in Small-Holder Cropping Systems –Economy, Food Product Value Chains, Climate Change Resilience and Soil Fertility*

Research planned by the BICEPS project heavily depends on interaction with smallholder farmers to conduct on-farm field experimentation. The restriction due to COVID-19 pandemic caused a delay in the initial phase of the project. Currently, the project is having an intensive interaction phase with the farmers and data collection in field experiments. The project has successfully organized participatory workshops in two different locations in Kenya. The first workshop was held in April this year in Kwale, a district on the southern coast of Kenya. Forty farmers attended the first workshop. The second workshop was organized in Embu, central Kenya, five months later. Fifty farmers participated the second workshop. During the workshops, the farmers learned a simple and efficient technology for biochar production and jointly discussed the plan for research activities. In addition, the establishment of two on-farm experiments with field-testing of the biochar made was done. Coconut shell and cob were used to make biochar due to their abundant availability in Kenya. In November, the project organized a similar workshop in Okhalamba, South Africa. Through this workshop, the third experimental site was established.

The experiments investigate the effect of biochar on the cultivation of maize indicated by maize yield. In addition, the experiments aim to understand the interaction of biochar with the nitrogen cycle and the effect of biochar on water availability. Data from samples in the first season of the experiment in Kwale are under analysis. The data will be used to assess the economic feasibility of biochar integration in different agricultural contexts. Furthermore, Life Cycle Analysis will be performed to evaluate biochar's role as a mitigation strategy. In the near future, the project will assess the potential of other agricultural leftovers to produce biochar and integrate biochar to grow legumes.

## NutriGreen

*Promoting Green Nutrition for the Sahel region*

The NutriGreen project started in June 2021. The official kick-off event of the project occurred in Zitenga, Burkina Faso. The first joint activity of the project was organizing an online dialogue entitled “Transformative Sustainable Agri-Food Systems for Sustainable Diets with Traditional Plants” in July 2021. During this event, the project conducted a co-research-guided consultation process in which farmers could select the traditional plants for the project activities. At the end of 2021, ten farmers in Burkina Faso have been collecting daily weather data (i.e., rainfall and temperature) and sharing their data with other farmers during the facilitated meetings to discuss the consequences of their production decisions. The same activity was done by two farmers in Senegal at the beginning of 2022.

The project conducted interviews and surveys in 210 households in Burkina Faso and 204 households in Senegal from March to April 2022. The interviews and surveys aimed to understand the living conditions of the households and disclose current farming practices, activities, and decisions. In April 2022, the project established a climate field school to train agroecological practices of baobab and moringa for women farmers in Burkina Faso. By the end of 2022, two PhD students from University Ouagadougou in Burkina Faso and Cheikh Anta Diop University of Dakar, Senegal, visited Sweden. The experiences from visiting Sweden will support them in organising their PhD research regarding a thorough value-chain analysis of traditional plants in their corresponding countries. The project has started the plans to develop value chain survey and living labs early next year in Burkina Faso and Senegal.





## C4C

*CropsForChange; Tackling the global warming effects in crops*

The C4C project has commenced breeding programs for heat-and-drought resilient crops. The project studies barley, rice, wheat, and eggplant. Some activities are undertaken by the project partners. Stellenbosch University in South Africa has been collaborating with University of Milan (UNIMI) and Research Center for Genomics and Bioinformatics (CREA) in Italy to optimize a method using enzyme linked immunosorbent assay to study barley, rice, and eggplant cell wall modification caused by drought. Simultaneously, UNIMI has identified genes involved in rice and barley seeds to respond heat and drought stresses. UNIMI, with the support from University of Kasdi Merbah Ouargla (UKMO) in Algeria, also identified similar genes in wheat. UNIMI obtained CAS9-mutants for the rice gene Late Embryogenesis Abundant protein which is involved in response to abiotic stress (i.e. drought, heat, and water stresses). Furthermore, UKMO has started characterization for salt and drought stresses in four local varieties of durum wheat. This activity consists in wheat germination, growing plantlets in pots, and ultimately growing wheat in the field.

Specifically for eggplant, CREA has developed a protocol to evaluate eggplant under water-deficit stress in controlled environmental conditions. Meanwhile, Bati Akdeniz Agricultural Research Institute (BATEM) in Turkey performed a study to test the effect of water stress on the second and third generations of a hybrid between *Solanum melongena* and *Solanum insanum* that were selected because of their contrasting response to the stress. Hence, the activity will produce the highly tolerant and susceptible eggplants. Two field experiments to observe response of several eggplant genotypes to water stress have been conducted by Université Mohammed Premier (UMP) in Morocco. UMP will observe the eggplants under the normal irrigation rate compared to half of the normal irrigation rate.

