Forest & Wood Products Australia
Knowledge for a sustainable Australia

R&D works.

R&D WORKS - MAY 2013

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Welcome to the May edition of the FWPA R&D newsletter.

This month our stories range from a report revealing Australia's bioenergy industry is worth more than $400 million per year, to research showing rotational wood-dowel welding as a promising alternative to gluing, to using recycled paper and cardboard as a raw material for disposable nappies.

Research projects, like the ones in this month's edition, help develop and expand the ways we grow and work with wood, creating new markets for our vital industry.

Ric Sinclair
Managing Director, FWPA

FOREST GROWING

Wildfires can burn hot without ruining soil

When scientists torched an entire 22-acre watershed in Portugal in a recent experiment, their research yielded a counterintuitive result: Large, hot fires do not necessarily beget hot, scorched soil.

It's well known that wildfires can leave surface soil burned and barren, which increases the risk of erosion and hinders a landscape's ability to recover. But the scientists' fiery test found that the hotter the fire-and the denser the vegetation feeding the flames-the less the underlying soil heated up, an inverse effect which runs contrary to previous studies and conventional wisdom.

Rather, the soil temperature was most affected by the fire's speed, the direction of heat travel and the landscape's initial moisture content. These new findings could help forest managers plan when and where to ignite small controlled burns to reduce dry vegetation and restore the ecosystem in at-risk areas, said Cathelijne Stoof, the soil and water scientist who led this study as part of her PhD research at Wageningen University in the Netherlands.

Click here for source.

Image Credit: Cathelijne Stoof

NASA: Seeing the forest, the trees and more

To Robert Green, light contains more than meets the eye: It contains fingerprints of materials that can be detected by sensors that capture the unique set of reflected wavelengths. Scientists have used the technique, called imaging spectroscopy, to learn about water on the moon, minerals on Mars and the composition of exoplanets. Green's favourite place to apply the technique, however, is right here on the chemically rich Earth, which is just what he and colleagues achieved this spring during NASA's Hyperspectral Infrared Imager (HyspIRI) airborne campaign.

"We have ideas about what makes up Earth's ecosystems and how they function," said Green, of NASA's Jet Propulsion Laboratory in Pasadena, Calif., and principal investigator of the campaign's Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) instrument. "But a comprehensive understanding requires us to directly measure these things and how they change over landscapes and from season to season."

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Image Credit: NASA

Soils in new forest could help offset climate change

Surface appearances can be so misleading. In most forests, the amount of carbon held in soils is substantially greater than the amount contained in the trees themselves. If you're a land manager trying to assess the potential of forests to offset carbon emissions and climate change by soaking up atmospheric carbon and storing it, what's going on beneath the surface is critical.

Two University of Michigan researchers and their colleagues helped to plug a knowledge gap by analysing changes in soil carbon that occurred when trees became established on different types of non-forested soils across the United States. U-M ecologist Luke Nave and his colleagues found that, in general, growing trees on formerly non-forested land increases soil carbon. Previous studies have been equivocal about the effects of so-called afforestation on soil carbon levels.

Click here for source.

Image Credit: Science Blog

Laser uncovers giant Tasmanian trees

Forestry Tasmania has discovered another 17 hardwood eucalyptus trees in the state's southern forests, with some of the giants believed to be up to 500 years old.

The manager of Forestry Tasmania's Giant Tree Program, Daniel Hodge said the trees, which are more than 85 metres tall, were discovered using LiDAR technology.

There are now 142 giants on Forestry Tasmania's big tree register. The tallest is the Centurion, located near Geeveston in southern Tasmania. It is 99.6 metres high and is the tallest hardwood tree in the world.

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Image Credit: ABC

MARKETS

New Australian bioenergy report

Bioenergy - for heat, power and liquid fuels – is the subject of considerable interest and activity worldwide. With revenues in excess of $400 million per year, Australia's bioenergy industry is already a valued contributor to businesses in cities and rural locations across the country.

Bioenergy Australia has just released a new report outlining the current status, opportunities and potential for bioenergy within Australia. This has been produced as a general resource for anyone interested in bioenergy and features a wide range of available feedstock options and developing technologies.

Click here for report.

Image Credit: Bioenergy Australia

NEW PRODUCT INNOVATIONS

Biodegradable nappies from recycled cardboard

Biodegradable nonwovens can be manufactured cost-effectively using a method developed by VTT.

VTT Technical Research Centre of Finland has developed a process that enables recycled paper and cardboard to be used as a raw material for nonwovens. Hygiene and home care products, such as nappies, sanitary towels and cleaning cloths, are among the many items that can be manufactured from the biodegradable nonwovens.

The manufacturing costs of cardboard-based nonwovens are around 20% lower than for nonwovens produced from wood raw materials. The forest industry will be among those likely to benefit from new business opportunities opened up by nonwovens based on recycled paper and cardboard.

Click here for source.

