

Functional Plant Biology

Contents

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<p><i>Goldacre Paper: Understanding meiosis and the implications for crop improvement</i> Jason A. Able, Wayne Crismani and Scott A. Boden</p>	575–588	<p>Meiosis is a key biological process for the majority of sexually reproducing organisms. During the past 50 years the scientific community has acquired significant knowledge on this process from single celled organisms such as yeast to higher order plant species including bread wheat. While many genes are already known to be involved during meiosis, the ability to directly apply this knowledge to crop improvement has been limited to date. This review examines some of the latest research findings reported on the process of meiosis, and how these results will impact crop improvement strategies of the future.</p>
<p><i>Review: <i>Sporobolus stapfianus</i> Gandoger, a model desiccation-tolerant grass</i> Donald F. Gaff, Cecilia K. Blomstedt, Alan D. Neale, Tuan N. Le, John D. Hamill and Hamid R. Ghasempour</p>	589–599	<p>Dry leaves of the African grass <i>Sporobolus stapfianus</i> display the latent life exhibited by dry seeds. Reabsorbed water rapidly reinstitutes normal metabolism in both. A conjunction of features makes <i>S. stapfianus</i> especially suitable for research into the mechanism, regulation and genetic base of desiccation tolerance in angiosperms.</p>
<p>Phospholipase D family interactions with the cytoskeleton: isoform δ promotes plasma membrane anchoring of cortical microtubules Zornitza Andreeva, Angela Y. Y. Ho, Michelle M. Barhet, Martin Potocký, Radek Bezvoda, Viktor Žárský and Jan Marc</p>	600–612	<p>Phospholipase D is a family of enzymes that play key role in the transduction of hormonal and environmental stress signals. The mechanism involves the cytoskeleton, although it is unclear how individual enzyme isoforms operate. Using synthetic siRNAs targeting individual isoforms, this papers shows that phospholipase D delta is unique in promoting anchorage of microtubules in the cell cortex.</p>
<p>Biomechanics of isolated tomato (<i>Solanum lycopersicum</i>) fruit cuticles during ripening: the role of flavonoids Eva Domínguez, Laura España, Gloria López-Casado, Jesús Cuartero and Antonio Heredia</p>	613–620	<p>Flavonoid accumulation in tomato fruit cuticles during ripening is correlated with a more rigid cutin network that reinforces the mechanical function of polysaccharides. The absence of flavonoids at red ripe is related with a predominance of the viscoelastic performance of the cuticle. A role of phenolics as biomechanical modulators of the cuticle behavior is proposed.</p>
<p>Estimating nitrogen uptake of individual roots in container- and field-grown plants using a ^{15}N-depletion approach Astrid Volder, Laurel J. Anderson, David R. Smart, Arnold J. Bloom, Alan N. Lakso and David M. Eissenstat</p>	621–628	<p>We compared age dependent nitrate-N uptake rates of intact roots of potted young grape cuttings and tomato plants with those of field-grown mature vines. Patterns of rapidly declining uptake capacity were similar across species, but there was large variability within roots of equal age and order, suggesting a functional diversity that is poorly understood.</p>

Cover illustration: To pair or not to pair? *Triticum aestivum* ASynapsis 1 (*TaASY1*) localisation in wild-type wheat cv. Chinese Spring during the early meiotic sub-stage known as zygotene. On the left, the *TaASY1* signal (white) is continuous and structurally defined as the condensing chromosomes begin to synapse and pair with one another. On the right, the same *TaASY1* signal (red) can be seen as being confined to the regions of the nucleoplasm containing chromatin, as shown by staining with 4',6-diamidino-2-phenylindole (DAPI) (blue) (see Able *et al.* pp. 575–588).

A 'simplest' steady-state Münch-like model of phloem translocation, with source and pathway and sink

**William F. Pickard and
Barbara Abraham-Shrauner**

629–644

The generally accepted mechanism introduced eighty years ago by Ernst Münch to explain phloem translocation is learned by every student of plant biology. Here, for the first time, we combine, loading, unloading, and osmotic water flux to get a single second order differential equation which yields simple predictions of sap velocity and saccharide concentration.

The net carbon balance in relation to growth and biomass accumulation of grapevines (*Vitis vinifera* cv. Semillon) grown in a controlled environment

Dennis H. Greer and Sylvie M. Sicard

645–653

The carbon economy driving growth of Semillon grapevines was investigated. Early in spring, the vines consumed root carbon reserves to support growth, creating a carbon deficit. After flowering, the vines fixed enough carbon to become self sufficient. After leaf, stem and bunches demands were met, carbon left over replenished the reserves.

Developmental stages of delayed-greening leaves inferred from measurements of chlorophyll content and leaf growth

**Andrzej Stefan Czech, Kazimierz Strzałka,
Ulrich Schurr and Shizue Matsubara**

654–664

We analysed chlorophyll accumulation and leaf growth in delayed-greening leaves of *Theobroma cacao* to examine whether these parameters can be used as indicators of chloroplast and leaf development. The results highlight coordinated development of photosynthetic machinery and leaf structure in delayed-greening leaves and provide a simple and non-invasive method for estimation of leaf developmental stages in *T. cacao*.