## CREATE

*Cross-Border Climate Vulnerabilities and Remote Impacts of Food Systems of the EU, Turkey and Africa: Trade, Climate Risk and Adaptation*

Since the CREATE project officially started on September 1st 2021, several activities have been completed. Six online meetings and one face-to-face meeting were organized. The project has created [the website](#) and social media account to disseminate its activities. The kick-off meeting was held on June 21st 2022 in Ankara. Different work packages within the project have identified climate risk assessments for the selected key crops from exporting countries (Turkey, Morocco, and Egypt) to importing country (e.g. the Netherlands). The key crops for the projects are grapes, hazelnuts, apricots, figs, potatoes, oranges, and tangerines. The project has presented the preliminary results at four conferences. The research entitled “Cross-Border Climate Vulnerabilities of Agri-Food Trade Systems: Turkey – Europe – Africa” was presented at the International Conference of Food, Agriculture, and Veterinary Sciences on May 27th and 28th 2022. The other studies about the water footprint of different products have been presented at three conferences: 1. Organic production and water footprint of grape in Gediz river basin; 2. An evaluation of water footprint of bread wastes in Turkey; 3. Water footprint of apricot production: a key exported crop in Turkey. In addition, the project has successfully mapped a climate hazard index for some key crops using different climatic scenarios.



## PHEALING

### *Post Harvest losses mitigation by improved plant healing*

The PHEALING project organized a kick-off meeting on October 21st 2021. The kick-off meeting was followed by a meeting with the industrial collaborator on February 11th 2022, and the first annual meeting on June 22nd 2022. These meetings have helped to foster tasks for the initial phase of the project performed by different working packages. The characterization of suberin biosynthesis pathways (i.e., suberization) in the model crop species is performed by KU Leuven in Belgium, University of Bonn in Germany, and University of Nairobi in Kenya. Suberin is synthesized by plants for protection, for example, when plants get wounded. The model crop species for the characterization of suberization are cassava, tomato, and potato. The characterization of suberization aims to identify genetic diversity for plant healing in selected cassava cultivars, develop methods for quantification of suberin in model crop species, and analyze the conducive conditions for suberization in cassava and potato.

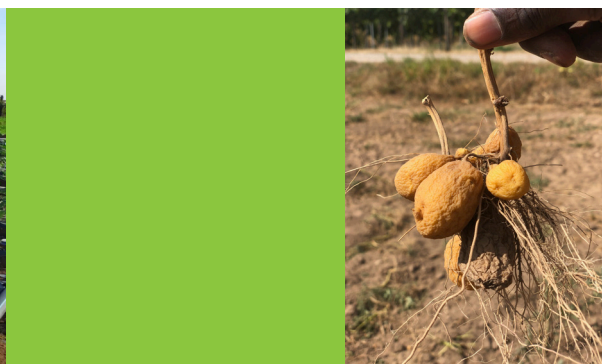
Simultaneously, a survey of cassava farms and small processing factories has been initiated by South Eastern Kenya University. The project will use the survey to identify current methods to mitigate post-harvest physiological deterioration and secondary microbial decay that can alter edibility and palatability of cassava. Changes in edibility and palatability are unfavorable for tapioca production and lead to cassava loss. In the case of tomato and potato, the project investigates the potential of lytic bacteriophages as a biocontrol to reduce post-harvest losses in tomatoes and potatoes. This research is carried out by University of Kwazulu-Natal in South Africa.

## BIO-BELIEF

### *BIOfortification of common Bean to promote healthy diet and Food security in a context of climatic variation*

The BIO-BELIEF project started in June 2021 and has been initiating research activities. The project has included 14 commercial bean lines for the experiments conducted by different project partners. Council for Agricultural Research and Agricultural Economy Analysis (CREA) in Italy and Pretoria University in South Africa carried out the multiplication of bean seeds and the first extensive phenotypic and yield analysis. The phenotypic analysis aims to characterize the genetic background of the low phytic acid that can affect hard-to-cook defect and bio-accessibility of beta-carotene in beans. The Institute of Agricultural Biology and Biotechnology of National Research Council (CNR-IBBA) in Italy has prepared gene editing for regulators of drought response in beans. Simultaneously, a set-up of field trials in Italy and South Africa was done to test the drought resilience of different bean lines and evaluate bean seeds quality. Center for Cardiovascular and Nutrition Research of Aix Marseille University (C2VN-AMU) in France and CREA have been conducting a study to observe the cooking time and measure the antinutrients of beans.

