SOWING THE SEEDS OF CORPORATE AGRICULTURE: THE RISE OF CANADA’S THIRD SEED REGIME

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The seeds of the world’s agricultural crops were, with few exceptions, the exclusive domain of farmers until the end of the nineteenth century. Through generations of experimentation and selection, farmers developed a wealth of seeds adapted to their unique conditions and suited to their various cultural, economic, and social needs. In the hands of farmers, seeds have nurtured and sustained diversity. In other hands, however, seeds can produce vastly different effects.

Friedmann and McMichael identified distinct food regimes organizing the increasing industrialization and globalization of food and agriculture systems during the twentieth century. Each of these food regimes involves a period of relatively stable relationships, governed by regulations and norms, and bordered by crises in which new possibilities emerge. Changes at the level of the seed are critical to the evolution and demise of such food regimes.

The industrialization of agriculture, which essentially substitutes on-farm, cyclical processes for inputs and implements produced off-farm under industrial conditions, generally begins with the large-scale adoption of standardized plant varieties tailored to the use of such commodities, be they pesticides, chemical fertilizers, or farm machinery. The pesticide and chemical fertilizer-dependent varieties of the Green Revolution are the most obvious example of the capacity of seeds to usher in the industrialization and globalization of food and agriculture systems.

Changes at the level of the seed, however, transpire through the development of their own set of relationships, norms, and regulations. Within the evolution of food regimes, it is possible to discern “seed regimes,” which, in their construction and dissi-
In this article, I argue that the historical development of the Canadian seed system is marked by three seed regimes through which control over seeds has passed from farmers to the state and now to corporations. In the initial seed regime, decisions about seeds were generally made at the local level — on the farm and by farmers — with state involvement limited to supporting efforts of settler communities to feed themselves. There were no seed regulations, simply the traditional cultural practices of farmers experimenting with, selecting for, and exchanging seeds. In the second seed regime, seeds were harnessed to a new set of state agricultural development policies that focused on large-scale production of certain commodities, largely for export markets. The state's preoccupations were enshrined in the Seeds Act of 1923, which ushered in a strong, all-encompassing regulatory system and was embedded in seeds through the centralization of plant breeding in public programs managed by Mendelian scientists.

In the third seed regime, which is still under construction and contestation, the state facilitates the transfer of decisionmaking over seeds into the hands of a few transnational corporations that seek proprietary control of seeds as a way to build new markets and secure their positions in a restructured global agrifood system. In the construction of this regime, agriculture research is privatized and the regulations of the previous seed regime, which served the national development objectives defined by the state, are reoriented to the needs of the seed industry. Thus, the regulations governing the introduction of new varieties are progressively relaxed in areas such as merit criteria and genetic modification, typically in the name of market choice, even as these regulations continue to shut out farmer varieties. New laws on intellectual property rights, such as plant breeders' rights, protect corporate profits while prohibiting farmer practices common to the earlier regimes. In essence, what happens in the third seed regime is the completion of what Kloppenburg refers to as the “commodification of the seed”: the use of biological means, such as genetic engineering, and social means, such as patents, to prevent seed-saving practices and guarantee monopoly rights over seeds. As discussed in the conclusion of this paper, if this commodi-
fication continues, it is likely to drive forward structural changes to agribusiness that will increase corporate control of the Canadian food system, make genetically modified (GM) crops a permanent feature of Canadian agriculture, and pose formidable barriers to any efforts to contest or bypass corporate power in the food system.

**Antecedents of the Third Seed Regime**

Although I refer to the seed regime at the end of the nineteenth century as the first Canadian seed regime, it was not the first seed system of the territory. Before the arrival of the European settlers, First Nations peoples were practicing highly developed systems of agriculture and permaculture with seeds from a variety of crops — squash, maize, sunflower, and beans to name a few — that they had carefully selected for and nurtured over generations. Colonization destroyed most of this agricultural diversity, but a significant amount of integration with settler agriculture took place. The seeds that the initial waves of European immigrants brought with them were not suited to the new climate, short seasons, and unfamiliar soil types and parasites, and they had little choice but to adopt some of the crops from the First Nations peoples.

Unlike the situation in the United States, where early colonial agricultural policy sought to develop export plantations, in Canada the mercantile system was built on fur and fish exports, but few agricultural export projects. Agriculture served the food requirements of the colonies, and the first seed regime was thus characterized by the need to develop an agricultural diversity adapted to Canadian conditions and to the cultural demands of the European settlers. Initially, this work was left to the settlers, both farmers and gardeners, and gradually, through strong systems of farmer-to-farmer exchange of both agricultural knowledge and seeds, they established a solid foundation of agricultural diversity.

