Plant Breeders' Rights in Canada and Abroad: What are These Rights aud How Much Must Society Pay for Them?

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In 1990, Parliament passed the *Plant Breeders' Rights Act* in response to Canada's international obligations concerning intellectual property protection for plant breeders. In this article, the author suggests that the *Act* strikes a legitimate balance between the exclusive ownership rights of plant breeders to the new varieties they create and society's residual liberty to use them. Society has an interest in ensuring the wide distribution of the benefits of plant breeding such as new varieties which are insect- or drought-resistant. However, without the assurance that their discoveries will be protected, the international firms which will be responsible for most plant breeding activity will not engage in this endeavour.

The author first describes basic research techniques used in the creation of new plant varieties. She then discusses the rationale for providing plant breeders with an ownership right to the varieties they develop. After demonstrating that patent legislation is not the appropriate form of protection for plant breeders, the author examines the *Plant Breeders' Rights Act* in some detail. She outlines the requirements for eligibility for protection and then discusses the rights granted under the *Act*. Finally, the author demonstrates how the *Act* forms part of the international network of plant breeders' rights:

The author concludes that the balance struck in the *Act* provides sufficient incentive to plant breeders while ensuring that the public can benefit from the introduction of new plant varieties. Domestically, the balance achieved between the rights of plant breeders and the residual liberties of farmers, as well as of the public and private research sectors, is appropriate. Furthermore, plant breeders' rights legislation will not exacerbate international environmental problems, such as threats to biodiversity and sustainable development, and is not insensitive to the concerns of developing countries.

Le Parlement a adopté, en 1990, la *Loi sur les obtentions végétales* afin de remplir les obligations du Canada en ce qui a trait à la protection de la propriété intellectuelle des chercheurs dans ce domaine. Dans cet article, l'auteure suggère que cette loi permet d'atteindre un juste équilibre entre le droit de propriété exclusif sur les obtentions que revendiquent les chercheurs et le droit résiduel qu'a la société de bénéficier de celles-ci. En effet, la distribution à grande échelle d'espèces végétales qui sont, par exemple, résistantes à la sécheresse et aux parasites est dans l'intérêt de la société. Toutefois, les multinationales n'investiront pas dans la recherche sans l'assurance d'une protection adéquate pour les nouvelles obtentions végétales.

Tout d'abord, l'auteure explique les techniques de base utilisées lors de la création de nouvelles espèces végétales. Elle discute ensuite les raisons pour lesquelles on accorde aux chercheurs un droit de propriété sur leurs obtentions. Après avoir démontré que la législation sur les brevets n'est pas adaptée aux espèces végétales, elle examine en détail la *Loi sur les obtentions végétales*. Elle expose les exigences devant être satisfaites pour avoir droit à la protection de cette loi, puis elle élabore sur les droits accordés par celle-ci. Finalement, l'auteure démontre que cette loi fait partie d'un plan international de protection des obtentions végétales.

En conclusion, l'auteure estime que l'équilibre atteint par la *Loi sur les obtentions végétales* est suffisamment stimulant pour les obtenteurs et assure au public le bénéfice de l'introduction de nouvelles espèces végétales sur le marché. Sur le plan national, l'équilibre atteint entre les intérêts des obtenteurs et ceux des fermiers, ainsi qu'entre ceux des secteurs public et privé de la recherche, est opportun. En outre, la nouvelle loi ne risque pas d'engendrer des problèmes environnementaux, telles des atteintes à la biodiversité, et elle tient compte des préoccupations des pays en voie de développement.

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Revue de droit de McGill
To be cited as: (1994) 39 McGill L.J. 144
Mode de référence: (1994) 39 R.D. McGill 144

Synopsis

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Introduction

The world of the twentieth century has been marked by change. We are now in the midst of a genetic revolution, where one of the building blocks of

the economy is biotechnology.[1] Most Canadians are aware of biotechnology but understand it mostly in terms of the ability to manipulate human and other animal genes. Few people realize that the biotechnological revolution has had a profound effect on the ability of a plant breeder to alter plant genes, thereby creating new plant varieties which are insect- or drought-resistant, or which produce increased yields.

The Science Council of Canada has stressed that "[to] retain and, if possible, increase its existing share of world markets, Canada must participate fully in the biotechnology revolution."[2] Furthermore, the Council has targeted plant agriculture as the sector in which to step-up biotechnological research. Growth in the world's population will require a corresponding increase in food production.[3] This need will be met in large part by improved plant varieties, developed by plant breeders. In order to encourage this activity, the Council recommended that plant breeders' rights be created.[4] It was in this context that Parliament passed the *Plant Breeders' Rights Act*[5] which created a new form of intellectual property right for plant breeders.

What are the consequences of granting such rights? They may concentrate the ownership of an important resource in the hands of few,[6] will give no recognition to third world countries which, in fact, are the genetic storehouses upon which plant breeders depend,[7] and may be linked to genetic uniformity and genetic erosion.[8] Given these potential consequences, should plant breeders be granted exclusive rights in the "new" seeds that they create, or should these seeds be owned collectively because they are part of the "common heritage of mankind"? I will argue that plant breeders' rights legislation should exist because it strikes the best balance between the interest of plant breeders in protecting their investment in the development of new plant varieties, and society's interest in benefitting from them. This balance is achieved by the Canadian *Plant Breeders' Rights Act* and by the international network of plant breeders' rights. Finally, any concerns raised about the effects of such legislation do not require that it be dismantled, and are more appropriately addressed in other contexts.

This paper will examine the intellectual property rights that plant breeders seek nationally and internationally, as well as the local and global effects of granting such rights to them. The discussion will be divided into several parts. The first Part will describe the techniques and the vocabulary of modern plant

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[1]See generally House of Commons, *Minutes of Proceedings and Evidence of the Legislative Committee on Bill C-15: An Act Respecting Plant Breeders' Rights*, Nos. 1-10 (1989), especially No. 2 at 13 [hereinafter *Minutes*].

[2]*Seeds of Renewal: Biotechnology and Canada's Resource Industries* (Report No. 38) (Hull, Que.: Supply & Services Canada, 1985) at 3 [hereinafter *Seeds of Renewal*].

[3]See P.R. Crosson & N.J. Rosenberg, "Strategies for Agriculture" (1989) 261:3 *Scientific American* 128 at 128.

[4]*Seeds of Renewal*, *supra* note 2 at 11.

[5]S.C. 1990, c. 20 [hereinafter *Act*].

[6]*Minutes*, *supra* note 1, No. 2 at 14, No. 2A at 1.

[7]J.R. Kloppenburg, Jr., "No Hunting!" (1991) 15:3 *Cultural Survival Quarterly* 14 at 14.

[8]R.E. Rhoades, "The World's Food Supply at Risk" (1991) 179:4 *National Geographic* 74 at 74.

breeding so that the reader can gain an understanding of what is involved in creating new plant varieties. Part II will show why it is in the public's interest and in Canada's economic interest to protect new plant varieties. Part III will consider the possibility of patenting a plant variety under the Canadian *Patent Act*,[9] and will comment on the value of creating such strong monopoly rights in such a fundamental resource. Part IV will examine the Canadian scheme for plant breeders embodied in the *Plant Breeders' Rights Act*. Part V describes the international network protecting plant breeders' rights. Finally, Part VI will consider the domestic and international consequences of plant breeders' rights and will address such issues as their effect on third world countries, on genetic erosion and on genetic uniformity.

I. Modern Plant Breeding in Canada — The Techniques and the Vocabulary

Plant breeding is "the art and science of improving the genetic pattern of plants in relation to their economic use."[10] It has brought the world numerous benefits in the areas of pharmaceuticals and agriculture. The muscle relaxant, tubocurarine, the anti-malarial drug, quinine, and the anti-leukemic drug, vincristine, are all derived from plants.[11] Scientists are using biotechnology to increase the yields of a substance that is extracted from the bark of the Pacific yew tree in order to produce taxol, a drug showing marked success in the treatment of ovarian cancer.[12] In a completely different field, companies such as Monsanto Co., Pioneer Hi-Bred International Inc. and Calgene Inc. are producing tomatoes that have longer shelf-lives,[13] herbicide-resistant cotton, insect-resistant tobacco and virus-resistant potatoes.[14] Plant breeders have also developed techniques to produce plants which do not require fertilizers.[15]

Even more interesting, however, is understanding the techniques used to achieve such results. This section will briefly describe the techniques presently used in plant breeding and will introduce some basic vocabulary. The discussion will focus on the technologies as they are used in agriculture and horticulture because this is the kind of activity that is contemplated by plant breeders' rights legislation.

The purpose of plant breeding is to produce new varieties which are known in the scientific community as "cultivars".[16] A cultivar is "a clearly distinguish-

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[9]R.S.C. 1985, c. P-4.

[10]A.R. Hallauer, "Selection and Breeding Methods" in K.J. Frey, ed., *Plant Breeding II* (Ames, Iowa: Iowa State University Press, 1981) 3 at 3.

[11]See S.R. King, "The Source of Our Cures" (1991) 15:3 *Cultural Survival Quarterly* 19 at 19; S. Strauss, "Uncovering the Truth behind the Rape of Madagascar's Rosy Periwinkle" *The [Toronto] Globe and Mail* (12 September 1992) D8.

[12]D. Erickson, "Secret Garden" (1991) 265:4 *Scientific American* 121 at 121.

[13]See D. Powell, "Invasion of the Mutant Tomatoes" *The [Toronto] Globe and Mail* (12 September 1992) D8; D. Erickson, "Putting Down Roots" (1990) 262:5 *Scientific American* 81.

[14]J.H. Barton, "Patenting Life" (1991) 264:3 *Scientific American* 40 at 42.

[15]R.F. Weaver, "Beyond Supermouse: Changing Life's Genetic Blueprint" (1984) 166:6 *National Geographic* 818 at 840.

[16]By comparing similar and differing characteristics, botanists classify plants into specific groupings. In order of increasing specificity, plants fall into a division, class, order, family, genus,

able group of cultivated plants which, when reproduced under control, retains its distinguishing characters."[17] These distinguishing characters result from the plant's genetic makeup, or genotype, and from the surrounding environmental conditions.[18] However, it is the genotype that is manipulated by breeders.

The creation of plant varieties, or cultivars, has been an important human activity ever since Mexican Indians tamed wild grasses to produce corn.[19] Mendel revolutionized plant breeding in 1865 by establishing the foundation of the science of heredity, now known as genetics.[20] One of this science's important principles is that each characteristic of an organism is determined by the existence of a gene — a piece of the hereditary material (DNA) found in each cell of an organism.[21] Biotechnology, also known as genetic engineering, is the modern form of plant breeding. It continues to use Mendel's principles of genetics as a foundation and has provided yet a third step in the development of plant breeding techniques.

