

ECPGR Activity Grant Scheme Proposal Form

Sixth Call – Phase X (2019-2023)

Activity Proposal

Activity	
Full title	Exploring of Grain Legumes diversity for sustainable European Agri-food Systems
Acronym (or short title)	ExploDiv
Duration of Activity (in months)	33 Months
Start date – End date <i>Please indicate start date not earlier than 3 months after deadline of Call</i>	March 1 st 2023 – November 30 th 2025

Applying Working Group(s)

	Working Group	Indicate name and surname of Working Group Chair
1.	Creola Brezeanu	Grain Legumes

Activity Coordinator

Activity Coordinator	
Name and Surname	Creola Brezeanu
Working Group	Grain Legumes
Nationality	Romanian
Current position	Chair of Grain Legume WG
Institute	Vegetable Research and Development Station Bacau
Country	Romania
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Activity Partners (ECPGR-funded)

Please note that each partner needs to be a member of an ECPGR Working Group to be eligible for funding. For self-funded partners please use the separate box below.

Partner ID No.	Name and Surname	Institute	Country
1	Mr Gert Bundgaard Poulsen	Danish Seedsavers	Denmark
2	Ms Ulrike Lohwasser	Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)	Germany
3	Ms Aleksandra Ilić (Savić)	Institute of field and vegetable crops	Serbia
4	Dalibor Živanov (on behalf)	Institute of field and vegetable crops	Serbia
5	Ms Sofiya Dimitrova Petrova	Institute of Plant Genetic Resources "K.Malkov"	Bulgaria
6	Ms Penelope Bebeli	Agricultural University of Athens	Greece
7	Barbara Pipan (on behalf)	Agricultural Institute of Slovenia	Slovenia
8	Ms Madalena Vaz	Banco Português de Germoplasma Vegetal	Portugal
9	Ms Ulrika Carlson-Nilsson	Nordic Genetic Resource Center	Sweden
10	Ms Creola Brezeanu	Vegetable Research and Development Station, Bacau	Romania
11	Ms Ms Erika Zetochová	National Agricultural and Food Centre Research, Institute of Plant Production	Slovakia
12	Mr Nigel Maxted	School of Biosciences University of Birmingham	United Kingdom

Self-funded partners

Partner No.	Name and Surname	Institute	Country
1			

Description of Activity (suggested max. 1000 words)

Please address the following aspects:

– **Background:** Explain the context behind the choice of this Activity, e.g. why this has been prioritized or selected. If this is the continuation of a preceding Activity, please indicate how and why the new Activity will build on previous results/experiences.

Context: in agreement with GENETIC RESOURCES STRATEGY FOR EUROPE there is a crucial need to improve the enabling environment for the **direct use of diverse genetic resources maintained on-farm** – particularly to **support diversification** and to meet the objectives of the Farm to Fork Strategy (1). The COVID-19 pandemic has proved the tremendous importance of a robust and resilient food system that functions in all circumstances, being able of ensuring access to a sufficient supply of affordable food for citizens. This context creates awareness related interrelations between our health, ecosystems, supply chains, consumption patterns and planetary boundaries (2). The local germplasm, oftentimes associated with traditional sustainable farming systems incorporates diverse and dynamic gene pools associated to adaptive traits that allow subsistence, in a changing climate.

Challenge: valorization of the Grain legumes diversity, with the aim to identify and secure materials, particularly to sustain adaptive capacity for resilience to climate change. On long term this, will boost local and rural economies while sustaining diverse agro-ecosystems and creating new food and non-food value chains.

– **Justification:** Explain why this Activity is justified in terms of making progress towards achieving the ECPGR objectives.

The Activity contributes to securing the vast diversity of grain legumes GenRes that exists in situ (*on-farm* or in the wild). This valuable germplasm is endangered due to a range of environmental and social threats, nor well-represented in *ex situ* collections, leaving future breeding for sustainable and resilient agriculture at risk. ExploDiv by inventorying the local genetic germplasm of grain legumes facilitates and exploits the benefits of complementarity between *in situ* and *ex situ* conservation and promotes of the use of genetic resources for valorization in European agri food chains. By its actions, this ExploDiv reinforces the collaboration among Grain legumes WG of ECPGR and contributes to improvement of European and mainly Regional genetic resources conservation and use. ExploDiv, will provide new passport and phenotypic data, that will be made available trough EURISCO catalogue, aimed to ensure the access to valuable and unique germplasm. In this manner Activity contributes to achieving ECPGR objectives (O1, O2, O4) as shown *Expected impact* section.