The state became active in the development of the seed system only near the end of the nineteenth century. In 1885, the Canadian Parliament commissioned William Saunders to look into the experimental farm system in the United States. Based on his recommendations, five federal experimental farms were established the following year, with another twenty opening up between 1905 and 1916. One of the priorities for these farms
was to support the improvement of seeds. But at this point, “improvement” was not something confined to the experimental stations. The experimental farms were only one part of a larger process of innovation that was still primarily carried out by farmers. Saunders and his assistants at the experimental stations focused on extensive collection missions to gather seeds from around the world, which were then multiplied on the experimental farms and sent out to farmers for further experimentation and selection. In 1895, the year Saunders began sending out free packets of seed varieties to interested farmers, he was swamped with 31,000 requests for seeds and was able to send out only 26,000. The next year, more than 35,000 packets were sent out and the program continued at this rate until the end of the nineteenth century.\textsuperscript{10}

The state’s seed efforts reflected its awareness that farmers were willing and capable of experimenting with, and improving seeds. At the time, there was little reason to think otherwise. Plant breeding and agricultural research in general were led by farmers, and by bringing varieties from their mother countries, exchanging seeds widely among themselves, and continuously selecting from within their crops, they produced significant results in a relatively short time.

Wheat, for instance, was particularly difficult to adapt to Canadian conditions because of the short growing season and rust disease. At the time of Confederation, farmers still had difficulty producing enough wheat to supply local markets, especially in the West where all efforts to grow wheat in the new colonies failed. The situation changed dramatically in the second half of the nineteenth century when David Fife, a Scottish farmer in Ontario, planted seeds of a variety that would become known as Red Fife. Fife received the wheat seeds from a friend in Glasgow who had collected them from a ship sailing from Poland carrying wheat from the Ukraine. Red Fife had good resistance to rust and, most importantly, it matured early enough to avoid the frost and was ideal for breadmaking. From David Fife’s farm, seeds of Red Fife spread rapidly from farmer to farmer across North America.\textsuperscript{11}

\textbf{Lineaments of the Third Seed Regime} Red Fife is a hallmark of the first seed regime, but it is also the starting point for the second seed regime. The
variety made it possible to produce wheat on the prairies and, as a result, immediately captured the interest of industry and the state as a means to settle the West and turn the prairies into the “grain elevator of the British empire.” By the end of the nineteenth century, the Canadian Pacific Railway and the Hudson’s Bay Company were already holding fairs in the western settlements and establishing their own experimental farms to promote Red Fife, with the federal government introducing a series of measures to support its adoption.

Discussions with farmers and industry people convinced William Saunders that improvements to wheat were still necessary, particularly in terms of maturity time. He had other varieties in his collection that matured earlier, but none had the superior milling quality of Red Fife. So instead of searching the world for new varieties, Saunders and his team embarked on a seminal change of course: they began to try to improve Red Fife according to the methods of the newly ascendant school of Mendelian genetics. Saunders started crossing Red Fife with other varieties that matured earlier and his efforts eventually led to the development of Markham wheat, a cross between Red Fife and an Indian variety called Hard Red Calcutta. His son Charles later selected a cultivar from within a population of Markham, and samples of this variety, called Marquis, were sent to prairie farmers in 1909. By 1920, Marquis accounted for 90 percent of the hard, red spring wheat on the Canadian prairies, being sown on more than 20 million acres in North America.12

Marquis’s overwhelming popularity was not simply a matter of agronomic performance. The variety was introduced in the context of a state program to rapidly settle the prairies and increase wheat exports. Many of those who began farming the prairies at the time and who took up Marquis wheat were recent immigrants without access to adapted seeds, or speculators interested in making a rapid return on investment. Moreover, state policies and high prices for wheat, particularly during World War I, when Canada was called upon to meet the flour supply needs of her allies, encouraged farmers to abandon cattle, hogs, poultry, and gardens to focus on growing wheat.13 The expansion in wheat acreage required an expansion of the seed supply, and this gap was filled, not with a massive distribution of seed packets
containing a diversity of varieties, but through the multiplication and distribution of Marquis wheat, which, with the passage of the *Canadian Grains Act* in 1912, had become the standard against which all other wheats were measured.\(^4\)

The immediate results of this narrow focus on wheat, and Marquis in particular, were catastrophic. In 1916, Marquis’s resistance to wheat stem rust broke down and nearly a third of the total harvest was lost. Charles Saunders tried in vain to identify and incorporate new resistance genes into Marquis without reducing its milling quality and, frustrated, he began to wonder “whether the discovery of Mendelian unit characters is sometimes due to the unhappy combination of a great deal of enthusiasm with very few facts.”\(^5\) Furthermore, by 1920, the extensive wheat monoculture was already producing widespread soil erosion. The problem worsened during the 1920s, leading eventually to massive crop failures, which were compounded by a dramatic plunge in global wheat prices. Western farmers not practising intensive wheat monoculture, such as the Mennonites of Manitoba, were comparatively much better off during these difficult years.\(^6\)

