

**Agriculture and Agri-Food Canada's**  
*Directory of Research*  
**2001–2002**

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**Achievements**

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# Research achievements

## ENVIRONMENTAL HEALTH

### *Soils, water and air*

#### **Fish out of water have impact on land**

Waste products from fish-processing plants are often used as compost in agriculture, and researchers at the Crops and Livestock Research Centre (CLRC) in Charlottetown are studying how this practice affects agricultural ecosystems.

Fish waste often contains significant amounts of nitrogen and phosphorous. Dogfish waste products, for example, have three times more nitrogen than liquid pig manure. At this level of concentration, nitrogen movement in the environment is bound to be affected, and researchers at CLRC are looking into how.

**Contact:** Dr. Christiane Deslauriers, Director, (902) 566-6800

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Nutrients and organic residues

#### **Banding reduces herbicides in potato fields**

Scientists at the Crops and Livestock Research Centre in Charlottetown have found a way to lessen the quantity of herbicide needed on potato fields while still maintaining weed control.

Instead of using the broadcasting method for applying herbicides, Charlottetown researchers tried a different method to keep weeds in check. The broadcasting method means spraying the chemical over the entire field, while an alternative method, called banding, involves placing the product in a band directly on top of the crop rows. By combining the banding method of application with cultivation between the crop rows, the scientists succeeded in reducing the quantity of herbicide needed by 66%.

**Contact:** Dr. Christiane Deslauriers, Director, (902) 566-6800

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **New method increases nitrogen use efficiency**

Knowing how much nitrogen fertilizer to apply is tricky, because too much can harm the environment and not enough can hinder plant growth. That's why research to determine just the right amount is under way at the Southern Crop Protection and Food Research Centre in London.

London scientists are developing a method that will accurately predict the amount of fertilizer needed to supplement existing soil nitrogen levels and meet plant requirements. The next step is to make this research user friendly for farmers, showing how to apply this method when estimating the quantity of nitrogen fertilizer to add to their crops.

**Contact:** Dr. Gilles Saindon, Director, (519) 457-1470

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Nutrients and organic residues

## **New sulfur fertilizer ideal for coastal soils**

A study on the effectiveness of a new sulfur fertilizer has been successfully completed by researchers at the Pacific Agri-Food Research Centre at Agassiz, B.C. The new fertilizer is made from the waste products of such activities as natural gas refining.

Sulfur in the elemental form is not water soluble, and therefore inaccessible to plants until it oxidizes to sulfate. This usually happens naturally in the soil, but the rate depends on the size of the sulfur particle. The new fertilizer is granular, which not only makes it easier to handle and blend, but allows for a formulation that breaks down more readily in the field. Tests showed that the fertilizer breaks down and oxidizes, becoming available to plants relatively quickly. This new low-cost, controlled-release product offers opportunities for economic and environmentally friendly sulfur fertilizer management, while using waste materials.

**Contact:** Dr. Barry Grace, Acting Director, (250) 494-6412

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Nutrients and organic residues

## **Buffer zones need the right vegetation**

Buffer zones are strips of land that form a border between agricultural fields and bodies of water. The

vegetation growing in these zones helps to prevent soil erosion and to absorb any excess nutrients or contaminants that may leach out of the fields and into the waterways.

The trick is to figure out which types of vegetation work best in buffer zones. Researchers at the Crops and Livestock Research Centre in Charlottetown are developing methods for measuring and comparing buffer zone effectiveness for different plant species. They plan to compare the nutrient content of sediment and runoff water from the top of the buffer to that collected at the bottom of the buffer. These data will tell scientists how well the vegetation worked to prevent runoff.

**Contact:** Dr. Christiane Deslauriers, Director, (902) 566-6800

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Water quality and quantity

### **Study looks at impact of intensive potato production on water quality**

As the leading agricultural sector in New Brunswick, potato farming inevitably has an effect on the environment in the province, including its soil and water quality. It's a never-ending job to monitor and address issues such as soil erosion and associated fertilizer loss from fields, sediment and pesticide concentrations in receiving streams, and leaching of nitrates and pesticides into groundwater.

The latest study is a team effort between scientists at the Potato Research Centre in Fredericton and Fraser Papers Inc. Researchers use model assessment and validation to study the impact of potato production and commercial forest operations on stream-water quality in mixed agricultural-forestry regions of northwestern New Brunswick.

**Contact:** Dr. Richard Butts, Director, (506) 452-3260

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Water quality and quantity

### **Good rhizobacteria become even better**

Not all help comes from above. Farmers who grow leguminous crops like soybeans, peas and alfalfa get help from below, thanks to beneficial soil bacteria called rhizobia. These micro-organisms live in nodules within the plant roots and work to transform nitrogen from the air into a form that can be used by the plant. This process is called nitrogen fixation.

Scientists at the Soils and Crops Research and Development Centre in Sainte-Foy, Que., are studying

how best to use rhizobia for the enhancement and sustainability of crop production. Research projects under way include selecting strains of rhizobia that are especially efficient at nitrogen fixation, are able to function well in cool conditions, and promote the growth of nonlegume crops such as wheat and corn.

**Contact:** Dr. Gilles Rousselle, Director, (418) 657-7985

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Soil assessment, use and health

## **New database helps manage land and water resources**

Farmers, planners and municipalities in Eastern Ontario can now point and click their way to information on soils, land, and water resources, as part of the new online Regional Environmental Information System (REIS).

REIS is a pilot project for the National Land and Water Information Service. It was developed by researchers at the Eastern Cereal and Oilseed Research Centre in Ottawa in partnership with several municipalities and Autodesk Canada Inc. The purpose of this program is to provide rural communities with tools for data collection and access to accurate information on rural land and water resource management. Already launched in Eastern Ontario, REIS is expected to gradually expand across the country.

**Contact:** Dr. Lianne Dwyer, Acting Director, (613) 759-1952

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Soil assessment, use and health

## **Scientists battle soil carbon loss**

Without carbon, soil is not healthy, and unhealthy soil is not conducive to agriculture. The problem is, carbon levels in some soils are diminishing, perhaps as a result of global warming.

Scientists at the Eastern Cereal and Oilseed Research Centre in Ottawa are on a mission to rescue soil from depletion of this essential element. They've developed a new technique using particles of soil organic matter to accurately measure changes in soil carbon levels and determine what is causing the change. This research will provide agricultural workers with information about the impacts that climate change has on soil and when and how to rebuild organic levels to keep soil healthy and productive.

**Contact:** Dr. Lianne Dwyer, Acting Director, (613) 759-1952

**Field:** Soils, water and air



**Priority:** Environment  
**National Program:** Environmental health  
**Theme:** Soil assessment, use and health

### **Fall zone tillage and red clover underseeding improve soil quality**

The advantages of adding red clover to crop rotations planted in a conservation tillage system are being proven by scientists at the Greenhouse and Processing Crops Research Centre in Harrow, Ont.

Conservation tillage is cost-effective and environmentally friendly because it requires little or no plowing and leaves remnants of the previous crop on the field to prevent erosion. According to research by Harrow scientists, including red clover in conservation tillage systems has a variety of benefits. Studies show that red clover speeds up the decomposition rate of crop residues, loosens the soil and improves its quality, fixes atmospheric nitrogen for plant uptake, and increases the yield of crops planted afterward.

**Contact:** Dr. Gary Whitfield, Director, (519) 738-2251  
**Field:** Soils, water and air  
**Priority:** Environment  
**National Program:** Environmental health  
**Theme:** Soil assessment, use and health

### **Compost boosts soil quality**

Yard waste, kitchen food scraps and swine manure make good compost, according to research that's under way at the Greenhouse and Processing Crops Research Centre in Harrow, Ont.

Studies on the use of compost to improve soil and environmental quality are in year three at Harrow. Scientists are looking into the impact of compost application on crop yields and crop nutrient cycling, optimum application rates, decomposition rates, and the effect on soil conditions. Results so far show that plots of land treated with compost have significantly better soil quality and crop growth, compared with untreated plots.

**Contact:** Dr. Gary Whitfield, Director, (519) 738-2251  
**Field:** Soils, water and air  
**Priority:** Environment  
**National Program:** Environmental health  
**Theme:** Soil assessment, use and health

### **Extracting groundwater can be useful**

Extracting shallow groundwater and lowering watertables by way of gravity and solar-powered pumps

have beneficial uses, according to research being done at the Semiarid Prairie Agricultural Research Centre (SPARC) in Swift Current, Sask.

SPARC scientists tested this idea by de-watering an area and using the saline soil for growing Harrington barley. Although that land had never been used for crop growth before, the barley responded with healthy growth and good yields. The researchers used the harvested water to irrigate woody-crop seedlings in a new shelterbelt.

**Contact:** Dr. Wayne Lindwall, Director, (306) 778-7200

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Water quality and quantity

### **Putting pig manure odour in its place**

Research on the odour-causing elements of pig manure has been completed by scientists at the Lethbridge Research Centre in Alberta. The smelly culprits are ammonia and butyric acid, whose odours were detectable up to 1 km downwind of swine feedlots.

Lethbridge scientists will use these results to develop a code of practice for intensive feedlot operations in Alberta. These guidelines will stipulate the minimum distances between new feedlot operations and other rural developments such as houses.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Air quality

### **Wheat grows better when earthworms help**

Soft white spring wheat has a new-found friend—the earthworm. In studies at the Lethbridge Research Centre in Alberta, earthworms helped to reduce the incidence and severity of take-all, a soil-borne fungal disease that damages soft white spring wheat and other crops.

