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R&D Works – May 2015

Welcome to our May edition of the R&D Works newsletter.

This month our stories include a study on the efficiency of log sorting on log processing productivity; gene modification research in poplar trees that have doubled growth rates and may have implications for future biomass production; a new model for guided circular saws to better predict flutter vibration onset to improve high performance at critical speeds; and an FWPA funded project that investigated the extent and causes of decline in productivity from first to second rotation blue gum plantations.

I do hope you enjoy reading about these exciting research projects.

Chris Lafferty
R&D Manager
FWPA

MAIN NEWS

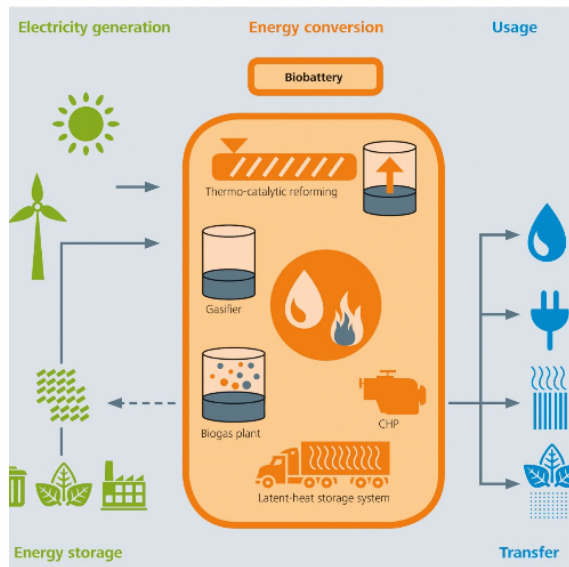
The extent and causes of decline in productivity from first to second rotation blue gum plantations

This CSIRO led research project measured and assessed changes in productivity of blue gum plantations between the first and second rotation, particularly in Western Australia. The research showed that well established



forestry management principles, such as soil and nutrition management, can sustain production through multiple rotations.

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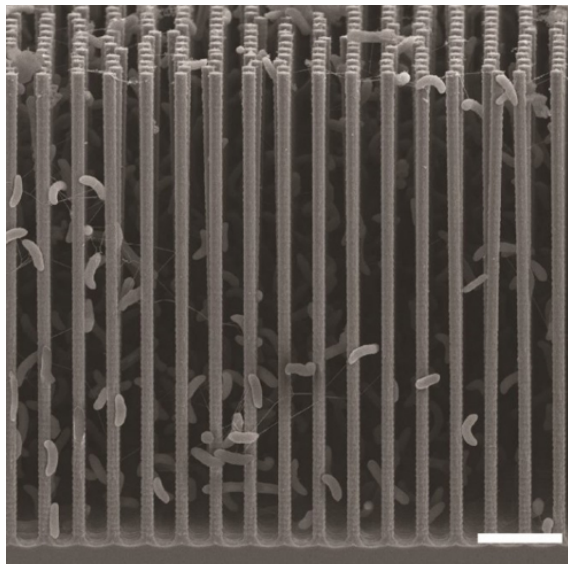


Modular bio-battery plant turns biomass into energy

Researchers at the Fraunhofer Institute for Environmental, Energy and Safety Technology have developed a “biobattery”, in the form of a highly efficient biogas plant. This plant can turn raw materials like straw, scrap wood and sludge into a variety of useful energy sources, including electricity, purified gas and engine oil.