The difficult experiences with wheat in these early years did not challenge the dominant model of agricultural development. During the 1920s and 1930s, largely in response to the demands of an increasingly organized and vocal farm population, marketing boards, pools, and price support mechanisms were established to support the production of wheat and other commodities. With the exigencies of World War II, the state intervened further, building up an extensive machinery to control production, prices, and exports of basic agricultural commodities. Those subsidy, support, and stabilization programs that were implemented to support the war effort endured long after, due to the political support from both farmers and industry that coalesced around commodity production. Moreover, the supply needs created by World War II, which converted Canada’s agricultural surpluses into shortages and thereby drove up prices for wheat and other cash crops, encouraged greater specialization and production.\(^7\)

In the decades following World War II, all the major actors — industry, government, and producers — and both sides of the political spectrum combined around a utilitarian, productionist paradigm: the surplus, indus-
trialized production of particular commodities for the satisfaction of perceived national interests. This postwar productionist paradigm and its national values were easily integrated into the public agricultural research system, which was already inclined towards reductionist science and adopting industrial technologies. In the absence of any critical challenge, agricultural research became simply a matter of applying modern science to increase profit and production, with, as one public scientist notes, all other potential indicators and alternatives being deliberately excluded. Moreover, the state, as the supposed “expression of the public interest,” became the logical site for agricultural research, with public scientists working for the benefit of farmers, industry, and the Canadian public.

The postwar period, then, also served to centralize and standardize agricultural research. The farmer-to-farmer model of agricultural exchange was quickly replaced by the one-way technology transfer model (scientist to farmer) and diversity gave way to uniformity. For instance, in the early decades of modern public agricultural research, between 1920 and 1940, the production of wheat, which was at the centre of public research, more than doubled while the production of other crops, which were once mainstays of Canadian agriculture but were neglected by agricultural research, dwindled and in some cases practically disappeared. The production of buckwheat dropped from 8,965 million bushels in 1920 to 6,692 million bushels in 1940 and then to a mere 2,938 million bushels in 1950.

By the time of World War II, the federal state was the central actor in the Canadian seed system, intervening directly to establish a national seed system based on centralized, Mendelian plant breeding. Seeds, in this sense, were unique. With other agricultural technologies, such as tractors, agricultural implements, and chemical inputs, research and development was led by the private sector. But in the case of seeds, the public sector continued to account for more than 95 percent of formal plant breeding in Canada and 100 percent of the breeding for cereals and oilseeds into the 1980s.

There were various reasons for the state’s intervention in seeds. As Canada moved into the second seed regime, the private sector consisted of small companies that focused on multiplying and distributing varieties brought in from the United States and other countries, not on their own plant
breeding. The private sector had little interest in plant breeding for Canadian agriculture because Canadian seed markets were relatively small and difficult to breed for due to the country’s unique and diverse agricultural and climatic conditions. Moreover, the state’s agricultural development policies focused on standardized export commodities, making it too difficult and costly for private breeding programs to develop and introduce new, improved varieties. But from a public standpoint, where the returns on investment are measured by overall welfare gains rather than on seed sales, the investment in plant breeding was easily justifiable. Public plant breeding was a matter of national interest, undertaken to benefit farmers, consumers, and industry. Such nationalist sentiment pervaded the plant breeding community and shaped the working environment.

In his study of the development of canola in Canada, Kneen argues that the research community and its intended beneficiaries possessed a “common culture.” According to Kneen:

They were all white males of European/British descent; and, they virtually all grew up on Prairie farms during the depression and shared a profound and unique experience that their followers, born and raised elsewhere, whether in cities or eastern farming areas, could never know .... Farmers were much more numerous and constituted a significantly higher percentage of the Canadian population at mid-century than they do now, and the culture of the country was itself much more cognizant of its rural and agricultural components, or simply more agrarian. So it was not entirely unreasonable for the researchers to assume that they were acting in the best interests of the farmers and the country.23

This transition from farmer-to-farmer seed exchanges to top-down technology transfers involved a critical shift in power from farmers to the state that passed with little controversy. Resistance was dulled by the common culture shared by farmers and researchers and the general satisfaction with the varieties released by public breeding programs. Farmers also enjoyed the protections afforded by the Seeds Act of 1923 and they held onto key functions, carrying out most of the multiplication, distribution, and saving of seeds, and participated in the variety registration committees. Now, however, with the state actively transferring control over seeds to a new set of actors (the
transnational seed corporations) and with farmers losing many of the safeguards they retained under the second seed regime, the consequences of this initial shift in control away from the farm are increasingly apparent.

