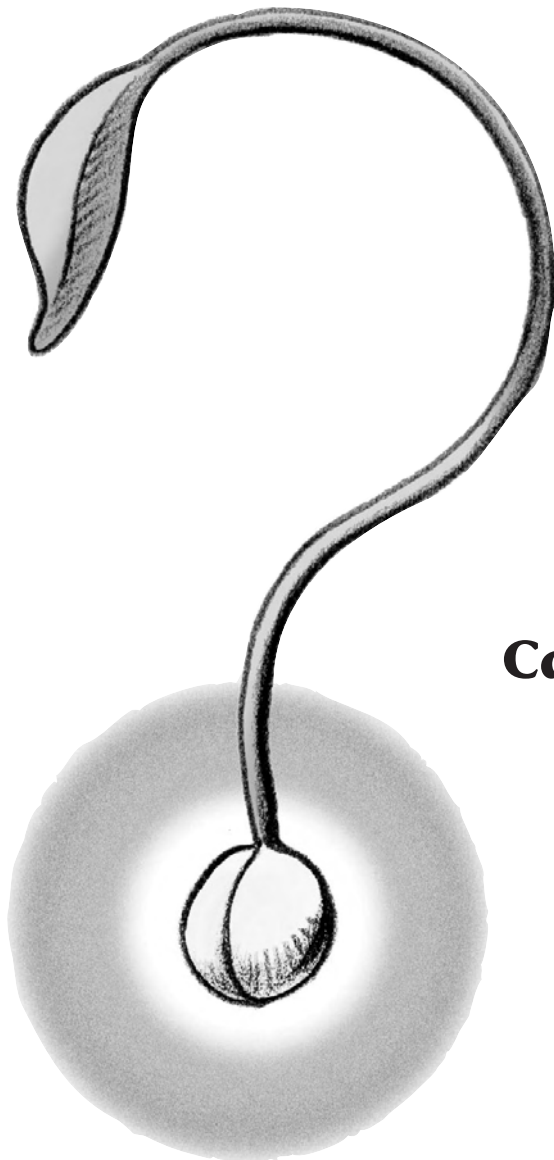


# Stolen Seeds



**the privatisation of  
Canada's agricultural  
biodiversity**

**Devlin Kuyek**

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# Table of Contents

<b>Introduction</b>	<b>3</b>
Demystifying intellectual property rights/regimes (IPRs)	
<b>Part One – Breeding for the common good: the way it was</b>	<b>6</b>
The story of western wheat	6
Free and open exchange of seeds	6
Farmer participation	7
Seed saver Mel Morton	7
Strong public breeding programmes	8
<b>Part Two – The corporate hijack of the Canadian seed supply</b>	<b>10</b>
Biotechnology and neo-liberalism	10
Direct subsidies	11
Monopoly rights and regulations to criminalise seed saving and encourage commercial seed sales	11
Monopoly rights:	11
Monsanto versus Percy Schmeiser	12
The seed industry wants downstream IPRs too	14
Regulations	17
Policies to dismantle and re-orient public plant breeding programs	21
History of resistance to IPRs in the public sector	24
<b>Part Three – Thoughts on Federal Policy</b>	<b>28</b>
Plant Breeders Rights	28
Patents on living organisms	32
Seed regulations	33
<b>Conclusion: Going back to a public seed system to build a better future</b>	<b>35</b>
<b>Appendix 1</b>	<b>37</b>
About the Groups involved in this publication:	37
<b>Appendix 2</b>	<b>38</b>
Acronyms	38
<b>Index</b>	<b>39</b>

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***If a private seed industry cannot survive when farmers are free to save and use seed, then it is not worth having one.***

## Introduction



Seeds are sown and then grow into plants. The plants are harvested and some of the seeds from the plants return to the earth to produce another crop. This cycle is the foundation of agriculture. It may appear simple, but within it there is tremendous complexity. The new seeds are always slightly different from the old, just as a farmer's field is always different from season to season: the climate changes, diseases and pests come and go, and rainfall varies. Through the variation of their seeds, plants enable future generations to adapt to their surroundings and thereby ensure the survival of the species.

Agricultural plants do not carry out this evolutionary process alone. People, generally farmers, have always encouraged and shaped it, by selecting and replanting seeds from those plants that fare best in their fields or that satisfy certain cultural interests. They have also intervened more directly by deliberately crossing certain varieties to try and breed plants for the attributes they desire. Both these processes of selection and cross-breeding constitute plant breeding and the tremendous agricultural biodiversity that exists today is a result of generations of plant breeding effort on the part of farmers and, more recently, formal plant breeding scientists.

The seeds we plant are thus profoundly social: they reflect and reproduce the cultural values and social interests of those who developed them. If they are widely distributed, as with the high-yielding and high-response varieties of the Green Revolution, they can effect massive social transformation. Yet, if seeds can determine the agriculture of today, they also constitute the options for tomorrow. New plant varieties are developed from the old. It is, therefore, easy to see why the question of control over the seed supply is so critical.

A quarter of a century ago, Canada had a public seed system in the full sense of the word. Our seed supply was the result of a free flow of seeds among farmers and formal breeders, within Canada and abroad. By this time, a rather loose process of farm-level plant breeding had given way to centralised breeding programs working to develop plants to meet national objectives. The 'national objectives' reflected the dominant socio-political forces of the time, but these programs still belonged to the public and the seeds they produced were still in the public domain. Consequently, plant breeding could be reoriented and reorganised through political change. And, just as importantly, farmers, gardeners and innovative plant breeders were free to work with seeds outside of the formal system to move agriculture in alternative directions.

Over the past twenty-five years, the Canadian seed system has been radically transformed. Our government is dangerously close to turning over our public seed system, and the options for the future that go with it, to a handful of transnational corporations. Through patents and other intellectual property regimes, corporate tactics, and government manoeuvring, our public goods are being destroyed to make way for private profit and the seed saving and plant breeding practices at the heart of our seed system are being criminalised. The future of Canadian agriculture is, as a result, increasingly in the hands of a few pesticide corporations that control the seed industry and whose interests hardly reflect the diverse aspirations of the Canadian people.

This paper provides an overview of the various ways in which this process is happening and discusses some of the consequences. We hope that it generates debate. Canada is at a critical juncture. A review of the Plant Breeders' Rights Act was recently presented to Parliament and proposed amendments are on the way that will bring plant breeders' rights much closer to patents. The Patent Act will also be up for amendment in the near future, given the Supreme Court's decision in the recent Harvard "Oncomouse" case to not allow for patents on higher life forms without clear guidance from Parliament. The Supreme Court may adopt a similar position in the contentious case of Monsanto versus Saskatchewan farmer Percy Schmeiser, set to come before the Supreme Court in January 2004. These upcoming decisions for Parliament and the Supreme Court hold enormous consequences for the future and the Canadian public must not be excluded from the debate.

There is still time for the public to take back control of the seed supply. But this will not be easy. As this paper will show, the corporate hijack of our seed supply is taking place rapidly in ways that are difficult to discern and resist. To act effectively we need to understand these processes. We hope the paper helps in this regard.

### **Demystifying intellectual property rights/regimes**

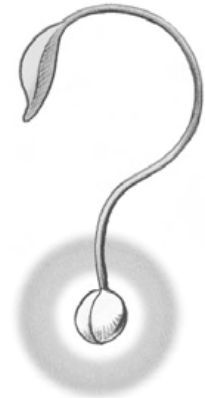
*"If we did not have a patent system it would be impossible, on the basis of our present knowledge of its economic consequences, to recommend one."*<sup>1</sup>

- Canada's Islay Royal Commission on Patents, Copyright and Industrial Design, 1957

Since the English enclosure movement began in the 15th century, laws enforcing exclusive property rights have continued to expand, going beyond the regulation of land and into the intellectual domain, establishing various forms of monopoly rights on music, inventions, books and, more recently, even ideas, genetic information, and life forms. During the last few decades, the pace of expansion has been dramatic. As noted by Duke University law professor, James Boyle:

*"I can wax nostalgic looking back to a five-year-old text [for a basic intellectual property course], with its confident list of the subject matter that intellectual property rights couldn't cover, the privileges that circumscribed the rights that did exist, the length of time before a work fell into the public domain. In each case, the old limits have recently been changed or challenged."*<sup>2</sup>

The sudden expansion of property rights has occurred with the support of a single justification: intellectual property rights, like patents, trademarks and copyrights, are an incentive to innovate. The other justification for property rights, that they encourage optimal investment and prevent "tragedies of the commons", doesn't work for intellectual property rights.<sup>3</sup> As legal scholar Carol Rose points out, "in Intellectual Space, [this] familiar argument falls away, since there is no physical resource to be ruined by overuse: books and tapes and words may be copied, inventions may be imitated, pictures may be reproduced, all without the slightest damage to the original."<sup>4</sup> Intellectual property rights, therefore, are supposed to be a "compromise between preserving the incentive to create knowledge and the desirability of disseminating knowledge at little or no cost."<sup>5</sup>



1. Cited in RMA Loyns and AJ Begleiter, "An Examination of the Potential Economic Effects of Plant Breeders Rights on Canada," Working Paper, Consumer and Corporate Affairs, 1984.

2. James Boyle, "Fencing off ideas: enclosure and the disappearance of the public domain", Daedalus, Spring 2002, p. 16.

3. The theory of the "tragedy of the commons" was put forward by Garrett Hardin. His essential argument is that when a resource is not owned, people will always act for their immediate benefit and exploit the resources as much as possible, even if these actions jeopardise the availability of the resource to future generations. In the words of Hardin: "What does 'freedom' mean? When men mutually agreed to pass laws against robbing, mankind became more free, not less so. Individuals locked in to the logic of the commons are free only to bring universal ruin; once they see the necessity of mutual coercion, they become free to pursue other goals." Garrett Hardin, "The Tragedy of the Commons", Science, 162 (1968), pp.1243-1248.

4. Carol M. Rose, "Romans, Roads, And Romantic Creators: Traditions of Public Property in The Information Age", Presented at the Conference on the Public Domain, Duke University Law School, November 9-11, 2001 : <http://www.law.duke.edu/pd/papers.html>

5. World Bank, Knowledge for Development - World Development Report 1998/99, OUP, 1998, p33.



But intellectual property rights are not the only incentives that can and have been used to encourage innovation. Scientists, for instance, can publish their results to get credit for what they accomplish. Prestigious scientists cite long lists of publications as a testament to their competence and, sometimes, a disease or chemical process is named after them. They may also win awards in recognition of contributions they made to advance specific causes—contributions that they often made without a profit motive. A similar diversity of incentives exists for other areas of creative work.

Jazz musicians create new material by taking a basic song and stretching it into all kinds of different directions. Every new jazz song takes from what came before; the new is a reformulation of the old. An incentive regime that forced jazz musicians to seek legal advice every time they wanted to develop new material would bring jazz to a standstill. A strong, restrictive intellectual property rights regime would be counter-productive for jazz.

Pharmaceuticals do share some elements in common with jazz. They generally emerge out of years of inquiry and discovery by indigenous peoples and formal scientists. But the final steps are almost always undertaken by large corporations that spend millions of dollars to bring the products to market. For this investment, the pharmaceutical corporations want patent rights that give them monopoly control over the sale of the drug and, as a result, the ability to charge high prices and earn big profits. These patent rights can be detrimental to the overall health care of a society: high drug prices can strain public health care systems or put critical drugs out of the reach of those in need. For this reason, some countries have compulsory licensing laws that force pharmaceutical corporations to licence their products at a reasonable price to generic manufacturers, who can offer the drugs at a fraction of the cost. Policy-makers in other countries, such as the US, argue that their interests are best served by strong patent laws; for them, the innovation these laws stimulate outweighs the negative impacts of higher drug prices. Still others believe in turning away from the corporate model of pharmaceutical development towards open models of research and development that deliver medicines to those most in need and that prioritise research according to social concerns not corporate profits. The important point here is that societies are different and the forms of incentives that might work for one are not always appropriate for another.

Plant breeding has much in common with the creative processes of jazz. Every plant breeder works with plant varieties that were developed by others. The “new” varieties they create are only slight variations of previous varieties that generations of formal plant breeders and farmers developed. Consequently, some argue that an incentive regime, such as a patent regime, that obstructs the exchange of varieties between breeders and gives monopoly control over a variety for a single contribution, is inappropriate for plant breeding. Others argue that intellectual property rights are the only way to stimulate innovation in new high-technology plant breeding applications, which, it is said, will make great contributions to agriculture. This is not an insignificant debate. Plant breeding is central to a country’s agriculture, its food security, and its social fabric.

## **Part One – Breeding for the common good: the way it was**

### **The story of western wheat**

When the European settlers first arrived in Canada, First Nation peoples were practicing highly developed systems of agriculture with seeds from a variety of crops– squash, maize, sunflower, and beans to name a few– that they had carefully selected over generations. Their agricultural diversity saved the Europeans from starvation and some of their plant varieties remained important on settler farms into the 20th century.<sup>6</sup> The European settlers came with their own seeds but had a miserable time getting them to grow in the Canadian environment. They had particular difficulty with wheat, their main staple, because of the short growing season in Canada and the susceptibility to rust of the varieties they brought. The situation changed dramatically at the end of the 19th century when David Fife, a Scottish farmer in Ontario, planted seeds of a variety that would become known as Red Fife.

David 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 bread making. From David Fife's farm, seeds of Red Fife spread rapidly from farmer to farmer across North America. The variety soon caught the attention of the Canadian Pacific Railway and the Hudson's Bay Company, who used it to settle the prairies and launch the western wheat industry.