– **Rationale for the choice of partners:** Explain why the selected partners are the most suitable to carry out the proposed Activity and briefly describe their respective roles in the Activity.

The partners of consortium are recommended for participation in ExploDiv by their **expertise** on conservation, breeding, cropping, by management of a large diversity of GrainLeg species; **active work** in GrainLeg ECPGR WG, some, already **involved in previous funded Activities**. The group has a long **experience** in the conservation, management, multiplication and characterization of genetic resources of GrainLeg species. A survey related **interest on topics and species** was realized during this open call. There is a **vast complementarity** of partners related to the aim of Activity: those belonging to the Gene Banks can provide valuable detail information on the status of collections of GrainLeg most representative accession lists, having also long experience conservation and management of germplasm. Partners are experienced in phenotyping. The divers geographical distribution of partners facilitates the assessment of germplasm in different agroclimatic conditions. Partners own **facilities for conservation**

and characterization, as well for **experimental trials** with low inputs management system, including organic certified fields.

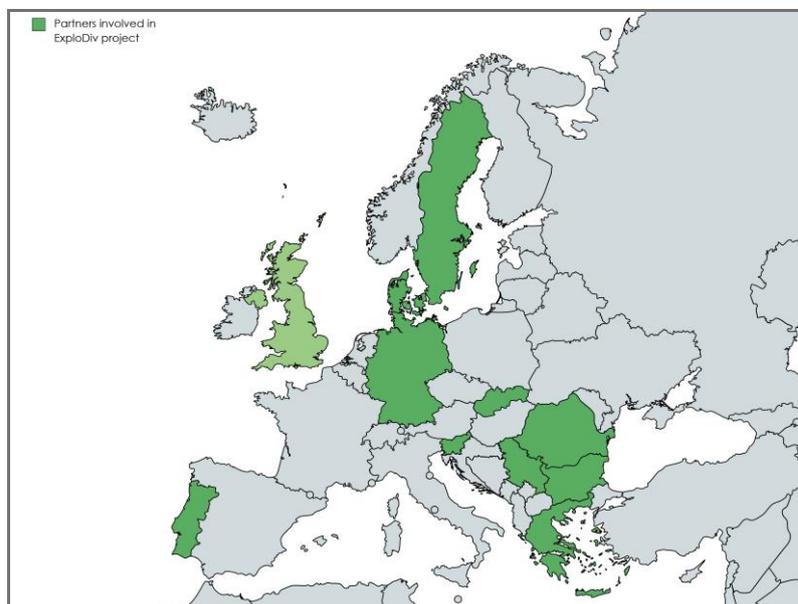


Figure 1. Geographical distribution of ExploDiv partners and county locations for experiments to be assessed in diverse climatic conditions

– **Methodology or Approach:** Explain how the partners will operate. Clearly explain who is expected to do what. Also explain the rationale of meeting (or not) as part of the Activity. Include a Gantt Chart, to illustrate the work breakdown structure of the project.

The genetic material will be identified and selected by each partner. **The focus is on local germplasm.** Criteria of selection: in situ, including on farm, and ex situ conserved material. Conformant to the results of survey realized during open call period, the focus is prioritized, including *Vicia faba*, *Pisum sativum*, *Phaseolus vulgaris*, *Cicer arietinum*, *Lathyrus*, *Lens*, *Vigna*, *Lupinus*.

Each partner will evaluate his own selected material in his/ her local agro climatic conditions. The experiments will be independent and will include a number of 40 accessions (of one, or more species). The final list of selected germplasm for investigation in ExploDiv is D1.1.

The field performance includes

(a) phenotyping using harmonized protocols, seed increase (for a set of materials).

(b) experiments as drought tolerance, specific pest and disease will be developed, using a subset of up to 10 -15 accessions consisting in the most promising accessions.

