

# Germany

[http://www.Arabidopsis.org/info/2010\\_projects/Germany.jsp](http://www.Arabidopsis.org/info/2010_projects/Germany.jsp)

Contacts:

- 1) **MASC**, German representative: Thomas Altmann; University of Potsdam; E-Mail: [taltmann@rz.uni-potsdam.de](mailto:taltmann@rz.uni-potsdam.de)
- 2) **AFGN** (*Arabidopsis* Functional Genomics Network, DFG funded): Klaus Harter; University of Tuebingen; E-Mail: [klaus.harter@uni-tuebingen.de](mailto:klaus.harter@uni-tuebingen.de)
- 3) **GABI** (Genome Analysis of the Plant Biological System, BMBF funded): Bernd Weisshaar; Bielefeld University; E-Mail: [bernd.weisshaar@uni-bielefeld.de](mailto:bernd.weisshaar@uni-bielefeld.de)

Research on *Arabidopsis thaliana* has a long history in Germany, and many individual research groups have used this reference plant for analysing different aspects of plant biology. Two independent programs support research on plant functional genomics in Germany, namely the *Arabidopsis* Functional Genomics Network (AFGN), supported by the German Research Foundation (DFG), and the more crop, and therefore application oriented plant genomics research program, GABI, funded by the Federal Ministry of Education and Research (BMBF). Both programs work together in close cooperation, with intensive links at both the scientific and the contributor level.

The DFG-supported AFGN was founded by a bottom-up approach of the German *Arabidopsis* research community in 2001 as a basic research program. AFGN currently funds 25 projects in Germany and has, almost from the start, been organized in close coordination with the 2010 Project of the United States National Science Foundation (NSF). Together with many other research programs throughout the world, these programs aim to elucidate the function of all *Arabidopsis* genes by the year 2010. A coordinated and unique reviewing process of the jointly submitted proposals from US and German research groups was organized for the first time for the projects currently running between the 2010 Project and the AFGN.

## AFGN Current Research Projects

The main activities of the ongoing research projects concentrate on the analyses of members of selected multiprotein families and cover the elucidation of their structure, activity, interaction partners, gene expression, intracellular localisation, post-translational regulation and function. From the methodical point of view, the AFGN members utilize many techniques and methods of the functional genomics approach.

In 2003, AFGN initiated the largest international *Arabidopsis* transcriptome project entitled AtGenExpress. It consists of 497 data sets almost all of which cover duplicate or triplicate experiments. The AFGN part of the project includes 310 data sets for *Arabidopsis* development and responses to the biotic and abiotic environment (photomorphogenic light, different stresses, pathogens) and for several natural accessions. Further major contributions to AtGenExpress were provided by colleagues from RIKEN (mainly hormone and inhibitor responses), from the 2010 Project (responses to pathogens) and from ETH Zürich (cell cycle). The overall database, which is open to the scientific public, provides the experimental base for many open access bioinformatics tools such as Genevestigator and MapMan.

## AFGN programs and funding

- In collaboration with the 2010 Project, AFGN founded the Young Researcher Exchange Program. This program financially supports short term research visits (up to three months) of young German scientists in cooperating US laboratories and vice versa.
- Together with colleagues from Austria and Switzerland, AFGN initiated an international conference on *Arabidopsis* functional genomics which is recognized and attended by many European and US scientists.
- The second funding period of the AFGN will end in the fall of 2007. Discussions about the structure and the main goals for future funding periods are presently underway. In any event, AFGN will maintain the basic character of its research and will continue to concentrate on the reference plant *Arabidopsis*. The future direction of the research in AFGN will aim to get in-depth predications of how certain plant processes and pathways take place under given endogenous or environmental conditions. This approach requires the analysis of gene networks and a strongly integrated view of gene functions.