Lethbridge researchers found that infected plants had significantly improved growth in the presence of earthworms, compared with infected plants grown in soil without earthworms. These results are yet another example of how earthworm populations benefit soil health.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Soil assessment, use and health

### **Some crops hungrier for manure nutrients**

Scientists at the Brandon Research Centre in Manitoba are making the most of a stinky situation with their research on manure management. The objective of their most recent project is to figure out which forage crops are best at using the nutrients from liquid swine manure.

Growing annual forage crops helps remove nitrogen from land to which large amounts of swine manure have been applied. Brandon scientists found that corn and fababeans were the most efficient in absorbing nutrients from the manure-laden soil. The data from this research will contribute to the Hog Environmental Management Strategy, which aims to reduce the environmental issues associated with hog production in Canada by developing effective, affordable solutions.

**Contact:** Dr. Reg Kucey, Director, (204) 726-7650

**Field:** Soils, water and air

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Nutrients and organic residues

### ***Genetic resources, pests, and biocontrol***

#### **Integrated pest management fights cabbage root maggot**

Calculating the number of degree-days adds up to doom for the pesky cabbage root maggot, and scientists at the Atlantic Cool Climate Crop Research Centre in St. John's, Nfld., are developing the mathematical formula.

By counting degree-days—days that go above a certain temperature degree—researchers can predict critical events in the life cycle of the cabbage root maggot, such as hatching. Using weather patterns to make predictions about pest occurrence is called forecasting, and forecasting is step one of developing an effective integrated pest management (IPM) program. The second step is to determine a suitable method of pest control. Scientists at St. John's are working to develop an IPM model for cabbage root maggot in collaboration with the Horticulture Research International of Wellesbourne, U.K.

**Contact:** Dr. John Richards, Director, (709) 772-7474

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **Pest-resistant potatoes lessen pesticide use**

Colorado potato beetles and aphids can reduce a farmer's potato crop yield by 50%, making them a mega-pest of potatoes in Canada. Although pesticides are an effective control method, they can have a negative impact on the environment. That's why scientists at the Potato Research Centre (PRC) in Fredericton are continually looking for alternatives to pesticides for controlling these crop-wreckers.

One potential alternative is to create potatoes that are more resistant to the insects. Researchers at the PRC have discovered six different species of wild potatoes that are mighty unappealing to the pests, either because they taste bad, or because they contain compounds that inhibit the insects' growth. Scientists hope to discover the genetic basis for these pest-resistant traits in wild potatoes and crossbreed them into cultivated species.

**Contact:** Dr. Richard Butts, Director, (506) 452-3260

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Biodiversity

## **Scientists stay ahead of potato viruses**

Battling the elusive potato virus is all in a day's work for scientists at the Potato Research Centre (PRC) in New Brunswick.

Depending on the type of virus and the severity of infection it causes, potato viruses can reduce a farmer's crop yield by up to one half. Even a low level of viruses can cause rejection of potato seed lots for certification. That's why researchers at PRC are collecting information on the spread, transmission and diagnosis of the troublesome micro-pests. This information can be used to help improve technology for early detection of viruses, identify potato-growing regions less prone to viral diseases, and develop strategies for virus control.

**Contact:** Dr. Richard Butts, Director, (506) 452-3260

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **Better weed management helps reduce herbicide use**

With the growing demand for alternative methods of weed control, scientists at the Soils and Crops Research and Development Centre in Sainte-Foy, Que., are making it a priority to find ways to reduce herbicide usage. Their goals include developing a prediction model to quantify crop losses attributable to weeds, identify weed-tolerant crop varieties, and implement weed management programs that lower the herbicide dosage required.

A recent experiment has put Sainte-Foy researchers one step closer to achieving these goals. Under controlled conditions, they demonstrated that measuring crop foliage and weed growth early in the season generate data that can be used to predict the impact weed populations will have on crop yields later on. If this method proves equally effective under field conditions, scientists can create a model to determine more precisely the need for weed control. This will result in reduced herbicide use, offering both economical and environmental benefits.

**Contact:** Dr. Gilles Rousselle, Director, (418) 657-7985

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **Cranberry pests get their own guide book**

If you grow it, they will come. Pests have made their way into the fields of cranberry farmers in Quebec, despite the relative newness of the industry there. Until recently, Quebec's cranberry farmers had to rely on the United States for pest information. But thanks to the work of scientists at the Eastern Cereal and Oilseed Research Centre and a number of other stakeholders, an identification guide to cranberry pests in Quebec has been published and is now available.

Entitled *Insectes ravageurs de la canneberge au Quebec*, the publication is the result of more than three years of research, including field surveys, experiments on insect feeding and rearing habits and a collection of over 3000 photographs. The guide was developed for easy reference and is well adapted for Quebec cranberry producers and integrated pest management workers. The guide is currently available in French, with the English edition now in press.

**Contact:** Dr. Lianne Dwyer, Acting Director, (613) 759-1952

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **Predatory mites control western flower thrips**

Western flower thrips are a major enemy of many greenhouse crops, including greenhouse tomatoes. But these pesky insects have an enemy of their own—a predatory mite named *Amblyseius cucumeris*.

Scientists at the Greenhouse and Processing Crops Research Centre in Harrow, Ont., have learned that releasing this predatory mite at the rate of one sachet bag every 4 weeks provides economical control of western flower thrips on tomatoes. An added bonus of this research is elimination of the use of chemical controls on greenhouse tomatoes, thereby increasing their competitive marketability as a pesticide-free product.

**Contact:** Dr. Gary Whitfield, Director, (519) 738-2251

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **Sheep grazing controls leafy spurge**

Herbicides can get the job done of controlling leafy spurge outbreaks, but scientists at the Brandon Research Centre in Manitoba have come up with an even better, more environmentally friendly alternative.

Sheep and goats are more than happy to graze on this troublesome weed, and thrive very well on such a diet. Leafy spurge is not suitable as forage for cattle and horses because it causes irritation to the mouth and digestive tract. But sheep and goats are not affected in this way, and so with repeated grazing can successfully bring an outbreak of leafy spurge under control within 3 or 4 years. Brandon researchers studied the effects of sheep grazing versus the use of herbicide to reduce leafy spurge in Kentucky bluegrass pastures in southern Manitoba. They found that the sheep provided excellent control, at lower cost than chemical treatments.

**Contact:** Dr. Reg Kucey, Director, (204) 726-7650

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## **GRIN-CA database has plant breeders smiling**

Plant breeders can now go on-line to gain access to Canada's plant gene database located at the

Saskatoon Research Centre. GRIN-CA is the acronym for the Germplasm Resources Information Network—Canada database now available on the Internet.

This web site allows plant researchers to look up information on over 850 plant species and over 100,000 accessions in the gene bank. For example, the plant taxonomy tables provide records for over 57,000 scientific names including distribution, common names, literature references and uses. GRIN-CA also provides easy access to other relevant information such as operations of the Plant Gene Resources of Canada, linkages to other world databases, and upcoming events relating to genetic resources of plants. This new service will facilitate the creation of new, harm-resistant crop varieties and at the same time offer a competitive advantage to Canadian farmers.

**Contact:** Dr. David Wall, Acting Director, (306) 956-7211

**Field:** Genetic resources

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Biodiversity

### **Wheat midge “johns” fall for pheromone spray**

The wheat midge is a troublesome and expensive pest for prairie farmers. To address this problem, scientists at the Saskatoon Research Centre (SRC) have laid a trap and they're using the allure of sex for bait.

The male wheat midge is attracted to the female by natural chemicals, called pheromones, that she exudes to indicate mating time has arrived. With collaborators from Simon Fraser University, scientists at SRC have copied and patented this pheromone and are using it in baited traps as a way to estimate populations of this insect in farmers' fields. The information is key to deciding whether control strategies will reduce crop losses. Another use for wheat midge pheromones that scientists are considering is a spray to disrupt mating. Spraying the air with pheromones hinders the males from locating the females, and since unmated females cannot reproduce, subsequent populations of the pest are diminished. The goal of mating disruption strategies is to reduce insect-related crop damage while decreasing pesticide applications.

**Contact:** Dr. David Wall, Acting Director, (306) 956-7211

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

### **Grasshoppers meet their own plague**

Grasshoppers are a nuisance to prairie farmers, causing extensive damage to their crops. To help the farmers out, scientists at the Lethbridge Research Centre in Alberta are working to develop safer and more effective control systems for this problematic pest.

One method they are investigating is the use of parasitic flies and fungal pathogens that prey upon grasshoppers, with consideration for the safety of birds that might consume the infected insects. The researchers at Lethbridge are also studying other nonchemical control measures such as various microbial strains harmful to grasshoppers, antifeedant plant compounds that deter feeding, and natural plant compounds toxic to the insects. The advantage of these methods is international applicability, because they work against locusts as well as grasshoppers.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

### **Fungus kills potato beetles**

Potato plants have a new champion to save them from the nasty Colorado potato beetle, and it's a naturally occurring soil fungus called *Beauveria bassiana*. The fungus latches onto the beetle and eventually kills it. Researchers at the Lethbridge Research Centre in Alberta are testing the fungus for its potential as a cost-effective, environmentally friendly pest control method for Canadian potato growers.

