



ECPGR Activity Grant Scheme Proposal Form

Third Call – Phase X (2019-2023)

Activity Proposal

Activity	
Full title	Capturing Brassica Wild Relatives Diversity in the South Eastern Europe
Acronym (or short title)	EUBRASWILD
Duration of Activity (in months)	24
Start date – End date <i>Please indicate start date not earlier than 3 months after deadline of call</i>	1 October 2020 – 1 August, 2023

Applying Working Group(s)

	Working Group	Indicate name and surname of Working Group Chair
1.	Brassica	Ferdinando Branca
2.		
3.		
4.		

Activity Coordinator

Activity Coordinator	
Name and Surname	Smiljana Goreta Ban
Nationality	Croatian
Current position	Scientific Advisor
Institute	Institute of Agriculture and Tourism
Country	Croatia
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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	Ferdinando Branca	University of Catania (UNICT)	Italy
2	Smiljana Goreta Ban	Institute of Agriculture and Tourism (IPTPO)	Croatia
3	Sokrat Jani	Agricultural University of Tirana, Institute of Plant Genetic Resources (IPGR)	Albania
4	Ana Marjanović Jeromela	Institute of Field and Vegetable Crops (IFVO)	Serbia
5	Vladimir Meglič / Barbara Pipan	Agricultural Institute of Slovenia (KIS)	Slovenia
6	Nataša Mirecki	University of Montenegro Biotechnical Faculty (UNIMO)	Montenegro
7	Georgia Ntatsi	Institute of Plant Breeding and Genetic Resources (IPBGR)	Greece

Self-funded partners

Partner No.	Name and Surname	Institute	Country
1	Nikola Major	Institute of Agriculture and Tourism	Croatia
2	Nevena Nagl	Institute of Field and Vegetable Crops	Serbia
3	Bernard Prekalj	Institute of Agriculture and Tourism	Croatia
4	Dragana Rajković	Institute of Field and Vegetable Crops	Serbia
5	Di Bella Maria Concetta	University of Catania	Italy
6	Lorenzo Maggioni	ECPGR	Italy

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.

The primary center of diversity for *Brassicaceae* is Himalayan area, from where they dispersed to North African and European Atlantic coasts. The southwest Mediterranean area seems to represent the secondary center, if not the primary, in the light of the recent evolutionary evidence recorded. Wild relatives of the *Brassica oleracea* complex species (n=9) can be found sporadically on the western Atlantic coast and certain parts of the central Mediterranean. Of interest are also the large numbers of *Brassicaceae* wild species used as leafy vegetables (*Eruca* spp., *Diplotaxis* spp., *Sinapis* spp., *Isatis*

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spp., *Hirschfeldia* spp.) widespread in South-East Europe and utilized for preparing traditional dishes. Several projects were funded and accomplished aimed to collect *Brassica* wild relatives of across the EU, among which CHOICHEVA was conducted during First Call of the ECPGR Phase IX and focused on cultivar, landraces, and wild relatives in Italy, Portugal and Spain. However, the information on *Brassica* wild relatives from Eastern Europe is lacking. There is evidence that this area is rich in wild Brassica relatives but with no recent systematic approach to this subject. The main diffused and mentioned are *Brassica rupestris* Raf., *B. villosa* Biv., *B. macrocarpa* Guss., *B. drepanensis* (Caruel) Damanti, *B. incana* and related endemic species such are *B. botterii* Vis., *B. cazzae* Ginzb. & Teyb and *B. mollis* Vis.. As far as we know, wild relatives of Brassica were never cultivated in the area but they grow wild and are sporadically used in the diet of the local population.

The aim of this activity is to contribute to knowledge on presence, distribution and biodiversity status of wild Brassica relatives in the Eastern Europe as well as to filling the gaps of wild *Brassicaceae* in genbanks and AEGIS.

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

Local landraces of cultivated plants and wild relatives may be carriers of desirable agronomic or quality properties and serve as useful material in breeding programs, which are particularly interesting for low-input agriculture. Unfortunately, habitats of *Brassica* wild relatives in Eastern Europe are endangered by climatic changes and human activities. They grow mostly on cliffs by the coast and more or less rocky terrains near the coast and therefore threatened by enlargement of urban area and infrastructure projects particularly for touristic purpose. Summer fires as a consequence of long drought period are often in these areas.