Red Fife is also the parent of Canada's most famous public wheat variety– Marquis wheat. It is a cross between Red Fife and Hard Red Calcutta, a farmer's variety from India. By 1918, Marquis was sown on more than twenty million acres in North America, from southern Nebraska to northern Saskatchewan. Nearly every variety of wheat developed for western Canada since is derived from Marquis.<sup>7</sup>

The story of wheat is not unique. Most of Canada's major crops rest on the same three foundations:

- The free and open exchange of seeds, both domestically and internationally;
- Farmer participation, in both plant breeding and seed saving; and,
- Strong public breeding programmes.

### **Free and open exchange of seeds**

Few of the crops grown in Canada are indigenous to this country. Canadian plant breeding, therefore, depends on varieties from other parts of the world. With short-season soybeans, for instance, Canadian public breeders used varieties from a Swedish breeder who was crossing early maturing varieties from the Sakhalin Islands of northern Japan with German varieties. The Canadian breeders crossed these Swedish varieties with Chinese varieties used in the American corn belt, and developed a series of very successful short-season soybean lines.<sup>8</sup> The short-season soybean programme, like all other breeding programmes



6. Gordon M. Ward, "A History of the Research Station Harrow, Ontario 1901-1974", AAFC Historical Titles Series, 1978: [http://collections.ic.gc.ca/agrican/pubweb/titles\\_e.asp](http://collections.ic.gc.ca/agrican/pubweb/titles_e.asp)

7. Stephan Symko, "From a single seed: Tracing the Marquis wheat success story in Canada to its roots in the Ukraine", A Web Publication of Research Branch, Agriculture and Agri-Food Canada, 1999.

8. HD, Voldeng, "Working with breeding short-season soybean in Canada (Interview)," SoyaScan Notes, March 2, 1993; TH Antsey, "One hundred harvests: Research Branch, Agriculture Canada 1886-1986" in Research Branch, Agriculture Canada, Historical Series, No. 27, 1987, pp. 228-230; and, Ontario Soybean Growers Marketing Board, Fifty Years of Progress: A history of the Ontario Soybean Industry, June 1999.



in Canada, would not have been possible without the open culture of exchange among plant breeders and open access to the seeds of farmers from other countries.

### Farmer participation

Canadian farmers are not merely clients or customers of public breeding programs or seed companies. Over the years, they have played a critical role in plant breeding. Their exchange, selection, and experimentation with seeds have been essential in supporting Canada's agricultural diversity. The public breeders that developed canola, for example, worked with a rapeseed variety that Saskatchewan farmer Fred Solvoniuk introduced to Canada in 1927.<sup>9</sup> Such farmer participation in plant breeding continues to this day. Farmers of the Maritime Certified Organic Growers (MCOG) began an initiative to collect and compare a number of old and new wheat varieties to identify varieties best suited to the region's humid climate and organic growing conditions.<sup>10</sup> Seeds of Diversity, an organisation of gardeners, farmers and others, grows, propagates and distributes over 1500 plant varieties in Canada.<sup>11</sup>

Farmers have played an equally important role in multiplying, distributing and saving seeds. The Canadian Seed Growers' Association (CSGA), initially an association exclusively of farmers, was established at around the same time as Canada's experimental farms. When public programs release varieties, certain CSGA members are sent seeds from the breeders and carry out the first two generations of multiplication. The seed is then distributed to more CSGA members who multiply it into registered and then certified seed. The certified seed is then sold to farmers. From this point on, farmers continue to take care of the seed by saving it for themselves or their neighbours for any number of generations, depending on the crop. Farmers have always done an excellent job of maintaining seed quality. One study in Alberta in 1980 found that 60% of the farmer-saved seed surveyed was equal to the highest quality seed on the market.<sup>12</sup> No wonder then that farm-saved seed has traditionally provided the bulk of Canada's seed supply. At the end of the 1970s, only 20-30% of seed used in Canadian agriculture was certified seed; there was only enough certified seed available for 14% of the seeded acreage for wheat, 31% for barley, and 30% for oats.<sup>13</sup>

9. Brewster Kneen, *The Rape of Canola*, NC Press: Toronto, 1992, p.27.

10. See Heritage Wheat Project Website maintained by Sharon Rempel : <http://www.members.shaw.ca/oldwheat/maritimecertifie.html>

11. See Seeds of Diversity Canada website : [www.seeds.ca](http://www.seeds.ca)

12. Pamela Cooper, "Plant Breeders Rights : Some economic considerations, A preliminary report", Economic Working Paper, Agriculture Canada, Ottawa, March 1984, p.23.

13. RMA Loyns and AJ Begleiter, "An examination of the potential economic effects of plant breeders' rights on Canada, Working Paper for Consumer and Corporate Affairs Canada, 1984, p.21; and, Pamela Cooper, "Plant Breeders Rights : Some economic considerations, A preliminary report », Economic Working Paper, Agriculture Canada, Ottawa, March 1984, p.23.

### *Seed saver Mel Morton*

Mel Morton operates a 40-acre farm in Peterborough County, Ontario that has been certified organic since 1997. Soybeans are one of his major crops. In 2002, he grew two soybean varieties, Marathon and Bounty. He bought the Marathon seed in 1998 and Bounty seed in 2000. Morton cleans his seeds with a machine from the late 1800s, that he's rigged up with an electric motor and he uses peat moss to protect the seeds during storage. Apparently, his seed saving system works, as his yields keep improving. In 2002, he got 35 bushels per acre, just above the county average of 34.9 bushels per acre. Not bad considering his costs of production are half those of his neighbours – who generally use expensive genetically engineered seeds, pesticides, and chemical fertilisers.

## Strong public breeding programmes

As noted above, Canadian agriculture depends on varieties from other parts of the world because our major crops are not indigenous. But identifying varieties in other countries to grow in Canada is no easy matter. Canada has unique agricultural conditions that are not suitable to plant varieties from most parts of the world. Finding adaptable varieties requires extensive searches and, as is often the case, major breeding efforts to cross various plants. In general, it takes a large investment of time and resources to breed varieties for Canadian seed markets. In addition, these seed markets are relatively small by seed industry standards. In this context, the potential returns on investment are simply too small to justify long-term investment by the private sector. The bulk of formal research and development in plant breeding has therefore been left to the public sector, with the private sector limited to “final stage” activities – marketing public varieties or developing new varieties using public varieties. Transnational seed companies tend to look within their own globally-sourced collections for varieties that might work in Canada.

From a public standpoint, the returns on investment in plant breeding are justifiable, since returns on public investment are measured by the overall public good they create, not the seed sales they generate. Farmers, consumers, and the downstream food and feed industry all benefit from plant breeding, and public programs have always focussed on larger national economic development objectives.

### *In conclusion:*

Canada’s agricultural diversity was built on the foundations of collective processes of information and seed exchange, farmer participation and seed saving, and public breeding. The private sector has only played a minor role in plant breeding, and for good reason: open exchange prevents monopoly rights that can generate big profits; seed saving undermines annual seed sales; and, public breeding programs generate good varieties for low prices that private companies cannot compete with.

This is not to say that Canadian plant breeding was not influenced by agribusiness. With plant breeding concentrated in public breeding programmes, breeding priorities reflected the socio-political relations affecting decisions within public institutions. Canadian plant breeding was public, but it was also dominated by what rural sociologist Frederick Buttel refers to as a “productionist coalition” of commodity group leaders, agribusiness firms and university and government administrators. According to Buttel:

*“The essence of the predominant ‘productionist’ ideology was a doctrine that increased production is intrinsically socially desirable, and that all parties benefit from increased output. Productionism emphasized the collective benefits of new technology, and implicitly concealed the social costs of technological change and the unequal ways in which the benefits of new technology are distributed. Productionist ideology was particularly efficacious in providing a shared sense of purpose among the public agricultural research community, agroindustry (including not only agro-input and agro-output firms but also banks), major farm organizations (especially commodity organizations), and federal agricultural policy makers.”<sup>14</sup>*



14. Frederick H. Buttel, "Ever since Hightower : The new politics of agricultural research activism in the molecular age", Paper prepared for presentation at the annual meeting of the American Sociological Association, Atlanta, 16 August 2003: <http://www.drs.wisc.edu/bell/STARE/ASA-SKAT-2003.doc>



This emphasis on productivity in Canadian public plant breeding has contributed to a concentration of farmland, a decline of family farming, environmental degradation, and a growing gap between farm-gate revenue and agribusiness profit over the last decades. There is no doubt that this “productionist approach” needs an overhaul.<sup>15</sup>

Plant breeding, however, can only move in different directions if plant breeding activities and the seed supply are free – meaning free to respond to changing social forces and desires. If plant breeding remains a public exercise with a free and open exchange of seeds and strong farmer participation, such change is possible. Such change will not occur if plant breeding and the seed supply are tightly controlled by a few large corporations with an inherent interest in maintaining the productionist model. Unfortunately this latter scenario is exactly where Canada is heading.

In the 1970s and 1980s, the Canadian government, caught up in the hype of biotechnology and neo-liberal ideology, made the development of the private seed industry a priority. Conflict with the old system was inevitable and the foundations of the “free” and “public” seed system had to be demolished.

15. National Farmers' Union (Canada), "The Farm Crisis, Bigger Farms, and the Myths of 'Competition' and 'Efficiency'", Saskatoon, Nov 20, 2003: <http://www.nfu.ca/>

## Part Two – The corporate hijack of the Canadian seed supply

There are a few interwoven historical developments at the heart of Ottawa's decision to develop a private seed industry. For one, the seed lobby became more powerful. Up until the 1970s, the global seed industry was composed mainly of small European or US family-owned firms and it did not have the political muscle to advance its agenda when its interests clashed with more influential industrial sectors or national interests.<sup>16</sup> The implementation of intellectual property regimes in the US and Europe in the 1960s and 1970s, however, triggered a wave of consolidation and investment in the industry. The emergence of biotechnology increased interest in the seed industry as well. It was felt that genetic engineering would replace the laborious, inconsistent and limited methods of conventional plant breeding with a more precise technique, allowing breeders to go beyond the natural "species barrier" in introducing traits into their elite cultivars.<sup>17</sup> Suddenly seeds had enormous commercial potential, and the seed industry was a hot sector for investment.

### Biotechnology and neo-liberalism

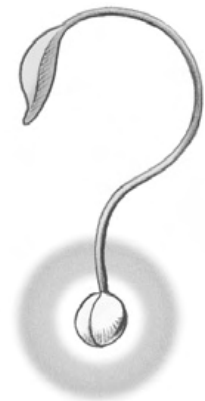
The Canadian government, like other Western governments at the time, was convinced that biotechnology was the engine of the future economy. In 1983, it launched the National Biotechnology Strategy, committing itself to establish a national biotech industry, with agriculture identified as a key sector. This new commitment to biotechnology and the seed industry went hand-in-hand with the rise of neo-liberalism in Ottawa. 'Neo-liberal' policy is primarily concerned with creating attractive business environments for chosen sectors of industry through: increased freedom of movement for capital, goods and services; budget cuts for social welfare programs and budget increases for programs that support industry; deregulation; privatisation of government enterprises, agencies and services; and the elimination or privatisation of 'public goods'. It is essentially government intervention in the name of 'free-market' forces.<sup>18</sup>

The Canadian government began to take a more active interest in the seed industry in the 1970s. But developing a private seed industry would not be easy. By the early 1980s, the public sector still accounted for over 95% of formal plant breeding in Canada and 100% of the breeding for cereals and oilseeds.<sup>19</sup> The Canadian seed system, as explained earlier, was simply not conducive to private sector investment in plant breeding. Only drastic government intervention and an overhaul of the entire system could change the situation.

Ottawa's efforts to support the private seed industry can be divided into three categories:

- Direct subsidies
- Monopoly rights and regulations to criminalise seed saving and encourage commercial seed sales
- Policies to re-orient and dismantle public plant breeding programs.

The following section explores these efforts in detail and examines the implications.



16. N. McMullen, *Seeds and World Agricultural Progress*, National Planning Association: Washington D.C., 1987; see also, Robin Pistorius and Jeroen van Wijk, *The Exploitation of Plant Genetic Information: Political Strategies in Crop Development*, CABI Publishing: New York, 1999.

17. Vic Duy, "A Brief History of the Canadian Patent System," Prepared for the Canadian Biotechnology Advisory Committee, January 2001 : [http://cbac-ccb.ca/epic/internet/incbac-ccb.nsf/vwGeneratedInterE/h\\_ah00128e.html](http://cbac-ccb.ca/epic/internet/incbac-ccb.nsf/vwGeneratedInterE/h_ah00128e.html)

18. Devlin Kuyek, "The Real Board of Directors : the Construction of Biotechnology Policy in Canada, 1980-2002," *The Ram's Horn* : Sorrento, BC, May 2002.

19. RMA Loyns and AJ Begleiter, "An examination of the potential economic effects of plant breeders' rights on Canada," Working Paper for Consumer and Corporate Affairs Canada, 1984, p.109.



20. Pat Roy Mooney, *Seeds of the Earth: A private or public resource*, CCIC: Ottawa, 1979, p.66.

21. Devlin Kuyek, "The Real Board of Directors : the Construction of Biotechnology Policy in Canada, 1980-2002," *The Ram's Horn* : Sorrento, BC, May 2002.

22. Pamela Cooper, "Plant Breeders Rights : Some economic considerations, A preliminary report", *Economic Working Paper, Agriculture Canada*, Ottawa, March 1984, p.74.

23. RMA Loynes and AJ Begleiter, "An examination of the potential economic effects of plant breeders' rights on Canada," *Working Paper for Consumer and Corporate Affairs Canada*, 1984, p.24.