Traditional plant breeding can introduce new varieties sexually by means of pollination. Without intervention, plants either self-pollinate or cross-pollinate with the same variety. However, in plant breeding, the breeder takes pollen from one type of plant and transfers it to the flower of another plant to produce progeny which incorporate the different characteristics of the two parents.[22] This procedure is called "crossing". As one might imagine, this method takes a great deal of time if several crosses must be made and does not always yield completely uniform results. A great deal of experimentation is required to ensure that the characteristic being bred into the plant will show up consistently each time the seed is planted.[23]

Using this technique, many different kinds of crosses can be performed which yield different results. For example, when two different inbred lines are crossed, the resulting plant is called a hybrid. Hybrids tend to be more vigorous and productive than the parents but these characteristics are not transmitted to a sufficient extent to the next generation. This creates a natural form of protection for the plant breeder and forces the farmer to buy new hybrid seeds each season.[24] Another crossing technique is breeding by selection. Using this technique, a favourable characteristic can be enhanced by selecting and propagating

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species and variety. See Library of Parliament (Research Branch), *Plant Breeders' Rights* by T. Curren (Hull, Que.: Supply & Services Canada, 1990) at 2. Thus, as alluded to above, the breeder manipulates plants in the lowest category.

[17]J.R. Thomson, *An Introduction to Seed Technology* (Toronto: John Wiley & Sons, 1979) at 240.

[18]Curren, *supra* note 16 at 2.

[19]R. Lewis, "Agritechnology: Building a Better Plant" in D. Calhoun, ed., *1988 Yearbook of Science and the Future* (Chicago: Encyclopaedia Britannica, 1988) 101 at 101.

[20]J.R. Welsh, *Fundamentals of Plant Genetics and Breeding* (New York: John Wiley & Sons, 1981) at 4.

[21]A cell is the basic building block of all living things.

[22]Welsh, *supra* note 20 at 69.

[23]Lewis, *supra* note 19 at 102.

[24]The use of this natural form of protection is discussed in J.J. Wolf, "The 'Genetic Message' from the Cornfields of Iowa: Expanding the Law of Trade Secrets" (1989) 38 Drake L. Rev. 631 at 634, n. 21.

plants with that characteristic. Similarly, to eliminate an unfavourable characteristic, these plants are simply eliminated from the stock.[25]

The traditional plant breeding methods described above cannot be used for all plants because some plants reproduce asexually without a pollination system. Examples of asexually reproducing plants are strawberries, potatoes, perennial grasses, legumes and rootstocks.[26] In some of these cases, a plant breeder must use cuttings of the plant in order to make the necessary crosses.[27]

Agritechnology involves the application of the latest biotechnological (genetic engineering) advances to agriculture. As already mentioned, this modern method of plant breeding is also founded in Mendel's principles of genetics and yields similar results to the traditional method. However, agritechnology saves time and space, introduces countless forms of new varieties, and ensures consistency in crop quality.[28] With this technique, rather than manipulating the characteristics of plants at the organismal level, as described above, the plant breeder manipulates cells. Two principal methods are used.

The first involves protoplast fusion followed by cell culture. Protoplast fusion involves removing the cell walls of the two different kinds of plant cells, suspending these protoplasts in a medium, and then adding a chemical or a current of electricity that fuses the protoplasts together. These fused protoplasts regenerate a cell wall and begin to multiply when placed in a nutrient medium.[29] From this cell culture, an undifferentiated mass of plant cells grows — a callus — which can be further manipulated to form artificial seeds.

The second method involves the use of a cell culture in conjunction with recombinant DNA technology to produce artificial seeds. In recombinant DNA technology, the gene which codes for a particular characteristic in one kind of plant is removed from its cell and inserted into the cell of another kind. This insertion technique requires a vehicle that can enter the plant cell. Plasmids, circular structures of genetic material which can hold the specific gene in question, and viruses can both be used as vehicles for insertion.[30]

Neither traditional nor modern plant breeding techniques are effective if there is an insufficient amount of germplasm (hereditary material) from which to select the varieties that will be crossed. All plant breeders recognize the importance of collecting, classifying, storing, maintaining and distributing plant genes. The Science Council of Canada confirmed the importance of having storage facilities when it recommended that "Canada needs a national system of culture collections that could be used by biotechnologists all across the country."[31] Thus, any comprehensive breeding program must include a gene storage program.

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[25]Curren, *supra* note 16 at 4-5.

[26]Welsh, *supra* note 20 at 79.

[27]*Ibid.* at 267.

[28]See Lewis, *supra* note 19 at 102.

[29]E.C. Cocking & R. Riley, "Application of Tissue Culture and Somatic Hybridization to Plant Improvement" in Frey, ed., *supra* note 10, 85 at 91.

[30]Weaver, *supra* note 15 at 834.

[31]*Seeds of Renewal*, *supra* note 2 at 5.

As can be seen from this brief description, plant breeding involves numerous advanced scientific techniques. It is a time-consuming process, and when performed on a large scale, it is a costly process. This suggests that plant breeders must be encouraged to invest their knowledge, time and money so that the public can benefit from the latest drought-resistant wheat or insect-resistant potato.

II. A Rationale for Providing Exclusive Ownership Rights in Newly Created Plant Varieties and a Method of Determining the Most Appropriate Type of Ownership Right

There is no reason to protect the creation of new plant varieties unless doing so would be in the public interest and in Canada's economic interest. Furthermore, there is no reason for choosing exclusive ownership rights as the means of protection unless there are clear advantages to using this type of system. In this Part, we identify Canada's economic interest as well as the public interest in the creation and protection of new plant varieties, and we provide a rationale for choosing ownership rights as the most appropriate form of protection for new plant varieties. We examine the rationale and the interests from a global perspective. Finally, having found that the exclusive ownership right is an appropriate form of protection, we determine how to recognize which type of ownership right best addresses the concerns of plant breeders, farmers and the public at large.

Canada's economic interest stems from the need to have its industries remain competitive in light of the increasing globalization of the world economy. At the moment, Canada's corporations and agricultural industry compete economically with those of other countries. However, in order to continue doing so, these corporations must gain a competitive advantage in the future. Although the best way to create such an advantage is by way of technological advancement,[32] it is often difficult to encourage companies to invest time and money into agricultural innovation when there is no guarantee that they will reap profits from their developments. In the absence of any kind of protection, there is the ever-present risk that the newly developed plant variety will be copied by a competitor, and consequently, inventors will be discouraged from undertaking any kind of innovative activity.

The general public also has an interest in technological advancement for several reasons. First, technological advancement brings about healthy economic change, which in turn provides a stable or improving standard of living for the public. Second, once technological advancement occurs, it is desirable that society be able to obtain access to inventions and to the knowledge that led to them. Obtaining access to such information can often be very difficult in the absence of any protection for the inventor. This is because inventors who finally choose to expend the necessary time and money fear losing their competitive advantage and, consequently, attempt to create their own protective mechanism

[32]See G.Y. Bertin & S. Wyatt, *Multinationals and Industrial Property: The Control of the World's Technology* (Atlantic Highlands, N.J.: Humanities Press International, 1988) at 24-26.

by keeping their invention secret. Third, apart from the benefits that the public reaps from technological advancements made by Canadian corporations, the public as a group of consumers has an interest in attracting the investment of foreign corporations so as to ensure that it is getting the best products for the best prices. As with domestic corporations, foreign corporations will be unwilling to do business in Canada in the absence of a system of protection.

Thus, unless a system of protecting inventions and the knowledge that led to them exists, technological advancement in the areas of agriculture and horticulture will be minimal and Canada and its people will lose in the long run.[33] Canada will fail to remain competitive and this will lead to an unhealthy economy, and to a Canadian society which is unable to educate itself with respect to the latest technological innovations in the area of plant breeding. The lack of a system of protection will also mean that Canadians will be unable to obtain some of the best agricultural products.

As already mentioned, biotechnology in the agricultural sector is one area in which significant technological advancements are occurring. At a time when the world's population continues to increase, and the world's biodiversity is at risk, these advancements are definitely in Canada's interest and in the public interest. They can lead to efficient crop production and to the creation of diverse kinds of crops. Furthermore, given the global need for food and biodiversity, wide distribution of biotechnological creations is essential so that everyone in the world can benefit.

However, a market structure involving large, multinational firms and domestic firms with large international markets will be the price society must pay so that everyone can access technological advances. This is because

> [t]he dimensions of national markets are often inadequate; and, therefore, in order to realise economies of scale in production and to spread the high research and development costs the firm will seek new, foreign, markets.[34]

Thus, agritechnological advancement must be seen in a global context.

To remain competitive, a firm will seek worldwide protection for its biotechnological advantage. Firms could try to protect themselves through the use of trade secrets, however, "[b]oth theoretical and empirical evidence shows ... that multinationals are more interested in establishing an efficient apparatus for protection primarily based on the use of patents."[35] Domestic corporations with international markets would likely have the same preference for patent-like protection. Because it is these corporations whose innovation we are trying to trigger, it is rather important to tailor the method of protection to their desires so long as that method does not carry with it great negative implications. This suggests that for Canada's corporations to be players in the global markets, for Canada's agricultural industry to gain access to the newest plant varieties, and

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[33]These economic policy arguments are usually put forward to justify patent-like legislation. See *e.g.* E.T. Penrose, *The Economics of the International Patent System* (Westport, Conn.: Greenwood Press, 1973) at 31-41.

[34]Bertin & Wyatt, *supra* note 32 at 10-11.

[35]*Ibid.*

for Canada to be attractive to foreign investors, Canada must provide some form of patent-like protection to plant breeders.

There are many forms of protection, but a patent-like system, based on proprietary rights, creates an appropriate trade-off between corporate desires and the needs of the general public. A patent-like system would benefit the public because it would make the new plant variety available for consumption or use, and provide disclosure of some key information about the new variety. Thus, either the *Patent Act* or a completely new patent-like scheme such as the *Plant Breeders' Rights Act*, could be used to provide protection. It is important to stress, however, that because of the globalization of this industry, either choice will only be effective if Canada's legislation becomes part of a network of such rights around the world.

Having found that patent-like ownership rights are preferred by the major innovators and provide positive results for the public, we are now in a position to be able to determine which ownership-based system is best. The system that is ultimately chosen must provide sufficient incentives to plant breeders to create new plants and sufficient disclosure to the public. The superior system is the one that provides a monopoly ownership right which is broad enough to encourage plant breeders to invest in biotechnological advancements, but no broader.

The appropriate legislative scheme is the one that creates a balance between the interests of breeders and of the public. However, because we have come to the conclusion here that a form of ownership right is the most appropriate form of protection, it is no longer appropriate to discuss the "interests" of the public and of the plant breeder. The term "balancing the interests" wrongly suggests that rights are held by two entities. Under an ownership scheme, rights will be granted to one entity only. It is, therefore, more accurate to describe an ownership situation as does Fitzgerald in *Salmond on Jurisprudence*.[36] Fitzgerald describes ownership as a right which has a residual character in which unrestrained activity is allowed.

Therefore, it is best to state that the most appropriate legislative scheme will be the one that creates a balance between the scope of the ownership right and the size of the residual liberties of farmers and breeders to use the creation for their own purposes. I use the terms "rights" and "residual liberties" to make the distinction between the access to plant varieties and to germplasm which is exclusive to the holder of the right, and the residual access to the plant variety and to the germplasm which remains for the public following a grant of the right. This residual access is a liberty, in the jurisprudential sense, because the public at large is at liberty to obtain access to certain aspects of the innovation. This language of rights and liberties will be used throughout the paper when an ownership-based protection scheme is being evaluated.

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[36]See P.J. Fitzgerald, *Salmond on Jurisprudence*, 12th ed. (London: Sweet & Maxwell, 1966) at 215-49. Fitzgerald describes ownership as a right which has a residual character (*ibid.* at 247). This residual character could be seen to encompass the liberties of persons to have free access to new plant varieties or to germplasm. Fitzgerald describes liberties as the areas within which the law permits unrestrained activity (*ibid.* at 224-28).