The fungus has already been manufactured as a leaf spray in the United States, but is not particularly effective. Lethbridge scientists have come up with an innovative new method of application that targets the insects in the soil, because that's where they spend more than half their life cycle. Tests so far show this idea is working well, but scientists must still ensure the fungus will not cause harm to the surrounding environment, including nontarget organisms.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

### **Natural methods force weed retreat**

The need for chemical herbicides to control weeds is going the way of bell bottoms and Hula Hoops in western Canada, thanks to natural control methods employed by scientists at the Lethbridge Research Centre in Alberta.



With foreign weeds encroaching on the rangeland and wildlife habitats of the prairies, Lethbridge researchers decided to take action and set up the Classical Weed Biological Control Program in 1952. The program uses natural enemies from the invading weeds' homelands to keep them under control. Now, 50 years later, the program has been so effective that chemical herbicides are no longer needed to control weeds like nodding thistle, St. John's Wort, leafy spurge, Dalmatian toadflax, hound's tongue and purple loosestrife.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Pests and biocontrol

**Priority:** Environment

**National Program:** Environmental health

**Theme:** Integrated pest management

## SUSTAINABLE PRODUCTION SYSTEMS

### *Cereals*

#### **Wheat varieties show resistance to *Fusarium***

When it comes to developing new wheat varieties, the trait that breeders want most is resistance to fusarium head blight. Caused by a fungus called *Fusarium graminearum*, this disease is devastating to crop yields and grain quality.

Scientists at the Eastern Cereal and Oilseed Research Centre (ECORC) in Ottawa have tracked down genes for *Fusarium* resistance in a Brazilian spring wheat variety called Frontana, and then successfully incorporated this trait into winter wheat. In subsequent collaboration with industry science partners, ECORC researchers transferred genes from this new *Fusarium*-resistant winter wheat stock into a large number of winter wheat lines using procedures that slash the time to produce new lines by 75%. The first winter wheat line tolerant of *Fusarium* has been submitted for registration in Canada. More new varieties are expected in coming years.

**Contact:** Dr. Lianne Dwyer, Acting Director, (613) 759-1952

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

#### **Researchers continue the fight against fusarium head blight**

The fight to control fusarium head blight is a never-ending research priority for scientists at the Cereal Research Centre (CRC) in Winnipeg. This fungal disease continues to have a severe impact on cereal

crop yield and quality on the eastern Prairies, costing the industry up to \$100 million annually.

What makes this disease particularly offensive is that it affects wheat, corn and barley, and it causes problems in all areas of the grain industry. Producers are hurt directly by yield and quality losses, grain companies see lost market opportunities, and mycotoxin contamination makes the grain unsuitable for human or animal food products. CRC scientists are focusing their efforts on breeding genetic resistance to fusarium head blight into high-quality wheat varieties.

**Contact:** Dr. Jim Bole, Director, (204) 983-0099

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **New barley types make more malt, feed**

Two new barley varieties developed at the Brandon Research Centre in Manitoba will soon be good to grow after receiving support from the Prairie Registration Recommending Committee for Grain. Registration at the Canadian Food Inspection Agency is the next step, and then on to the farmers' fields.

These new barleys, known as TR256 and Newdale (TR258), have several benefits. Both show improved strength against lodging—which is root or stem breakage—and increased resistance to the plant diseases spot blotch, net blotch and common root rot. They are also both higher-yielding than current standards. The TR258 variety is a two-row malting barley, whereas TR256 is currently supported as a feed variety. It is also being evaluated as a malt variety.

**Contact:** Dr. Reg Kucey, Director, (204) 726-7650

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **Old wheat genes make strong dough**

Strong flour makes better bread dough. Scientists at the Cereal Research Centre (CRC) in Winnipeg are working to develop varieties of wheat that can be used to make stronger flours.

CRC researchers have discovered the genetic sequence of proteins that make dough strong by analyzing Glenlea wheat, which is an especially strong variety registered in the 1970s. With this genetic information, scientists are now able to monitor the strength components of wheat at the DNA level, allowing them to breed strength into weaker wheat lines. The ability to produce strong flour is key to

capturing international markets for several wheat classes.

**Contact:** Dr. Jim Bole, Director, (204) 983-0099

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **New rye coming through**

Some potential new varieties of rye may be coming from the Semiarid Prairie Agricultural Research Centre (SPARC) in Swift Current. A new spring rye with a white kernel is being evaluated for specialty food and industrial markets, and SPARC has succeeded in attracting a partner to work on the development and marketing process.

SPARC researchers have also developed a winter rye that is low in dietary fiber. It promises to make good livestock feed and has very high commercialization potential. SPARC is projecting to market this rye within 3 years. Another potential variety in the mill has genes for improved gluten protein quality. This variety is expected to produce dough with greater strength and stability than normal rye and will therefore be popular in the bread-making industry.

**Contact:** Dr. Wayne Lindwall, Director, (306) 778-7200

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **DNA markers adapted for wheat breeding**

Resistance against loose smut disease and the pesky wheat midge can now be bred into new wheat varieties. Scientists at the Semiarid Prairie Agricultural Research Centre (SPARC) in Swift Current, Sask., are applying DNA markers for these two troublemakers in their wheat-breeding program.

The identification and use of resistance markers is beneficial in several ways. For one thing, it means reduced development costs in both time and money for breeding new wheat varieties with the ability to withstand these two pests. In addition, tolerant plants have little need for outside help from pesticides, thus reducing the amount of chemicals being applied to the environment.

**Contact:** Dr. Wayne Lindwall, Director, (306) 778-7200

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **Scientists save barley from scald**

Barley growers are in hot water when their crops are hit by scald, a fungal disease that can reduce yields by up to 25%. Putting the freeze on scald disease is the purpose behind research efforts currently under way at the Lacombe Research Centre in Alberta.

Studies include investigating alternative approaches for treating the disease, developing test methods for detecting fungal presence in barley seed before planting, and evaluating different barley varieties for their natural ability to resist the disease. Traits for resistance will be incorporated into breeding programs for the creation of disease-tolerant barley varieties. This work was done in cooperation with the University of Alberta.

**Contact:** Dr. David Bailey, Director, (403) 782-8100

**Field:** Cereals

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### *Oilseeds*

#### **Researchers seek to ramp up isoflavone levels in soybeans**

Soybeans contain chemical compounds, called isoflavones, that are widely recognized for their potential role in the prevention and treatment of diseases such as cancer, heart disease, kidney disease and osteoporosis. But not all soybeans are rich in isoflavones, and scientists at the Greenhouse and Processing Crops Research Centre in Harrow, Ont., are investigating why.

Preliminary work suggests that isoflavone content of soybeans may be affected during growth by the levels of potassium and phosphate nutrients in the soil. Scientists are working to determine the quantities of potassium and phosphate fertilization that will maximize the isoflavone content in soybeans.

**Contact:** Dr. Gary Whitfield, Director, (519) 738-2251

**Field:** Oilseeds

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **New canola varieties are worth their salt**

Two canola varieties, Quantum and Hyola 401, have a taste for salt. Researchers at the Semiarid Prairie Agricultural Research Centre (SPARC) in Swift Current, Sask., have demonstrated that these two canola varieties grow on saline land just as well as Harrington barley does, which is the crop typically planted in salty areas.

Even at today's low canola prices, producers can realize greater revenues from growing canola on saline land instead of barley. Also, rotating barley with a canola crop will help control weeds and pests.

**Contact:** Dr. Wayne Lindwall, Director, (306) 778-7200

**Field:** Oilseeds

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **Test shows canola seed vigour**

High vigour is an ideal quality of canola seed, because it means successful germination, seedling emergence, crop establishment and, at harvest, good yields. Of course, canola growers never mean to plant low-vigour varieties. The trouble is, canola seed can be highly variable in its vigour level and, so far, vigour is not an easy characteristic to distinguish prior to planting.

Scientists at the Brandon Research Centre in Manitoba are developing a test to identify the vigour level of canola seed. Research is at the experimental stage. Scientists are now gathering seed samples to measure the reliability of this new method on a large scale. Pending success, the next step is to make the vigour test available for canola producers. Brandon is looking for industry partners to help bring an on-farm test kit to market.

**Contact:** Dr. Reg Kucey, Director, (204) 726-7650

**Field:** Oilseeds

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **Coated canola seeds extend planting season**

Coating canola seeds before fall planting helps restrict water absorption while still allowing the crop to germinate and emerge in early spring. This information is the finding of a collaborative research study between the Saskatoon Research Centre and Grow Tec Inc. of Nisku, Alberta.

Grow Tec is commercializing this seed coating technology and is marketing the product under the trade name Extender. This technology will extend the fall seeding period by three extra weeks and will thereby encourage more extensive fall planting of canola.

**Contact:** Dr. David Wall, Acting Director, (306) 956-7211

**Field:** Oilseeds

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **New canola varieties stand up to weed treatments**

The options for canola growers whose fields became weed-infested were none too practical before scientists at the Lacombe Research Centre in Alberta developed management systems for canola varieties resistant to herbicide treatment. Whereas before, canola farmers either had to tolerate the weeds or risk killing the crop, the development of three new herbicide-tolerant canola (HTC) breeds now offers farmers a third, more viable, option.

Lacombe researchers tested the three HTC varieties to measure weed control and yield advantages when using various herbicide treatments. Glyphosate was the herbicide that performed best, allowing higher yields by up to 39% and providing greater weed control than other brands.

**Contact:** Dr. David Bailey, Director, (403) 782-8100

**Field:** Oilseeds

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

## ***Forages***

### **No-till methods seed legume pastures**

The stony soils in many parts of Newfoundland make it almost impossible to plow in preparation for crop planting. Luckily, plowing isn't necessary in the no-till seeding methods being perfected by scientists at the Atlantic Cool Climate Crop Research Centre in St. John's.