24. Devlin Kuyek, "The Real Board of Directors : the Construction of Biotechnology Policy in Canada, 1980-2002," *The Ram's Horn* : Sorrento, BC, May 2002.

25. In 1998, the OECD asked CIPO to indicate whether any judicial decisions in Canada have addressed an action by a patent holder in response to the use or sale of products harvested from a specific plant variety that has been produced using a patented plant or plant that has incorporated a patented gene. CIPO's response was: "There are no judicial decisions which have addressed this issue. Plants and plant varieties are not patentable." (CIPO Response to OECD Questionnaire on IP Practices in the field of Biotechnology, March 2, 1998.)

26. Vic Duy, "A Brief History of the Canadian Patent System," Prepared for the Canadian Biotechnology Advisory Committee, January 2001, pp. 25-26 : [http://cbac-cccb.ca/epic/internet/incbac-cccb.nsf/vwGeneratedInterE/h\\_ah00128e.html](http://cbac-cccb.ca/epic/internet/incbac-cccb.nsf/vwGeneratedInterE/h_ah00128e.html)

27. Judge J MacKay, *Judgement in the case of Monsanto Canada Inc and Monsanto Inc versus Percy Schmeiser and Schmeiser Enterprises Ltd.*, Federal Court of Canada, March 29, 2001. [www.fct-cf.gc.ca](http://www.fct-cf.gc.ca) ; click on decisions

## **Direct subsidies**

The most immediate way to get a seed industry going is to hand out money. In the 1970s, the federal government began to pump funds into private seed companies in Canada through the National Research Council's (NRC) Industrial Research Assistance Program (IRAP).<sup>20</sup> Between 1967-1978, the NRC provided \$2,133,000 in grants to private seed companies. By 1984, half the private breeding firms in Canada had received grants from NRC's IRAP. Funding increased with the National Biotechnology Strategy in 1983, particularly for biotech start-ups.<sup>21</sup>

Most of the federal subsidies did not end up with small Canadian seed firms; they either went directly to the subsidiaries of TNCs or to companies that were later taken over by TNCs.<sup>22</sup> Between 1974/75-1982-83, at least 13 Canadian seed firms were acquired by foreign seed companies.<sup>23</sup> Similar fates have befallen the agbiotech start-ups of the 1980s. Canola biotech companies Allelix and Paladin Hybrids, for instance, received considerable financial support from the federal government before being taken-over by Pioneer Hi-Bred of the US, now owned by DuPont.<sup>24</sup>

## **Monopoly rights and regulations to criminalise seed saving and encourage commercial seed sales**

Farmer participation in plant breeding is often ignored and the contributions that farmers make, through varietal experimentation and selection, seed growing and seed saving are rarely acknowledged, much less considered for their value. Seed saving alone is worth millions of dollars every year. But this practice is now under threat of disappearing. The seed industry and Ottawa want to put this value in industry's pocket by way of monopoly rights and regulations.

### **Monopoly rights:**

Ottawa and the seed industry have put in place various forms of monopoly rights to criminalise seed saving. The monopoly rights currently operating in Canada include: patents, contracts, and plant breeders' rights.

### **Patents**

In 1982, the Commissioner of Patents, in applications by Abitibi Co. for a yeast culture and by Connaught Laboratories for a cell line, recognised patents on unicellular life forms and gene sequences. The Canadian Intellectual Property Office did not understand that in doing so they were opening the door to patent rights over plant varieties,<sup>25</sup> something which they specifically decided against in 1987 when Pioneer Hi-Bred applied for a patent on a soybean variety.<sup>26</sup> The implications of the 1982 decisions only came to light nearly 20 years later, in the case of Monsanto versus Percy Schmeiser, when Judge MacKay of the Federal Court of Canada ruled that Monsanto's patent on a gene gives the company rights over plants containing that gene.<sup>27</sup>

## **Monsanto versus Percy Schmeiser**

Percy Schmeiser, a farmer from Bruno, Saskatchewan, had grown rape-seed/canola since the 1950s. The last time he claims to have purchased seed was in 1993. Since then he says he saved seed and, through selection, was able to develop his own strain of canola that was relatively resistant to various diseases. In 1996, Monsanto introduced its Roundup Ready (RR) canola, genetically engineered for resistance to the herbicide glyphosate, in the area.

Two years later, Monsanto's private inspectors took samples from Schmeiser's fields. Tests showed that the canola in Schmeiser's fields was glyphosate-resistant and the company took him to court for patent infringement. Monsanto's patent is for a gene construct inserted into plants to make them resistant to glyphosate. Monsanto argued that its patent rights extend to all plants containing the gene construct, including the canola growing in Schmeiser's fields. Schmeiser argued that he did not deliberately sow his fields with RR canola and that, if his fields were Roundup Ready, it must have occurred by way of an accidental roadside spill of RR seed or contamination from cross-pollination with neighbouring fields.

Schmeiser was found guilty of a) knowingly having Monsanto genes on his land, and b) not advising Monsanto to come and fetch it. Allegations of obtaining the seed fraudulently were dropped at the hearing, due to lack of evidence. It didn't matter whether or not Schmeiser was responsible for the RR plants being in his fields. Nor did it matter that Schmeiser did not benefit in any way from the RR seed. Schmeiser was, found guilty, and fined \$15/acre x 1030 acres (\$37/ha x 421 ha), plus the value of his crop (\$105,000), plus \$25,000 for punitive and exemplary damages. He also lost the improved genetics resulting from his lifelong practice of saving his own seed to produce his own tailor-made variety of canola, as the crop was confiscated.

According to Judge MacKay:

"The defendants grew canola in 1998 in nine fields, from seed saved from their 1997 crop, which seed Mr. Schmeiser knew or can be taken to have known was Roundup tolerant. That seed was grown and ultimately the crop was harvested and sold. In my opinion, whether or not that crop was sprayed with Roundup during its growing period is not important. Growth of the seed, reproducing the patented gene and cell, and sale of the harvested crop constitutes taking the essence of the plaintiffs' invention, using it, without permission. In so doing the defendants infringed upon the patent interests of the plaintiffs."

Judge MacKay's decision puts the onus on farmers to identify the presence of Monsanto's Roundup Ready genes in their crops and, if found, to take steps to remove the plant or seek permission from Monsanto.

Schmeiser, however, is not giving up. He appealed to the Supreme Court of Canada and on 8 May 2003, the Court confirmed it would hear his case in January 2004.

Percy Schmeiser is definitely not the only farmer with fields contaminated with the Roundup Ready gene. In 2000, approximately 4.5 to 5 million acres of RR canola were planted in Canada. Researchers at the University of Manitoba conducted a survey of 27 certified seedlots of canola in 2002. Of the 27 seedlots, 14 had contamination levels above 0.25% and three seedlots had glyphosate resistance contamination levels in excess of 2.0%.<sup>28</sup> If the certified seed lots are contaminated, it can safely be assumed that almost every canola field in Canada has some



28. Lyle Friesen et al, "Evidence of contamination of pedigreed canola (*B. napus*) seedlots in Western Canada with genetically engineered herbicide resistance traits", Draft Manuscript under review, Department of Plant Science, University of Manitoba.



plants with the RR gene, whether the fields are planted with RR canola or not.

In its recent report on the patenting of higher life forms, the Canadian Biotechnology Advisory Committee (CBAC) acknowledges the problem that patents on plants can cause for farmers. To prevent these problems, CBAC recommends the inclusion of a farmer's privilege, which would allow farmers to save and sow seeds from patented plants that they grow, and of provisions to protect "innocent bystanders from claims of patent infringement with respect to adventitious spreading of patented seed or patented genetic material." But this is a case of one step forward, two steps back. These provisions will not compensate for the harm that patents on plants will bring to farmers. The first provision, to allow farmers to save seeds, would still allow seed companies to exact royalties every time the saved seeds are planted. And the second provision does nothing to help farmers because it keeps the onus on them to demonstrate their innocence. Monsanto is probably not going to launch court cases against every farmer growing crops contaminated with the RR gene. It's the precedent that matters. Every farmer growing non-Roundup Ready canola fears that they could be the next Percy Schmeiser and the only way out appears to be to sign up for Monsanto's RR package.

### **Contracts**

Monsanto rarely relies on the courts to prevent farmers from saving seed from its plant varieties. Its primary vehicle is the contract. In order to purchase Roundup Ready seeds, farmers have to attend a Grower Enrolment Meeting, where Monsanto explains the technology and the rules governing its use, and then the farmers have to sign a Technology Use Agreement. Under the terms of this contract, farmers can only use the seed for planting one crop and the crop can only be sold for consumption to a commercial purchaser 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. Monsanto also controls what herbicides the farmer can spray on the crop and reserves the right to make unannounced inspections of the farmer's fields. In the US, where the company has a team of 75 employees and an annual budget of \$75 million to enforce its contracts, Monsanto has filed 73 cases against farmers.<sup>29</sup>

Monsanto is not the only company pursuing such contracts. 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. BASF Canada is introducing the CLEARFIELD system for wheat, canola, and corn. The company's website claims that "all newly registered [canola] seed varieties as well as the Advanta Seeds varieties HyLite 289CL, HyLite 243CL, the Canterra 1604CL and the Pioneer brand 46A76 varieties" will only be sold as part of the Clearfield Production System.

In order to purchase seeds that are part of the CLEARFIELD Production System, farmers must sign the CLEARFIELD Commitment. Like the Monsanto agreement, this contract says that farmers can only use the seed for planting one crop and cannot supply the seed to other growers

29. Peter Shinkle, "Monsanto reaps some anger with hard line on reusing seeds: Agriculture giant has won millions in suits against farmers", St-Louis Post-Dispatch, 12 May 2003.

or users, and that all seed produced under the agreement has to be disposed of as commercial grain and cannot be used for planting a subsequent crop. According to BASF Canada: "A grower who has not complied with the CLEARFIELD Commitment will be responsible for administrative charges of up to \$100 per acre."<sup>30</sup>

One of BASF's selling points for its CLEARFIELD varieties is that they are not genetically engineered. But if they are not genetically engineered, then there are no recognised patent claims either. And, even if the varieties were protected by plant breeders' rights, these rights would not offer the scope contained in the contract. Nothing in intellectual property law in Canada provides BASF or other seed companies with such far-reaching rights.

University of McGill legal scholar Richard Gold says that this does not matter. The fact that the CLEARFIELD Commitment relates to intellectual property is irrelevant: "A contract can say anything and all of its provisions are enforceable."<sup>31</sup> This is deeply disturbing. More and more seed companies in Canada are selling their seed varieties exclusively through contracts with farmers. For example, C&M Seeds operates an "Identity Preserved Program" in Ontario. It sells several "high-value" varieties of wheat under this program. To purchase seeds from these varieties, farmers have to sign an "Identity Preserved Growers Agreement", which 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."<sup>32</sup> Put simply: the farmer has no rights to his or her harvest. What this really amounts to is that the farmer cannot actually purchase the seed, only rent it for a season from its legal 'owners'.

With the retreat of the public sector (or its mutation into a private actor) and the consolidation within the seed industry, there will be little choice left for farmers but to sign on to contracts if they want access to the best varieties. Cargill and Dow AgroSciences, for instance, have developed a low-linolenic, high-oleic canola that Cargill sells under contract growing agreements with farmers. Only Roundup-Ready 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".<sup>33</sup> Such contracts are not creeping in under the same banner as Intellectual Property Rights (IPRs)—with the claim that protection creates the incentive for innovation. The justification used for contracts and "identity preservation" is crop "purity", and, as will be discussed below, Canada's regulatory system is now being called upon to institutionalise this questionable concept.

### ***The seed industry wants downstream IPRs too***

The ways in which regulations and laws, like patents, Plant Breeders' Rights or contracts, give the seed industry control over plant breeding and seed saving are somewhat obvious. It is less apparent but entirely possible that similar mechanisms will be used by the seed industry to exert control over plant varieties once they leave the farm and enter the downstream food system. For instance, a seed company could conceivably claim royalties from a bakery using its specialty wheat variety.



30. BASF Canada website, Retrieved February 6, 2003:  
<http://www.agsolutions.ca/pub/west/clearfield/commitment/gen.cgi/main>

31. Personal communication, February 2003.

32. See C&M website:  
[http://www.redwheat.com/identity\\_preserved\\_program.htm](http://www.redwheat.com/identity_preserved_program.htm)

33. Laura Rance, "Canola heads for the big leagues", Farmers Independent Weekly, July 25, 2002, p.14.



Jeff Guest, Chair of the Variety Name Preservation Working Group of the Canadian Seed Trade Association suggests that this is an avenue that the industry is looking to pursue:

“We have these rules (the Seeds Act and Plant Breeders’ Rights) that protect us on the seed side, but nothing as clearly defined for the downstream processing side . . . As we go forward in the next decade, more people in the agri-food chain are going to be involved in identity preservation. As that’s happening, we need intellectual property regulations to keep pace with where industry is going to ensure protection for seed companies, along with intellectual property protection for everyone in the identity-preserved chain.”<sup>34</sup>

### ***Plant Breeders’ Rights***

The international seed industry’s end goal is full-scale patent protection for plant varieties. Historically, however, most countries have refused to recognise patents on plants and the seed industry has had to settle for a separate intellectual property regime, specifically for plant varieties, known as Plant Breeders Rights (PBR) or Plant Variety Protection.<sup>35</sup>

In 1961, after four years of negotiations, the Western European governments signed into being the International Union for the Protection of New Plant Varieties (UPOV), the first convention establishing minimum standards for PBR legislation in member countries. The PBRs had lower protection requirements than patents, and, as a trade-off, they were narrower in scope. Breeders got rights over the commercial propagation of their protected varieties but they could not restrict farmers from saving seeds or breeders from doing further breeding with their protected varieties.<sup>36</sup> UPOV came into force in Europe 1968. Shortly thereafter, the US signed into being a similar Plant Variety Protection Act.

