

Functional Plant Biology

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Volume 46 Issue 12 2019

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| <p>Relationship between seed morphological traits and wind dispersal trajectory Quanlai Zhou, Zhimin Liu, Zhiming Xin, Stefani Daryanto, Lixin Wang, Jianqiang Qian, Yongcui Wang, Wei Liang, Xuanping Qin, Yingming Zhao, Xinle Li, Xue Cui and Minghu Liu</p> | <p>1063–1071</p> | <p>Wind dispersal of seeds is a fundamental biological process that relates to the composition, structure and dynamics of plant populations and communities. We determined four modes of dispersal trajectory for seven species of wind-borne seeds and the relationship between seed traits and dispersal trajectory by using a wind tunnel and video camera. Our results clarify the primary dispersal mechanisms and provide critical information for understanding mechanisms and dynamics of seed dispersal of plant populations and communities.</p> |
| <p>Genotypic variation in whole-plant transpiration efficiency in sorghum only partly aligns with variation in stomatal conductance Geetika Geetika, Erik J. van Oosterom, Barbara George-Jaeggli, Miranda Y. Mortlock, Kurt S. Deifel, Greg McLean and Graeme L. Hammer</p> | <p>1072–1089</p> | <p>Water scarcity can limit sorghum production, but increased whole-plant transpiration efficiency (TE) can enhance yield. We investigated genotypic variation in TE in sorghum and its links to leaf-level processes. The daily transpiration per unit of green leaf area (TGLA) was determined by vapour pressure deficit (VPD) and the response of conductance to radiation and VPD. Variation in TE was partly explained by variation in TGLA, with residuals linked to leaf chlorophyll.</p> |
| <p>Enhanced antioxidant enzyme activities in developing anther contributes to heat stress alleviation and sustains grain yield in wheat Sharad K. Dwivedi, Sahana Basu, Santosh Kumar, Surbhi Kumari, Alok Kumar, Sneha Jha, Janki S. Mishra, Bhagwati P. Bhatt and Gautam Kumar</p> | <p>1090–1102</p> | <p>Continuous climatic changes severely influence worldwide agricultural productivity. Delayed sowing of spring wheat in the Eastern Indo-Gangetic Plains exposes the anthesis stage to severe heat stress, resulting in dramatic yield losses. The present study revealed that thermo-tolerance in wheat is associated with the redox homeostasis in the developing anthers, and identified Eastern Indo-Gangetic wheat as a potential heat tolerant form of this species.</p> |
| <p>Ameliorating effects of exogenous calcium on the photosynthetic physiology of honeysuckle (<i>Lonicera japonica</i>) under salt stress Luyao Huang, Zhuangzhuang Li, Shaobin Pan, Qian Liu, Gaobin Pu, Yongqing Zhang and Jia Li</p> | <p>1103–1113</p> | <p>Suitable fertiliser applications or nutrient management of crop plants are practical ways for alleviating salt injury, and are applicable for popularisation in actual production. The application of calcium facilitated the maintenance of ion homeostasis and PSII photochemistry activity against the adverse effects of salt stress in honeysuckle. The effects of calcium on salt-stressed honeysuckle should be evaluated in a field experiment in saline-alkaline soil so that we can develop ways to maximise benefits.</p> |
| <p>Gene expression and evidence of coregulation of the production of some metabolites of chilli pepper inoculated with <i>Pectobacterium carotovorum</i> ssp. <i>Carotovorum</i> Arnaud Thierry Djami-Tchatchou, Lerato Bame Tsalaemang Matsaunyane, Chimdi Mang Kalu and Khayaletu Ntushelo</p> | <p>1114–1122</p> | <p>Understanding the gene expression and coregulation of metabolites in response to soft rot infection in chilli pepper plants is fascinating and gives clues to broader defence processes. Lack of knowledge of the molecular responses of pepper to soft rot infection prompted this study. Different defence genes were induced during soft rot infection, with matching of coregulation of the production of certain metabolites. This gives an important perspective on defence in pepper plants.</p> |

Cover illustration: Tomato fruit development. Image by Dr Maria Slugina.

Proteomics analyses revealed the reduction of carbon- and nitrogen-metabolism and ginsenoside biosynthesis in the red-skin disorder of *Panax ginseng*

**Rui Ma, Rui Jiang, Xuenan Chen,
Daqing Zhao, Tong Li and Liwei Sun**

1123–1133

Red-skin disorder (RSD) is a common non-infectious disease in ginseng plants, the mechanism of which is not well understood; therefore, there are no effective measures for prevention and control. We found that metal-induced stress in RSD ginseng induced disorder in carbon and nitrogen metabolism and decreased ginsenoside biosynthesis and thus reducing its production and potency. This finding will help in the understanding the RSD mechanism.

Divergent responses of above- and below-ground chemical defence to nitrogen and phosphorus supply in waratahs (*Telopea speciosissima*)

**Edita Ritmejerytė, Berin A. Boughton,
Michael J. Bayly and Rebecca E. Miller**

1134–1145

Plant nutrition can affect levels of chemical defence compounds, yet little is known about how phosphorus, and relative nitrogen and phosphorus supply, affect chemical defences, especially in species with conservative nutrient use adapted to nutrient-poor soils, such as the waratah (*Telopea speciosissima*). We evaluated how nitrogen and phosphorus supply affected defences in whole waratah seedlings. Roots had higher defence concentrations than leaves, and root and shoot defence chemistry responded differently to nitrogen and phosphorus supply, showing the importance of whole-plant studies.

The expression pattern of the *Pho1a* genes encoding plastidic starch phosphorylase correlates with the degradation of starch during fruit ripening in green-fruited and red-fruited tomato species

**Maria A. Slugina, Anna V. Shchennikova and
Elena Z. Kochieva**

1146–1157

In this study, 10 wild and cultivated tomato species that form green or red fruits were used to characterise fruit sugar and starch content and its possible dependence on the functioning of the starch phosphorylase *Pho1a* gene. It was shown that gene variability may influence the content and composition of starch and sugar in fruits, which, in turn, may determine the tomato fruit size and colour.