The project has produced two scientific publications. [The first publication](#) was a review article to explore the state of art in developing drought-resistant beans and the contribution of common beans to food, nutrient security, and health. [The second publication](#) was a perspective paper about current advances in mutant bean characterization and the potential use of these mutant beans in innovative foods. The project has presented the work at four international conferences. In addition to dissemination for the scientific community, the project has created social media accounts on Facebook, Twitter, and LinkedIn to share its activities.





## Sus-Agri-CC

*Innovative biofertilizers boosting yield of cereals and horticultural crops under global climate change: Toward Sustainability of Agricultural systems against the Climate Change in arid zones*

Since the start of Sus-Agri-CC project in September 2021, two meetings have been held in October 2021 and May 2022. These two meetings helped the project partners to pave a direction for research activities. In the initial research phase, the project selected cereal (i.e., wheat, quinoa, and maize) and vegetable (i.e., tomato and lettuce) crops, bio-stimulants, and compost in Morocco, Germany, and Turkey. Bio-stimulants refer to microorganism that contribute to plant growth, such as growth-promoting rhizobacteria (PGPR) and arbuscular mycorrhizal fungi (AMF).

The research aims to observe the effect of bio-stimulants and compost on crop growth under salinity and drought. Different partners within the project have been doing tasks according to their working packages, from identifying selected strains of PGPR and preparing compost, to assessing bio-stimulants and compost on the yield and quality of selected crops. As a result, the project began to see a positive preliminary result that indicated improvement in crop tolerance to high salinity and drought due to the application of PGPR, AMF, and compost. The project will follow up the research to perform molecular identification of new PGPR and AMF strains in Morocco and decipher pathway of the bio-stimulants in crops growth. The project also plans to include a wider range of crops in different locations to understand stress because of salinity and to observe the potential to reduce water use without compromising crop quality. Eventually, the project will use data collected to develop a predictive model for the crops.



## Introducing the FOSC partners

The FOSC Partnership is a dedicated collaboration on Food Systems and Climate spanning three continents. For this newsletter, Titis Apdini interviews some of our partners. We present their ideas about FOSC by asking them questions about their motivation to join FOSC, their hopes for FOSC and the important themes and needs regarding Food Systems in their country. In this edition we give the floor to: CIHEAM-IAMB, MASAF (previously MIPAAF) and MESRSI.

### CIHEAM-IAMB

The Mediterranean Agronomic Institute of Bari (CIHEAM-IAMB) in Italy is a consortium partner in FOSC and contributes to additional activities as part of Work Package (WP) 6 (Additional Activities). CIHEAM-IAMB is co-leading the organization of the FOSC mid-term meeting and researchers' training. We speak with Maroun El Moujabber about CIHEAM-IAMB, the Mediterranean food systems, and the experience of CIHEAM-IAMB in performing tasks for FOSC.

*Can you tell us a bit about CIHEAM-IAMB?*

CIHEAM-IAMB is specialized in knowledge transfer regarding water management, integrated pest management, organic agriculture, and coastal area management. Having 60 years of experience, CIHEAM-IAMB not only focuses on the Mediterranean but also brings the best practices in the Mediterranean to other regions, for example, the Balkan, Pakistan, Syria, and Kenya.

*The work done by CIHEAM-IAMB related to agricultural practices in the Mediterranean is important for food systems. What do you think about the Mediterranean food systems?*

The Mediterranean constantly struggles to produce food because of the low resources and severe environmental conditions. Nowadays, rising energy prices add a challenge to food production. Meanwhile, food production also puts pressure on the environment. Lack of access to food and energy can lead to economic crises and social instabilities. Due to the COVID-19 pandemic and war in Ukraine, people have started thinking about sustainable food

systems. Resilience, low environmental impact, and a healthy diet become important aspects of food systems. Besides the challenges in food production, the Mediterranean offers an opportunity to set an example of a sustainable diet. The Mediterranean diet has been recognized by UNESCO as a non-tangible heritage and is promoted as a good model of a healthy diet with low environmental impact. In addition, the Mediterranean people value food frugality as an action contributing to lessen food waste.