Image Credit: Antonin Halas

New process could allow any plant to serve as a food source

A team of Virginia Tech researchers has succeeded in transforming cellulose into starch, a process that has the potential to provide a previously untapped nutrient source from plants not traditionally thought of as food crops.

Y.H. Percival Zhang, an associate professor of biological systems engineering, led a team of researchers in the project that could help feed a global population expected to swell to 9 billion by 2050. Starch is one of the most important components of the human diet and provides 20% to 40% of our daily caloric intake.

Cellulose is the supporting material in plant cell walls and is the most common carbohydrate on earth. This new development opens the door to the potential that food could be created from any plant, reducing the need for crops to be grown on valuable land that requires fertilisers, pesticides, and large amounts of water.

Click here for source.

Image Credit: VirginiaTech

TIMBER CONSTRUCTION AND DESIGN

Life Cycle Assessment of a cross laminated timber building

At 10 storeys, the Forté building is the world's tallest modern timber apartment building, made predominantly from cross laminated timber (CLT) panels. This FWPA sponsored project investigated the building's environmental performance for construction, operating (heating, cooling, hot water and lighting systems) and end-of-life. It also compared the building with the environmental performance of a similar building built using conventional reinforced concrete as the main structural material.

The research shows the environmental impacts of eutrophication, water use, non-renewable cumulative energy and greenhouse gas emissions are lower for the Forté building. If carbon sequestration in the CLT panels at the end of life is included, the Forté building has a 22% lower global warming potential; if sequestration is not included, Forté's impacts are still 13% lower.

FWPA Project Ref: PRA282-1112

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Image Credit: FWPA

WOOD HARVESTING, TRANSPORT AND LOGISTICS

Moisture content and composition of logging residues

The most frequently used handling method in Sweden for the extraction of forest fuels is one in which logging residues are piled in harvester heaps to dry within the clear-cutting area before stacking into larger windrows. This handling method, however, requires multiple stages and the amount of handling involved results in a significant loss of biomass that could have been used for energy.

This study compares two handling methods for the extraction of logging residues. The traditional "dried-stacked" method was compared to the "fresh-stacked" method in which logging residues are collected simultaneously during normal logging operations and stacked in windrows at or near the roadside to dry.

Researchers from the Department of Forestry and Wood Technology at Linnaeus University in Sweden, found that the weather and forest conditions had greater impact on the moisture content than the handling method. This finding opens up additional opportunities for new technologies, reduced costs and greater biomass volume deliveries.

Click here for source.

WOOD PROCESSING AND MANUFACTURING

Advances in wood welding

Gluing is a valid and extensively used alternative to panelling in the furniture industry. However, adhesives, which are generally produced by the petrochemical industry, require curing times and multiple handling, which limits the production flow and flexibility required for customised production. Rotational wood-dowel welding has been shown to rapidly produce wood joints of considerable strength without any adhesive and provides a promising alternative to gluing.

A recent study conducted at the Centre de recherche sur le bois, Laval University, Canada, examined the suitability of wood welding technology for producing composite panels for furniture applications with sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis*), two hardwood species commonly used in Canada for indoor appearance applications.

The results showed that wood-dowel welding could be suitable for producing panels. The technique could then help improve production flow and flexibility by eliminating curing times for adhesive polymerisation as well as multiple handling.

Click here for source.

Image Credit: FPInnovations

Pest free wood through radio-frequency heating

Forest health is threatened by different types of pathogens, many of which are introduced through the global movement of people and goods, including green wood and wood packaging. Currently, around the world, wood product infestation is minimised using conventional heat sterilisation treatments or fumigation with methyl bromide.

Researchers at University of British Columbia's Wood Drying Laboratory, led by Dr Stavros Avramidis, have been testing dielectric heating at radio frequencies as an effective heating and drying method for the past 2 decades. The proof of concept has now been successfully accomplished, with heat generated within the developed wood/water system killing microorganisms in 20 to 30 minutes.

Discussions are already underway for acceptance of radio-frequency waves as an alternative treatment and for the development of relevant guidelines for the use of such technology in commercial phytosanitation.

Click here for source.

Image Credit: Branchlines

OTHER INFORMATION

Mountain pine beetle goes under the microscope

The days of the mountain pine beetle gnawing, unchecked, through the forests of B.C. and north-central Alberta could be numbered, thanks to a microscopic breakthrough.

Scientists at the University of British Columbia and the Michael Smith Genome Sciences Centre have decoded the genome of the voracious pest, permitting the first crystal clear look at how the little beetle wreaks such tremendous havoc.

A study published in the journal Genome Biology shows the genome, the genetic coding that makes the beetle unique, reveals extreme variations among individuals of the species, more than four times as many differences as those found among humans. The wide variety equips the mountain pine beetle to easily switch from its current diet of lodgepole pine to target other trees.

Click here for source.

Image Credit: Wood Business