



Partners in life sciences
Accelerating medical
discovery



Decoding the
wheat genome
It's all in the seed



September 2012

BIOTECHNOLOGY: HARNESSING INNOVATION

TRANSFORMING DISCOVERY INTO OPPORTUNITIES



3 FACTS THAT
YOU DID NOT
KNOW ABOUT
BIOTECHNOLOGY

Learn how Canadians are taking a **step towards tomorrow.**

“Invest in the future,,

Life Science companies listed on Toronto Stock Exchange and TSX Venture Exchange are at the forefront of their industry, with leading researchers developing tomorrow’s innovation.

TMX.com/LifeSciences



Toronto Stock
Exchange

TSX Venture
Exchange

CHALLENGES



Canada has a strong and vibrant biotechnology industry contributing great value to our economy and quality of life. For years, **Canada has been a world leader in the biotechnology discovery and innovation sector.**

A glance at Canada's biotechnology future

Through the work of Canadian biotechnology companies, there have been a multitude of life-saving innovations in HIV/AIDS therapies, biodefense vaccines, cardiovascular disease treatments, and cancer treatments.

Canada's bio-economy has grown 12 percent over the past four years and now stands as an \$87 billion per year economic driver, representing 7 percent of national GDP. The foundation of the Canadian bio-economy represents an employment network of 1 million people nationwide.

All of this has helped stabilize the economy and establish the industry as a central part of Canada's economic recovery and long-term growth. But the status quo is not enough, the industry must continue to re-invest and innovate to stay ahead of the competition in other nations.

Industry must do its part, as must its other partners, including governments at all levels.

Biotech solutions abound

Canada's biotech industry has become an essential component of the transformation and redefining of many traditional economic cornerstones, including forestry, energy, aerospace, and other manufacturing industries.

In partnership with these other sectors, the biotech industry has helped position the Canadian economy as a leader in the emerging global 'bio-economy'. There is now a bio-based component in virtually all sectors of the economy in the form of improved products and processes.

Canadian biotech companies are developing sustainable bioenergy technologies to power cars and jet aircrafts. Renewable composite materials are now an essential component of virtually every aspect of our lives — from transportation to housing to manufacturing. Clean chemicals are being produced for use in clothing, lubricants, plastics along with a host of other consumer and commercial products.

Canada's industrial biotechnology companies are commercial-

izing solutions to address existing and emerging global issues. These issues include, but are not limited to, the need for renewable energy sources, issues of climate change, and environmental degradation. This is a rather significant attribute given the forecasted growth in global population and the pressures this will place on an already over-taxed land base and climate.

Driving innovation

From resource management to renewing manufacturing technologies, from new medicines to healthier foods, from renewable energy sources to cleaner chemical production, biotechnology is driving vast levels of innovation into all elements of the Canadian economy.

We are now at a point where biotechnology is an essential component that will facilitate the reinvention of numerous industries, ensuring long-term competitiveness while creating employment opportunities for our best and brightest.

This new reality offers a distribution of economic opportunities



Andrew Casey
President and CEO of BIOTEC Canada

across Canada, with a significant emphasis on regions of the country particularly hard hit by the economic downturn. The outlook for the Canadian bio-economy is promising as we look forward to keeping Canada competitive.

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Small and mighty: Stem cells hold great promise for Canada

Stem cells are at the cutting-edge of medicine and will one day help to heal and to cure the body. Whether they are found in embryos, blood, fat tissue or skin are wondrous things.

Peruse mainstream media and scientific journals and you'll see that there is a great deal happening in this field. Perhaps that's not surprising given that this year is the 50th anniversary of James Till's and Ernest McCulloch's identification of stem cells at Princess Margaret Hospital in Toronto. Canada is acknowledged as a founding member of the field of stem-cell science and Canadian scientists are recognized as leaders.

But despite Canada's "head-start" at conducting ground-breaking stem cell research, we have faltered at commercializing stem cell discoveries.

Commercializing research

The Centre for Commercialization of Regenerative Medicine (CCRM), launched in June 2011 and primarily funded by the federal government's Centres of Excellence for Commer-

cialization and Research (CECR) program. They are tasked with commercializing stem cell, biomaterial-based products, and therapies to ensure that potentially life-changing regenerative medicine-based treatments reach the marketplace — i.e. patients.

