



ECPGR Activity Grant Scheme Proposal Form

Sixth Call

Activity Proposal

Activity	
Full title	Facilitating use on the European perennial ryegrass collection: improving access to genetic resources and C&E data
Acronym (or short title)	ImprovLoliumCol
Duration of Activity (in months)	36
Start date – End date Please indicate start date not earlier than 3 months after deadline of call	01.09.2018-31.08.2021

Applying Working Group(s)

	Working Group	Indicate name and surname of Working Group Chair
1.	Forages	Anna Palmé
2.	Documentation Information (Doc&Info)	Theo van Hintum
3.		
4.		

Activity Coordinator

Activity Coordinator	
Name and Surname	Sampoux, Jean-Paul
Nationality	France
Current position	Plant breeding scientist and genebank curator
Institute	INRA Lusignan
Country	France
Telephone	+33 (0)5 49 55 60 27
Email	<jean-paul.sampoux@inra.fr>

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Activity Partners

Please note that each partner needs to be a member of a Working Group's Pool of Experts to be eligible.

A maximum of 12 funded partners can be listed. For self-funded partners please use the separate box below.

Partner ID No.	Name and Surname	Institute	Country
1	Sampoux, Jean-Paul	INRA	France
2	Willner, Evelin	IPK	Germany
3	Palmé, Anna	NordGen	Sweden
4	Ghesquiere, An; Muylle, Hilde	ILVO	Belgium
5	Barata, Ana Maria	INIAV	Portugal
6	Norkeviciene, Egle; Kemesyte, Vilma	LAMMC	Lithuania
7	Sokolovic, Dejan	IKBKS	Serbia
8	Weise, Stephan	IPK	Germany
9	Aavola, Rene	ETKI	Estonia
10			
11			
12			

Self-funded partners

Partner No.	Name and Surname	Institute	Country
1			
2			
3			
4			
5			
6			

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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 ECPGR Working Group for Forages has already committed itself to meet the ECPGR objectives for phase IX (2014-2018) by implementing two previous Grant Scheme Activities in the frame of the First and Second ECPGR calls for activities. These activities have especially made progress towards Objectives 1 and 2 of phase IX. The present proposal aims to strengthen these advances for perennial ryegrass, a major forage grass species, by taking advantage of data and results of the FACCE-JPI ERA-NET+ project *GrassLandscape* in which several members of the working group have been involved. In this project, 438 accessions from the natural diversity of perennial ryegrass provided by genebanks of almost all the Working Group members have been extensively genotyped and phenotyped, and documented about the environment of the accessions' collection sites. The proposed *Activity* aims to use information collected in the frame of this project to help the commitment of the Working Group in meeting the Objectives 1 and 2 of the ECPGR phase IX. Only a part of the accessions used in *GrassLandscape* were previously flagged to enter the EFC (European Forage Collection) in the frame of AEGIS. The *Activity* will first list accessions used in the *GrassLandscape* project that were not already included in the EFC and will contribute to promote their inclusion, hence contributing to Objective 1 of phase IX. The phenotypic data recorded in the frame of *GrassLandscape* will be uploaded to the EURISCO database as C&E data, as well as additional information about the sites of origin of the accessions, hence contributing to Objective 2 of phase IX. Furthermore, the analysis of the *GrassLandscape* data will enable us to define several nested levels of core collection that could be flagged as additional information in EURISCO to help the choice of accessions for future projects; this also contributing to Objective 2. This contribution of the *GrassLandscape* project to the objectives of the WG for Forages was included in the Workplan for 2015-2018 of the WG.

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

The *GrassLandscape* project has been an unprecedented opportunity to collect exhaustive information about the natural diversity of perennial ryegrass. This information, and the set of accessions used, represent a valuable basis for further investigations on the genetic diversity of perennial ryegrass and for breeding purposes. It is therefore important that accessions used are secured as entries in the EFC and that the recorded data are made available through EURISCO. This will make a substantial progress in the achievement of objectives 1 and 2 of phase IX for perennial ryegrass.

– **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 *Activity partners* will include the *Activity* coordinators Jean-Paul Sompoux (INRA) and Evelin Willner (IPK), the member of the ECPGR WG for Forages from ILVO who is also partner in the *GrassLandscape* project, other members of the ECPGR WG for Forages willing to participate in the *Activity*, the Chair of ECPGR WG for Forages Anna Palmé and the EURISCO coordinator Stephan Weise also member of the ECPGR WG Doc&Info.

The processing of the data from the *GrassLandscape* project will be carried out by, and shared between, the *Activity partners* who are also partners in the *GrassLandscape* project, since they have direct access to these data.

