

# The Netherlands

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

Contacts: Willem Stiekema,

Centre for BioSystems Genomics, Wageningen

Email: [willem.stiekema@cbsg.nl](mailto:willem.stiekema@cbsg.nl)

Ben Scheres

Department of Molecular Cell Biology, University of Utrecht

Email: [b.scheres@bio.uu.nl](mailto:b.scheres@bio.uu.nl)

## Center for BioSystems Genomics, the Netherlands Plant Genomics Network

*Arabidopsis* research within this national plant genomics research program focuses on the analysis of the regulatory network of genetic, biochemical, physiological and environmental interactions that control plant performance and the complex traits involved in plant-oomycete interactions and adaptation to stresses. The Center strives for fully integrated large-scale activation tag screening, gene expression, proteome and metabolite profiling based on the full exploration of the available genetic variation with emphasis on control of metabolic composition. Additional projects involve understanding the adaptive traits relevant for research in potato and tomato and the development of concepts and technologies based on *Arabidopsis* genetics and genomics. Four current projects funded through 2008 focus on:

- *Arabidopsis* quality: the genetic and genomic analysis of metabolic composition (Koornneef/Vreugdenhil, Wageningen University; Pereira, Plant Research International, Wageningen; Smeekeens, Utrecht University).
- The analysis of ligand-receptor interaction networks in *Arabidopsis* (Liu, Plant Research International, Wageningen; Heidstra, Utrecht University; De Vries, Wageningen University).
- The role of chromatin structure in gene expression of *Arabidopsis* and tomato (Bisseling/de Jong, Wageningen University).
- Priming of defense gene expression in plant-oomycete interactions (Pieterse/van Ackervecken, Utrecht University).

*Arabidopsis* projects funded by other sources such as first flow university funds, second flow Netherlands Organization for Scientific Research, EU etc. and third flow contract research:

## Wageningen University- Current Projects

- QTL express: identification of plant performance traits in *Arabidopsis* by combining high-throughput mapping and expression profiling (funded to 2008; M. Koornneef, D. Vreugdenhil).
- Controlling phytate and micronutrients as determinants of food quality (funded to 2007; Jianjun Zhao, M. Koornneef, G. Bonnema, D. Vreugdenhil)
- Heavy metal tolerance and accumulation in *Thlaspi caerulescens*, a heavy metal hyper-accumulating plant species (M. Aarts, J. van de Mortel, S. Talukdar; 2002-2007).
- Do plants love heavy metals? (A. Assunção, M. Aarts; 2005-2008)
- Functional genomics of secondary metabolite biosynthesis: the *Arabidopsis* glucosinolate model (W. van Leeuwen, M. Aarts; 2004-2006)
- Natural variation for *Arabidopsis* mineral content (A. Ghandilyan, M. Aarts; 2003-2007)
- Brassica vegetable nutrigenomics (G. Bonnema, M. Aarts; 2005-2010)
- The role of tomato serine and cysteine proteases in defense signaling (R. van der Hoorn)
- A molecular genetic approach to chemical ecology and community ecology (M. Dicke)
- Cross-talk between signal-transduction pathways in induced defense of *Arabidopsis* against microbial pathogens and herbivorous insects. M. Dicke (joint projects with C. Pieterse, Utrecht University)
- Development of a method for breeding of cucumber for improved attraction of biological control agents (M. Dicke, H. Bouwmeester)
- From genetic code to ecological interactions: molecular, phytochemical and ecological aspects of a glucosinolate polymorphism in *Barbarea vulgaris*. (N. van Dam)

- *Arabidopsis*: the system to study structure and function of heterochromatin (T. Bisseling)
- Chromatin genomics: functional analysis of *Arabidopsis* chromatin remodeling genes in development (T. Bisseling)
- Wageningen Phytoinformatics: the added value from plants (funded to 2008; W. Stiekema)

#### **Plant Research International, Wageningen- Current Projects**

- Identification and characterization of genes for drought tolerance (2006; A. Pereira).
- Identification of plant genes for abiotic stress resistance (2006; A. Pereira).
- Isolation and characterization of key-genes in the formation of germination stimulants of the parasitic weeds *Striga* and *Orobancha* (H. Bouwmeester).
- LRR receptor-like proteins and their functions in plant signaling (2004-2008; G.C. Angenent).
- MADS box transcription factor functioning, their signaling and protein interaction (2004-2008; G. Angenent)
- Cis-Trans regulation in floral organogenesis (G. Angenent; 2005-2008)
- Signaling Pathways Controlling Embryogenic Cell Development in *Arabidopsis* (funded to 2008; K. Boutilier)
- Signaling in the shoot apical meristem: A question of determinate or indeterminate growth (funded to 2007; R. Immink)