The path to PBRs was more slow and difficult for the seed industry in Canada. After years of lobbying, they finally succeeded in getting the federal government to introduce a bill to establish a PBR Act in 1978, but it died on the floor of Parliament. It took another ten years before the government, with heavy support from the biotech lobby, re-introduced the bill, which was finally adopted in 1990. Canada’s PBR Act is based on UPOV 1978; it 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 PBR Act has important consequences for seed saving. First, it creates the legal basis for companies to go after farmers for activities that many farmers still believe to be firmly within their rights. So far, however, the seed industry, which is responsible for the enforcement of the Act on the ground, has had a tough time changing farmer practices. Through the use of private investigators, the industry had, by May 1997, reached 24 out-of-court settlements with farmers worth over \$240,000.<sup>37</sup> For the general manager of Cargill Seeds, Bruce Howison: “There [was] still a low level of awareness and understanding at the farm level as to what plant breeders rights are all about and the ramifications of violating them. It is not something farmers are used to dealing with.”<sup>38</sup> Realising that they would have to do something on a bigger scale, a number of seed companies came together later that year to form the Canadian Plant Technology Agency to police and promote the Act. But, by 2001, the industry had only pursued between 40-50 cases

34. Germination, March 2002, p.36.

35. Robin Pistorius and Jeroen van Wijk, *The exploitation of Plant Genetic Information: Political Strategies in Plant breeding*, CABI Publishing, Cambridge UP: Cambridge, 1999.

36. Robin Pistorius and Jeroen van Wijk, *The exploitation of Plant Genetic Information: Political Strategies in Plant breeding*, CABI Publishing, Cambridge UP: Cambridge, 1999, pp.84-85.

37. Barry Wilson, "Industry forms alliance to help enforce seed rights," *Western Producer*, December 4, 1997.

38. Barry Wilson, "Industry forms alliance to help enforce seed rights," *Western Producer*, December 4, 1997.

of infringement, managing to collect over half a million dollars in fines.<sup>39</sup>

Howard Love, a plant breeder with the Saskatoon subsidiary of Svaloff Weibull, a Swedish multinational seed company, says the seed industry spends more in enforcement costs than it recovers in fines. To correct this situation, the industry is going to get tough by instituting a ticketing system, with private investigators roaming the countryside issuing tickets to violators, and by going after seed plant operators, who take in seed of protected varieties from farmers and allow it to be loaded on to the trucks of other farmers. Seed plant operators may now think twice about accepting farmer-saved ("common") seed.<sup>40</sup>

Second, the Plant Breeders' Rights Act establishes a basic legal framework that can be tightened incrementally. The Canadian Plant Breeders' Rights Act is modelled after UPOV 1978 and the scope of the rights that it provides do not prevent farmers from saving seeds or breeders from doing further breeding with protected varieties. But, in 1991, UPOV adopted a new Act that strengthens the rights of breeders considerably. Some of the important changes in the UPOV 91 Act are:

- Breeders have rights over the harvest of protected varieties. If the farmer sows a field to a PVP variety without paying the royalty fee, the breeder can claim ownership of the output (e.g. wheat) and the products of the output (e.g. wheat flour).
- Breeding with protected varieties is restricted. Anyone using a PVP variety in creative research has to make major changes to the genotype or else the 'new' variety will not be considered 'new' – it will be considered an 'essentially derived' variety, falling to the ownership of the first breeder.
- The 1991 Convention does not protect the rights of farmers to freely use their harvest as further planting material, leaving it up to countries to make special provision for it.

With UPOV 91, there's not much left separating plant variety protection from patents.

Canada is a signatory to UPOV 91 but it is under no international obligation to ratify it. Article 1701 of the 1994 North American Free Trade Agreement (NAFTA) specifies that the parties will, at a minimum, enforce UPOV 1978 but it goes no further. Yet, the seed industry and the Canadian government insist that the absence of UPOV 91 legislation puts Canada at a competitive disadvantage and at "risk of losing investment and trading opportunities."<sup>41</sup> The move to UPOV 91 is imminent. In 1998, the federal government introduced a bill to amend the Plant Breeders' Act and bring it into conformity with UPOV 91. The bill died on the order paper, but the government is busy working with industry to re-introduce the proposed amendments. The original bill was based on UPOV 91: it placed restrictions on further breeding; gave breeders rights over harvests and the exclusive right to "condition propagating material of the plant variety for the purpose of propagating the plant variety"; and limited farmers' rights to "the use of harvested material of the plant variety grown by a farmer on the farmer's holdings for subsequent reproduction by the farmer of the plant variety on those holdings."<sup>42</sup>



39. Alberta Seed Industry, "PBR: They Mean Business": <http://www.seed.ab.ca/pbr/sf20000901.shtml>, accessed on January 27, 2003; and, "40-50 people found in violation of PBR Act to date", Germination, September 2001.

40. Personal communication with Howard Love, 21 November 2002.

41. Canadian Food Inspection Agency, Ten-year Review of the Plant Breeders' Rights Act, Government of Canada, Available at : <http://www.inspection.gc.ca/english/plaveg/pbr/pov/pbrpove.shtml>

42. Bill C-80: Part 10 – Plant Breeders Rights, 1998.



Even though the Canadian Seed Trade Association (CSTA) approved of the 1998 bill, it wants the government to go further. The CSTA says it “is strongly against any farmer’s privileges going beyond the provision of the 1991 Act of the UPOV Convention, i.e. within reasonable limits in terms of quantity of seed and species concerned and subject to the safe-guarding of the legitimate interest of the breeders in terms of payment of a remuneration and information.”<sup>43</sup> In other words, the industry is willing to let farmers save small quantities of seed, as long as they pay them royalties every time they do so.

## Regulations

Canadian seed regulations were originally established to protect farmers from the seed industry. The Seeds Act of 1923 was designed to prevent seed salesmen from selling bad varieties and bad seed to unsuspecting farmers. It restricted sales of seed to registered varieties and set a high standard for variety registration: new varieties could only be registered if they proved to be superior to the best variety already on the market.

The regulatory framework has since been turned upside down. Regulations are now more concerned with regulating farmers than the seed industry. The high standards for varietal registration have all but disappeared, and the emphasis is now on protecting the seed supply from supposedly inferior and “impure” farmer-saved seed.

Certified seed is not superior or more ‘pure’ than farmer-saved seed. Most major food crops in Canada are self-pollinating and farmers can save seeds from year-to-year without causing any serious diminishment of quality or performance. Only hybrid varieties, which are bred in a particular manner to prevent further breeding work and seed saving, degenerate significantly in subsequent generations. Unfortunately for the seed industry, seed ‘purity’ is therefore simply a technical matter of making sure that seeds are properly selected, cleaned and stored, and farmers can do this themselves.

The real threat to the purity of the Canadian seed system comes from the seed industry’s reckless introduction of genetically modified (GM) seeds. Consumers in Europe and Japan, two of Canada’s most important agricultural export markets, refuse to eat GM foods and Canadian farmers growing GM crops have lost markets. So have conventional farmers because the seed industry has deliberately contaminated conventional and organic grain supplies. It has done this by introducing GM varieties into a system where contamination is bound to occur, either by mixing during grain handling, cross-pollination, or the persistence of GM crops in fields. This is particularly the case with canola, which has the largest area planted to GM plants in Canada. Unwanted GM canola is turning up all over the place in western Canada.

According to Robert Stevenson, a Saskatchewan farmer who has never planted GM canola: “It’s close to being as thick as a crop. Crop insurance considers nine plants per square metre to be a viable canola crop. Without even trying I have four [GM canola] plants per square metre. This for me is a new weed, and it’s here in very significant numbers”.<sup>44</sup> The widespread contamination creates indirect problems for farmers as well. As described earlier, Monsanto, the leading GM canola company in Canada, claims that all canola plants in farmer’s fields containing

43. CSTA Position Paper on Intellectual Property, July, 2001 : <http://www.cdnseed.org/press/May01%20Intellectual%20Property.PDF>

44. Reg Sherren, "The controversy over genetically modified canola", CBC News and Current Affairs, March 21, 2002.

their patented Roundup Ready gene belong to them, even if plants arrived in the fields accidentally or the gene was transferred through cross-pollination.

Contamination is not only happening in farmers' fields. With canola, the Canadian crop with the most widespread use of GM varieties, studies show that the certified seed supply is deeply contaminated.<sup>45</sup> Canola breeder Keith Downey suspects that, "There are varieties of certified seed out there, in which part of the level of contamination is coming right from the breeders' seed."<sup>46</sup> Walter Fehr, an agronomist and director of the Office of Biotechnology at Iowa State University says the same is true of other crops, such as soybeans and maize.<sup>47</sup> If the breeder seed supply is contaminated then the whole system is contaminated and it will be hard to find any fields that can be considered GM free. The extent of the penetration of contaminated seed into the seed supply of several crops is now so deep that segregating GM from non-GM grain will not help at this point.

Only upstream mechanisms, such as regulation, can effectively prevent contamination. One tool that should be able to help is Canada's varietal registration system, which was set up to protect farmers from the introduction of varieties with negative impacts. All new agricultural plant varieties are tested for agronomic performance, disease resistance and end-use quality and, at present, only those varieties that are at least equal to the best varieties available are allowed on the market. The varietal registration system does have its limitations: committees of "experts" – composed primarily of formal plant breeders and scientists, commercial seed growers and commodity group representatives – make the final decisions; the "merit" criteria are biased towards industrial agricultural systems (as opposed to ecological agriculture systems); and there are no mechanisms to specifically assess GM varieties.

When the first GM varieties came through the registration system, the evaluation committee actually took the unprecedented step of awarding bonus points for herbicide resistance (the varieties probably would not have been approved otherwise).<sup>48</sup> Now that the negative implications of GM crops are apparent, the committees should be able to deduct points from GM varieties where there are negative consequences for farmers. But instead, the Canadian government, in close collaboration with the seed industry, is moving rapidly in the opposite direction. As will be shown below, government and industry are using the introduction of GM crops and the privatisation of plant breeding as a pretext to strip the varietal registration system of its capacity to fulfil its mandate.

Agriculture and Agri-food Canada (AAFC), Canada's department of agriculture, has put forward a proposal to overhaul the varietal registration system. The number of recommending committees will be cut from 20 to six.<sup>49</sup> Certain crops – wheat, canola, barley, rye, triticale, oat, mustard, pea and sunflower – will continue to be tested for agronomic merit, but the criteria will include only quality and/or disease resistance. Only one year of performance information will be required, instead of three.<sup>50</sup> This appears to be a token gesture to appease critics because, as Rob Graf, a research scientist with AAFC, suggests: "For yield and some other agronomic traits, environment has tremendous influence, which means that one year of data cannot provide a reliable



45. Lyle Friesen et al, "Evidence of contamination of pedigreed canola (*B. napus*) seedlots in Western Canada with genetically engineered herbicide resistance traits", Draft Manuscript under review, Department of Plant Science, University of Manitoba.

46. A study commissioned by the AAFC, which the government refused to release, confirmed the severity of the contamination of canola. The study found that the "... large number of canola seeds normally planted per acre plus the high probability that a small percentage of herbicide tolerant seeds will be present in most Certified Seed lots has and will continue to result in significant herbicide tolerant plant populations in most commercial canola fields". ("Organic farmers gain key piece of evidence in class action", Media Release, Organic Agriculture Protection Fund, June 26, 2002.)

47. Karen Charman, "Seeds of Domination: Don't want GMOs in your food? It may already be too late." In *These Times*, February 10, 2003

48. Laura Rance, "Annual variety exams pose difficult questions," *The Manitoba co-operator*, March 13, 1997, p.16.

49. PRRCG Report: From the 2002 Prairies Registration Recommending Committee for Grain Annual Meeting, Meristem Land and Science, Spring 2002. [www.meristem.com](http://www.meristem.com)

50. "The future of variety registration", Meristem Land and Science, May 3, 2002 <http://www.meristem.com/prrcg/prrcg02.html>



prediction of long-term performance”.<sup>51</sup> Kevin Falk, another AAFC breeder, says that, “you need four years, maybe more” to measure yield.<sup>52</sup>

The government and the seed industry clearly have no interest in strengthening the current regulatory system to deal with genetic contamination. They have a very different system in mind for segregation and regulation, which they refer to as “Identity Preservation”. The term suggests diversity and a closer relationship between the farm and the consumer, yet what it actually amounts to is a system to off-load the responsibility for contamination on to farmers while facilitating agribusiness’ control over the food system.

Government and industry claim that the Identity Preservation system will “preserve the identity of specific lots of grain from farm to market” and give Canada a “significant competitive advantage”.<sup>53</sup> However, the Canadian prairies already have a system to protect Canada’s so-called “competitive advantage”. The current variety registration system and Kernel Visual Distinguishability system, whereby grain operators look at batches of grain and decide the class they fall into, are designed to work together to maintain the quality of Canadian exports and guarantee farmers premium prices on the world market. These systems are the cornerstones of the Canadian Wheat Board, a farmer-controlled organisation that markets wheat and barley grown by western Canadian farmers. The actual problem for many farmers is not with securing top prices on the world market but with preventing the loss of markets (competitive disadvantages) from the introduction of GM varieties and low-quality varieties, which the proposed system will exacerbate.