"CCRM's approach to commercializing stem cell research is to rigorously evaluate technologies with a view towards company creation, while offering our commercial and institutional partners high value innovative translational technology platforms based on stem cell generation, manufacturing and biomaterial-based formulation," explains Peter Zandstra, Chief Scientific Officer of CCRM and the Canada Research Chair in Stem Cell Bioengineering at the University of Toronto.

"We have an advantage in Canada," says Dr. Zandstra, "thanks to our collaborative culture, our scientific expertise and the major public investment in regenerative medicine research."

Canadian stem cell researchers are leaders in the field and prolific in their output. According to the Ontario Stem Cell Initiative, Ontario's stem

cell researchers are among the most highly cited in the world today. They have secured over 170 patents and, in the last five years alone, received approximately \$500 million in grant funding and trained over 1,000 graduate students and PhDs.

Moving technology forward

According to Michael May, CEO of CCRM and co-founder of Rimont Therapeutics, commercializing research, any research, takes a great deal of resources and time. "CCRM will succeed because of its business leadership and its in-house scientists," says Dr. May. "Having three platforms that can move technologies forward to the patent or sub-licensing stage is an obvious advantage. Our network of expert academic advisors and our strong links to the industry set us apart."

Since launching one year ago, CCRM has built an industry consortium of over 20 companies that represent the key sectors in regenerative medicine — reagents, devices, cells as tools and therapeutics. Together they are tackling such industry challenges as producing cost effective, clinically viable stem cells in the huge quantities that

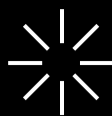


Stacey Johnson
Manager, Communications
Centre for Commercialization of
Regenerative Medicine (CCRM)

are needed for transplantation and other medical uses.

"It won't happen overnight, but Canada will succeed at increasing its commercialization output," says Dr. May. "Canada has a legacy to uphold and that's a powerful motivator."

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WE RECOMMEND



Modern farming
Farmers use plant biotechnology

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"With these new scientific tools, we're able to find solutions to our problems much more quickly, resulting in more consistent food production and more financial stability for farmers."

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World and waste p. 7
Managing our resources through biotechnology



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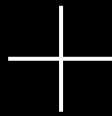
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RESEARCH AND DEVELOPMENT FACTS

Canadian leadership

1 Canada leads the G7 in R&D performed by the higher education sector as a percentage of GDP and leads the G8 in scientific output per capita.*

Business investment

2 The Canadian business sector invests only about 1 percent of GDP to R&D, compared with 2 percent in the U.S. and 2.5 percent in Japan, Korea and several Nordic countries.**

*Conference Board of Canada

** Organisation for Economic Co-operation and Development (OECD) Economic Survey of Canada 2012

SOURCE: THE QUÉBEC CONSORTIUM FOR DRUG DISCOVERY
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Decoding the wheat genome helps keep bread on the table

SCIENTIFIC TOUCH

For Curtis Pozniak, putting bread on the table starts in his wheat genetics lab at the University of Saskatchewan. He pins down the genes for disease and insect resistance, field performance, and the high quality that consumers expect when they pick up a loaf of bread or buy their favorite pasta at the supermarket.

Genetic sequencing

"It's all built into that little genetic package that is the seed," Pozniak says.

Pozniak and Pierre Hucl, both wheat breeders at the U of Saskatchewan, co-lead the \$8.5-million Canadian Triticum Advancement through Genomics (CTAG) project with funding from Genome Canada, Saskatchewan Ministry of Agriculture, Western Grains Research Foundation, India's National Agri-Food

Biotechnology Institute, and other partners.

The project is Canada's contribution to the International Wheat Genome Sequencing Consortium, an effort to sequence and map the wheat genome, which is five times larger than the human genome.

Teamwork

The job has been divvied up to teams around the world, each working on one of wheat's 21 chromosomes. The information will help wheat breeders keep one step ahead of challenges, such as crop diseases and changing market demands.

"Linking key genes to economically-valuable traits can allow plant breeders to choose only those plants which express those traits," Pozniak says. "It allows us to be much more precise in our breeding efforts."

For example, Pozniak and his colleagues recently identified the gene

in durum wheat (used in pasta) that causes the plant to accumulate the toxic metal cadmium. Plant breeders can now select varieties that lack this gene with a DNA test before taking them to the field.