In this manner a diverse intra and inter specific panel of germplasm will be evaluated in multi-site trials and will be made available for large local, regional, and European use.

Action 1 Survey and selection of PGR on farm, in situ, ex situ (M1-M4)

Each partner will focus on one or several species, based on the economic importance of the species in the region, traits of interest, own expertise. The selection includes in situ, on farm, and ex situ conserved material, up to 40 accessions. Material collected from traditional farms is prioritized for insertion in each experimental location.

Deliverables: D 1.1 List of selected material to be evaluated in each location, D1.2 Evaluation sites description.

Action 2 Development of templates, unified protocols, DOI implementation, set of experiments (M1-M8)

This action will provide the uniform framework for project implementation. The group is focused on

several species, specific templates and protocols will be established for each species. Traits will be prioritized with an emphasize on traits related tolerance to specific biotic and abiotic stressors, according to each species particularities, yield, yield components. Each partner will propose and design his/ her own experiment(s) for Action 4, based on germplasm multiplied in Action 3 (set of 10 - 15 accessions). The experiments include performance on low input conditions and tolerance to different (a)biotic stressors. The template for sites description (D1.2) will be developed (parameters to be collected)

Deliverables: D2.1 Protocols for phenotyping, prioritized traits D2.2 DOI assessment for all selected GenRes, D2.3 Template for sites description D2.4 List of experiments for Action 4

Action 3 Phenotyping, seed increase (M5 – M21)

Based on D2.1, phenotyping will be cared out, and seed increase for a set of 10 -15 accessions. SSD and tissue can be developed/ collected and conserved/ stored for further investigations.

Deliverable: D3.1 Phenotypic data available for EURISCO, D3.2 Seeds availabilities (for conservation and for Action 4).

Action 4 Agronomic evaluation of selected accessions (M5 – M29)

Agronomic evaluation of a subset of accessions (10 – 15 accessions), in low input crop management systems and in different agroclimatic conditions to facilitate selection of GrainLeg local accessions for inclusion in AEGIS and/or for promoting their use. In case of enough seed material some experiments can be simultaneous with phenotyping, if not, it can succeed to seed increase. These experiments will enhance the use of GrainLeg by achievement of a divers volume of data useful in breeding and also to the farmers and other end users. As a double benefit the utilization of genetic resources can enhance and diversify the genetic resources base. Data will be made available via EURISCO repository.

Deliverables: D4.1 Set of materials featured by different attributes D 4.2 Evaluation data, accessions for EURISCO, D4.3 Seeds availabilities.

Action 5 Management and reporting (M1-M33)

Partners will work and will communicate for smooth implementation of the project. The Activity will include online meetings and one workshop related DOI assessment (with support of FAO)

Deliverables: 5.1 Kick off meeting on line, 5.2 Workshop DOI implementation 5.3 Progress report 1, D 5.4 Progress report 2, D 5.5 Final meeting-on line D5.6 Final report related GrainLeg collections consisting of existing population samples identified on the basis of agreed criteria, and conserved in situ and ex situ using integrated and complementary approaches and common management standards.

During the first meeting, teams of two partnes in consensus will assume the coordination each task.

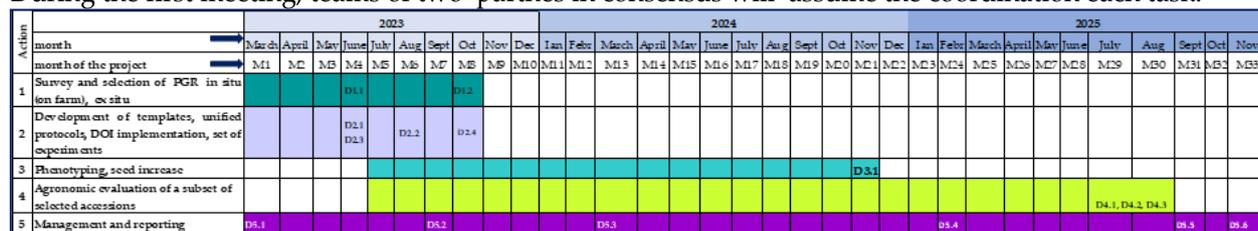


Figure 2 Gantt chart of ExploDiv proposal

– **Description of genetic material:** If your Activity is focusing on genetic material, please describe in detail, as far as possible, who is providing this genetic material, its status and the number of accessions under investigation (for example: *This Activity aims at molecularly analysing / safety-duplicating / evaluating / collecting XY accessions (listed) of “Genus species”, provided by genebank Z/ farmers in country W /to be collected in country P..., etc.).*