The Identity Preservation scheme proposed by government and industry should not be confused with genuine attempts to enhance biodiversity in prairie agriculture. It is a way to allow more private sector varieties on the market – GM varieties that are rejected by export markets or varieties that do not surpass the standards set by public varieties. It is a way to break apart the Canadian Wheat Board to let big players like Cargill and Archer Daniels Midland Company take over the grain trade and Monsanto and Syngenta take over the seed supply. It is also a way to shift the costs and responsibility of contamination onto farmers growing non-GM crops. As pointed out by Bill Toews, a wheat farmer from southern Manitoba: “What [the Identity Preservation system is] trying to do is introduce a lower-value variety [the GM variety] into a stream that has a relatively higher value”. This, says Toews, will “add a segregation cost which will be shifted from the GM crop to the non-GM crop, because it is a higher-value crop that we are trying to protect. Why [as farmers] do we want to do that?”<sup>54</sup>

There is another important element in the larger “Identity Preservation” agenda, which revolves around the seed industry’s scheme for an “Affidavit System”. This proposed system 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. But the assumption is false; the seed supply is contaminated, so knowing the variety is no indication of genetic purity. The “Affidavit System”, therefore, cannot effec-

51. Germination, July 2002, p.34.

52. Laura Rance, “Canola Industry wrestles with too much of a good thing,” The Manitoba Co-operator, March 13, 1997, p18.

53. Canadian Grains Commission, “Identity Preserved Systems in the Canadian Grain Industry: A discussion paper,” Government of Canada, December 1998

54. Laura Rance, “Farmers want protection from Roundup Ready wheat,” Manitoba Co-operator, March 1, 2001.

tively prevent genetic contamination. It is really only a trap to prevent farmers from saving seed.

The seed industry is well aware that the Canada Seeds Act, due to a 1973 amendment, prevents farmers from declaring the variety name of their crops if the 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."<sup>55</sup>*

This is an incredible interpretation of responsibility. First, grain handlers have been sorting farmer-saved seed by class without a problem since the classification system began in Canada. Why should farmers all of a sudden have to prove the use of certified seed in recent years? Second, as every farmer or decent plant scientist knows, you do not need to use certified seed to preserve the genetic "identity" of a variety. Farm-saved seed can cause agronomic problems if the seed is not properly handled, but this will not affect its quality for the end-user – unless, of course, the crop is at risk of contamination from GM crops. But the seed industry, not the farmer, is responsible for this. It is mighty unfair to penalise farmers by making them buy seed every year for a problem created by those selling seed. This is especially true when the certified seed supply is as seriously contaminated as farmer's fields, a problem that the seed industry itself admits to.<sup>56</sup>

The CSTA's suggestions would be laughable if it were not for the fact that they are in the process of being implemented. In June 2003, the Canadian Grain Commission launched a voluntary programme to oversee and officially recognize "identity-preservation" programmes in Canada. The Canadian Seed Institute, a "not-for-profit, industry-led organisation" founded by the CSTA and the Canadian Seed Growers Association and managed by a board of industry representatives, is the first agency accredited by the Canadian Grain Commission to offer auditing services for this new program.<sup>57</sup> The Canadian Seed Institute's official involvement in this area dates back to November 2001, when AAFC Minister Lyle Vanclief allocated \$1.2 million to the Canadian Seed Institute to develop a "Market Delivery Value Assurance Program" to "help develop standards and audit procedures, as well as launch a research program to verify grain purity, develop an internet-based tracking system requiring key information during each step of the handling process, and create a national third-party certification body." Not surprisingly, the seed industry's proposals are integrated into the Standards of the Canadian Grain Commission's Identity-Preservation programme. Section 5.4.2 states: "The company shall ensure that appropriate stock seed is selected to fulfill the IP contract, and that the seed is traced to the grower. Where the IP contract is variety specific, certified seed shall be used."<sup>58</sup>



55. "Affidavit systems: A position paper of the Canadian Seed Trade Association", January 2003: <http://cdnseed.org/press/Affidavitsystemsposition.pdf>

56. Mark Condon, Vice-President of the American Seed Trade Association, "Seed Genetic Purity in the Pre and Post Biotechnology Eras", Presentation to the Conference "Knowing Where It's Going: Bringing Food to Market in the Age of Genetically Modified Crops", Pew Initiative and the Economic Research Service of the U.S. Department of Agriculture, Minneapolis, September 11, 2002.

57. Canadian Seed Institute website : <http://www.csi-ics.com/en/>

58. Canadian Grain Commission, Canadian Identity Preserved Recognition System, June 2, 2003: <http://www.grainscanada.gc.ca/Prodser/ciprs/ciprs1-e.htm>



These developments are really bad news for farmers. They are under attack from all sides. The combination of patents, plant breeders' rights, grower's contracts, and the looming changes to the registration and classification system leaves them with no room to do plant breeding, save seeds or exercise influence over formal plant breeding programs. More and more, the new varieties that come to market will reflect a set of interests that has nothing to do with them. "Choice" will be an empty word for farmers. All the benefits from this transformation will go to a small number of transnational corporations, even as the new varieties they produce will continue to be based on the accumulated agricultural biodiversity of farmers, in Canada and abroad, and the preceding investment in plant breeding by the public sector. The interests of the Canadian public, not just the interests of farmers, are being sold down the river by its very own government.

### ***Policies to dismantle and re-orient public plant breeding programs***

Private seed companies cannot make profits if they have to compete with public varieties, where the costs of R&D are generally not accounted for in the price of the seed. J.A. Stewart of Alex M. Stewart and Sons, a small Ontario seed company, laid it out bluntly for the plant breeding community back in 1971: "[There must be] fewer public sector breeders and fewer public varieties, if seed companies are to survive."<sup>59</sup> But the seed industry also relies on public breeding programs to carry out much of the long-term breeding work that private companies are typically unwilling to do. So, in a language that suits its interests, the industry pushes for a division of labour according to basic (public) versus applied (private) research or, more honestly, between the "discovery phase" of research and the "exploitation phase" of research.<sup>60</sup> This division has much less to do with the structure of plant breeding than industry's desire to insert itself between the farmer and the public researcher in order to control the market and increase its profits.<sup>61</sup>

Biotechnology has thrown a wrench in this division. The "exploitation phase" now extends to the level of the gene, as genes can be patented and sold on the market. The division between basic and applied research is no longer enough to guarantee industry's control over the seed market. Industry and the government's solution for getting out of this predicament has been to starve public programs of funds and then force them to adopt a commercial direction, either by partnering with the private sector or by patenting and licensing the products of their research. In either case, industry retains control of the market and collects the benefits of public research.

The transformation of the public breeding programs actually dates back to the mid-1970s, with the creation of the SeCan Association. SeCan is an association of seed growers, much like the Canadian Seed Growers Association, except that it charges a membership fee and allows seed distributors, processors and others involved in the seed market to join. There was another, more fundamental, difference between the two seed associations. SeCan made agreements with public breeding programs for exclusive licenses to multiply, distribute, and market varieties. Only SeCan members could grow varieties licensed by SeCan, and SeCan charged a levy of 2% on the sale price of certified seed and

59. Proceedings of Conference on Plant Breeding and Breeders Rights in Canada, Crop Science Department, University of Guelph, June 15-16, 1971.

60. Byron Beeler, "Does the Canadian Seed Trade want breeders' rights and why?", Presentation at the Conference of the Canadian Grains Council: The Council Presents Viewpoints on Plant Breeders' Rights, Winnipeg, 1977.

61. J.R. Kloppenburg Jr., *First the Seed : The Political Economy of Plant Biotechnology*, Cambridge UP : USA, 1988, p.110.

collected any royalty that the plant breeder chose to impose. Agriculture Canada, which, at least until the early-1980s, undertook roughly 70 percent of the breeding work in Canada, chose not to collect royalties from the varieties it licensed to SeCan, but the important thing was that a precedent was set. By charging levies and collecting royalties for breeders, SeCan 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, with Canadians and Canadian industry as the beneficiaries.

The transformation of the public breeding programs deepened under the Mulroney and Chrétien governments. They slashed funds for public agricultural research programs and promoted the idea of public-private partnerships as a substitute. Much of Agriculture and Agri-food Canada's (AAFC) research budget now goes to the Matching Investment Initiative, where AAFC matches industry investments in collaborative agriculture research projects with public programs. In the fiscal year 1997-98, AAFC spent \$64.4 million on Matching Investment Initiative crop research projects.<sup>62</sup> AAFC canola breeder Keith Downey expresses how this re-orientation of funding has affected public breeding programs:

*"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."<sup>63</sup>*

The government has also used this new language of partnerships to off-load research costs onto farmers by way of check-off funds. These funds collect a levy on farm-gate sales of a particular crop to pay for research on that crop. The Wheat Check-off Fund, which began in the 1993-4 crop year, now funds approximately 25 percent of the operating budget of the key public breeding programs for wheat.<sup>64</sup>

Much of the transformation to public breeding programs is due to developments in intellectual property rights. Canada's public breeding programs, as every public breeder knows, have succeeded through cooperation and the free exchange of germplasm and information. According to AAFC soybean breeder Elroy Cober: "Plant breeding is incremental. We all stand on the shoulders of everyone who has gone before us and add our little bit. But our little bit, when you look at the whole contribution is just a little bit, no grounds for claiming it as the final contribution that makes it more valuable than anyone else's contribution and allows you to get IPRs that preclude the continued use."<sup>65</sup> University of Saskatchewan barley breeder Brian Rosnagel makes a similar point: "If you don't give, you don't get, and if you don't get, you're dead . . . All of the germplasm we use we get from someone else. It takes a whole career for this exchange of germplasm to balance out."<sup>66</sup> This give-and-take culture is being undermined by the competitive culture of IPRs and royalties.

In 1999, Steven Price, a plant breeder with the University of Wisconsin, sent out a survey to 187 public breeders in the US asking them about difficulties they may be having in obtaining genetic stocks from private



62. Richard Gray, Stavroula Malla and Shon Ferguson, (Centre for Studies in Agriculture Law and the Environment, University of Saskatchewan), "Agricultural Research Policy for Crop Improvement in Western Canada: Past experience and future directions," Report prepared for Saskatchewan Agriculture and Food, February 2001, p.1.

63. Brewster Kneen, *The Rape of Canola*, NC Press: Toronto, 1992, pp.37-38.

64. Meristem Land & Science, Canada in *The Big Picture: Wheat Breeding Report*, January 2003, <http://www.meristem.com/wheatRpt/01wheatRpt.html>

65. Personal communication, 4 November 2002.

66. Personal communication, 21 November 2002.



companies. Forty-eight percent of those who responded said that they had had difficulties obtaining genetic stock from companies; 45% said it interfered with their research; and 28% said that it interfered with their ability to release new varieties.<sup>67</sup> Obstacles to germplasm exchange are not confined to private breeders. In Canada, public breeders are refusing to share their research. Rossnagel says that certain breeders at AAFC were working with genes that they had identified for disease resistance. Most breeders would have exchanged their most advanced material incorporating these genes with other breeders, but, in this case, the AAFC breeders refused to even share the resistance genes. After pressure from the plant breeding community, they agreed to share the genes, but only in the form of raw, early germplasm, making it very difficult for other plant breeders to work with the material.<sup>68</sup>

It could be said that this has nothing to do with Canadian intellectual property regimes since PBRs provide research exemptions. Under the PBR Act, the owner of a protected variety does not have the right to restrict other breeders from using that variety in their breeding programs. But, PBRs, like patents, provide exclusive rights and the potential for royalties, and, therefore, they create the incentive for breeders to keep their research to themselves until they have received PBRs or patents. Even if public breeders are not interested in going down this road, the people above them are insisting. Istvan Rajcan, a soybean breeder with the University of Guelph, says he's "not the biggest fan of IPRs" but he admits that he could be asked to seek patents over his work in a "mild or less mild form" by the university administrators.<sup>69</sup>

Senior bureaucrats in the AAFC are contemplating a policy change that would see their plant breeders personally collecting a portion of the royalties from varieties they develop. Jim Bole, AAFC's science director of cultivar development and genetic enhancement, commented: "I don't know that there is any deadline or if anybody has been specifically asked to come up with this but I do know that it has been discussed from time to time and in fact discussed recently."<sup>70</sup> Whatever the case, the AAFC is already moving aggressively down the patent route in the US, where patents on plant varieties are permitted. AAFC has a US patent on a new canola variety that it developed in collaboration with Saskatchewan Wheat Pool.<sup>71</sup> AAFC might argue that the patent is a defensive move to prevent others from patenting its work, but they could just as easily have published their research to keep it in the public domain. Saskatchewan Wheat Pool breeder Derrick Potts says AAFC insisted on applying for a patent: "They were more interested in the potential profit than we were."

This new culture of competition and secrecy in plant breeding obstructs research in more indirect ways as well. Rossnagel says that it used to be that breeders operated according to an unwritten code of ethics, where if you received material from another breeder and discovered something of value within it, you simply got that breeder's permission to carry out further work. There was no legal fussing and people never refused to give permission. Times have changed. According to Rajcan: "It is a lot more complicated than it was a few years ago when everyone was benefiting and everyone producing good lines."

67. *Nature Biotechnology*, Vol 17, October 1999, p.936.