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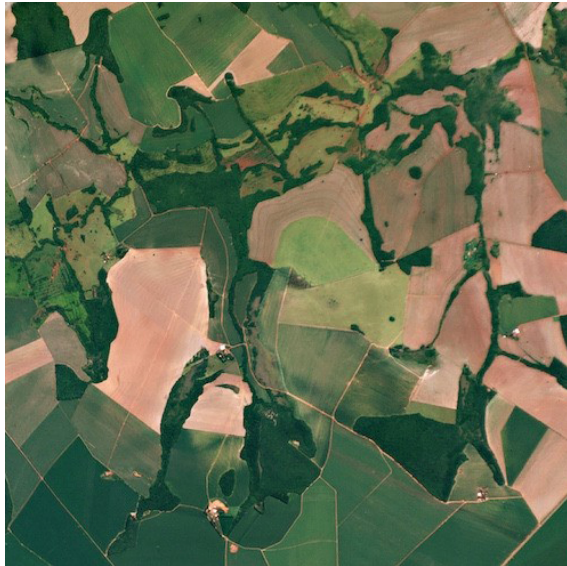
NEW PRODUCT INNOVATIONS



Artificial photosynthesis breakthrough turns CO2 emissions into plastics and biofuel

Scientists at the Lawrence Berkeley National Laboratory and the University of California, Berkeley have created a hybrid system of bacteria and semiconducting nanowires that mimics photosynthesis. According to the researchers, their versatile, high-yield system can take water, sunlight and carbon dioxide and turn them into the building blocks of biodegradable plastics, pharmaceutical drugs and even biofuel.

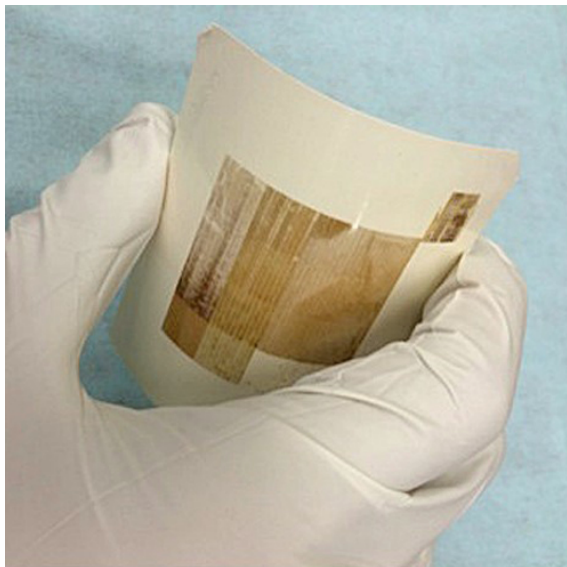
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Predictive software to identify indicators of deforestation risk from satellites imagery

Monitoring global deforestation can be a tedious process of analysing individual satellite images from a handful of government spacecraft and trying to infer trends from relatively blurry pixels. Even so, recent advances have yielded clues about shifting hotspots of deforestation, including tropical nations and industrialised countries.

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Laser-printed polysilicon transistors on paper

Printed electronics have opened up applications—flexible circuits and rollable displays, to name two—that were impossible with conventional electronics. Usually printed electronics are created using materials whose electronic properties often pale in comparison to silicon. Now scientists have discovered a new way to print silicon onto paper which could lead to a whole range of new products and uses.

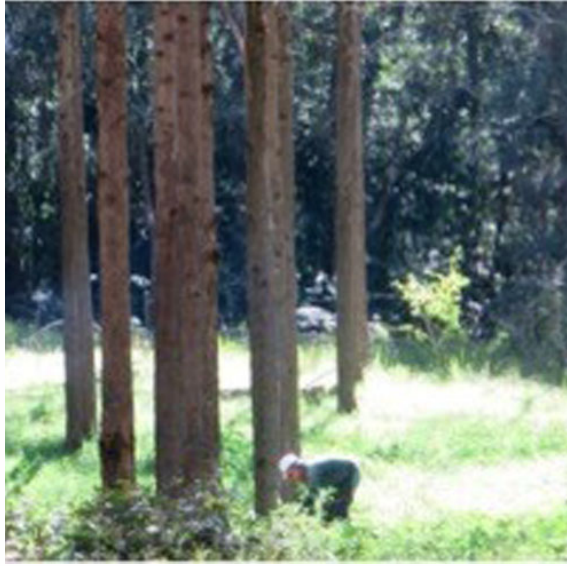
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FOREST GROWING

Speeding up tree growth is a reality

Researchers at the University of Georgia have discovered that manipulation of a specific gene in a hardwood tree species not only makes it easier to break down the wood into fuel, but also significantly increases tree growth.

