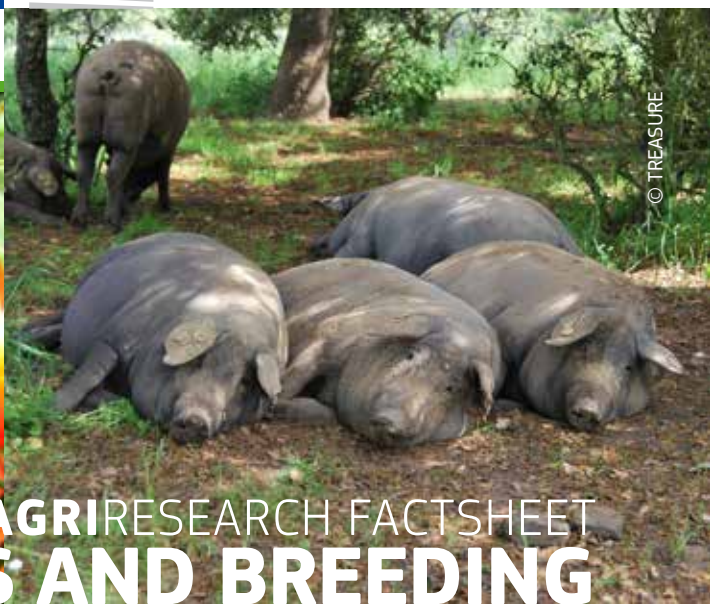
European Commission



AGRIRESEARCH FACTSHEET

GENETIC RESOURCES AND BREEDING

Why do research and innovation on plant and animal genetic resources and breeding matter?

Genetic Resources play a crucial role in agricultural and forest-based activities. They hold the key to diverse and healthy diets and to the adaptation of plants and animals to a changing and more variable climate. This potential is not sufficiently used and current farming modes increasingly rely on a limited number of plant and animal species. Three major crops (rice, wheat and maize) provide more than 50% of the world's plant-derived calories. Reversing this trend and increasing the resilience of farming and forestry is critical and of global concern, in particular in the current context of accelerated climate change and an ever increasing population. R&I activities aim at halting the further loss of genetic diversity by tapping into the vast genepool of plant and animals and making it available for breeders, farmers and ultimately consumers. Furthermore, particular breeding efforts are undertaken to broaden the genetic base of cultivated crops and create varieties that meet the manifold demands in relation to quality, resilience and sustainability.

Genetic resources and breeding under Horizon 2020 societal challenge 2

33
Projects or expected grants

189 M€
EU contribution 2014-2020

490
Participations in selected projects

Key themes

Landraces and local products & value chains – Genebank management – Coordination and development of biodiversity strategies - Diversifying agriculture and forestry – Plant and animal breeding

Agriculture and Rural Development

Genetic resources and breeding under EIP-AGRI activities

Focus group: Cooperation for genetic resources	bit.ly/2E3Cryv
Operational groups (OGs) on genetic resources and breeding	bit.ly/2utNa5N
OG example: population management of old cattle and pig breeds	bit.ly/2GjTS3N
OG example: Olive biodiversity and safeguard (Italy, 2017-2020)	bit.ly/2E4JVBd

SC2 Collaborative projects - Genetic resources and breeding

DIVERSIFOOD
www.diversifood.eu
Total cost: 4 M€
EC contribution: 3,4 M€
Coordinator: INRA
Mar. 2015 to Feb. 2019

DIVERSIFOOD seeks to increase the intra and interspecific diversity in cropping systems, thereby increasing the performance, resilience and quality of cultivated plants. It capitalises on underutilized and forgotten plant species and promotes participatory breeding methods to tap effectively into farmers' knowledge. It will demonstrate the value of on-farm seed systems.

TRADITOM
traditom.eu
Total cost: 4,4 M€
EC contribution: 4,4 M€
Coordinator: CSIC, ES
Mar. 2015 to Aug. 2018

A large number of traditional tomato varieties have been developed by local farmers ever since tomato was introduced to Europe in the 16th century. TRADITOM brings together complementary expertise from genetics, genomics, metabolism, socio-economy, agronomy and farming to identify and valorize the genetic diversity stored in traditional tomato varieties.

TREASURE
treasure.kis.si
Total cost: 3,4 M€
EC contribution: 3,4 M€
Coordinator: Agricultural Institute of Slovenia
Apr. 2015 to Mar. 2019

TREASURE focuses on the characterization and evaluation of underutilized pig breeds, using novel genomic tools, and on feeding and management strategies for high product quality. It looks at different agro-geo-climatic environments and production systems (indoor, outdoor, organic) and takes into account the needs and preferences of consumers, farmers and other actors in the value chain.