68. Personal communication, 21 November 2002.

69. Personal communication, 8 November 2002.

70. Allan Dawson, "Concerns raised about royalties for public breeders," *Farmers' Independent Weekly*, January 9, 2003.

71. US6303849: *Brassica juncea* lines bearing endogenous edible oils.

## History of resistance to IPRs in the public sector

"Plant-variety protection was the death knell for public breeding programmes." - Michael Gale, head of comparative genetics at the John Innes Centre in Norwich, Britain's leading public plant-science research institute. <sup>72</sup>

In 1984, Consumer and Corporate Affairs Canada commissioned R.M.A Loyns and A.J. Begleiter of the University of Manitoba to produce a working paper on the potential economic effects of Plant Breeders' Rights. Loyns and Begleiter studied the experiences of other countries with plant breeders' rights and surveyed a large number of public plant breeders and representatives of seed companies from Canada and other countries. Their conclusion was that plant breeders' rights were unlikely to have much of a positive or negative impact on plant breeding in Canada. Plant breeders' rights, they argued, do not have any significant advantages over the current system. Those surveyed

*"did not indicate any significant negative effects attributable to the fact that Canada does not have PBR legislation . . . The feeling exists that the present varieties licensing system, combined with the SeCan Association, could fulfil all the domestic requirements of PBR. That is, royalties can be collected by SeCan on new varieties if the breeder or breeding organisation so chooses. The licensing system ensures that the new varieties are visually distinguishable from existing ones as well as meeting all existing quality standards and exceeding at least one of them. In this latter regard, the Canadian licensing system imposes a more stringent requirement than the UPOV system. Many felt that if the international arrangements for reciprocity in the release of new varieties could be established through SeCan, then passing Bill C-32 and setting up a legislated PBR organization would be redundant. Even if this could not be achieved, it was felt that because of the seemingly limited potential exchange of varieties between Canada and other countries, the current system of individual agreements between foreign seed companies and their Canadian counterparts would allow Canadian farmers access to the best foreign varieties."*

Moreover,

*"There was unanimous agreement among plant breeders that there had been no change in the rate of [seed] exchange with breeders in countries which had adopted PBR. Similarly, there was almost complete agreement among seedsmen that Canadian growers were not being deprived of the best varieties because of lack of PBR."*

According to Loyns and Begleiter, PBRs, in the view of both the public breeders and seed industry representatives that they contacted, were not going to make a significant difference to the Canadian seed supply.

Yet, the report did uncover a great deal of anxiety about PBRs within the Canadian plant breeding community:

*"Despite federal assurances to the contrary, a good deal of concern was expressed in both the public and private sector about the possibility of reduced government support for public plant breeding in the future, especially for varietal development . . . The majority concern in Canada seems to be that the federal government is introducing plant breeders rights in the expectation that increased private sector investment will allow it to decrease its support for plant breeding. There is support for the idea that SeCan already provides most of the protection plant breeders rights is intended to provide. . . Also, although the federal government is on record as being committed to maintaining current variety licensing requirements, quite a number of people expressed the view that if private investment in*



72. Jonathan Knight, "Crop improvement: A dying breed", *Nature* 421, pp. 568-570.



*plant breeding increased, there would be irresistible pressure brought to bear to modify the licensing system.”<sup>73</sup>*

Criticism of PBRs was not confined to the margins of the public plant breeding community. E.E. Gamble, the Chairman of the Department of Crop Science at the University of Guelph, felt that PBRs were simply unnecessary. With Canada’s certification system “a private company would have as much control over a variety as they would have under any form of breeders’ rights.”<sup>74</sup> Keith Downey, one of Canada’s foremost public breeders, told his colleagues: “Exchange of vital and important genetic material at a very early stage is also part of today’s scene and is based on the belief that such exchanges will be reciprocated . . . The walling off of certain areas or crops for public breeding while leaving the rest exclusively for private breeders will not work.”<sup>75</sup> Downey was concerned that PBRs would encourage the breakdown of the system of varietal testing, the loss of the public sector’s team approach to plant breeding, and the promotion of foreign varieties “of questionable adaptation and performance in the face of equal or superior Canadian public varieties.”<sup>76</sup>

Up until the early 1970s, Agriculture Canada shared similar concerns. C.R. Phillips, the Director General of the Production and Marketing Branch of Agriculture Canada, told a 1971 public conference: “the most significant incentive for private breeding is the cessation of public breeding or for the public breeder to act like a private breeder and charge sufficiently for the seed to recover cost.” Phillips understood that the debate about whether or not to adopt PBRs boiled down to a decision about whether private breeders could produce better varieties than public breeders at a reasonable price. His answer was clear: “I believe it would be very difficult to demonstrate that private breeding would be superior to public breeding, particularly when you consider . . . the particular climate, crop, and acreage conditions in Canada.”<sup>77</sup>

While there may be little in the way of hard evidence at this point, IPRs and the reorganisation of public research are going to prevent the forms of innovation that produced Canada’s breeding success stories in the past, such as canola. This excerpt from a 1975 article describing the development of canola, also known as rapeseed, tells of a very different culture than that in operation today:

*“Cooperation – this has been the most important aspect of the rapeseed story. Though emphasis has been placed on the teamwork among the scientists, it existed throughout the rapeseed industry as a whole: among farmers, oilseed processors, and businessmen of the food industry. The exchange of information in the arena of international agricultural science was also important. Without this cooperation, devoid as it was of formal structuring, rapeseed might have remained for Canadians what it was in the early stages of development – a laboratory curiosity.”<sup>78</sup>*

When barriers are put up to co-operation and exchange, innovation in plant breeding is constrained. Proponents of intellectual property rights maintain that such constraints are a trade-off for increased private sector investment, which is more efficient and responsive to market demand. But increased innovation in the private sector is not a substitute for innovation in the public sector. Public breeding programs have different objectives than private ones, and as breeding shifts from the public to the private sector, the outcomes of plant breeding change accordingly.

73. RMA Loyns and AJ Begleiter, An Examination of the Potential Economic Effects of Plant Breeders Rights on Canada, Working Paper, Consumer and Corporate Affairs, 1984.

74. Proceedings of Conference on Plant Breeding and Breeders Rights in Canada, Crop Science Department, University of Guelph, June 15-16, 1971.

75. Proceedings of Conference on Plant Breeding and Breeders Rights in Canada, Crop Science Department, University of Guelph, June 15-16, 1971.

76. Proceedings of Conference on Plant Breeding and Breeders Rights in Canada, Crop Science Department, University of Guelph, June 15-16, 1971.

77. Proceedings of Conference on Plant Breeding and Breeders Rights in Canada, Crop Science Department, University of Guelph, June 15-16, 1971.

78. Brewster Kneen, The Rape of Canola, NC Press: Toronto, 1992, p.32.

With canola, for example, in 1970, 83% of the total research spending on canola (\$3 million) was public investment. By 2000, the numbers were reversed, with the private sector accounting for over 85% of the total \$160 million expenditure on canola research. Similarly, before 1973 all varieties were public; between 1990-98, 86% of the varieties introduced were from private breeders.<sup>79</sup>

Some see this as a success story. Solid public breeding initiates a wave of private investment that allows the public sector to back away. This should be the model for every crop. But there are some problems with this argument. First, canola is rather unique among Canada's major crops: it has a large seed market and farmers tend not to save canola seed. Second, private investment was encouraged by a large amount of public support and subsidies. Third, canola is attractive to the transnational seed industry because it is an easy crop to genetically engineer. And fourth, the large private investment hasn't necessarily produced much in the way of crop "improvement".

In their study of policy for plant breeding policy in Western Canada, Gray, Malla, and Ferguson show that large private investments in canola R&D in the 1980s and 1990s did not significantly improve the rate of increase in crop yields. This private investment did, however, transform the objectives of plant breeding. The private sector investment went primarily into the development of hybrid varieties and varieties resistant to herbicides. By 1999, one half of the canola area was seeded to herbicide tolerant varieties that required annual technology use agreements or the use of a specific herbicide.<sup>80</sup> In 2000, over two thirds of canola acreage was either planted under production contracts, or required the use of specific herbicides. The first hybrid variety was introduced in 1989; by 1997, hybrid varieties had a 30% market share.<sup>81</sup>

Gray, Malla and Ferguson also warn that private investment may actually reduce overall investment in the long run:

*"While the current canola research industry appears to be very competitive, there are some concerns for the future level of competition in the industry that are related to the issue of 'freedom to operate.' Many of biotechnology processes and the genes used in the breeding of canola are patented and have become the property of many firms in the industry. A single new variety may require three-dozen different licensing agreements for the use of use of genetic material and the processes used in its production. The negotiation and the construction and enforcement of contracts to manage this property is a very costly activity. These costs have raised the issue of the freedom to operate for firms in the industry. Because larger firms can more easily deal with these costs, and the costs can be avoided if firms merge so that these transactions take place within a firm, the property rights will tend to accelerate firm concentration in the industry. This raises the spectre of insufficient long-run competition in the industry potentially reducing the long-run investment research and having research products that are sold at higher than competitive prices."*<sup>82</sup>

This situation is not unique to canola. There has been a rapid concentration within the international seed industry over the last twenty years. The five biggest firms now control over 25 percent of the global seed market and over 71 percent of all patents in agricultural biotechnology.<sup>83</sup> With their transnational scale and large intellectual property



79. Richard Gray, Stavroula Malla and Shon Ferguson, (Centre for Studies in Agriculture Law and the Environment, University of Saskatchewan), "Agricultural Research Policy for Crop Improvement in Western Canada: Past experience and future directions," Report prepared for Saskatchewan Agriculture and Food, February 2001, p.2

80. Richard Gray, Stavroula Malla and Shon Ferguson, (Centre for Studies in Agriculture Law and the Environment, University of Saskatchewan), "Agricultural Research Policy for Crop Improvement in Western Canada: Past experience and future directions," Report prepared for Saskatchewan Agriculture and Food, February 2001, p.2

81. Richard Gray, Stavroula Malla and Shon Ferguson, (Centre for Studies in Agriculture Law and the Environment, University of Saskatchewan), "Agricultural Research Policy for Crop Improvement in Western Canada: Past experience and future directions," Report prepared for Saskatchewan Agriculture and Food, February 2001, p.28

82. Richard Gray, Stavroula Malla and Shon Ferguson, (Centre for Studies in Agriculture Law and the Environment, University of Saskatchewan), "Agricultural Research Policy for Crop Improvement in Western Canada: Past experience and future directions," Report prepared for Saskatchewan Agriculture and Food, February 2001, p.31

83. ETC Group Communiqué, "Globalization, Inc.," July/August 2001, Issue #71, ETC stats are here adjusted to account for Bayer's purchase of the agricultural division of Aventis and Aventis' controlling interests in the seed companies Groupe Limagrain and KWS AG.



portfolios, they can squeeze out smaller competitors and exert control over public agriculture research programs. They also have large enough plant collections that they do most of their breeding work from within their own collections. Their interests are, therefore, to develop hybrid varieties and seek strong intellectual property rights in order to prevent the exchange of germplasm among breeders. Moreover, as these firms are also the world's biggest pesticide companies, one of their primary breeding objectives is to develop varieties that depend on their proprietary herbicides. In 2002, 75 percent of the 58.7 million acres planted with genetically engineered crops worldwide were planted with crops genetically engineered for herbicide resistance.<sup>84</sup>

Canola provides an example of what happens when private companies begin to dominate plant breeding for a specific crop. But, for many other crops, with less attractive seed markets, if the public sector backs away, no companies will be there to pick up the slack. As bean breeder Tom Michaels, Associate Dean of the Ontario Agricultural College, notes, with crops like pulses, transnational seed companies are unlikely to carry-out region specific plant breeding. They are much more likely to look within their existing portfolios to see what "cast-offs" from their collections might work in Canada.<sup>85</sup> Realistically, the seed industry is only going to invest in plant breeding for most crops if these markets become much more valuable. This, in effect, means shutting the public sector out of applied breeding, increasing the price of seed, increasing market share, and preventing farmers from saving seed from year-to-year.

84. Clive James, "Preview: Global Status of Commercialised Transgenic Crops: 2002", ISAAA Briefs, No.27, ISAAA: Ithaca, New York, p.4.

85. Personal communication with Tom Michaels, Associate Dean of Agriculture, University of Guelph, February 13, 2003.

## ***Part Three – Thoughts on Federal Policy***

Canadian plant breeding is being radically and rapidly transformed. With the active and essential support of the Canadian government, the previous framework of innovation, based on a collective process of information and seed exchange, farmer participation and seed saving, and a mandate to serve the public interest, is being replaced by a framework of exclusive property rights and private profit. Canadian agriculture will suffer from this policy direction.

Canada needs strong public plant breeding programs and open access to the world's seeds. The private sector is not an effective substitute and the framework for plant breeding must reflect this reality. As intellectual property rights (IPRs), such as patents and plant breeders' rights, undermine public breeding programmes, the priority for the Canadian government should be to work at the national and international level to restrain the IPR push and create a free environment for the public programs to operate within.

The federal government has also abdicated its duty to serve the public interest by failing to protect farmers from the criminalisation of seed saving. The social value created by farm-saved seed greatly exceeds any value that the private sector may generate with the proceeds from royalties it collects from farmers. The use of patents, plant breeders' rights, contracts, and affidavits to force farmers to buy seed is nothing but a cash grab on the part of the seed industry. If a private seed industry cannot survive when farmers are free to save and use seed, then it is not worth having one.

Federal policy must move beyond the current, narrow conception of innovation. Great advances in plant breeding have and can continue to be made through the collaborative efforts of farmers and public breeders. This collaboration is particularly important for sustainable agriculture, which the government supposedly supports. Private breeders can play an important role, but their interests should not be protected at the expense of farmers or public breeders. The bottom line is that the Canadian seed supply must remain open and free for everyone to work with. Our seeds and, by extension, our agriculture are far too important to leave in the hands of the few transnational corporations that dominate the seed industry.

There are several key policy issues at the federal level that must be immediately addressed if we are going to begin moving in a different direction. These include:

- plant breeders' rights (PBRs),
- patents on living organisms, and
- seed regulations.