Pozniak's team is contributing to sequencing wheat chromosome 6D. This is chosen because some Canadian wheat varieties carry unique genes that provide resistance to stem rust, a fungal disease that saps the plant's vitality and can drastically reduce yields. Stem rust is a worldwide problem and a growing concern in Canada, where some forms of rust appear to be adapting to hot, dry Prairie weather.

Early prevention

Genomics research is already yielding benefits for farmers and consumers.

“Some of the most popular wheat varieties out in the field now were developed using earlier forms of DNA testing. The CTAG project is designed

to build on this knowledge and deliver the next generation of DNA testing tools," Pozniak says.

Having completed the first of a three-year project, the team is on the verge of identifying novel genes for rust resistance, insect resistance, and overall quality. The team then is responsible for incorporating these novel genes into wheat varieties to be tested in the field. Those that pass muster will go on to further development, eventually ending up in farmers' fields.

Breeding research

With a tradition of agricultural research stretching back more than a century, the U of S is home to the College of Agriculture and Bioresources—with its internationally recognized Crop Development Centre—and new global food security institute. Scientists enjoy easy access to research lands next to

campus and research farms a few minutes' drive out of the city.

"The U of S is an ideal place for conducting plant breeding research. Within our own department, college, and across campus, we work closely with people working in basic science and make sure the knowledge generated is quickly applied to develop the next generation of crop varieties," Pozniak says. "It's definitely an advantage that will keep our breeding programs at the university on the leading edge."

With nearly 40 percent of Canada's crop land, Saskatchewan is the country's largest wheat producer. The crop is second only to canola in terms of return to the country's farmers, bringing in \$4.8 billion in 2011. Canada is recognized for producing the highest quality wheat in the world.

MICHAEL ROBIN

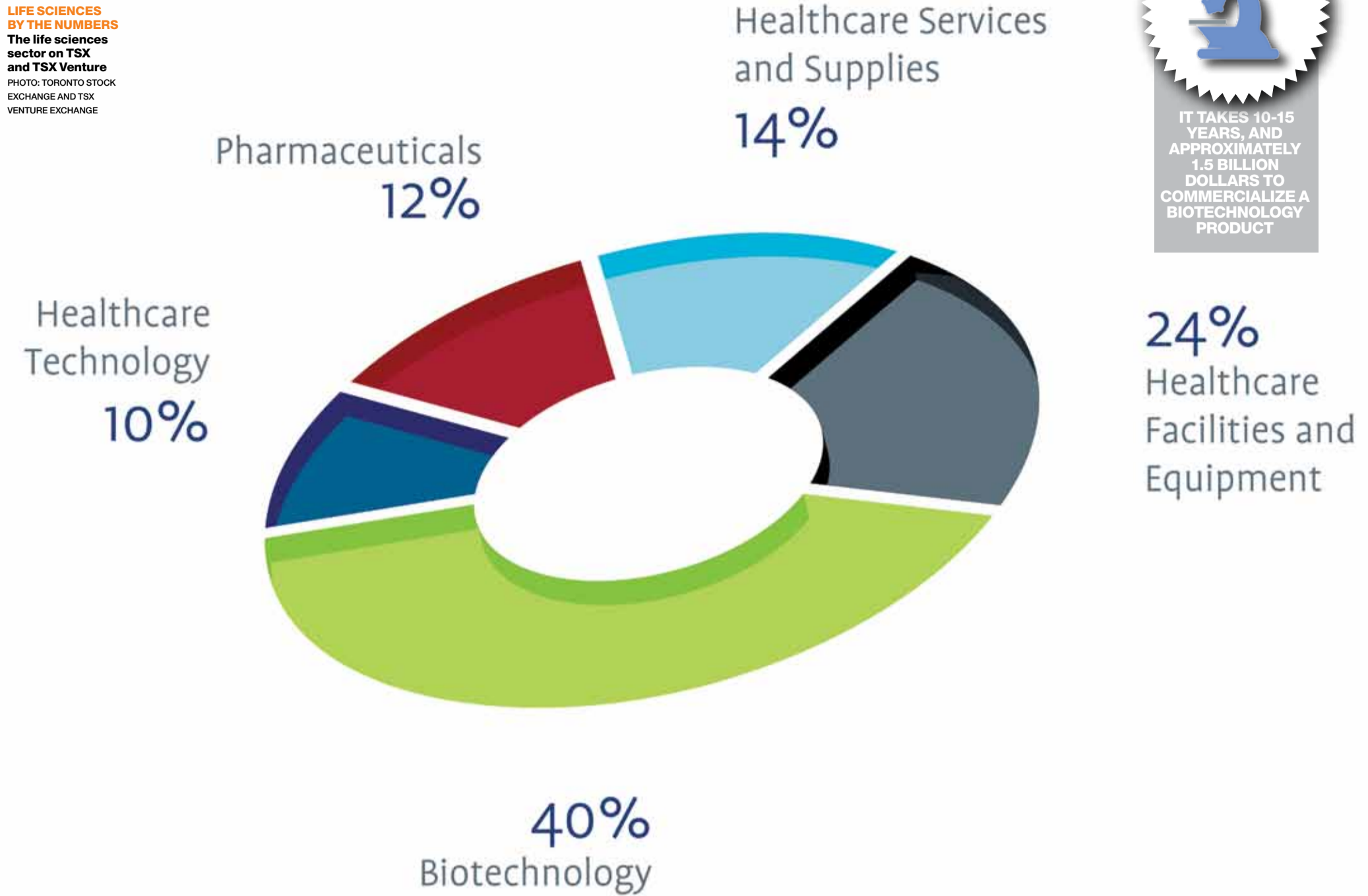
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Canadians have access to one of the safest, most abundant food supplies in the world, thanks in part to plant biotechnology.