In a recent study, researchers at St. John's demonstrated that using no-till methods for seeding legume pastures actually results in the production of superior forage in soil too stony to plow. Herbicide was used to control existing vegetation and seed was planted with a heavy-duty commercial seeder, proving that agronomic-limiting factors can be overcome to produce a successful crop yield.

**Contact:** Dr. John Richards, Director, (709) 772-7474  
**Field:** Forages  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

### **Corn growth aided by plastic mulch**

What helps maize to sprout faster, mature sooner and produce a 31% higher forage yield? This corny riddle has been the subject of investigation for scientists at the Atlantic Cool Climate Crop Research Centre in Newfoundland, and they've found the answer—translucent plastic mulch.

A fast-growing, early-maturing, high-yielding corn was the successful end result of a study to determine the effects of covering crop rows with translucent plastic mulch at seeding time. The corn was used in a high-quality silage and fed to dairy cows, with excellent results, during the winter of 2000–2001.

**Contact:** Dr. John Richards, Director, (709) 772-7474  
**Field:** Forages  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

### **Red clover helps fight nematode pests**

Red clover is important in crop rotations because it puts usable nitrogen into the soil for the next crop planted in that location. The problem is, nitrogen is not always the only thing left behind by red clover. Pesky root lesion nematodes that feed on the clover don't mind waiting around to make a meal out of the next crop as well.

Scientists at the Crops and Livestock Research Centre in Charlottetown noticed that some breeds of red clover seem to be more tolerant of the pest. This research has a few important implications. Emphasizing nematode-resistant traits in red clover would make it even more beneficial in crop rotations. Also, using genetic resistance to combat pests reduces the financial and environmental costs of using chemical pesticides.

**Contact:** Dr. Christiane Deslauriers, Director, (902) 566-6800  
**Field:** Forages  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

## **New alfalfa has high nutrition and yield levels**

Not all alfalfa varieties were created equally. Some varieties of this forage crop have high concentrations of rumen undegraded protein, called RUP for short, which greatly improves the nutritional value of the alfalfa and also lessens losses of nitrogen to the environment. The bad news is, varieties high in RUP also tend to produce poor yields.

The good news is, scientists at the Soils and Crops Research and Development Centre in Sainte-Foy, Que., have identified specific varieties of RUP-rich alfalfa that do yield well. The researchers plan to study the genes of these varieties for use in breeding types of alfalfa that will have greater nutritional and environmental benefits.

**Contact:** Dr. Gilles Rousselle, Director, (418) 657-7985

**Field:** Forages

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

## **Ice storm spurred forage research**

Research on forage crops that can withstand icy conditions has been a focus of the Soils and Crops Research and Development Centre in Sainte-Foy, Que., since the ice storm of January 1998 caught Canada unaware.

Freezing rain can cause the formation of an impermeable layer of ice that covers the ground and prevents the exchange of gases between plant roots and the atmosphere. Gas exchange is crucial to plant survival. Lack of oxygen, for example, creates a condition called anoxia. Researchers at Ste-Foy have been studying forage crops like alfalfa, red clover, orchardgrass and timothy to determine their ability to withstand such anoxic conditions. By identifying those species that are best able to survive and developing improved genetic material, Ste-Foy scientists are helping to prepare Canada in case of extreme climatic events.

**Contact:** Dr. Gilles Rousselle, Director, (418) 657-7985

**Field:** Forages

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

## **Bloat-reduced alfalfa seed selling well**



The world's first bloat-reduced alfalfa became available for planting in the spring of 2000, and all 50 tonnes of the seed produced sold out to Canadian producers. The quantity of seed sold for the 2001 season was even greater, at 75 tonnes.

Developed by scientists at the Saskatoon and Lethbridge Research Centres, AC Grazeland Br is the name of this new variety of alfalfa that reduces bloat in cattle by more than 60%. Bloat is an acute digestive disorder costing the Canadian cattle industry at least \$25 million a year in treatment and prevention costs. The successful sale of this new bloat-reduced variety indicates how beneficial alfalfa can be to farmers. This forage crop is rich in protein and minerals, making it a healthy choice for grazing cattle—plus it increases pasture yield and soil fertility.

**Contact:** Dr. David Wall, Acting Director, (306) 956-7211

**Field:** Forages

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

## *Horticulture*

### **Study shows when to fertilize blueberries**

To fertilize or not to fertilize, that is the question researchers at the Atlantic Cool Climate Crop Research Centre in Newfoundland have been working to answer for lowbush blueberry plants. And after an 8-year study the results are in—to fertilize is best during crop years, while not to fertilize is the answer for noncrop years.

Plants produced a high yield of fast-maturing, plump blueberries during crop years when researchers used a mix of nitrogen, phosphorous and potassium fertilizers along with methods for weed control. Fertilizing during vegetative years resulted in lower yields at crop time.

**Contact:** Dr. John Richards, Director, (709) 772-7474

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **It's a mite eat mite orchard**

Scientists at the Atlantic Food and Horticulture Research Centre in Kentville, N.S., have continued introducing beneficial mites into orchards all across Atlantic Canada. Strains such as typhs and lemon yellow mites are used to control pests because they prey upon destructive mite species and limit the need for chemical control treatments like miticides.

The next step is to determine the cost-effectiveness, environmental impact and pest control success of this research. One downfall is that when populations of pest mites are high, predatory mites are less effective as a means of control. Using miticides as a secondary measure is harmful to the beneficials as well as to the pests, so scientists are also looking into producing breeds of predatory mites that are resistant to chemical treatments.

**Contact:** Dr. Wade Johnson, Director, (902) 679-5700

**Field:** Horticulture (tree fruits)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **Friend or foe: new fungus discovered on blueberries**

Scientists at the Atlantic Food and Horticulture Research Centre in Kentville have isolated a new heat-resistant fungus from blueberries in Nova Scotia. This discovery has significant implications for the processing of blueberries using conventional heating and washing techniques.

The next step for researchers is to examine the potential benefits and drawbacks of the fungus to the blueberry industry.

**Contact:** Dr. Wade Johnson, Director, (902) 679-5700

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **Weed control for wild raspberry plants**

Raspberry fruits make a tasty crop, but wild raspberry plants can be a nuisance if they're competing for the same habitat as coniferous crop trees planted for pulp and paper. That's why researchers at the Atlantic Food and Horticulture Research Centre in Kentville, N.S., are studying how wild raspberry plants can be controlled by the herbicide glyphosate.

Drought conditions, for example, affect the way in which raspberry plants absorb the herbicide. By using a variety of sensing instruments, researchers found that well-watered plants absorbed more glyphosate than drought-stressed plants. These results will help manufacturers of herbicide-spraying equipment design “smart” sprayers that can detect plants most susceptible to herbicide application. Smart sprayers would allow more precise herbicide distribution and thus reduce environmental impacts.

**Contact:** Dr. Wade Johnson, Director, (902) 679-5700

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **Strawberry plants hit Florida for the winter**

Contrary to popular belief, warm temperatures are good for harvesting strawberry plants. Researchers at the Atlantic Food and Horticulture Research Centre in Kentville have learned that plants shipped from Nova Scotia for planting into winter production in Florida grow better when harvested under warm conditions.

In Nova Scotia, the plant nursery industry is even bigger than the fresh berry industry, with over 25 million seedlings being shipped to the southern United States each year. The results of this research will therefore be helpful in modifying the production technology for this export market.

**Contact:** Dr. Wade Johnson, Director, (902) 679-5700

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **Program aims to get new potato clones to market faster**

With Canadian exports of frozen french-fries bringing in \$600 million annually, a readily available raw product supply is key to meeting the demands of today’s competitive market. That’s why scientists at the Potato Research Centre in Fredericton created the accelerated release program, a 5-year pilot project now in its fourth year.

The program is expected to cut in half the time to move a potato clone from the scientist’s lab to the production line. The centre will continue to develop and present new clones each year, but the responsibility for testing and registering new varieties now belongs to the french-fry industry. Currently, the centre is accepting and evaluating requests for clones and will grant both nonexclusive and exclusive

testing rights. The project will be reviewed in 2002.

**Contact:** Dr. Richard Butts, Director, (506) 452-3260

**Field:** Horticulture (vegetables)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **New potato clones closer to making debut**

Three new potato clones are available this year for the french-fry production industry, thanks to the work of scientists at the Potato Research Centre in New Brunswick.

The release of new potato varieties is part of the centre's objective to develop and introduce varieties that are better quality, higher yielding and more stress resistant. These three new clones were offered to the production industry for 2 years of nonexclusive evaluation as part of the accelerated release program. Since the program's inception 4 years ago, 20 clones have been offered and 10 companies have requested one or more clones throughout this time. This response demonstrates the success of the accelerated release program, which is a new process to help speed up the commercialization of new french-fry potato varieties.

**Contact:** Dr. Richard Butts, Director, (506) 452-3260

**Field:** Horticulture (vegetables)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **Designer potatoes destined for fresh market**

Whether they're served baked, boiled or mashed, consumer demands for fresh market potatoes are on the rise with the increasing awareness that eating fresh can have health benefits. But customers aren't as easy to please as all that—they have expectations about the characteristics a fresh market potato should have. Small-sized gourmet potatoes, for example, have been gaining in popularity.

For the first time, breeders at the Potato Research Centre (PRC) in New Brunswick are talking about custom-designing a fresh market spud that will meet specific consumer needs. PRC scientists have entered discussions with the fresh market industry and the Marketing and Industry Services Branch at Agriculture and Agri-Food Canada to determine the national scope for such a project.

