

Functional Plant Biology

Contents

Volume 42 Issue 11 2015

Lipoxygenase 2 functions in exogenous nitric oxide-induced stomatal closure in *Arabidopsis thaliana*

Yanfeng Sun, Dong Lv, Wei Wang, Wei Xu, Li Wang, Chen Miao and Hong-Hui Lin

1019–1025

The stomata controls water and gaseous exchange and even the response to bacterial invasion. Its aperture is finely regulated by plants. However, its regulation mechanism still needs to be explored. The possible role of oxylipin in NO signalling in guard cells was studied and the existence of LOX-NO crosstalk in *A. thaliana* guard cells was indicated.

Physiological characterisation and fine mapping of a salt-tolerant mutant in rice (*Oryza sativa*)
Ping Deng, Dan Jiang, Yanmin Dong, Xingyu Shi, Wen Jing and Wenhua Zhang

1026–1035

Salt-tolerant mutants are valuable resources for basic and applied research on plant salt tolerance. In the present study, we characterised a salt-tolerant rice mutant that had a higher survival rate under salt stress and found that its increased tolerance to salt stress was controlled by a single gene located on Chromosome 6. This result will be useful for molecular breeding to improve the salt tolerance of rice.

Modelling photosynthesis in flag leaves of winter wheat (*Triticum aestivum*) considering the variation in photosynthesis parameters during development
Jingsong Sun, Jindong Sun and Zhaozhong Feng

1036–1044

Modelling photosynthesis is one key step in estimating plant biomass under different growth conditions. In this study, we investigated and quantified the patterns of the photosynthesis parameters V_{cmax} , J_{max} and g_m during flag leaf development in two cultivars of winter wheat. The dynamics of the photosynthesis parameters, particularly g_m , play an important role in estimating the photosynthesis rate of winter wheat, which greatly improves the modelling of photosynthesis in plants.

Responses of pea plants to elevated UV-B radiation at varying nutrient levels: N-metabolism, carbohydrate pool, total phenolics and yield
Suruchi Singh, Shashi B. Agrawal and Madhoolika Agrawal

1045–1056

A holistic study to evaluate elevated UV-B response of a legume at varying NPK additions was not attempted before. In the present study, various metabolic- and oxidative stress related variables of pea were analysed and correlated with nitrogen (N) metabolism and plant performance. Recommended NPK through optimum N metabolism helped the plants to counter the negative impact of elevated UV-B, maximally by maintaining yield.

Copper amine oxidase-catalysed hydrogen peroxide involves production of nitric oxide in darkness-induced stomatal closure in broad bean
Ai-Xia Huang, Yong-Shun Wang, Xiao-Ping She, Juan Mu and Jin-Liang Zhao

1057–1067

As the commonest environmental factor, the light–dark cycle regulates transpiration and gas exchange in plants by controlling stomatal movement. This work shows that the copper amine oxidase-catalysed product H_2O_2 is required for NO production and cytosolic alkalisation in darkness-induced stomatal closure. This finding may contribute to the knowledge of the guard-cell signalling cascade in response to darkness.

Cover illustrations: Comparison of the salt tolerance of Nipponbare (Nipp) and the *rst1* mutant (see Deng *et al.* pp. 1026–1035). Fourteen-day-old seedlings were treated with 140 mM NaCl for 10 days and then recovered for 7 days. (a) Performance of Nipp and the *rst1* mutant subjected to NaCl stress. (b) Survival rates of Nipp and the *rst1* mutant grown under NaCl stress for 10 days. Data are presented as means $\pm$ s.e.m. ($n = 3$). **, significant at the 0.01 probability level. Images by W. Jing and P. Deng.

In vitro cell wall extensibility controls age-related changes in the growth rate of etiolated *Arabidopsis* hypocotyls

Dmitry Suslov, Alexander Ivakov,

Agnieszka K. Boron and Kris Vissenberg

1068–1079

Cell wall extensibility is a crucial characteristic controlling plant cell growth at the biophysical level that is currently estimated by various indirect methods. We have developed new metrics providing very accurate cell wall extensibility assessment and offered novel statistical approaches for their comparisons. Our findings will help discover new proteins that regulate plant cell growth by influencing cell wall extensibility.

Expression of maize heat shock transcription factor gene *ZmHsf06* enhances the thermotolerance and drought-stress tolerance of transgenic *Arabidopsis*

Hui-cong Li, Hua-ning Zhang, Guo-liang Li,

Zi-hui Liu, Yan-min Zhang, Hong-mei Zhang

and Xiu-lin Guo

1080–1091

Heat shock factors (HSFs) play an important role in regulation of heat-induced transcriptional reprogramming. To understand the molecular mechanism of maize adaptation to heat stress, the *ZmHsf06*, A1 subclass, was cloned and the expression and role were investigated. *ZmHsf06* may be a central representative of maize Hsfs and useful as a candidate gene in molecular breeding of crops for enhanced tolerance during terminal heat and drought stresses.

A comparative structural and functional study of leaf traits and sap flow in *Dracaena cinnabari* and *Dracaena draco* seedlings

Nadezhda Nadezhkina, Roman Plichta,

Valeriy Nadezhdin, Roman Gebauer, Radek Jupa,

Hana Habrova and Petr Madera

1092–1105

Trait-based approaches have become widely used in ecophysiology as a proxy of community responses to environmental changes. This study documents the differences in sap flow and water-related leaf traits in seedlings of two remote *Dracaena* species: *Dracaena cinnabari* and *Dracaena draco*. Our results provide an important context for research into the function of water transport in arborescent monocots and may help to predict the potential direction of plant evolution in response to possible future global warming and changing land use.