Tension on the Farm Fields: The Death of Traditional Agriculture?

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Tension on the Farm Fields: The Death of Traditional Agriculture?

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Taking into account the historic transitions and progressions in agricultural science, this article examines the emergence of the phenomenon of agricultural biotechnology. It identifies pivotal sites of tension between agricultural biotechnology and alternative approaches to agriculture. The article identifies two distinct sources of contemporary social tension around agricultural science. First, it identifies the epistemological fault line and examines how the latter is promoted by intellectual property. Second, it spotlights the gene-wandering syndrome—a byproduct of genetic modification—and evaluates its impact on the escalating tension in our agricultural communities. Drawing from recent court decisions in Canada, the article recognizes the present urgency for a better jurisprudence and practical regulatory policy on aspects of agricultural biotechnology to mediate current tensions in those communities. It argues that judicial and policy response must be predicated on recognition of agro-epistemic pluralism and an understanding of broader socioeconomic impact of agro-biotechnology on alternative forms of agriculture.

Keywords: *agricultural biotechnology; traditional agriculture; genetic contamination/gene wandering; intellectual property; agricultural communities; common law liability; agro-epistemic pluralism; judicial and public policy*

Agriculture: A Tale of Transitions

As a progressive creature, humankind, from time immemorial, has continued to exploit the earth's resources for its survival. Few experiences illustrate this tendency better than the interminable transitions in agricultural science throughout the centuries. At first, we started with hunting and gathering, our two primordial occupations and precursors to conventional agriculture.[1] The evolutions in agricultural knowledge generally took a modest and common pathway. These transitions are marked by two distinct epistemological divergences that are driven and supervised by variant world views and contested ideologies about nature as well as by the global political economics of agriculture (Gonzalez, 2004; Kloppenberg, 1998). The highpoint of this phenomenon is the schism between traditional agricultural practices including, for convenience, organic farming and other forms of agricultural practices whether described as conventional or as part of agricultural biotechnology (especially genetic engineering) or both.[2]

From its modest past, agriculture is an aspect of "folk culture." Its essence was human subsistence. Because of its primordial place in humanity's relationship with nature, agriculture has been and remains for most people a cultural enterprise, enabling them to observe, partner in, and influence the interaction of natural forces and to reflect on their role in the process. For example, in the traditional agricultural context, farmers rely on careful observation of randomly occurring mutations in nature (Oguamanam, 2005, p. 60). They make selections of desired plant or animal varieties or traits on the basis of these observations. This process involves limited direct intervention with the course of natural propagation.

Traditional agriculture's reliance on lessons from accidentally occurring mutations in nature was a universal phenomenon in the modest evolution of agricultural. It was not limited in its application to the world's indigenous and local communities per se. Indeed, more sophisticated or "scientific" approaches to agriculture that later distinguished the Western industrial agricultural complex from traditional agricultural practices have never been the folk tradition of the West. According to anthropologists, scientific knowledge as we know it today owes its origin to the

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18- and 19th-century reconstitution and absorption of preexisting European folk knowledge and practices (Ellen, Harris, & Parkes, 2000, pp. 6-11; Oguamanam, 2006, p. 14).

In the traditional setting, agriculture is essentially an ecological as well as a cultural process (Kuhnlein & Turner, 1991, pp. 4-6). It is a site for negotiating complex ecological relationships, whereof the sanctity of life forms, the holism of the natural order, and the compelling imperative for humanity's humble mediation and appreciation of its dependence on other life forces is more of a lived reality than a theoretical postulate (Battiste & Henderson, 2000). Agriculture provides symbolic as well as practical demonstration of cultural, including religious, health, ethical, and broad social experiences and exchanges around food. In many such non-Western societies, food choices are socioculturally determined. According to an observer, "we express ourselves through our food choices and use food as a means to communicate the meanings and values in religious and cultural ceremonies" (Pascalev, 2003, p. 588). In its historic context, the traditional approach to agriculture is an important epistemological domain in contrast to the framework of subsequent scientific transitions in agriculture.

As an essentially subsistence venture, basic breeding that is devoid of formal scientific methodologies is the main plank of traditional agriculture. In a rather simplified way, this breeding model still translates to selective homogenous recombination of genomes as the basis of the creation of desired genetic diversity. Agriculture's transition from a subsistence enterprise under the traditional framework to a commercial one was a gradual process advanced by intense scientific activism, especially the more formal scientific hybridization and other research and development (R&D) in genetic resources.

Before hybridization, for the most part, agricultural R&D was undertaken by the public sector through public science (Evenson, Santaniello, & Zilberman, 2002). Private investment in plant breeding was less attractive because the inherently propagating nature of genetic materials proved to be a formidable biological barrier to sustaining or monitoring proprietary claims and for achieving profitability in the plant-breeding sector (DeBeer, 2005, p. 21). However, because seeds from hybrid crops could not be relied on for viable yields suitable for replanting, farmers' inevitable dependence on plant-breeding enterprises for seeds opened the way for a profitable private sector role in agriculture (DeBeer, 2005, p. 21). As will become clearer, these transitions in agriculture are premised on an agro-scientific epistemological regime. This formal scientific model of agriculture, which is bolstered by intellectual property rights, is distinct from traditional agricultural models prevalent in indigenous and local communities.

The extension of biotechnology practices to the agricultural realm (i.e., agricultural biotechnology) marks perhaps a revolutionary phase in agricultural transition. Indeed, biotechnology, or the instrumental deployment of microorgamisms to accomplish diverse tasks (Mehta & Gair, 2001, p. 241), has been a catalyst in agricultural and food production. Historically, we have been using microbes for fermentation and in accomplishing other important tasks in agriculture, brewing, and confectionary industries. The biotechnological process known as genetic engineering is perhaps the most significant aspect of agro-biotechnology. However, it is the basis for a groundswell of ongoing tension in agricultural communities. Genetic engineering involves the direct alteration of the genetic code of living organisms through the insertion of novel genetic material into cells for the purpose of influencing the characteristics of the organisms. It targets, isolates, and generally manipulates genes associated with specific traits, controlling their use, expression, or suppression within and across organisms to achieve preferred results (Bains, 2003; Lee, 1996, p. 280).

