

Plant gene for water efficiency found

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ANU researchers have identified a gene that regulates the water efficiency of plants, the first to be discovered that mediates the process critical to plant survival, crop yield and vegetation dynamics.

Dr Josette Masle, from the Research School of Biological Sciences, with colleagues Mr Scott Gilmore and Professor Graham Farquhar, identified the gene in the model plant *Arabidopsis*, a convenient species for laboratory studies of genetics, and the only plant species with rice for which the whole genome has been sequenced.

Known as *ERECTA*, it is the first gene to be discovered for the regulation of the coordination between plant photosynthesis and transpiration. The findings were published today in advanced online publication of the journal *Nature*.

“*ERECTA* controls plant transpiration efficiency, which is the trade-off between water vapour loss through the stomata of the plant and the fixation of carbon during photosynthesis,” Dr Masle said.

“It is an essential function to the survival of plants yet until this point little was known about why some plants lose less water through transpiration than others.

“*ERECTA* is, to our knowledge, the first gene to be shown to mobilise the coordination between transpiration and photosynthesis and therefore the first to be identified as a transpiration efficiency gene, as opposed to simply a stomatal or photosynthesis gene.

“It was initially identified from measurements of carbon isotope discrimination, a process earlier linked to transpiration efficiency by research at ANU, and then confirmed by direct measurements of leaf gas exchange.”

Transpiration is the release of water vapour from a plant’s leaf surfaces during photosynthesis.

According to the researchers, ERECTA mediates the transpiration efficiency process through directing the development of the plant’s features, including features of the epidermis and the mesophyll (the inner tissue) of leaves, stomatal density and porosity of leaves.

“The gene belongs to the large family of Leucine-Rich Repeat Receptor-like kinases, thought to be important signalling genes. The ERECTA gene most likely evolved early in the evolution of flowering plants, so it is not totally surprising that it should have a function in a trait like transpiration efficiency, which is of major importance for the survival of the plant,” Dr Masle said.

“In water limited environment, transpiration efficiency is obviously most critical to plant survival and crop yield. Our finding will help unravel some of the unanswered questions about this process and potentially lead to further development of more robust plants for crops in dry areas.”

Source: Australian National University

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