

# Functional Plant Biology

## Contents

Volume 46      Issue 5      2019

Disentangling the net: concomitant xylem and over-bark size measurements reveal the phloem-generated turgor signal behind daytime stem swelling in the mangrove <i>Avicennia marina</i> <b>Alicia Donnellan Barraclough, Roman Zweifel, Jarrod Cusens and Sebastian Leuzinger</b>	393–406	Trees heavily rely on water stored inside their stems during water shortage. This study addressed the stem water storage patterns of the mangrove <i>Avicennia marina</i> and discovered that the tree's sugar transport system stored water during the daytime, a little observed phenomenon. The authors suggest this unusual adaptation could have a role in helping <i>A. marina</i> thrive in salty environments.
Ameliorating effects of exogenous $\text{Ca}^{2+}$ on foxtail millet seedlings under salt stress <b>Fei Han, Mingjie Sun, Wei He, Xiumin Cui, Hong Pan, Hui Wang, Fupeng Song, Yanhong Lou and Yuping Zhuge</b>	407–416	Salt stress has started threatening regional development and could continue to threaten agricultural production and food security. The mitigation mechanism of $\text{Ca}^{2+}$ of foxtail millet to salt stress is not only related to the yield and the patterns of saline-alkaline land utilisation but is also related to the food security of human beings. We examined the effects of different $\text{Ca}^{2+}$ concentrations on foxtail millet growth, physiology, ion balance and gene expression under salt stress induced with 1.0% w/v NaCl, and found the optimal $\text{Ca}^{2+}$ concentration to improve salt tolerance. This study provides theoretical and technical support for the cultivation of foxtail millet and the utilisation of salinised land with saline-alkaline soil.
Isobaric tags for relative and absolute quantitation-based quantitative proteomics analysis provides novel insights into the mechanism of cross-incompatibility between tree peony and herbaceous peony <b>Dan He, Xue-Yuan Lou, Song-Lin He, Ya-Kai Lei, Bo-Va Lv, Zheng Wang, Yun-Bing Zheng and Yi-Ping Liu</b>	417–427	Tree peony, known as the king of flowers, can be improved and bred by interspecific hybridisation. To elucidate the molecular mechanisms of the cross-incompatibility between tree peony and herbaceous peony, six differentially expressed proteins containing enolase, DnaK, GroEL, calmodulin, adenine nucleotide translocator and glyoxalase I were found by isobaric tags for relative and absolute quantitation-based quantitative proteomic analysis. These results should facilitate interspecific hybridisation in agricultural practice.
The <i>VvBAP1</i> gene is identified as a potential inhibitor of cell death in grape berries <b>Shifeng Cao, Zeyu Xiao, Vladimir Jiranek and Stephen D. Tyerman</b>	428–442	A type of programmed cell death in grape berries occurs late in ripening influencing yield via berry shrinkage, and ultimately affecting wine quality. A gene transcript ( <i>VvBAP1</i> ) linked to cell death in the grape berry has been discovered that also confers ROS and drought tolerance to <i>Arabidopsis</i> when overexpressed. This discovery will allow future research to uncover the downstream regulators of berry cell death that occurs only in some cultivars of grapevine.

*Cover illustration:* Improved performance of transgenic *Arabidopsis* over-expressing *OsRBGD3* under cold stress and ABA (see Lenka *et al.* pp. 482–491). Image by Sangram K. Lenka and Senthilkumar K. Muthusamy.

<p>The role of jasmonate signalling in quinolizidine alkaloid biosynthesis, wounding and aphid predation response in narrow-leaved lupin</p> <p><b>Karen M. Frick, Rhonda C. Foley, Kadambot H. M. Siddique, Karam B. Singh and Lars G. Kamphuis</b></p>	443–454	<p>The factors that increase the levels of toxic quinolizidine alkaloids (QAs) in the grain legume narrow-leaved lupin are poorly understood. We hypothesised that jasmonates are involved in regulating QA biosynthesis in response to biotic stresses. We identified that methyl jasmonate induces QA biosynthesis in high-QA narrow-leaved lupin, but observed no response in low-QA narrow-leaved lupin. Furthermore, predation by aphids – a major insect pest of narrow-leaved lupin – did not affect QA levels in low-QA cultivars.</p>
<p>Amplification of abiotic stress tolerance potential in rice seedlings with a low dose of UV-B seed priming</p> <p><b>Dhanya T. Thomas and Jos T. Puthur</b></p>	455–466	<p>UV-B seed priming is a means of inducing abiotic stress tolerance in a cost-effective manner with appropriate and essential expenditure of energy towards stress tolerance. This priming method effectively influence various physio-chemical features in the rice seedlings under different stress conditions and brings about more positive stress tolerance features for NaCl stress than for PEG and UV-B stress.</p>
<p>Confirmation of mesophyll signals controlling stomatal responses by a newly devised transplanting method</p> <p><b>Takashi Fujita, Ko Noguchi, Hiroshi Ozaki and Ichiro Terashima</b></p>	467–481	<p>Is mesophyll involved in stomatal responses to environmental stimuli? The mesophyll segments of <i>Commelina communis</i> pretreated in the light at low CO<sub>2</sub> air were more effective to induce stomatal opening in the epidermal strips transplanted from the plants kept in the dark than those pretreated in the dark and/or high CO<sub>2</sub>. Our results indicate the involvement of mesophyll in stomatal responses.</p>
<p>Heterologous expression of rice RNA-binding glycine-rich (RBG) gene <i>OsRBGD3</i> in transgenic <i>Arabidopsis thaliana</i> confers cold stress tolerance</p> <p><b>Sangram K. Lenka, Amit K. Singh, Senthilkumar K. Muthusamy, Shuchi Smita, Viswanathan Chinnusamy and Kailash C. Bansal</b></p>	482–491	<p>Cold stress leads to major crop losses in many parts of the world, so identifying key genes of agronomic importance could provide a sustainable solution to this problem. We have identified the key role of a rice gene (<i>OsRBGD3</i>) attributed to cold tolerance, root elongation and early flowering. Use of this gene will provide agricultural industry an opportunity for breeding future frost-resistant and early flowering crops.</p>