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Contents

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Transcriptional regulation of phosphate transporters from *Lolium perenne* and its mycorrhizal symbionts in response to phosphorus supply
Qianhe Liu, Anthony J. Parsons, Hong Xue, Chris S. Jones and Susanne Rasmussen 1–8

Phosphorus is essential for plant growth but little is known about its acquisition in pasture grasses. We isolated a phosphate transporter gene from perennial ryegrass together with genes associated with mycorrhizal fungal colonisation and studied how these were affected by varying phosphate supply. This research will help understand phosphorus uptake in pasture grasses and how the relationship with symbiotic mycorrhizal fungi supports this.

Radial oxygen loss and physical barriers in relation to root tissue age in species with different types of aerenchyma
Milena E. Manzur, Agustín A. Grimoldi, Pedro Insausti and Gustavo G. Striker 9–17

Plants grown under flooding conditions display a large variation in aeration strategies in order to maintain suitable levels of oxygen to survive. We investigated these responses in three lowland grassland species, focusing on radial oxygen loss from roots, with different arrangement of aerenchyma. We found that hypoxia response as the oxygenation of roots depends on species and we discuss the physiological implications of the different responses.

PvLOX2 silencing in common bean roots impairs arbuscular mycorrhiza-induced resistance without affecting symbiosis establishment
Guadalupe A. Mora-Romero, Maria A. Gonzalez-Ortiz, Francisco Quiroz-Figueroa, Carlos L. Calderon-Vazquez, Sergio Medina-Godoy, Ignacio Maldonado-Mendoza, Analilia Arroyo-Becerra, Anahí Perez-Torres, Fulgencio Alatorre-Cobos, Federico Sanchez and Melina Lopez-Meyer 18–30

Arbuscular mycorrhizal colonization elicits mycorrhizal-induced resistance (MIR), an enhanced pathogen defence response. To investigate the role of the oxylipin biosynthetic pathway in this phenomenon, we silenced lipoxygenases in normally AM colonized common bean roots and observed MIR impairment against a foliar pathogen. These findings provide novel insights into the onset of MIR, and will eventually be of great benefit to agriculture.

Suppression of starch synthesis in rice stems splays tiller angle due to gravitropic insensitivity but does not affect yield
Masaki Okamura, Tatsuro Hirose, Yoichi Hashida, Ryu Ohsugi and Naohiro Aoki 31–41

In rice (*Oryza sativa* L.), tiller angle – defined as the angle between the main culm and its side tillers – is one of the important factors involved in light use efficiency. Our analysis of a low stem starch mutant revealed suppression of starch synthesis in rice stems splays tiller angle due to gravitropic insensitivity but does not necessarily impact dry matter production. These findings provided new insights for rice breeding to improve plant architecture.

Cover illustration: Arbuscules and infection units morphology is not affected in *PvLOX2*RNAi-silenced roots of common bean composite plants. Confocal laser-scanning microscope images of common bean roots of NT, *PvLOX2*RNAi and EV plants colonised by *Rhizophagus irregularis*. Images were taken 4 weeks after *R. irregularis* inoculation. Roots were stained with WGA-Alexa Fluor 488 (green). Left column: portion of an infection unit. Right column: a single arbuscule from the same root. No red fluorescence from the TDT marker gene in composite plants was detected in these images, due to fixation of roots and clarification of KOH. Images by Francisco Quiroz-Figueroa and Guadalupe A. Mora-Romero.

Light-stimulated heat tolerance in leaves of two neotropical tree species, *Ficus insipida* and *Calophyllum longifolium* ***G. Heinrich Krause, Klaus Winter, Barbara Krause and Aurelio Virgo***	42–51	In the tropics, climate warming and intensified extreme weather events may lead to elevated peak temperatures transgressing the limit of thermal tolerance in plant leaves, causing permanent tissue damage. We demonstrate experimentally that light absorbed by leaves in excess of photosynthetic utilisation ameliorates thermal tolerance. Our results contradict the widespread notion that exposure of leaves to high light in combination with heat aggravates leaf damage.
Increasing nitrogen supply stimulates phosphorus acquisition mechanisms in the fynbos species *Aspalathus linearis* ***Pravin M. Maistry, A. Muthama Muasya, Alex J. Valentine and Samson B. M. Chimphango***	52–62	The mechanisms for growth of *Aspalathus linearis* (Rooibos tea) in the nutrient-poor soils of the Core Cape subregion, and its response to combined addition of N and P, are not known. When addition of N induced low availability of P, the species increased partitioning of resources towards acquisition of P and also enhanced growth. Our findings show that plant growth is colimited by multiple resources.
Foliar trait contrasts between African forest and savanna trees: genetic versus environmental effects ***Franziska Schrodt, Tomas F. Domingues, Ted R. Feldpausch, Gustavo Saiz, Carlos Alberto Quesada, Michael Schwarz, F. Yoko Ishida, Halidou Compaore, Adamo Diallo, Gloria Djagbletey, Fidele Hien, Bonaventure Sonké, Herman Toedoumg, Loius Zapfack, Pierre Hiernaux, Eric Mougin, Michael. I. Bird, John Grace, Simon L. Lewis, Elmar M. Veenendaal and Jon Lloyd***	63–83	Plants are generally assumed to become more sclerophyllous as precipitation declines – but not in West Africa where leaf mass per unit area actually declines with decreasing rainfall. Foliar potassium concentrations increase dramatically with increasing aridity, also differentiating ecotonal forest and savanna species. This suggests an important but as yet unidentified role for K as a modulator of tropical vegetation structure and function.
Changes in timing of water uptake and phenology favours yield gain in terminal water stressed chickpea *At*DREB1A transgenics ***Krithika Anbazhagan, Pooja Bhatnagar-Mathur, Kiran K. Sharma, Rekha Baddam, P. B. Kavi Kishor and Vincent Vadez***	84–94	Effect of *DREB1A* on the yield under stress of transgenic chickpea was tested in a lysimetric system. Only modest yield benefits were found and higher yield related with higher water availability during the reproduction and grain filling period and the capacity to successfully produce filled pods from late flowers. This confirms earlier results obtained with chickpea germplasm.
Potential advantages of highly mycotrophic foraging for the establishment of early successional pioneer plants on sand ***Ingo Höpfner, Martina Friede, Stephan Unger and Wolfram Beyschlag***	95–104	Nutrient uptake through symbiotic mycorrhizal fungi can be considered as an alternative to nutrient acquisition via roots. A comparison of both strategies in sand pioneer plants revealed that in 'mycorrhiza strategists' the enlargement of the absorptive surface area was clearly promoted and led to enhanced soil phosphorus depletion compared with 'root strategists'. Thus, mycorrhizal fungi may be an important factor for the establishment of some plant species in nutrient poor sandy habitats.
Nitrogen supply controls vegetative growth, biomass and nitrogen allocation for grapevine (cv. Shiraz) grown in pots ***Aurélie Metay, Jessica Magnier, Nicolas Guilpart and Angélique Christophe***	105–114	Apart from water, nitrogen is also an important limiting factor in grape growing. The effects of nitrogen deficiency were investigated with 2-year-old *Vitis vinifera* cv. Shiraz plants grown in pots and exposed to various N supplies under well watered conditions. Primary axis elongation, leaf emergences on the primary and the secondary axes and lamina area expansion were significantly inhibited by nitrogen deficiency from flowering in an intensity-dependent manner.