*What does motivate CIHEAM-IAMB to join FOSC?*

Before FOSC, we participated in ERANETMED and LEAP-Agri. The experiences in those networks motivate us to continue fostering dialogue and synergies between different parties to transfer knowledge and conduct research. Thereby, we see the potential in FOSC.

Speaking about the potential in FOSC, Maroun shared his thoughts about FOSC and its funded projects. He considered FOSC as a *rodage*, a technique to run in an engine. The FOSC consortium and project partners consist of organizations from North Europe to South Africa. This diversity reflects not only collaboration between Global North and South but also South and South cooperation. Therefore, FOSC has a potential to run in collaboration between different parties to fine-tune approaches and acquire funding for improvement of food systems.

*Can you share your experiences in performing task for WP 6 of FOSC?*

As a training institute, CIHEAM-IAMB has the capacity and capability to train researchers. The FOSC





consortium partners see the relevance in valorising research results beyond scientific publication. For instance, training in writing policy briefs and creating a business model can be potential additional activities. To organize the training, a delay in funding may be a hurdle for the preparation. Nonetheless, Maroun is optimistic that funding won't be a major difficulty because the partners are willing to work together.

### MASAF

The Italian Ministry of Agriculture, Food Sovereignty and Forestry (MASAF) is a consortium partner in FOSC, it contributes to Work Package (WP) 3 (Evaluation and Proposal Selection) and is WP leader in WP 6 (Additional Activities). We speak with Stefano Grando about food systems in Italy and the experiences in FOSC.

*What challenges in food systems will Italy face in the future?*

The overall challenge is pursuing a more socio-economically and ecologically sustainable agro-food systems development. Recently, we put special attention to the vulnerability of food systems vis-à-vis shocks that are getting more extreme and frequent because of climatic events, pandemics, and geopolitical crises. In relation to this, we also face the challenge of an ongoing depopulation in mountain and remote areas. Last but not least, challenges exist to grant rights and income opportunities to individual farmers and agricultural workforce, including migrants.

*What does Italy need to overcome those challenges?*

It is necessary to preserve territory-based agro-food chains with high added value and promote rural development processes that can safeguard historical landscapes and valorise ecosystem services. In this view, we need more research and innovation (R&I) using a system approach to address relevant challenges that are both thematically and geographically

characterised, with a stronger collaboration at EU and global level. Moreover, Italy needs to implement a "triple helix" strategy: a constant dialogue among science, policy, and society. Besides, the structural policies, economic, and regulatory decisions must be in synergy with R&I policies and findings to support the transition towards more sustainable food systems based on the full exploitation of research results.

Since collaboration is crucial to face challenges in food systems, Stefano sees the potential in FOSC as a frontline of policy coordination action. Moreover, FOSC is one of the main initiatives that offer an opportunity to deepen cooperation between different countries at the policy and scientific levels in the agro-food remit. Therefore, MIPAAF is highly motivated to join FOSC.

The funding opportunities offered by MIPAAF have been positively received by Italian researchers, in terms of interest and capacity to submit high-level proposals. As a result, Italian researchers successfully acquired funds for various research projects. Stefano underlines that those projects can increase capacity in selecting, improving, and promoting practices to cope with the effects of climate change on Italian food systems. These projects will also be able to trigger an exchange of information and skills needed to upscale the impacts. Additionally, Stefano argues that the projects are a cradle to enhance cooperation among the Mediterranean countries, and beyond.

*What are your experiences with performing tasks for FOSC?*

We have positive and constructive collaboration in WP6 with our partners, with whom we had already collaborated in the previous initiatives. The work for the 2021 Joint Call with SUSFOOD2 gave us the opportunity for fruitful cooperation to further enlarge the already broad and systemic vision of FOSC. Moreover, the work carried out by WUR for Task 6.1



gave us a map of the existing initiatives for research coordination in the FOSC remit, which are often not fully valorised and connected. Yet, room for improvement is available. Now, we are working on the ideas planned under the umbrella of the knowledge platform (Task 6.4) and the training activities (Task 6.5).

Stefano continued that carrying out an initiative within the sphere of food systems like FOSC can be complex in a rapidly changing context (i.e., different actions and tools, many interconnected themes and priorities). At the same time, it is an exciting path, as it is part of the current evolution towards new policy configurations, such as the Partnership and Mission approaches of Horizon Europe. MIPAAF aims to be present in all initiatives where research on agricultural, rural, and food themes interfaces with the main environmental and socio-economic challenges of these times.