Genetic engineering stretches the phenomenal possibilities of agricultural biotechnology, while at the same time expanding its sphere of controversy. It has transformed plant breeding from a sacred art of sorts to precision science. Beyond that, as a biotechnology process, genetic engineering has bolstered industrial and disciplinary convergences in the agricultural, chemical, health, and environmental sectors (to mention a few). The litany of promises from genetic engineering in these fields is innumerable. A few examples include eradication of global hunger, reduction of agro-chemical input, and general enhancement of the efficiency of agro-output through diverse means, including pest control and generation of disease-resistant and environmentally responsive and friendly crops. In the health and pharmaceutical realms, genetic engineering narrows further the faint distinction between agriculture and health. This is evident, for example, in the use of microorganisms for fermenting grains as antibiotics and the exploitation of animals for the generation of human organs for transplantation and for development of antibodies and vaccines. Others include the subsequent application of the recombinant DNA technology in the development of vaccines for efficient treatment of infectious diseases as well as the

potential application of gene therapy to tackle diseases induced by genetic deficiency.

Almost every one of the enormous benefits of genetic engineering attract corresponding concerns based on ethical, safety, cultural, religious, sustainability, and many other grounds implicated in the direct manipulation of life forms and inherent erosion of the sanctity of life forms. In addition, most of the claims of genetic engineering in agricultural, health, and other sectors are contested or at best inconclusive. For instance, the promise of increased global food production as a result of genetic engineering has not translated into the reduction of hunger or food insecurity (Sharma, 2004, p. 91). Also, it is unclear to what extent genetic engineering has reduced or is capable of shrinking the use of agro-chemicals (Krimsky & Wrubel, 1996, p. 28).

An important feature of the transitions in agro-science from its folk origins is the direct mechanization of agriculture with its attendant increase in the use of agro-chemical inputs. From the middle of the 20th century through the later part, increased public sector and subsequent private sector interest in agricultural R&D has been marked by the use of chemicals to boost agricultural production. The highpoint of this trend occurred in the Green Revolution epoch. That "revolution" was an intervention strategy to mitigate postwar global hunger and rural poverty. With emphasis on high-yielding crop varieties, the Green Revolution encouraged the use of agro-chemicals, such as synthetic fertilizers, pesticides, herbicides, and other external agro-inputs as a means of boosting agricultural production while also concentrating on a few crops (Conway, 1997; Ellis, 1992; Gonzalez, 2004; Young, 1997). It radically distorted the traditional cultivation techniques and natural agro-resource management practices in indigenous and local communities.

The chemicalization of the agricultural system provided a strong foothold for mega agri-businesses to dominate agricultural production in both developed and developing countries. Contrary to the impression in some quarters (Mehta & Gair, 2001, p. 247), it is not a coincidence that agro-chemical corporations are also the leading stakeholders in the manufacture of proprietary transgenic seeds. The ongoing trend of corporate consolidations in the agro-chemical and agro-biotechnology industries, which started as early as the onset of commercial plant breeding, have only exacerbated in the era of genetic engineering.[3] Indeed, the claim that genetic engineering in the agricultural sector is the antidote to chemicalized agriculture is probably a public relations gimmick. Corporate dominance and activism in the agricultural sector, whether under genetic engineering or its antecedents, have given rise to high input agriculture and proprietary control of agro-allied services and products. In an unlikely but perhaps a fitting analogy, mega-agro corporations are to global agriculture what the military industrial complex is to the conduct of American foreign policy. Consequently, the agricultural arena is a highly "coerced" environment with limited choice in terms of preferred agricultural methods or philosophies at the expense of the larger public interest. Traditional or small-scale farming setups in indigenous and remote parts of the globe and their counterparts in the industrialized countries who prefer to operate outside the genetic modification framework are, literally, endangered species at the mercy of mega agri-business.

Agricultural Communities: Complexly Layered and Conflicted

Today, in both local and global arenas, there are two distinct agricultural communities in conflict. The discord in these communities has epistemological ramifications at the center of which is intellectual property. Broadly stated, the two communities are, first, the indigenous and traditional agricultural communities in the rural areas of the South and their counterparts in mainly indigenous and smallholder[4] farming communities in the industrialized world. In contrast to agricultural biotechnology (including genetic engineering) or, to some extent, conventional agriculture, practitioners in this category are mainly involved in alternative agriculture. They apply diverse "techniques that depart from intensive chemical use, animal feedlots, high energy and high capitalization at the expense of soil sustainability and overall health of the agro-ecosystem" (Krimsky & Wrubel, 1996, p. 245). For ease of analysis, many small- and medium-scale farmers in the industrialized countries, especially those presently classified as organic farmers, operate within the first category, even though they may not neatly fit into it.

Admittedly, there are variations in the fine details of agricultural orientations in this first category. However, their comparison with genetic engineering provides the basis for their distinct status and highlights their often romantic association with the integrity of the agricultural process. Although the boundaries of the claim to organic, traditional, or even conventional agricultural status are contestable, farmers in this category have several things in common. In addition to the quoted features in the preceding paragraph, they eschew the use of synthetic fertilizers and transgenic growth regulators

and livestock feed additives. For the most part, they rely on crop rotation, crop residues, animal manure, and other forms of organic fertilizers and diverse traditional agricultural methods (Brookfield & Padoch, 1994; Gilpin, 1996, p. 166). These methods, which are effective in sustaining soil productivity and general agricultural production without compromising the agro-ecosystem, are largely devoid of direct transgenic manipulation.

For many in indigenous and local communities, traditional agricultural knowledge and practice are integral to their culture, world view, and general epistemic orientation, which are based on the sanctity of life forms within the broader ecological order that abhors direct human manipulation. For others, organic or alternative farming provides a purely commercial opportunity for the exploitation of a viable market niche arising from popular trepidation over transgenic foods. Either way, agricultural activities under this first category are legitimate alternatives to conventional agriculture and genetic modification. Arguably, these alternatives are quite crucial for sustainable agriculture given regard to the uncertainties and controversies that trail agricultural biotechnology, especially the practice of genetic modification.

Agricultural biotechnology and its various dependents represent the second category and pivot of new agro-scientific communities. Unlike their counterparts in the first category, transgenic agricultural practices are, for the most part, corporate driven. Simply put, agricultural biotechnology is the site of megacorporate agri-business and agro-chemical convergences. It is premised on an epistemological orientation in which virtually all life forms are objects of unbridled scientific experimentation and on a "hegemonic view that 'technology can fix everything'" (Mehta & Gair, 2001, pp. 242-243). Corporate concentrations in agricultural biotechnology, especially genetic engineering, have wittingly and unwittingly given rise to complexly layered communities around the phenomenon. They include researchers, marketers, investors, lobbyists, even antagonists, dependent industries, and downstream transgenic farmers. Detailing the characteristics of these communities is beyond the scope of this article. Although these corporate interests are concentrated in the industrialized world, by reason of the global political economics of agriculture, their influences are felt in the remotest parts of indigenous and local communities (Kloppenberg, 1996; Mgbeoji, 2005; Tokar, 2004).

