

Eating Our Way Back to the Future: Low Greenhouse Gas Agriculture

by Joyce Nelson

Peak oil may soon give us peak food. As we run out of fossil fuels, food will get increasingly expensive not only to produce, but to import and export. Changes to this system can also be good news, however, since globally, agriculture and our industrial food system account for almost one-third of all greenhouse-gas (GHG) emissions that contribute to climate change. Changing how we farm our food can literally change the fate of the world.

With an entire agricultural edifice constructed upon cheap energy, Canada is especially vulnerable, and not just because of rising oil prices – which economist Jeff Rubin (*Why Your World is About to Get a Whole Lot Smaller*) recently claimed will reach “record highs” by 2011. Canada’s dominant form of agriculture follows a high input, energy-intensive, export-oriented model of industrial food production that gives little thought to feeding ourselves. According to the *Toronto Star* (Oct. 12, 2009), “Canada now imports 80 percent of its fruits and vegetables,” even though we grow more than 100 varieties of these foods, mostly for export.

Sarah Elton’s book *Locavore* (Harper Collins, 2010) describes the absurdity: “Carrots from Ontario’s richest soils, in the Holland Marsh, are loaded onto trucks and driven south to the US and shipped to places as far away as Puerto Rico and Venezuela, passing other trucks heading north loaded with American carrots destined for Ontario stores.”

Equally mind-boggling is the fact that globally, agriculture and our industrial food system account for almost one-third of all greenhouse-gas (GHG) emissions that contribute to climate change. Critics are increasingly calling for ways to both increase our food sovereignty and lessen agriculture’s carbon footprint – both of which would be helped by a focus on production for local markets, which, in turn, would help sustain family farms.

Nonetheless, the Harper government’s new national policy for agriculture, “Growing Forward,” remains largely

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committed to industrial-scale agriculture and biotechnology, with an emphasis on production for export. That policy has been roundly criticized across the country.

As the National Farmers Union (NFU) Women's Advisory Committee recently claimed, "Canadians need a [national food] policy that recognizes the importance of food providers, the local community, and the natural resources our food system is built on." Calling for "more attention to a triple bottom line" that includes social, environmental, and financial contexts, the NFU Committee argues that attention to this bigger picture "would better position Canada to prepare for a future made uncertain by the effects of climate change and peak oil."

Peak Soil

One of those effects is "peak soil." Across the planet, an estimated 75 billion tonnes of fertile topsoil is lost annually because of urban sprawl, chronic soil mismanagement, erosion, flooding, and drought. As climate change leads to increasing fluctuations of weather, farmers are focussing on good soil management for uncertain times.

Laura Telfort, Executive Director of the Canadian Organic Growers Association (COG), agrees that the Canadian system is "designed for big export kinds of agricultural operations" but, she tells me in our phone interview, the Feds "want to move farming into a better environmental position." That means that out of \$8 billion in federal/provincial annual funding for farm programmes, there are "some good programmes," especially for "rebuilding the soil."

Healthy topsoil contains an incredibly diverse community of organisms – billions of beneficial microbes per handful, nitrogen-fixing fungi, nutrients and earthworms. A major factor in soil health is the amount of

carbon content it is storing, called soil organic carbon (SOC). Agricultural soils can thus act as a very effective carbon sink ("conservation carbon"), or these soils can release their carbon

Switching to organic farming methods can reduce carbon dioxide emissions from soil by up to 92 percent.

through faulty farming practices.

What's being called "low GHG agriculture" places top priority on soil restoration and soil as a carbon sink

(increasing SOC) and looks to farming methods that are common practice in organic agriculture and, in some cases, practices that were widely used by Canadian farmers sixty or more years ago. While only a few of these methods are currently funded by Canada's federal farm programmes, some of them are supported at the provincial level.

Soil's Conservation Carbon

One of those practices is the planting of cover crops. Bare, unplanted fields erode more easily and

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Saying No to Genetically-Engineered Alfalfa

Opponents of genetically-engineered (GE) crops and foods are urging Canadians to oppose the introduction of GE alfalfa. The Harper government has already approved Monsanto's GE alfalfa, but Monsanto has not yet applied for "variety registration" – the next step before the crop can be commercially grown in Canada.

Patrick Connor, a Toronto member of the Non-GMO Project, told me, "If genetically-modified alfalfa is introduced into Canada, it would decimate organic farmers" by easily contaminating their alfalfa crops. Alfalfa is widely used as a cover crop and as a high protein livestock feed. If their alfalfa is contaminated by GE seeds, organic farmers could lose their markets for organic meats and dairy.

Flax farmers in Canada are now paying a heavy price because of GE contamination. Late last year, Canadian flax exports were discovered to be contaminated with a GE flax that is not approved in Europe, and farmers lost their export markets in 28 countries. They are also having to pay for costly testing and cleanup.