The other *Activity partners* will be queried for their expertise about which accessions to include in the EFC, which data to include in EURISCO, how to set up core-collections of perennial rye-grass. They will also contribute networking to get agreement from genebank curators for inclusion of accessions in the EFC and to consult the other members of WG for Forages on different issues.

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– **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 Activity will include a *Preliminary workshop* and three tasks:

- **Preliminary workshop:** This workshop will include the Chair of the WG for Forages (Anna Palmé), the EURISCO coordinator (Stephan Weise), and the other *Activity partners*. During this workshop, a detailed view of accessions included the *GrassLandscape* project and of data possibly delivered by this project will be provided by *Activity partners* also members of the *GrassLandscape* consortium. Accessions used in *GrassLandscape* and not already included in the EFC will be identified and it will be decided which ones (if not all) among these accessions should be worthwhile to include in the EFC. A precise workplan (milestones and deadlines) will be set up to move forward three tasks by the *Activity partners*.

- **Task 1:** Including accessions used in *GrassLandscape* in the EFC (Sept 2018 – August 2019). A list of the *GrassLandscape* accessions not already included in the EFC and worthwhile to be included will be set up. A memorandum will be written by the *Activity partners* to explain why it is important that these accessions should be included in the EFC. This memorandum will emphasise the great amount of information (genomic, phenotypic, environmental descriptors) now available for these accessions, and the need to secure these accessions in the EFC for future projects. On the basis of this document, the *Activity partners* will ask genebank curators to add the targeted accessions to their contribution to the EFC. In the case when accessions have not beforehand been included in EURISCO, the *Activity partners* will encourage genebanks to query their National Focal Points (NFPs) for including them.

- **Task 2:** Inclusion of the *GrassLandscape* data into EURISCO. Data from the *GrassLandscape* project to be included in the EURISCO database will include C&E data, as well as new environmental descriptors collected for the needs of *GrassLandscape*. Data to be included in EURISCO will have been agreed on during the *Preliminary workshop*.

- **Sub-task 2.1** (Sept 2018 – August 2019): The *Activity partners* will consult with the whole ECPGR WG for Forages, the Doc&Info WG and the EURISCO coordinator for agreement on inclusion of new environmental descriptors of the *GrassLandscape* project as additional forage-specific passport descriptors in EURISCO. In a first step, the environmental descriptors from *GrassLandscape* will be uploaded on dedicated portals hosted by INRA and IPK information platforms in order to make them readily publicly available. Their possible integration as passport data in EURISCO will come in a second step subject to agreement by relevant ECPGR authorities.

- **Sub-task 2.2** (Sept 2019 – Dec 2019): A meeting of the *Activity partners* will be organised in order that the EURISCO coordinator Stephan Weise deliver a small training for *ad-hoc* formatting of C&E and environmental data from *GrassLandscape* for inclusion into EURISCO. This training will be adapted according to decisions taken during the *Preliminary workshop* and in sub-task 2.1. During this meeting, the final list of C&E and environmental data from *GrassLandscape* to be uploaded into EURISCO will be decided.

- **Sub-task 2.3** (Dec 2019 – Aug 2020): The *Activity partners* will prepare and format data from *GrassLandscape* and deliver these data to the EURISCO coordinator for inclusion in EURISCO. All accessions should at this stage already be included in EURISCO. According to the procedure “*Uploading characterization and evaluation data into EURISCO*” (August 2017), the uploading of C&E data could be delegated by relevant NFPs to the *Activity partners*. Besides, the *Activity partners* will propose the NFPs to upload *GrassLandscape* data agreed on as passport data.

- **Task 3:** Setting up different levels of perennial rye-grass core-collections to be flagged in EURISCO

- **Sub-task 3.1** (Sept 2020 – Dec 2020): On the basis of results delivered by the *GrassLandscape* project, The *Activity partners* will suggest different nested levels of core-collections for accessions from the natural diversity of perennial ryegrass. These core-collections will be set up in order to represent the neutral genomic structure of the natural diversity of perennial ryegrass while maximising its natural genomic adaptive diversity and its phenotypic diversity. The numbers of accessions in the

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different nested levels of core-collections could be set for example to 70, 130 and 200 accessions (to be decided upon data and discussion with the WG for Forages).

- *Sub-task 3.2 (Jan 2021 – May 2021):* The *Activity partners* will consult the whole ECPGR WG for Forages, the Doc&Info WG and the EURISCO coordinator for agreement on inclusion of core-collection flags into EURISCO.