### **GABI funding and programs**

GABI, a BMBF funded German plant genome research program is now in its seventh year. With an annual budget of 10 million Euros plus an additional 20% from industrial partners GABI is the biggest research program in plant genomics in Germany. Approximately 30% of the total budget supports research on *A. thaliana*. In its second program period translational research was introduced: topic-oriented research clusters combine basic research on *A. thaliana* with research activities on crops. Since the start of GABI, *A. thaliana* has also served to deepen international cooperation through bilateral as well as trilateral research projects between France (Génoplate), Spain and GABI.

Within GABI, important resources such as the GABI-KAT lines, the world's second largest T-DNA insertion line population, were generated and are available to the global research community. The transfer of the confirmed insertion lines from Cologne to the Nottingham Stock Center (U.K.) began in 2005 and will continue until the conclusion of the GABI-KAT project. The generation of plant resources for the analysis of natural diversity (natural accessions and experimental populations such as F1's, F2's, RIL's, NIL's), as well as their geno- and phenotyping to provide characterized biological material for researchers, is coordinated between colleagues from Génoplate (France) and GABI. A database summarising genetic and experimental data is under construction, and data warehousing, management and visualisation are primary foci for bioinformatics activities in GABI. GABI-Matrix at MIPS (GSF Munich) and the GABI-Primary Database (RZPD Berlin) are the two big centres for bioinformatics in GABI, flanked by many decentralized bioinformatics groups within the research institutions. ARAMEMNON, one of the world largest databases on *Arabidopsis thaliana* membrane transport proteins, was generated to aid in the identification, classification and characterization of novel transporters. The GABI TILLING facility is an example of a coordinated technological development that expands the worldwide capacity for TILLING screens in *Arabidopsis*.

Discussions have also started within the GABI community on how to continue research and development activities. GABI-FUTURE (2007-2013), the third funding phase of the national plant genomics program, is underway and is expected to increase the research budget significantly. GABI-FUTURE will continue to bundle fundamental and applied, but still pre-competitive, research activities within a single program. Public-private-partnerships, the backbone of the program, will continue and more partners will be needed for the gradual creation of a knowledge based bio-industry. Furthermore, basic research on crops will be improved to close the gaps in knowledge and to ease the technology transfer from *A. thaliana* to important crop plants. GABI and the AFGN played an important role during the establishment of the European Research Area Network on plant genomics (ERA PG). Out of the total annual budget of approximately 10 million Euros for the first joint call of the ERA PG, the two German funding agencies support German research groups with more than 3 million Euros per year.

### **Major funding sources for *Arabidopsis* functional genomics:**

- AFGN: ([www.uni-tuebingen.de/plantphys/AFGN/](http://www.uni-tuebingen.de/plantphys/AFGN/)) 2 million €/year budget from the German Research Foundation (DFG) ([www.dfg.de](http://www.dfg.de))
- GABI: ([www.gabi.de](http://www.gabi.de)) 12 million €/year from the Federal Ministry of Education and Research ([www.bmbf.de](http://www.bmbf.de)) and a Business Platform promoting GABI Plant Genome Research e.V. (WPG) ([www.wirtschaftsverbund-gabi.de](http://www.wirtschaftsverbund-gabi.de))

### ***Arabidopsis* genomics tools and resources:**

- AtGenExpress: ([web.uni-frankfurt.de/fb15/botanik/mcb/AFGN/atgenex.htm](http://web.uni-frankfurt.de/fb15/botanik/mcb/AFGN/atgenex.htm))
- GABI-KAT: ([www.gabi-kat.de/](http://www.gabi-kat.de/))
- GABI-Matrix: (<http://mips.gsf.de/projects/plants/>)
- GABI-PD: (<http://gabi.rzpd.de/>)
- GABI-ARAMEMNON: ([www.uni-koeln.de/math-nat-fak/botanik/bot2/agflue/HOME/projects/GABI\\_rkunze/index.html](http://www.uni-koeln.de/math-nat-fak/botanik/bot2/agflue/HOME/projects/GABI_rkunze/index.html))
- GABI-TILLING: ([www.gabi-till.de/index.de.html](http://www.gabi-till.de/index.de.html))