III. The Possibility of Patenting a Plant under the Canadian *Patent Act*

If we accept that the granting of a proprietary right is the best way to encourage investment in the creation of new plant varieties, it is then important to determine whether a patent right is the most appropriate form of protection, or whether a *sui generis* right would be more appropriate. If a new plant variety could be patented, then the scope of the protection would be large in that the recipient would acquire the exclusive right to make, use and sell the new plant variety.[37]

The *Patent Act* contains three main requirements that a creation must meet before it can be seen as a patented invention. First, the creation must be an "art, process, machine, manufacture, or composition of matter."[38] It follows that the creation must be a product of human intervention and not a product of nature. Second, the creation must be new, useful and non-obvious.[39] If these first two criteria are met, then the creation will qualify as an invention. The third criterion, that of proper disclosure, is the final one that must be met before the invention is patentable. Subsection 34(1) of the *Patent Act* sets out the extent of the necessary disclosure:

> **34.** (1) An applicant shall in the specification of his invention
> (*a*) correctly and fully describe the invention and its operation or use as contemplated by the inventor;
> (*b*) set out clearly the various steps in a process, or the method of constructing, making, compounding or using a machine, manufacture or composition of matter, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most closely connected, to make, construct, compound or use it;
> (*c*) in the case of a machine, explain the principle thereof and the best mode in which he has contemplated the application of that principle;
> (*d*) in the case of a process, explain the necessary sequence, if any, of the various steps, so as to distinguish the invention from other inventions.

The purpose of this disclosure requirement is to permit the public to benefit from the knowledge that led to the invention and to reproduce the invention.

Applying these three requirements to a non-conventional creation such as a new plant variety introduces numerous conceptual difficulties and stretches the meaning of the *Patent Act*. First, plants are peculiar candidates for patenting because, as living things, they reproduce. Because reproduction is a natural occurrence, and plant breeding relies on this reproduction to create new plants, it is often difficult to distinguish between changes that have come about naturally and those that have resulted from human intervention. This in turn makes it difficult to classify a plant, or its propagating material, as a "manufacture" or a "composition of matter". The second problem with obtaining a utility patent for a plant is the difficulty in meeting the written disclosure requirement.

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[37] *Patent Act*, *supra* note 9, s. 42.
[38] *Ibid.*, s. 2 (definition of "invention").
[39] *Ibid.*, ss. 2, 27.

In the United States, these two difficulties led Congress to enact the 1930 *Plant Patent Act*[40] and the 1970 *Plant Variety Protection Act*.[41] As we shall see, however, it is now accepted in the United States that utility patents can be obtained for plants. Canada, on the other hand, has taken its usual slow and cautious approach with respect to frontier questions in intellectual property. It was only in 1990 that Parliament adopted specific intellectual property legislation for plants, and to this day, Canadian courts have not accepted that plants are patentable. In fact, the official position of the Canadian Patent Office is that "[p]lants and animals are not patentable subject matter."[42]

The Supreme Court of the United States ushered in a new era by granting intellectual property rights in living things in *Diamond* v. *Chakrabarty*.[43] In that case, the Court held that a live, human-made micro-organism was a "manufacture" or "composition of matter" and was therefore patentable subject matter. This conclusion stemmed from the Court's finding that "Congress intended statutory subject matter to 'include anything under the sun that is made by man'."[44] This broad approach led to the subsequent revolutionary decision in *Ex parte Hibberd*,[45] which stands for the proposition that plants, seeds and tissue cultures can be protected by utility patents as well as by the specific plant protection statutes. In the case, the maize seeds were held not to be patentable because "[t]he disclosure [was] inadequate to enable one skilled in the art to make and use the invention." However, the Patent and Trademark Office Board of Appeals and Interferences did suggest that, as with micro-organisms, deposition of the seed in a permanent collection, freely accessible to anyone after the patent is issued, would constitute sufficient disclosure.[46]

After the United States' bold approach to the patenting of micro-organisms, Canada's Patent Appeal Board and Commissioner of Patents followed suit in *Re Application of Abitibi Co*.[47] The Board found that micro-organisms were patentable under the *Patent Act*[48] and concluded that the ideal form of disclosure would include both their deposit and a written description. "But if the organism [could] subsequently only be reproduced from itself, [the Board did] not see why the inventor should be deprived of his reward provided, by deposition, he [made] it available to others."[49]

The Canadian equivalent of *Ex parte Hibberd* is *Pioneer Hi-Bred Ltd.* v. *Canada (Commissioner of Patents)*.[50] However, when faced with the question of

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[40]35 U.S.C. §§ 161-64 (1988).

[41]7 U.S.C. §§ 2321-2582 (1988).

[42]Canadian Patent Office, *Manual of Patent Office Practice* (Ottawa: Canadian Patent Office, 1990) para. 12.03.01.

[43]447 U.S. 303 (1980).

[44]*Ibid.* at 309.

[45]227 U.S.P.Q. 443 (1985). See also N.J. Seay, "Protecting the Seeds of Innovation: Patenting Plants" (1989) 16 AIPLA Q.J. 418, which discusses the impact of this case.

[46]*Ex parte Hibberd, ibid.* at 447.

[47](1982), 62 C.P.R. (2d) 81.

[48]*Ibid.* at 88.

[49]*Ibid.* at 91.

[50][1989] 1 S.C.R. 1623, 60 D.L.R. (4th) 223, 25 C.P.R. (3d) 257, 25 C.I.P.R. 1 [hereinafter *Pioneer Hi-Bred* cited to S.C.R.], aff'g (*sub nom. Re Application for Patent of Pioneer Hi-Bred*)

protecting a new soybean variety which had been developed through artificial cross-breeding, the Supreme Court of Canada handed down a highly unsatisfying and highly criticized judgment.[51] The Court chose not to address the pressing question of whether plants were patentable subject-matter, but rather decided the case on the issue of whether there had been sufficient disclosure. The Court held that the patent applicant had failed to disclose everything that was essential to permit others to duplicate the "invention"; only the materials were mentioned but not the plant breeding method. The Court also decided that the deposit of a sample of the seed of the new variety did not meet the disclosure requirements of the *Patent Act*.[52]

As emphasized by Ledgley and Stewart, this case did not determine whether or not higher life forms are patentable in Canada, but rather only that the deposit of a sample of a new plant variety, by itself, does not meet the disclosure requirements of the *Patent Act*.[53] The decision in *Pioneer Hi-Bred* was limited to the question of sufficiency of disclosure because of the lack of judicial expertise in scientific areas,[54] combined with Pioneer Hi-Bred's weakness in the preparation of its case.[55]

A detailed critique of the reasoning applied in *Pioneer Hi-Bred* by the various courts is beyond the scope of this paper. Suffice it to say that many questions were left unanswered and that, of the questions that were addressed, many were addressed poorly. For example, the Supreme Court stated that "[t]he intervention made by Hi-Bred does not in any way appear to alter the soybean reproductive process, which occurs in accordance with the laws of nature."[56] This fails to take into account the following point made by Mr. Justice Frankfurter of the United States Supreme Court:

> It only confuses the issue, however, to introduce such terms as "the work of nature" and "laws of nature." For these are vague and malleable terms infected with too much ambiguity and equivocation. Everything that happens may be deemed "the work of nature," and any patentable composite exemplifies in its properties "the laws of nature."[57]

Inherent in the Court's thinking about the "laws of nature" concept was the potential difference that could exist between the patenting of new plant varieties created by traditional and modern plant breeding techniques.[58] Creating such a

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[1987] 3 F.C. 8, 11 C.I.P.R. 165, 14 C.P.R. (3d) 491 (C.A.), aff'g (1986), 11 C.P.R. (3d) 311 (Pat. App. Bd. & Pat. Comm'r.).

[51]See *e.g.* R.W. Marusyk, "The Patentability of New Plant Life Forms in Canada" (1990) 16 Can. Bus. L.J. 333 at 340.

[52]*Pioneer Hi-Bred, supra* note 50 at 1643.

[53]C.J. Ledgley & M.I. Stewart, "Patent Protection for Plants and Animals in the Wake of Pioneer Hi-Bred" (1990) 7 Can. Intell. Prop. Rev. 290 at 290-91.

[54]This point is clearly illustrated in J.R. Rudolph, "Biotechnology, Pioneer Hi-Bred and Patent Law: Judicial Expertise Missing?" (1990) 7 Can. Intell. Prop. Rev. 69.

[55]*Pioneer Hi-Bred, supra* note 50 at 1640-41.

[56]*Ibid.* at 1634.

[57]*Funk Brothers Seed Co.* v. *Kalo Inoculant Co.*, 333 U.S. 127 at 134-35 (1948). See also E.J. Sease, "From Microbes, to Corn Seeds, to Oysters, to Mice: Patentability of New Life Forms" (1989) 38 Drake L. Rev. 551 at 557.

[58]*Pioneer Hi-Bred, supra* note 50 at 1640-41. This distinction with respect to the patentability

difference in patentability would likely seem artificial to a plant breeder since the same effort may be involved using either technique, and the same result may be obtained.

The impact of *Pioneer Hi-Bred*, whether or not the judgment was strong or weak, remains the same: the possibility of patenting plants in the near future appears slim in Canada. The Patent Office and the Federal Court of Canada have refused to regard plants, pods and seeds as patentable subject matter.[59] The Supreme Court has not commented on this issue other than indicating that "[it] must ... be very cautious regarding the scope of [its] pronouncements."[60] Furthermore, it has placed an onerous disclosure requirement on the plant breeder which may be difficult to meet.

The inability of plant breeders to secure protection in Canada under the *Patent Act* in the wake of *Pioneer Hi-Bred*, highlighted the need for specific plant breeders' rights legislation. In any event, patent legislation is not entirely appropriate in that it does not strike the proper balance between the residual liberty of the public to freely access plant varieties, and the exclusive ownership rights of plant breeders to exploit their new plants and plant genes. This is because such legislation creates a very strong monopoly right of ownership. As argued in the previous Part, if a narrower monopoly right can provide sufficient financial incentive to stimulate plant breeding, then it should be used. The rights typically contained in plant breeders' rights legislation are less exclusive than those contained in patent legislation.[61] The Canadian *Plant Breeders' Rights Act* both addresses the incentive problem and provides a more favourable allocation of rights and residual liberties.

IV. The Canadian *Plant Breeders' Rights Act*

The previous three Parts provided the necessary background information to understand the *Plant Breeders' Rights Act*. We found that creating exclusive ownership rights, if drafted properly, could strike a proper balance between the interests of plant breeders and those of the public. We also found that the *Patent Act* would have to be broadly interpreted if it were to apply to plant varieties and that, in any case, patents cannot strike an appropriate balance between these competing interests. This Part will focus on the *Plant Breeders' Rights Act* itself by examining the preliminary and subsequent requirements for eligibility, and the degree of protection afforded by the *Act*.[62] This analysis will demonstrate

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of various breeding techniques is also made in the *Manual of Patent Office Practice*, *supra* note 42. At para. 12.03.02, the *Manual* states:

> Inventions for new plants and animals are not patentable. Processes for producing plants and animals which require significant technical intervention by man may be patentable. Traditional biological breeding processes used for the production of plants and animals are considered essentially natural biological processes and are not patentable.

