



SusCrop – ERA-NET

Cofund on Sustainable Crop Production

FACCEJPI

SusCrop is an ERA-Net Cofund Action under H2020, which aims to strengthen the European Research Area (ERA) in the field of “Sustainable Crop production” through enhanced cooperation and coordination of different national and regional research programmes.

To meet the SusCrop objectives, among others, a **first joint transnational call** (co-funded by the EC) was implemented **in 2018**. The aim of this call was to support scientifically excellent transnational research, development and innovation projects that contribute to the improvement of sustainability and resilience of crop production. The EU and 18 countries, both from inside and outside the EU, funded 13 consortia for a total amount of approximately €16 M.

The output, outcomes and impact of these projects as well as the perceived gaps and identified opportunities for future transnational research are summarised below.

Projects	Crop	I	II	III	IV
AC/DC-weeds	Perennial weeds		✓		
BARISTA	Barley	✓			
DIFFUGAT	Potato	✓			
LegumeGap	Soybean and Faba bean			✓	✓
NETFIB	Nettle (<i>Urtica dioica</i>)			✓	
potatoMETAbiome	Potato	✓	✓	✓	✓
ProFaba	Faba bean	✓	✓		✓
PROSTRIG	Maize	✓			✓
ROOT	Tomato	✓	✓		✓
RYE-SUS	Rye	✓	✓	✓	
SOLNUE	Tomato and Eggplant			✓	
SUSCAP	Wheat	✓		✓	
WheatSustain	Wheat	✓			
Total	13	9	5	6	5

Topic I. Enhancement of predictive breeding technologies and development of new genotypes leading to new phenotypes and crop varieties for improvement of plant health, protection, production and resilience

Topic III. Improvement of resource-use efficiency of crops and cropping systems

Topic II. Development and exploitation of novel integrated pest and crop management methods and practices

Topic IV. Systemic research on agricultural crops as part of an ecosystem including interactions between plants and other organisms (“the plant as a meta-organism”)

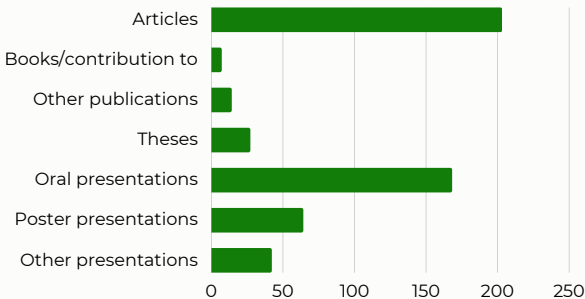
MULTIDISCIPLINARY RESEARCH

The **13 co-funded projects** combined various disciplines, visualised in the word cloud, to properly address at least one of the **topics** mentioned on the previous page.



ACADEMIC OUTPUT AND SUCCESSFUL SCIENTIFIC COLLABORATIONS

By the end of the projects' runtime, the 13 consortia had generated **203 scientific articles** in peer-reviewed international journals. Other publications include articles in magazines or data repositories. A total of **27 theses** were supported, and **168 oral presentations** as well as **64 poster presentations** were given at (inter)national scientific conferences. Other events were organised as online symposia.



The successful collaborations served as the basis for new grant applications. Partners from six of the 13 consortia were already able to obtain new funding to continue their research.

CAPACITY BUILDING

Over 500 persons were paid as 'existing employees' through the 13 SusCrop co-funded projects, being mainly experienced scientists or technical personnel. In addition, 167 persons were newly hired for the projects. In this way, SusCrop fostered economic impact by the creation of new positions to implement the research activities. Furthermore, SusCrop contributed to education and training by employing 128 PhD and Master's students.