### ***Plant Breeders Rights***

The PBR Act, enacted in 1990, obliged the government to a ten-year review of the administration of the Act. AAFC contracted Serecon Management Consulting, a private firm in Edmonton, to research and write the review and it was presented to Parliament in May 2002. The review was supposed to assess the extent to which the Act resulted in:





- i) the stimulation of investment in businesses involving the breeding of plant varieties in respect to the protection afforded by the Act;
- ii) any improvement in facilities to obtain foreign varieties of plants in the interests of agriculture in Canada;
- iii) the protection abroad, for commercial purposes, of Canadian plant varieties;
- iv) the improvement of plant varieties to the public benefit, and particularly to the benefit of farmers and nurserymen; and,
- v) any other public advantage.<sup>86</sup>

These were the original justifications for the Act.

The review paints a positive picture of the Act and even recommends that Canada move further by bringing the PBR Act into conformity with UPOV 91. It says that the PBR Act increased investment in plant breeding in Canada and improved access to foreign varieties, while not causing any significant negative consequences. Yet, the review is far from a ringing endorsement of the Act, since very little hard evidence is presented to justify the conclusions, especially on the agricultural side (as opposed to the horticultural side). In fact, a closer look at the review reveals that the Act has not lived up to any of its original justifications.

The review makes a number of tenuous links to support its assertion that the Act has fulfilled its objectives. It claims that the Act's influence in stimulating investment in agricultural plant breeding can be seen in the increase in varieties for sale during the review period. As an example it points to soybeans, where the number of varieties available for sale increased from 104 to 343. But how does this increase relate to the PBR Act and investment in plant breeding? According to the October 2003 CFIA list of PBRs, 47 soybean varieties have been granted PBRs in Canada. Of these 47 varieties, the PBRs for 27 of them have already been abandoned, surrendered or rejected. Of the 20 PBR protected varieties remaining, 6 are public varieties, 7 are foreign varieties, and 5 varieties belong to seed subsidiaries of foreign multinational corporations. Only two varieties with PBRs were bred by a private Canadian breeding program—not a strong indication that PBRs have increased investment in Canadian private plant breeding.<sup>87</sup> And these figures are for soybeans, where there is a strong private sector presence and a big commercial seed market. If you look at a crop like buckwheat, which has a smaller seed market, there has only been one PBR granted for a variety and that was for a variety developed by AAFC. For barley, which is an important crop in Canada, only two varieties were PBR protected by private Canadian breeding programmes.

The review claims that PBRs were a “major element” in the expansion of pea crops and hence the “diversification of prairie agriculture.” Farmers don't appear to share the same view. In 1997, the Saskatchewan Pulse Growers Board began a long-term funding arrangement with the Crop Development Centre, a public breeding programme, to finance a pulse breeding programme that would produce royalty-free varieties. According to the Board's Chairman, Glenn Annand, the “traditional cereal and oilseed commercialisation models were not working” for pulses and “growers (and the Board) had been critical of past releases of pulse seed that had been granted exclusivity for widely adapted varieties in return for royalty payment.”<sup>88</sup> So far, the farmer-Crop Development Centre programme has been a great success; 33 royalty-free varieties have been released since 1997.

86. Canadian Food Inspection Agency, Ten-year Review of the Plant Breeders' Rights Act, Government of Canada, Available at : <http://www.inspection.gc.ca/english/plaveg/pbrpov/pbrpove.shtml>

87. Plant Breeders' Rights Office, October 2003 Complete list of PBR varieties: <http://www.inspection.gc.ca/english/plaveg/pbrpov/pbrpove.shtml>

88. Glenn Annand, "Royalty-Free varieties a levy benefit", Pulse News, Summer 2002.

There's also the question of quality. It cannot be assumed that an increase in the number of varieties on the market means that there are better varieties to choose from. The increase in the number of varieties may have as much to do with the recent changes to the merit criteria of the variety registration system and corporate marketing strategies as it does with the coming into force of the PBR Act. Unfortunately, the review did not even consider these possibilities. One indicator of quality that the review should at least have picked up on is the "drop-out" rate for PBR varieties: the number of PBR applications that are abandoned, surrendered or rejected. The PBR Office says that this usually happens because of economic reasons—when the variety is not worth the annual \$300 fee.<sup>89</sup> With canola, for instance, of the 342 PBR applications made for canola to date, 244 have already been abandoned, surrendered or rejected; that's a 71% drop-out rate!

The review's claim that the PBR Act has contributed to increased royalties for public breeding programmes is also dubious. According to University of Saskatchewan plant breeder Brian Rossnagel:

*"All of the numbers they refer to being the great results of Plant Breeders' Rights, most of the dollars collected in the time period being reviewed were collected on varieties that (a) weren't covered by Plant Breeders' Rights and (b) the ones that were covered weren't producing royalties yet because it takes a while from the time you release them. The report is really, really biased."<sup>90</sup>*

But what about increased investment in private breeding programmes, which was really the central justification for the Act? Besides the internal figures given by the Canadian Seed Trade Association, which, for obvious reasons, should not be taken at face value, the report refers to statistics from the Organisation for Economic Cooperation and Development (OECD) to back up its claim that seed sector activity increased over the review period. According to the review, the number of Canadian companies and organisations listed in the OECD report on the schemes for varietal certification of seed moving in international trade increased from 51 to 83 between 1995-2000. However, the review fails to note that of the 83 companies and organisations listed, only 36 are Canadian seed companies, the rest are multinational subsidiaries or public breeding programmes. Of these 36 companies, few are engaged in plant breeding and only one seed company engaged in plant breeding was established after the coming into force of the PBR Act—the Industrial Hemp Seed Development Company.

What of the other objectives of the Act? The review admits that the Act did not make a significant contribution to the protection of Canadian plant varieties abroad. Only 28 PBR applications were filed abroad by Canadians in 1999, the same number as in 1992. With regards to increasing access to foreign varieties, the review is much more positive, claiming that the PBR Act has had a big impact on the number of foreign varieties introduced into Canada. But, if this is indeed true, is it a positive development? Increasing the number of foreign varieties sold in Canada does not equal increasing access to foreign varieties for Canadian plant breeding programs. PBR protected varieties in other countries are generally stored in public seed collections, where access to the varieties for Canadian breeders is no more restrictive than access to non-PBR protected varieties. Seed curators will send PBR protected varieties to countries that do not have PBR regimes, without hesitation.<sup>91</sup> The PBR Act may have encouraged foreign companies to sell their vari-



89. Personal communication with Valerie Sisson of the Plant Breeders' Rights Office, October 16, 2002.

90. Allan Dawson, "A 10-year review of the impact of PBR legislation in Canada conducted by the CFIA is biased," *Farmers Independent Weekly*, January 9, 2003.



eties in Canada, but only by restricting the use of these varieties in formal and non-formal plant breeding and seed systems. Moreover, royalties generated by these varieties flow out of the country, reducing investment in Canadian breeding programs. Seen in this light, the PBR Act may have encouraged foreign varieties to the detriment of Canadian plant breeding, particularly over the long term. This is not a positive development. Seed companies may bring in the occasional foreign variety that works under Canadian conditions, but they can in no way substitute for Canadian-based breeding programs over the long term.

With regards to benefits of the Act for farmers, the review focuses on yield increases among various crops during the review period. Soybean yields decreased, but yields for other crops, such as canola, increased significantly, and the review claims that the Act made a contribution in this regard. This is quite a stretch. Yields for wheat, for instance, increased on average by 21.86 percent during the review period, but there is little evidence that these increases are in any way related to PBRs. Of the 29 PBRs granted for wheat varieties to date, 8 have already been abandoned, surrendered or rejected. Eleven of the 21 PBR protected varieties that remain are from Canadian public breeding programmes and six are imported varieties, five of them from a German company specialising in hard red wheats and the other not yet introduced in Canada. Only four PBR varieties are from Canadian private breeding programmes and none of these occupy a significant amount of acreage.<sup>92</sup>

The larger problem with the review is its undeniable bias towards industry. Most of the information presented in the review comes from industry, either through consultations with “stakeholders” or two surveys conducted by the Canadian Seed Trade Association. The initial draft of the report, obtained through an Access-to-Information request by Ken Rubin, admits that “much of the analysis provided herein is subjective in nature” but the final report, which went through several rounds of comments and modifications by AAFC, claims to be balanced. According to the final report: “considerable effort was undertaken to make contact with all parties having an interest in the PBR Act and Regulations. Repeated contact was made to ensure responses represented a cross-section of industry sectors and sub-sectors. A number of advocacy groups with major concerns at the commencement of the PBR Act did not respond, which would again suggest that initial concerns with the PBR Act and Regulations, did not materialize.” This is simply not true. Serecon did not seek or include input from many of those groups that AAFC itself considered to be the major groups in opposition to the PBR Act, including the National Farmers Union, Rural Advancement Foundation International (RAFI), and the Canadian Labour Congress. RAFI, now the ETC Group was contacted early on by Serecon for an informal discussion where the limitations of the review were discussed, but a formal consultation never took place and the organization was not contacted subsequently. A report based on “subjective” information cannot be taken seriously if different perspectives are not considered.

Brian Rossnagel said it right: “the review is a complete crock of garbage.”<sup>93</sup> The PBR Act deserves much more serious analysis and attention, and so do the possible alternatives. One alternative option is

91. Personal communication with Randy Nelson, Curator of the US Department of Agriculture's Soybean Germplasm Collection, November 18, 2002.

92. Plant Breeders' Rights Office, October 2003 Complete list of PBR varieties: <http://www.inspection.gc.ca/english/plaveg/pbr/pov/pbrpove.shtml>

93. Allan Dawson, "A 10-year review of the impact of PBR legislation in Canada conducted by the CFIA is biased," Farmers Independent Weekly, January 9, 2003.

to return to the certification system as a means for breeding programs to collect royalties. According to Rossnagel:

*"We collected royalties on varieties way before we had PBRs. In fact, most of the royalties collected at the University of Saskatchewan have been collected on varieties that are not protected. The seed system protects them sufficiently in our opinion."*<sup>94</sup>

Another option, which could conceivably complement the PBR Act or some amended version of it, would be to support the development of a General Public Licensing System for plant varieties, as proposed by Tom Michaels, Associate Dean of the Ontario Agricultural College, that would keep plant varieties and their descendants, freely available for use in any breeding programme.<sup>95</sup> At the very least, the Canadian government should back down from its plan to bring the current PBR Act, which is based on UPOV 78, into conformity with UPOV 91.

IPR proponents will likely use Canada's engagement in international trade agreements to bolster their case for moving to UPOV 91, as they did with UPOV 78. At present, NAFTA commits Canada to UPOV 78 and the World Trade Organisation's agreement on intellectual property (TRIPS) obliges Canada to adopt a system to protect plant varieties, but it does not specify a regime. Neither of these two agreements, or any other trade agreement, bind Canada to any intellectual property regimes for plant varieties beyond UPOV 78. While UPOV 78 raises a number of concerns, which this paper documents, the more significant danger is the tendency to ratchet up intellectual property laws in international trade agreements, either through regional agreements, such as the Free Trade Agreement of the Americas, bilateral agreements, or conventions, such as UPOV 91. Canada should resist all attempts to integrate agreements on intellectual property rights for plant varieties or their parts thereof (such as genes) in international trade agreements and should refuse to sign or ratify any international conventions that oblige Canada to go beyond UPOV 78. Over the long term, Canada should work to take provisions on intellectual property protection for plant varieties and their parts thereof out of all international trade agreements in order to keep such important policy decisions within the domestic arena.

## **Patents on living organisms**

The second immediate issue is that of patents on living organisms. In December 2002, the Supreme Court of Canada, in what has become known as the Oncomouse Case, upheld the decision of the Commissioner of Patents to reject an application from the Regents of Harvard University for a patent on a genetically engineered mouse. According to the Court: "Since patenting higher life forms would involve a radical departure from the traditional patent regime, and since the patentability of such life forms is a highly contentious matter that raises a number of extremely complex issues, clear and unequivocal legislation is required for higher life forms to be patentable. The current Act does not clearly indicate that higher life forms are patentable." Given the importance and complexity of decisions about the patenting of life forms, the Court felt that they should be determined by Parliament.



94. Allan Dawson, "A 10-year review of the impact of PBR legislation in Canada conducted by the CFIA is biased," *Farmers Independent Weekly*, January 9, 2003.

95. Personal communication from TE Michaels, Department of Plant Agriculture, University of Guelph



When the Commissioner of Patents granted patents on genes in 1982 it made a similar “radical departure” from the traditional patent regime and was seemingly unaware of the consequences of its decision. As we see with the case of Monsanto versus Percy Schmeiser, patents on genes can effectively give companies patents over plants and other higher life forms, to the great detriment of farmers and Canada’s seed system. Parliament, however, never had the chance to debate this important decision. Hopefully, this will change when Percy Schmeiser’s case goes before the Supreme Court in January 2004 – and if and when new legislation with specific wording on the patenting of life forms is introduced in Parliament. Parliament should have the opportunity to amend the Patent Act in order to specify that patents on genes do not give companies rights over the living organisms within which these genes are inserted.

### **Seed regulations**

The focus of regulations should be on preventing the introduction of varieties and seeds that are detrimental to the Canadian seed supply. This means setting standards of merit, but it does not mean setting uniform and rigid standards. Varieties should be assessed according to the agricultural systems that they are developed for. It does not make sense to put varieties for organic agriculture through the same tests as varieties for chemically intensive agriculture, but it does make sense to keep standards high.