Did you know: Farmers achieve higher yields, thanks to biotechnology, which helps keep food affordable. Canadians save almost 60% on their weekly grocery bills thanks to advancements in agricultural technologies like plant biotechnology.

For the future: Scientists are using plant biotechnology to develop more nutritious foods that can help fight diseases and deliver other health benefits. Currently in development are corn and soybeans with higher levels of vitamin C and E.

NEWS



INVESTORS SEE LIFE IN LIFE SCIENCES

PROFITABLE IDEAS

In the midst of a cautious investment environment, one sector of the Canadian economy continues to develop products and services that could have a dramatic effect on the quality of our lives in the not-so-distant future.

Companies involved in the Life Sciences sector focus on a range of specialties, from biotechnology to healthcare equipment and facilities, medical devices and technology, nutraceuticals and pharmaceuticals. The Life Sciences space even extends into agriculture, aquaculture, and clean technology.

Risk and reward

There are currently 116 Life Sciences companies listed on Toronto Stock

Exchange (TSX) and TSX Venture Exchange (TSXV). The research and product development of these companies predominantly aim to influence treatment for a variety of health concerns.

For example, cancer is a top focus of MethylGene Inc. (TSX:MYG); companies such as BioOasis Technologies Inc. (TSXV:BTI) are undertaking research on disorders of the central nervous system; and Cipher Pharmaceuticals Inc. (TSX:DND) is working on, among other things, a treatment for acne-related concerns.

The combined market value of Life Sciences companies on TSX and TSXV is more than \$22 billion. More than half of these companies are listed on TSXV and have an average market capitalization of \$15 million.

For investors, these companies provide a combination of risk and opportunity: some of them will spend years developing products and services, and while there's no guarantee that they will ever capture a receptive market, they may grow significantly if they can successfully commercialize their products and services.

Exponential growth

Approximately one in three Life Science companies on TSX began as smaller firms on TSXV. For example, Neptune Technologies & Bioresources Inc. (TSX:NTB), which manufactures oil from krill rich in omega-3 fatty acids, incorporated in 1998 and was listed on TSXV in 2001.

As the company developed new products, it also signed distribution agreements that expanded its markets to more than 30 countries. Today, the company trades on TSX and has a market capitalization of more than \$227 million.

Opportunity for diversification

Another example of a company that has grown from TSXV to TSX is Centric Health Corp. (TSX: CHH). Centric operates in the areas of medical assessments, disability and rehabilitation management, physiotherapy, and hospital services. Founded in 2001, the company went public on TSXV in 2002 and graduated to TSX in 2009. Centric now has a market capitalization of over \$100 million and a P/E ratio of 7.8.


So how does this sector compare to the market's overall performance? Compared to the S&P/TSX Composite index, which fell by 2.12 percent over the first eight months of this year, the Life Sciences sector has performed relatively well. Over the same period, the five companies included in the S&P/TSX Capped Health Care Index were up 17.86 percent. Likewise,

according to Philippa Flint of Bloom Burton & Co., Canada's largest and most active healthcare-specialized investment banking group, if we were to measure performance of the sector on a broader scale, the value of the 34 largest Life Science companies by market capitalization on TSX rose by 2.94 percent (on an equal weighted basis) over the same 8-month period.

