

Functional Plant Biology

Contents

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<i>Review: Flooding tolerance: suites of plant traits in variable environments</i> T. D. Colmer and L. A. C. J. Voesenek	665–681	Flooding is an environmental stress worldwide. Plants possess or develop various traits upon flooding that improve survival. Suites of adaptive traits re-occur together in dependence of the depth and duration of flooding events. Many of these traits act synergistically to improve plant survival upon flooding stress.
<i>Review: The evolutionary development of plant body plans</i> Karl J. Niklas and Ulrich Kutschera	682–695	Why are body plans highly conserved and yet ‘plastically’ responsive to environmental conditions? This question is examined in the context of plant evolution and evidence for lateral gene transfer and the recruitment and modification of ancient genomic systems that define major evolutionary events in the history of plant life.
<i>Review: Genetic technologies for the identification of plant genes controlling environmental stress responses</i> Csaba Papdi, Mary Prathiba Joseph, Imma Perez Salamó, Sabina Vidal and László Szabados	696–720	A number of genetic approaches have been used to identify plant genes that control responses to different abiotic stress factors. In this review, strategies and concepts for forward and reverse genetic screens, conventional and insertion mutagenesis, TILLING, gene tagging, promoter trapping, activation mutagenesis and cDNA library transfer are described and illustrated with a number of published examples.
Seasonal patterns of leaf H₂O₂ content: reflections of leaf phenology, or environmental stress? John M. Cheeseman	721–731	The results of a season long, 18 species field study indicate that bulk leaf H₂O₂ concentrations are poor indicators of environmental stress, and are too high to reflect either signalling or metabolic control networks. Instead, they better reflect leaf phenology and the roles of H₂O₂ in cell expansion, lignification and wall cross-linking.
Seasonal changes in optically assessed epidermal phenolic compounds and chlorophyll contents in leaves of sessile oak (<i>Quercus petraea</i>): towards signatures of phenological stage Juliette Louis, Sylvie Meyer, Florence Maunoury-Danger, Chantal Fresneau, Emmanuelle Meudec and Zoran G. Cerovic	732–741	During the growth season, the variations of dry mass invested in chlorophyll and epidermal phenolic compounds contents revealed the changes of oak leaf structure and function. From <i>in vivo</i> measurements, non-destructive indicators of phenological stages were proposed and the lability of epidermal phenolic compounds throughout the growth season was shown.

Cover illustration: Rumex species have the capacity to elongate petioles in response to complete submergence (left). Due to this ethylene-driven growth stimulation, leaves emerge from the flood water and low resistance gas diffusion through aerenchyma tissue (right) aerates roots exposed to anaerobic soil conditions (see Colmer and Voesenek pp. 665–681).

Improved elongation of Scots pine seedlings under blue light depletion is not dependent on resource acquisition

Marian Sarala, Erja Taulavuori, Jouni Karhu, Eira-Maija Savonen, Kari Laine, Eero Kubin and Kari Taulavuori

742–751

Removal of blue light (400–500 nm) induced shoot elongation of 2-year-old Scots pine (*Pinus sylvestris* L.) seedlings in Northern Finland (64°N), which was not related to resource acquisition and frost hardening. The results suggest that the growth inhibiting effect of blue light on Scots pine elongation is probably a photomorphogenic regulation response.

Hydraulic redistribution by *Protea* ‘Sylvia’ (Proteaceae) facilitates soil water replenishment and water acquisition by an understorey grass and shrub

Heidi-J. Hawkins, Hans Hettasch, Adam G. West and Michael D. Cramer

752–760

For the first time in this flora, we demonstrate that Proteaceae redistribute deep water to upper soil layers and facilitate water parasitism by understory plants. These data provide an explanation for growth of proteas and persistence of understory plants during the summer drought.