

## Genetic responses to phosphorus deficiency (Botanical Briefing)

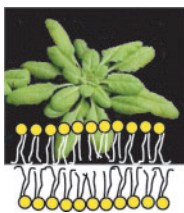
Phosphorus is an essential macronutrient for plants and a lack of phosphorus modifies morphology, physiology and metabolism in characteristic ways.

**Hammond *et al.* (pp. 323–332)** review the changes in gene expression that orchestrate these responses to phosphorus deficiency.



## Tree growth and competition in post-fire boreal forest

**Dolezal *et al.* (pp. 333–343)** examine mechanisms of growth and competition that underlie the dynamics of an important forest type in Kamchatka following fire damage. They highlight the impact of low soil fertility, vegetative origin and low density of pioneer birch populations as well as below-ground competition, a lack of intense competition for light, self-thinning and the extent of early colonization by larch.



## Membrane lipids in droughted *Arabidopsis thaliana*

*Arabidopsis* (Columbia) plants are shown by **Gigon *et al.* (pp. 345–351)** to tolerate considerable dehydration as

indicated by the stability of membrane lipids and expression patterns of genes related to lipid metabolism. Membrane lipid repair after rehydration is notably efficient and associated with increases in DGDG/MGDG ratio and in lipid unsaturation. These findings indicate a previously unrecognized capacity for adaptation to drought in this species.



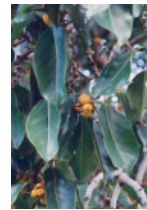
## Genome size of *Cirsium* and its hybrids

Despite frequent natural hybridization between *Cirsium* species, the DNA content of parental taxa remains variable and this can be correlated with eco-geographical features. **Bureš *et al.* (pp. 353–363)** show that frequently hybridizing species have smaller genomes and that genome size of hybrids is smaller than the average of parental genomes.



## Pollination system frequency in the Caatinga

The Caatinga is the fourth largest ecosystem in Brazil and is one of the 37 'Wilderness Areas of the World'. Data on the frequency of the pollination systems for this exclusively Brazilian dry forest are assessed by **Machado and Lopes (pp. 365–376)**. Their results indicate diversification of the pollination systems despite the climatic restrictions and reveal values similar to other tropical dry and wet forest communities.



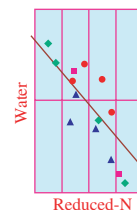
## Plant traits of *Ficus* spp. associated with resistance to insect herbivory and to position in a successional hierarchy

Pioneering species of ficus are shown by **Xiang and Chen (pp. 377–384)** to suffer more from insectivorous grazing than late successional species. High resistance is linked to low N, K and P concentrations, high toughness, shortness of leaf longevity and greater incidence of calcium oxalate crystals.



## Plant-to-plant variability in grain legumes

An empirical principal axis model (PAM), to quantify the impact of individual plant performance on crop yield, is validated by **Ayaz *et al.* (pp. 385–392)** for four grain legumes treated to induce interplant competition. The use of PAM enables crop ideotypes to be identified that may stabilize interplant competition and therefore contribute to stabilizing crop yields.



## Modelling ontogenetic changes of nitrogen and water in lettuce

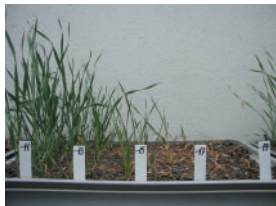
Water content of lettuce increases and reduced-nitrogen content decreases

towards harvest time. **Seginer *et al.*** (pp. 393–404) model these trends with a variant of the lettuce growth-model NICOLET. The new model can estimate uptake of nitrogen more accurately than its predecessors.



#### Pod set in droughted soybean

The physiological basis for pod abortion in soybean under anthesis-drought is unclear. Using plants growing under different water regimes and/or exogenous growth regulator treatments, **Liu *et al.*** (pp. 405–411) relate pod set to photosynthetic rate and to pod abscisic acid (ABA) concentration. They show that sufficient photosynthate supply is essential for pod set and that ABA and benzyladenine affect pod set via effects on photosynthesis.