**Contradictions of the Third Seed Regime** The references to national interests that lay behind the broad ideological support of the productionist paradigm started to lose hold in the 1980s. As public awareness of the environmental costs of productionist agriculture increased and as agriculture's economic weight relative to other sectors declined severely, much of the public lost its willingness to absorb these “external” costs. Producers were suddenly confronted with new political actors, from rural property owners to environmental groups, willing and able to engage in local and provincial policy struggles over agricultural practice. Cracks in the commodity approach to food were also starting to show, with both the emergence of a sizeable market for organic and “high-quality” foods and increasing line-ups at urban food banks. If the political Left originally backed productionist agriculture for its potential to bring benefits to farmers and the poor, by the 1980s few could argue against the fact that the main beneficiary of the system was agribusiness and the clear losers were small farmers and the poor. Social activists and progressive intellectuals began to desert the productionist coalition and turn their attention to a “new agrarian question,” calling for an alternative direction in food and agriculture that would marry changes at the farm level to larger transformations of the food system based on equity.

Their departure from the productionist coalition came as agribusiness was doing the same. While the ideological shift within the Left was based on a critique of postwar productionist agriculture, international developments in the food and agricultural industry were already setting the stage for the old model’s decline. For two and a half decades, while other sectors were subjected to deep global restructuring, agriculture and food endured within national regulatory systems held together by complex and often bizarre webs of domestic and international political ambitions and alliances. But, after the food crisis of the 1970s in which global food surpluses rapidly turned into food shortages, the old order began to fall apart.
The new food order that emerged was shaped by a vast corporate restructuring in the global agrifood industry, driven in large part by consolidation in the retail sector. In Canada, by 1987 the five largest grocery distributors accounted for 70 percent of all grocery sales. Retail concentration translated into great economic power over other sectors in the agrifood industry, particularly producers. Between 1981 and 1987, as farm gate prices decreased by 10 percent, retail prices increased by 32 percent. Other sectors of the agrifood industry were also affected and were forced to respond. Pesticide corporations, squeezed by declining producer revenues and generic competition, reacted by buying up seed companies and investing heavily in biotechnology. They realized early on that they could strengthen their position vis-à-vis the rest of the agrifood industry through the proprietary control of seeds and genetics (the primary elements in the agrifood chain), which they could transform with “value-added” properties. The large agrifood processors and commodity traders, such as Cargill and ADM, were also moving towards “product differentiation” or “value differentiation” based on proprietary technology, as a means to escape from the price competition situation they faced with their downstream buyers. The newly refashioned Cargill Company now tellingly describes what it does as “food systems design.”

Overall, this corporate positioning has intensified vertical integration all along the agrifood chain. The trend involves tightly integrated “supply chains” or “food systems” organized around a single firm or alliance of firms and operating from field to fork; some economists speculate that farmers will soon identify themselves as members of the particular “food systems” of which they are a part. This does not mean, however, the end of bulk commodity production; even as these supply chains evolve, most agricultural production destined for the market will continue to be for the traditional commodity crops, such as cereals and oilseeds. The difference, however, would be that this production would not occur within the postwar national regulatory frameworks that provided at least some protection to farmers and other domestic interests. In the new global food system, producers and the food they produce will be “substitutable,” leaving those agrifood corporations that have the global reach to play the various producers and their crops off against each other in an increasingly powerful position.
Friedmann argues that corporations have now replaced states as “the major agents attempting to regulate agrofood conditions, that is, to organise stable conditions of production and consumption which allow them to plan investment, sourcing of raw materials, and marketing.” The largest agribusiness and food corporations are no longer served by the national regulatory systems that once nurtured them; they have outgrown them. For the vertically integrated agrifood firms, the postwar surplus production regimes have become obstacles to further integration and, consequently, the firms have turned their attention, with great success, to the development of a global, integrated, “liberalized” and stable food order, under the framework of international trade agreements and harmonized regulatory standards.

The Canadian state, like most other OECD countries, has not generally resisted this restructuring. Its response has been to move away gradually from the postwar national policies while pushing for a more liberalized trading environment, with foreign investment as the new engine of economic growth. The interventionist state of the postwar period, which focused on broad national economic objectives and was sensitive to the interests of various constituencies, is giving way to a neoliberal state concerned with establishing the business environment, both at home and abroad, within which the corporate agenda can manifest.

State seed policy in the third seed regime is thus conditioned by the corporate restructuring described above or, more accurately, by the state’s perception of this corporate restructuring and its ideas for how Canada should position itself within the changing context. Whereas the second seed regime was characterized by state efforts to harness the seed system to broad national objectives, the third seed regime is characterized by state intervention to facilitate corporate efforts to harness the seed system for corporate objectives. In effect, this means removing the main impediments to private sector investment in the seed industry, namely the triple character of the seed (which leaves farmers and plant breeders free to save, share, and conduct plant breeding with seeds) and competition from strong public breeding programs that make their varieties available at minimal cost. The state and industry are addressing these impediments by reorganizing agricultural research and commodifying the seed — by way of biological means — in
which plants are designed to produce seeds that are sterile, low yielding, or unable to grow properly when replanted (such as hybrids or Terminator seeds) and by way of various social and legal/regulatory mechanisms.

