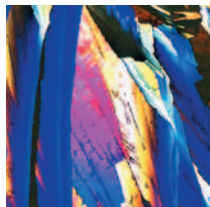


Polar molecules can cross cuticles (Botanical Briefing)

Although plant cuticles are lipophilic polymer membranes, there is increasing evidence that polar compounds can diffuse across them. **Schreiber (pp. 1069–1073)** show that ions and charged organic molecules use polar paths of transport. Transfer takes place preferentially in the vicinity of stomata and trichomes. These results demonstrate pronounced inherent lateral heterogeneity in plant cuticles.



Efficacy of phytochemicals for cancer reduction (Invited Review)

Identifying health-promoting compounds in plants and developing foods enriched with such compounds are important research goals. However, stringent criteria are needed to evaluate health benefits. **Finley (pp. 1075–1096)** proposes such criteria and uses them to evaluate the efficacy of carotenoids, lycopene, glucosinolates, polyphenols and selenocompounds for the reduction of cancer.



Chiropterophily in *Sinningieae* (*Gesneriaceae*) species

The extent of bat pollination in the *Gesneriaceae* is uncertain.

SanMartin-Gajardo and Sazima (pp. 1097–1103) present data that strengthen an independent origin for bat pollination in *Sinningia brasiliensis* and *Paliavana prasinata*. *Paliavana sericiflora* is shown to possess characteristics between bird and bat syndromes but is pollinated by hummingbirds, suggesting either a species in transition or at an evolutionary endpoint.



Anther–stigma separation and outcrossing rates in a self-compatible daffodil

In animal-pollinated plants, anther–stigma separation (herkogamy) is considered an adaptive character that functions to limit selfing. **Medrano *et al.* (pp. 1105–1111)** test this hypothesis in self-compatible *Narcissus longispathus* using allozyme markers. They show that outcrossing rates do not increase monotonically with herkogamy, a result not previously documented for any other species.



Stamens, staminodes and pollen of *Commelina* flowers

Commelina flowers possess both cryptically coloured, pollen-laden anthers, and highly advertised staminodes with little pollen. **Hrycan and Davis (pp. 1113–1130)** examine and compare the structure and pollen characteristics of the different stamen types in two species, explore the pollination roles each play and investigate possible breeding systems.



Rice morphogenesis, plant architecture and 3D modelling

The architecture of rice plants is characterized by large numbers of tillers and leaves. **Watanabe *et al.* (pp. 1131–1143)** describe rice plant architecture from 3D digitizing measurements, and construct a 3D structural model, ‘Virtual Rice’, using L-system syntax to digitize the pattern of rice growth and development from seedling to maturity.



Gene erosion in endangered tree species

Berchemiella wilsonii var. *pubipetiolata* is an endangered tree with only four known populations in eastern China. Using allozyme analysis as an indicator of genetic erosion in recently fragmented populations, **Kang *et al.* (pp. 1145–1151)** detect a loss of low-frequency alleles. An excess of heterozygotes in all populations suggests that selection for heterozygotes has occurred in this species.



Optimal hydration status for *Citrus* seed cryopreservation

For non-orthodox seed species, cryopreservation is the only technique available

for long-term germplasm conservation. Using citrus seeds as a case study, **Hor et al.** (pp. 1153–1161) show that the optimal seed water content for cryopreservation coincides with the unfrozen water content, is negatively correlated to seed lipid content and can be attained by equilibrating seeds in 75 % relative humidity.



Molecular fingerprinting of *Leucadendron* cultivars

The identification of *Leucadendron* cultivars and the determination of their molecular relationships are important for breeding and management.

Pharmawati et al. (pp. 1163–1170) examine the relationships of 30 *Leucadendron* cultivars using ISSR markers. A fingerprinting key is shown based on the banding patterns of ISSR markers.



Genetic variation in an endangered tropical tree

Dalbergia nigra is endangered by intensive timber exploitation and habitat fragmentation. **Ribeiro et al.** (pp. 1171–1177) assess the genetic variation and structure in adult trees and saplings from three remnant areas with different degrees of anthropogenic disturbance. The results highlight the importance of preserving small remnants to maintain genetic variation.



Xylem vessels comply with optimal engineering design principles

Xylem vessels adopt many different thickening patterns. An engineering analysis of microscopic images by **Karam** (pp. 1179–1186) reveals that all patterns follow the engineering principle of constant strength. This systematically minimizes and optimizes the amount of material built into vessel walls. Cell wall structures could usefully be analysed in a similar way.



N use efficiency and modelling N dynamics in oilseed rape

A dynamic model by **Malagoli et al.** (pp. 1187–1198) enables the pool of cycling N compounds in *Brassica napus* to be quantified throughout the growth cycle. It reveals that when N transfer from vegetative to reproductive tissue is optimized and residual N in abscised leaves is reduced, seed N content or yield increase by 15 %.



Model for floral development in the Cyperoideae

Using SEM, **Vrijdaghs et al.** (pp. 1199–1209) show that ontogeny of the eight perianth bristles in

Dulichium and the many silky hair-like parts of the perianth in *Eriophorum* (Cyperaceae, subfamily Cyperoideae *sensu* Simpson *et al.* 2005) follow the pattern seen in *Scirpus*. The floral ontogeny in *Scirpus* thus serves as a model for the Cyperoideae.



Applicability and limitations of optimal biomass allocation models

Osone and Tateno (pp. 1211–1220) test the applicability of optimal biomass allocation models in two herbs (*Polygonum cuspidatum* and *Chenopodium album*) with different habitats. These species show limitations to plasticity of root:leaf ratios. This results in sub-optimal root:leaf ratios under nitrogen conditions that differ from the normal habitat.



Genetic variation and threat of extinction

Endangered, insular endemic species are expected to be low in genetic variation due to their origin by a founder event, narrow geographic range and low number of, often small, populations.

Helenurm et al. (pp. 1221–1227) show that despite 150 years of overgrazing, *Castilleja grisea* retains moderately high levels of genetic variation and is unlikely to be further endangered by genetic factors.



Reproductive biology of endangered *Helianthemum* spp.

Information on the reproductive biology of endangered plants is crucial for predicting survival capacity.

Rodríguez-Pérez (pp. 1229–1236) examines two endangered *Helianthemum* species of the west Mediterranean and concludes that neither species suffers from reproductive limitations (i.e. fruit and seed set, pollination service and seedling survival).



Germination, sowing depth, water supply and air-seeding

Zheng *et al.* (pp. 1237–1245) investigate the impact of sowing depth and water supply on seedling emergence of six species to determine their requirements for successful revegetation of China's Ordos Plateau. A sowing depth of 0.5 cm was identified as optimal for all species. Optimal coverage by wind-blown sand requires careful timing of air-seeding.



Effects of plant leachates on plant–soil and plant–plant interactions

Poor natural regeneration by *Picea glauca* may be related to release of allelopathic compounds from the understory. **Castells *et al.* (pp. 1247–1252)** test this notion by determining the effects of leachates from two shrubs and two bryophytes on soil N cycling, *P. glauca* germination and seedling growth.