

## Dispersal units in orchids, and their consequences for germination

The various pollen dispersal units found in orchids are described by **Pacini and Hesse (pp. 653–664)**. The consequences for germination and fertilization as well as possible evolutionary trends of the various types of compound pollen are discussed. Some features are present in all orchids, whereas others are found only in orchids with pollinia.



## Preformation and neoformation in *Nothofagus antarctica*

In woody plants, leaf differentiation and extension are usually separated by a period of dormancy. **Puntieri et al. (pp. 665–673)** show that the extent of leaf preformation in *N. antarctica* may be both year- and position-dependent. In addition to preformed leaves, relatively short shoots of *N. antarctica*, unlike those of other woody plants, may produce leaves whose differentiation and extension are simultaneous.



## Flower bud abortion compensates for female clone growth

The dioecious shrub *Aucuba japonica* grows clonally by branch-drooping. An unusual feature is that branching is tied closely to flower bud formation at the apices of current shoots. Females flower

at low frequency because of higher reproductive costs. To cancel this sexual dimorphism, **Abe (pp. 675–681)** reports that females abort many flower buds and produce as many clonal shoots as males.



## High-temperature-tolerant rice has distinctive anthers

Anticipated global warming may induce floret sterility in rice even in temperate regions. **Matsui and Omasa (pp. 683–687)** examine the relationship between morphological characteristics of anthers and tolerance of the floret to high temperatures. Compared with susceptible cultivars, tolerant cultivars have fewer cell layers separating the anther locule from the lacuna formed in the septum.



## Ethylene is not always the natural regulator of flower abscission

Ethylene plays a major role in regulating floral abscission in many species, but is it a universal characteristic? By surveying 50 families and about 300 species of monocotyledons and eudicotyledons, **Wouter van Doorn (pp. 689–693)** shows that an exception is the orchid *Cymbidium*, which is ethylene-insensitive.



## Modelling kiwifruit budbreak

Bud position has a pronounced effect on budbreak, a factor not considered by standard chilling-based dormancy mod-

els. **Austin et al. (pp. 695–706)** present an alternative ‘loss of potential’ model, which describes spring budbreak in relation to time of budbreak, winter temperature and position-dependent bud-to-bud interactions.



## Physiological variation in the turlough buttercup

**Lynn and Waldren (pp. 707–714)** investigate how morphologically distinct turlough populations of *Ranunculus repens* survive an amphibious existence. Physiological comparisons such as aerial and submerged gas exchange were made with populations from a terrestrial habitat. The observed differences may be due to differences in leaf morphology, which allow this terrestrial species to survive in an ephemeral aquatic environment.



## Defoliation affects xylem sap amino acids

Following defoliation of *Lolium perenne*, **Thornton and Macduff (pp. 715–722)** report that the concentration of amino acids in the xylem fluid, sampled above the leaf meristem, falls rapidly, concomitant with an increased Asn : Gln ratio. These responses are independent of the phasing of the defoliation to the light period. In intact plants, <sup>15</sup>N-labelled nitrate supplied to the roots is quickly incorporated into xylem Gln suggesting rapid Gln turnover.

*Continued overleaf*



### Physiology of beech and sessile oak in a natural stand

Comparisons of tree species in natural mixed stands and their responses to drought are not well documented.

**Raftoyannis and Radoglou (pp. 723–730)** find that during an exceptionally dry summer, sessile oak is more tolerant to drought than beech due, in part, to its maintenance of photosynthesis at low water potential.



### Benefits of the stay-green mutation for animals and environment

Grass carrying the stay-green mutation does not degrade chlorophyll during senescence and retains LHCPII.

**Kingston-Smith et al. (pp. 731–740)** examine the relationships between chlorophyll, protein and protease activities in wild-type and stay-green *Lolium perenne* with regard to improving protein quality when fresh and conserved forage are used as ruminant feeds.



### Ploidy levels among species in the *Oxalis tuberosa* alliance

Ploidy complicates the study of origins and evolution of the diverse Andean tuber crop, oca (*Oxalis tuberosa*). **Eve Emshwiller (pp. 741–753)** uses flow cytometry to survey ploidy levels and nuclear DNA contents to confirm that cultivated oca is octoploid. One of oca's

putative progenitors was among two tetraploids found, whereas the remaining species were diploid.



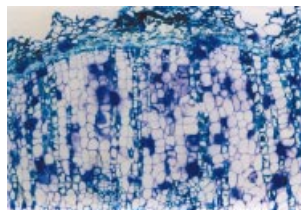
### Comparative developmental anatomy of seedlings in nine species of Podostemaceae

The extraordinary body plan of Podostemaceae is established in early stages of development. **Suzuki et al. (pp. 755–765)** describe developmental anatomy of seedlings. Neither an obvious shoot apical meristem nor a primary root is formed, but capless adventitious roots usually initiate from the hypocotyl.



### Cost of reproduction in *Styrax obassia*

*Styrax obassia* is a typical masting tree species. **Miyazaki et al. (pp. 767–772)** find that in reproductive shoots, the amount of storage starch decreases significantly during the fruit-growing season. The leaves of reproductive shoots have high rates of photosynthesis, but are small. Therefore, the cost of reproduction depends mainly on storage starch in reproductive shoots.



### Surface callus formation in lime trees after debarking

Debarking induces surface callus during the vegetative growth period. Using light and transmission electron microscopy,

**Stobbe et al. (pp. 773–782)** show parenchymatous tissue first develops on the wound surface followed by a wound periderm and finally a wound cambium. The wound cambium goes on to form wound xylem and phloem.



### Mycorrhizas and organic nutrient patches

The physiological attributes of fungal hyphae (including the secretion of nutrient-mobilizing enzymes, and rapid and plastic growth) may offer the plant partner in ectomycorrhizal symbiosis access to transient nutrient patches not available to roots. **Tibbett and Sanders (pp. 783–789)** show that the ectomycorrhizal fungus *Hebeloma syrjense* is able rapidly to access discrete organic nutrient patches more effectively than can the root system alone, to the benefit of the plant.



### Pollen tubes enter neighbouring ovules

An unusual route for pollen tube growth is described by **Wang et al. (pp. 791–796)** in *Sagittaria potamogetifolia*, a monoecious species with an apocarpous gynoecium. The mechanism is shown to increase fruit set, and this partially offsets the proportion of unpollinated stigmas in gynoecia of pistillate flowers.