

Functional Plant Biology

Contents

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<p><i>Review: Seasonal flowering and evolution: the heritage from Charles Darwin</i> R. W. King and O. M. Heide</p>	1027–1036	<p>Seasonal control of the timing of the flowering of plants is critical for their survival. Its precision from year to year involves the sensing of a number of environmental cues. Genetic, molecular and physiological studies show the complexity of the plant's responses while evidence from population geography shows the adaptive, evolutionary value of such traits.</p>
<p>Maintaining the yield of edible rice in a warming world Melissa A. Fitzgerald and Adoracion P. Resurreccion</p>	1037–1045	<p>Genetic diversity exists for physiological responses to high temperature, including responses that minimise the effect of higher temperature on the yield of acceptable and marketable rice grains. Selecting for these can maintain the yield of edible/marketable polished grain for the most important staple crop in a world that is becoming warmer.</p>
<p>Interactive effects of high irradiance and moderate heat on photosynthesis, pigments, and tocopherol in the tree-fern <i>Dicksonia antarctica</i> Liubov Volkova, Michael Tausz, Lauren T. Bennett and Erwin Dreyer</p>	1046–1056	<p>This climate chamber experiment indicated negative effects of high irradiance, exacerbated by moderate heat, on the photosynthetic capacity of the tree-fern <i>Dicksonia antarctica</i>. Increases in temperature stability of membranes (measured as critical temperature, T_c) were not associated with accumulation of osmotica or zeaxanthin formation, while increases in lutein, β-carotene and α-tocopherols potentially contributed to increased T_c under high irradiance.</p>
<p>Impacts of UV radiation on growth and photosynthetic carbon acquisition in <i>Gracilaria lemaneiformis</i> (Rhodophyta) under phosphorus-limited and replete conditions Zhiguang Xu and Kunshan Gao</p>	1057–1064	<p>Impacts of solar UV radiation depends on the availability of inorganic phosphorus. Solar UV-A enhances the growth rate of the red macroalga, <i>Gracilaria lemaneiformis</i> under Pi-replete but reduces it under Pi-limited conditions. UV-A increases the apparent photosynthetic efficiency, and enrichment of Pi raises the acquisition capacity of inorganic carbon.</p>

Cover illustration: In reviewing flowering, evolution and the heritage from Charles Darwin, King and Heide (pp. 1027–1036) highlight a breadth of seasonal adaptations. Findings with many species are summarised but three encapsulate the breadth of this information. When *Hardenbergia violaceae* (*left*) flowers, it senses winter short days and mild temperatures and avoids warming conditions, which cause flower loss. Heritability and a genetic basis for such responses in cultivated strawberry can be traced back to its wild progenitors including *Fragaria chiloense* (*centre*). Selective advantage of such adaptation is shown from reciprocal field transplantation studies with *Pimelea feruginea* (*right*). Photography by Ola Heide and Carl Davies.

<p>Identification and functional characterisation of aquaporins in the grapevine, <i>Vitis vinifera</i> Megan C. Shelden, Susan M. Howitt, Brent N. Kaiser and Stephen D. Tyerman</p>	<p>1065–1078</p>	<p>Eleven aquaporin genes are identified in <i>Vitis vinifera</i> L. (cv. Cabernet Sauvignon) some of which were not represented in the published genome of a near homozygous line of <i>V. vinifera</i>. Phylogenetic analysis showed clustering into the four main subfamilies of aquaporin genes identified in other species. PIP and TIP proteins function as water channels with the exception of VvPIP2;5. VvPIP2;5 differs from the water conducting VvPIP2;1 by the substitution of two highly conserved amino acids probably causing blockage of the water pore.</p>
<p>Housekeeping gene selection in poplar plants under Cd-stress: comparative study for real-time PCR normalisation Brigitta Basa, Ádám Solti, Éva Sárvári and László Tamás</p>	<p>1079–1087</p>	<p>The expression stability of six reference genes in control and Cd-treated poplar plants was evaluated by a real-time PCR approach. Validation of the candidates by the RiboGreen method and geNorm software proved that accurate normalisation is crucial particularly in developing leaves and under severe stress.</p>
<p>Tomato mitogen activated protein kinases regulate the expression of extracellular invertase <i>Lin6</i> in response to stress related stimuli Tae Kyung Hyun, Anja Hoffmann, Alok K. Sinha and Thomas Roitsch</p>	<p>1088–1097</p>	<p>This paper describes a relationship between activation of tomato MAP kinases, LpMPK2/LpMPK3, and regulation of expression of extracellular invertase, <i>Lin6</i>, which are involved in sink metabolism. Stress-related stimuli that result in the induction of <i>Lin6</i> require activation of MAPK, which is shown in transgenic tobacco overexpression of β-glucuronidase reporter gene under the control of the <i>Lin6</i> promoter.</p>
<p>Phylogenetic analysis and functional characterisation of strictosidine synthase-like genes in <i>Arabidopsis thaliana</i> Natalie A. J. Kibble, M. Mehdi Sohani, Neil Shirley, Caitlin Byrt, Ute Roessner, Antony Bacic, Otto Schmidt and Carolyn J. Schultz</p>	<p>1098–1109</p>	<p><i>Arabidopsis</i> is not known to produce monoterpenoid indole alkaloids, yet its genome has 15 genes with similarity to strictosidine synthase genes. This paper shows that <i>Arabidopsis</i> protein extracts cannot make strictosidine but can produce an ‘unknown’ compound. Gene expression and metabolomics data suggests that <i>Ssl</i> genes may have a role in plant protection.</p>
<p>Ionic relations and osmotic adjustment in durum and bread wheat under saline conditions Tracey Ann Cuin, Yu Tian, Stewart A. Betts, Rémi Chalmandrier and Sergey Shabala</p>	<p>1110–1119</p>	<p>Shoot ionic relations were studied in 50 bread and durum wheat genotypes exposed to high salinity. The significance of Na⁺ exclusion from the shoot is re-evaluated, and the role of inorganic ion accumulation in the shoot osmotic adjustment under saline conditions is discussed.</p>

Corrigendum to:

An analysis of the sensitivity of sap flux to soil and plant variables assessed for an Australian woodland using a soil–plant–atmosphere model

Melanie Zeppel, Catriona Macinnis-Ng, Anthony Palmer, Daniel Taylor, Rhys Whitley, Sigfredo Fuentes, Isa Yunusa, Mathew Williams and Derek Eamus [Vol. 35, No. 6 (2008) pp. 509–520] 1120