



# **Scientific and Technological Cooperation in Plant Genome Research as basis of the ‘Knowledge- Based Bio-Economy’**

## ***4<sup>th</sup> Call for Proposals (2009)***

presented by the transnational activity (France, Germany, Spain, and – for the first time - Portugal) and based on the research program “Transnational Plant Alliance for Novel Technologies - toward implementing the Knowledge-Based Bio-Economy’ (PLANT-KBBE) in Europe”.

## 1. Background

So far, the French-German-Spanish cooperation in plant genomics, plant biotechnology and molecular breeding has successfully executed three consecutive calls for cooperative research projects - published under the titles:

- “*Functional and comparative genomics approaches for the investigation and use of natural diversity*” (2003),
- “*Trilateral partnership and beyond: the future for European public/private partnerships in plant genomics*” (2006), and
- “*Scientific and Technological Cooperation in Plant Genome Research as basis of the ‘Knowledge-Based Bio-Economy’*” (2008).

As a result of these initiatives, a total of 35 research proposals have been awarded with grants corresponding a public budget of more than 40 M€.

Originally launched with projects accomplished by purely academic consortia (2003), the trilateral initiative entered a new phase of sustainable groundwork after the adoption of a common strategic document on “*Genomic approaches for the investigation of genetic diversity in crop plants and its use for innovation*” in 2005, which defined the future development of the cooperation with regard to (i) the application of research results to industrial practice, (ii) the strengthening of the competitiveness of the businesses involved and (iii) the reinforcement of the cooperation between public research and industry.

The present document announces the fourth joint call for research projects within the new framework of the transnational cooperation initiative (France, Germany, Portugal and Spain), with the purpose to foster more joint European research and development activities, which are clearly directed towards application-oriented objectives. It focuses again on the **Scientific and Technological Cooperation in Plant Genome Research as basis of the ‘Knowledge-Based Bio-Economy’**. Proposed consortia will be assigned to two different modules, i.e. the respective joint projects are either clearly industry-driven or at least application-oriented. As a principle, collaborations are expected to consist at least of participants from three partner countries, preferably as mixed consortia including researchers from public institutions and private industrial companies. However, bilateral consortia can be accepted in the module of industry-driven cooperation.

Initially, project ideas will be submitted as “Expressions of Interest” and at a later stage as full proposals. Positively evaluated projects are expected to start at the beginning of 2010 (for more details see chapter 6 and the following).

## 2. Motivation

In the future, our agricultural system will be expected to become more sustainable, in order to supply food and feed for a globally growing demand and to ensure an increasing range of non-food products from medicines and biomaterials to alternative sources of biomass as well as bio-energy under sustainable conditions regarding the long future of the planet, i.e. ecobalances. Due to significant advances in plant sciences and biotechnology, these major goals are to be achieved necessarily under a knowledge-based agricultural system. It is also generally accepted that these long term and quite ambitious goals cannot be realized without a sustainable structuring of plant research in the EU. Bearing these challenges in mind and relying on the abovementioned successful collaborative experiences, France, Germany and Spain have been encouraged to further develop their mutual interests through the establishment of a joint research program to support the **“Transnational Plant alliance for novel technologies - toward implementing the Knowledge-Based Bio-Economy’ (PLANT-KBBE) in Europe”**. The common interest in deepening the cooperation in research and development is inspired by the shared vision of the need to build a *KBBE* that will be a major challenge for our economies as well as for our societies within the 21<sup>st</sup> century.

It is evident that the bio-economy – as *the* growing part of the economy in general – is primarily based on the use of renewable biological resources. This includes bio-energy, industrial bio-products and bioprocesses that are derived from those renewable biological resources. The basic knowledge will become a central building block of this bio-industrialization and demands significant investments in research and development as well as in suitable measures accompanying the respective programs. Bio-based industrial products will influence many sectors, including, but not limited to, energy, manufacturing, medicine, food production, and chemical as well as textile industries. Bio-based processes or bioprocesses will be the platform of the future industry and will include living organisms (e.g. plants or micro-organisms) or parts of living organisms (e.g. enzymes) as feedstock or production systems. Therefore, research in these areas will become increasingly integrative. At the same time conventional food and feed will be needed which will be produced under agricultural systems driven by the key principle of

sustainability and under the uncertainties of increasing demand, decreasing hand labor, advanced mechanization, higher cost of raw materials, global (climate) change(s), etc.

