

Functional Plant Biology

Contents

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<p><i>Review: The effect of the elicitors on the steviol glycosides biosynthesis pathway in <i>Stevia rebaudiana</i></i></p> <p>Hourieh Tavakoli, Nasibeh Tavakoli and Foad Moradi</p>	787–795	<p>Type 2 diabetes and obesity are two major risk factors for cardiovascular disease that are caused by over-consumption of sugar. Since artificial sweeteners have been shown to be harmful to health, natural extracts including steviol glycosides (SGs) are now considered the best substitute for sugar. We present new knowledge on the effect of elicitors on SGs biosynthesis, and show that an increase in plant yield can also increase these secondary metabolites.</p>
<p>The labile zinc pool in plant cells</p> <p>Ilya E. Zlobin, Alexander V. Kartashov, Alexander V. Nosov, Artem A. Fomenkov and Vladimir V. Kuznetsov</p>	796–805	<p>The dynamic aspects of zinc homeostasis in plant cells are poorly understood. We demonstrated for the first time that plant cells contain a pool of labile zinc complexes that control intracellular zinc availability and the physiological action of zinc ions. Our findings are crucial in understanding the mechanisms of intracellular zinc distribution and zinc regulatory action.</p>
<p>Functional roles of ammonium (NH_4^+) and nitrate (NO_3^-) in regulation of day- and night-time transpiration in <i>Phaseolus vulgaris</i></p> <p>Mandilakhe Naku, Learnmore Kambizi and Ignatious Matimati</p>	806–815	<p>Terrestrial plants retain <5% of their root-acquired water, losing or using the rest through transpiration, cooling and drawing nutrients towards their roots. Using common bean (<i>Phaseolus vulgaris</i>), we established that soil nitrates, and not ammonium, regulated day- and night-time leaf water loss, which delivered soil nutrients to the roots. When leaf nitrate is limiting, plants elicit day- and night-time water loss, consequently gaining soil nutrients, but reduced their water loss when nitrate is replete.</p>
<p>Involvement of OpsLTP1 from <i>Opuntia streptacantha</i> in abiotic stress adaptation and lipid metabolism</p> <p>Mario Rojas, Francisco Jimenez-Bremont, Claudia Villicaña, Laura Carreón-Palau, Bertha Olivia Arredondo-Vega and Gracia Gómez-Anduro</p>	816–829	<p>Plant lipid transfer proteins are involved in diverse biological processes; however, most of them have been characterised from traditional plant models and little is known about homologues from other species. We characterised the function of <i>OpsLTP1</i> gene from <i>Opuntia streptacantha</i> by <i>OpsLTP1</i> overexpression in <i>Arabidopsis</i>, demonstrating an improvement in germination under abiotic stress, which was not observed in tolerance at seedling stage, in addition to alteration in lipid accumulation in seeds. These findings support the function of <i>OpsLTP1</i> in abiotic stress responses suggesting possible mechanisms involving lipid metabolism.</p>
<p>Transcriptomic profiling revealed genes involved in response to cold stress in maize</p> <p>Meng Li, Na Sui, Lin Lin, Zhen Yang and Yuanhu Zhang</p>	830–844	<p>Low temperature can decrease maize production by affecting seed germination and seedling growth, especially in early spring. We analysed chlorophyll fluorescence, membrane lipids, secondary metabolites and the transcriptome of two maize inbred lines (chilling-tolerant M54 and chilling-sensitive 753F) under cold stress. M54 showed better ability to protect the photosynthetic structures by synthesising unsaturated fatty acids and accumulating secondary metabolites. Our RNA sequencing dataset provides an important resource for future studies and breeding maize for improved cold tolerance.</p>

Cover illustration: As an organelle, rice protoplasts can perfectly complete subcellular co-localisation for green and red fluorescent protein (see Lin *et al.* pp. 857–868). Image by Zhimin Lin.

<p>Leaf metabolites profiling between red and green phenotypes of <i>Suaeda salsa</i> by widely targeted metabolomics</p> <p>Xin Wang, Junhong Bai, Wei Wang and Guangliang Zhang</p>	845–856	<p>This is the first comprehensive report of metabolites of <i>Suaeda salsa</i>. We found gallic acid exists only in the red phenotype, and was the main reason for leaf succulence, and two anthocyanins were responsible for red colour of red phenotype. Our research could provide references for the utilisation of this medicinal and edible plant in the future.</p>
<p>Novel <i>OsGRAS19</i> mutant, <i>D26</i>, positively regulates grain shape in rice (<i>Oryza sativa</i>)</p> <p>Zhimin Lin, Jingwan Yan, Jun Su, Huaqing Liu, Changquan Hu, Gang Li, Feng Wang and Yi Lin</p>	857–868	<p>Grain size and shape are one of the most important components of grain yield in rice. <i>D26</i> was cloned and identified as a positive regulator of grain size and shape through overexpression and CRISP/Cas9 editing. The functional characterisation of <i>D26</i> suggests that <i>D26</i> may be a potential tool for improving grain yield in crops.</p>
<p>Detergent-resistant microdomains (lipid rafts) in endomembranes of the wild halophytes</p> <p>Olga Rozentsvet, Irina Nesterkina, Natalia Ozolina and Viktor Nesterov</p>	869–876	<p>This work reports a progress in understanding of the membrane structure in mechanism of adaptation of halophytes. Based on the lipid analysis, evidence for the presence of rafts in chloroplast membranes of halophytes has been given for the first time; differences in the composition of raft-forming lipids in chloroplast and mitochondrial halophyte membranes differing in salt-resistance strategy have been elicited.</p>