The AEGIS database consist 2273 *Brassica* accessions mostly held in UK (909), Netherlands (673) and Italy (256). From the east Adriatic and western Balkan countries only 5 accessions from Bosnia and Herzegovina are listed. Of the all Brassica accessions in AEGIS more than a half are *B. oleracea* (1490), while *B. napus* (367) and *B. rapa* (375) are also well represented. There are just few accessions of some species of Brassica wild relatives and none from the geographical area that will be covered by this project.

This activity will directly contribute to objectives 1, 2 and 3 of the ECPGR Phase X by contributing to the activities listed in program.

– **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 selected partners are members of WG *Brassica* involved in collection, maintenance and characterization (phenotyping and genotyping) of *Brassica* spp. in the respective countries with the access to national gene bank collection. Partners in this project can provide detail information on the status of wild *Brassica* relatives in national bank collection and they are capable to get information on the possible locations for acquisition of new accession. Some of the species targeted in this proposal are not spread all around South-Eastern Europe so each partner will focus on species of their interest/availability. The partners of Albania, Croatia and Greek will collect and regenerate populations of *B. cretica*, and *B. incana*. They will explore diversity of *B. incana* (which is the common one in several sites and countries involved in the proposal) and *B. cretica* and study their relationship with the other *B. oleracea* complex species (n=9), as such as *B. drepanensis*, *B. macrocarpa*, and *B. rupestris*. The partners of Montenegro, Serbia, and Slovenia will carried out the same activities related to wild *Brassicaceae* utilized (underutilized) as vegetables in own countries (*Eruca* spp., *Diplotaxis* spp., *Sinapis* spp., *Isatis* spp., *Hirschfeldia incana*). Both sets of species are of great interest not only for conservation issues but also for innovating *Brassicaceae* products and improving the resilience, the efficiency and the sustainability of the production chains.

Regarding the partners capacity to carry on proposed activities University of Catania has long experience in Brassica characterization on morphological, biochemical and molecular level. A group from Croatia has been collecting cultivated and wild *Brassicaceae* in islands and coastal part of eastern Adriatic and has available field, greenhouse and laboratory infrastructure for crop characterization. The Agricultural Institute of Slovenia is familiar with volunteer and feral populations of *Brassica* species, especially in terms of naturally occurred gene flow assessment and population genetics studies among related Brassica germplasm. The Institute of Plant Breeding and Genetic

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Resources will contribute to the project with field and greenhouse experiments in order to describe and regenerate collected wild *Brassica* accessions. Partners from Serbia, Montenegro, and Albania will organize expeditions and participate in them, perform greenhouse and field trials, and participate in characterization of collected material.

– **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.

This project will focus on following activities:

- Two meetings with aim to define the number of samples and detail protocols for collecting, regenerating and characterizing the collected accessions (kick-off and final meeting managed respectively by IPTPO and UNICT)
- Sharing information on status of national gen-banks and national priorities related to Brassica CWRs (all partners)
- Collecting and monitoring of at least 10 accessions of Brassica wild relatives populations in each involved country (all partners)
- Establishing field/greenhouse collection(s) of gathered CWRs populations and their regeneration (all partners)
- Description of morphological traits using the same descriptors (all partners)
- Selection of accessions for inclusion in AEGIS (all partners)

Gantt chart of the proposed activities:

Activity	2020			2021												2022								2023									
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Meeting		■																															
Collecting material/exchange								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Characterization/regeneration																																	
Duplication for AEGIS																																	

– **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.*).

As the follow up activities to this proposal the promising genetic material already consisted in national collections of participated countries and samples collected during this project will be further biochemically and molecularly analyzed at UNICT, IPTPO and/or IPBGR. The characterization of the genetic material collected in this proposal will be useful to evaluate and describe the genetic diversity and the relationships among the CWRs populations of *Brassica* species in the area of SE Europe. The costs for this follow-up activity will be funded the H2020 BRESOV project and other interested partners. Obtained results of the follow up work will be compared to already analyzed samples characterized by the partners.

– **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 expected impacts of the proposal are:

- widening activities of Brassica working group to members of underrepresented genbanks in EURISCO and particularly AEGIS
- capturing of Brassica CWRs diversity in SE Europe
- exploration and identification of new accessions of Brassica CWRs for inclusion into AEGIS
- improvement of genebank management in accordance with principles of AEGIS.