Recent developments in the field of agricultural biotechnology have had a coercive influence on society, leaving it with limited options for informed choices in the wake of the uncertainties associated with genetic engineering. The overshadowing influence of agricultural biotechnology in relation to alternative agricultural practices is a source of tension in global and local agricultural communities. Limiting my analysis to a two-dimensional framework, I identify two interconnected fault lines that generate these tensions. The first is the epistemological fault line that is facilitated by intellectual property rights. The second is the phenomenon of gene wandering or genetic contamination in the agricultural arena, which is currently situated at the legal and policy crossroad.

The Epistemic Fault Line and Intellectual Property

The epistemological framework for the practice of genetic engineering is "western science." In the context of genetic engineering, formal science's characteristic reductionism and separatism takes a new meaning. Unlike in the holistic orientation of indigenous and traditional agriculture that is based on the unity and internal cohesiveness of ecological processes, harmony, and interconnectedness of life forms and forces, here, plants and animals are molecular lots and bundles of genetic information. As complex building blocks, such information can be deliberately exploited by isolating them from plants and animals to generate even more sophisticated content and bundles. This emphasis on plant or animal genetic information is significant for property jurisprudence, especially in the agricultural sector. As DeBeer (2005) rightly noted, whereas "plants have long been objects of private property; germplasm has not" (p. 5). Germplasm is the hereditary trait of an organism that is passed on to offspring through sex cell or gametes (King & Stansfield, 1990, p. 131). It is central to genetic engineering and agricultural biotechnology.

In the indigenous or traditional agricultural setting, farmers' interactions and relationships with plants and animals constitute a complex experience (Battiste & Henderson, 2000, p. 43). They illustrate in practical terms the role of agriculture as a way of life. However, in the transition to agro-biotechnology, agriculture is mainly a means of production in which genetic resources and associated information are vital raw materials. The emphasis on genetic information corresponds to a shift in property jurisprudence in the agricultural context from classic property, such as a farmer's ownership of his or her crops or farm animals, to proprietary claims over component genetic information through intellectual property rights.

Intellectual property is the legal mechanism for allocation of rights and attendant benefits over knowledge, including vital information. In the agro-scientific or health milieu, "law creates intellectual property by separating an abstract idea like a molecular engineered gene, from its physical vessel, such as the gene itself contained in a plant or seed" (DeBeer, 2005, p. 5). From the advent of the science of plant breeding including hybridization to the present era of genetic engineering, judicial, legislative, and policy responses have gradually reified intellectual property claims in plant genetic information over classic property rights claims in plants as a whole.[5]

Intellectual property is instrumental to the "commodification of germplasm" (DeBeer, 2005, p. 21; see also Aoki, 2003, p. 250; Kloppenberg, 1998). Because of its historical roots in the West, it consolidates the Western scientific episteme over alternative knowledge frameworks prevalent in indigenous and local communities. There is voluminous literature linking the crisis of legitimacy in the intellectual property system to the fitness gap between it and traditional knowledge and underlying world views (Coombe, 2001; Haight, 1997; Mgbeoji, 2001; Oguamanam, 2004). The disdain for indigenous knowledge or "folklore" in intellectual property jurisprudence is indicative of the power dynamics and assumptions of cultural hierarchies that consider such knowledge as inferior to Western science and unworthy of intellectual property protection (Arewa, 2006, p. 161).

The key intellectual property regimes in the plant-breeding context are plant breeders' rights (PBRs) and patents.[6] In their jurisprudence and practical application, PBRs and patents support and service plant breeding or genetic engineering. Conventional patent criteria include novelty, utility, and nonobviousness of subject matter. Recent case law emphasizes the interpretation or analysis of what amounts to patentable subject matter as a crucial criterion.[7] A common feature of these two intellectual property regimes is their deliberate focus on direct human-induced artificial intervention in dealings with plant or animal genetic resources.

By focusing on bioactive or hereditary traits of life forms, genetic engineering yields highly improved uniformity, stability, and mass reproducibility, thus making patents a more attractive regime of protection. In many jurisdictions, both patents and PBRs provide concurrent protection for plant genetic resources while blurring the distinctions between the two. Patent and PBRs exclude human activities in facilitating and learning from the nuanced and nature-supervised process of genetic evolution in the traditional or conventional setting.

The interplay between technology (biotechnology and genetic engineering) and intellectual property rights (patents and PBRs) through the commodification of germplasm has secured for corporate agri-business the much-needed control over the self-propagating power of seeds. A combination of different sophisticated genetic engineering techniques, including self-enforcing genetic control technologies,[8] and a more aggressive intellectual property regime is redefining the face of agriculture in the 21st century.

Analysts have identified "biopiracy" as a phenomenon that illustrates how genetic engineering in particular and agro-biotechnology in general are endangering the sustainability of traditional agricultural practices and their underlying agro-ecological epistemic world views (Mgbeoji, 2005; Fowler & Mooney, 1990; Shiva, 1997). Biopiracy refers to the conversion or appropriation of biological resources and associated indigenous or traditional knowledge (Oguamanam, 2006, pp. 176-178; Sell, 2002, p. 202). This happens first through the Western scientific epistemological narrative exemplified in various forms of scientific plant breeding, especially genetic engineering and then gets consolidated, for the most part, by the patent and PBRs regimes of intellectual property rights that are used to support "spurious inventions based on such knowledge" (Mgbeoji, 2005, p. 13). By facilitating the appropriation of endemic local knowledge of genetic resources in indigenous and local communities, biopiracy threatens the viability of traditional agriculture as a way of life. As evident in controversial patents over plants and genetic resources, such as the neem, rosy periwinkle, endod berry, turmeric, basmati rice, and so forth, biopiracy is a key source of tension between the traditional and agricultural biotechnology communities.[9]

Gene Wandering or Genetic Contamination

The next fault line or site of tension in our agricultural communities is the phenomenon of gene wandering or cross-pollination by genetically modified seeds. In the agricultural context, gene wandering generally refers to the contamination of nontransgenic or organic plants, animals, or farm fields by transgenic or genetically modified materials. Because of the proprietary nature of transgenic materials, their escape and consequential contamination of nontarget farms or organisms raise concerns for both proprietary rights holders and third-party farmers. In the rank of the latter are farmers who may be willing to exploit the transgenic resources[10] and others who are conversely inclined.[11] For rights

holders, gene wandering or genetic contamination has the potential to undermine both their exclusive rights and to expose them to legal liabilities. As a byproduct of agricultural biotechnology, gene wandering presents a clear tension in our local and industrial agricultural communities. It also challenges the ability of our legal system, including our courts and regulators, to respond to new phenomena.