**Commodifying the Seed**

**Biological Options**

The commodification of the seed began in 1909 when two American geneticists discovered the inbred-hybrid plant breeding technique, and the subsequent production and popularization of hybrid corn seeds by Henry Wallace, one of the earliest tycoons of the North American seed industry and son of the then-US Secretary of Agriculture.\(^{38}\) Hybrid seeds are produced through complex, conventional plant breeding techniques.\(^{39}\) While the agronomic merits of hybrid seeds remain debatable, they have one clear advantage for seed companies that Wallace and others in the industry immediately understood: farmers cannot save the seeds from hybrid crops and, therefore, have to purchase new seeds every year.\(^{40}\)

Hybrids were also a boon for Mendelian scientists struggling with open-pollinated crops like corn that are not easily subjected to pure line plant breeding methods. Canadian plant breeders had pretty much abandoned corn breeding by the end of the first decade of the twentieth century, and it was only the development of hybrid corn south of the border that rekindled their interest in the crop. In 1923, the Harrow, Ontario research station, the leading centre for research on corn among Canada’s research stations, decided to focus exclusively on the development of hybrid varieties. The station’s first hybrid variety was released sixteen years later, and soon after a number of private corn seed companies sprang up. Today, the corn seed market is dominated by a few private seed companies that are integrated into transnational firms, while public plant breeding plays only a marginal role.

Hybridization, however, has not worked for most other major agricultural crops in Canada. For self-pollinating crops such as wheat, technical difficulties with cross-pollination continue to make hybrid seed production uneconomic and impractical. Genetic use restriction technologies (GURTS) present a new biological avenue that the industry could take, but this technology is still in development and is unlikely to be ready for commercialization in the immediate future.\(^{41}\)
Without a feasible biological option on the near horizon, the state and industry have turned to an array of social and legal/regulatory mechanisms. These encompass patents, plant breeders’ rights, and seed regulations, as well as contracts between seed companies and farmers, which have become one of the main mechanisms for curtailing the customary practices of the second seed regime.

**Social and Legal/Regulatory Mechanisms**

The Canadian Intellectual Property Office (CIPO) does not allow patents on seeds or plant varieties. In 1982, however, CIPO began granting patents on unicellular life forms and gene sequences, thus leaving unclear what would happen if a company were to modify a plant with a patented gene. The first case to test this grey area occurred nearly twenty years later when the Monsanto Corporation sued Saskatchewan farmer Percy Schmeiser for patent infringement after samples that the company took from his canola fields tested positive for a gene patented by the company to make plants tolerant to its glyphosate herbicide. While Schmeiser argued that he did not deliberately sow his fields with Monsanto’s canola and that, if his fields were glyphosate tolerant, it must have occurred by accidental contamination, Monsanto maintained that its patent rights extend to all plants containing the gene construct. The Federal Court sided with Monsanto ruling that, even if Schmeiser was not responsible for the patented genetic material being in his fields, he was guilty of knowingly having Monsanto genes on his land and of not advising Monsanto to come and fetch them. The ruling was upheld by the Supreme Court in an appeal decision in 2004.

The repercussions of this ruling must be considered in light of the current extensive contamination from GM plants in Canada. In 2000, approximately 4.5 to 5 million acres of GM canola were planted in Canada. Researchers at the University of Manitoba conducted a survey of 27 certified seed lots of canola in 2002. Of the 27 seed lots, 14 had contamination levels above 0.25 percent and three seed lots had glyphosate resistance contamination levels in excess of 2.0 percent. If the certified seed lots are contaminated, it can be safely assumed that almost every canola field in Canada has some plants incorporating Monsanto’s patented gene,
whether the fields were planted with GM canola or not. Even if Monsanto cannot possibly pursue court cases against every farmer growing crops contaminated with the patented genes, the precedent of the Schmeiser case is likely to influence farmers’ seed decisions. It is also possible that Monsanto will start testing crops as they are dropped off at the elevators and force farmers to pay royalties if their crops test positive for the patented gene, as they are currently doing in Brazil. In Argentina, where Monsanto has not been able to secure its full demands over patent protection, the company is, at the time of writing this article, working with European customs officials to test exports of Argentinean soybeans in overseas ports where Monsanto’s patents are recognized, and to seek royalty payments at these destinations.44

In 1990, after years of lobbying, the seed industry also succeeded in getting the Canadian government to adopt a Plant Breeders Rights (PBR) Act.45 The Act was sold to the public as a way to increase investment in research without compromising the interests of farmers and public research, since the Act only covers the unauthorized commercial propagation of protected plant varieties, leaving farmer seed-saving and further breeding with protected varieties outside of the scope of the Act. The Canadian government has twice tried to amend the PBR Act to strengthen the rights of breeders and weaken the rights of farmers over their harvest, effectively doing away with any real difference between patents and plant variety protection. In 1998, it introduced a bill to amend the PBR Act that died on the order paper. Six years later, with the completion of an industry-led, government-financed seed sector review, the Canadian Food Inspection Agency put forward a similar set of proposed amendments under a 60-day public consultation process on its website. The consultation process, however, drew an unexpected public outcry that has, at least with a minority government, put the amendments on hold.46