### 3. Purpose of the call

Within the framework of the **PLANT-KBBE** program, funding will be provided for transnational, collaborative, application-oriented projects with a high degree of scientific and technical innovation. This call for proposals intends to attract integrative projects that (i) share resources and technologies, (ii) rule out redundancies but provide synergies, (iii) represent as many links as possible of the respective value-added chain, as well as (iv) provide significant contributions to the solution of superior questions of common interest to the three countries. Such projects are expected to strengthen industry's innovative capacity and facilitate its access to future markets. As a basic prerequisite for ensuring the success of this funding strategy, cooperation between industry and science is highly encouraged with the aim to accelerate the application of new findings and to translate research results more quickly into products, services and processes.

In order to realize the above-mentioned goals, two different funding modules are implemented:

- 1) **Module A – industry-driven consortia:** The aim of this module is to foster transnational industry-driven projects. Respective projects should involve at least two private industrial companies from two different partner countries. Essentially, such bilateral collaborations can be accepted on their own, however, additional academic and private partners from other partner countries are encouraged to join such core consortia. Small and medium sized enterprises are particularly addressed to participate. Academic research groups or other public organisations are welcome to participate as partners or coordinators of the consortia.
  
- 2) **Module B – application-oriented consortia:** expected to consist at least of participants from three of the partner countries, preferably as mixed consortia including researchers from public institutions as well as private industrial companies and following clearly application-oriented research objectives. Academic proposals, which may not require the direct participation of a private industry, can be only exceptionally accepted and should in any case fit within the scope of novel interdisciplinary **exploratory approaches for innovative plant genome research with a foreseeable application.**

Projects falling into module A will be prioritized.

Since the purpose of **PLANT-KBBE** also includes the increase of efficiency under sustainability requirements and all along the innovation chain (and not only at the step of raw material production), multidisciplinary proposals that integrate other disciplines in addition to plant biotechnology, such as microbiology, chemistry, chemical engineering, mathematics, informatics, industrial processing and conversion technologies, etc will be highly encouraged. Special interest will be devoted to topics related to the following general fields:

- **Bio-energy**

Developing a secure and sustainable energy supply is a pillar of a KBBE. The term bio-energy comprises the production of heat, electric power and biofuels derived from biomass through a cost-effective process with increased energy efficiency and minimized production of waste. Non limitative examples of topics that may be addressed by proposals are: (i) Engineering crops for biofuels (alcohol, biodiesel and biogas) (**for French participants there is a specific ANR policy described in national annex**); (ii) combustion crops (heating and/or electricity generation via combustion or gasification of biomass used directly as combustible raw material); (iii) modification of ligno-cellulosic material for improved down-stream processing and efficient biocatalytic degradation, (iv) development of crops which have the potential of resource cascading for different energetic but also for industrial applications (biorefinery concept), as well as (v) exploration, development or adaptation of novel energy crops and other possible plant organisms (microalgae and photolithotrophs in general) that are not presently cultivated in Europe but have the potential to do so. Model or “bridging” species are not excluded as far as they can be used to address key issues for bio-energy crop species, yield, stress tolerance, nitrogen fixation, lipid metabolism, cell wall synthesis and softening. The projects could also integrate aspects of the subsequent steps for biomass conversion.

- **Biomaterials and bio-based products (plant cell factory)**

The combination of plant breeding, genetic engineering and industrial (white) biotechnology in order to produce chemicals and raw materials with industrial or

pharmaceutical application is another column of a KBBE. Plant biotechnology will contribute to key sectors of industry by providing biomaterials including novel biopolymers and bioplastics for the construction and engineering sector. The production of substances of high added value, such as fine and special chemicals is expected to increase significantly. However, substantial progress in these fields will rely on the availability of novel plants designed to provide high yields and properties well suited for industrial processing. Non limitative examples that may be addressed by proposals are: (i) Yield and chemical suitability of plant biomolecules to down-stream industrial processing; (ii) improvement of fractionation for streamlined biorefinery; (iii) targeting the storage of specific molecules to certain compartments/organs of the plants, as well as (v) developing new high-throughput systems of screening.

- **Sustainable production of healthier and safer food and feed**

Healthy nutrition is one of the keys to the prevention of diseases. The coming years will see the advent of custom-tailored, personalized nutrition (nutraceuticals, functional foods) providing better food with improved health attributes while minimizing in parallel inputs in agriculture and the amount of toxins and/or allergens to increase consumer safety. Non limitative examples of topics that may be addressed by proposals are: (i) Enhancing metabolic pathways for improved nutritional value and quality; (ii) developing crops for functional food with added value significant to consumers (iii) genomic approaches to reduce input uses (such as pesticides, water, fertilizer), (iv) increase of yield and yield stability as well as (v) new studies of plant interactions with soil micro-organisms to reduce inputs (water, nutrients, fertilizers and pesticides); in this respect, metagenomics of soils supporting cultivated plants is illegible.