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Intensive farming alters soils in forest remnants

Failure to consider the effects of agriculture spillover into areas adjacent to intensely farmed zones will likely have severe consequences for soil variables.

A new CIFOR study, conducted in the Waipa District on the north island of New Zealand, looked at areas representative of “land sparing,” the combination of small isolated forested areas or forest remnants embedded within lands used for food production. These areas—typically two to 16 hectares—represent the only remaining natural habitats in lowland agricultural landscapes.

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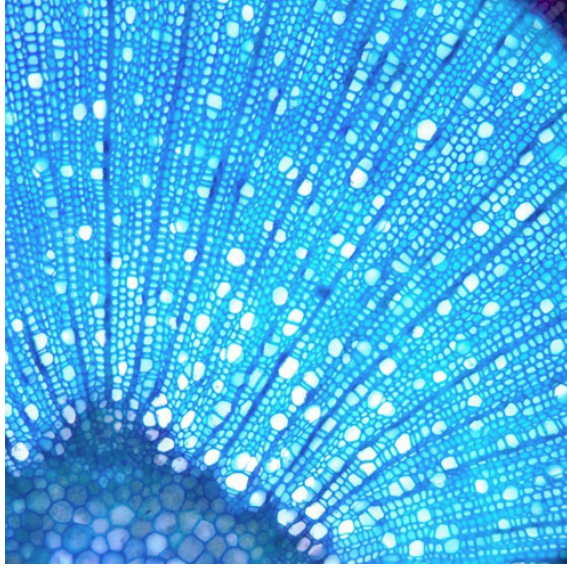


Eucalyptus trees the future for Tiwi Islands forestry

As the Traditional Owners of the Tiwi Islands gear up for their first woodchip harvest of *Acacia mangium* trees, there are nearby trials showing what the future of Tiwi forestry will look like. A variety of eucalyptus trees are showing significant growing advantages to the acacias that currently dot the landscape of Melville Island.

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Gene manipulation



boosts tree growth rate and size

Trees may be a renewable resource, but the rate of this renewal may not meet the increasing demand for plant biomass. But now researchers at the University of Manchester have potentially found a way to boost tree stocks by using gene manipulation to increase the size and growth rate of trees.

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Effects of stand density & seedlot on young radiata pine

Manipulation of stand density and choice of genetic material are two key mechanisms through which forest managers can influence tree growth and wood properties. Past silvicultural practices in New Zealand have been characterised by early thinning to relatively wide spacing, while tree improvement programmes have primarily focussed on growth and form.

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WOOD HARVESTING TRANSPORT AND LOGISTICS



Improving truck transportation of wood chips

British Columbia (BC) is currently experiencing major issues in the pulp and paper sector, such as the shortage of experienced drivers, inefficient transportation planning and the high transportation cost of raw material. A more efficient supply chain management in the pulp and paper industry is needed.

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The effect of the number of log sorts on log processing productivity

New Zealand's forestry supply chain handles a wide range of log products to meet domestic and export market demands and to maximise returns to the forest grower. A typical harvesting operation will produce 8 to 22 log sorts while harvesting *Pinus radiata*, however strong market demand for logs are currently reducing the value gains from producing a wide range of log sorts.

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New design guidelines for guided circular saws

Optimisation of saw thickness and feed speeds can be determined by trial and error, but the results are most often specific to the particular conditions in that sawmill, and not generally applicable to other mills. Models have been developed for guided circular saws to calculate critical speeds, however they did not yield the desired predictability.

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