**Contact:** Dr. Richard Butts, Director, (506) 452-3260  
**Field:** Horticulture (vegetables)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Cultivar development and other genetic enhancement

### **New organic fertilizer feeds vegetables**

Researchers at the Horticulture Research and Development Centre in St-Jean-sur-Richelieu, Que., are working to develop a new organic fertilizer by combining cow, pig and chicken manure in the form of dried pellets. Developed by a company called Agrior Inc., the mixture is environmentally friendly, but, the question is, does it work in vegetable production?

To answer this, researchers tested the new product on broccoli fields and the results they obtained are very promising. Because it works well as a substitute for chemical fertilizers, this new organic mixture helps to reduce the environmental costs associated with the disposal of excess manure. This means that manure surpluses in some regions will serve as a useful source of ingredients for organic fertilizers, which can then be used in those regions that have need.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494  
**Field:** Horticulture (vegetables)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

### **Green shows cold rose plants**

One thorn in the side of rose gardeners is the susceptibility of their plants to chilly temperatures. To help them out, scientists at the Horticultural Research and Development Centre in St-Jean-sur-Richelieu, Que., are working on new techniques to assess chilling injury in rose leaves.

Measuring chlorophyll fluorescence is one method they're testing, with promising results. Chlorophyll is the compound in plants that makes them green, and it emits a tiny amount of light, called fluorescence. Researchers have found that measuring fluorescence emissions from rose leaves is useful as an indicator of plant tissue injury. The lower the fluorescence, the greater the harm. This research will help breeders develop new varieties of winter hardy roses and to assess plant quality in nurseries. Benefits of this method are that it's fast, reliable, nondestructive, and quantitative.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494  
**Field:** Horticulture (ornamentals)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Cultivar development and other genetic enhancement

### **Software forecasts agricultural pests**

Called CIPRA for short, the Computer Centre for Agricultural Pest Forecasting is a user friendly software that makes predictions about insect and disease development for a variety of crops. The research behind CIPRA came from the work of scientists at the Horticultural Research and Development Centre in St-Jean-sur-Richelieu, Quebec. The final product was constructed with help from Environment Canada in Sainte-Foy, the Food Research and Development Centre in Saint-Hyacinthe, and la Compagnie de recherche Phytodata Inc in Sherrington, Quebec.

Agricultural officers can use CIPRA as a decision-making tool for field pest management and for preparing recommendations about the use of plant protection products. One advantage of being able to forecast, for example, is that producers can apply pesticides only as needed and thereby reduce the number of applications. CIPRA is already implemented in Quebec, and other provinces are also showing interest.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494  
**Field:** Horticulture  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

### **Mechanical cabbage harvester to replace back-breaking labour**

Cabbage harvesting is about to change for the better, thanks to a new invention being constructed by scientists at the Horticultural Research and Development Centre (HRDC) in St-Jean-sur-Richelieu, Que.

Cabbages are still harvested by hand, which represents a considerable cost for producers. That's the reason researchers at HRDC have teamed up with Univerco Hydraulique to develop and test a prototype for a mechanical cabbage harvester. Studies will include which cabbage varieties are most suitable for mechanical harvesting and the impact that mechanical harvesting has on the quality of the vegetable. If everything goes as planned, researchers hope that growers can use the machine by the summer of 2002.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494  
**Field:** Horticulture (vegetables)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

### **Rhizobacteria help carrot growth**

Researchers at the Horticultural Research and Development Centre (HRDC) in St-Jean-sur-Richelieu, Que., are studying ways of improving carrot care that go right down to the roots.

Rhizobacteria are beneficial micro-organisms that develop in and around plant roots, and scientists at HRDC are testing which varieties of these little helpers can be used to best stimulate carrot growth and lessen damage caused by pests. Two specific rhizobacteria, 2F15 and 3B15, seem to be especially successful in protecting against the pesky root-knot nematode and in contributing to increased carrot weight, diameter and length.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494  
**Field:** Horticulture (vegetables)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Crop production systems

### **New strawberry is authentic winner**

A good shelf life, high yields and a large, firm fruit are just a few of the characteristics of L'Authentique Orleans, a new strawberry variety recently released by the Horticultural Research and Development Centre in St-Jean-sur-Richelieu, Que.

What's especially sweet about this new berry is that it contains a high level of antioxidants, which are a group of organic compounds found naturally in plants, including vitamin C, vitamin E and beta-carotene. Scientists at HRDC are now studying the role antioxidants play in improving the quality, increasing the nutritional value and lengthening the shelf life of strawberries. This research will be useful for breeding new strawberry varieties.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494  
**Field:** Horticulture (tree fruits and berries)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Cultivar development and other genetic enhancement

## **New orchard sprayer helps keep apple pests at bay**

A prototype for a new apple orchard sprayer has been constructed and is undergoing testing by scientists at the Horticultural Research and Development Centre in St-Jean-sur-Richelieu, Que.

Called RÉCUPAIR, this novel sprayer is designed to lessen pesticide use by reducing drift and enabling recovery of spray droplets. Initial tests in a commercial apple orchard show that, in addition to being more environmentally friendly, RÉCUPAIR is just as effective in controlling apple pests and diseases as conventional sprayers. The testing process is being extended to orange groves in Florida and the technology is also being adapted to vineyards. Researchers have filed patents in Canada and the United States.

**Contact:** Dr. Denis Demars, Director, (450) 346-4494

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **Researchers put plum pox virus under scrutiny**

Plum pox virus has been in Canada for less than 2 years, but it's already wreaking havoc with fruit growers and costing the Canadian government almost \$40 million in financial aid. This untreatable viral disease infects the fruit of peach, nectarine, plum and apricot trees, making the fruits tasteless, low in sugar and unsuitable as food. The only way to stop the disease from spreading is to remove the infected trees.

In order to respond to the challenges that this new disease presents, the Southern Crop Protection and Food Research Centre in London is heading an extensive research program that involves learning more about the disease, surveying for its presence, destroying infected trees and providing financial aid to fruit growers and nurseries.

**Contact:** Dr. Gilles Saindon, Director, (519) 457-1470

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## **Control strategies help stamp out fire blight in orchards**

Fire blight, a bacterial disease of rose bushes and apple and pear trees, may soon be put out by



scientists at the Southern Crop Protection and Food Research Centre in London. They're working to develop strategies for fighting the nasty germs that cause this affliction.

London researchers found that injecting apple and pear trees with a tiny amount of harmful protein activates the trees' protective systems, thus preparing the trees to fight off infection by fire blight bacteria. Another technique they tested with success was the use of bacteriophages, which are tiny virus parasites of harmful bacteria. Bacteriophages kill the micro-organisms that cause fire blight, thereby preventing the bacteria from developing on fruit and flowers and substantially reducing grower fruit losses.

**Contact:** Dr. Gilles Saindon, Director, (519) 457-1470

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **Alluring aroma deceives grape berry moths**

The scent of love now comes in a spray—for the grape berry moth, that is. Scientists at the Southern Crop Protection and Food Research Centre in London have successfully registered a new sprayable pheromone formulation for managing this troublesome grape pest by disrupting its mating cycle.

The idea behind using pheromones as a control technique is that if the moths can't mate, then they can't produce offspring. No offspring means no crop damage. By copying the pheromones that female grape berry moths release to attract males, London scientists have developed a spray that disrupts mating by luring the males away from the females. This new, cost-effective product will allow Canadian grape growers to control the pest with little risk to the applicator or the environment, and leaving no toxic residue on the fruit.

**Contact:** Dr. Gilles Saindon, Director, (519) 457-1470

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **Tomatoes and peppers learn to resist bad bacteria**

Tomato and pepper farmers trade one copper for another when they spend their hard-earned pennies on the metal-based pesticide that protects their crops from bacterial diseases. On top of being costly and potentially tough on the environment, copper sprays are losing effectiveness as bacteria develop resistance. But without an alternative to copper-based treatments, tomato and pepper growers have few options since bacterial diseases can cause devastating crop losses.

Scientists at the Southern Crop Protection and Food Research Centre in London are testing alternative controls. Systematic acquired resistance is one such method, which triggers the plants' natural defence mechanisms to protect against infection. London scientists have found that plant resistance can be effectively activated by a compound called acibenzolar-*S*-methyl. Another method involves prevention, with scientists working to develop a test for identifying the presence of harmful bacteria in tomato and pepper seeds.

**Contact:** Dr. Gilles Saindon, Director, (519) 457-1470

**Field:** Horticulture (vegetables)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **Disease control finds the pulse**

Pulse crops are the seeds of legume plants such as dry peas, dry beans, lentils and chickpeas. Canada is one of the biggest exporters of pulse crops in the world.

Scientists at the Cereal Research Centre (CRC) in Morden are contributing to the well-being of the pulse crop industry with their research on disease control strategies. Research studies have included the effectiveness of crop rotation techniques and pesticide applications in reducing the incidence of pulse crop diseases. CRC scientists are currently focusing on the identification of disease resistance traits in order to breed adapted pulse crop varieties that will maintain stable economic production.

**Contact:** Dr. Jim Bole, Director, (204) 983-0099

**Field:** Horticulture (field crops)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **New apples won't get browned off**

Unappetizing is a polite way to describe the brown colour that apples turn after slicing, but researchers at the Pacific Agri-Food Research Centre (PARC) in British Columbia are working on a way to fix that. Scientists figured out the cause of browning, and then used that information to develop apple clones that are brown-proof.