While the seed industry continues to pursue changes to intellectual property laws to defend its interests, in practice Monsanto and the other major seed corporations rarely rely on the courts to stop farmers from saving seed. Monsanto’s primary vehicle is the contract. In order to purchase its GM seeds, farmers have to sign a Technology Use Agreement that prohibits them
from saving their seed or selling their crops to a commercial purchaser not authorized by Monsanto. Monsanto dictates what the farmer can do with the seed from the crop and who the farmer can sell the crop to. In the United States, where the company has a team of 75 employees and an annual budget of $75 million to enforce its contracts, Monsanto had filed 73 cases against farmers by March 2003.47

More and more seed companies in Canada are selling their seed varieties exclusively through contracts with farmers. BASF, a German multinational corporation, has developed what it calls the Clearfield Production System, integrating conventionally bred, herbicide-tolerant plant varieties with a system of herbicide application. Even though Clearfield plants are not genetically modified and therefore contain no patented genetic material, in order to purchase Clearfield seeds farmers must sign a contract stipulating that they will not save the seed or exchange it with other farmers. C&M Seeds operates an Identity Preserved Program in Ontario for “high-value” varieties of wheat. To purchase their seeds, farmers have to sign a contract that states that the grower agrees:

To use only certified seed from C&M … not to sell, give, transfer or otherwise dispose of any Identity Preserved Wheat seed to any one for any purpose … [and] not to retain seed produced from IP Wheat seed for the purpose of re-planting or for sale, transfer or other disposition to anyone.

The expansion of such contracts weighs heavily on the notion of choice for farmers, particularly as these contracts are used by the downstream industry as part of their supply chains. Cargill and Dow AgroSciences, for instance, have developed a low-linolenic, high-oleic canola that Cargill sells under contract growing agreements with farmers. Only Monsanto’s GM varieties are available and farmers have to sign a Monsanto Technology Use Agreement, pay the $15 per acre technology fee, and cover some of the costs of “identity-preservation.”48

There is a strong link between the expansion in the use of contracts and recent changes to seed regulations. Under the logic of the second seed regime, the Seeds Act of 1923 was established to protect farmers and the food industry from seed salesmen selling bad seed. It restricted sales of seed to registered
varieties and set a high standard for variety registration: plant varieties had
to be tested for agronomic performance, disease resistance, and end-use
quality, and only those varieties that were at least equal to the best varieties
available were allowed on the market. The seed industry, however, maintains
that the variety registration system is onerous and has led a fight to dismantle
it. In 1998, the Canadian Food Inspection Agency began a process to
overhaul the variety registration system. The intention is to reduce the
number of recommending committees from 20 to six, and to eliminate or
dramatically reduce the criteria and testing for merit for all major crops. Crops
like wheat, canola, and barley will require only one year’s worth of perfor-
mance tests, which, as Agriculture and Agri-Food Canada’s own scientists
admit, cannot provide a reliable indication of long-term performance.\(^49\)

This is not simply a process of deregulation; it is more a reformulation
of regulation. While the merit criteria, the guarantee of high-quality seed
for farmers and the core of the original *Seeds Act*, are all disappearing from
Canadian seed regulations, a new criterion is rather silently taking its place:
seed “purity.” Given that most major food crops in Canada are self-polli-
nating and farmers can save seeds from year to year without causing quality
or performance to seriously diminish, seed purity is simply a technical matter
of making sure that seeds are properly selected, cleaned, and stored. Farmers
have been quite successful at doing this themselves over the years.\(^50\) For the
seed industry and increasingly for government, however, pure seed equals
certified seed (that is, non-farm saved seed of registered varieties) and
protecting seed purity means preventing seed saving. Yet, this self-serving
concern for purity does not extend to GM crops. Neither the seed industry
nor the federal government has taken any steps to protect the purity of the
Canadian seed system from the introduction of GM crops, despite the
economic problems that this GM contamination can produce, such as the
loss of export markets.

When a GM crop is widely introduced, contamination is inevitable. Even
with precautions, a certain level of contamination will occur, either by
mixing during grain handling, cross-pollination, accidental release, or the
persistence of GM crops in fields.\(^51\) The only way to ensure the purity of
non-GM crops is to prohibit the planting of GM crops near where non-GM
crops are grown. Such a solution is, of course, not acceptable to the seed industry or the government. Instead, they are proposing a voluntary system of identity preservation that will shift the costs and responsibilities to farmers and drive forward the use of contracts on seed sales.