Lucy Sharratt, Co-ordinator of the Canadian Biotechnology Action Network (www.cban.ca) is urging Canadian citizens to voice their support for Bill C-474, a private member's Bill introduced in Parliament by Alex Atamanenko, the NDP Agriculture Critic and MP for BC's Southern Interior. The Bill would require "an analysis of potential harm to export markets be conducted before the sale of any new genetically engineered seed is permitted" in Canada.

Bill C-474 passed second reading in the House of Commons on April 15 and moved to committee for further study, especially throughout June. This is the first time a bill to change the rules on GMOs has passed second reading. Sharratt says, "We can't allow Monsanto's GE seeds to destroy the livelihoods of farmers and jeopardize the future of organic farming."

—J.N.



↩ *Future Farming continued*

release carbon, which is why some farmers are now being paid by the acre to plant certain cover crops.

The most popular is alfalfa, which is deep-rooted and can soak up heavy rains. Alfalfa also builds the soil and naturally breaks up pest cycles. The usefulness of alfalfa is one of the reasons that organic farmers and consumer groups are fiercely opposing the introduction of genetically-engineered alfalfa into Canada (see sidebar 1).

In its 2008 document entitled *Low Greenhouse Gas Agriculture*, the UN's Food and Agriculture Organization (FAO) recommends reduced or no tillage on crop-land in order to increase SOC. The use of "no-till" farming conserves soil carbon because there is no churning up of soil between crops. Rather than being ploughed under, crop stubble is left in place to reduce erosion and new seeds are planted between the stubble rows.

The COG's Telfort says that "Canada leads the world in no-till," which is rapidly being adopted across the country. Some 30 percent of Canadian cropland is no-till. "But," says Telfort, "we think you need to do organic no-till" to be really effective.

As the World Resources Institute has recently found, "Without tillage to eliminate weeds, no-till farmers apply more pesticides and herbicides and are likely to rely on GMOs [genetically-modified organisms]."

"With organically managed soils," Telfort explains, "there are mycorrhizal fungi which live in association with plant roots and make nutrients available to plants." These fungi produce a potent glue-like substance called glomalin that stimulates increased soil aggregates which "hold the soil together." Usually, nitrogen and carbon are "sent back out of soil," says Telfort, but with organic soil, the nitrogen and carbon stay inside the soil. "That's why we think organic

no-till is the answer. If we could get the chemicals out of no-till, Canadian soils could hold a lot more carbon and more nitrogen." Healthy soil also usually means fewer weeds and thus less need for herbicides.

While some scientists dispute the effectiveness of no-till to increase SOC, there are many other benefits of the practice, including a reduced need for irrigation, less labour from the farmer, increased soil quality, reduced erosion, less fuel use, less compacting of soil by a tractor, and increased ability of the soil to withstand extreme weather.

"I remember the drought on the Prairies five years ago," says Telfort. "You could drive through the countryside and immediately see which farms had the better soil management practices because of the green fields. Better soil handles things like drought and extreme rains." Switching to organic farming methods can reduce carbon dioxide emissions from soil by up to 92 percent.

Crop rotation is another practice that can restore soil and sequester carbon, and also keep weeds in check. Planting corn one year, followed by oats or barley, and then two years of

A "Capitalist Con-Job of Epic Proportions"

The manufacture of phosphate fertilizers creates a highly toxic (but lucrative) by-product. When raw phosphate ore is processed into water-soluble phosphate (via the addition of sulphuric acid) to make phosphate fertilizer, the high fluoride content of the ore is vaporized and forms two toxic gaseous compounds: hydrogen fluoride and silicon tetrafluoride. These emissions are captured at the fertilizer plant by "wet-scrubbers," which scour the toxins from the plant's stacks. This residue becomes hydrofluorosilicic acid (HFSA).

The HFSA is then collected, pumped into tankers, and sold to communities across North America, who add HFSA to their drinking water supplies as the primary chemical used in water fluoridation, supposedly to prevent cavities.

According to Toronto's *Vitality Magazine* (March 2010), "Safe disposal of phosphate fertilizer factory waste (HFSA) is very expensive and a financial liability for Big Agribusiness – which would prefer to sell this poison at a profit to our municipalities."

The phosphate fertilizer industry, which includes subsidiaries of Cargill and Archer Daniels Midland, sells more than 200,000 tonnes of HFSA annually in North America, earning millions of dollars for this toxic waste. Nationwide, about 42 percent of Canadians drink fluoridated water treated with HFSA.

Robert Carlton, a former US Environmental Protection Agency scientist, has called this arrangement a "capitalist con-job of epic proportions," which has been going on for more than fifty years.