The genetic material will be identified and selected by each partner. Criteria of selection includes in situ / on farm, and ex situ conserved material. Conformant to results of survey realized during open call period, the focus will be on *Vicia faba*, *Pisum sativum*, *Phaseolus vulgaris*, *Cicer arietinum*, *Lathyrus*, *Lens*, *Vigna*, *Lupinus*. Each partner will evaluate selected material in his/ her local agro climatic conditions. The

experiments will include up to 40 accessions (of one, or more species). The identity of materials by DOI assignment will be implemented (D2.2). The field performance will include phenotyping using harmonized protocols (D2.1), seed increase for a set of materials (D3.1) – mandatory to create availabilities for next step investigations. After creating seed availabilities, experiments as drought tolerance, specific pest and disease will be developed, using the subset of accessions.

– *Expected impact.* Clearly specify the expected impact from this Activity for the respective ECPGR objective(s), compared to the current state of progress of those same objectives. Explain how the impact will be obtained.

The Activity ensures the increase of diversify genetic resources use and will contribute to respond and adapt to the future impacts of global change. Consortium will target yield stability, host plant resistance to pathogens, considering that profitable crops confer long-term benefits to the farming system.

Related ECPGR objective	Created impact of ExploDiv: safeguard Grain Legumes diversity to respond and adapt to the future impacts of global change	Actions* and deliverable* of current Activity aimed to create impact
O1	Increasing the percentage of the national collection analyzed for eligible accessions to be included into AEGIS	Action 1, D1.2
	Recommendations made by GL WG	Action 5, D5.6
	Number of new or updated traits.	Action 2, D 2.1
	Number of AEGIS accessions	Action 5, D 5.6
O2	Number of descriptors updated for data quality improvement (including taxonomic data)	Action 2, D2.1
	Number of accessions with DOI	Action 2, D2.2
	Number of European accessions with C&E data in EURISCO	Action 3, D3.1 Action 4, D4.2
	Number of crops and accessions proposed to be evaluated	Action 1 D1.1
O4	Number of issues analyzed	Action 5 D5.6
	Number of solutions to issues proposed	Action 5 D5.6

– *Links with other non-ECPGR projects or individuals:* If applicable, clearly explain the objectives of the linked projects and the reasons for complementarity with the ECPGR Activity.

Building on previous projects tackling the need of diversity conservation and taking the benefits from its rational exploitation, partners of ExploDiv are experienced and have background in:

identification and screening for different traits with breeding value	(BRESOV, CiLaKlima, PreLuteus, SPITFIRE) related to performance in low in put conditions and different tolerance and resistance – linked to Action 1, 2, 3
diversity improvement	(CROPDIVA, BRESOV, EUCLEG, INCREASE) – linked to Actions 2, 3, 4, 5.
Facilitating the versatile use for multiple benefits of GrainLeg in agri food chains	(LEGATO, EUCLEG, BRESOV, INCREASE) – linked to Action 1 and Action 5.
phenotyping	data for a large variety of species as bean, cicer, lentil pea, , lathyrus, lupinus and pea (INCREASE, BRESOV, CiLaKlima, PreLuteus, SPITFIRE) – linked to Actions 1, 2, 4

management of collections including local populations, wild material	(CROPDIVA, BRESOV, INCREASE) – linked to Actions 1 - 5
CWR and LR conservation, Facilitating breeders’ CWR and LR use	PGRSecure – linked to Actions 1 - 5
Promote best practices in <i>in situ</i> and on-farm conservation and management Enhance the use of plant genetic resources conserved <i>in situ</i>	Farmer’s pride – linked to Actions 1 - 5
Few details about linked projects are presented at <i>Additional remarks</i> section	

Expected products and related ECPGR Objectives

List concrete products and results that are obtained by the Activity and the corresponding number(s) of the ECPGR Outcome(s) and/or Output(s) and/or Activities to which each product/result will contribute.