[59]See *Pioneer Hi-Bred Ltd.* v. *Canada (Commissioner of Patents)*, [1987] 3 F.C. 8 at 13-14, 11 C.I.P.R. 165 (C.A.).

[60]*Pioneer Hi-Bred*, *supra* note 50 at 1632.

[61]This point is illustrated very well in W.L. Hayhurst, "Exclusive Rights in Relation to Living Things" (1991) 6 I.P.J. 171 at 185.

[62]Unfortunately, as of the writing of this paper, no cases have been heard interpreting the *Act*. Therefore, the analysis will be based on the content of the *Act* only.

that the *Act* was created for valid reasons, that it is drafted with the peculiarities of plants in mind, and that it strikes the appropriate balance between the interests in question.

A. Preliminary Requirements of the Act

Just as the *Patent Act* requires that the art, process, machine, manufacture or composition of matter to be patented be new, useful and non-obvious,[63] the *Plant Breeders' Rights Act* contains equivalent preliminary requirements which must be satisfied. Subsection 4(1) states that the *Act* will apply to a variety that is prescribed by regulation and which is found to be a new variety by the Commissioner, pursuant to the procedure set out in subsection 27(1). In section 2, the *Act* describes a new variety as being one that complies with the requirements in section 4. A plant variety is described in section 2 as "any cultivar, clone, breeding line or hybrid of a prescribed category of plant that can be cultivated."

The *Plant Breeders' Rights Regulations*[64] set out the categories to which the *Act* and the *Regulations* apply: african violet, alfalfa, apple, barley, bean, cherry, chrysanthemum, corn, dianthus, flax, grapes, oats, pea, pear, poinsettia, potato, potentilla, rape, rose, soybean, strawberry, wheat and yew. Pursuant to international obligations, the number of eligible varieties will have to increase with time. For now, however, the application of the *Act* is limited to plant breeders producing a new variety in one of these categories.

Within this subset of plant varieties, the application of the *Act* is further restricted by subsection 4(2) of the *Act*. Subsection 4(2) states that a plant variety will qualify as a new variety if it:

> (*a*) is, by reason of one or more identifiable characteristics, *clearly distinguishable* from all varieties the existence of which is a matter of *common knowledge* at the effective date of application for the grant of the plant breeder's rights respecting that plant variety;
> (*b*) is *stable* in its essential characteristics in that after repeated reproduction or propagation or, where the applicant has defined a particular cycle of reproduction or multiplication, at the end of each cycle, remains true to its description; and
> (*c*) is, having regard to the particular features of its sexual reproduction or vegetative propagation, a *sufficiently homogeneous* variety [emphasis added].

Section 4(3) adds:

> (3) In paragraph (2)(*c*), *"sufficiently homogeneous variety"* means such a variety that, in the event of its sexual reproduction or vegetative propagation in substantial quantity, any variations in characteristics of plants so reproduced or propagated are *predictable, capable of being described and commercially acceptable* [emphasis added].

When determining whether a plant variety is a matter of *"common knowledge"* in paragraph 4(2)(*a*) of the *Act*, section 5 of the *Regulations* states that the following criteria should be considered:

> (*a*) whether the variety is already being cultivated or exploited for commercial purposes; or

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[63]*Patent Act*, *supra* note 9, ss. 2 (definition of "invention"), 27.
[64]SOR/91-594 as am. by SOR/93-87, sch. I [hereinafter *Regulations*].

(*b*) whether the variety is described in a publication that is accessible to the public.

The preliminary requirements of subsection 4(2) can be summarized as requiring the plant variety to be: (1) clearly distinguishable or distinct; (2) stable; and (3) sufficiently homogeneous. The additional information provided in the enumerated sections qualify these three requirements and help to determine whether they have been met. Notice that there is no "utility" requirement as found in the *Patent Act* but that there are "stable" and "sufficiently homogeneous" requirements which were introduced due to the nature of plant breeding. As mentioned in Part I, breeding involves crossing two different kinds of plants to introduce, accentuate or remove certain characteristics which render the variety "new". Stability and homogeneity are reached only after numerous crosses so that the gene coding for the characteristics becomes a part of the plant's complement of genetic material.

In addition to the requirements of section 4, section 7 contains the "no prior commercialization" requirement. In this section, the *Act* provides that a new variety will not qualify for protection if a breeder, or his or her legal representative, sold or concurred in the sale of that variety either inside or outside of Canada prior to the effective date of the application.[65] The effective date is the date on which the application is received by the Commissioner, or a date prescribed by the *Regulations*.

We can see that if a plant: (1) is prescribed in Schedule I of the *Regulations*; (2) is clearly distinguishable, or distinct; (3) is stable; (4) is sufficiently homogeneous; and (5) has not been commercialized, then it has satisfied the preliminary requirements of the *Act* and is on its way to being granted protection. The fact that the plant breeder need not prove that the variety is useful somewhat reduces the threshold that must be met to qualify for a plant breeder's right. As we will see later, the lower threshold for the requirements results in a more limited grant of rights than those provided by the *Patent Act*.

B. Subsequent Requirements of the Act

Once the threshold test has been met, the plant breeder must provide sufficient disclosure about the new variety, must maintain the propagating material, and must give the new variety a denomination, or a name.

The need to disclose certain information about the variety is hinted at in subsection 4(3) which was set out above. This section states that the characteristic must be "capable of being described". The disclosure requirement is elaborated in paragraph 9(1)(*c*), which provides that an application for the grant of any plant breeder's rights must be "supported by the documents and any other material prescribed." Sections 19-21 of the *Regulations* describe in more detail that information which must be provided to the Commissioner. Most of section 19 contains administrative information that is easily ascertainable; however,

[65]Although the description of the prior sale provisions in this paper is short, it suffices for the purposes of this paper. For specific questions regarding these provisions, please refer directly to the details of the wording found in s. 7 of the *Act*, *supra* note 5.

paragraphs (*i*) and (*n*) are of particular interest. Paragraph 19(1)(*i*) requires that the manner in which the plant variety was developed be disclosed. Paragraph 19(1)(*n*) requires disclosure of the manner in which the propagating material will be maintained. Section 20 of the *Regulations* contains the following additional disclosure requirement:

> **20.** An application referred to in subsection 19(1) shall be supported by
> (*a*) the results of comparative tests and trials to demonstrate that the plant variety is a new variety; and
> (*b*) photographs and a detailed description of the plant variety that illustrate that the plant variety is clearly distinguishable pursuant to paragraph 4(2)(*a*) of the Act.

In order to verify the information that is in the application, the *Act* has created what could be described as an "ongoing disclosure obligation". Section 30 requires that the applicant maintain the propagating material throughout the period of registration, that is, throughout the entire period that the applicant has been granted rights under the *Act*.[66] The applicant must maintain the propagating material so that, upon request, the Commissioner may be provided with the new variety. Furthermore, the Commissioner has the right to inspect the maintenance facility.

Apart from the initial and ongoing disclosure obligations, the plant breeder must designate the new variety by a denomination pursuant to section 14. If the proposed denomination is unsuitable, misleading or confusing then the Commissioner can request that the denomination be changed. Because Canada's legislation is part of an international framework of plant breeders' rights, the *Act* also provides for international uniformity with respect to a new variety's denomination.[67] The denomination becomes the generic name of the new variety[68] and must be clearly recognizable from the variety's trade-mark or trade name.[69]

We see from the preliminary and subsequent requirements that the *Plant Breeders' Rights Act* is much better tailored than the *Patent Act* to the particular characteristics of plants. As a result, fulfilling these requirements is a much less onerous task for the plant breeder. We will see below that in return for these specifically tailored and less onerous requirements a narrower monopoly right is granted.

C. Degree of Protection

Having considered the requirements for protection under the *Act*, we now come to the most important section in this entire discussion on the *Plant Breed-*

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[66]Section 2 of the *Act*, *ibid.*, defines "propagating material" as "any reproductive or vegetative material for propagation, whether by sexual or other means, of a plant variety, and includes seeds for sowing and any whole plant or part thereof that may be used for propagation."

[67]*Ibid.*, s. 14(4). S.D. Schlosser, "The Registration of Plant Variety Denominations" (1988) 29 IDEA 177, elaborates on the the international requirements for these denominations as set out in article 13 of the UPOV Convention (*infra* note 89) and criticizes the requirements' inadequacies.

[68]*Ibid.*, s. 15.

[69]*Ibid.*, s. 14(6).

ers' Rights Act: the degree of protection provided. There are three reasons for this section's importance. First, the protection afforded by the *Act* is what underlies the *Act*'s existence. Plant breeders will not bother applying for these rights if they do not feel that the gains outweigh the costs in terms of the time and money required to create a new plant variety and then to apply for the certificate. Likewise, the cost of disclosing what is often highly sensitive information may also be too high a price to pay if there is an insufficient degree of protection.[70] Second, the degree of protection is important because it determines the monopoly protection that is granted to the breeder, and the consequent restriction on the ability of other groups such as farmers and other plant breeders to use the variety. Third, the global consequences of having such rights in Canada, as well as in other industrialized countries, may be related to the degree of protection, as we will see later. The protection afforded under the *Act* includes: the nature and term of the actual monopoly right, the ability to assign this right, the ability to get a protective direction, and finally, the mechanisms available to enforce the right. This protection can be limited by a compulsory licence issued to another person by the Commissioner, as set out in sections 32 and 33 of the *Act*.

The nature of plant breeders' rights is described in subsection 5(1):

> 5. (1) Subject to this Act, the holder of the plant breeder's rights respecting a plant variety has the exclusive right
> (*a*) to sell, and produce in Canada for the purpose of selling, propagating material, as such, of the plant variety;
> (*b*) to make repeated use of propagating material of the plant variety in order to produce commercially another plant variety if the repetition is necessary for that purpose;
> (*c*) where it is a plant variety to which ornamental plants or parts thereof normally marketed for purposes other than propagation belong, to use any such plants or parts commercially as propagating material in the production of ornamental or cut flowers; and
> (*d*) to authorize, conditionally or unconditionally, the doing of an act described in paragraphs (*a*) to (*c*).

According to section 2, the word "sell" in subsection 5(1) includes "agree to sell, or offer, advertise, keep, expose, transmit, send, convey or deliver for sale, or agree to exchange or to dispose of to any person in any manner for a consideration." Subsection 5(2) states that the exclusive right in paragraph 5(1)(*a*) does not apply to the sale of the propagating material outside of Canada. But, if that propagating material is subsequently used in Canada, this will constitute infringement of the holder's rights. Subsection 5(3) states that the sale by the holder of the right to a purchaser implicitly authorizes the purchaser to resell the propagating material as a distributor might do. However, a sale does not authorize the purchaser to produce the propagating material and then to sell it. Finally, subsection 5(4) allows the plant breeder to require that royalties be paid by a party to whom authority has been conferred under paragraph 5(1)(*d*).

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[70]When breeders find that the cost of disclosure is too costly, they will look to trade secrets as an alternate form of protection. The factors that determine whether or not to disclose are discussed in W.L. Casey, Jr. & L.S. Moss, "Intellectual Property Rights and Biotechnology" (1986) 27 IDEA 251.

