September 2006 | **Issue 2**

SCION

NEWSLETTER

Biomaterial Futures

A NEW LOOK AT VIRTUAL REAL ESTATE

Home buyers are spending more time on the internet than ever before. How is this technology affecting consumer behaviour now that people have the ability to browse thousands of properties without leaving their own home?

A study by Scion technologist, Karen Bayne, found that people aren't just looking for a home on the net, they are looking for entertainment. Sites that are interactive and fun to surf are creating a new generation of virtual real estate shoppers.

"People who search the net actually take longer to buy a house and visit more open homes than those who don't. This is partly because they have access to more options, but it is also because surfing the net is a recreational activity for many people and has become a pastime in its own right," Karen explains.

Smart real estate companies have responded to this opportunity by making their sites interactive and entertaining. Karen says people no longer view the web as a convenient source of information - buyers want to lose themselves in the browsing experience.

Karen's study, which was carried out as part of her masters degree in Commerce, provided valuable insight into marketing and how modern consumers make choices with regard to housing. As a technologist working for Scion's Built Environment group, Karen used the project to test a theoretical behavioural model that enables researchers to identify the drivers of technology adoption.

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Plastics for the future

Society uses and discards huge volumes of plastic every year. Many of these items take decades, or even centuries, to break down. For this reason, there is growing demand for plastics that degrade more easily.

"Globally, there is widespread concern amongst governments with limited landfill capacity. Plastic waste disposal in particular is a huge ecological problem and one of the approaches to solving this problem has been the development of biodegradable plastics," says Scion's Biomaterial Engineering leader, Dr Alan Fernyhough.

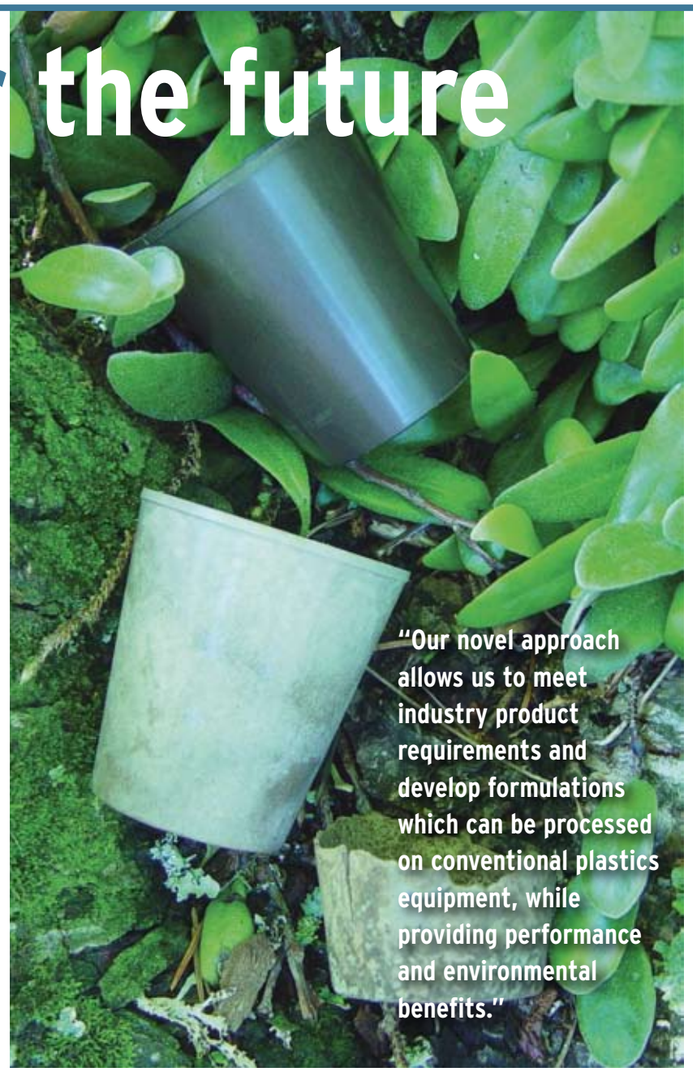
"Regulatory trends which consider 'end of life' disposal are now well established and have major impacts on exporters to regions such as Europe and Japan," he explains.

In response to these trends, Scion has developed a unique approach to creating biodegradable plastics that utilise either waste materials or renewable resources.

"The biodegradable plastics we have developed are cost effective because they utilise low cost, naturally sourced biomass additives, and contribute to environmental sustainability," Alan says.