Legal and policy responses so far are sending mixed signals (Atkinson, 2003). They have as yet to identify let alone grapple with the underlying epistemological rift and broader socioeconomic tensions between the two competing approaches to agriculture implicated in the gene-wandering syndrome. Yet that step is imperative to salvage traditional and alternative agriculture from the stranglehold of agricultural biotechnology.

Judicial Developments in Canada

Judicial developments in Canada have addressed two contentious scenarios posed by gene wandering and the resulting conflicts in the agricultural communities. Although similar examples are not lacking in other jurisdictions (Lee & Burrell, 2002, p. 258),[12] the Canadian experience remains the toast of the international community, which had looked on Canadian jurisprudence to provide a much-needed alternative juridical option vis á via America's extremely permissive approach to private claims over life forms. Also, as a leading biotechnology country, judicial developments in Canada have global ramifications. So far, such developments have turned on three issues: (a) the patentability of transgenic subject matter; (b) liability for patent infringement over farmer "use"/exploitation of proprietary genetic resources resulting from adventitious contamination, and (c) the applicability or extent of tortious liability for cross-pollination. Three cases provide the pathway for exploring and weighing law's response to the developments.

The Harvard Mouse decision. The first case, the Harvard Mouse decision, requires no detailing as it is not directly implicated in the present analysis. It nonetheless merits a brief mention. Here, a narrowly divided Supreme Court of Canada held that pursuant to Section 2 of the Canadian Patent Act (1985), a genetically modified mouse predisposed to cancer to facilitate cancer research was not a "manufacture or composition of matter" and hence unpatentable. This ruling was without prejudice to Harvard's patents on somatic cell cultures harboring the oncogene and on the plasmid in oncomouse cells and the process for inserting oncogenes into the plasmid (Atkinson, 2003, p. 5). For the majority, the reason for the validation of some claims and the outright rejection of the oncomouse patent itself (which is valid and subsisting in Europe and the United States) is anchored on the inchoate and highly criticized division between lower and higher life forms.[13] Exploration of the soundness or lack thereof of that distinction is outside the scope of this article.

Essentially, *Harvard Mouse* is a biotechnology patent decision in the context of health research. Its significance is not so limited, however. Indeed, it is a watershed in what promises to be a long and tortuous attempt by the judiciary to grapple with the challenge posed by modern biotechnology in all its disciplinary intersections. This is still the case despite the impression that the decision has done little to clarify the state of the law. Subsequent judicial developments in Canada, especially the *Schmeiser* (*Monsanto Canada Inc. v. Schmeiser*, 2004) case, suggest that, thus far, the implication of that decision is felt more in the agricultural context than in the health realm.

The Schmeiser case. In Schmeiser, one aspect of gene wandering was in issue. Like in Harvard Mouse, the litigation centered on the patent regime of intellectual property rights. However, Schmeiser was a case of patent infringement, whereas Harvard Mouse concerned the patentability of a transgenic subject matter. Monsanto (Canada)—an agro-business giant and arguably the face of global agricultural biotechnology—accused Percy Schmeiser, a rural Saskatchewan farmer, of patent infringement. Monsanto proved the presence of genetically engineered canola, which contained its (Monsanto's) glyphosate-resistance gene in Schmeiser's farm. The gene in question is responsible for the canola plant and its subsequent propagation to be glyphosate-resistant. Monsanto had subsisting patents for glyphosate-resistant genes in Canada, which it markets under the general and specific names, including "Roundup" and "Roundup Ready" canola. When sprayed, the roundup herbicides kill weeds while leaving unharmed plants containing the glysophate-resistant gene. For some undetermined reason, Monsanto's glyphosate-resistant genes made their way into Schmeiser's farm. The latter saved and used seed containing the patented gene from a previous harvest as was his practice. The presence of the glysophate-resistant gene was desirable and not antithetical to Schmeiser's business interest. He was not a certified organic farmer.

In upholding Monsanto's patent infringement action against Schmeiser, the Supreme Court of Canada was again sharply divided: 5-4. It held that

the standard of liability for patent infringement was a strict one: Knowledge or lack thereof of the presence of the patented gene in the defendant's farm or crop was not material. Also, lack of deliberate action or fault on Schmeiser's part, including the fact that he did not and had no need to spray the herbicide on his farm, only went to reduce his liability to pay damages. Perhaps of great significance is the High Court's rejection of the argument that the patent in issue is invalid because a plant is a higher life form pursuant to the *Harvard Mouse* decision. The Court avoided the opportunity to revisit *Harvard Mouse*, especially the controversial distinction that it made between lower and higher life forms. Rather, adopting a generally evasive or at best a low-key attitude to that distinction, the Court held that the patent in issue was valid because it concerns a gene and a cell (Phillipson, 2005, p. 365), which are now contained in Schmeiser's canola plant! Simply stated, although the gene and cell are supposedly if not conclusively lower life forms, the plant of which they are component is a higher life form that enjoys patent protection contrary to *Harvard Mouse* decision.

Pursuant to its strict liability approach to patent infringement, in *Schmeiser*, the Court affirms an extremely liberal interpretation of "use" of a patented object to include mere possession. In sum, the distinction that the *Harvard* panel drew between higher and lower life forms appears to translate to no practical significance. Contrary to the thinking after the *Harvard Mouse* decision, it is still possible to erect a flag and claim a continent (Brett, 2004, p. 85). In its practical translation, the *Schmeiser* decision may have overruled, albeit subtly, *Harvard Mouse*.

The *Schmeiser* decision is a perfect demonstration of judicial endorsement of commodification of germplasm, which I alluded to earlier. In upholding Monsanto's gene patent, the Court impliedly assumes that intellectual property rights trumps a farmer's classical property rights over his or her crops. This unhelpful privileging of intellectual property rights over orthodox property rights demonstrates a bankrupt understanding of property jurisprudence (Lessig, 2003, pp. 775-777). *Schmeiser* clearly indicates that rather than mitigate apparent tensions in our agricultural communities, judicial responses have a tendency to escalate such tensions.