The Life Sciences sector provides investors with some interesting investment options and can be considered a good diversification opportunity for resource-heavy portfolios. If recent performance is an indicator, this sector just might continue to outpace the broader index.

SOURCE: TORONTO STOCK EXCHANGE AND TSX VENTURE EXCHANGE

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NEWS



Partnerships bridge R&D productivity gap

■ Question: What has happened to the “D” in Canada’s Research and Development strategy?

■ Answer: In the race to innovate, Canada leads the way with novel research, then stumbles before reaching the finish line. Too often, scientific discoveries go undeveloped due to rising costs, lagging productivity and a lack of business investment. The solution can be found in partnerships.

Canada leads the G7 in per capita funding of public sector research, but “remains a low performer on business investment in R&D,” according to the 2012 OECD Economic Survey of Canada.

Max Fehlmann, president and CEO of the Québec Consortium for Drug Discovery (CQDM) refers to the financing gap between early research and late development as “death valley.”

The traditional R&D model is changing, said Fehlmann. “There is a new process of ‘open innovation’ that favours interaction between public sector researchers, small biotechs, and the pharma companies.”

Promoting cooperation

Established four years ago, CQDM has earned acclaim for fostering product-



Max Fehlmann
President and CEO, CQDM

“Everything that is developed with CQDM is shared by all our members. This is another advantage, because together we can address the major challenges of the industry.”

ive partnerships between academia, government, and industry. The non-profit public/private consortium identifies, finances, and supports innovative research into tools and technologies leading to new drug discoveries.

“We work as a consortium. We have six of the world’s major pharmaceutical companies around the table: Merck, Pfizer, AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline and Lilly,” said Fehlmann.

“Everything that is developed with CQDM is shared by all our members. This is another advantage, because together we can address the major challenges of the industry.”

CQDM members also provide invaluable mentorship, “Those experts are completely involved in following and helping the pro-

ject deliver tangible results,” said Fehlmann.

Boosting growth

CQDM’s success rate is enviable, the organization’s inaugural projects are culminating in “wonderful successes” said Fehlmann, citing the example of Medicago, a Quebec biotech firm that developed a platform to produce new vaccine antigens from plants. “At the time it was financed by CQDM, Medicago was a tiny company. It now has plants in Europe and a research institute in the U.S. The technology has been licensed by one of our members and is being used by the others.”

CQDM is extending its activities across provincial and international borders. “We have started a partnership with Ontario and have the objective of

extending across Canada,” said Fehlmann. “We are also engaged in two collaborations in France, one with Alsace and one with Lyon.”

In addition to participating in the CQDM consortium, Merck has invested \$35 million to launch the Merck Lumira Biosciences Fund. The fund is part of Merck’s five-year, \$100-million commitment to drive innovation in Quebec.

Québec innovations

Merck has collaborated with Lumira Capital, Terlys Capital, and other partners to provide investment capital to promising early-stage biotech companies in Quebec. Currently at \$43 million, the fund is expected to reach \$50 million upon final closing.

Cyril Schiever, president and managing director of Merck in Canada, said, “the Merck Lumira Biosciences Fund represents a collaborative approach to research between government, academia and industry that builds upon the strong foundation of innovation in Quebec. Through this Fund, we are committed to supporting Québec-based researchers to help stimulate R&D productivity, and early stage innovation in particular.”

JEANNIE ARMSTRONG
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BIOTECHNOLOGY

Producing more with less!

✓ Biotechnology allows Canadian farmers to produce more grain per acre, while reducing the use of fuel, fertilizer, and pesticides.

✓ Biotechnology is the smart and sustainable choice for farmers, for the environment, and for Canada!



Saskatchewan will be part of the solution

Over the past century, the University of Saskatchewan has led far-sighted agricultural research and innovation to help grow a province and feed a growing nation.

The U of S is known for leading-edge research that spans the food supply chain—from crop development, to animal and plant health, to trade policy.

With our new global food security institute, our research aims to create sustainable production systems that can provide food and bio-based products to the world’s growing population—a population that is expected to need twice the current food supply by 2050.

We have the talent, facilities and partners to help feed a hungry world.