The seed industry is calling for an affidavit system that would serve as the basis of identity preservation. It would require farmers to sign a written guarantee testifying to the variety of their crop when they drop their harvests off at grain elevators. In this way, the grain is supposed to be segregated by maintaining the “identity” of the variety through the grain handling system. While the merits of such a program are questionable given the level of GM contamination in the certified seed supply, if adopted it would have major implications for seed saving practices.

The Canada Seeds Act prevents farmers from referring to their crops by variety name if their crops are not grown with certified seed. According to a January 2003 position paper by the Canadian Seed Trade Association (CSTA) on the affidavit system:

A legal opinion obtained by the CSTA confirms the reality that only crops planted with [certified] seed can be identified by a variety name in the grain handling and processing system …. We recognise the concerns of industry stakeholders with mandating the use of certified seed. Where products are to be sold by ‘class,’ the CSTA supports a middle ground position of not requiring the crop to have been planted with certified seed. However, the grower must be able to prove the purchase of certified seed of that variety in recent years. In cases where the grain handler or processor is claiming the grain is identity-preserved the requirement for the use of [certified] seed must be complete.

Put simply, any farmer looking to sell her harvest as identity-preserved cannot sow her fields with farm-saved seed.

Identity preservation systems, which are really just a form of contract production, are no longer a marginal element of Canadian agriculture and, as the global agrifood industry continues to restructure towards vertically integrated supply chains, they could well become the norm. Back in 1992, William Leask, then Executive Vice-President of the Canadian Seed Trade Association, put forward a three-wave theory of crop development. His second wave corresponds to what I describe as the second seed regime, and
his third wave is based on identity preservation systems. According to Leask, “Merit has traditionally been defined by the needs of farmers such as yield improvements and disease resistance .... The third wave means that merit will be determined by the crop’s utility further down the chain of production.” Of course, this “utility” will be tightly controlled and owned by the seed industry and the larger corporate structure or supply chain that it belongs to, and the state will be called upon to ensure this ownership and control.

Reorganising Agricultural Research By the mid-1970s, a change in perspective began to take root within the federal government. The frank and open recognition of the natural contradictions between a public and a private seed system gradually gave way to an idealistic effort to support a private seed system that would “complement” the public sector. The SeCan Association of seed growers was established in the 1970s to make agreements with public breeding programs for exclusive licenses to multiply, distribute, and market varieties, with SeCan charging a levy of two percent on the sale price of certified seed and collecting royalties for the plant breeder. SeCan thus shifted some of the costs of plant breeding from the government to farmers, signifying a new perspective on plant breeding as a business with farmers as customers, rather than plant breeding as a national activity carried out in collaboration by breeders and farmers.

The federal government also began to cut the budget for public plant breeding programs and to introduce changes to how funding was allocated. Overall federal expenditures on agricultural research declined significantly in the second half of the 1980s, while new funding programs forced public researchers to pursue partnerships with the private sector. According to Agriculture and Agri-Food Canada canola breeder Keith Downey:

It used to be that we could say to the outside funders, give us enough to get the hands to run this stuff. We won’t worry about supplies or travel, we have that in our basic budget; we just need hands. But then it got to the point where we didn’t have enough money in our budget to buy supplies, and keep the place operating, so we had to build that in. Now basically the outside money is running the whole show.
Downey was speaking in 1992, before the enactment of the *PBR Act* and the rapid rise of patents and biotechnology. Today, the direction of public plant breeding is even more commercial, putting great strain on its all-important culture of cooperation and free exchange of germplasm and information.

The consequences for the Canadian seed system are already palpable. A recent study of plant breeding in Western Canada found that large private investments in canola R&D in the 1980s and 1990s went primarily into the development of hybrid varieties and varieties resistant to herbicides. By 1999, one half of the canola area was seeded with herbicide tolerant varieties that required farmers to sign technology use agreements or use a specific herbicide. In 2000, more than two thirds of canola acreage was planted either under production contracts or with canola varieties dependent on specific herbicides.56

**Conclusion** The depth of the current transformation of the Canadian system may not be readily apparent because the institutions of the productionist period, such as the variety registration committees and the public breeding programs, are still there. However, they are or are becoming empty shells of what they once were. Public plant breeding programs are being starved of funds and reduced to a support role for seed companies. The institutions surrounding the variety registration system that once offered at least a small window for farmers and the general public to have input into the decisionmaking process are gradually losing their influence and, in some cases, their legitimacy as spaces for public engagement. Decisionmaking used to be dominated by “experts” from the public sector, typically scientists, who assumed that they knew what was in the best interests of farmers and the general public, and who assumed that their opinions mattered. Those days are drawing to a close. Decisionmaking over seeds is fast becoming the exclusive domain of another elite — the transnational corporations that dominate the global seed industry.