Farmers are already suffering from the consequences of changes to seed regulations. SeCan was telling its members about the problems caused by reductions in agronomic testing as early as 1996: “Often there is not enough data available to make an informed evaluation of a variety, and this problem is getting worse each year as less money is available for testing.”<sup>96</sup> Again in June 2000, in response to concerns from its members about the quality of the varieties it was distributing, SeCan blamed the regulatory system: “We try to release only new varieties that offer benefits over current varieties, but it is often difficult to evaluate varieties from the limited amount of data available.”<sup>97</sup>

In the west, farmers suffered huge losses when a new canola variety failed last year. Variety 45A77, a CLEARFIELD herbicide-resistant canola variety developed by Pioneer Hi-bred and marketed by Proven Seeds, a subsidiary of Agriscore United, was badly damaged from herbicide spray in various fields across the prairies. Agriscore CEO Brian Hayward suggested that it may have had to do with “variable conditions” and he admitted that there was widespread but variable damage.<sup>98</sup> With the dismantling of the varietal registration system, canola varieties do not have to be tested under variable conditions, leaving some to wonder if the current system is inadequate. According to John Morriss of the Farmers’ Independent Weekly:

*“For the past several years, the mantra for canola registration system is that less regulation is the best regulation and, ‘Let the marketplace work.’ Just what that means for the farmer is not so clear. Canola seed is not like a home appliance with a one-year moneyback guarantee. You can’t take the seed back if it didn’t perform as advertised. The marketplace may be working to the extent that no one is likely to buy 45A77 next year, but that doesn’t do anything for farmers looking for compensation this year. . . The rush to*

96. SeCan News, December 1996, p.6.

97. SeCan News, June 2000, p.5.

98. Farmers Independent Weekly, July 25, 2002, p.1.

*develop and market the latest “new and improved” variety may be leading to unacceptable risks for not only farmers, but for the companies who develop and market the seed. There is enough uncertainty in agriculture these days. If steps can be taken to reduce risks of this magnitude, a little more regulation (or maybe that should be “protection”) may not be such a bad thing.”<sup>99</sup>*

Self-regulation of the seed industry, which is where the government is heading, does not work, especially with the seed industry’s aggressive efforts to sell genetically engineered crops.

Seed regulations need to be updated to deal with genetically engineered crops. These crops create new risks for farmers that should be accounted for in the varietal registration process. Since genetic contamination of the seed supply from these crops is inevitable, the impacts, including economic impacts, from this contamination must be considered and seed companies must be held liable for any economic, environmental or health damages caused by their seeds, such as the damage caused to organic canola growers in Saskatchewan.<sup>100</sup>

The Seeds Act, as a legal instrument to protect farmers, should also be amended to protect the farmer’s right to save, use and exchange seeds. Specific wording could be introduced to prohibit any contracts, such as the current growers agreements, that infringe upon this right. GM crops that threaten the practice of saving seed, either through contamination or seed sterility, should be prohibited. The Act should also recognize the role that farmers have traditionally played in plant breeding and support their access to seeds. The current set of proposals to amend the variety registration system that were put forward by the Canadian Food Inspection Agency (CFIA) in September 2002 go in the opposite direction, locking farmers into a seed system set up for the exclusive benefit of the seed industry. The CFIA intends to bring the amendments to the point of legislation by the summer of 2004 but maintains that it will be “consulting widely and engaging stakeholders on the substance of any proposed changes.”<sup>101</sup> As yet, however, such a process has yet to materialize.



99. John Morriss, "Viewpoint", Farmers Independent Weekly, July 25, 2002, p.4.

100. For more information see the website of the Saskatchewan Organic Directorate, Organic Agriculture Protection Fund: <http://www.saskorganic.com/oapf.htm>

101. Canadian Food Inspection Agency, Plant Products Directorate, Plant Production Division, Variety Registration Office, "Variety Registration Review Update and Next Steps", May 21, 2003: <http://www.inspection.gc.ca/english/plaveg/vari/et/deferralve.shtml>

## **Conclusion: Going back to a public seed system to build a better future**



This paper is not a nostalgic look back to the past. It examines what has been lost and what is in the process of being lost, but only with the objective of understanding how this will influence the future. When we comprehend this loss, we see that it is our capacity to change, our capacity to innovate that has diminished most.

Canada needs a plant breeding space that is free: where information and seeds are freely shared and where farmers are free to save seeds. But, as this paper has shown, this free space is being systematically and rapidly fenced in. And along with the loss of this free space go our options for taking agriculture in different and diverse directions, for developing ecological agricultural systems that respect the environment, strengthen rural communities and provide high-quality food to all Canadians.

The significance of this free space should be clear to farmers and plant breeders. But the issue extends beyond them, and is important to all Canadians. In the late 1980s, the National Farmers Union brought together a broad, diverse coalition of groups to inform the public about the looming introduction of Plant Breeders' Rights legislation and to fight against it. The coalition included groups like the Rural Advancement Foundation International, the Canadian Environmental Law Association, Friends of the Earth, the Council of Canadians, Inter Pares, the United Church of Canada, Mouvement Agriculture Biologique au Québec, and others. The coalition did not succeed in stopping Plant Breeders' Rights, but, contrary to the government's claims, many of their predictions have come true and, in fact, the current situation is even worse than they predicted.

Today, the crisis in our seed system requires a stronger mobilisation. It is definitely time for those plant breeders concerned by the current trends to become more vocal. Publishing a few critical pieces in academic journals or sharing informal complaints with colleagues during scientific conferences is not enough. Plant breeders will have to step out of the circles they are used to working within if they want to help bring about meaningful change.

While corporate control of the seed system is expanding, so too is the potential for resistance. The "second enclosure movement" is not simply an agriculture issue; the push for patents and other monopoly rights is a fundamental part of corporate globalisation.<sup>102</sup> Whether it's in agriculture, music, information technology or medicine, transnational corporations seek to increase their profits by exerting and expanding monopoly control. This makes economic sense for these companies, but what improves the bottom line for transnational corporations does not necessarily work for the rest of society. We have seen how the expansion of monopoly rights and mechanisms of control are detrimental to plant breeding and agriculture in Canada. The same can be said for software development, literature, health care and, certainly, the knowledge and innovation systems of First Nation peoples.

102. James Boyle, "The Second Enclosure Movement," *Law and Contemporary Problems*, 2003. This article and several other excellent resources are available on Professor Boyle's Home Page: <http://james-boyle.com/>

There is a common ground, and a growing understanding of how open, collective processes of innovation are far more important to society than closed, isolated processes. This paper is offered as another step forward in this direction. It is hoped that it will raise awareness among the general public about the dangers of the expanding corporate control of seeds in Canada and stir people to action.



## Appendix 1

### **About the Groups involved in this publication:**



**The Ram's Horn** is a monthly newsletter of food systems analysis published since 1980 by Brewster and Cathleen Kneen. Our perspective is that food is nourishment for the body, the spirit and the community and not a commodity to be produced and traded globally for corporate profit or the benefit of trade balances. Genetic engineering of crops is excluded by respect for the integrity of organisms.

**Inter Pares** is a Canadian social justice organization working to build understanding about the causes and effects of poverty and injustice, and the need for social change.

**The Canadian Catholic Organization for Development and Peace** is one of Canada's leading international development agencies. Since 1967 we have helped improve living and working conditions in 70 countries around the globe, providing \$425 million for human rights, community development and humanitarian aid in Africa, the Middle East, Asia, Latin America and the Caribbean. Launched by Canada's Catholic bishops and a concerned group of laity and clergy, *Development and Peace* educates Canadians about Third World issues and supports initiatives by Third World peoples to use social and economic tools to take control of their lives. Our goal is to promote alternatives to unjust social, political and economic structures.

**Groupe de recherche Technosciences du Vivant et Sociétés:** An interdisciplinary, interuniversity and international research team that combines empirical and theoretical research on the bio-technosciences with holistic and integrated analysis of the contexts within which these sciences emerge and the various safety and environmental, economic, socio-political and cultural issues they raise. Founded in 2001 and directed by Louise Vandelac, the groupe brings together over 20 researchers and as many students around 5 funded research projects. The groupe is affiliated with CIN-BIOSE, a centre of OMS-OPS (Interdisciplinary Research Centre on Biologie, Health, Society and the Environment), and with the Institute of Environmental Sciences of the University of Quebec at Montreal (UQÀM)

**NFU:** The NFU is the only voluntary, direct membership, national farm organization in Canada. It is also the only farm organization incorporated through an Act of Parliament (June 11, 1970). The NFU is non-partisan and works toward the development of economic and social policies that will maintain the family farm as the primary unit of food production in Canada and abroad.

**Council of Canadians:** Founded in 1985, The Council of Canadians is a citizens' watchdog organization, comprised of over 100,000 members and more than 70 Chapters across the country. Strictly non-partisan, the Council lobbies Members of Parliament, conducts research, and runs national campaigns aimed at putting some of the country's most important issues into the spotlight: safeguarding our social programs, promoting economic justice, renewing our democracy, asserting Canadian sovereignty, advancing alternatives to corporate-style free trade, and preserving our environment.

## **Appendix 2**

### **Acronyms**

IPR = Intellectual Property Rights

CSGA = Canadian Seed Growers Association

TNC = Transnational Corporation

NRC = National Research Council

RR = RoundupReady

CBAC = Canadian Biotechnology Advisory Committee

UPOV = International Union for the Protection of New Varieties of Plants

PBR = Plant Breeders Rights

NAFTA = North American Free trade Agreement

CSTA = Canadian Seed Trade Association

GM = Genetically modified

AAFC = Agriculture and Agri-food Canada

CFIA = Canadian Food Inspection Agency

OECD = Organisation for Economic Co-operation and Development



# Index

- Abitibi 11  
Affidavit System 19, 20  
Agricore United 33  
Agriculture and Agri-food Canada 18, 19, 20, 22, 23, 28, 29, 31  
Allelix 11  
Annand, Glenn 29  
Archer Daniels Midland 19  
BASF 13, 14  
biotechnology 9, 10, 11, 13, 18, 21, 26  
Bole, Jim 23  
Buttel, Fred 8  
C&M Seeds 14  
Canadian Biotechnology Advisory Committee 13  
Canadian Food Inspection Agency (CFIA) 29, 34  
Canadian Grain Commission 20  
Canadian Intellectual Property Office 11  
Canadian Plant Technology Agency 15  
Canadian Seed Growers' Association 7  
Canadian Seed Institute 20  
Canadian Seed Trade Association 15, 17, 20, 30, 31  
Canadian Wheat Board 19  
canola 7, 11, 12, 13, 14, 17, 18, 22, 23, 25, 26, 27, 30, 31, 33, 34  
Cargill 14, 15, 19  
certified seed 7, 12, 14, 17, 18, 20, 21  
check-off 22  
CLEARFIELD Production System 13-14  
Cober, Elroy 22  
Connaught Laboratories 11  
contamination 12, 17, 18, 19, 20, 34  
contracts 11, 13-14, 21, 26, 28, 34  
copyright 4  
Crop Development Centre 29, 30  
Dow AgroSciences 14  
Downey, Keith 18, 22, 25  
DuPont 11  
enclosure movement 4, 35  
Fehr, Walter 18  
Gamble, E.E. 25  
genetically modified (GM) 17, 18, 19, 20, 34  
identity preservation 14, 15, 19  
Identity Preserved (IP) 14, 20  
Intellectual Property Rights (IPR) 4-6, 14, 22, 23, 24, 25, 27, 28, 32  
Kernel Visual Distinguishability 19  
MacKay, Judge 11, 12  
Marquis (wheat) 6  
Matching Investment Initiative 22  
Michaels, Tom 27, 32  
Monsanto 4, 11, 12, 13, 14, 17, 19, 33  
Morton, Mel 7  
National Biotechnology Strategy 10, 11  
National Research Council 11  
North American Free Trade Agreement 16, 32  
oncomouse 4, 32  
Organisation for Economic Cooperation and Development (OECD) 30  
Paladin Hybrids 11  
Patent Act 4, 33  
patents 3, 4, 11, 13, 14, 15, 16, 21, 23, 26, 28, 32, 33, 35, 36  
Phillips, C.R. 25  
Pioneer Hi-Bred 11, 33  
Plant Breeders Rights 15, 23, 24, 25, 28-32  
Plant Breeders' Rights Act 4, 16, 28-32  
plant breeding 3, 5, 6, 7, 8, 9, 10, 11, 14, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 34, 35  
Plant Variety Protection (PVP) 15, 16  
Price, Steven 22  
productionist coalition 8  
Rajcan, Istvan 23  
Red Fife wheat 6  
Rossnagel, Brian 22, 30, 32  
Rubin, Ken 31  
Saskatchewan Pulse Growers 29  
Saskatchewan Wheat Pool 23  
Schmeiser, Percy 4, 11, 12, 13, 33  
SeCan Association 21, 22, 24, 33  
seed industry 3, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 34  
Seeds Act 15, 17, 20, 34  
Serecon Management Consulting 28, 31  
soybeans 6, 7, 11, 18, 22, 23, 29, 31  
Stevenson, Robert 17  
Stewart, J.A. 21  
Supreme Court 4, 12, 32, 33  
Svaloff Weibull 16  
Syngenta 19  
Toews, Bill 19  
trademark 4  
TRIPS 32  
Union for the Protection of New Plant Varieties 15, 16, 17, 24, 29, 32  
University of Manitoba 12, 24  
University of Saskatchewan 22, 30, 32  
Vanclief, Lyle 20  
varietal registration 17, 18, 33, 34  
wheat 6, 7, 13, 14, 16, 18, 19, 22, 23, 31