All of the rights described in section 5 exist for a term of eighteen years, as stated in subsection 6(1). This term is from the date of issue of the certificate and is subject to the necessary maintenance fees. The rights can be assigned in accordance with section 31 and are enforced by means of civil remedies as set out in sections 41-51. In addition, when applying for the grant of a plant breeder's right, a breeder can also apply for a protective direction under sections 19-21. A protective direction will give a breeder the same kind of protection it would have with a plant breeder's right while the application is pending in the Plant Breeders' Rights Office, on two conditions. First, the breeder must subsequently be granted the right. Second, every person applying for a protective direction must undertake to sell only in three cases: in good faith for purposes of scientific research; as part of a transaction involving the sale of the plant breeder's rights; or for the purposes of accumulating stock for subsequent resale by that other person.[71] This undertaking to sell only in particular circumstances is only applicable prior to any grant of plant breeders' rights.

At a later date, if a person opposing the grant of a plant breeder's rights certificate makes an application under section 32, the Commissioner may decide that the right must be qualified by a compulsory licence. Determining whether such a licence should be granted involves the weighing of two competing interests.[72] On the one hand, the Commissioner wishes to ensure that the "plant variety is made available to the public at reasonable prices, is widely distributed and is maintained in quality."[73] On the other hand, the Commissioner must keep in mind one of the main purposes of the *Act*, namely that "there is reasonable remuneration, which may include royalty, for the holder of the plant breeder's rights respecting the plant variety."[74] A compulsory licence could have a serious detrimental effect on a plant breeder trying to maximize a return on research investment. This is because a licence automatically reduces the scope of the artificially created monopoly of the breeder.

D. Understanding the Scope of Protection Provided by the Act

What protection does a plant breeder get from a grant under the *Plant Breeders' Rights Act*? It is important to note that the right only relates to the propagating material. This includes the seed, artificial or natural depending on the breeding technique, and the cuttings, or parts of the plant, if the plant reproduces vegetatively. The rights do not extend to the actual plant. This is done because, unlike inert objects that are patentable, and unlike unicellular organisms that replicate into exact copies of each other, higher organisms such as plants start off from a cell and then grow and differentiate into a complete plant. The difficulty lies in having to decide what should and should not be protected. Legislators have chosen to address this particular concern by creating a separate "patent-like act" for plants and to limit the protection to the seed or other propagating material.

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[71] *Act*, *supra* note 5, s. 19(2).
[72] *Ibid.*, s. 32(2).
[73] *Ibid.*, s. 32(2)(*a*).
[74] *Ibid.*, s. 32(2)(*b*).

This fundamental point is better explained by means of an example. In the case of a wheat crop that reproduces by means of seeds, there is no exclusive right to the plant that grows from the seed that is sold. The breeder has the exclusive right to produce the seed and to sell it. However, once sold to a farmer, the farmer can grow the seed into a plant, sell the plant and retain these profits. The profits from the sale of the plant, of the actual wheat, are not those of the breeder, and the act of selling the wheat does not constitute infringement. The farmer can also plant the seed, grow it, retain the subsequent seed, grow the subsequent seed and then sell the resulting plant without infringing a breeder's exclusive rights. This last limitation on the holder's right is often referred to as the "farmer's exemption". Likewise, if a breeder had a plant breeders' rights certificate, sold seeds to a farmer, and then the farmer resold these seeds to someone else, this would not constitute infringement either, as a result of subsection 5(3).[75] Of course, if the farmer were to plant the seed, grow it and then subsequently sell the new seeds that are generated, this would constitute infringement.[76]

Thus, the holder of the right has an exclusive right to sell the propagating material in Canada. Furthermore, although the right does not extend to sales outside of Canada, if the propagating material is subsequently used in Canada, the subsequent use will constitute infringement.

In addition to the exclusive right to sell the propagating material, the breeder has the exclusive right to repeatedly use the propagating material of the new variety in order to produce subsequent plant varieties. At first glance, this right does not seem to provide for the breeder's exemption found in the UPOV Convention, which is the international agreement creating the international network of plant breeders' rights.[77] This exemption provides that a protected variety may be used as an initial source of variation by other breeders for the purpose of creating other varieties. However, this would be an incorrect interpretation of the right. As we shall see in Part VI, the *Act* was created in order to ratify the UPOV Convention. *National Corn Growers Ass'n* v. *Canada (Import Tribunal)*[78] established that enabling legislation must be interpreted in light of the international convention which is being implemented. Therefore, because the UPOV Convention contains a breeder's exemption, such a right must also exist under the *Act*.

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[75]This scenario is similar to the situation in *Canmar Grain Inc.* v. *Radloff* (1986), 52 Sask. R. 161, [1987] 6 W.W.R. 427 (Q.B.), which was labelled as Canada's first plant breeders' rights case in P. Cramer, "Canada's First Plant Breeders' Rights Case Blooms in Sask." *The Lawyer's Weekly* (11 July 1986) 8. In that case, however, there was no legislation yet in place. The dispute arose from the breach of an exclusive distribution agreement with a farmer. The breach occurred because the farmer sold seeds to other farmers when the contract prevented such distribution.

[76]For further exploration of this type of exemption, please refer to the American Court of Appeals Federal Circuit decision in *Asgrow Seed Co.* v. *Winterboer*, 25 U.S.P.Q. 2d 1202 (1992). In that decision, the Court discussed the scope of the crop exemption (the American equivalent to the farmer's exemption) in the context of the American *Plant Variety Protection Act*, 7 U.S.C. §§ 2321-2582 (1988).

[77]See *infra* note 89 and accompanying text.

[78][1990] 2 S.C.R. 1324 at 1371, 74 D.L.R. (4th) 449 at 482-83 [hereinafter *National Corn Growers* cited to S.C.R.].

Plant breeders' rights seem to be somewhat similar to the *Patent Act* and dissimilar to the *Copyright Act*[79] in that a breeder need not prove that his or her variety was actually copied in order to prove infringement. To prove infringement, it is sufficient to show that the infringing variety is the same as the protected variety. On the other hand, as pointed out by Hayhurst, the *Act* is similar to the *Copyright Act* in that it expressly allows a holder of plant breeder's rights to authorize the performance of acts within his or her exclusive domain.[80]

E. Dual Protection of Plants under the Patent Act *and the* Plant Breeders' Rights Act

We have examined the content of the rights granted under the *Act* and have compared some of these rights with those granted under other intellectual property statutes. However, two important questions remain unanswered. First, if a plant breeder's right refers to the propagating material, does this include the genetic material within the seed? Second, could parts of the seed, the actual seed, or the whole of the plant still be patented if the seed is already protected under the *Act*? The answer to the first question affects the answer to the second question.

If the breeder has the exclusive right to make repeated use of the seed in order to create subsequent varieties, then the breeder must have some kind of exclusive right to the cells and the genes within the seed. This exclusive right would likely refer to the entire complement of genes as arranged in the plant variety, but would not extend to the individual genes. The exclusive right cannot extend to individual genes because, according to the breeder's exemption, other plant breeders have the right to use a new plant variety as an initial source of variation. Given that variation in a plant occurs due to changes in its gene complement, it follows that in order to exercise the breeder's exemption a breeder must be given unencumbered access to the individual genes.

Having determined the answer to the first question, we can consider the issue of dual protection. In answering this question, we must distinguish between the seed and the plant, and the parts within the seed.

We have seen the reluctance of the Supreme Court of Canada to allow patent protection for the plant, seed and pod of a soybean variety in *Pioneer Hi-Bred*. We have also found that patent protection is unnecessary to provide plant breeders with a sufficient financial incentive to produce new plant varieties. It is therefore unlikely that a lower court would be willing to protect plants and seeds, especially if they are already being protected by the *Plant Breeders' Rights Act*. Furthermore, as we will see more clearly below, because Canada is now a party to the UPOV Convention on plant breeders' rights, Canadian courts are prevented from granting protection under both a patent act and a plant breeders' rights act. The answer with respect to patenting parts of the seed is

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[79]R.S.C. 1985, c. C-42.

[80]These points about similarities and differences of the *Act* and the *Copyright Act* are made in Hayhurst, *supra* note 61 at 186. This article is worth reading as it is one of the few articles that has looked at Canada's *Plant Breeders' Rights Act*. An American article suggests that an intellectual property right that protects a plant is most similar to a copyright (D.B. Bernstein, "Is a Plant Patent a Form of Copyright?" (1986) 27 IDEA 31).

more difficult. Hayhurst argues that despite this ban on dual protection, plant breeders may be able to get protection for cell lines, modified cells, genes and plasmids under the *Patent Act*.[81] However, if we consider that the breeder has some exclusive rights that extend to the complement of genes in the new variety, then the ban on dual protection would still hold with respect to the genes and the cells. This would mean that no further protection could be afforded by the *Patent Act*. Of course, if a breeder could show that the *Patent Act* allowed for the patenting of plant cell lines, plant cells and plasmids in the 1960s, when the international convention on point was open for signature, then Hayhurst may be right. This is because the international agreement in question provides an exception to the ban on dual protection where such protection was allowable at the time specified above.[82]

Having considered the technical arguments that can be made supporting and opposing dual protection, we should also examine what kind of effect dual protection would have on the delicate balance between the proper allocation of rights and residual liberties. At this more abstract level of analysis, it is clear that the balance created by the *Plant Breeders' Rights Act* would be destroyed if dual protection were allowed. The protection of plants would not be limited to the propagating material, nor would the exclusive right be subject to the farmer's and breeder's exemptions.

V. The International Phenomenon of Plant Breeders' Rights

In the previous Part, we explored the content of Canada's *Plant Breeders' Rights Act* and found that at a domestic level the legislation balances the rights of plant breeders and the residual liberties of the public by confining the right to the propagating material, and by providing exemptions for farmers and breeders. In this Part, we examine this legislation in the international context as it exists now, and as it may potentially exist in the future. Consideration of this context is essential because agritechnology has taken on a global perspective as we saw in Part II. Understanding these rights at the international level will allow us to make a final evaluation of the positive and negative impacts of plant breeders' rights legislation.

A. *The Existing International Network of Plant Breeders' Rights under the UPOV Convention*

The need to provide plant breeders with protection was recognized well before the Canadian *Plant Breeders' Rights Act* was proclaimed into force on

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[81] *Ibid.* at 187-88. This, in fact, also seems to be the position of the Canadian Patent Office.

[82] *International Convention for the Protection of New Varieties of Plants*, 2 December 1961, 815 U.N.T.S. 89, arts. 2(1), 31, 37. The exception to the ban on dual protection arises from the joint operation of article 2(1), which creates the ban on dual protection, article 31, which specifies the time at which the Convention was to enter into force, and article 37, which states the following: "This Convention shall not affect existing rights under the national laws of member States of the Union or under agreements concluded between such states." Countries which protected plants by way of patent legislation before the coming into force of the Convention were able to continue doing so since article 2(1) did not affect these existing rights. The United States was such a country.