Fluoride is increasingly being linked to dental fluorosis, osteoporosis, and brain disorders. In 2006 Canada's National Research Council identified fluoride as an "endocrine disruptor" which can harm thyroid function. The Canadian Association of Physicians for the Environment (CAPE) considers fluoride "a potential immunotoxin, embryotoxin, neurotoxin, and harmful to bony tissues, including both dental and ordinary bone."

Rock phosphate also contains cadmium, a heavy metal that is contaminating oyster beds on the West Coast possibly through farm runoff.

—J.N.

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hay (alfalfa) is considered one example of a good rotation.

There are also increased calls to restore native grasslands across Canada, which can effectively remove CO₂ and nurture topsoil. The deep roots of native grasslands can sequester as much as 1.8 metric tonnes of carbon per hectare.

Animal Management

These grasslands can also be used as pasture for farm animals. In fact, cows that pasture on grass produce 20 percent less methane from burping and farting (called enteric fermentation). Cows' stomachs are intended to digest grass, not the corn they are fed on factory farms. The methane they produce is one of the most potent GHG emissions – twenty-one times more potent than CO₂ – and the biggest source of methane on the planet. Methane accounts for about 14 percent of all GHG emissions globally, and two-thirds of all methane emissions come from enteric fermentation and farm animal manure.

Guy Dauncey's *The Climate Challenge: 101 Solutions to Global Warming* (New Society Publishers, 2009) recommends: "If 50 percent of the world's grassland farmers were to graze their animals rotationally, mimicking the way they used to graze when predators were around, they could store an additional one tonne [of GHG] per hectare per year."

Wayne Roberts, agricultural writer for Toronto's *Now Magazine* (Feb. 25, 2010), reminds us that such grazing can help with manure management: "While the barren feedlots of conventional farming turn cow dung into toxic waste, animal poo dumped on luxuriant growing grass becomes organic fertilizer."

Although grass-fed dairy cows produce less milk, this grazing is part of what's called integrated crop and livestock farming, another low GHG

agricultural practice that saves energy by not having to bring feed to the animals or remove their wastes, as in factory farming. Integrated farming also helps decrease external inputs, mak-

Across the planet, an estimated 75 billion tonnes of fertile topsoil is lost annually

ing the farm more self-sufficient and economical. Some farmers are also using animals in place of tractors.

Conventional farmers are increasingly using anaerobic digesters as a way to turn feedlot animal dung into composted fertilizer. These industrial-size digesters use bacteria to hasten the composting process and provide energy at the same time. They have been called "the real waste-to-energy technology" of the future, and

they cut down on nitrous oxide emissions from manure, which are 310 times more potent as GHG than CO₂. An estimated 80 percent of all nitrous oxide emissions globally come from the farm sector.

A landmark 2007 FAO study estimated that industrial meat production – the factory farm raising of chickens, turkeys, hogs and beef cattle – is by itself globally responsible for nearly 20 percent of all GHG emissions.

Getting Rid of Problems

"One huge policy shift we could make," says Telfort, "is to ban synthetic fertilizers. You'd have a huge, 30 percent reduction of [agricultural] green-house gases immediately. The energy that goes into the production, manufacturing, distribution, and use

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Cows that pasture on grass produce 20 percent less methane from burping and farting (called enteric fermentation). Cows' stomachs are intended to digest grass, not the corn they are fed on factory farms.

Ester Srijbos

↔ *Future Farming continued*

of synthetic fertilizers is immense. If we could get rid of them, we could get rid of a lot of the problem.”

We could also get rid of a huge, if little-known, side-effect of that industry. Every tonne of nitrogen fertilizer that is phased out reduces GHG emissions by the equivalent of five tonnes. At the least, conventional farmers can do testing to determine the exact amounts of fertilizers needed.

Interestingly, Telfort says that in 2007-08, when the price of fossil fuel-based synthetic fertilizer “went through the roof,” conventional farmers couldn’t afford it and “found they could do without it,” although “they went back to it” when the price came down.

“Rather than focus on these kinds of piecemeal programmes,” says Telfort, “why not just pay farmers to do organic farming? The European Union pays farmers to convert to organic.”

In its recent Economic Stimulus Package, the Green Party of Canada recommends setting up a \$500 million fund to help farmers transition to organic – with the money coming from the removal of the GST exemption for agricultural pesticides.

It’s a recommendation that makes sense because Canada’s farm programmes “are not written for organic farmers or for small-scale farming,”

says Telfort. Organic farmers “can apply for all the programmes, but they have a harder time with the way programmes are designed” and small-scale farmers are “disadvantaged by all these rules against small farms” in Canada.

That’s exactly the point that Thomas Pawlick underlines forcefully in his new book, *The War In the Country: How the Fight To Save Rural Life Will Shape Our Future* (Greystone Books, 2009), which focuses on the fight to save Canadian small-scale farming “systematically penalized” by unfair tax regimes, rules, regulations, building codes, and programmes that fa-

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vor industrial farming.

