

# Functional Plant Biology

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## Contents

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Magnetic resonance imaging of water movement through asparagus

**Julian A. Heyes and Christopher J. Clark**      1089–1095

Post-harvest water loss is a major determinant of vegetable quality. This study uses magnetic resonance imaging to probe water uptake and distribution within harvested asparagus spears using serial magnetic resonance imaging and a paramagnetic probe species (manganese). The results help us gain insight into the internal processes involved, and for estimating transport rates.

Multiple effects of antibiotics on chloroplast and nuclear-gene expression

**Paula Mulo, Saijaliisa Pursiheimo, Cai-Xia Hou, Taina Tyystjärvi and Eva-Mari Aro**      1097–1103

Antibiotics are widely used tools in plant science; although the specific site of action for many antibiotics is known, the secondary effects remain obscure, thus making interpretation of results difficult. This study focuses on the molecular level effects of antibiotic treatments of mature leaves, and shows that the antibiotic treatments do not always lead to expected inhibition of translation and may additionally affect the PSII function and phosphorylation pattern of LHCII polypeptides as well as the transcription of photosynthesis-related and -unrelated nuclear genes.

Constitutive expression of *Vitis vinifera* thaumatin-like protein after *in vitro* selection and its role in anthracnose resistance

**Subramanian Jayasankar, Zhijian Li and Dennis J. Gray**      1105–1115

The capacity of plants to counter the attack of pathogenic fungi depends on their ability to trigger defence mechanisms. These authors describe induced constitutive expression in regenerated grapevine plants of pathogenesis-related proteins. One of the proteins, *Vitis vinifera* thaumatin-like protein-1, was cloned using molecular techniques and shown to inhibit fungal growth. Functionality of the cloned protein was positively correlated with that of *in vitro*-selected plants.

The *Cf-2/Rcr3<sup>esc</sup>* gene interaction in tomato (*Lycopersicon esculentum*) induces autonecrosis and triggers biochemical markers of oxidative burst at cellular level

**Enrico Santangelo, Valentina Fonzo, Stefania Astolfi, Sabrina Zuchi, Riccardo Caccia, Pietro Mosconi, Andrea Mazzucato and Gian Piero Soressi**      1117–1125

A tomato plant with necrotic leaf spots mimicking disease lesions was singled out in progeny from spontaneous selfing, which exhibited spontaneous, necrotic lesions on the leaves with acropetal progression (autonecrosis). The authors proved that the necrotic phenotype is not associated with the movement of a signal molecule, since the autonecrosis was not transmitted across the grafting point.

*Cover illustration:* Autofluorescence image of an asparagus stem vascular bundle approximately 30 mm behind the shoot tip. Image acquired on an Olympus BH2 microscope by Julian Heyes and digitised by Anthony Corbett, Crop & Food Research, New Zealand (see Heyes and Clark, pp. 1089–1095).

The effect of calcium on the antioxidant enzymes from salt-treated loquat and anger plants

**Jose A. Hernández, Ana Belén Aguilar, Bruno Portillo, Elvira López-Gómez, Jorge Mataix Beneyto and Manuel García-Legaz**

1127–1137

This paper describes the effect of salt stress on antioxidant enzymes in two woody species. In addition, new information is presented on the possible role of Ca in antioxidant enzymes under saline conditions, but the mechanism of Ca regulation remains unclear. The more salt-tolerant species showed a higher capacity to scavenge AOS and lower lipid peroxidation.

Morphological development of rice caryopses located at the different positions in a panicle from early to middle stage of grain filling

**Tsutomu Ishimaru, Toshiaki Matsuda, Ryu Ohsugi and Tohru Yamagishi**

1139–1149

Caryopses in various positions in rice panicles elongate at different rates and accumulate different amounts of starch, especially at grain filling. Understanding the development of these caryopses is important for determining grain yield and quality. This study followed the coordinated development of endosperm with maternal tissues.

High temperature and water deficit may reduce seed number in field pea purely by decreasing plant growth rate

**Lydie Guillioni, Jacques Wéry and Jérémie Lecoeur**

1151–1164

This paper reports on greenhouse and field experiments to evaluate the impact of water deficit and high temperature on seed number in field pea. Yield responses occur via gross changes in biomass accumulation rather than through direct effects on reproductive organs. A single linear relationship between final seed number and plant growth rate was established.

Kinetics of ammonium and nitrate uptake by eucalypt roots and associated proton fluxes measured using ion selective microelectrodes

**Trevor P. Garnett, Sergey N. Shabala, Philip J. Smethurst and Ian A. Newman**

1165–1176

The current trend towards high productivity forestry has meant that many plant nutritional aspects are now being investigated more thoroughly in plantation species. One such aspect is the N uptake characteristics of the roots of forest trees. This study describes research of whole-plant N uptake, in the forms of ammonium and nitrate, in forestry seedlings, and highlights existing problems in the literature. The results point toward an adjustment in forestry fertilization regimes.