Government and industry maintain that the current changes to the seed system will make it more market driven. This is a poor expression for the actual situation. The new global agrifood order is controlled by a small
number of increasingly integrated firms that seek to enhance their position in relation to other corporate players by owning and controlling technology, from seeds to supermarkets. The four transnational pesticide corporations that now control nearly half of the world’s seed market (Monsanto, Syngenta, Bayer, and DuPont) invested in seeds with the specific objective of enhancing their power within the food industry and driving forward the industrialization of agriculture. In the world that such corporations are building, the “market” does not exist, except in a very limited manner on the supermarket shelves where few people possess the means to enjoy the luxury of exercising real choice. The main concern for today’s transnational seed company is not to sell seeds so much as to sell proprietary “value-added” traits through grower contracts or identity preservation systems. The added value reflects the values of the corporations, which are generally concerned with selling more industrial inputs (pesticides and fertilizers) and providing efficiencies to downstream industrial processes. In this system, there is no room for social, environmental, or even agronomic considerations that impinge on corporate profits.

While states fall over themselves to facilitate this new corporate seed order, people everywhere are contesting it. From the indigenous farmers of Mexico defining strategies to decontaminate and protect their sacred maize crops from GM corn, to Dalit women in India demolishing the official wisdoms of the Green Revolution with food systems based on traditional grains and seed practices, communities are securing and redefining means of autonomy. From the organic farmers in Saskatchewan suing Monsanto and Bayer for destroying their organic markets, to the farmers in Switzerland who led a successful, broad-based campaign for a five-year national moratorium on GM crops, people are becoming more sophisticated in resisting, and understanding what is at stake when it comes to seeds and what needs to be done. As Jack Kloppenburg pointed out nearly 20 years ago, “First the Seed” is the motto of the American Seed Trade Association, but the message applies equally to social movements contesting globalization: control over the seed is the foundation for all else. There is, in this sense, reason for optimism. The third seed regime is by no means a fait accompli. Pockets of resistance are emerging everywhere, linking together, and, at any given
moment, threatening to overwhelm the whole corporate project, from the seed up.

Notes


5. Kloppenburg, *First the Seed*.

6. Indigenous people in Canada continue to care for traditional varieties passed down through generations in the face of enormous obstacles with little or no outside support. See, for example, Sean Robertson, “Legal and Political Strategies for ‘Protecting’ Traditional Environmental Knowledge in Penticton, Okanagan Nation” (British Columbia, 2006), <http://www.forumonpublicdomain.ca/files/ROBERTSON_Protecting_TEK_Penticton.pdf> (accessed 1 June 2007).


34. Ibid.; Nichola, “Globalization’s Consequences.”
37. Pistorius and van Wijk, *The Exploitation of Plant Genetic Information*.
39. Breeders begin by selecting a number of crop lines with desired characteristics and self-pollinating them. The inbreeding is then repeated with subsequent generations in order to isolate “pure lines” — plants that are homozygous and, when inbred, produce exact clones of themselves. With these pure line varieties, the breeder then experiments by crossing one pure line with a different pure line. Some of the crosses should result in a first generation of plants that are completely uniform and, due to a phenomenon called ‘heterosis,” higher yielding than their inbred parents. But seeds from subsequent generations will produce plants that perform unevenly and poorly, obliging the farmer to purchase new seed every year, thereby increasing seed sales.
41. GURTS, commonly known as Traitor or Terminator technologies, are genetic engineering techniques that modify plants so that the seeds they produce will not germinate if planted. The technique involves a method whereby a gene is turned on or off in a developmentally regulated fashion and a procedure for controlling the expression of an engineered gene from the outside using a chemical inducer or other factor, such as cold treatment. A farmer saving seeds would conceivably have to spray these seeds with a particular chemical in order for them to germinate. While GURTS technologies have yet to be commercialized, there are a number of companies, as well as the US Department of Agriculture, which hold patents for GURTS or GURTS-related technologies. The US Department of Agriculture and Delta and Pine Land, a US cotton seed company now owned by Monsanto, claim to have advanced a GURTS technology to the point of laboratory and greenhouse tests with tobacco and cotton plants. See ETC Group, “Terminator Technology: Five Years Later,” *ETC Communiqué* 79 (2003).
45. Pistorius and van Wijk, *The Exploitation of Plant Genetic Information*.
In a personal communication, a member of the National Farmers’ Union revealed that one CFIA bureaucrat within the PBR office complained to her of “literally hundreds” of letters, faxes and e-mails commenting on the proposed changes having poured into her office (14 March 2005).


“Opinion,” Germination Magazine (July 2002), p. 34.


Kneen, The Rape of Canola, p. 159.

Agriculture Canada, which undertook roughly 70 percent of the breeding work in Canada until at least the early 1980s, chose not to collect royalties from the varieties it licensed to SeCan.

National Farmers’ Union, “Memo to the Canadian Wheat Board on the Subject of Producer Funding of Plant Breeding Research” (Saskatoon, 10 December 1991).