### MESRSI

Since 2020, the Ministry of Higher Education, Scientific Research, and Innovation (MESRSI) of the Kingdom of Morocco have officially become a consortium partner in FOSC. MESRSI contributes to Work Package 6 (Additional Activities). We speak with Anas Chokairi and Abdelouahid Ezzarfi about Moroccan food systems, agricultural and food systems research in Morocco, and the experiences in FOSC.

*What challenges in food systems will Morocco face in the future?*

Climate change represents the most important challenge in Moroccan food systems. The frequency of droughts, rising temperatures, and extreme weather events greatly disrupt agricultural yields, including fodder and pasture availability for livestock. Meanwhile, water resources are under enormous pressure because of recurrent drought, population growth, the extension of irrigated areas, and industrial development.

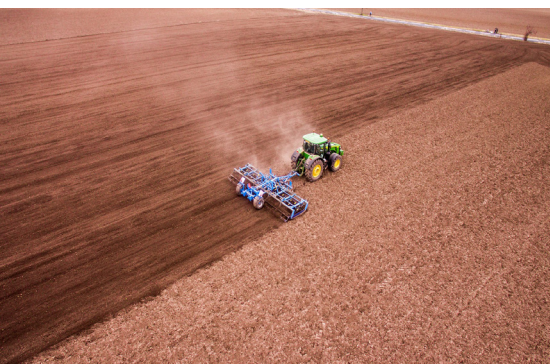
*What does Morocco need to overcome those challenges?*

Scientific research is crucial for climate change adaptation in agriculture. For example, creating drought-tolerant varieties, optimizing irrigation to strictly meet crops needs, developing integrated management against emerging pests, and conservation agriculture are highly relevant strategies for climate change adaptation in Morocco.

*Having mentioned the importance of scientific research, can you give insight into agricultural and food systems research in Morocco?*

Agriculture is considered one of the national research priorities. Morocco has launched the new agricultural strategy named “Generation Green 2020-2030”. This strategy represents a new vision within the “Green Morocco Plan” framework that mainly aims to develop agricultural production and supply chains to meet the national food demand and increase exports and investments. Subsequently, Generation Green 2020-2030 focuses on capacity building for farmers to improve their social and economic status. One of the action plans for Generation Green 2020-2030 is allocating one million hectares for direct sowing in 2030. Scientific research must support this program by optimizing technical management of the crops under direct sowing including adapted varieties, fertilization strategies, and approaches to control weeds.

MESRSI supports Generation Green 2020-2030 by providing grants both for national and international research programmes. We understand the importance of international collaboration based on our experiences in research initiatives funded by Horizon 2020 such as PRIMA, CORE ORGANIC, ARIMNET, and ERANETMED. These initiatives allow sharing of experiences among different countries. Following the announcement of the 2019 FOSC Joint Call, we realised that the objective of FOSC is aligned with the priority of the research agenda in Morocco.



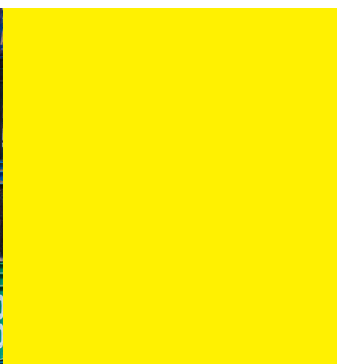


*What do you think about the FOSC projects participated by Moroccan researchers?*

Moroccan researchers enthusiastically proposed interesting research ideas. They have experiences in calls funded by Horizon 2020 such as PRIMA (Partnership for Research and Innovation in the Mediterranean Area). Therefore, Moroccan researchers successfully acquired funding from both FOSC Joint Calls.

The funded projects fit perfectly with the strategy included in Generation Green 2020-2030 and contribute very well to the achievement of the United Nations 2030 Sustainable Development Goals. Hence, Morocco must take advantage of the results obtained from these projects. It is also necessary to learn the experiences of other countries for further improvement of agricultural and food systems research in Morocco. Additionally, the results obtained in the calls of projects encouraged us to participate as a FOSC project partner when the FOSC coordinator asked us to join the consortium on the halfway and contribute specifically to Work Package 6 in organizing trainings for researchers.

Ultimately, they consider FOSC as a pathway for Moroccan researchers to work with their counterparts that enable technology for the resilience of Moroccan agriculture. Resources must be allocated to broaden topics and increase the number of funded projects. In the near future, it is essential to support research initiatives with innovative projects involving the private sectors.





# FOSC

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