

Italy

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Contact: Giovanna Serino

University of Rome “La Sapienza”, Dept. Genetics and Molecular Biology, Rome

Email: giovanna.serino@uniroma1.it

Arabidopsis projects

- Several Italian labs working on Arabidopsis are involved in two different ERA-PG projects: CISCODE (Cis-element conservation and divergence in plant reproductive development), Italian partners G. Morelli (INRAN, Rome) and L. Colombo and C. Tonelli (University of Milan); MULTI-STRESS, Italian partners P. Costantino (La Sapienza University, Rome) and I. Ruberti (CNR, Rome).
- Several National Research grants (PRIN) have been awarded to Italian Arabidopsis scientists by the Italian Ministry of University and Scientific Research (MIUR) as part of its institutional activities (<http://www.miur.it>).

Relevant Arabidopsis meetings

A meeting for the launch of the Italian Technological Platform Plants for the Future was held in Rome on June 17 2008. The final meeting of the Marie Curie Research Training Network “Wallnet: functional genomics for the biogenesis of the plant cell wall” was held in Rome on June 19-20 2008. The mid-term meeting of the ERA-PG MULTI-STRESS project was held in Rome on October 24 2008. Food and Water for Life, 4th Conference Future of Science was held in Venice on 25-27 September 2008.

Relevant tool and resource development

Several useful engineered Arabidopsis lines have been created, including lines overexpressing the AtMRP3 gene (by M. Cardarelli, CNR, Rome) and plants overexpressing active and inactive polygalacturonases from *A. niger*, as well as plants overexpressing the MEI genes (by the groups of F. Cervone and G. de Lorenzo). Ida Ruberti's lab has generated: new computational tools for the analysis of genome-wide expression data, new GFP-tagged lines for HD-Zip II transcription factor genes and new single and double mutants for HD-Zip II transcription factor genes. Novel Arabidopsis Guard Cell specific promoters and mutations have been generated by C. Tonelli and M. Galbiati (University of Milan)

Highlights of groundbreaking Italian Arabidopsis journal articles from 2008-2009

- Among the most groundbreaking research carried out in the last year, two papers, published respectively in *Science* and in *Plant Cell*, have focused on plant hormones' function and interactions in Arabidopsis development: the group of S.

Sabatini/P. Costantino (La Sapienza, Rome) has discovered that the balance between cell differentiation and division necessary for determining root meristem size is the result of the interaction between cytokinin and auxin through a regulatory circuit converging on the SHY2 gene, a repressor of auxin signaling - the cytokinin-responsive transcription factor ARR1 activates transcription of the gene SHY2. SHY2 mediates cell differentiation, controlling auxin distribution as is required for the negative transcriptional control of the auxin transport facilitators PIN genes; the group of M. Cardarelli/P. Costantino (La Sapienza, Rome) has shown that auxin, synthesized in the anthers by YUC genes before the inception of late processes and perceived by the TIR/AFB receptors when late processes begin, coordinates anther dehiscence and pollen maturation and independently triggers filaments elongation.

- The group of F. Cervone/G. de Lorenzo (La Sapienza, Rome) established a new model system based on the use of *A. thaliana* and *B. cinerea* to study plant interactions with necrotrophic fungi. They demonstrated that the oxidative burst induced by OGs is not required for early gene induction or for resistance to fungal infection, and that OGs- and Flg22-mediated responses largely overlap, suggesting host- and pathogen-associated molecular patterns activate the plant innate immune system through the activation of a common signaling pathway. They conducted experiments with plants expressing a fungal polygalacturonase and revealed that pectin alterations increase resistance to pathogens and reduce sensitivity to auxin, suggesting a link between cell wall damage, activation of defense responses and hormones. This research was published in the journals *Plant Physiology*, *Proteomics* and *Molecular Plant*.
- The group of I. Ruberti (CNR, Rome) recently performed a genome-wide analysis of the Arabidopsis HD-Zip II family of transcription factors. Their results, published in several journals (*Plant signaling behavior*, *PLOS computational biology*, *Plant Molecular biology*) provide evidence for a complex pattern of expression and regulation of this gene family, and strongly suggest that HD-Zip II genes act as members of highly integrated networks in controlling organ development and plant responses to light quality changes.
- The group of C. Tonelli (University of Milan) has identified novel transcription factors involved in cuticle development (AtMYB41, *Plant Journal*) and growth rate (AtMYB 11, *J. Exp. Bot*)

Awards to Arabidopsis researchers

Felice Cervone of University La Sapienza – Rome was the recipient of a European Research Council Advanced Grant: FUEL-PATH “Exploiting the saccharification potential of pathogenic microorganisms to improve biofuel production from plants.”