The *Schmeiser* experience and similar scenarios have given rise to a number of proposals to mitigate potential consequences on disadvantaged smallholder farmers. These proposals include calls for a special statutory provision for patentee liability for gene wandering and the relaxation of a strict liability standard for patent infringement in the agricultural biotechnology arena. Others involve the elaboration of the doctrine of "innocent infringer" to cover the likes of Schmeiser as well as the defense of farmers' privilege, the doctrine of waiver, or implied license as a shield against the likes of Monsanto (Kershen, 2004; Lee & Burrell, 2002; Phillipson, 2005). All these lend support to commentators' observations that

> it may well be that judicial creativity [as well as legislative audacity] in this area is precisely the sort of intervention that will be needed to deal with an almost entirely new form of technology, and the problems flowing from it, which the patent law still rooted in concepts designed to deal with mechanical inventions seems unable to anticipate. (Lee & Burrell, 2002, p. 256; see also Phillipson, 2005, p. 363)

The Hoffman application. The third case is the Hoffman application, again a Saskatchewan, Canada, proceeding, which presents an opposite fact scenario to Schmeiser. Unlike the Schmeiser decision, where an agro-biotech giant was pitched against a smallholder transgenic farmer, in Hoffman, a few certified organic farmers are seeking to hold two agro-biotech multinationals, Monsanto and Bayer CropScience, responsible for alleged genetic contamination of their organic fields by the respondents' volunteer genetically modified canola.

A few points provide the necessary backdrop to understand the significance of this case. For the most part, organic farming in industrialized countries is purely a commercial venture servicing a viable market niche for organic products that have arisen in the wake of uncertainties around genetically modified food. However, organic farming is the pattern of traditional agricultural practices in indigenous and local communities in the North and South.

Since the advent of commercial agro-biotechnology, especially genetic engineering, mega-agribusinesses have exploited the opportunities provided by the global political economics of agriculture, under free trade and neoliberal frameworks, to penetrate indigenous and local communities. Consequently, traditional or conventional agricultural practitioners operate under a coerced environment that undermines their cultural and agro-epistemological orientations and leaves them with limited choices. The issue of genetic contamination in the *Hoffman* scenario is truly a symbolic depiction of a global phenomenon. Simply put, traditional or alternative agricultural practices are under siege by agricultural biotechnology. Hoffman and Co.'s claims against Monsanto and Bayer CropScience can be analogized to

a more complex experience of indigenous and local community practitioners of agriculture in both the North and South. Beyond *Hoffman*, how the issues are eventually resolved will be important in moderating the tensions in the agricultural communities.[14]

The plaintiffs in *Hoffman* seek certification as a class—a procedural step required to bring action against Monsanto and Bayer CropScience for alleged contamination. According to them, contamination of their organic farm by transgenic canola threatens their status as organic farmers, as they could no longer guarantee that their canola has genetically modified (GM)-free status.[15] In accordance with the Class Action Act (2001), the applicants have to establish that they have a cause of action. At this procedural stage, the applicants base their application and claim for damages under the common law torts of negligence, strict liability, nuisance, and trespass. Also, they rely on pollution liability provisions of provincial environmental statutes.[16] There is a material fact peculiar to this proceeding. In Saskatchewan, a provincial statute[17] shields neighboring farmers directly implicated in alleged contamination from actions in nuisance under the so-called "right to farm." Consequently, the applicants' recourse to the tort of nuisance is limited to manufacturers or proprietary right holders to the genetically modified canola, that is, Monsanto and Bayer CropScience.

After a detailed review and analysis of all the common law as well as statutory grounds of the plaintiffs' application pursuant to the Class Action Act (2001), the court held that they did not disclose a cause of action. Consequently, it declined to certify the farmers for class action. The court, however, took into consideration a subsequent amendment to the Environmental Management Act, in which a more neutral language, "substance," was substituted for the previous term, "pollutant," as the basis for civil liability in nuisance.[18] It reluctantly concluded that to establish a cause of action, it is not necessary for the plaintiff to prove that the offensive "substance" "is inherently harmful or unsafe" (*Hoffman and ors. v. Monsanto Canada Inc & Bayer CropScience Inc.*, 2005, para. 168) as was the case before the amendment.

Although the role of the lower court in this case was preliminary and procedural, the ruling of Justice Smith, which spans 341 paragraphs and more than 170 pages, was thorough and, according to Phillipson (2005),

> certainly raises questions as to the adequacy of the common law to deal with widespread commercial uptake of GM crops . . . [i]t is also abundantly clear that that her analysis of the merits of the common law claims was far from cursory. (p. 370)

The Saskatchewan Court of Appeal has since granted the plaintiffs leave to appeal. Whether the appellate court ends up upholding or rejecting it, Justice Smith's reasoned judgment will be an important resource for the appellate court.

Without going into the details and criticisms (Olszynski, 2005) of the Saskatchewan Court of Queen's Bench decision, a miserly sketch of Justice Smith's analysis of the common law grounds is helpful to underscore the enormity of the challenges that face the courts in regard to liability over gene wandering. On negligence, she held that the plaintiffs could not satisfy the issues of foreseeability and proximity. First, the loss and damage to farmers resulting from their canola's failed organic status, canola disuse in crop rotation, and postcontamination clean-up costs of farm fields could not have been foreseen by the manufacturers. Second, the plaintiffs did not establish any relational proximity between them and the defendants to ground a finding of duty of care (*Hoffman and ors. v. Monsanto Canada Inc & Bayer CropScience Inc.*, 2005, para. 67)—a prerequisite for a successful action in negligence.

On nuisance, the court noted that the defendants' "commercial release" of the genetically modified canola by "mere sale or marketing" (*Hoffman and ors. v. Monsanto Canada Inc & Bayer CropScience Inc.*, 2005, para. 114) may have precipitated the occurrence of contamination of the plaintiffs' fields. Nonetheless, it did not constitute harm. However, the intervention of neighboring farmers (growing of genetically modified canola) was conduct pursuant to the statutorily protected right to farm. Such intervention made it unlikely that the court could have supported a claim of relational proximity and imposed a duty of care on the defendants under negligence. Again, according to Phillipson, "by a combination of statutory provision and common law doctrine they [the plaintiffs] cannot sue the user or the manufacturer of materials which are causing them significant harm" (Phillipson, 2005, p. 369). On the doctrine of strict liability, the court held that "commercial release and sale" of two transgenic canola brands did not amount to "escape" of substance from property under the control of the defendants in accordance with the interpretation of *Rylands v. Fletcher* (1886) (*Hoffman and ors. v. Monsanto Canada Inc & Bayer CropScience Inc.*, 2005, para. 97; see also Howarth, 2004, p. 192). Last, the court dismissed the claim of trespass because the plaintiffs could not establish any

"direct interference" on their farm fields by the defendants (*Hoffman and ors. v. Monsanto Canada Inc & Bayer CropScience Inc.*, 2005, para. 133).[19] Arguably, this finding is unlikely to be different if they sued neighboring farmers.

