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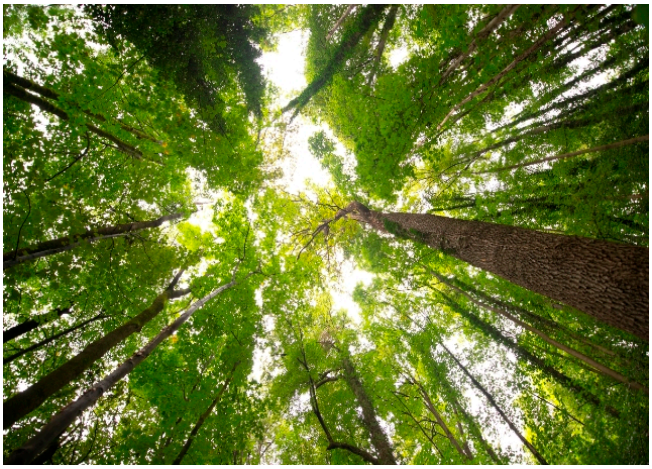
CO2 induced water efficiency in plants

Professor David Ellsworth and Dr Brendan Choat from the Hawkesbury Institute for the Environment are working alongside Dr David Hammond from Campbell Scientific Australia Pty. Ltd., to develop new technology able to monitor the water efficiency of plants in real-time.

'CO2 levels today are higher than they were in the last few centuries,' explains Professor Ellsworth. 'As a result, plants of the 21st century will be grown in a completely different atmosphere and climate. The rising amount of CO2 in the atmosphere is likely to increase plants' water efficiency, as it has been found that increased levels of CO2 in the atmosphere also increase the level of CO2 intake of plants through two physiological changes – faster photosynthetic rates and reducing water loss by leaves. In order to observe these changes, we must monitor the water movement in trees; however, continuously monitoring the water status of plants is difficult because of limitations in measuring instruments. What we aim to produce is an instrument capable of reliably and continuously measure plant water status which can combine leaf and stem measurements of trees through stem water use and carbon storage by growth. We will apply this new technology to the EucFACE – an experiment that exposes large areas of native trees to elevated CO2 – and monitor the changes induced in the trees.'

Researchers will collaborate with Campbell Scientific Australia Pty. Ltd., to engineer the necessary equipment to monitor water efficiency of eucalyptus trees. The equipment designed will measure the stem and leave's response to increase CO2 in real-time. Changes in the stem radius, water stem content, fluid flow and leaf rigidity will be analysed. Researchers will also test whether the effects of elevated CO2 levels on plant water-use and carbon accumulation will be similar across different parts of the trees.



This project will give us an insight into the future as to how Australian native trees will cope with increasing CO2 levels. Doing so will result in the production of new sensor systems which may be commercialised to other industries alongside the development of new analytical techniques.

Project Title: Carbon-water linkages for native trees under elevated CO2: a unique coupled sensor system for tree water-use efficiency
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Contact Details: d.ellsworth@westernsydney.edu.au; http://www.westernsydney.edu.au/hie
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