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A novel T-DNA vector design for selection of transgenic lines with simple transgene integration and stable transgene expression

Song Chen, Christopher A. Helliwell, Li-Min Wu, Elizabeth S. Dennis, Narayana M. Upadhyaya, Ren Zhang, Peter M. Waterhouse and Ming-Bo Wang

671–681

A major cause of transgene instability in plants, and a serious problem for the commercialisation of transgenic crops, are multiple-copy and repetitive transgene insertions. These authors test a novel T-DNA vector based on the RNA silencing concept that increases the chance of obtaining transgenic plants with a single T-DNA insertion.

Alternative splicing of the *Vupur3* transcript in cowpea produces multiple mRNA species with a single protein product that is present in both plastids and mitochondria

John D. Bussell, Doug J. Hall, Anthea J. Mann, Danica E. Goggin, Craig A. Atkins and Penelope M. C. Smith

683–693

Nodules of tropical legumes are ideal for studying the purine biosynthesis pathway, for determining aspects of its subcellular localisation and for the isolation of pathway enzymes and the genes encoding them. This paper details work characterising the alternative splicing of the transcript of *pur3* from cowpea, and the localisation of its protein product. The authors show that several different mRNAs are produced from this gene, and correct previous work on the soybean homologue of this gene, to suggest that the different transcripts seen may not have originated from different genes.

A wheat genotype developed for rapid leaf growth copes well with the physical and biological constraints of unploughed soil

Michelle Watt, John A. Kirkegaard and Gregory J. Rebetzke

695–706

Agriculture worldwide has steadily adopted conservation farming, with no parallel increase in development of crops suited to the unploughed soil conditions. This paper explores the question, 'Can a novel vigorous wheat genotype overcome the physical and biological constraints of unploughed soil?'. Macro- and microscopic techniques are used to characterise root–soil interactions in ploughed and unploughed soil. The vigorous genotype had faster root and shoot growth in unploughed soil, and was not inhibited by rhizosphere organisms. Vigorous genotypes may provide an opportunity to increase productivity with conservation farming.

Cover illustration: A single-insertion T-DNA vector can suppress transgenic lines with repetitive transgene insertions. When T-DNA is integrated as multiple-copy repeats, the promoter (P) near the T-DNA borders (RB or LB) initiates transcription that proceeds into the neighboring T-DNA and ends at the transcriptional terminator (T), generating hairpin RNA (hpRNA) against the selectable marker gene (SM). This silences SM and the corresponding cell lines are sensitive to the selective agent in the regeneration medium. Transformed cell lines with repetitive T-DNA insertions are less likely to regenerate into plants than those with single-copy or dispersed multiple-copy transgenes. (See Chen *et al.* pp. 671–681.)

Effect of hydrogen peroxide on catalase gene expression, isoform activities and levels in leaves of potato sprayed with homobrassinolide and ultrastructural changes in mesophyll cells

José M. Almeida, Fernanda Fidalgo, Ana Confraria, Arlete Santos, Helena Pires and Isabel Santos 707–720

There exist very few studies describing the effect of H₂O₂ on catalase gene expression and isozyme activity. In addition, the role of brassinosteroids in protection against oxidative stress has rarely been investigated. The work confirms the role of H₂O₂ on catalase mRNA levels and isoform activities in potato plants, previously reported only in maize, and ultrastructural changes in mesophyll cells. It provides evidence for strict discrimination on the induction of gene expression by H₂O₂ that is restricted to the CAT2 isoform only, and also correlates CAT isoform activities with CAT1 and CAT2 levels.

Recruitment of myosin VIII towards plastid surfaces is root-cap specific and provides the evidence for actomyosin involvement in root osmosensing

Przemysław Wojtaszek, Anna Anielska-Mazur, Halina Gabryś, František Baluška and Dieter Volkmann 721–736

The individual molecules building a cell wall–plasma membrane–cytoskeleton (WMC) continuum in plants are still largely unknown. These authors use immunofluorescence microscopy to document the evidence that myosins (particularly myosin VIII) are redistributed in maize root columella cells after hyperosmotic stimulation and protoplasting, and speculate that actomyosin complexes might be involved in the regulation of cellular volume and spatial distribution of cell compartments. They also demonstrate the differences in the mechanisms of plastid movement in roots and in leaves.

Root architectural tradeoffs for water and phosphorus acquisition

Melissa D. Ho, Juan Carlos Rosas, Kathleen M. Brown and Jonathan P. Lynch 737–748

Root architecture is notoriously difficult to study, especially in the field, yet has considerable ecological and agricultural implications. The trade-off between needing shallow roots to acquire immobile nutrients in the topsoil, and deep roots to acquire water and possibly nitrate in the subsoil, is one that is rarely explored. These authors evaluate the importance of the organisation of root architecture in exploiting the multiple soil resources, particularly when their availability is inadequate due to unequal spatial distribution.

Topsoil foraging and phosphorus acquisition efficiency in maize (*Zea mays*)

Jinming Zhu, Shawn M. Kaeppler and Jonathan P. Lynch 749–762

This group has previously shown that topsoil foraging is an important adaptation to low P soil in legumes. The demonstration of this feature in grasses, which have distinctly different root architecture than legumes, would be of interest. Here they show that regardless of mycorrhizal status, shallow root architectures improve P acquisition in maize, which has relevance to ecophysiology and crop breeding.