Browning is caused by an enzyme called polyphenol oxidase that's activated when the inner flesh of an apple is exposed to the air by a bruise or cut. PARC scientists have found a trait that suppresses the activities of this enzyme, and then incorporated this suppression trait into approximately 400 apple clones. These new varieties must still be tested under field conditions.

**Contact:** Dr. Barry Grace, Acting Director, (250) 494-6412

**Field:** Horticulture (tree fruits and berries)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

### **Ginseng replant disease gets the treatment**

Getting ginseng to grow in soil where ginseng has grown before is tough business, because fungi and bacteria accumulate in the soil and hinder the growth of new plants. This phenomenon is called ginseng replant disease, and scientists at the Pacific Agri-Food Research Centre in British Columbia have come up with a few solutions to treat it.

Chemical and nonchemical treatment methods were tested, and PARC scientists found useful types for both. Of the chemical methods, Nutri-Q and Busan were the two that significantly reduced seedling mortality rates on replant soil. The two nonchemical methods, Gro-mate Plus and Aldergrove compost, were not quite as effective but still successfully reduced seedling mortality. The results of this experiment provide ginseng growers with a choice of either chemical or nonchemical treatments to control the problems of ginseng replant disease.

**Contact:** Dr. Barry Grace, Acting Director, (250) 494-6412

**Field:** Horticulture (vegetables)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

### **Greenhouse tomato growth influenced by electrical conductivity**

In their quest to improve the quality of greenhouse tomatoes, scientists at the Greenhouse and Processing Crops Research Centre in Harrow, Ont., are studying the electrical conductivity of the hydroponic nutrient solution in which the plants grow.

Electrical conductivity, cultivar selection, composition of nutrient solution, air temperature, humidity, and crop management can affect tomato fruit quality. Higher electrical conductivity means better-quality tomatoes. The problem is, it also means smaller fruit size and reduced crop yields. Harrow scientists have developed a method for increasing the electrical conductivity of the solution by 30–40% over the

current recommendations without compromising yield or size of fruit. Their strategy involves varying the level of electrical conductivity in relation to the level of solar radiation entering the greenhouse.

**Contact:** Dr. Gary Whitfield, Director, (519) 738-2251

**Field:** Horticulture

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Crop production systems

## ***Beef and dairy cattle, swine and other animals***

### **Two-pronged approach fights mastitis in dairy cattle**

Mastitis is the most common and costly disease in milk production, causing lost yields and treatment costs for dairy farmers. On top of that, the current treatment method of using antibiotics is not always very effective as bacteria become resistant, and consumers are increasingly concerned about the presence of antibiotics in animal products.

Scientists at the Dairy and Swine Research and Development Centre in Sherbrooke, Que., are looking for ways to address these issues by developing alternative treatment methods for mastitis. One potential method involves the use of lactoferrin, which is a protein naturally present in milk that has antibacterial and anti-inflammatory properties. Another promising alternative under development is a DNA-based vaccine that helps prevent mastitis-causing bacteria from attaching to the cells in the udder.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (dairy)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Scientists aim to weed out genetic flaw in pigs**

Good carcass quality is key when it comes to making ham, so researchers at the Dairy and Swine Research and Development Centre in Sherbrooke, Que., are working on product-quality issues that affect the pork industry.

One major quality problem is caused by muscle steatosis, a genetic condition in swine that results in the degeneration of ham muscle into fatty tissue. The carcasses of pigs with steatosis require extra trimming at the abattoir, which means increased costs for the industry. Scientists at the centre are working to identify the genetic factors responsible for steatosis and to develop practical methods for identifying carriers of this condition. The results of this study can then be used to reduce the incidence of steatosis

in swine by eliminating carriers from breeding programs. It could also be used to target the affected animals to niche markets where fat is important, such as the production of prosciutto, a cured ham often served thinly sliced as an hors d'oeuvre.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (swine)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Cultivar development and other genetic enhancement

## **Mammary gland research leads to udder success**

Scientists at the Dairy and Swine Research and Development Centre in Sherbrooke, Que., are paying attention to the real milk producer—the mammary gland. Directing the maximum amount of nutrients to a healthy, productive mammary gland is key to the dairy program at Sherbrooke.

Research activities include understanding the basic biology of mammary growth and development, impacts that various factors have on milk quality, gene expression of milk proteins and gene therapy to improve mammary cell function and health. For example, one specific project currently under way is the investigation of kappa-casein as a potential marker for genetic selection in dairy cattle. This protein is associated with several beneficial changes in milk composition and processing quality.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (dairy)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

## **Comfy cows are happy cows**

Comfy cows are healthier, and healthy cows produce more milk. That's the logic behind research on the well-being of dairy cattle that's under way at the Dairy and Swine Research and Development Centre in Sherbrooke, Que.

Scientists are looking into a variety of methods for reducing stress in dairy cows. Projects include designing more space-effective barns and stalls, mattresses for lining rest areas, and improved walking surfaces that reduce lameness and slippage.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (dairy)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Animal behaviour and welfare

### **Swine can claim immunity with cytokines**

A good immune system is important for good health, so researchers at the Dairy and Swine Research and Development Centre in Sherbrooke, Que., are studying the immune system in swine as a way to improve efficiency in swine production. More specifically, researchers are looking at cytokines, and the role these proteins play in reproduction and stress responses in pigs.

Cytokines are released by cells in the immune system, and not only help to regulate immune responses, but also influence the production of hormones involved in growth, embryo development and stress-coping mechanisms. Sherbrooke scientists are currently working to develop tools for measuring the expression of genes coding for different cytokines.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (swine)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Fiber-rich diet good for sows**

The health benefits of a fiber-rich diet apply not only when served on the breakfast table, but also in the pig trough. Studies conducted at the Dairy and Swine Research and Development Centre in Sherbrooke, Que., show that increasing the fiber in the diets of pregnant sows reduces their hunger and improves their welfare.

Researchers found that sows eating extra wheat bran or oat hulls were calmer, had larger litters and exhibited fewer abnormal behaviours such as chain chewing. During lactation, sows fed high-fiber diets had bigger appetites and their piglets were heavier at weaning time.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (swine)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Anaerobic exercise solves swine manure conundrum**

Bad smell and pollution are two major issues when it comes to making effective use of pig poo. But a solution has been found, thanks to scientists at the Dairy and Swine Research and Development Centre in Sherbrooke, Que. They've developed an anaerobic treatment system that uses new biotechnology to deodourize and stabilize swine manure slurry.

Researchers are currently demonstrating this new technology on a large-scale commercial swine farm to prove that it is cost effective, very stable, and easy to operate and does not interfere with regular farm operations. The process has the potential to contribute to the long-term sustainability of integrated farm operations.

**Contact:** Dr. Jacques Surprenant, Director, (819) 565-9174

**Field:** Animals (swine)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Cattle gain weight when fed fashionably late**

When winter comes, beef farmers have a tough time making sure their young cattle continue to beef up, as it were. This may be because as it gets colder, the steers use the calories for body maintenance instead of for weight gain. To compensate, farmers boost their rations.

New research from the Brandon Research Centre in Manitoba offers an alternative to increased feeding. Brandon scientists tested moving dinner time to the evening so that the steers were eating just before the coldest hours of the day. The underlying idea was that the heat generated by the digestion process would keep the steers warm and so calories could turn into weight gain. This logic proved true, as Brandon researchers found evening-fed steers gained more weight and, in turn, generated \$30 more at sales time than cattle fed the same amount during the morning hours.

**Contact:** Dr. Reg Kucey, Director, (204) 726-7650

**Field:** Animals (beef cattle)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Show me the bull, say prepubescent heifers**

Heifer development is an important area of research for scientists at the Brandon Research Centre in Manitoba. One particular study under way involves introducing bulls to the heifers and assessing the effects this has on the establishment of female puberty and pregnancy.

Brandon scientists demonstrated that introducing sterilized bulls to heifers nearing puberty aided in the establishment of regular estrous cycles in the females. In turn, heifers with regular estrous cycles showed an 81% higher first-service pregnancy rate. On the other hand, exposing females to bulls too soon before puberty had the opposite effect, causing irregular estrous cycles and significantly lower first-service pregnancy rates.

**Contact:** Dr. Reg Kucey, Director, (204) 726-7650

**Field:** Animals (beef cattle)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Cows should make beef, not love**

Good carcass quality, not baby-making ability, is the desired characteristic of feedlot heifers. So scientists at the Lethbridge Research Centre in Alberta decided to test the effects of immunizing these young beef cows against gonadotropin-releasing hormone, a natural chemical associated with the reproductive system.

Immunized heifers were less fertile, which means less chance of unintended pregnancy. They also had a greater ribeye area, better lean yield and thinner grade fat, which are all desirable carcass characteristics. Lethbridge scientists are continuing to study immunization against gonadotropin-releasing hormone for its potential as a method of improving carcass quality.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Animals (beef cattle)

**Priority:** Renewal

**National Program:** Sustainable production systems

**Theme:** Livestock production systems

### **Happy honey bees work harder**

Honey bees look after farmers by pollinating hectare after hectare of crops. After their hard day's work, honey bees deserve to have someone to look after them. That task has been taken on by scientists from the Lacombe Research Centre, at Beaverlodge, Alta.

Beaverlodge researchers are developing a number of strategies for more effective honey bee care, including better colony management systems for minimizing the risks of diseases and pests, production of safe, high-quality hive products, and improved wintering conditions. These measures will help bee keepers promote sustainable development of their colonies, and thereby maintain a high standard of crop pollination and bee-made products.