- *Sub-task 3.3 (June 2021 – August 2021):* The *Activity partners* and the EURISCO coordinator will implement the core-collection flags into dedicated portals hosted by INRA and IPK information platforms and next into EURISCO.

– **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 analyse/safety-duplicate/evaluate/collect XY accessions (listed) of “Genus species”, provided by genebank Z/ farmers in country W /to be collected in country P..., etc.*).

The investigations of the *GrassLandscape* project have been based on a set of genebank accessions including 438 accessions from the natural diversity of perennial ryegrass. 380 of these accessions were provided by the genebanks of 15 members of the ECPGR WG for Forages.

These accessions were genotyped using a GBS protocol that yielded more than 500 000 SNPs usable for genetic analyses. Accessions were furthermore phenotyped in dense micro-swards in three locations (INRA, IPK and ILVO). Phenotypic traits related to phenology, morphology, growth dynamic, tolerance to biotic and abiotic stresses were recorded. The environment of collection sites was documented by mining climatic databases as well as soil, subsoil and landcover databases. Bioclimatic parameters were also computed from climatic data to report the climatic suitability of collection sites for the growth of perennial ryegrass.

The *GrassLandscape* consortium has only kept a few grams of seeds from each accession as a backup for the needs of the project. The maintenance of the accessions is therefore still in the hands of the genebanks which provided them.

– **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 priority of this *Activity* will be to make the data produced by the *GrassLandscape* consortium available to a large community of scientists and breeders and to make sure that the important accessions identified by this project will be secured in the future. Advances resulting from this *Activity* will make a strong basis to build new projects at the European scale investigating and using the genetic diversity of perennial ryegrass. More specifically, these might serve to set up new European breeding research towards the adaptation of perennial ryegrass to climate change, as a continuation of the commitment of the *GrassLandscape* project.

Practically, the inclusion of most accessions used in *GrassLandscape* into the EFC and their documentation with data from this project will make a very substantial advance in meeting Objectives 1 and 2 of the ECPGR phase IX for perennial ryegrass, which is one of the major forage species in Europe.

– **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.

The *GrassLandscape* project was awarded by the 2014 FACCE-JPI ERA-NET+ call *Climate Smart Agriculture* and has been granted for the period 2015 – 2018. It is coordinated by Jean-Paul Sampaou (INRA) and gathers INRA and EPHE-CEFE in France, IBERS in the UK, IPK in Germany and ILVO in Belgium. It uses an innovative methodological frame (Landscape genomics) to screen the natural diversity of perennial ryegrass (*Lolium perenne*) in order to discover genetic variability involved in environmental adaptation, and more specifically in climatic adaptation. The Landscape genomics approach is based on the combined use of methods correlating genomic polymorphisms and environmental variations at sites of origin of genotypes (or populations) and of tests of signature of selection. In addition to the Landscape genomics analyses, Genome-Wide Association Studies (GWAS) have been implemented to detect genomic polymorphisms linked to phenotypic variations between populations and the history of natural expansion of perennial ryegrass across Europe has

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been inferred by a phylogeographic reconstruction. The objective is ultimately to define allelic profiles of perennial ryegrass expected to provide climatic adaptation at regional scale in anticipation of the anthropogenic climate changes foreseen to occur in the next decades.

GANTT chart of the Activity 'ImproveLoliumCol'

	2018	2019	2020	2021
Preliminary workshop	█			
Task 1 Including new accessions in the EFC	█	█		
Task 2 Including new data in EURISCO				
2.1 - Consultation for addition of new Forage environmental descriptors into EURISCO	█	█		
2.2 - Mid-term meeting and training to format data for uploading to EURISCO			█	
2.3 - Preparing data for uploading to EURISCO			█	
Task 3 Setting up core-collections				
3.1 - Design of several levels of core-collection				█
3.2 - Consultation for agreement to flag core-collections in EURISCO				█
3.3 - Implementing core-collection flags on crop portals and possibly into EURISCO				█

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 outcome, output, activity
1	A progress in exhaustiveness of the European Forage Collection (EFC) for accessions from the natural diversity of perennial ryegrass. Accessions extensively documented in the <i>GrassLandscape</i> project will be included in the EFC.	Outcome 1, output 1.2, activities 1.2.1, 1.2.2, 1.2.3
2	A progress of the documentation of EURISCO for C&E data from accessions representing the natural diversity of perennial ryegrass across Europe	Outcome2, output 2.2, activities 2.2.1 and 2.2.2
3	Additional environmental descriptors of sites of origin of accessions from the natural	Outcome2, output 2.4, activities 2.4.1 and 2.4.2