1 August 1990.[83] The first country to enact such legislation was the Netherlands, in 1941. Now there are more than 900 seed trading firms actively engaged in plant breeding in that country.[84] Similar increases in plant breeding activity occurred[85] in the United Kingdom and in the United States after these countries enacted similar legislation in 1964,[86] and in 1930 and 1970,[87] respectively. The results from New Zealand are also encouraging: "[I]ts [plant variety rights] legislation in 1974 [resulted] in a five-fold increase in available plant varieties and the development of a valuable export industry in pasture and crop seeds."[88]

Because plant trading is not restricted to domestic markets, countries with plant breeders' rights legislation moved in 1961 to protect their investments in export markets through an international agreement. The International Union for the Protection of New Varieties of Plants was created by the first UPOV Convention, signed on 2 December 1961. The acronym is derived from its French name — *Union pour la protection des obtentions végétales*. The Convention was revised on 10 November 1971 and again on 23 October 1978. Canada became a party to the Convention on 4 March 1991.[89] The following twenty countries are signatories to the 1978 UPOV Convention: Australia, Belgium, Canada, Denmark, France, Germany, Hungary, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Poland, South Africa, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Canada ratified the 1978 UPOV Convention by enacting the *Plant Breeders' Rights Act*. It is for this reason that the *Act* is referred to as "implementing legislation". Justice Gonthier, speaking for the majority of the Supreme Court of Canada, established the importance of considering the relevant international agreement when analyzing implementing legislation:

> [W]here the domestic legislation is unclear it is reasonable to examine any underlying international agreement. In interpreting legislation which has been enacted with a view towards implementing international obligations, as is the case here, it is reasonable for a tribunal to examine the domestic law in the context of the relevant agreement to clarify any uncertainty. Indeed where the text of the domestic law lends itself to it, one should also strive to expound an interpretation which is consonant with the relevant international obligations.

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[83]The following publication provides a very good explanation of the various pieces of legislation which existed worldwide before Australia and Canada passed similar plant breeders' rights legislation: Australia, Parliament of the Commonwealth, Senate Standing Committee on National Resources, *Plant Variety Rights* (Canberra, Aust.: Australian Government Publishing Service, 1984) at 1-9.

[84]*Minutes*, *supra* note 1, No. 6 at 24.

[85]*Ibid.*, No. 6 at 24-25.

[86]The United Kingdom enacted the *Plant Varieties and Seeds Act 1964* (U.K.), 1964, c. 14, to give effect to the 1961 UPOV Convention, which was amended by the *Plant Varieties Act 1983* (U.K.), 1983, c. 17, to give effect to the 1978 UPOV Convention. See Common Law Institute of Intellectual Property, *The Scope of Intellectual Property Protection for Plants and Other Life Forms* (Report, Part 1) by N.J. Byrne (London: Intellectual Property, 1989) at 3.

[87]*Supra* notes 40, 41.

[88]J.G. Starke, "A New Class of Personal Property By Statute" (1989) 63 Aust. L.J. 515 at 517.

[89]The 1961-UPOV Convention can be found at 815 U.N.T.S. 89, U.K.T.S. 74 (1962) whereas the 1978 amendments are found at U.K.T.S. 11 (1984). The 1991 amendments have not yet been reported in any treaty series.

> Second, and more specifically, it is reasonable to make reference to an international agreement at the very outset of the inquiry to determine if there is any ambiguity, even latent, in the domestic legislation. The Court of Appeal's suggestion that recourse to an international treaty is only available where the provision of the domestic legislation is ambiguous on its face is to be rejected.[90]

Therefore, the 1978 UPOV Convention must be considered to be the primary interpretive tool of the *Plant Breeders' Rights Act*. As mentioned in the previous Part, the *Act* must be interpreted both in light of the Convention and so as to give effect to the provisions of the Convention, even where the provisions of the implementing legislation seem to differ from it. Furthermore, recourse to the Convention is not limited to cases where the meaning of a provision in the *Act* is unclear.

This analytical approach requires that we now turn to the Convention. A comparison of the *Act* and the Convention reveals many similarities. For example, the conditions required for protection in Article 6 of the Convention parallel those of the *Act* at section 4.

Article 5 of the Convention, which sets out the scope of protection, is particularly important since it clarifies the meaning of section 5 of the *Act*. First of all, it implicitly contains the farmer's exemption because the rights of the breeder extend only to the propagating material. It follows that the farmer can sell the grown plant for profit and, more importantly, can retain seed and grow it in future seasons, all without infringing on the breeder's rights. Second, article 5(3) contains a breeders' exemption which, as we saw in the previous Part, does not appear to be included in paragraph 5(1)(*b*) of the *Act*. This provision in the *Act* should be read so as to incorporate the words of the Convention at article 5(3):

> 5. (3) Authorisation by the breeder shall not be required either for the utilisation of the variety as an initial source of variation for the purpose of creating other varieties or for the marketing of such varieties. Such authorisation shall be required, however, when the repeated use of the variety is necessary for the commercial production of another variety.

There are other examples where the Convention provides the proper context for interpretation of the *Act*. Article 4 sets out the rate at which new botanical genera and species must be added to the prescribed categories of the *Act*, and article 8 specifies the minimum period of protection which can be granted. Article 9 of the Convention states that "the free exercise of the exclusive right accorded to the breeder may not be restricted otherwise than for reasons of public interest." This informs the compulsory licencing provisions of the *Act*. Furthermore, article 2(1) of the Convention, which bans dual protection for a plant variety under plant breeders' rights legislation and patent legislation, and the exemption in article 37, establish the entire context in which the *Act* should be interpreted.[91]

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[90]*National Corn Growers*, *supra* note 78 at 1371.

[91]Note that article 37 allows those countries that provided the possibility of double protection during the period in which the Convention was open for signature, to continue to do so. New Zealand and the United States are examples of such countries. For more information on double pro-

The Convention also contains provisions for its administration. Without provisions on national treatment,[92] rights of priority,[93] and the organs of the Union,[94] a global network of plant breeders' rights could not have been established.

B. Recent Amendments to the UPOV Convention

On 19 March 1991, the UPOV Convention was once again revised in light of advances in technology that had occurred since 1978. The amendments contained in the 1991 UPOV Convention are not binding on Canada or most of the other countries mentioned above. However, it is interesting to see which amendments have been made because not only do they indicate how plant breeders' rights might look in the future, but they also indicate what the acceding parties see as being inadequacies in the present international network of such rights.

In this section, we will look at some of the more important changes that have occurred.[95] Most of the important changes, as we will see, increase the monopoly rights of the plant breeder. This disturbs the balance between the rights of plant breeders and the residual liberties of the public which exists in the 1978 UPOV Convention, and in the legislation of the various acceding countries.

First, the ban on dual protection no longer exists in article 2. This disposes of the issues that were discussed previously concerning the possibility of patenting parts of the plant, such as genes and plasmids, when the propagating material is already protected by the *Act*. It will also put all countries that have acceded to the *Act* on an equal footing. In addition, it will give plant breeders the opportunity to amass greater monopoly rights with respect to plants and germplasm. Those groups that believe that germplasm is part of the "common heritage of mankind"[96] will view the elimination of the ban on dual protection as a negative change.

Second, the minimum duration of the monopoly right has been increased. Article 19 changes the minimum period of the breeder's right from 18 years for trees and vines, and 15 years for all other species, to periods of 25 years and 20 years, respectively. These durations are similar to those found in New Zealand's *Plant Variety Rights Act 1987*.[97]

The 1991 UPOV Convention also provides for the possibility of extending the breeder's right to harvested material and to the product made directly from

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tection in these countries, see C. Brown, "Protecting Plant Varieties: Developments in New Zealand" (1988) 18 Vict. U. Well. L. Rev. 83; Seay, *supra* note 45.

[92]UPOV Convention, *supra* note 89, art. 3.

[93]*Ibid.*, art. 12.

[94]*Ibid.*, arts. 15-28.

[95]Much of the information regarding the amendments to the UPOV Convention was obtained from B. Greengrass, "The 1991 Act of the UPOV Convention" (1991) 12 E.I.P.R. 466.

[96]This concept will be discussed in more detail in Part VI, below, in which the consequences of the legislation on the Third World are discussed.

[97]1987, No. 5, s. 14.

harvested material. This "cascade effect" is set out in articles 14(2) and 14(3). The right would cascade to the harvested material, but only where the entire plants, and parts of plants, were "obtained through the unauthorized use of propagating material of a protected variety." These cascading rights could not be exercised if "the breeder has [had] reasonable opportunity to exercise his right in relation to the propagating material of the variety."[98]

Other important changes have been made to the scope of the right in terms of the farmer's and breeder's exemptions. As stated by Greengrass:

> Article 14(1) of the 1991 [UPOV Convention] provides that, in respect of the propagating material of a protected variety, any production, reproduction (multiplication), conditioning for the purpose of propagation, offering for sale, selling or other marketing, exporting, importing, or stocking for any of these purposes, shall require the authorization of the breeder. Accordingly, the basic scope of the protection extends to *all* production or reproduction (multiplication) without reference to its purpose and, unlike the 1978 [UPOV Convention], does not have the effect of creating, by implication, a 'farmer's privilege'.[99]

Although the legislative presumption is not to provide a farmer's exemption, article 15(2) states that, within reasonable limits, such an exemption can be granted by the contracting party, so long as the legitimate interests of the breeder are protected.

The breeder's exemption has been qualified by the principle of essential derivation in article 14(5), also referred to as the "minimum distance between varieties" principle.[100] This principle ensures that a breeder will not make a minimal change in a protected variety using genetic engineering techniques and then pass it off as being another new variety worthy of protection. This amendment is necessary to prevent abuse of the breeder's rights and will not disturb the balance between the public's residual liberties and the breeder's monopoly rights. The essential derivation principle will ensure that the monopoly rights that are available in a plant variety will flow to the party that invested the most in its creation. If developing countries were to accede to the Convention, they might use the essential derivation principle to prevent breeders from making minor changes to crops located in their countries, and then passing the varieties off as their own.

As mentioned above, most of these new rights have the effect of increasing the monopoly rights available to plant breeders at the expense of free access to plant germplasm. These amendments were adopted unanimously by the twenty member states of the 1978 Convention.[101] The change in attitude in favour of increased monopoly rights reflects a corresponding disinterest in ensuring accessibility to new plant varieties. One way that the UPOV countries could have indicated their interest in protecting society's interests would have been to require member states to establish and maintain accessible germplasm storage facilities for the new, protected plant varieties. This kind of requirement already

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[98]Greengrass, *supra* note 95 at 470.
[99]*Ibid.* at 469.
[100]Byrne, *supra* note 86 at 10.
[101]Greengrass, *supra* note 95 at 466.

exists in the Australian legislation,[102] and it is unfortunate that it did not find its way into the latest amendments to the UPOV Convention.

VI. Evaluating the Domestic and Global Consequeuces of Creating Plaut Variety Rights

An evaluation of Canada's *Plant Breeders' Rights Act*, and of plant breeders' rights legislation worldwide, requires that one consider the balance created between the rights of plant breeders and the residual liberties of the public.[103] This has been emphasized throughout the paper, and specifically in Part II. The balance that is struck inevitably leads to certain consequences at the domestic and international levels. In this Part, we examine some of the arguments that have been made against the legislation, all of which claim that the *Act* will have negative consequences.

A. Striking a Balance at the Domestic Level

At the domestic level, two main attacks have been made against plant breeders' rights legislation. The first attack is based on the balance created between the monopoly rights of the breeder and the residual liberties of the farmer with respect to the seeds. The second attack is based on the alleged detrimental effect that this legislation will have on the public sector's research effort.

