

Functional Plant Biology

Continuing *Australian Journal of Plant Physiology*

Contents

Volume 30 Number 7 2003

Review: Legume seed flavonoids and nitrogenous metabolites as signals and protectants in early seedling development

Patrick A. Ndakidemi and Felix D. Dakora 729–745

This review provides a useful compilation of the occurrence and biological functions of secondary metabolites in legume seeds. Multiple organisms in the soil encounter combinations of plant metabolites, and may exert synergist interactions on a given phenotype. The review considers the overall chemical environment created by seed imbibition and the multiplicity of biological targets for these molecules.

Circadian rhythm of stem and fruit diameter dynamics of Japanese persimmon (*Diospyrus kaki* Thunb.) is affected by deficiency of water in saline environments

Kounosuke Fujita, Junki Ito, Pravat K. Mohapatra, Hirofumi Saneoka, Kei Lee, Heilil Kurban, Kouji Kawai and Katsumi Ohkura 747–754

Stem and fruit diameter reflect plant water potential, and are affected by stress; early diagnosis of stress is important for mitigating stress-related injury. These authors measured the effects of salt stress during fruit growth on stem and fruit diameters in Japanese persimmon, using a micromorphometric technique, which is less cumbersome and more precise than other methods.

Mucilage production by wounded xylem tissue of maize roots — time course and stimulus

Laura J. Crews, Margaret E. McCully and Martin J. Canny 755–766

Xylem occlusion by mucilage following pathogen invasion is well known. This study advances knowledge of the process by showing (for the first time) a detailed time-course in roots, secretion of mucilage by xylem parenchyma stimulated only by mechanical wounding, and implications for interpretations of xylem functioning using wounded or detached organs.

The heterogeneity of turnip-tops (*Brassica rapa*) seeds inside the silique affects germination, the activity of the final step of the ethylene pathway, and abscisic acid and polyamine content

María Isabel Puga-Hermida, Mercedes Gallardo, María del Carmen Rodríguez-Gacio and Angel J. Matilla 767–775

In an investigation of the factors regulating germination, these authors demonstrate implications of the ethylene and polyamine pathway in the heterogeneity of turnip seeds. They also provide evidence that an alteration in germinative capacity may be related to the early imbibition water-uptake rate, without dismissing the alteration caused by the heterogeneous character in the ABA levels.

Leaf area development of ABA-deficient and wild-type peas at two levels of nitrogen supply

Ian C. Dodd 777–783

Leaf growth, water and hormonal relations of ABA-deficient wilted and wild-type peas were determined at two levels of N supply, to determine whether ABA status alters leaf growth response to N deprivation. No genotypic differences were seen in leaf expansion rate, and ABA status was not seen to alter leaf growth response to N deprivation.

Cover illustration: A representation of the impression an artist may get by reading FPB: Protocol and drawing of a living system in the 15th/16th century (Leonardo da Vinci), overlaid by the graphics and models used for teaching photosynthesis in the 21st century (Bioenergetics Laboratory, University of Geneva) based on experimental signals such as simultaneous fluorescence and transmission kinetics (picture arranged by Ronald Maldonado-Rodriguez).

Left panel: Green line: fast polyphasic fluorescence rise with the discernable phases in alphabetical order GHIJKL between P and O, short OJIP transient. Red line: Simultaneous transmission signal at 820 nm on a green leaf.

Right panel: Cartoon of the Z-scheme for the photosynthetic non-cyclic electron transport from water to NADP (see Schansker *et al.*, pp. 785–796).

Characterization of the 820-nm transmission signal paralleling the chlorophyll *a* fluorescence rise (OJIP) in pea leaves

Gert Schansker, Alaka Srivastava, Govindjee and Reto J. Strasser 785–796

New equipment has been developed to measure fluorescence and transmission simultaneously, down to the sub-millisecond region. This enables kinetic separation of the contributions of plastocyanin and P700 to the 820 nm transmission changes in leaves, and is based on an analysis of the re-reduction kinetics of the 820 nm transmission after a far-red pulse of light.

Stabilization of the oxygen-evolving complex of photosystem II by bicarbonate and glycinebetaine in thylakoid and subthylakoid preparations

Vyacheslav V. Klimov, Suleyman I. Allakhverdiev, Yoshitaka Nishiyama, Andrei A. Khorobrykh and Norio Murata 797–803

This paper covers the effects of bicarbonate and other compounds on the stability of the water-oxidising complex *in vitro*. The authors provide novel evidence that the effects of bicarbonate and glycinebetaine are additive.

Dual targeting ability of targeting signals is dependent on the nature of the mature protein

Orinda Chew and James Whelan 805–812

A number of proteins are targeted to both mitochondria and chloroplasts, referred to as dual targeted proteins. Here we show that dual targeting ability is determined by the nature of the passenger protein. This differs to signals that specify only mitochondrial or chloroplast targeting where numerous studies have concluded that the targeting signal is sufficient for targeting.

Blocking ethylene perception enhances flooding tolerance in rice seedlings

Evangelina S. Ella, Naoyoshi Kawano, Yasuo Yamauchi, Kiyoshi Tanaka and Abdelbagi M. Ismail 813–819

Large areas of South and Southeast Asia experience short durations of flash flooding during the rice-growing season, which dramatically affect plant survival and productivity. These authors examine the relationship between ethylene and flood tolerance in two varieties of rice. Results imply that ethylene exerts its action through the enzyme chlorophyllase.

Colletotrichum gloeosporioides infection induces differential expression of glutathione S-transferase genes in *Malva pusilla*

J. Doug Dean, Paul H. Goodwin and Tom Hsiang 821–828

Glutathione S-transferase (GST) is an enzyme with several functions in plant metabolism. This paper describes four GST genes of the weed, *Malva pusilla*, and the changes in the expression of these genes following inoculation with a hemibiotrophic plant pathogenic fungus and during incubation of these plants in the dark.

Corrigendum to:

Conversion of canopy intercepted radiation to photosynthate: a review of modelling approaches for regional scales

Belinda Medlyn, Damian Barrett, Joe Landsberg, Peter Sands and Robert Clement 829