

# Functional Plant Biology

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## Contents

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*Review:* Using the short-lived isotope  $^{11}\text{C}$  in mechanistic studies of photosynthate transport

**Peter E. H. Minchin and Michael R. Thorpe**      831–841

Minchin and Thorpe have made substantial contributions to mechanistic understanding of photoassimilate transport in plants through insightful use of the short-lived and strong emitting carbon isotope,  $^{11}\text{C}$ . Here they offer an informed and competent commentary on how  $^{11}\text{C}$  can be used, with the appropriate experimental designs and analyses of the collected data, to extract information about the behaviour of transport systems in a manner not possible through other experimental approaches.

Proteomic analysis reveals developmentally expressed rice homologues of grass group II pollen allergens

**Tursun Kerim, Nijat Imin, Jeremy J. Weinman and Barry G. Rolfe**      843–852

Hayfever and seasonal allergic asthmas resulting from pollen allergies affect a substantial proportion of the population living in temperate regions. Three isoforms of group II allergens from rice pollen have been identified and characterised using proteomic and immunological analysis and database searches.

Short-day photoperiod induces changes in N uptake, N partitioning and accumulation of vegetative storage proteins in two *Medicago sativa* cultivars

**Carine Noquet, Frédéric Meuriot, Sébastien Caillot, Jean-Christophe Avice, Alain Ourry, Suzanne M. Cunningham and Jeffrey J. Volenec**      853–863

Stored N is crucial in forage species for supplying N to shoots during growth in spring and after defoliation. The effect of photoperiod on growth, N uptake and N partitioning in taproots of alfalfa was studied. The results indicate that photoperiod modulates N accumulation (as vegetative storage protein form), and this may be mediated by the phytochrome system.

Anthocyanins in leaves: light attenuators or antioxidants?

**Samuel O. Neill and Kevin S. Gould**      865–873

Putative effects of anthocyanin pigments in leaves include light absorption and free-radical scavenging. These authors show that the abatement of green light mitigates the formation of superoxide radicals and reduces oxidative injury, and that red, vacuolar anthocyanins and colourless cytoplasmic anthocyanins can serve as strong antioxidants in leaf cells. They conclude that anthocyanins provide a versatile, multifarious means of protection from the effects of high-light stress.

Diversity in root aeration traits associated with waterlogging tolerance in the genus *Hordeum*

**Alaina J. Garthwaite, Roland von Bothmer and Timothy D. Colmer**      875–889

Traits that enhance internal aeration of adventitious roots, namely large volumes of aerenchyma and a barrier to radial oxygen loss, are associated with waterlogging tolerance. This study links the capacity to form a barrier to radial oxygen loss with two genomic groups within the genus *Hordeum*. This may eventually lead to the identification of the controlling gene(s) and to improved waterlogging tolerance in some agricultural species.

*Cover illustration:* Cover illustration: Differences in xylem cavitation and other drought resistance components were studied in plants of several pure *Eucalyptus globulus* Labill. clones grown from rooted cuttings (see Pita *et al.*, pp. 891–899).

Xylem cavitation, leaf growth and leaf water potential in *Eucalyptus globulus* clones under well-watered and drought conditions

**Pilar Pita, Antonio Gascó and José A. Pardos** 891–899

Leaf growth, predawn leaf water potential, evapotranspiration, maximum permeability, and the percentage loss of hydraulic conductivity were measured in plants grown from rooted cuttings of selected clones of *Eucalyptus globulus* subjected to well-watered and drought conditions. Drought significantly reduced evapotranspiration, leaf growth and maximum permeability.

Nitric oxide mediates elicitor-induced saponin synthesis in cell cultures of *Panax ginseng*

**Xiangyang Hu, Steven J. Neill, Weiming Cai and Zhangcheng Tang** 901–907

Nitric oxide (NO) is a signalling molecule in animals and plant; these authors show NO acting as a signal molecule to mediate the induction of triterpenoid saponin by elicitor in ginseng cells. This expands the knowledge of how elicitors regulate plant secondary metabolites and endow NO with a new role in regulating gene transcription and protein expression during plant response to elicitor stimulation.

Effects of di-butyl phthalate on *in vitro* morphogenesis of *Arabidopsis thaliana*

**Xiao-juan Wang** 909–912

Phthalate acid esters are widely used in industrialized nations, and subsequently found polluting soil, water, industrial effluents and food. The detrimental effect of phthalate acid esters on plant morphogenesis was studied in *Arabidopsis*. De- and re-differentiation processes were affected in cultured plant cells, and membrane and organelle disruption was observed.