	Expected products/results	Corresponding ECPGR output, activity
1	List of local germplasm identified and proposed for investigations (number of accessions per species)	Output 1.2 European Collection represents the European ex situ PGR diversity A 1.2.2 Verification of the European Collection by crops in terms of representation of the ex situ PGR diversity Output 4.2 European on-farm diversity and trends monitored 4.2.2 Analyzing on-farm diversity and trends
2	Agroclimatic profile of each location – sites description	Output 4.4 Definition of Most Appropriate Areas (MAPAs) sites of on farm cultivated plant diversity discussed and implemented 4.4.1 Through dedicated meetings of interested country representatives, promoting agreement on criteria for definition of MAPAs containing unique landrace populations
3	Set of traits to be investigated for each species - unified protocols	Output Identification of new accessions for inclusion into AEGIS or suitable for further characterization
4	List of experiments for agronomic assessment	Output 4.3 Good practices for on-farm management and conservation and adding value promoted Act 4.3.1 Provision of store of knowledge and evidence-based practices,
5	Number of accessions with DOI assigned	Output 2.1 update national ex situ inventories effectively and timely 2.1.2 Improving quality of data in EURISCO (including taxonomic data as well as coverage and precision of descriptors; inclusion of DOIs)
6	Systematized data related phenotypic characterization of local germplasm,	Output Identification of new accessions for inclusion into AEGIS or suitable for further characterization
7	Data and materials shared via EURISCO	Output 2.2 C&E data in EURISCO included, with high quality and wide coverage

		2.2.1 Identification of available C&E data and their inclusion into EURISCO
8	Data related agronomic evaluation of selected accessions in low-input conditions	Output 3 Identification of landraces or varieties suitable for sustainable agriculture
9	Recommendation for synergies between on farm and ex situ conservation	Output 1.12 Options for the integration of in situ and on-farm conservation A 1.12.2 On-farm Conservation and Management WG mediated discussion and recommendations concerning integration Output 4.2 European on-farm diversity and trends monitored A 4.2.3 Establishing a knowledge base of case studies aiming to analyze genetic diversity and its trend in the field Output 4.3 Good practices for on-farm management and conservation and adding value promoted A 4.3.1 Provision of store of knowledge and evidence based practices, related to successful experiences of conservation and sustainable use of landraces and other heterogeneous genetic resources in Europe
10	Identification of useful germplasm featured resilience (capacity to perform in low input and adverse conditions)	Output 1.2 European Collection represents the European ex situ PGR diversity A 1.1.2 Identification of new European Accessions for inclusion into AEGIS

Workplan for the proposed period of the Activity

Brief description of meetings and/or main actions of the Activity.

	Type of Action <i>(indicate if "meeting" or "other action")</i>
1	"Meeting" virtual meeting – kick off meeting Status of Grain Legumes local germplasm in the National Gene banks Information on existing <i>in situ/ on farm</i> conservation of Grain Legumes germplasm Revision of Grain Legumes descriptors – focus on each species Next activities planning
2	"Other action" Primary characterization, regeneration, and seed increase of accessions (new inclusions in EURISCO)
3	"Other action" Agronomic evaluation of a set of local accessions to identify resilient material
4	"Other action" Selection of Grain Legumes local accessions for inclusion in AEGIS and/or for promoting their use
5	"Other action" and "Meeting" - on line Intermediary reports, final meeting, and final report.