As a preliminary decision on a procedural issue, the court in *Hoffman* did not have the opportunity to appraise how the coming together of biotech and agrochemical corporations have rolled back farmers' traditional activities. Biotechnology companies have relied on technology, licensing, and other special contractual arrangements to consolidate their proprietary and monopolistic interests over genetic resources. In many cases, farmers are merely downstream participants in a complex and highly coerced setting now strictly "policed" by corporate "gene giants." For practical purposes, most of these farmers and their farm fields are mere agents and retail outlets for the big agro-biotech concerns that can be analogized to disclosed principals. The role of agro-biotech and chemical corporations transcends the mere release, sale, or marketing of genetically modified crops as the *Hoffman* court suggests. From this perspective, the issues of forseeability and relational proximity would not have assumed so much importance. Certainly, they require a closer scrutiny than the court has given them so far. Therefore, the statutory constraints under the aforementioned "right to farm" legislation, such as the Saskatchewan's Agricultural Operations Act, that limited the plaintiff's recourse to the defendant manufacturers as opposed to neighboring farmers may not have been inherently fatal.

In all, Justice Smith's decision in *Hoffman* is probably unassailable in the context of her analysis of tortious relations and statutory class action. However, the indeterminate and fluid nature of all the common law notions implicated in her analysis provide the courts the leeway to develop an innovative judicial response to allow the common law to evolve in the compelling circumstances necessitated by genetic contamination. Also, the nature of the relationship between agro-biotech concerns and downstream farmers must attract the court's interest. Such an approach could potentially yield a converse finding. Although constrained by the procedural limitations in *Hoffman*, Justice Smith's approach is characteristic of the judiciary's inability to address the larger socioeconomic impact of agricultural biotechnology, especially in regard to existing or alternative forms of agriculture (Lee & Burrell, 2002, p. 518). Regrettably, the direct regulatory response to agricultural biotechnology is similarly inclined. Worse still, it does not take the issue of economic harm of cross-pollination into account.

Global Ramifications of *Hoffman* and Genetic Contamination

In comparison to the United States and Canada, Europe has a more precautionary response to agricultural biotechnology. Unfortunately, Europe's neglect of the issue of genetic contamination remains a yawing gap in its regulatory response to agricultural biotechnology (Lee & Burrell, 2002, p. 528). According to Lee and Burrell (2002, p. 518), genetic contamination raises far more serious socioeconomic concerns that are not addressed by the existing regulatory framework in Europe. One of the concerns is that if genetic contamination is not decisively tackled, "existing industry [organic or traditional farming] will simply be unable to continue regardless of consumer demand for the original product" (p. 518). In Canada, preliminary policy exploration of the genetic contamination experience emphasizes environmental benefits of transgenic crops and underrates the seriousness of the phenomenon. Ironically, it recommends the adoption of traditional agricultural methods for isolating conventionally bred crops as an alternative way of achieving genetic isolation and stemming transgenic contamination of nontarget organisms (Fulton et al., 2001). It does not recognize, however, the threats transgenic materials pose for traditional agriculture and conventionally bred crops.

For dedicated organic farming communities, the harm caused by cross-pollination is mainly a loss of GM-free status and, consequently, their certification where applicable. In the industrialized countries, organic farming is a fast-growing industry that commands a strong market niche. It is the basis of livelihood for many farming communities. Also, and perhaps most important, patronage of organic foods by sections of the community is an exercise in food choice. As already noted, such food preferences are informed by a variety of reasons. Despite those considerations, contamination of organic farms by transgenic products is a stark reality in our agricultural fields. It is interesting that the market and industry self-regulatory response in this arena appears to be adjusting to that reality, especially in regard to adventitious contamination (European Council [E.C.], 1999).[20] Thus, certification bodies committed to a "zero tolerance" standard for genetic contamination may be operating from an idealistic plane.[21] Realistically, many organic farmers are concerned with determining what amount of transgenic material would be unacceptable for organic certification.[22] Indeed, for consumers, the "organic label" poses a semiotic quandary rather than being a safety or quality assurance alternative to transgenic food products.

Other major victims of cross-pollination are indigenous or traditional farming communities in both the developing and developed countries. Unlike their organic counterparts, the impact of genetic contamination transcends the issue of loss of organic certification and market niche or the search for an acceptable threshold for contamination in the organic setting. Indigenous and local peoples' agricultural experience constitutes a way of life, embodying a wide spectrum of activities for the realization of complex indigenous world views of relationships and indigenous identity (Pascalev, 2003, p. 588). In contrast to agro-science, especially the phenomenon of genetic engineering, traditional agricultural practices are conducted through an alternative epistemological domain conveniently known as traditional knowledge.

The unique methodological features of traditional agricultural practices include fundamental reliance on accidental mutations that occur in nature and the spurning of intensive chemical use and other artificial agro-inputs. Others involve the use of natural or organic fertilizers and various traditional agricultural methods such as crop rotation and shifting cultivation. Also, deliberate aversion for direct genetic manipulation of life forms constitutes a key methodological feature of traditional agriculture.

Traditional agricultural practices, crops, and animals are under siege by agricultural biotechnology (Otsuka, 2003, p. 299). Farmers in indigenous and local communities continue to witness massive loss of their traditional landraces to genetic manipulation, biopiracy, and commodification of germplasm. The ubiquitous influence of transnational agro-biotech companies on traditional agricultural practices in indigenous and local communities compromises the significance of traditional agriculture as an alternative agro-epistemic form. Farmers' customary practices to save seeds and the cultural meaning of seeds as genetic copy propagating material are now circumscribed by mega agro-biotech companies through the instrumentality of intellectual property and other hi-biotech devices (Drahos & Braithwaite, 2004, p. 216). Taken as a whole, such influence amounts to a replication of the *Hoffman* scenario on a global scale. The distinction here is that although *Hoffman* highlights the potential loss of organic certification by victims of gene wandering, on the traditional or indigenous scale, cross-pollination at genetic and agro-epistemic levels has more dire consequences. It generates socioeconomic impacts in ways that threaten indigenous and local community peoples' self-determination, food security, cultural survival, and more.

