



# Bio-fibres team largest in Canada

*Working from seed to final product*

**RESEARCHERS AT** the Alberta Research Council are planting seeds of innovation that may cause farmers to re-think some of their crops. Plants such as flax, hemp and jute are used to create bio-fibres, and ARC is at the forefront of helping grow this new industry, which aims to benefit consumers in several ways.

A key area of research for ARC is the hemp plant and its extremely durable fibres. Hemp is one of the most environmentally-friendly fibres in the world, and it grows well in Canada's climate.

Dr. John Wolodko, program leader for ARC's Polymers and Composites Group, predicts that hemp fibres will be commonly used in consumer products such as car parts and building materials around the world within the next decade.

"Synthetic materials primarily originate from petrochemical feedstocks," explains Dr. Wolodko. "As oil & gas prices increase, and as the move towards sustainable development grows, so too does the desire to find alternatives."

Dr. Wolodko and his team are also developing expertise in bio-composites,

which are a hybrid of natural plant fibres mixed with plastics or cements. The result is green products and renewable sources of raw material for manufacturing.

#### **Multitude of benefits**

The far-reaching benefits of bio-composites and bio-fibres touch a number of sectors. For consumers and manufacturers, reduced product costs and lower environmental impacts are key benefits. The lower weight of manufactured product parts translates into reduced shipping costs and better transportation performance in weight-critical applications, such as in vehicles.

Farmers also stand to benefit. As new fibre-processing facilities are established in response to an expanded

market, demand for natural-fibre feedstocks will increase, encouraging the growth of new crops. Growing value-added crops for alternative markets would, in turn, reduce financial risk for farmers, and the use of multi-platform crops would provide increased plant utilization.

## Alberta is well suited to take a lead role in the development of the bio-composites industry

#### **Blending hemp fibres with plastics**

ARC's decade of experience in bio-fibres and bio-industrial products is a solid underpinning for the work Dr. Wolodko and his colleagues are doing in a number of areas, including process development for blending hemp fibres with locally-produced plastics.

The tough stalk of the hearty hemp plant is composed of exceptionally strong fibres, so anything made with plastics can potentially be reinforced with natural hemp fibres to create hemp/polyethylene composite materials and products. The Polymers and Composites Group is determining how much hemp fibre should be blended with the plastic for optimal results, the best length of fibres to use, and how different types of hemp plants affect the product. They are also developing technologies and treatments to make stronger, more durable bio-products.

Alberta is well suited to take a lead role in the development of the bio-composites industry thanks to an established plastics industry and abundance of natural fibre feedstocks and local resin supplies.

### COMPLETE CHAIN

The ARC bio-fibre development team is the largest group of its kind in Canada and provides expertise in every step—from 'seed to final product.'

Research and development activities are focused on five main areas:

- bio-fibre feedstock development, where new plant cultivars are being created for better-engineered fibres;
- fibre processing, where improved and cost effective methods are being developed to extract natural fibres from agricultural plants;
- bio-composites, where natural fibres from plants such as hemp are combined with polymers, and cements to create new materials;
- bio-polymers, where new plastics are derived entirely from natural plant sources;
- agricultural fibre board developments, which are used to create fibre boards and building products.

"It's quite unique to have all of these capabilities working together—the whole chain—and it allows us to integrate resources," explains Dr. John Wolodko, program leader for ARC's Polymers and Composites Group.

In the case of bio-composites, Dr. Wolodko is backed by his colleagues. These includes various world experts in their field including Dr. John Vidmar and Dr. Jan Slaski (Bioresource Technologies), from Life Sciences, along with Wade Chute, Wayne Wasylciw and Dr. Yaman Boluk (from Forest Products) and Richard Gibson and Dr. Jurgen Quandt (Life Sciences).