Additional remarks

Indicate any additional remark(s) that is/are important for the evaluation/implementation of the proposed Activity

Remarks:			
<p>The Activity is designed in accordance with the principles and objectives of PGR Strategy: conservation of genetic resources requires interventions to ensure the ecological or management processes necessary for the preservation of populations in situ (including on-farm), and to support the collection and management of population samples in dedicated ex situ facilities. Therefore, escalating efforts to conserve genetic resources, both in situ and ex situ is urgently needed. These two complementary approaches to conserve genetic resources are anchored in the CBD, the FAO GPAs for plant, the SDGs, and other relevant global, regional and national legislative and policy instruments.</p>			
Bibliography			
<ol style="list-style-type: none"> 1) GenRes Bridge Project Consortium, ECPGR, ERF and EUFORGEN. 2021. Genetic Resources Strategy for Europe. European Forest Institute. 2) f2f action-plan 2020 strategy-info en.pdf (europa.eu) 3) The Plant Genetic Resources Strategy for Europe, ECPGR, 2021 Objectives and targets of PGR Strategy for Europe and associated priorities for ECPGR Phase XI (272,6 KB)(Annex 3 of the report of the 16th ECPGR Steering Committee meeting) 4) Objectives of ECPGR for Phase X (2019-2023) (agreed at the 15th Steering Committee meeting, May 2018) (264,3 KB) 			
Details related linked projects			
Partner name	Project name, acronym	Funded by	How these projects are linked with ExploDiv
	IPK - CiLaKlima: Screening of genetic resources of chickpea (<i>Cicer arietinum</i>) and grass pea (<i>Lathyrus sativus</i>): Adaptation to climate change in Germany with alternative legumes for human consumption German Ministry of Food and Agriculture		Screening of legume PGRs, Focus of adaptation to the climate changes Linked mainly with development of Action 1, 2, 3, 4
	IPK -PreLuteus: Development of high-yielding and resistant pre-breeding lines of yellow lupin (<i>Lupinus luteus</i>) in Germany German Ministry of Food and Agriculture		Screening of legume PGRs, Focus on traits related resistance Linked mainly with development of Action 1, 2, 3, 4
	IPK - SPITFIRE: Screening of <i>Pisum sativum</i> (pea) accessions for pea necrotic yellow dwarf virus resistance Cornet		Screening of legume PGRs, Focus on traits related resistance Linked mainly with development of Action 1, 2, 3, 4
	IFVCNS - LEGATO LEGumes for the Agriculture of Tomorrow, EU		<ul style="list-style-type: none"> •identification of materials possessing valuable characters such as disease and pest resistance •linked mainly with development of Action 1, 2, 3, 4
	IFVCNS – EUCLEG Breeding forage and grain legumes to increase EU's and China's protein self-sufficiency, EU		<ul style="list-style-type: none"> •improve diversification, crop productivity, yield stability •phenotyping methods •linked mainly with development of Action 1, 2, 3, 4,

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IFVCNS – CROPDIVA Climate Resilient Orphan cropPs for increased DIVERsity in Agriculture, EU	<ul style="list-style-type: none"> •reinforce agrobiodiversity at different levels and along geographic and socio-economic areas. •promotion of key underutilized arable crops •creation of value chains and the study of the socio-economic impact of the project’s results. •enable biodiversity management at all levels, including diversifying the use of genetic resources, crop production systems, •linked mainly with development of Action 1, 2, 3, 4
VRDS, IPK – BRESOV Breeding for Resilient, Efficient and Sustainable Organic Vegetable production EU	<ul style="list-style-type: none"> •Identification of valuable bean materials •Investigations of bean influence and its performance in organic crop rotation with vegetables, •Linked mainly with development of Action 2, 3
VRDS, KIS, IPK, INIA, NordGen – INCREASE Intelligent Collections of Food Legumes Genetic Resources for European Agrofood Systems	<ul style="list-style-type: none"> •Development of intelligent collection for EU agri food chains, pure lines SSD; •phenotyping protocols; •Linked mainly with development of Action 1, 2, 3, 4, 5
KIS -ECOBREED	<ul style="list-style-type: none"> •improve the availability of seed and varieties suitable for organic and low- input production •linked mainly with development of Action 1, 2, 3, 4, 5
Univ of Birmingham - PGR Secure	<ul style="list-style-type: none"> •CWR and LR conservation, Facilitating their use Action 1, 2, 3, 4, 5
Univ of Birmingham, NordGen - Farmer’s pride	<ul style="list-style-type: none"> •on-farm conservation and management •enhance the use of plant genetic resources conserved <i>in situ</i>

**Please send the completed form together with the budget table to the
Chair of the submitting Working Group for submission of the Activity proposal.**