

## **Request for additional budget for the project “Implementation of the ECPGR European Evaluation Network (EVA) on wheat/barley and vegetable crops (carrot, lettuce and pepper)” GenR 2019-2 (September 2023)**

The EVA networks have been very productive in generating valuable standardized evaluation data during the past few years, exceeding the expectations of the original project, both in terms of accessions evaluated and trials conducted. EVA partners, both from industry and the public sector, have expressed their appreciation of the Public-Private-Partnership approach and the benefits they gain from participating, which include shared expertise and knowledge, priority access to genebank accessions and associated large phenotypic datasets and availability of genotyping data to support association analyses and marker development for breeding. Work is now mainly shifting to finalizing this current phase of the project, processing and curating the evaluation data for the EURISCO-EVA database and data analysis. In this process the EVA carrot and pepper networks have identified some gaps in their datasets, which, when filled, would add significant value to the datasets already generated by the networks. In addition, the extent of the generated datasets showed the need for dedicated data management to ensure the quality of metadata and experimental data for further analysis and eventual publication in EURISCO. Finally, the successful implementation of the EVA project has sparked interest in the breeding and research community for the establishment of new EVA crop networks, which will contribute to the long-lasting impact of the current project.

Specifically, in EVA Carrot, during the lab trials conducted at JKI in 2022/21, 10 individual plants each of 66 carrot accessions (the EVA collection plus controls) were grown, phenotyped and also sampled for genotyping. Sampling individual plants is important for GBS, since carrot accessions are populations and pooling plants for genotyping would result in high heterozygosity and lower genotyping resolution. At the same time when sampling for genotyping, additional leaf samples were collected to be used as backups for DNA sample prep but also to potentially assess polyacetylenes and volatile profiles using LC-MS as had been done in a previous project within ECPGR, CarrotDiverse (<https://www.ecpgr.cgiar.org/working-groups/umbellifer-crops/carrotdiverse>). Volatile organic compounds are associated with aromatic properties and pathogen resistances and knowledge of their composition in the EVA carrot accessions would add significant value to the project, which is also appreciated by the private sector partners. The LC-MS analysis had not been included in the original workplan, but performing this analysis on the genotyped panel would allow to conduct GWAS for metabolite production in addition to other traits already collected in the trial, including biotic stress traits and morphology. This activity was identified by the EVA Carrot network as a useful add-on made possible through the project extension until 2024 but has not been previously budgeted and EUR 8,500 are requested to cover the associated costs.

In the EVA Pepper collection, from the initially selected 230 accessions, so far only 160 accessions have been genotyped and phenotyped, including 110 *Capsicum annuum* accessions. However, in order to enable effective GWAS for traits of interest for breeders, a minimum of 150 *C. annuum* accessions are recommended for statistical analysis and the network has therefore identified an additional 50 *C. annuum* accessions to be added to the initial set. These accessions had not previously been included in phenotyping and genotyping, due to capacity issues. With the extension of the project until December 2024 it has become possible to multiply these lines for genotyping and phenotyping, enabling GWAS analysis for traits of interest in the larger accession set. Additional phenotyping will also include abiotic stress trials conducted by the new partner CNR-IBBR, facilitating GWAS also for traits relevant for breeding climate-smart varieties. The costs for genotyping with the same 40k SNP array used for the other samples had not previously been included in the budget and EUR 6,500 are requested to cover the associated costs.

Data curation, management and analysis continue to be big challenges for the projects, considering the large datasets created in the genotyping and phenotyping experiments of the different networks (295 datasets uploaded by EURISCO-EVA by 30 June 2023). Despite providing standard data collection templates that were simplified as much as possible and providing guidance and training in the use of these templates, some partners still have problems submitting their data in the recommended standardized format, thus requiring extensive data curation by the EVA coordinator and communication with the evaluators. In 2023, more than 200 trials have been planned in the different networks and to facilitate timely data analysis, upload to the database by end of 2023 is important for the successful completion of the project. Management of corresponding metadata and maintenance of the EURISCO-EVA intranet to ensure the high quality of the datasets also in view of future publication in EURISCO, require special attention. For example, detailed metadata for experimental trials along with meteorological data are required for analysis of environmental effects and need to be collected, images of EVA accessions should be uploaded and connected with relevant metadata and connections between EVA accessions and associated genotyping datasets should be created. Filippo Guzzon, a Research Specialist recently hired by ECPGR, mainly to work on the pro-GRACE project, will support the EVA project's data curation and management, and an additional contribution to ECPGR staff costs to cover his work on curating the 2023 datasets and metadata would be very welcomed.