**Contact:** Dr. David Bailey, Director, (403) 782-8100  
**Field:** Animals (other)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Animal behaviour and welfare

### **Enzyme cleans up chicken poo**

Chicken manure that contains less phosphorus is the objective of one research study currently under way at the Pacific Agri-Food Research Centre (PARC) in British Columbia, and scientists are looking at a specific enzyme to achieve this.

PARC scientists have been studying how the phytase enzyme is useful for increasing the availability of organic phosphorus in poultry feed. The more available this natural form of phosphorus is, then the less inorganic phosphorus is needed to supplement the diet, resulting in less phosphorus being excreted in manure. By taking advantage of phytase enzyme actions, PARC scientists were able to reduce the costs of chicken food as well as significantly reduce phosphorus excretion. Future studies will examine how the phytase enzyme interacts with minerals and vitamins to affect egg shell quality and bone strength.

**Contact:** Dr. Barry Grace, Acting Director, (250) 494-6412  
**Field:** Animals (poultry)  
**Priority:** Renewal  
**National Program:** Sustainable production systems  
**Theme:** Livestock production systems

## **BIOPRODUCTS AND BIOPROCESSES**

### ***Value-added foods and nonfood products***

#### **Test spots potato wart fungus**

An outbreak of potato wart disease can have serious economic repercussions, as demonstrated recently when detection of the causal pathogen led to a United States embargo on Prince Edward Island potatoes. Prompted by this finding, scientists at the Eastern Cereal and Oilseed Research Centre (ECORC) in Ottawa developed a new method of testing soil to detect the presence of *Synchytrium endobioticum*, the fungus responsible for causing potato wart disease.

In order to create such a test, scientists first needed to learn the unique molecular sequence for *Synchytrium endobioticum*. They accomplished this by studying the DNA from several diseased potatoes, including one specimen from the original outbreak in Newfoundland in 1903. This research

made it possible to create a highly sensitive test for detecting as few as one to three fungal spores per gram of soil. In the case of Prince Edward Island, the implementation of this test helped scientists prove that the fungus was only present in one small field (0.1 hectare) and eventually the embargo was lifted.

**Contact:** Dr. Lianne Dwyer, Acting Director, (613) 759-1952

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Genomics, bioinformatics and other bioinformation

## **Phage therapy takes on nasty bacteria**

Treating harmful bacteria with antibiotics is becoming less and less popular. For one thing, micro-organisms are adapting and developing resistance to chemical treatments. Also, consumers are increasingly concerned about the impact of antibiotics on food products.

Phage therapy is one alternative to antibiotics, being investigated by scientists at the Food Research Program in Guelph. A bacteriophage, called phage for short, is a sub-microscopic virus that preys upon some types of harmful bacteria. This tiny virus will latch onto a bacterium and reproduce by depositing its genetic material inside. The bacterium responds by rapidly producing copies of the phage until it bursts, spilling out hundreds of new phages. Researchers in Guelph are currently testing this method to treat bovine mastitis, a bacterial disease causing udder inflammation in dairy cattle, and to control *Salmonella* contamination of alfalfa sprouts.

**Contact:** Mr. Greg Poushinsky, Director, (519) 829-2400

**Field:** Products and processes (nonfood)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Genomics, bioinformatics and other bioinformation

## **Milk does the body even more good**

Making the most of milk and its molecular components is the goal of an ongoing research project at the Food Research and Development Centre (FRDC) in Saint-Hyacinthe, Que.

Because of its unique qualities, milk is being dissected for its component parts, which are in high demand for both food and nonfood uses. FRDC scientists are in the process of developing cost-effective fractionation techniques that can single out different components within milk and allow selective extraction. This technology can isolate proteins, lipids, sugars and minerals for separation from milk, so they can be used to improve hygiene and cosmetic products, functional foods, and nutraceutical products. For example, FRDC scientists are working on the extraction of protein fractions that could

have antibacterial uses in food and cosmetic applications.

**Contact:** Dr. Christian Toupin, Acting Director, (450) 773-1105

**Field:** Products and processes (animal)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

### **It's a matter of extracting the good stuff**

Scientists at the Food Research Program (FRP) in Guelph are always on the lookout for value-added, health-promoting food products. That's why they're constantly working on methods to identify, extract and enhance those ingredients that add to the nutritional value and therapeutic properties of different foods.

Extraction techniques, such as the use of supercritical fluid and microwaves, are a current area of focus. Guelph researchers have succeeded in developing methods to extract lycopenes from tomato waste, beta-glucans from oats and isoflavones from soybeans. These extracts can all be used in the development of products with enhanced health benefits for consumers. The FRP's most recent research involves testing beta-glucan-rich oats in human trials, with the aim of lowering blood levels of cholesterol, glucose and insulin.

**Contact:** Mr. Greg Poushinsky, Director, (519) 829-2400

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

### **New use could rehabilitate tobacco**

Tobacco dependence is about to take on new meaning as the potential health benefits of using this crop for molecular farming are becoming apparent. Most recently, scientists at the Southern Crop Protection and Food Research Centre in London succeeded in breeding and growing tobacco plants that contain interleukin-10, used to help treat the intestinal debilitation of Crohn's disease. Researchers are already testing this compound on animals, with encouraging results.

Molecular farming is the production of valuable proteins using plants, animals and cell cultures. Tobacco is an ideal plant for molecular farming. Proteins are produced in its leaves, so flowering is not a requirement. Because tobacco has no close wild relatives in Canada to which it could pass on genes, it is easily contained in an agricultural setting. Also, no one eats it.

**Contact:** Dr. Gilles Saindon, Director, (519) 457-1470

**Field:** Products and processes (nonfood)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

### **Flax lignan has practical health benefits**

Flaxseed contains a health-boosting, disease-preventing compound called flax lignan, and scientists from the Saskatoon Research Centre (SRC) have developed the technology for extracting and purifying this compound.

Flax lignan is believed to be helpful in the fight against heart disease, cancer, and kidney disease. Saskatoon researchers have teamed up with medical research scientists, and together the group is working to discover potential uses for flax lignan. Already, the team has licensed the technology to an agricultural processing company that will produce and market a flax lignan complex for use in functional foods, nutraceuticals, pharmaceuticals, animal feed additives and veterinary products.

**Contact:** Dr. David Wall, Acting Director, (306) 956-7211

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

### **Scientists turn grape waste into face paint**

When wine is produced, the seeds, skins and stems from the grapes are left at the bottom of the vat. But this leftover gunk isn't just garbage. The scientists at the Pacific Agri-Food Research Centre in Summerland, B.C., have found a way to turn the grape waste from the wine-manufacturing process into a product of value.

Summerland researchers are using microwave technology to gather oil from the dried grape seed, which can be marketed as a nonfood product and used, for example, by large cosmetic companies in Europe. The remaining grape waste can then be processed to recover polyphenolics, which are compounds thought to be effective in reducing cardiovascular disease.

**Contact:** Dr. Barry Grace, Acting Director, (250) 494-6412

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

## **Cereal by-products make good fuel**

The recent increases in the cost of fossil fuels like gasoline, heating oil, natural gas and diesel fuel have prompted producers to look at expanding the potential of ethanol as an energy source. Ethanol is a volatile flammable alcohol produced from the fermentation of sugar in agricultural crops like fruit or cereals, and is currently used as a fuel additive in regular pump gasoline. As a fuel additive, ethanol is cost effective and cuts down on carbon monoxide, hydrocarbon and nitrogen oxide emissions.

Scientists at the Lacombe Research Centre took part in a project to evaluate cereals as a source of ethanol. Although the grain itself is the traditional source, new technologies allow the straw to be used as well. Using the entire biomass of the harvest changes the way you'd estimate the ethanol yield. Scientists determined that oat and triticale have the highest biomass yield, making these crops a good bet for ethanol production.

**Contact:** Dr. David Bailey, Director, (403) 782-8100

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Bioenergy and biomass products and processes

## **A blueberry a day keeps the doctor away**

Not only do blueberries taste great, they're good for you. Blueberries contain a variety of bioactive compounds that have health-boosting properties. The blue colour of the fruit comes from anthocyanins, for example, which are powerful antioxidants believed to protect against cancer, cardiovascular disease and other illnesses.

Scientists at the Atlantic Food and Horticulture Research Centre in Kentville, N.S., are studying the bioactive ingredients of blueberries in collaboration with three different research teams, working on neurology, cardiac function and cancer. This project should help to establish a true life sciences link between agricultural research and practical application of principles in medicine.

**Contact:** Dr. Wade Johnson, Director, (902) 679-5700

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

## **Older may be better when it comes to wheat**

Although they've been cultivated since the days of old, early wheat breeds like einkorn, emmer and

spelt are receiving new attention from researchers at the Food Research Program in Guelph. Prompted by the current trend in organic farming and healthier eating, Guelph scientists began investigating claims that these ancient wheats are lower in allergenicity, better suited for organic agriculture, and higher in nutritional and therapeutic value than modern wheat breeds.

Findings so far have been encouraging. Einkorn, for example, contains compounds thought to reduce the risk of eye degeneration, heart disease and cancer. Results of this research will be used to develop a quality database for ancient wheats that can be used by wheat growers, bakers and processors. Organic and health foods based on these breeds could also be developed, creating a niche market.