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	diversity of perennial ryegrass first accessible via crop portals and possibly later through EURISCO.	
4	Several nested levels of core-collection for accessions from the natural diversity of perennial ryegrass first accessible via crop portals and possibly later through EURISCO.	Outcome2, output 2.4, activities 2.4.1 and 2.4.2

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	Meeting - Preliminary workshop (Sept / Oct 2018) A detailed view of accessions included in the <i>GrassLandscape</i> project and of data possibly available from this project will be provided. <i>GrassLandscape</i> accessions not already included in the EFC will be identified. A precise workplan (milestones and deadlines) will be set up to move forward three next tasks.
2	Other action - Task 1 (Sept 2018 – August 2019) <i>Including accessions used in GrassLandscape in the EFC</i> A list of the <i>GrassLandscape</i> accessions not already included in the EFC and worthwhile to be included will be set up. A memorandum will be written to explain why it is important that these accessions should be included in the EFC. On the basis of this document, the Activity partners will ask genebank curators to add the targeted accessions to their contribution to the EFC. In the case when accessions have not beforehand been included in EURISCO, the Activity partners will encourage genebanks to query their National Focal Points (NFPs) for including them.
3	Other action – Task 2 - Sub-task 2.1 (Sept 2018 – August 2019) <i>Delivery of new environmental descriptors from collection sites of natural populations of perennial ryegrass</i> The <i>Activity partners</i> will consult with the whole ECPGR WG for Forages, the Doc&Info WG and the EURISCO coordinator for agreement on inclusion of new environmental descriptors of the <i>GrassLandscape</i> project as additional forage-specific passport descriptors in EURISCO. In a first step, the environmental descriptors from <i>GrassLandscape</i> will be uploaded on dedicated portals hosted by INRA and IPK information platforms in order to make them readily publicly available. Their possible integration as passport data in EURISCO will come in a second step subject to agreement by relevant ECPGR authorities.
4	Meeting – Task 2 - Sub-task 2.2 (Sept 2019 – Dec 2019): The EURISCO coordinator Stephan Weise will deliver a small training to the <i>Activity partners</i> for <i>ad-hoc</i> formatting of C&E and environmental data from <i>GrassLandscape</i> for inclusion into EURISCO. During this meeting, the final list of C&E and environmental data from <i>GrassLandscape</i> to be uploaded into EURISCO will be decided. This meeting will also enable to evaluate the progress on already ongoing tasks and to plan next actions to complete the Activity.
5	Other action – Task 2 - Sub-task 2.3 (Dec 2019 – Aug 2020): <i>Inclusion of data from the project GrassLandscape into EURISCO</i> The <i>Activity partners</i> will prepare and format data from <i>GrassLandscape</i> and deliver these data to the EURISCO coordinator for inclusion in EURISCO. Ideally, the uploading of C&E data could be delegated by relevant NFPs to the Activity partners. Besides, the <i>Activity partners</i> will propose the

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	NFPs to upload <i>GrassLandscape</i> data agreed on as passport data.
6	Other action - Task 3 - Sub-task 3.1 (<i>Sept 2020 – Dec 2020</i>): On the basis of results delivered by the <i>GrassLandscape</i> project, The <i>Activity partners</i> will suggest different nested levels of core-collections for accessions from the natural diversity of perennial ryegrass.
7	Other action – Task 4 - Sub-task 3.2 (<i>Jan 2021 – May 2021</i>): The <i>Activity partners</i> will consult the whole ECPGR WG for Forages, the Doc&Info WG and the EURISCO coordinator for agreement on inclusion of core-collection flags into EURISCO.
8	Other action – Task 3 - Sub-task 3.3 (<i>June 2021 – August 2021</i>): The <i>Activity partners</i> and the EURISCO coordinator will implement the core-collection flags into dedicated portals hosted by INRA and IPK information platforms and next into EURISCO.

Additional remarks

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

Remarks:
According to expectable funding, we only plan two meetings of the Activity partners: one meeting at the start of the Activity (see above Workplan – action 1) and another one at mid-term of the duration of the Activity (see Workplan – Action 4). Remote meetings (e.g. Skype meetings) will be organised at any step during the course of the Activity and as often it will appear necessary for the right processing of the Activity. IBERS was partner of the <i>GrassLandscape</i> project. However, the IBERS member of the ECPGR WG for Forages is planning to retire in 2018. The future member of the WG from IBERS is not known so far. Therefore, we did not include a representative from IBERS in the Activity as partner. However, we would be happy to have the opportunity to add the new representative from IBERS in the Activity when this person is known.

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