#### **Utrecht University - Current Projects**

- Sugar signaling pathways in plants (funded to 2010; J. Smeekeens)
- Trehalose-6-phosphate as a regulatory molecule in plants (funded to 2010; H. Schlüpmann)
- Control of plant architecture (funded to 2010; M. Proveniers)
- Dormancy as survival mechanism in plants (funded to 2010; L. Bentsink)
- Induced disease resistance signaling in *Arabidopsis* (funded to 2010; C. Pieterse)
- Cross-talk between signal-transduction pathways in induced defense of *Arabidopsis* against microbial pathogens and herbivorous insects (funded to 2006; C. Pieterse, joint projects with M. Dicke, Wageningen University)
- Plant innate immunity: cross-talk between signaling pathways to fine tune defense (funded to 2009; C. Pieterse)
- Controlled regulation of broad spectrum pathogen resistance in plants (C. Pieterse; 2004-2008)
- A functional proteomics approach to identify phosphoproteins involved in plant innate immunity; the relation between innate immunity signal transduction and plant development. (F. Menke)
- Priming in plant-pathogen interactions: the molecular mechanism of the alarmed state (2005-2008; J. Ton)
- Signaling at the host-microbe interface: pathogen-induced modulation of the plant plasma membrane (A. van den Ackerveken)
- Genetic networks in root development: Interplay between cell polarity information, pattern formation cues, and control of cell division; Chromatin dynamics; Ubiquitination and cell cycle control; dissection of retinoblastoma-mediated control of cell differentiation; in silico modeling of developmental pathways, with an emphasis on emergent properties of feedback loops between auxin transport, cell polarity and transcription factor networks (B. Scheres)
- Genomics for multicellular development: Function of the quiescent center in regulation of pattern formation and differentiation within the *Arabidopsis thaliana* root meristem (R. Heidstra)
- Analysis of the hyponastic and differential growth response of *Arabidopsis thaliana* petioles induced by submergence and low light conditions (funded to 2010; T. Peeters, R. Voesenek)

#### **Leiden University- Current Projects**

- Auxin-mediated orientation of plant development directed by plant protein kinases (R. Offringa)
- The role of ubiquitination in auxin and jasmonic acid signaling (funded to 2008; R. Offringa; J. Memelink)
- Characterization of a novel regulator of plant secondary metabolism (funded to 2008; J. Memelink)
- Regulation of jasmonate-responsive gene expression in *Arabidopsis* (funded to 2007; J. Memelink)
- Novel approach for dissection of jasmonate signaling in *Arabidopsis* (funded to 2006; J. Memelink)
- T-DNA activation tagging: an approach to isolate components in jasmonate-dependent defense responses in *Arabidopsis* (funded to 2009; J. Memelink)
- Plant stress resistance: jasmonate-responsive defense signalling (funded to 2008; J. Memelink)
- Analysis of the ORA47 transcription factor involved in jasmonic acid signal transduction in *Arabidopsis thaliana* (funded to 2008; J. Memelink)
- Analysis of the transcription factor ORA59, which plays a crucial role in the jasmonate- and ethylene-mediated defense response in *Arabidopsis* (funded to 2010; J. Memelink)

- Jasmonate-mediated changes in the modification and protein interaction status of AP2/ERF-domain transcription factors in *Arabidopsis* (funded to 2006; J. Memelink)
- How do plants discriminate between specialist and generalist insects (funded to 2010; H. Linthorst, P. Klinkhamer, R. Verpoorte)
- Changes in the *Arabidopsis* metabolome after stress, using NMR-metabolomics and targeted analyses of secondary metabolites (R. Verpoorte, H. Linthorst, P. Klinkhamer, C. van den Hondel)
- Effect of Non-homologous recombination mutations on genome stability and development in *Arabidopsis* (P. Hooykaas)
- Targeted transgene integration in plants (funded to 2009; S. de Pater, P. Hooykaas)
- Cre-lox mediated cassette exchange in the *Arabidopsis* genome (funded to 2007; J. Louwerse, P. Hooykaas)
- Development of artificial zinc finger transcription factors as regulators of plant function (funded to 2009; E. van der Zaal, P. Hooykaas)
- Phospho-fingerprinting *Arabidopsis* development (R. Offringa)
- The role of auxin in fruit initiation (funded to 2009; A. Vivian-Smith, R. Offringa)

#### **University of Amsterdam- Current Projects**

- Role of PA kinase in plant stress signaling (funded to 2007, B. van Schooten, T. Munnik)
- Sensing the lipid second messenger, phosphatidic acid (funded to 2011, T. Munnik)
- Targets for the novel lipid second messenger, phosphatidic acid (funded to 2006; C. Testerink, T. Munnik)
- Role of phospholipase C signaling in plant defense (funded to 2007; S. van Wees, Munnik)
- SUMO-signaling in plants (H. van den Burg)

#### **Vrije Universiteit, Amsterdam-Current Projects**

- Function of meristem identity in flower and inflorescence development (R. Koes)
- Genetic control and evolution of inflorescence architecture (R. Koes)

#### **University of Groningen- Current Projects**

- Molecular biology of programmed cell death in higher plants (Dijkwel, J. Hille)

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

- Netherlands Organization for Scientific Research ([www.nwo.nl](http://www.nwo.nl))
- The Netherlands Genomics Initiative ([www.genomics.nl](http://www.genomics.nl))
- The Netherlands Plant Genomics Network ([www.cbsg.nl](http://www.cbsg.nl))
- Foundation for Technology funded by Ministries of Economic Affairs and Education ([www.stw.nl](http://www.stw.nl))