**Contact:** Mr. Greg Poushinsky, Director, (519) 829-2400

**Field:** Products and processes (crops)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

## **Not all fat is bad**

As dietary fat has become associated with unhealthy eating, many consumers check the fat content of foods they buy and avoid those that contain saturated fats. And since milk has been identified as high in saturated fat, this low-fat-food trend has led to reduced consumption of dairy products.

But wait, dairy fats may not be so unhealthy after all. One component within milk fat, called conjugated linoleic acid (CLA), seems to protect against cancer and atherosclerosis. It also helps to convert body fat into muscle tissue. Scientists at the Food Research Program in Guelph are developing methods to increase the quantity of CLA in dairy products. They're helping cows to produce more CLA-rich milk by feeding the animals a diet that promotes formation of the compound and by modifying rumen conditions to increase CLA production.

In a related project, pork consumers are also benefiting from CLA. Guelph scientists have teamed up with researchers from Lacombe and are adding a chemically prepared CLA mixture to pigs' food. Pork from these animals is leaner and has more CLA than pork from traditionally fed animals. CLA-enriched pork provides a healthy food choice for people watching their fat intake.

**Contact:** Mr. Greg Poushinsky, Director, (519) 829-2400

**Field:** Products and processes (animal)

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

## **Benefits of fenugreek getting attention**

Reduced cholesterol and lower blood sugar are two newly discovered side effects of eating fenugreek, a herb used in the preparation of curry dishes. Because of these health-enhancing benefits, fenugreek has potential to create new treatments for diseases like diabetes.

Scientists at the Lethbridge Research Centre in Alberta are working to identify and isolate the medicinal properties of fenugreek. Once identified, these health-boosting compounds can be bred into new varieties with commercial potential. Fenugreek also has potential as a forage crop, because it adapts well to dryland conditions and maintains high quality throughout the year. If research on the medicinal potential of this herb goes according to plan, it could turn out to be a valuable cash crop for producers.

**Contact:** Dr. Peter Burnett, Acting Director, (403) 327-4561

**Field:** Products and processes

**Priority:** Renewal

**National Program:** Bioproducts and bioprocesses

**Theme:** Specialty biobased products and processes

## FOOD SAFETY AND QUALITY

### *Meat, dairy, and processed foods*

#### **Antimicrobial strategies improve meat safety and shelf-life**

Meat safety is an important field of study for scientists at the Lacombe Research Centre in Alberta. Their current project in this area involves developing strategies to control the incidence and growth of disease-causing and spoilage bacteria on raw meat destined for overseas markets and for local distribution.

Lacombe scientists are analyzing the pathogenic micro-organisms of raw meat on several different levels. Topics for investigation include determining the number of pathogens on raw meats, evaluating the effectiveness of antimicrobial substances against meat-borne pathogens, testing methods for physical decontamination, and implementing improved meat packaging technology. This research will provide a knowledge base for developing techniques to improve the safety and extend the storage life of raw meat.

**Contact:** Dr. David Bailey, Director, (403) 782-8100

**Field:** Products and processes (animal)

**Priority:** Food safety and quality

**National Program:** Food safety and quality

**Theme:** Knowledge and tools supporting food safety and regulations

#### **New blueberry juice pours into the marketplace**

With all the health-enhancing compounds that blueberries contain, it was only a matter of time before scientists at the Atlantic Food and Horticulture Research Centre in Kentville, N.S., teamed up with the production industry to develop a marketable blueberry juice. That time is now here.

It's been no simple task to make a drink that's both tasty and has a stable storage life, but researchers have come up with a product that is now being marketed with considerable success.

**Contact:** Dr. Wade Johnson, Director, (902) 679-5700

**Field:** Product and processes (crops)

**Priority:** Food safety and quality

**National Program:** Food safety and quality

**Theme:** Improved and new products and processes

### **Canadian pork gets the thumbs-up**

Canadian pork breeders are able to breathe a sigh of relief following completion of a study that shows their pigs don't carry a costly genetic mutation.

Scientists at the Food Research and Development Centre in Saint-Hyacinthe, Que., recently showed that the main pure breeds used for swine selection in Canada are free from a mutation of the RN gene. Swine that carry the defective RN gene produce poor-quality pork, which results in significant industry losses of about \$14 for each hog carrying the gene. These results will strengthen Canada's reputation as a reliable supplier of quality pork in local and international markets.

**Contact:** Dr. Christian Toupin, Acting Director, (450) 773-1105

**Field:** Products and processes (animal)

**Priority:** Food safety and quality

**National Program:** Food safety and quality

**Theme:** Meeting consumer preferences and nutritional needs

### **Radio frequency heating is in tune with safer food**

Radio frequency heating is one method that scientists at the Food Research Program in Guelph are investigating as an alternative to conventional high-temperature–short-time pasteurization. Pasteurization is a process of partial sterilization involving the use of heat to kill bacteria in food products such as milk. As a result, pasteurized products are safer and have a longer shelf-life.

Using radio frequency as a heating method has the advantages of rapid and uniform heating, high penetration depth, and short residence times. Guelph scientists are assessing the dielectric properties of food to develop radio frequency heating for the Canadian food-processing sector.



**Contact:** Mr. Greg Poushinsky, Director, (519) 829-2400  
**Field:** Products and processes  
**Priority:** Food safety and quality  
**National Program:** Food safety and quality  
**Theme:** Knowledge and tools supporting food safety and regulations

### **Probiotic bacteria help control pathogens**

Hello bifidobacteria, goodbye *E. coli* and *Salmonella*. Scientists at the Food Research Program in Guelph are investigating the use of helpful bacteria, called probiotics, to control dangerous micro-organisms. Bifidobacteria are one variety of probiotic that have caught their attention.

In one study, Guelph researchers found that bifidobacteria help to protect against the harmful effects of *E. coli* in the human intestine. Other studies involve supplementing the diet of chickens with probiotics to prevent the colonization of *Salmonella*. Researchers are continuing to analyze the data from these studies to better understand the potential of probiotic bacteria as a treatment technique. Bifidobacteria are found in some commercial yogurts and kefir.

**Contact:** Mr. Greg Poushinsky, Director, (519) 829-2400  
**Field:** Products and processes (nonfood)  
**Priority:** Food safety and quality  
**National Program:** Food safety and quality  
**Theme:** Knowledge and tools supporting food safety and regulations

### **Warm water better for washing lettuce**

The development of technology to improve sanitation methods for ready-to-eat vegetables is an ongoing area of study for scientists at the Pacific Agri-Food Research Centre (PARC) in British Columbia. The vegetable currently receiving their attention is iceberg lettuce.

Chlorinated cold water washes is the typical method to clean lettuce and to reduce the number of contaminating micro-organisms before packaging. Recent research at PARC has shown that warming the chlorinated water to between 47 and 50°C greatly improves the antimicrobial effect. Furthermore, lettuce sanitized with warm water shows reduced browning and better retains its eating quality after being packaged and stored. PARC researchers will soon begin commercial trials of this new process.

**Contact:** Dr. Barry Grace, Acting Director, (250) 494-6412  
**Field:** Products and processes (crops)  
**Priority:** Food safety and quality  
**National Program:** Food safety and quality

**Theme:** Knowledge and tools supporting food safety and regulations

### **Barley makes tacos and tortillas**

Tortilla wraps and taco chips are now available in an exciting new flavour—barley. This is because scientists at the Cereal Research Centre in Winnipeg have been cooking up ways to expand barley processing from its current uses in animal feed or malting by developing new food products made from barley flour. So far, they've come up with tortilla wraps and taco chips.

Not only are they tasty, these new barley-based foods have health benefits because of the high fiber content that barley adds. In addition, they have a longer shelf life than corn- and wheat-based products and are easier to process.

**Contact:** Dr. Jim Bole, Director, (204) 983-0099

**Field:** Products and processes

**Priority:** Food safety and quality

**National Program:** Food safety and quality

**Theme:** Improved and new products and processes

### **Dietary supplement improves pork carcass quality**

When measuring carcass characteristics for pork, high lean and low fat are good qualities. Scientists at the Lacombe Research Centre in Alberta have discovered a way to help emphasize these two characteristics.

In two different studies, Lacombe researchers demonstrated that adding conjugated linoleic acid (CLA) to swine diets resulted in improved lean yield and reduced subcutaneous fat on the carcass, while still maintaining good eating quality. CLA is a naturally occurring fatty acid, and could easily be manufactured as a supplement and added to swine food. The prospect of incorporating CLA into pig feed represents a potential opportunity to develop a functional food for the pork industry.

**Contact:** Dr. David Bailey, Director, (403) 782-8100

**Field:** Products and processes

**Priority:** Food safety and quality

**National Program:** Food safety and quality

**Theme:** Meeting consumer preferences and nutritional needs

### **Dried cranberries make good business**

Quebec is now 1 year into the dried cranberry business after scientists at the Food Research and Development Centre in Saint-Hyacinthe, Que., perfected a new drying process for this fruit. What's

unique about this new technique is that cranberries are immersed in a sweetened water bath, which helps to keep the fruit from losing its colour and to retain its flavour throughout the storage life.

Dried cranberries are in high demand by food processors for use in cakes, cookies, muffins and health snacks, so Quebec cranberry suppliers have their work cut out for them. Researchers are also optimistic that this drying process could easily be adapted for other fruits, like mangoes, blueberries and apples, to be used in creating a healthy and flavourful dried snack.

**Contact:** Dr. Christian Toupin, Acting Director, (450) 773-1105

**Field:** Products and processes

**Priority:** Food safety and quality

**National Program:** Food safety and quality

**Theme:** Improved and new products and processes