Scientists have learned to control biopolymer properties such as biodegradability and slow release, in soil and other environments. Once the product is discarded, degradation is caused by naturally occurring microorganisms over a period of time ranging from a few months to two or three years, depending on the performance requirements of the material.

Scion is currently working with commercial partners to develop industrial applications for bioplastic products offering controlled or intelligent degradability in the environment. Formulations can be developed not only for programmable degradation, but also for animal repellency, controlled release fertiliser, anti-fouling agents, mechanical properties, and other user-defined requirements.



"Our novel approach allows us to meet industry product requirements and develop formulations which can be processed on conventional plastics equipment, while providing performance and environmental benefits," Alan says.

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New technology is helping to put Scion at the cutting edge of environmental biotechnology.

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TOGA TECHNOLOGY A WORLD FIRST

As the world looks for new ways of utilising waste, scientists are investigating the potential of micro-organisms to replace industrial chemicals. To this end, Scion has created a world class facility for measuring metabolic functions of organic systems.

Dr Daniel Gapes.

Known as TOGA, this new technology helps to put Scion at the cutting edge internationally in terms of environmental biotechnology. The EcoSmart Technologies group is putting the analytical system to use in reducing and transforming wastes from industrial processes.

TOGA's co-inventor, Dr Daniel Gapes, explains that the system enables highly detailed analysis of any organism exchanging gases with its environment. This allows scientists to determine exactly how micro-organisms function and how they respond to different conditions.

TOGA, which stands for Titrimetric and Off Gas Analysis, consists of a biological reactor unit surrounded by an array of control and analysis equipment. Although each component is commercially available as laboratory equipment, Daniel says this is the first time these instruments have been integrated into a single analytical system.

"By putting all this measuring equipment together, we are able to get a better result than the sum of the parts," he explains.

EcoSmart Technologies uses TOGA in a range of applications, including the analysis of bacterial polymer production, composting, and waste water systems.

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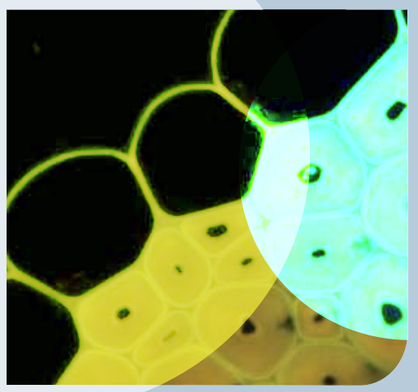
HARAKEKE GOES UNDER THE MICROSCOPE



Growing interest in the revival of Harakeke (New Zealand flax) as an industrial crop has led Scion to investigate why some varieties are easier to process than others. By putting flax fibres under the microscope, scientists are unlocking the secrets of fibre yield.

Microscopy specialist, Dr Lloyd Donaldson explains that the processing of flax involves scraping off the green leaf tissue so you can access the fibres.

"Some cultivars require much less scraping than others, so it is relatively easy to yield raw fibre. My job is to figure out why," he explains.

"If a new industry is to be established, clearly we need cultivars that require minimal processing."

As a world-recognised leader in his field, Lloyd is able to glean much more information from a microscopic image than meets the eye. By using specialised techniques of fluorescence, he is able to discern not just the physical structure of matter, but also its chemical composition.

"There is obviously something different about the chemical or physical structure of easily processed varieties, and it is just like a detective problem to try and figure it out," Lloyd says.

The project involves testing the fibre yield of 50 different cultivars (varieties) in the Orchiston Harakeke collection held by Scion. Lloyd has completed some preliminary research on the Harakeke fibres using the confocal microscope, and he is now preparing to go deeper with the scanning electron microscope.

This project builds on existing research carried out by other research organisations to develop new biomaterial resources for future industries.