1. Striking a Balance between the Rights of Plant Breeders and the Residual Liberties of Farmers

At the domestic level, there has been a concern that the monopoly rights of plant breeders would be created at the expense of farmers. Opponents argued that as a result of this legislation, "farmers would pay patent fees for protected seeds and plants, [would pay] higher seed costs, and [would] suffer from lack of choice."[104] However, proponents suggested that this legislation would bring new varieties to Canada from which farmers could benefit, which in turn would greatly increase their export sales:

> [T]he prairie farmer would be much better off if there was more research being done both in the private and public sectors. Certainly [the *Act*] would encourage that sort of research and give the producers a much greater choice of varieties from which to choose. One only has to look at the European experience, for example, where they have had dramatic increases in crop yields. I think this is partly due to vastly improved varieties of seed.[105]

The concerns raised about the balance that would be created between farmers and commercial plant breeders are untenable. The higher prices, although a

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[102]See *Plant Variety Rights Act 1987*, 1987, No. 2, ss. 10(1), 33. See also *Plant Variety Rights*, *supra* note 83 at 3, regarding Australia's germplasm storage system.

[103]A similar analysis was carried out by Szczepanik in her article evaluating the effect of the recent EC Directives on biotechnology (V. Szczepanik, "Regulation of Biotechnology in the European Community" (1993) 24 Law & Pol'y Int'l Bus. 617). The two Council Directives in issue were Council Directive 90/219 of 23 April 1990 and Council Directive 90/220 of 23 April 1990.

[104]*Minutes*, *supra* note 1, No. 3 at 7.

[105]*Ibid.*, No. 6 at 11.

setback, would provide Canadian farmers with better seed of improved varieties.[106] Furthermore, safeguards have been placed in the legislation. First, the *Act* contains the farmer's exemption which allows farmers to plant their own bins.[107] Second, there is a system of compulsory licencing in the *Act* which ensures that farmers will get seed at reasonable prices. There is also an advisory committee to which farmers can voice their concerns as to pricing.[108] Based on the safeguards in the *Act*, and the reality that Canadian farmers will be better off if Canada remains competitive and if they receive the best and newest varieties available, it must be concluded that domestically, the proper balance has been struck.

2. Striking a Balance between the Interests of the Public and Private Sectors in Plant Breeding

Many Canadians were also concerned that the introduction of plant breeders' rights legislation would cause the quantity and quality of plant breeding in the public sector to decrease, that the role of the public sector in this area would change, and that large corporations would eventually control the growing of commercial seed. In this subsection, we will examine statements from various sources describing public and private sector involvement before and after the implementation of the *Act*, and we will comment on the balance or imbalance that is created.

In 1989, most research into plant breeding carried out in Canada was government-funded;[109] it occurred mostly at agricultural faculties and government departments. The Science Council of Canada found that "Agriculture Canada and the National Research Council had the greatest involvement in government research into plant biotechnology."[110] In response to the public's concerns stated above, governmental spokespeople emphasized that the publicly-funded breeding effort would remain unchanged and might increase.[111] Researchers from the public sector were also not concerned that publicly-funded research would suffer from the introduction of such legislation.[112]

The Canadian Seed Trade Association, a voluntary association of seed companies operating in Canada, qualified the findings of the Science Council of Canada. It was not particularly positive about the amount of plant breeding in Canada before the Canadian *Plant Breeders' Rights Act* was enacted:

> There is very little plant breeding, public or private, in our vegetable, horticultural and ornamental crops grown in Canada. Compare that to the Netherlands which is one of the major suppliers to Canada, almost all of those varieties coming from private sector breeders. We see severe danger signals on the horizon regarding Canada's ability to stay competitive without things like plant breeders' rights. Even in our major crops, we see the new canola varieties being registered. I believe there were 11 last year; 9 came from the private sector and 7 from Sweden.

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[106]*Ibid.*, No. 6 at 4.
[107]*Act*, *supra* note 5, s. 5(1).
[108]*Ibid.*, ss. 32, 73, 74.
[109]Curren, *supra* note 16 at 10.
[110]*Seeds of Renewal*, *supra* note 2 at 4.
[111]Curren, *supra* note 16 at 10.
[112]See *Minutes*, *supra* note 1, No. 5 at 5-8.

> So here we have one of our largest important crops in Canada. Now the plant breeding efforts in Canada are being surpassed by plant breeding activity in other parts of the world.[113]

This association found that in 1989, before the *Act* was in place, the private sector was spending about $17 million in research and development of varieties and said that it would be prepared to increase that commitment by at least 40 per cent if plant breeders' rights legislation were enacted. This would translate into a $561 million benefit to farmers and consumers[114] by producing greater yields of crops for lower prices. In terms of minor crops, which are of use only in Canada, it found that far more varieties were developed by the private sector than by the public sector. Furthermore, in terms of agricultural research being done in the private sector, King Agro, which was recently acquired by SANOFI of France, and Pioneer Hi-Bred were engaged in the "greatest amount of research and development in Canada."[115]

Mr. Mooney, the representative from the Canadian Council on International Co-Operation, suggested that the private sector is more involved in plant breeding than the public sector. Furthermore, for the most part, the leading companies involved in plant breeding are taking over the smaller companies.[116] According to Mr. Mooney:

> There is a myth going around that there is a whole lot of small biotech boutiques out there working in agriculture and getting involved in plant breeding. That is not true. There are in fact few of them involved in this field and those that are are owned by the seed companies or the multinationals that control the seed companies.[117]

The comments from these various sources paint a rather interesting picture of the players that were involved in plant breeding in 1989, before the *Act* was in place, and that would be involved as a result of the legislation. It appears that the *Plant Breeders' Rights Act* will encourage greater investment in both sectors, but that the private sector will be the most profitable because it will be able to engage in economies of scale and in mass production. Furthermore, profitability will likely be concentrated in the hands of multinational companies. The question, therefore, is whether the greater profitability of the private sector, and specifically of multinational firms, as a result of the *Act* should be seen as creating an unacceptable imbalance between the public's residual liberties and the breeder's exclusive ownership rights.

The answer must be given in light of the analysis found in Part II. In that Part, it was found that it is in the public interest to ensure that new varieties are created and that these varieties get distributed widely. It was also stated that concentration of market power was an inevitable consequence of wanting wide distribution of new varieties. Given these realities, it seems that the public must choose between the lesser of two evils. The analysis so far suggests that the gov-

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[113] *Ibid.*, No. 6 at 25.
[114] *Ibid.*, No. 6 at 27.
[115] *Ibid.*, No. 6 at 31.
[116] *Ibid.*, No. 2 at 14; No. 2A at 1-10.
[117] *Ibid.*, No. 2 at 14-15.

ernment made the proper choice in enacting the *Plant Breeders' Rights Act* because it provides an appropriate allocation of rights and liberties. That this is a proper choice is further evidenced by looking at the needs of people worldwide. With a steadily growing world population, we require an equivalent steady increase in food production. One way to cope with the necessary increase is to encourage the development of high-yielding crops, as well as insect- and drought-resistant crops. This can be achieved by encouraging the private sector to create and to widely distribute new varieties by way of the *Plant Breeders' Rights Act*. It is worth noting that even though the profits may lie in the private sector, this will in no way deny public sector breeders the right to make use of the breeder's exemption. This is because the breeder's exemption is found implicitly in the *Act*, as suggested earlier, and is equally available to any breeder irrespective of affiliation. Furthermore, government spokespeople have emphasized that public sector research will not be forgotten.

B. Striking a Balance at the International Level

A heated debate exists about the merits of the international network of plant breeders' rights legislation. Two main allegations are made regarding the consequences of granting monopoly rights to breeders of new varieties. First, it is alleged that companies involved in plant breeding which derive new varieties from the germplasm found in developing countries do not provide these countries with compensation. Secondly, it is alleged that granting monopoly rights to plant breeders "encourages and seeks to solidify an agricultural system that is environmentally damaging and incompatible with the concept of sustainable development."[118] These issues will be addressed in turn.

1. Distributing the Rights to the World's Germplasm

In understanding the first allegation, we must start from the premise that germplasm, or genetic material, is considered to be part of the common heritage of mankind and thus should be available without restriction.[119] As a result of this generally accepted ideology,

> [f]or over two centuries scientists from the advanced industrial nations have freely appropriated plant genetic resources from Third World nations for use in the plant breeding and improvement programs of the developed world.[120]

Opponents of this ideology allege that the industrialized world is gathering knowledge and germplasm from informal innovators of the Third World, are calling it their own,[121] and are not compensating the informal innovators for that which they gather. As stated by Kloppenburg, the usual crops associated with agricultural economies of industrialized nations — maize, wheat, soybeans,

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[118]*Ibid.*, No. 7 at 21.

[119]J.R. Kloppenburg, Jr. & D.L. Kleinman, "Seeds of Controversy: National Property Versus Common Heritage" in J.R. Kloppenburg, Jr., ed., *Seeds and Sovereignty: The Use and Control of Plant Genetic Resources* (London: Duke University Press, 1988) 173 at 174.

[120]*Ibid.* at 173.

[121]See *Minutes*, *supra* note 1, No. 2 at 8.

potatoes, alfalfa, barley, sorghum, tomatoes, cotton, tobacco — all originated in the Third World.[122]

Mr. Mooney states that the Third World has considered enacting similar plant breeders' rights legislation,[123] imposing levies on genetic resources and refusing access to their germplasm. This would ensure that breeders from developed countries would provide compensation for the genetic resources that they take, or else be unable to obtain any genetic resources at all. Without undertaking such actions, Third World countries find themselves in a dilemma because the concept of mankind's heritage contains a double standard. On the one hand, the gene banks and land races of Third World countries are accessible to all for free, and on the other hand, the mutant lines, special stocks and genetic stocks of private breeders in developed countries are available to a select group of breeders only.[124]

How does a proponent of plant breeders' rights legislation answer such allegations? The picture that is painted seems manifestly unfair. However, before commenting on this issue, it is important to look at the arguments on the other side.

Barton and Christensen respond to the concern that the developing countries do not have access to the genetic stocks of private breeders. They state that, in fact, developing nations are able to obtain seeds and to conduct their own plant breeding programs. Furthermore, other than increases in the price of seed sold to the developing nations, plant breeders' rights legislation will have little effect on them.[125] They do, however, state that patent legislation would have a much more serious effect on the Third World.

Sedjo emphasizes that plant breeding firms do fulfill a very important research and development function. They are needed to make the investments that will result in the effective utilization of natural genes, and then to market the results:

> While it may be true that under current institutional arrangements breeders are able to capture most or all of the commercial benefits that are generated by the application of technology to newly discovered germplasm, it is also true that their investments are a critical prerequisite for the realization of almost *any* of the social benefits from newly discovered plant genetic resources.[126]

Sedjo acknowledges that the debate between the two sides is a question of the social values attributed to the initial and improved resource.

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[122]Kloppenburg, *supra* note 7 at 14.

[123]*Minutes*, *supra* note 1, No. 2 at 21.

[124]*Ibid.*, No. 2 at 24-25. D.A. Rose would agree that multinational corporations must be prepared to yield some of their control over genetic resources to the developing world if they wish to profit from the agritechnological revolution ("Changing Relationships in Technology Transfer to the Third World: Case Study of Biotechnology in Agriculture" (1985) 11 Rutgers Comp. & Tech. L.J. 531).

[125]J.H. Barton & E. Christensen, "Diversity Compensation Systems: Ways to Compensate Developing Nations for Providing Genetic Materials" in Kloppenburg, ed., *supra* note 119, 338 at 340-41.