From field to fork

Research at the University of Saskatchewan optimizes the food supply system to make the best use of natural resources and deliver the best nutrition to people around the world—with a focus on wheat, pulses and related prairie crops.



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INSIGHT



SCIENTIFIC INNOVATIONS SUPPORT FOOD PRODUCTION AND FARM STABILITY

FARM PROFITABILITY

Farmer Todd Hames understands the challenges of growing food. He also knows that science can help avoid the pitfalls of the past and build a more sustainable food production outlook for the world's future.

Heavy dust clouds fill the hot, dry air as the wind jettisons layer after layer of topsoil, the lifeblood of food production, off the fields of the nation's breadbasket, trapping it in nearby ditches and fence lines. The aftermath is a barren desert of earth eroded to the hard pan, seeds left exposed to perish in the hot sun and insects devouring what crop has persevered the elements.

This is a story from Canada's prairie agriculture at a time before farming advances mitigated these kinds of disasters from ravaging our food resources.

Adapting technology

Fast forward to the farmers of today. Todd Hames, like many of his friends and neighbours surrounding the rural Alberta community of Marwayne, has learned plenty from the experience of his farming forefathers.

He's learned how to protect the soil and rebuild it for generations to come. He's also learned that with billions of people to feed, he must embrace modern technology to grow more nutritious food, and do that in a way that allows him to care for his family and the natural environment

that surrounds his 5,000 acre farm.

Hames, like many other farmers who grow crops such as canola, wheat, barley, and peas says that advances such no-tillage farming that preserves valuable soil moisture; more fuel efficient tractors; and a better understanding of the symbiosis between crops have increased his yields and helped him be a more productive and environmentally-conscience farmer. But the most impactful advancement has been in the field of plant science, including improved seeds and better practices for controlling pests.

Modern efficiency

The newest seeds yield more, handle environmental stresses better, and often have defense mechanisms against herbicides, plant diseases or insects.

"Many canola varieties have a special characteristic that prevents the crop from being damaged when we spray our fields for weeds, which can rob our crop yields by more than half if left unchecked," explains Hames. This biotechnol-

ogy innovation has enabled farmers to grow more food on the same amount of land, and even reduce their use of herbicides.

In addition, this herbicide tolerance means farmers can for the first time grow canola without tilling the land, a practice that lead to the devastating soil erosion problems of years gone by. It's also meant less fuel is required in crop production.

Harvesting the benefits

The science of biotechnology is also responsible for other advances in agriculture. "Crop diseases such as clubroot can have distressing impacts on our canola yields," says Hames. "As a result of plant scientists being able to employ technological advances, we now have canola varieties with resistance to these plant diseases — varieties that only a few years ago were not available."

Hames stresses that the tools of biotechnology can help farmers deal with problems more quickly. "In the past farmers would have to



INCREASED YIELDS
Todd Hames operates a 5,000 acre family farm near the rural Alberta community of Marwayne. PHOTO: CCGA

wait decades for a new plant variety to reach market once a damaging pest or disease was identified. With these new scientific tools, we're able to find solutions to our problems much more quickly, resulting in more consistent food production and more financial stability for farmers."

Constant challenges

"Farmers are challenged everyday to grow food in an environment that we cannot control with shifting climates and changing pests," says Hames. "New technologies, whether they improve my farm equipment, my land stewardship skills, or the seeds I plant, have dramatic impacts on my ability to produce safe and healthy food year-after-year."

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CANADIANS
PRODUCE MORE
THAN 30 MILLION
TONS OF WASTE
IN A YEAR

HEALTHY CROP
Farmers use technology
to safeguard against pests
and a variety of challenges.

Federal government leads the way on regulating biotechnology

Plant biotechnology can be a confusing term because it actually refers to a number of processes that are used to improve plants, such as genetic modification or genetic engineering. Regardless of the technique used to modify a plant, all products of plant biotechnology are federally regulated to ensure they are safe.

The Canadian Food Inspection Agency is responsible for regulating these products to ensure they are safe for the environment and for livestock animal feed use while Health Canada ensures that all products of plant biotechnology are safe as food for humans.

The Canadian Food Inspection Agency is responsible for regulating these products to ensure they are safe for the environment and for livestock animal feed use while Health Canada ensures that all prod-

ucts of plant biotechnology are safe as food for humans.