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- recommendations for future activities contributing to long-term in situ and ex situ conservation of Brassica CWRs
The participants of this project will further continue to work on links between stakeholder groups involved in Brassica genetic resources preservation and sustainable utilization.

– 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.

These activity is linked to ongoing project 1) ‘Biodiversity and molecular plant breeding’ (KK.01.1.1.01.005) focused on biodiversity of Croatian leafy kale landraces and wild relatives of Brassica while the complementarity with ECPGR Activity will expand research on PGR in surrounding countries. This activity is complementary also to the Serbian national project; 2) “Development of new varieties and production technology improvement of oil crops for different purposes” (TR31025). It involves work on GR of oilseed Brassicas, their wild relatives and possible utilisation in commercial breeding programs; 3) The bilateral project SLO-BiH: ARRS-MS-BI-BA-JR-Prijava/2018/77 and Slovenian Target research project V4-1806: Establishment of a system for the use of DNA markers for genetic identification and verification of varietal authenticity and purity of major cereals and brassicas as a basis for the quality production of seeds, food and feed; 4) FP7 EUROLEGUME - Enhancing of legumes growing in Europe through sustainable cropping for protein supply for food and feed and H2020 TRUE - Transition paths to sustainable legume based systems in Europe where the use of legumes (common bean and faba bean) in crop rotation systems in organic crops of different broccoli landraces, aiming solely to increase soil fertility, was studied; 5) H2020 BRESOV (Breeding for Resilient, Efficient and Sustainable Organic Vegetable production, GA n. 774244) will phenotype and genotype the genetic variability of wild and cultivated germplasm of broccoli, snap bean and tomato for establishing new elite cultivars and for improve the quality of seed production for implementing organic vegetable food chains.

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	Defined accessions for inclusion in AEGIS	Output 1.2.; Activity 1.2.1 - identification of new EU accessions for inclusion into AEGIS
2	Update on crop-specific gen-bank standards for Brassica CWRs	Output 1.6; Activity 1.6.2 - standards – agree on crop-specific gene bank standards
4	Seeds available for exchange among partners and available for AEGIS	Output 1.8; Activity 1.8.3 - ECPGR-mediated regeneration of AEGIS accessions

Workplan for the proposed period of the Activity

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

	Type of Action (indicate if “meeting” or “other action”)
1	<p>Meetings: At kick-off meeting in Poreč organized by IPTPO the project participants will discuss the following subjects:</p> <ul style="list-style-type: none"> - Status of the Brassica accessions in the national banks - Discuss the possible accessions for sharing and using as a ‘standard’ for each species - Exchange of the information on methods for survey and collection of Brassica CWRs - Defining protocols for collection, regeneration and characterization of targeted species - Detail planning and synchronization of next activities <p>At final meeting in Catania organized by UNICT the project participants will discuss the following</p>

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	<p>subjects:</p> <ul style="list-style-type: none"> - The reports on gathered data and collected samples - Selecting accessions for EURISCO and AEGIS databases - Program for next season and follow-up activities
2	<p><i>Other activities</i></p> <p>Field survey and collection of plant material for at least 10 accession (seed, cuttings, etc.) in the area previously defined, and collection of related passport data.</p>
3	<p><i>Other activities</i></p> <ul style="list-style-type: none"> - Establishing field collections (existing and new accessions) to regenerate collected accessions and provide plant material for description - Description of the new and existing accessions using descriptors for Brassica and standards adopted on 'meeting'
4	<p><i>Other activities:</i></p> <ul style="list-style-type: none"> - Regeneration of accessions for AEGIS and exchange among partners
5	<p><i>Other activities:</i></p> <ul style="list-style-type: none"> - Developing of a proposal for future collaboration on Brassica CWRs characterisation and sustainable utilization

Additional remarks

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

<p>Remarks:</p> <p>The agriculture and food production nowadays mainly relay on small number of species, with narrow genetic base, which may pose the food production even more exposed to constraints caused by abiotic and biotic stressors due to climatic changes. Also, the loss of genetic diversity is particularly fast in the areas with high economic activity as a consequence of competition with industry for land resources. Filling the gap in knowledge on <i>Brassica</i> diversity from one of the gen-centers will contribute to better understanding of their variability and to their protection.</p>
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**Please send the completed form together with the budget table to the
Chair of the submitting Working Group for submission of the Activity proposal.**