- **Systems Biology**

Corresponding proposals should address topics in a way that they utilize a *Systems Biology* approach in order to solve the underlying biological question. Respective *Systems Biology* approaches need to provide a comprehensive quantitative understanding of the dynamic interactions that take place between the components as well as modules of a biological system, in order to appreciate the system as a whole and, in addition, to enable significant predictions. *To reach this goal mathematical concepts need to be applied to biological systems and iterative processes involving lab experiments and computer modelling are of particular importance.* The foundations for *Systems Biology* approaches are interdisciplinarity and division of labor of various

scientific disciplines (such as biology, mathematics, informatics, physics, chemistry, and engineering) within a consortium. All proposals need to comply with the above mentioned approach of *Systems Biology* and should be build on existing data (such as genome-wide mutagenesis libraries, large-scale transcriptome, proteome and metabolome data sets) where possible, although quantitative data may be collected within the framework of a project. The biological questions of these projects could address cellular or intracellular processes e.g. (i) a metabolic pathway and/or interconnected metabolic pathways (Metabolic Control Analysis), (ii) a tissue or an organ (e.g. a seed or a leaf), or (iii) a whole plant (which could be considered either as a whole or as a part of a cultivated field).

#### **4. Financial modalities, funding recipients and funding prerequisites**

Positively evaluated projects that are selected for funding will receive their grants directly from the responsible national funding bodies. Within a consortium funding to the individual research group will be given as well as administered according to the terms and conditions of the responsible national funding bodies taking into account all other applicable national regulations and legal frameworks. Applicants should take note of respective national annexes (see electronic attachments to the call text), and should address their respective national contact person (for details see section 9.) for any queries related to these annexes.

Only true transnational projects will be funded. In general, each proposal must involve research groups from at least three partner countries, although bilateral consortia could be exceptionally accepted. The total number of participants should be appropriate for the aims of the research project and reasonably balanced in terms of national participation and exploitation of the results. All partners of a collaborative project should significantly contribute to the overall critical mass of the consortium in order to achieve ambitious scientific as well as application-oriented goals and to gain a clearly noticeable added value from working together. Consortia may be composed by research groups from universities (or other higher education institutions), non-university public research institutions, as well as commercial companies, in particular small and medium-sized enterprises. A **Project Coordinator** who represents the consortium externally will be responsible for its internal management.

In order to provide for proper protection of intellectual property rights (IPR) and dissemination of research results arising from the collaborative research projects, each

consortium is required to sign a **Consortium Agreement (CA)** by the start of the project, which will clarify the responsibilities of all partners and should include arrangements for handling of IPR provided for and arising from the collaborative work. The CA, together with any other information required by national regulations, must be made available on request to the national funding agencies. In order to address this issue adequately the funding partners have jointly prepared and agreed about IPR conditions a model CA that will be available at <http://www.agence-nationale-recherche.fr/>. Its use will be highly recommended to all consortia.

This call is also open to partners from other countries, particularly from Europe, provided that they bring - as supplements to otherwise trilateral consortia - their own funds and demonstrate true added value to the partnership. Within the proposal they have to state clearly if the necessary funds are already secured or how they plan to ensure the availability of these funds until the project start.

## **5. PLANT-KBBE management boards**

i) The **Direction Panel** is composed of members from each funding organization participating in the call. It will supervise the whole procedure of the call and, as a result, based on the evaluation results of the Advisory Board, makes the ultimate recommendation of the proposals to be funded by the national funding bodies.

ii) The **Advisory Board** is a panel of international experts from science and industry that will be responsible for the scientific as well as technical aspects of the evaluation procedure.

iii) The **Call Secretariat** is the centre for the management of the call. It will deal with all the information that flows between the applicants (reception of the applications, sending of decisions), the reviewers (contacting the referees, sending the proposals, collecting the evaluation reports) and the representatives of the funding organizations.

To ensure objectivity during the evaluation procedure, those persons who belong to these boards will not submit proposals to this call.