Beyond *Hoffman*: Genetic Contamination in Broader Context

So far, the judicial and policy responses to the tensions in the agricultural communities occasioned by the twin problems of the intellectual property–sponsored epistemological fault line between traditional agriculture and agricultural biotechnology and the gene-wandering phenomenon are narrowly focused. The epistemological question has hardly been tackled. Nor has any serious consideration been given to the broader socioeconomic issues implicated under the two fault lines. If courts and policy bureaucrats were to focus on the bigger picture, it is possible that their responses to extant tension between our agricultural communities would be different. There is plenty of room in the indeterminate common law tort principles explored by Justice Smith in her *Hoffman* decision as well as in the patent jurisprudence symbolized in the *Schmeiser* case for a progressive judicial response to the tension. A few examples may be helpful.

Between existing or traditional forms of agriculture and agro-biotech methods, there is a contested claim and appeal to "nature." Although promoters of genetic modification locate their practice within "nature's own methods" (Krimsky & Wrubel, 1996, p. 9), opponents are conversely inclined. For the latter, artificial manipulation of plant and animal genetic composition is scarcely nature's own method. The short point is that the contested ideology of nature implicated in agricultural biotechnology and traditional or preexisting forms of agriculture have implications for legal analysis. For example, under the rule in *Rylands v. Fletcher* (1886), strict liability is the standard of legal responsibility for damages arising from nonnatural use of land. A court faced with sophisticated forms of genetic engineering may be forced to ponder whether an agro-biotech defendant implicated in the contamination of an organic farm was engaged in a natural or nonnatural use of land to preclude or attract strict liability.[23] Thus, agricultural biotechnology raises many issues in its wake that tasks legal and judicial skills in ways that may facilitate the evolution of the common law to address the present socioeconomic crisis associated with genetic engineering. Unfortunately, the *Hoffman* court was constrained by the procedural dictates of class action and could scarcely grapple with the complex legal issues implicated in genetic contamination.

Nuisance is another example that demonstrates the inadequacy of an uncritical approach to common law doctrines in cases of genetic contamination. Despite the inherently indeterminate nature of nuisance

actions, a transgenic contamination claim has the potential to compound the situation. For instance, theoretically, a claimant in a nuisance action based on genetic contamination is precluded from recovering if her use of the farm land for organic or nontransgenic farming amounts to a "sensitive use" as opposed to an ordinary use of the land. Given the coercive and domineering nature of agricultural biotechnology, a transgenic farmer may be tempted to argue that organic or other nontransgenic agricultural practices in an adjoining farm is a "sensitive use" that potentially disqualifies such an action in nuisance (Lee & Burrell, 2002, p. 532).[24] Ironically, those engaged in organic or other preexisting farming practices can potentially be characterized as engaged in sensitive use of land in relation to their transgenic counterparts. Undeniably, organic and other forms of nontransgenic farmers are engaged in ordinary and natural use of land, even though their products/processes can well pass for "sensitive" in relation to those of agricultural biotechnology. Clearly, agricultural biotechnology creates subtle but complex distinctions in the relationships that exist within the farming communities. A strict approach to common law doctrines is inadequate to unravel the situation. Biotechnology provides an opportunity for "creative evolution" of the common law.

In Europe, there is a lame attempt to plug the loopholes in intellectual property jurisprudence in ways to mitigate the Percy Schmeiser scenario. For example, the Biotechnology Directive of 1998 (E.C., 1998) creates new defenses[25] to infringement of biotechnology patents. Those defenses are for the most part critically circumscribed. The first allows farmers to plead an "exhaustion defense" if they exploit, by way of propagation or multiplication, a patented biological material obtained from the market in so far as the act of exploitation is a necessary incidence of the purpose for which the material was marketed. This defense is grossly constrained in that it is dependent on a special commercial relationship between the patent owner and the farmer in which the former closely monitors the farmer's use of the genetic resources to ensure that it "is not subsequently used for other propagation or multiplication" (E.C., 1998, art. 10). It has been rightly noted that the defense "does not protect a farmer who does not have an existing commercial relationship with the patent owner" (Lee & Burrell, 2002, p. 524). Moreover, technology control devices may be used to foreclose this weak option.[26]

The other defense falls under "farmers' privilege." This has a corollary to the global international regime under UPOV (1991).[27]

Farmer's privilege is putatively aimed at preserving indigenous, local community, and smallholder farmers' customary right to use farm-saved seeds. Under the Directive, this defense is not automatic. It does not extend to farmers such as Schmeiser, who save adventitiously contaminated seeds for replanting. Rather, it is targeted at usually smallholder farmers who must have purchased the seed and obtained the consent of the patent owner to save and replant them (UPOV, 1991, art. 11). In all, the European Directive does little to mitigate the overarching impact of agricultural biotechnology on existing forms of agriculture. Like the judicial and policy responses earlier highlighted, it demonstrates a narrow understanding or, at best, lack of commitment to the broader socioeconomic and epistemic nuances of the intersection between agricultural biotechnology and preexisting forms of agricultural practices.

Conclusion

Genetic contamination and, for that matter, agricultural biotechnology represent a clear and present threat to traditional or alternative forms of agriculture. They both have the capacity to undermine traditional or alternative agro-epistemic approaches with attendant larger socioeconomic consequences. As demonstrated in both the *Schmeiser* and *Hoffman* decisions, a narrow application of common law principles and statutory prescriptions cannot yield results that could mitigate that threat. However, judicial creativity in exploiting the dynamism of the common law system and principles (especially those implicated in the genetic contamination scenario) is urgently needed. In Canada, this is imperative given the government's apparent opposition to a special regulatory intervention and misplaced faith in the adequacy of general tort law to tackle the menace of genetic contamination (Canadian Biotechnology Advisory Committee, 2002; Glenn, 2004, p. 553). While examining the breadth of applicability of common law principles in genetic contamination scenarios, courts should pay close attention to the coerced change in the orthodox role of traditional farmers and the nature of their relationship with agro-biotech proprietary right holders.

Given the global ramifications of the political and legal economics of agriculture, the impact of the *Schmeiser* and *Hoffman* decisions transcend national boundaries. Shielding agro-biotech proprietors from liability for genetic contamination and holding smallholder farmers strictly responsible for patent infringement on the ground of adventitious possession of

proprietary transgenic material provide little hope for smallholder and nontransgenic farming communities and practices. It is important to note that the latter are indispensable custodians of our marginalized and endangered alternative agro-epistemic base. There are diverse reasons for sustaining epistemic pluralism in our agricultural strategies. Foremost are the uncertainties around agricultural biotechnology. Judicial and policy responses to agricultural biotechnology that underrate the latter's capacity to undermine preexisting or alternative forms of agriculture create a potential recipe for a crisis of sustainability in agriculture. That may yet be averted if only our courts and policy makers are minded to see the larger picture.

