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Functional Plant Biology

Contents

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Cover illustration: Arbuscular mycorrhizal phenotypes in a reduced mycorrhizal colonisation (*rmc*) mutant of tomato with *Glomus intraradices* (left) and *Scutellospora calospora* (right).
New Feature: More details on root mycorrhizal colonisation can be seen in movie format in the accessory publication available from the online version of *Functional Plant Biology* (see Manjarrez *et al*. pp. 86–96).

Self-organisation at the whole-plant level: a modelling study
Zongjian Yang and David J. Midmore 56–65

Vascular plants have a modular structure. The development of a plant is most likely to rely on distributed control mechanisms. This modelling study suggests that morphological dynamics and phenotypic adjustment at the whole-plant level can be understood as the sum of all modular responses to their local environments. Oriented vascular differentiation specified by polar auxin transport plays a central role in the adjustment of resource allocation and growth partitioning in response to environmental changes.

ABA mediation of shoot cytokinin oxidase activity: assessing its impacts on cytokinin status and biomass allocation of nutrient-deprived durum wheat
Lidia B. Vysotskaya, Alla V. Korobova, Stanislav Y. Veselov, Ian C. Dodd and Guzel R. Kudoyarova 66–72

Nutrient deprivation alters biomass allocation and the concentrations of several plant hormones. The role of ABA in nutrient deprivation-mediated decreases in cytokinin concentrations was addressed by adding ABA or fluridone to the nutrient solution of well-fertilised plants or nutrient-deprived plants, respectively. Shoot ABA concentration and cytokinin oxidase activity were negatively correlated in all treatments, suggesting that shoot ABA status can regulate shoot cytokinin concentration via altering cytokinin metabolism.

Zm401p10, encoded by an anther-specific gene with short open reading frames, is essential for tapetum degeneration and anther development in maize
Dongxue Wang, Chengxia Li, Qian Zhao, Linna Zhao, Meizhen Wang, Dengyun Zhu, Guangming Ao and Jingjuan Yu 73–85

We characterised a maize anther-specific gene, *Zm401*, which contains short open reading frames (sORFs). The longest ORF encodes a small nucleic protein Zm401p10. *Zm401p10* overexpression retarded tapetal degeneration and caused microspore abnormalities. A microarray analysis identified 278 downregulated and 150 upregulated genes in transgenic anthers.

Different arbuscular mycorrhizal fungi induce differences in cellular responses and fungal activity in a mycorrhiza-defective mutant of tomato (*rmc*)
Maria Manjarrez, Meredith Wallwork, Sally E. Smith, F. Andrew Smith and Sandy Dickson 86–96

A well known mycorrhiza-defective tomato mutant (*rmc*) was used to investigate the cellular responses associated with arbuscular mycorrhizal colonisation. *rmc* and its wild-type parent showed similar initial stages of fungal development, although at least three potential blockages: at the epidermis, exodermis and cortex needs to be overcome to form a functional symbiosis in *rmc*.