## **6. Partnering Workshop**

A Partnering Workshop will be organized to bring together interested people from both the academia and the industrial sector, related to the different disciplines that are

expected to be integrated in the projects. Participants (pre-formed consortia or individual research groups) are invited to introduce their expertise, work or project ideas by submitting a short **Expression of Interest** (Eol) (a maximum of 2 pages) before the partnering event. Eols will be presented in the Workshop by means of posters or short oral presentations. This event will take place in Spain and the official language of the meeting will be English. Details about the exact location, the time point and registration opportunities as well as a standard form for the preparation of an Eol is available at <http://www.agence-nationale-recherche.fr/>. The deadline for registration and submission of Eols is **27 March 2009**. They must be sent by mail to : **laborde@genoplante.com**. Participation in the Workshop is highly recommended, although it is not a prerequisite for submitting a proposal afterwards.

## **7. Submission of proposals**

Full proposals are to be submitted to the Call Secretariat by **29 May 2009** midnight. by means of the application system available at <http://www.agence-nationale-recherche.fr/>. . They must be written in English (Arial type 10 pt.) and include:

- Summary of the project (goal(s)work plan and expected results; max. 1 page)
- Financial plan (on the form provided)
- Aims (1 page)
- Background and state-of-the-art (max. 2 pages)
- Work plan (including involvement of participants in different work packages with names and men-months for each partner; max. 6 pages, plus lists of milestones and deliverables)
- Added value of the proposed international collaboration (max. 1/2 page)
- Exploitation plan: Prospects regarding application in industry, market potential, position with regard to IPR both within and outside the consortium (e.g. barriers to sharing materials or results) (max. 2 pages)
- Description of ongoing projects of each participant related to the present topic, indicating funding sources and amounts, and possible synergies with this proposal (max. ½ page per participant)
- Brief CVs of the project leaders, including lists of up to five recent publications (max. 1 page each)

- Description of any significant facilities and large equipment available to the consortium (max. ½ page).
- Description of any training/exchange activities foreseen within the project, if applicable (max. ½ page).
- For private companies: short description of the company, own contribution to the project (max. 1 page per company).
- List of scientists not recommended as evaluators for known or suspected conflict of interest.

The proposals should not exceed the limits shown above. No additional documents will be considered. The duration of projects is limited to three years.

## **8. Evaluation and selection of proposals**

i) Formal check. The Call Secretariat will assess proposals to ensure that they meet the necessary formal criteria (date of submission; number of participating countries; inclusion of all necessary information in English). In parallel, the respective national funding organizations will perform a formal check of compliance with the respective national regulations (eligible type of institutions and complementary enforced information). Proposals not meeting the formal criteria will be rejected. Proposals passing both stages will be forwarded to the Advisory Board.

ii) Peer review. The Advisory Board will select suitable experts from the international scientific community as well as independent industry experts that are available and prepared to evaluate the proposals. External reviewers will carry out a scientific and technical evaluation according to the following specific evaluation criteria:

- Scientific quality, level of innovation and soundness of the project
- Feasibility of the project (adequate budget, resources, time schedule)
- Relevance to the aim(s) of the call
- International competitiveness of the proposal
- International competitiveness of participating research groups in the field(s) of the proposal (previous work in the field, expertise of the research groups)
- Level of collaborative interaction between the groups and added value to be gained by the proposed consortium (individual contribution of each partner)

- Potential of the expected results for future industrial applications (economic innovation potential, market potential and competitiveness, quality of exploitation plan)
- Sustainability parameters, ecobalances concerns

iii ) Final selection. Based on evaluation reports, the Advisory Board will develop two ranking lists of proposals with the potential to be funded for two types of projects:

- Modul A: Industry-driven applied research projects with significant contribution of companies
- Modul B: A smaller number of Exploratory research projects, however with a clear foreseeable application-orientation

iv) The Direction Panel, after a common meeting and discussion with the Advisory Board, will propose a final list of projects recommended for funding. Approved by the national funding institutions the participants involved in the selected projects will be granted through the national programs (see specific national regulations in the respective “national annex” and/or contact the respective national agency/ministry). Anticipated start of the projects is early 2010.

## **9. Contact persons**

Contact point for the project coordinator is the Call Secretariat. The project coordinator will be the person contacted by the Call Secretariat during the application procedure, so he/she is obliged to forward this information to the other affected participants. Each country has national contact persons who can be contacted for information about the specific national requirements:

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## **10. Reporting requirements**

The coordinators of all funded projects are requested to submit an annual scientific project report, to the Call Secretariat together with summary reports from each participant (everything in English). In accordance with specific national regulations, each participant needs also to submit periodical financial and scientific reports and a final report to its national funding agency. The coordinators will present the results of their projects at annual status seminars to be organized by the Call Secretariat.