Notes

1. In contrast to traditional agricultural practices, or organic farming, conventional agriculture refers to mechanized or industrial approaches to agro-scientific endeavors. It is characterized for the most part by high energy and chemical inputs, including use of synthetic fertilizers, chemical pesticides, and herbicides, and diverse high-tech intervention processes in agro-resource control, management, and production.

2. It could be argued that as an epochal phenomenon, agricultural biotechnology, especially genetic engineering, is a *sui generis* category. It may not fit neatly within conventional agriculture. There is now a tendency to make a distinction between conventional food and genetically modified foods (Pascalev, 2003, p. 585).

3. Given the series of unending convergences in the agro biotech and transgenic sectors, it is hard to determine with certainty the profile of these megacorporations and their share of the global seed and agro biotech and chemical markets. Resulting from these convergences, quite a few agrochemical and biotechnology companies now control more than 85% of the global agrochemical market and almost the entire global transgenic seed market.

4. In 2003, the CBD Ad Hoc Technical Expert Group on Genetic Use Restriction Technology defined "smallholder farmers" as

> those farmers involved in systems that meet most of, but not limited to, the following characteristics: (i) low external input; (ii) limited resource-base; (iii) limited market access and orientation; (iv) high capacity for local innovation of technologies related to genetic resources; and (v) vulnerable to a range of external pressures as a result of the above criteria. (*Ad Hoc Technical Expert Group meeting on the potential impacts of genetic use restriction technologies on smallholder farmers, indigenous and local communities and farmers' rights*, 2006)

5. The privileging of intellectual property rights over classical property rights in plants is accomplished by various ways. They include the creation of sui generis forms of intellectual property protection such as PBRs or plant variety rights regimes, extension of conventional intellectual property model, especially patents to the realm of plant genetic resources nationally and internationally.

6. Canada, the United States, and the countries of the European Union have legislative regimes on PBRs or plant variety protection. At the multilateral level, the principal treaty for plant variety protection is the International Union for the Protection of New Varieties of Plants (UPOV, 1991). Under Article 27 of the World Trade Organization agreement on Trade-Related Aspects of Intellectual Property Rights, members may protect plant varieties by "patents or by an effective *sui generis* system or by any combination thereof."

7. For example, in the *Harvard Mouse* case, the court was required to decide whether Section 2 of the Canada Patent Act (1985), which defines invention (as subject matter of a patent), includes a higher life form such as a genetically modified mouse.

8. This is exemplified in the "terminator" or genetic use restriction technologies phenomena. In addition to use of technology, transgenic seed companies have resorted to complex contract arrangements with farmers to secure the former's intellectual property rights.

9. Biopiracy is not limited to the agricultural sector. According to Arewa (2006), "narratives of appropriation are typically told with respect to three broad [but interrelated] categories: Agriculture and medicinal and other plants, expressive culture, and other commercial uses" (p. 170).

10. For example, that was the case in *Schmeiser*.

11. For example, as in *Hoffman*.

12. See, for example, *R v. Secretary of State for the Environment and MAFF*, *ex parte Watson*, a U.K. case in which an organic farmer challenged, by way of judicial review application, a regulatory approval for trial planting of genetically modified maize on an adjourning farm for not addressing the risk of cross-pollination.

13. Although there is no direct reference or use of these phrases in the Canadian Patent Act (1985), they are introduced by the Commissioner of Patents, and they represent logical articulation of the practice of the Patent Office and judicial decisions prior to the *Harvard Mouse* litigation.

14. *Hoffman* is constrained by the procedural technicalities of a class action. Yet the issue raised by genetic contamination will continue to attract judicial and policy attention after *Hoffmann*.

15. More than 80% of Canadian-grown canola is genetically modified. Out of this, Monsanto's Round-up Ready Canola constitutes 65%.

16. The two statutes are Environmental Management and Protection Act (1983-1984) and Environmental Management and Protection Act (2002). Section 13(3) of the latter Act provides that an owner of a pollutant may be held liable for any damage arising from the discharge of such pollutant.

17. The Agricultural Operations Act (1995) prohibits actions in nuisance from issuing against farmers whose conduct falls within "normally accepted agricultural practices." According to Phillipson (2005, p. 368), this statutory protection of "right to farm" is a Canada-wide trend.

18. The relevant section is s. 15 of the Environmental Management and Protection Act (2002). Following the Act's coming into effect, the plaintiffs amended their statement of claim to assert a cause of action under the new regime.

19. This is pursuant to Lord Denning's decision in *Southport Corporation v. Esso Petroleum Inc.* (1954).

20. The European Council (1999) does not bar the use of "organic" designation to market products unknowingly contaminated by GMOs.

21. For example, this is the practice of the Soil Association, the United Kingdom's largest organic certification organization.

22. According to Lee and Burrell (2002), "GM-free will no longer mean 'no GMOs present'; 'organic' will not mean GM-free" (p. 518). Article 23 of the European Council Regulation 1804/99 provides for setting a maximum threshold for inadvertent contamination.

23. In *Richards v. Lothian* (1913), the court, Lord Moulton, articulates that nonnatural use to be "some special use bringing with it increased danger to others." Lee and Burrell (2002) note that "the notion remains [] difficult to apply" (p. 533) and that the more recent decision in *Cambridge Water v. Eastern Country Leather* (1994) is not helpful because the House of Lords declined to define natural use even though it held that that storage of large amounts of chemicals on industrial complex was nonnatural use of land.

24. In *R. v. Secretary of State for the Environment and MAFF, ex parte Watson* (1999), the court, per Buxton LJ, alluded to the constraining nature of sensitive crops in a private nuisance claims in regard to genetic contamination. Lee and Burrell (2002, p. 532) argue that although sensitive use seems rarely used by the courts, given this [Buxton LJ's] dictum, it will almost certainly be raised by the GM farmer, thus providing an opportunity to challenge this dated requirement.

25. Relevant articles are 10 and 11.

26. For example, the genetic use or terminator technologies.

27. The relevant article (of the 1991 UPOV) is 15, available online at http://www.upov.int/en/publications/conventions/1991/msword/act1991.doc. The provision of that article is similar to Article 9 of the International Treaty on Plant Genetic Resources for Food and Agriculture (2001).

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