G2P-SOL
www.g2p-sol.eu
Total cost: 6,9 M€
EC contribution: 6,9 M€
Coordinator: ENEA, IT
Mar. 2016 to Feb. 2021

G2P-SOL brings together main European and International genebanks hosting germplasm of the four major Solanaceous crops: potato, tomato, pepper and eggplant. It will create a 'genetic blueprint' of main accessions of these crops and catalogue their genetic diversity and extent of duplication. It will further characterise in detail 'core collections' for each species in order to capture the potential stored in the global gene pools.

GenTree
www.gentree-h2020.eu
Total cost: 8 M€
EC contribution: 6,7 M€
Coordinator: INRA
Mar. 2016 to Feb. 2020

GenTree will support the European forestry sector with knowledge on the genomics of local adaptation, and methods and tools for sustainable management and use of forest genetic resources (FGR). The project will develop strategies for dynamic conservation of FGR in Europe as well as scenarios and policy frameworks for forest management in the context of climate change and bioeconomy.

GoodBerry
goodberry-eu.eu
Total cost: 5,1 ME
EC contribution: 4,9 M€
Coordinator: U de Malaga
Mar. 2016 to Feb. 2020

GoodBerry focuses on the genetic improvement of berry fruits in different environments, seeking to better capture their genetic complexity and plant, environment and management interactions. It will facilitate the development of high yields and quality berry fruits by working on traits that confer quality and resilience, on crop improvement and on locally adapted cultivation techniques.

IMAGE
www.imageh2020.eu
Total cost: 9 M€
EC contribution: 7 M€
Coordinator: INRA
Mar. 2016 to Feb. 2020

MAGE will enhance the use of genetic collections and upgrade animal gene bank management. It will further develop genomic methodologies, biotechnologies, and bioinformatics for a better knowledge and exploitation of animal genetic resources in breeding and farming. It will also develop synergies between ex-situ and in-situ conservation to maximise resources for the future.

NEURICE neurice.eu Total cost: 4,7 M€ EC contribution: 4,6 M€ Coordinator: U de Barcelona Mar. 2016 to Feb. 2020	NEURICE will develop strategies for rice productivity, stability and quality. It will do so by developing new commercial rice varieties harbouring salt tolerance alleles to protect the sector against deteriorating water quality in Mediterranean basins and apple snail invasion linked to salinization. The availability of commercial salt tolerant rice will not only prepare the rice sector to the effects of climate change but will also prevent further dispersion of this devastating pest.
TomGEM tomgem.eu Total cost: 5,7 M€ EC contribution: 5 M€ Coordinator: INPT, FR Mar. 2016 to Feb. 2020	TomGEM addresses yield stability in high temperature conditions with the aim to produce genotypes that are better adapted to climate change. It will select superior tomato genotypes for heat stress, identify genetic variations associated with climate change tolerance of fruit yield, set up optimal growing conditions and design innovative breeding and management strategies for various geographical conditions.
SolACE www.solace-eu.net Total cost: 7.2 M€ EC contribution: 6M€ Coordinator: INRA May 2017 to Apr. 2022	SolACE aims to help European agriculture face the challenge of more frequent combined limitations of water and nutrients in the coming decades, through the design of novel crop genotypes and agroecosystem management innovations to improve water and nutrient use efficiency.
BREEDCAFS www.breedcafs.eu Total cost: 6,4 M€ EC contribution: 4,2 M€ Coordinator: CIRAD Jun. 2017 to May 2021	BREEDCAFS will design and test hybrid coffee varieties which are well adapted to agro forestry systems (AFS) and show robustness against biotic and abiotic stresses. Gene by environment interactions will be assessed in a wide range of environments and low-input management inherent to AFS. Farmers' experiences with new hybrids (profitability, social acceptance) will inform the farm assessment and the breeding strategy.
LIVESEED www.liveseed.eu Total cost: 9 M€ EC contribution: 7,5 M€ Coordinator: IFOAM Jun. 2017 to May 2021	LIVESEED will help to establish a level playing field in the organic seed market across Europe, improve the competitiveness of the organic seed and breeding sector, and encourage greater use of organic seeds by farmers. LIVESEED will improve guidelines for cultivar testing and strategies for ensuring seed health. It will develop innovative breeding approaches suited to organic farming.
TomRes www.tomres.eu Total cost: 6 M€ EC contribution: 6 M€ Coordinator: U di Torino Jun. 2017 to Nov. 2020	TOMRES will select tomato rootstocks and scions tolerating combined stress, while retaining fruit quality and yield, taking advantage of innovative screening approaches. Novel below-ground and hormone linked resilience traits will be identified. TOMRES will test and optimize sustainable crop management strategies and the use of rootstocks more suited to water and nutrient uptake from the soil.
GenTORE www.gentore.eu Total cost: 7,6 M€ EC contribution: 7 M€ Coord: INRA Jun. 2017 to May. 2022	GenTORE will develop innovative genome-enabled selection, phenotyping and management tools to empower breeders and farmers to optimize cattle resilience and efficiency (R&E) in different and changing environments. These tools will be applicable across the full range of systems (beef, milk and mixed), and will increase the sustainability of European cattle meat and milk production.
DYNAVERSITY dynaversity.eu Total cost: 1,9 M€ EC contribution: 1,9 M€ Coordinator: Arcadia Nov. 2017 to Oct. 2020	DYNAVERSITY will increase capacities for in-situ conservation of plant genetic resources by mapping and bringing together all stakeholders involved in the dynamic management of plant genetic resources. The project will develop new management and governance models, establish new forms of seed networking and exchange and promote socio-environmental practices.
FarmersPride (C) Total cost: 2 M€ EC contribution: 2 M€ Coordinator: U Birmingham Nov. 2017 to Oct. 2020	Farmers' pride aims at establishing a durable structure for *in situ* conservation of plant genetic resources in Europe. It will enhance existing knowledge of European landraces and crop wild relatives, showcase how these resources can be effectively secured and managed, and establish a modus operandi for the effective linkage of in situ conservation and farmer or breeder based utilization.