#### Vernalization, shoot apex development and frost tolerance in wheat

Frost tolerance of winter wheat depends primarily upon a requirement for vernalization that delays the transition to the reproductive phase. **Prášil *et al.*** (pp. 413–418) support the hypothesis that genes coding for vernalization requirement regulate the duration of low temperature-induced frost tolerance. Following saturation of the vernalization requirement, winter wheat exhibits only low frost tolerance similar to that of spring wheat.



#### Outcrossing frequency in anemophilous plants

Outcrossing is expected to rise in anemophilous plants as their density increases. However, **Ferrer *et al.*** (pp. 419–426) report that *Flourensia cernua*, a species of arid zones, is an exception. This is explained in terms of the presence of a self-incompatibility system that ensures similar outcrossing rates in two populations of contrasting densities, and with life history attributes that explain the genetic structure of the species.



#### Phosphorus uptake and retention by calcifuge and calcicole herbs

**Zohlen and Tyler** (pp. 427–432) demonstrate that calcifuge herbs forced to grow on calcareous soil take up less phosphorus and retain less soluble inorganic phosphate than calcicole herbs well adapted to such soils. This may help to explain the failure of calcifuges on calcareous soils.



#### Variation in sex allocation in hermaphrodites

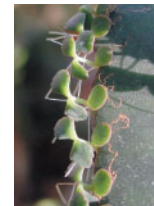
Resource allocation to male and female functions in hermaphrodites can vary with position up the plant.

**Gutián *et al.*** (pp. 433–440) examine variations in sexual investment in *Polygonatum odoratum*, and show a marked influence of vertical positioning on various quantitative aspects of flower formation and development.



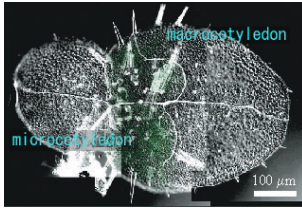
#### Intra-inflorescence variation in floral traits and reproductive success

Within-plant variation in floral and reproductive success often differs from between-plant variation. **Buide** (pp. 441–448) finds consistent patterns of intra-inflorescence variation in ovule number, fruit set, number of seeds per fruit, and seed set in different populations of *Silene acutifolia*. She also finds a notable reduction in variation in secondary and especially tertiary positions and some variability in seed germination.



#### Metabolic differences between CAM

**Chen and Nose** (pp. 449–455) compare hexose-utilizing *Annas comosus* (pineapple) with starch-utilizing *Kalanchoe pinnata* and *K. daigremontiana*. Pineapple is typically rich in pyrophosphate-dependent phosphofructokinase while *Kalanchoe* contains predominantly ATP-dependent phosphofructokinase. Pineapple accumulated more inorganic phosphorous and less ATP during the night indicating increased efficiency of the pyrophosphate-dependent phosphofructokinase-mediated reaction.



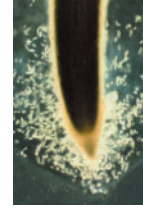
**Hormone-mediated regulation of the unifoliate character of some *Streptocarpus* and *Monophyllaea* species**

Uniquely, certain *Streptocarpus* and *Monophyllaea* spp. bear only one leaf throughout their life cycle. This leaf is derived from the macrocotyledon and **Nishii *et al.* (pp. 457–467)** demonstrate that its formation is the outcome of a phase change in the ascending cotyledon that is triggered by cytokinin.



**Foliaceous stipules of primary leaves in cowpea**

The presence of connate foliaceous stipules of primary leaves is unique to the cowpea genotype EC394736. **Pandey and Dhanasekar (pp. 469–471)** examine the morphology and the inheritance pattern of these foliaceous stipules. They show that duplicate recessive genes govern the character and highlight the potential for foliaceous stipules as morphological markers.



**Mucilage and root cap effects on soil impedance**

Impedance to root extension imposed by soil can be decreased by lubrication from mucilage secretion and by border cells sloughed off the root cap. **Iijima *et al.* (pp. 473-477)** show that these two features assisted passage of the root through soil by 43 % and 58 %, respectively.