Biotech crops a boon to biodiversity

Innovations in biotechnology, including the development of vaccines and drugs, have saved countless lives. But did you know that biotechnology also plays an important role in agriculture?

Since 1996, many farmers have been choosing to plant biotech crops. Today, almost 95 percent of canola planted is biotech, along with 90 percent of corn and 80 percent of soybeans.

What's behind this surge in popularity? These crops help farmers grow more food on the same amount of land. Data shows that this helps make farming more profitable, but it also protects Canada's rich biodiversity because when farmers are able to grow more on the same amount of land, they do not have to expand onto valuable wildlife habitats.

To put this into a Canadian perspective: if farmers didn't have access to

biotechnology and crop protection products to help increase their yields, they would have to farm an additional 37 million acres to generate the same amount as they do today - that's equal to the total cropped acreage of Saskatchewan.

Feeding the world's population

By 2050, there will be 9 billion mouths to feed and food production will have to rise by 70 percent if they are all going to be fed, according to the Food and Agriculture Organization of the United Nations.

Meeting this massive increase will require foresight and scientific innovation, not only to grow more food, but to grow food with greater nutritional value says the head of a national plant science trade association.

"Farmers need access to innovative tools and technologies to feed this growing population," says Lorne Hepworth, president of Crop-Life Canada. "But it isn't going to be enough to just grow food, we need to grow it in more efficient and

environmentally sustainable ways."

Hepworth added that research is currently underway to develop plants that can withstand water shortages, colder temperatures and varying soil conditions, all of which will help farmers grow food even when weather and other growing conditions don't co-operate.

"Plant biotechnology has been helping farmers for decades," said Hepworth. "With continued support for research, we believe that the challenges of our growing world population can be addressed."

Biotech crops are safe

When it comes to genetically modified crops and foods, consumers can rest assured that Canada has one of the safest food supplies in the world.

The federal government's Canadian Food Inspection Agency (CFIA) and Health Canada are responsible for regulating products of plant biotechnology. These organizations have been assessing tests on biotech crops for close to two decades and the results

demonstrate that these crops are safe for people, animals and our environment.

In fact, Health Canada, has concluded that biotech crops are just as safe as non-biotech crops.

Canadian farmers say this is reassuring news for a few reasons. Farmers are avid users of the technology, as shown by the 8.8 million hectares of biotech crops planted in 2010, but also because they are equally avid consumers.

Did you know?

It takes close to \$150 million and up to 10 years of research and testing before a plant biotechnology crop is even ready to be submitted for approval?

Researchers examine issues related to human health, animal feed safety and environmental safety before they seek regulatory approval from the Canadian Food Inspection Agency and Health Canada.

SOURCE: CROPLIFE CANADA
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THE WORLD AND WASTE: MANAGING OUR RESOURCES

I recently spent some time in Brazil and Argentina, part of the time at the IUPAC (International Union of Pure and Applied Chemistry), 4th International Conference on Green Chemistry.

The purpose of the conference was to get a flavour for the issues globally and the importance of the role Green Chemistry has for the future; as we strive to become a world of sustainability. As this area is developed and moved beyond the research bench, Biotechnology will play a key role in transforming science to commercialization.

Experience and knowledge for the need in sustainability is moving science and business communities to improved applications. This results in a convergence of disciplines including biotechnology, chemistry, engineering, biology, and others.

Wealth through waste

Waste to landfills is not a solution, and as we look at sustainability there needs to be more thought given to waste as a resource for creating wealth.

For example, today we use rare metals in electronics, much of which ends up in landfills rather than being designed for recovery and reuse. Solutions are needed to move this and other waste to value non-waste products that can be reused and create value.

True cradle to cradle opportunities

My area of experience is agriculture and biomass to biofuels, biomaterials and bio-based chemicals. On a global basis there is a lot of food processing and agricultural waste — potato peels; orange peels; coffee grounds; corn stover; wheat straw; pomace from grapes, etc. All of this waste material contains green products that could be used effectively if we developed the proper extraction and processing techniques.

There could be new or replacement products for things such as solvents, adhesives, fibres, antioxidants, etc. By applying the right disciplines to solution creation we will end up with cost efficient products that are more environmentally sustainable.

Of course this is all easy to say, but

doing it is a challenge. Challenging problems related to thermodynamics, catalysis, separation sciences and process engineering are ones that need to be solved and there are scientists around the world focusing on solutions. At IUPAC, it was evident that the science community is looking for solutions and working with the industry to ensure the processes are reasonable to implement.