[126]R.A. Sedjo, "Property Rights and the Protection of Plant Genetic Resources" in Kloppenburg, ed., *ibid.*, 293 at 296.

To put the entire problem into perspective, it is also important to realize that most plant breeders do not utilize primitive cultivars because often "unimproved forms of germplasm exhibit many traits that cannot be tolerated in modern cultivars" and this results in a high failure rate.[127] Furthermore, when samples are taken, they leave the country no poorer than before, and in fact may make the country richer since a sample stored in the country and abroad could prevent extinction of the species.[128]

Although taking samples from a country is seen by many to be "robbery", this would only be true if breeders were taking away "national property" without consent. However, it is difficult to classify germplasm as being the national property of one country because that germplasm "may have existed for thousands of years and have been subject to [numerous] migrations and ... dispersals," which make it virtually impossible to pinpoint the original "owner" of the germplasm.[129]

With some of the arguments laid out on both sides of the debate, the reader should be quick to realize that although a problem does exist, its degree is uncertain, and its solution unknown. However, in seeking a solution, the answer is not to eliminate plant breeders' rights legislation. As we saw in Part II, an absence of legislation would result in less investment and may translate into severe consequences for the whole world since everyone would lose out on new varieties. This legislation provides an important incentive to plant breeders and may in fact be beneficial to the Third World because its countries can also gain access to the latest high-yielding or disease- and drought-resistant new varieties.[130]

Given that some experts feel the main negative impact on the Third World countries is that they must pay more for seeds that have genes originating from their lands, perhaps the solution is to provide the developing countries with these new varieties but with an abatement in price. This abatement could mean that Third World countries would not have to pay royalties if it is found that they contributed substantially to the existence of the new variety. This gesture would recognize their contribution to the creation of new plant varieties. It would probably not be a good idea, however, to charge breeders for germplasm samples since this will simply discourage plant breeders from diversifying their use of germplasm, and will aggravate the next problem that we will discuss below.

Of the various experts who have spoken on these issues, none have suggested that eliminating such legislation is the answer. Most have suggested that to rectify any imbalance between the private breeders and the Third World, government and breeders should provide financial, technical and research assist-

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[127]W.L. Brown, "Plant Genetic Resources: A View from the Seed Industry" in Kloppenburg, ed., *ibid.*, 218 at 220-21.

[128]*Ibid.* at 222.

[129]D. Wood, "Crop Germplasm: Common Heritage or Farmers' Heritage?" in Kloppenburg, ed., *ibid.*, 274 at 277.

[130]Kloppenburg and Kleinman stated that there is a very great dependence of devcloping countries on improved crops from other continents (*supra* note 119 at 180).

ance to the Third World so that they may improve their germplasm storage systems and their plant breeding programs.[131] In fact, "Canada does fund quite substantially the operation of the International Board for Plant Genetic Resources, and Canada also links very closely with the gene banks that are linked through that network" throughout the world.[132]

If the solution is to provide assistance to developing countries, then this is something that should be implemented not by a piece of intellectual property legislation, either at the domestic or at the international level. Intellectual property legislation is enacted for a different purpose entirely and would not lend itself to being combined with the purpose of assisting developing countries. Developing an assistance program would require the participation of other organs of the United Nations. As for the other possible solution, that of providing seed to developing countries at a lower rate, this should be implemented with the help of an international agreement on point. Given that the solutions cannot be resolved within plant breeders' rights legislation, and given that such legislation has many positive aspects, two conclusions can be made. First, the imbalance between breeders of the First and Third Worlds should be addressed separately. Second, actual plant breeders' rights legislation should remain substantially unchanged and should definitely not be eliminated.

2. Monopoly Rights and Their Effect on the Globe's Sustainable Development

In addition to the issue discussed above, opponents of the legislation argue that plant breeders' rights will result in greater emphasis on a reduced number of crops which in turn will result in genetic uniformity.[133] It has been stated that this would lead to genetic erosion, which is an "overall loss of genetic diversity resulting from the extinction of different plant varieties."[134] This threat to biodiversity is one of the most serious for our environment today.

There is no doubt that genetic erosion and genetic uniformity are extremely serious issues. In our modern form of plant breeding and crop growing, where the world's population is dependent on a limited number of crops, our food supply is clearly vulnerable to drought, disease, and insect infestation.[135] In fact,

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[131]See Brown, *supra* note 127 at 227; J.R. Harlan, "Seeds and Sovereignty: An Epilogue" in Kloppenberg, ed., *supra* note 119, 356 at 358. See also C. Juma, *The Gene Hunters: Biotechnology and the Scramble for Seeds* (Princeton, N.J.: Princeton University Press, 1989) in which the author describes in detail the potential impact of biotechnology on Africa and emphasizes that "Africa must innovate at technological, institutional and political levels: conventional agriculture and industry must adapt to the emerging transformations as must the intellectual as well as the policy environment" (*ibid.* at 5).

[132]*Minutes*, *supra* note 1, No. 8 at 27. See also R.G. Adler, "Biotechnology Development and Transfer: Recommendations for an Integrated Policy" (1985) 11 Rutgers Comp. & Tech. L.J. 469, in which the author emphasizes the need for the United States to store germplasm and to make it accessible via a freer biotechnology transfer policy.

[133]See *Minutes*, *ibid.*, No. 7 at 21.

[134]E.M. Baker, "Patents, Plants and Biotechnology — Policy and Law" (1987) 14 Western State Univ. L. Rev. 529 at 538.

[135]See Rhoades, *supra* note 8 regarding the vulnerability of our food supply.

history can tell of the consequences of growing limited crop varieties. In 1970, half of the orange crop of Southern Florida and Texas was destroyed when a virulent new fungus attacked the crop. Ireland's famous potato famine of 1845 also was a result of a Mexican fungus that destroyed the genetically similar potatoes in that country. It is also thought that the ancient Maya civilization of 900 A.D. was hit with crop destruction due to the genetic uniformity of its maize crops.[136]

However, as important as this issue is, the existence of plant breeders' rights legislation is not the source of the problem. First of all, the risk of genetic uniformity existed well before this type of legislation. Furthermore, the previously mentioned statistics on the increase of new plant varieties as a result of the legislation would suggest that the legislation is actually increasing genetic diversity in the world's crops. This increase in plant varieties will provide farmers with the ability to plant diverse crops so as to ensure that the historic problems of genetic uniformity are avoided. Finally, when scientists speak of threats to biodiversity, these seem to result mostly from the elimination of habitats such as the extinction of the rain forest,[137] and not from the kinds of crops that are grown in order to feed the world's population.

Although plant breeders' rights cannot be directly linked to genetic erosion, it is true that something must be done to preserve the richness of germplasm available to the world population, much of which is found in the developing countries. While it is unfair to expect developing countries to preserve their genetic varieties if they have low yields or are otherwise inadequate, it is fair to expect the whole world to take part in the storage and maintenance of germplasm. This is in fact what is taking place. Canada has a Plant Gene Resource Centre in Ottawa which is linked to other such germplasm storage centres around the world.[138] Furthermore, there is an International Board for Plant Genetic Resources which devotes its time to this task.[139]

The final question one should ask is whether a storage system should have been put in place in the *Plant Breeders' Rights Act* to store important new plant varieties in addition to the international efforts for storing naturally occurring germplasm. The answer is yes. As mentioned above, Australia does require that the plant breeder deposit his or her new variety for storage at a genetic resource centre and specifies that this deposit does not become part of the national gene bank collection.[140] Requiring such a deposit would facilitate the exercise of the breeder's exemption and would ensure that there is free access to these genes once the term of the plant breeder's monopoly is over.

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[136]*Ibid.* at 84.

[137]See *e.g.* E.O. Wilson, "Threats to Biodiversity" (1989) 261:3 *Scientific American* 108.

[138]See *Minutes*, *supra* note 1, No. 8 at 27-28.

[139]Note that although the developed countries strongly support the endeavour to store germplasm, they strongly oppose the International Undertaking on Plant Genetic Resources, devised by the IBPGR, which states that the private genetic stocks of breeders are also part of the common heritage of mankind and should also be stored for easy access. For more information on this point, see H.J. Bordwin, "The Legal and Political Implications of the International Undertaking on Plant Genetic Resources" (1984-85) 12 Ecology L.Q. 1053.

[140]See *Plant Variety Rights Act 1987*, *supra* note 102, s. 33.

Although the legislation is lacking because it does not provide for the national storage of new varieties, this does not mean that the legislation is completely deficient. Furthermore, it is not deficient because it is not directly linked to genetic erosion.

Conclusion

In this paper, we have looked at Canada's *Plant Breeders' Rights Act* from many perspectives. For background knowledge, we explored the research techniques used to create new plant varieties. Then we looked at the rationale for providing protection to new plant varieties in the form of an ownership right. We considered the reasons why the *Patent Act* was not resorted to for protection of new plant varieties. Finally, having set the stage, we examined the *Act* itself and observed its structure in terms of the requirements for eligibility and the rights that flow from the *Act*. The rights created by the *Act* parallel those found in the 1978 UPOV Convention but are much narrower than those contained in the amended UPOV Convention of 1991. These rights were then tested against certain allegations that suggest that this legislation has not created an appropriate balance between monopoly rights and residual public liberties.

From this lengthy consideration of the issues, several conclusions can be drawn. First, because of its connection to biotechnological developments relating to agriculture, the *Act* will become increasingly more important. Although the public sector will seek protection under the *Act*, it is likely that large transnational corporations, such as Pioneer Hi-Bred, Monsanto and Calgene, will reap the greatest profits as a result of the *Act*'s protection. These corporations have been calling for some kind of protection, given that most other industrialized countries already have plant breeders' rights legislation, and Canadian courts have not been favourably inclined to grant patent protection for new plant varieties.

The *Act* itself is well-tailored to the peculiar characteristics of plants. The tests of distinctness, homogeneity, novelty and stability can be applied logically to new varieties without having to stretch the meaning of the legislation. Furthermore, the disclosure requirements are less onerous than those under the *Patent Act* but should include deposition as a requirement, and not just maintenance of the propagating material.

The legislation itself grants narrower monopoly rights than the *Patent Act* and so a better balance is created between the breeder's rights and those of the rest of the population, including farmers and other breeders. Furthermore, although the extraction of germplasm from developing countries is a problem, this problem is not substantially worsened by the existence of plant breeders' rights and should be addressed outside of the context of the *Act*. The *Act* also does not contribute to genetic erosion in a substantial way. On the contrary, the *Act* will encourage the innovation of new plant varieties and will provide more assurance that adaptable crops will continue to be created. However, the *Act* should establish a storage system for new plant varieties to maintain genetic diversity and to facilitate a researcher's access to new varieties.

A great deal of effort has been put into the drafting of the *Plant Breeders' Rights Act*. It is similar to the UPOV Convention to which many developed countries adhere. The fact that these developed countries now have strong breeding industries strongly supports the existence of such an *Act* in Canada. This evidence proves that the monopoly rights under the *Act* provide plant breeders with sufficient incentive to create new varieties.

A compromise must always be reached when there are competing claims to rights and liberties. In the case of plant breeders' rights, we are faced with competing claims to the rights in new plant varieties. This paper has shown that, both domestically and internationally, plant breeders' rights legislation creates a healthy balance between monopoly rights and residual public liberties without destroying the plant breeders' incentive to create new varieties of plants.