>500
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DIFFUGAT produced a novel breeding method for **potato**. This technology **allows stacking of disease and pest resistance genes for increased resilience** and is being disseminated to commercial breeders. **Breeding for sustainable production**

Similarly, **SOLNUE** developed for **tomato and eggplant** pre-breeding lines with **high nitrogen use efficiency (NUE)**. **WheatSustain** developed an **innovative data harmonisation tool** that facilitated the combination of partial datasets of **wheat** genotype to phenotype information. This has been **actively used by breeding companies**. **BARISTA** developed a **genomic prediction model** to predict crop performance in different climatic conditions. **Barley breeders are currently using** this model in combination with new genetic material in order to accelerate the production of new varieties adapted to various conditions.

The methodologically focused project **PROSTRIG** aimed to develop novel **maize genotypes with altered strigalactone activity**. Commercial exploitation was not expected but proof of concept was anticipated to be taken up by other laboratories. In contrast, **RYE-SUS** delivered **two new semi-dwarf rye varieties** and **applied to the German Federal Plant Variety Office** for national listing as the first semi-dwarf P-type CMS hybrids.

Management practices

SUSCAP employed a **combination of crop modelling and interaction with farmers** which identified four major adaptation strategies (sowing time, soil management, irrigation and genotype selection). Similarly, **LegumeGap** combined **ground-truth model outputs and farmer surveys** to improve **faba bean and soybean** production in Spain, France and Germany. Outputs from **ProFaba** complemented this work by characterisation of a large germplasm collection of faba bean that revealed great potential for **exploiting the genetic diversity** that exists throughout Europe.

Although attempts to develop sustainable cropping practices for **nettle** with farmers were mixed, in **NETFIB**, a new, **commercialisable method for extracting the fibres** was developed along with 2 technologies for the use of the fibres in composites.

AC/DC-weeds (investigating methods to control creeping **thistle**), **ROOT** (investigating variations in root system architecture in **tomato**) and **PotatoMETAbiome** (investigating interactions of **potato** roots and rhizosphere organisms) had **longer-term sustainability objectives** with limited opportunities for immediate exploitation of the results.



STAKEHOLDER ENGAGEMENT, POLICY RELEVANCE AND IMPACT ON SOCIETY

The projects, as shown in the word cloud, are relevant to and engaged directly with a wide range of target groups. Most interaction took place with farmers, however, some consortia also engaged with industrial partners such as biomass producers and technology providers. Policy makers were engaged mainly by informing them about the projects and its (potential) results. Although only few projects interacted intensively with policy makers, all indicated via a questionnaire that the DG Agri Strategy on Agriculture R&I and CAP2020+ are frameworks of major relevance for their project output, followed by the SDG 12 (Responsible consumption and production), Food 2030, SDG 13 (Climate action), SDG 2 (Zero hunger), and the European Green Deal with a focus on waste reduction under the Farm to Fork Strategy.



FUTURE OF SUSTAINABLE CROP BREEDING AND MANAGEMENT

Future calls should request a **foresight** into how the results might be **practically implemented** in breeding programs or integrated into business, with a **route to market**. To support this, stakeholder engagement should be intensified and clearly stated in the initial proposal. Furthermore, it would be extremely relevant to include a call re-assessment 3 to 5 years after the project ends to determine the extent of implementation. To support this, **stakeholder engagement** should be intensified and clearly stated in the initial proposal. New crop research, based on the outputs generated within SusCrop, will enhance national and regional breeding for

more sustainable and resilient crop production.

The development of **databases** with data generated within the projects, and **easily accessible** by the relevant research community as well as other end-users would be extremely valuable.

The **Intellectual Property (IP)** position for the material used as well as generated within the research projects is a knowledge gap in the field. It is therefore recommended that future calls highlight the need for the proposal to include both a preliminary study of the IP position and project activities to develop an IP strategy.

The conduct of all projects was affected by the **COVID-19 pandemic**. There were multiple impacts including delayed starts to experimental work, delayed and/or postponed field studies, cancelled physical project meetings and multiple challenges to dissemination efforts. Despite this, most projects came close to realizing their aim and objectives and delivered agreed outputs and outcomes.



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