In Canada we have lots of waste



Dr. Murray McLaughlin,
Executive Director,
Bioindustrial Innovation Centre

biomass in agriculture and forestry that can be used for establishing a biobased industry sector. There are key programs of the federal and provincial governments that have supported initiatives in this green and sustainable area. Sarnia is a cluster with a focus on bio-based chemistry and new technologies from biomass.

The federal program — Centre of Excellence for Commercialization and Research (CECR) has supported two centres: Bioindustrial Innovation Centre (BIC) (2008) and GreenCentre Canada (GCC) (2009). GCC is focused on the early phases of developing technologies from Canadian Universities and readying them for commercialization.

Mentoring ideas

The BIC has two aspects to its initiative of building clusters in green and sustainable chemistry. First was the establishment of a model accelerator at the Sarnia-Lambton Research Park which has its first 3 companies setting up their pilot/demo facilities. Secondly, the Sustainable Chemistry Alliance (SCA) which is a facilitator that assists start-up companies as

they move to commercialization. To date SCA has made 12 investments, totalling 5.4 million dollars — the 12 companies have raised more than 150 million dollars, created 262 direct jobs and 638 construction jobs over the past 3 years.

These two CECR programs have done a lot to position Canada as a leader in green and sustainable technology development. Through BIC/SCA we have started to build the Sarnia Cluster as a model cluster and to support start-up companies across Canada.

Leading the pack

As I have travelled the world and seen the programs in other countries, I believe Canada has a leadership position in green technologies. Thanks to biotechnology, with continued support we will see Canada become one of the top three countries in the world in green and sustainable technologies — a true leadership position.

DR. MURRAY MCLAUGHLIN
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A GLOBAL HUB

An Alberta delegation had a strong presence during the 2012 Agricultural Biotechnology International Conference (ABIC) recently held in Rotorua, New Zealand.

Dr. Stan Blade, CEO of Alberta Innovates Bio Solutions, was an invited speaker who described the exciting Canadian bioproduct landscape.

With a theme of “New Science, New Technologies, New Products”, Blade described how bioeconomy opportunities are being developed through partnerships between the private sector, the research community, and funding agencies.

A number of Alberta bioindustrial examples were presented that featured agricultural, forestry, and



municipal waste as feedstocks for the production of unique products.

Canadian foundation

Calgary will be the host for the 2013

ABIC event. More than 600 delegates from six continents are anticipated to gather in Alberta to discuss the newest agricultural biotechnologies.

Delegates will also learn how the sci-

ence is being translated to address the world’s most pressing issues of food and energy security, water sustainability, climate change, and population well-being.

The ABIC has a Canadian origin, but has now been held in locations across the world, such as Germany, South Africa, Australia, Thailand, and Ireland. Calgary previously hosted the event in 2007.

The conference has the unique characteristic of bringing together the science and business communities to better understand the rapid developments in the biotechnology sector.

In addition, it brings together the people who can translate new science into the products, practices, and policies that will ensure agriculture and food industries can remain profitable as well as competitive.

Making a difference

During the celebration of National Biotechnology Week, from September 14 to September 21, 2012, it is important to recognize that biotechnology tools are making a difference in the lives of Canadians.

Alberta Innovates Bio Solutions is investing in research that will further improve canola vegetable oil quality, enhance the health benefits and taste of meat products, develop new products derived from agriculture and forest fiber, as well as invest in projects that ensure food safety.

The benefits of biotechnology are already in the hands of producers and consumers — the future is full of remarkable potential as new ideas and tools are used to address global needs.

SOURCE: ALBERTA INNOVATES BIO SOLUTIONS

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FIGHTING HUNGER WITH TECHNOLOGY



INSIGHT

Feeding the world



A growing wave of food insecurity threatens more than one billion people around the world. Global food prices are continually increasing to sometimes unaffordable levels. These raising costs affect men, women, and children from all socio-economic backgrounds.

Although the majority of the industrialized world isn’t faced with the threat of starvation, there is an increasing number of individuals in developed countries that are forced to deal with random bouts of food shortages and spend a significant effort searching for their next meal. Keeping food prices affordable is critical to creating greater access to those living on low or fixed incomes. Biotechnology is part of the solution to this problem — keeping food prices affordable, sustainable, and attainable to the masses.