

Functional Plant Biology

Contents

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<p><i>Review:</i> Hybrid breeding in wheat: how shaping floral biology can offer new perspectives Caterina Selva, Matteo Riboni, Ute Baumann, Tobias Würschum, Ryan Whitford and Matthew R. Tucker</p>	675–694	<p>The ability to sustain the global population in the current climate crisis requires new agricultural approaches and improved breeding strategies. Hybrid breeding, already commonly used for maize and rice, could potentially be implemented in wheat if the challenge of increasing outcrossing is addressed. In this review, we provide an overview of how the wheat plant might be modified to increase outcrossing, thereby rendering hybrid breeding in wheat more feasible.</p>
<p><i>Review:</i> Very-long-chain fatty acids (VLCFAs) in plant response to stress Anatoly V. Zhukov and Maria Shumskaya</p>	695–703	<p>Very-long-chain fatty acids (VLCFAs) are hydrophobic complex molecules that are known to work as components of plant cell membranes and waxes. However, other functions are possible, since their amount and specific structure is found to change in response to stress conditions, such as drought or cold. The research on these molecules contributes to our knowledge on the overall mechanisms of plant stress response.</p>
<p>Understanding the heat resistance of cucumber through leaf transcriptomics Min Wang, Xiaoming He, Qin Peng, Zhaojun Liang, Qingwu Peng, Wenrui Liu, Biao Jiang, Dasen Xie, Lin Chen, Jinqiang Yan and Yu'e Lin</p>	704–715	<p>Heat stress seriously affects cucumber production and quality in open field cultivation. Differentially expressed genes related to plant hormones signaling pathway, transcription factors, and secondary metabolites were significantly changed under heat stress.</p>
<p>Production and roles of IAA and ABA during development of superior and inferior rice grains Heather M. Nonhebel and Karina Griffin</p>	716–726	<p>Understanding the hormonal control of cereal grain fill is essential for optimising crop yield. In this work we used accurate methodologies to clarify contradictory reports on the amounts and production of two plant hormones – auxin and abscisic acid – in good filling, superior grains versus poorly filling, inferior grains. We used analysis of gene expression and sequence data to link genes with important roles in grain fill, to the auxin-signalling pathway.</p>
<p>Biochemical and molecular approach of oxidative damage triggered by water stress and rewatering in sunflower seedlings of two inbred lines with different ability to tolerate water stress Federico Ramírez, Maximiliano Escalante, Ana Vigliocco, M. Verónica Pérez-Chaca, Mariana Reginato, Alicia Molina, Julio A. Di Rienzo, Andrea Andrade and Sergio Alemano</p>	727–743	<p>Water is essential for plant growth and research related to plant responses to water scarcity is important. We tried to understand how sunflower seedlings with different water stress tolerance were able to maintain a particular metabolic or functional state, although they were subject to negative environmental factors such as water stress. Here, the ability of B59 and B71 seedlings to respond to water stress was based on different antioxidant mechanisms comprising the coordinated action of enzymatic and nonenzymatic constituents.</p>

Impact of crop load on nitrogen uptake and reserve mobilisation in *Vitis vinifera*

Thibaut Verdenal, Jorge E. Spangenberg, Vivian Zufferey, Ágnes Dienes-Nagy, Olivier Viret, Cornelis van Leeuwen and Jean-Laurent Spring

744–756

Without fertilisation, plant nutrition can be enhanced to some extent through the optimisation of agricultural practices. In a ¹⁵N-labelling experiment, we demonstrate that grapevine has a strong ability to regulate N uptake and reserve mobilisation to maintain a constant fruit N concentration despite changes in crop load. Nitrogen uptake and root N mobilisation were positively correlated with crop load. This result is essential for improving perennial fruit crop production through higher fertilisation efficiency and lower environmental impact.

Anatomical, morphological and growth responses of *Thinopyrum ponticum* plants subjected to partial and complete submergence during early stages of development

María del Rosario M. Iturralde Elortegui, Germán D. Berone, Gustavo G. Striker, María J. Martinefsky, María G. Monterubbianesi and Silvia G. Assuero

757–768

Seedling recruitment and growth of forage grasses in flood-prone grasslands is often impaired by submergence. We found that *Thinopyrum ponticum* tolerance to submergence increased with plant developmental stage and that complete submergence impaired biomass accumulation and negatively affected survival of youngest plants (plants with three expanded leaves). Our results indicate that this species could be introduced in areas subject to soil waterlogging or partial plant submergence, but not to those prone to suffer high-intensity flooding that lead to full plant submergence.

Corrigendum to:

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[Vol. 47, No. 8 (2020) pp. 744–756]