One telling example that Pawlick, the former editor of *Harrowsmith* magazine, provides is the practice of farmers using portions of their land for grazing or a woodlot, and finding that government authorities have reassessed the land as residential for tax purposes because they’re not growing a crop on it. He also cites bizarre dairy and egg marketing board regulations such as the requirement for a separate building for grading eggs, and a 38-

page rule-book to follow for that procedure. And, writes Pawlick, raising free-range chickens is “expressly outlawed by the federal government” unless you have a minimum of 125,000 chickens.

Back to the Future

In March 2008, Britain’s Institute of Science in Society reported that shifting to organic agriculture could cut world energy use by 16.5 percent and reduce greenhouse gases by 29.5 percent. In April of the same year, the UN Agricultural Assessment meeting in Johannesburg reached a similar conclusion, calling for an end to fossil fuel-based agriculture and a return to natural, low-impact, sustainable farming.

Even more significant, in 2008 the highly respected US-based Rodale Institute released its report entitled *Regenerative 21st Century Farming: A Solution to Global Warming*. As a result of nearly thirty years of study of soil carbon data, the Institute announced that “the vast, untapped potential of regenerative agricultural practices” of organic farming “can be the most effective currently available strategy for mitigating CO₂ emissions,” and “if practiced on the planet’s 3.5 billion tillable acres, could sequester up to 40 percent of current CO₂ emissions.”

Thus, switching to organic, low GHG agricultural practices could not



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By the Numbers

Forget about carbon markets, geo-engineering and all the other false solutions. Here is a real way out of the climate crisis, by reducing total GHG emissions:

- Use agroecological practices to rebuild the organic matter in soils lost from industrial agriculture - 20-35%
- Decentralise livestock farming and integrate it with crop production: 5-9%
- Distribute food mainly through local markets instead of transnational food chains - 10-12%
- Stop land clearing and deforestation for plantations - 15-18%

These straightforward measures would lead to a reduction of 1/2 to 3/4 of current global GHG emissions.

What is required to get there is what farmers and food producers have been defending and calling for for decades:

- Decentralisation of production and distribution,
- Effective support for agricultural practices based on agro-ecological processes, biodiversity and local knowledge, and
- Profound agrarian reform

Politics is the only thing standing in the way of such a transition. The problem is that the corporations that profit from industrial food are setting the policy agenda. It's time to take the fate of the planet and humankind from the hands of big speculators and put the world's food producers first.

—*Small Farmers Can Cool the Planet: A way out of the mayhem caused by the industrial food system*, November 2009, GRAIN,

www.grain.org

only reduce the 30 percent of GHG emissions that current industrial agriculture creates, but could also sequester through soil restoration another 40 percent of emissions globally. That's a huge solution. The report continues: the Rodale Institute "advocates a rapid, nationwide transition from today's prevailing, petroleum-based farming methods to what we refer to as 21st Century biologically based, or regenerative, agricultural management practices."

By 2009, there were more than 500 farmers markets in Canada – a \$1.03 billion per year business. As well, Sarah Elton's *Locavore* reports that small-farm CSAs (community-supported agriculture) grew from a mere 60 in 1990 to 1,700 across North America in 2009. Clearly, the public wants good, local, organic food. De-

mand for organic food is increasing 20 percent per year, while the number of organic farmers in Canada is increasing by only 1-5 percent per year. But as the Rodale Institute report notes, "Farmers can transition to new practices relatively quickly and inexpensively using low-cost tools."

With peak oil set to make the import/export of food prohibitively expensive, Jeff Rubin argues that "the future will look a lot like the past. And that means more farms." Growing local food for local markets is probably the most important low GHG agricultural practice we can adopt, and ironically, it's one of the most radical suggestions of our time.



Joyce Nelson is a freelance writer/researcher and the author of five books.

TLC for Wild Hills and Beaches

Jordan River, Sandcut Beach, and the Sooke Hills occupy a very public place in the Vancouver Island community. These Western Forest Product properties are being sold on the public market. Responding to islanders' sense of community ownership over these properties, The Land Conservancy of BC and the Capital Regional District are taking advantage of the opportunity to protect 2,350 hectares. TLC needs to raise \$3.25 million to save this cultural and natural heritage. To support the Wild Hills and Beaches Campaign, please visit www.conservancy.bc.ca or call 1-877-485-2422.

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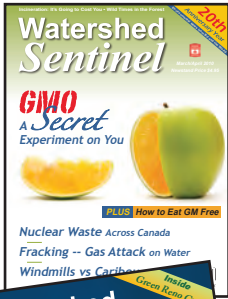
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