Implementation of the EVA networks have been identified as a priority action of ECPGR, incorporated in the Plant Genetic Resources Strategy for Europe and in the work programme of ECPGR for its Phase XI. One intention of the current EVA project was for it to serve as a springboard for additional crop-specific EVA networks that could be established in a similar process. Promotion of the EVA networks during project meetings of the H2020 project BRESOV have resulted in an ECPGR grant scheme activity by the

Grain Legumes Working Group, “Fostering the need of implementation of the ECPGR European Evaluation Network (EVA) on Grain legumes” (ForEVA). ForEVA is a preparatory action to establish a new EVA network on grain legumes, surveying the inventory of grain legumes available for evaluation, identifying stakeholders and possible private sector partners of the future network and developing a workplan and funding proposal based on partner’s priorities. Given the priority the EVA networks have during the next Phase XI of ECPGR, as well as the importance of grain legumes in the context of increasing the availability of plant-based protein in human diets (see EU Farm2Fork strategy), this project and the establishment of a new EVA Legumes network significantly contribute to the sustainability and impact of the current EVA project. The ForEVA project has 25 activity partners and so far identified 25 additional stakeholders (mostly public and private sector breeders) who have signed letters of commitment to contribute to the ForEVA project and future EVA Legumes network. Some of these stakeholders have also expressed interest in joining existing EVA networks, significantly increasing the stakeholder pool for EVA in general. A ForEVA project meeting is planned for 10-11 October 2023 in Bucharest, Romania to discuss priorities and develop the EVA legumes network. Since funding possibilities for the network per se have not yet been identified, additional financial support for the organization of the meeting would be welcomed, both for travel costs contributing to EPGR staff costs to support the administration of this and the EVA maize meeting in November 2023, both of which expect the participation of at least 30 partners in person.

To implement the above described additional activities within the EVA project in 2023, a budget increase of **€ 51,549** is requested to maximize the value of the evaluations conducted so far, enable efficient analysis through management of the EURISCO-EVA database and to increase the impact of the EVA project in general through the establishment of a new crop-specific EVA network on grain legumes.





## 2. Outline of additional Budget for EVA project for 2023.

Budget item	Budget 2023	Remarks
Travel funds vegetables	€ 16,500.00	Budget dedicated for the ForEVA meeting in October in Bucharest, Romania, aimed at establishing a new EVA Legumes network.
Staff costs at ECPGR Secretariat	€ 13,000.00	covers the Research Specialist at 35% for 3 months, for activities dedicated to data curation and management as well as an administrative consultant at 50% for 3 months, for support to the organization of project meetings.
Genotyping vegetables	€ 6,500.00	genotyping of ~50 additional pepper accessions
Lab tests vegetables (carrot & pepper)	€ 8,500.00	Volatile analysis of 660 carrot samples with LC-MS
<b>Subtotal</b>	€ 44,500.00	
Overheads (15.84%)	€ 7,049	rounded to the next full Euro (original amount 7,048.80)
<b>Total</b>	<b>€ 51,549</b>	

**3. Total Budget of the EVA Project divided for the periods Jun-Dec 2019, Jan-Dec 2020-2024, with modified budget items highlighted in red:**

Budget item	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Budget 2023	Budget under revision 2023	Budget 2024	Total Budget EUR	New revised Budget EUR
Multiplication and distribution of maize accessions		4,590.00	9,096.44	7,234.28	10,000.00	10,000.00		30,920.72	30,920.72
Multiplication and distribution of wheat and barley accessions	20,000.00	15,000.00	5,000.00					40,000.00	40,000.00
Multiplication and distribution of vegetable accessions		1,072.33	1,417.80	318.62	1,000.00	1,000.00		3,808.75	3,808.75
Lab tests vegetables (carrot & pepper)	1,500.00	3,000.00	10,440.00	7,726.16	1,432.22	9,932.22		24,098.38	32,598.38
Multilocation trials vegetables (carrot)		9,200.00	4,300.00					13,500.00	13,500.00
Genotyping wheat/barley		36,613.20	35,040.00	1,152.94	7,901.94	7,901.94		80,708.08	80,708.08
Genotyping vegetables		10,000.00	39,755.00	2,646.62		6,500.00		52,401.62	58,901.62
Genotyping maize		23,750.00	7,938.00	17,062.00				48,750.00	48,750.00
Travel funds wheat/barley	-	-		8,173.18			16,326.82	24,500.00	24,500.00
Travel funds vegetables	-	-		10,287.10	16,212.90	32,712.90		26,500.00	43,000.00
Travel funds maize		-	610.45	6,793.12	20,000.00	20,000.00	2,596.43	30,000.00	30,000.00
Provision of data from past evaluation of wheat/barley accessions to EURISCO		18,500.00						18,500.00	18,500.00
Provision of data from past evaluation of maize core collection accessions to EURISCO		18,500.00						18,500.00	18,500.00
Technical coordination/ Staff costs at ECPGR Secretariat	24,912.00	59,047.00	55,374.00	35,667.00	35,000.00	48,000.00	20,000.00	230,000.00	243,000.00

<b>Upgrade of EURISCO</b>		36,653.02	60,824.23	40,378.68				137,855.93	137,855.93
<b>Data analysis</b>					40,000.00	40,000.00	29,191.17	69,191.17	69,191.17
<b>Communication</b>		10,515.35			5,000.00	5,000.00		15,515.35	15,515.35
<b>Subtotal</b>	46,412.00	246,440.90	229,795.92	137,439.70	136,547.06	181,047.06	68,114.42	864,750.00	909,250.00
<b>Overheads (15.84%)</b>	7,351.66	39,036.24	36,399.67	21,770.45	21,629.05	28,678.05	10,789.32	136,976.40	144,025.40
<b>Total</b>	53,763.66	285,477.14	266,195.59	159,210.15	158,176.11	209,725.11	78,903.74	1,001,726.40	1,053,275.40