Some projects under "Ecological approaches" and "Animal production systems" also contribute to this cluster (like **EUCLEG** www.eucleg.eu or **FEED-A-GENE** www.feed-a-gene.eu).

Interesting activities under other Horizon 2020 sections

Many other parts of Horizon 2020 include interesting activities on genetic resources and breeding.

Marie-Skłodowska Curie Actions support individual fellowships, innovative training networks and Research and innovation staff exchange. Examples include:

- **DIAGRASS**, which works on differential adaptation capacity of dryland grasses to changes in water availability (bit.ly/2pLGona - EC contribution: 0.2 M€ - Apr. 2018 to Mar. 2021)

- **Bioinformatics4Breeding**, which harnesses the power of bioinformatics to improve genetic selection for fertility in dairy cows (bit.ly/2GG60LN - EC contribution: 0.2 M€ - May 2016 to Apr.2018.

Several **research infrastructures** are also supported, like EMPHASIS-PREP on plant phenomics (bit.ly/2uzqYai) and the **European Plant Phenotyping Network 2020** (bit.ly/2GkEjIY).

The **European Research Council** also finances a wealth of basic science projects in this area, such as **CRISBREED** on the use of CRISPR/CAS mediated plant breeding, while the **SME Instrument** supports many more applied projects, such as **SWINE-GEN** on Genetic markers assisted selection for improvement of swine breeding productivity.

In the pipeline – 8 projects to start under 2017 and 2018 SC2 calls (51 M€)

Organic breeding	(2 projects, 12 M€)
Breeding livestock for resilience and efficiency	(1 project, 7 M€)
Future-proofing our plants	(1 project, 3 M€)
Joining forces for genetic resources and biodiversity management	(1 project, 3 M€)
Innovation in plant variety testing	(1 project, 8 M€)
Agri-Aqua Labs - Understanding the genome of farmed animals	(2 projects, 18 M€)

Funding opportunities - Open SC2 calls for 2019 (24 M€) -2020

SFS-13-2020: Genome-enabled breeding	
SFS-28-2018-2019-2020: Genetic resources and pre-breeding communities B [2019]: Adding value to plant GenREs C [2020]: The GenRes-user interface and pre-breeding activities	(2 projects, 14M€)
SFS-30-2018-2019-2020: Agri-Aqua-Labs B [2019]: Looking behind plant adaptation	(2 projects, 10 M€)

Preparatory actions on EU plant and animal genetic resources

Following an initiative tabled by the European Parliament in 2013, the European Commission (DG Agriculture and Rural Development) contracted two "**Preparatory actions on EU plant and animal genetic resources in agriculture**". The first preparatory action (2014-2016) consisted in a study that mapped activities in the Member States and identified missing links. The second action (Jan. 2016 – Dec. 2018) seeks to develop and collect examples on how to valorise the use of neglected breeds and varieties in an economically viable way. More information: www.geneticresources.eu

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