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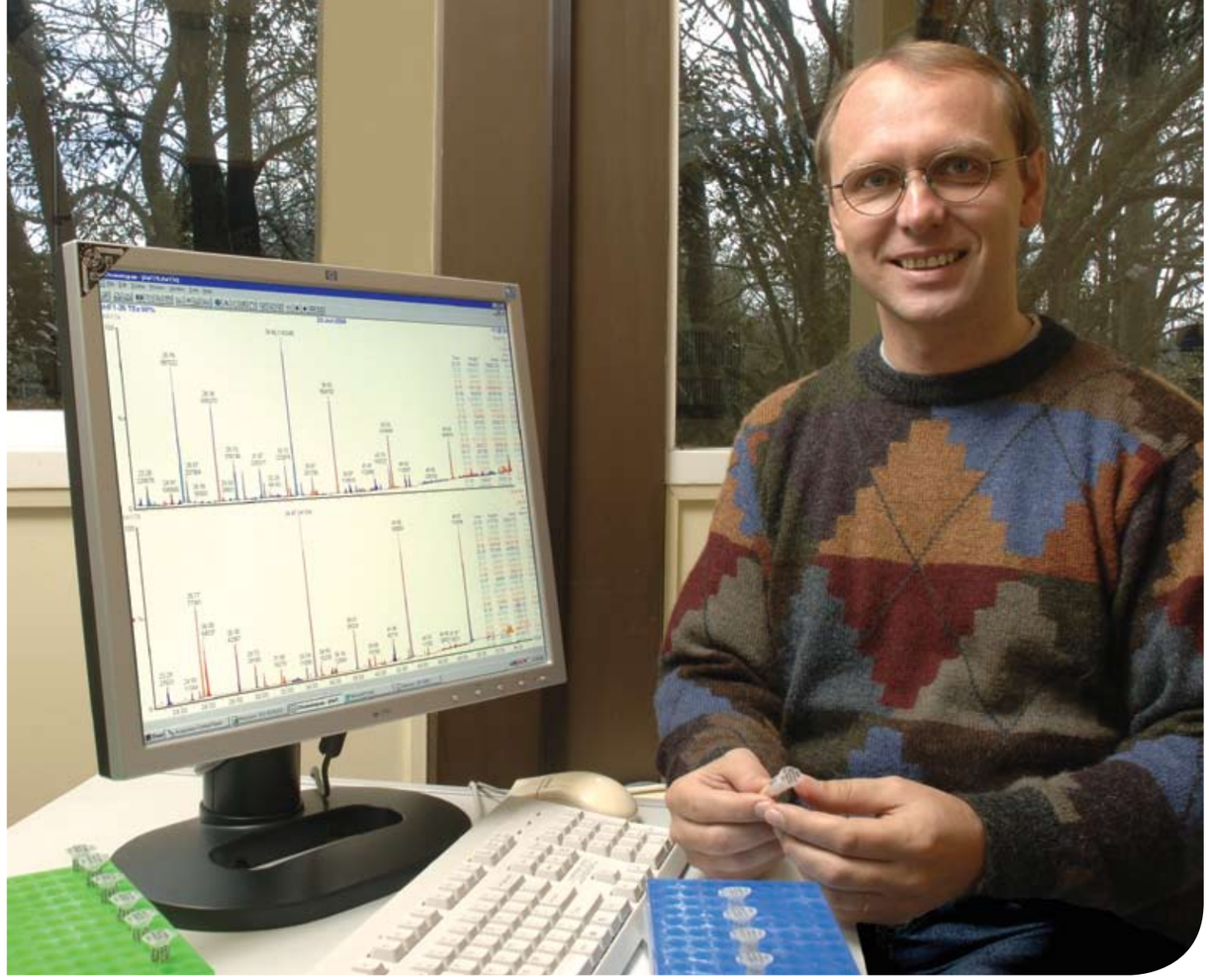

Dr Armin Wagner.

UNLOCKING THE MYSTERIES OF LIGNIN

Scion has established a new method for testing the function of genes in conifers. This technology uses a natural plant mechanism involved in pathogen defence and plant development. The breakthrough has enabled scientists to understand how lignin is formed within cells, and how this process can be influenced to potentially benefit the forest industry.

Using a technology known as RNA interference (RNAi), geneticists are able to interrupt the expression of any given gene. This process prevents the plant from making the corresponding protein that would normally be present, enabling scientists to figure out the original function of the targeted gene.

Genetic scientist, Dr Armin Wagner, explains that RNAi is a natural response used by living organisms to protect themselves from the genetic trickery performed by pathogens, such as viruses. In plants, RNAi is also essential to coordinate certain aspects of plant development. The same process has been harnessed for the first time in conifers to unlock the secrets of cell wall formation.

"Through applying this technology, we have learnt a lot about the lignin pathway, and how interference at various stages of the pathway leads to the formation of different lignin types," Armin explains.

Scientists within Scion's Cellwall Biotechnology Centre (CBC) have subsequently generated a range of genotypes with different lignin composition and content. While this development could primarily be of interest to the pulping industry, Armin also sees potential benefits for the generation of bio-fuel, which is dependent on the cell-wall composition.

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