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Intellectual Property and Genetically Modified Seeds:

The United States, Trade, and the Developing World

Haley Stein*

¶1 The United States' policy on intellectual property ("IP") rights for the life sciences grants broad patent rights to private industry. While this type of IP regime is common in developed nations, and in the United States in particular, developing nations do not have a comparable internal infrastructure for intellectual property rights. The private sector's influence has shaped IP policy in the United States, and has likewise shaped IP policies championed by the United States internationally through the Office of the United States Trade Representative ("USTR").

¶2 The result is a stringent patent regime for genetically modified seeds in both developed nations (the source for and consumers of IP protected seeds) and developing nations (the purchasers of IP protected seeds). IP protections on seed development have repercussions for trade, business, and food development issues. Recent dramatic developments in technology have opened new doors for seed developers and marketers. Rapid consolidation created a global industry primarily controlled by a few large corporations. As a result, the seed industry is now a global \$15 billion industry.¹

¶3 The private seed industry has made tremendous commercial gains as a result of strong IP protections on its products. The public also benefits, as these protections foster innovation, ingenuity, and research for new and improved products.²

¶4 IP rights are likewise at the forefront of the United States' trade agenda, just as they are priorities on the private seed industry's agenda.³ The United States is seen as having the strongest protections for IP rights world-wide.⁴ Agribusinesses in the United States

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¹ JEREMY RIFKIN, *HARVESTING THE GENE AND REMAKING THE WORLD: THE BIOTECH CENTURY* 68 (1998).

² J.M. Spectar, *Patent Necessity: Intellectual Property Dilemmas in the Biotech Domain & Treatment Equity for Developing Countries*, 24 *HOUS. J. INT'L L* 227, 234 (2002).

³ United States Trade Representative, *USTR's Role in Trade Policy*, available at http://www.ustr.gov/Who_We_Are/Mission_of_the_USTR.html (last visited April 20, 2005) ("The Office of the U.S. Trade Representative (USTR) is responsible for developing and coordinating U.S. international trade, commodity, and direct investment policy, and overseeing negotiations with other countries. The head of USTR is the U.S. Trade Representative, a Cabinet member who serves as the President's principal trade advisor, negotiator, and spokesperson on trade issues.").

⁴ Spectar, *supra* note 2, at 235.

wield an enormous amount of power in shaping IP biotechnology policies, as recent trade agreements reflect.⁵

¶5 Increased investment and unprecedented returns on these investments in agricultural biotechnology have brought issues of IP protection to the forefront. Agricultural biotechnology is a technique used by scientists to create, improve, or modify plants. Genetic engineering is one example of a biotechnological technique. For centuries, farmers have used selective breeding to improve seed production. Recent advances in science and technology now allow genetic engineers to easily and precisely move genes to improve plants and seeds.⁶

¶6 Agricultural biotechnology has enormous economic and humanitarian potential: “the great hope for genetically engineered crops is that they will feed the world.”⁷ There are vast benefits: more productive harvests, improved food quality (such as vitamin-enriched products), and decreased dependence on environmentally dangerous chemicals and pesticides.⁸ Yet there are many unknowns regarding genetically modified foods. There is no scientific confirmation that these foods are safe and many countries are adamantly opposed to the marketing of genetically altered foods.⁹ There are also fears of increased resistance to pesticides, adaptation of insects, unknown environmental impacts, and detrimental effects on the plants’ gene pool.¹⁰

¶7 The ability of humans to genetically manipulate seeds through science has altered the agricultural landscape for both large farming corporations and small family farms. While genetic modification provides many advantages for small farmers, particularly in developing countries, there are likewise many drawbacks.¹¹ Agribusiness domination of the global seed market and aggressive campaigns to promote broad patenting rights for biotech seeds and plants challenge traditional farming practices such as seed saving and seed sharing. Up to this point, the United States’ has been the most vocal advocate of bolstering these IP rights on the international front.

¶8 In this paper, I will consider three aspects of the business of genetic seed modification. First, I will look at the development of the U.S. seed industry and patentability from a historical and judicial perspective. I will examine how legislative and judicial decisions sculpted a complex and private-sector friendly IP jurisprudence for biotechnology. This evolution led to the erosion of traditional rights of farmers, as embodied by the development of “Terminator Technology.”¹²

¶9 Second, I will examine how private business shaped U.S. foreign trade policy and how trade was used by the United States as a conduit to expand intellectual property

⁵ See generally Susan K. Sell, *Industry Strategies for Intellectual Property and Trade: The Quest for TRIPS, and Post-TRIPS Strategies*, 10 CARDOZO J. INT’L & COMP. L. 79 (2002).

⁶ United States Department of Agriculture, *Agriculture Biotechnology FAQ’s* (April 2001), available at <http://www.nal.usda.gov/bic/> (last visited April 20, 2005).

⁷ Lara E. Ewens, *Seed Wars: Biotechnology, Intellectual Property, and the Quest for High Yield Seeds*, 23 B.C. INT’L & COMP. L. REV. 285, 295 (2000).

⁸ Henrique Freire de Oliveira Souza, *Genetically Modified Plants: A Need for International Regulation*, 6 ANN. SURV. INT’L & COMP. L. 129, 138 (2000).

⁹ *Id.* at 138-39.

¹⁰ *Id.* at 139. See also RIFKIN, *supra* note 1, at 17.

¹¹ Samantha M. Ohlgart, *The Terminator Gene: Intellectual Property Rights v. The Farmers’ Common Law Right to Save Seed*, 7 DRAKE J. AGRIC. L. 473, 474 (2002).

¹² “Terminator technology” is a biotechnological development created to prevent seeds from reproducing after the first harvest — in effect “terminating” the seed and preventing future use.

rights in plant life sciences internationally. I will focus on how U.S. business interests have shaped policies now affecting developing nations.

¶10 Third, I will argue that the pro-business approach by the USTR inhibits progress for developing nations. A more productive international IP policy would shift the legal and policy focus from protection of agribusiness interests to an encouragement of partnerships between the public, private, and academic sectors in developing nations.

I. INTELLECTUAL PROPERTY AND SEEDS: PAST TO PRESENT

¶11 The history of property rights over farming in the United States is a study in how large businesses and major industries develop out of small, family owned enterprises. Likewise, the evolution of intellectual property rights regarding seeds and plants is a study in the process of commodification.

¶12 In this section, I will look first at the development of the U.S. agricultural sector and private seed industry. Second, I will analyze the governmental shift from public to private interests in federal legislation. Third, I will look at key judicial decisions granting broad patent rights for living things. I will then turn to the agribusiness industry today and the development of Terminator Technology.

A. *Historical Look at Seeds and Agriculture*

¶13 Until recently, certain concepts were universally accepted among farmers. First, out of economic necessity, farmers had the right to save, replant, and resell seeds to other farmers willing to buy seeds with desirable characteristics. Second, the genetic composition of seeds, rather than the seed itself, was considered part of a common heritage and widely shared among farmers. Third, seeds were not seen as a commodity; rather, the right to use and reproduce seeds was inherent in the first purchase of the seed. Until the nineteenth century, seeds were seen as a public commons which were bred and then freely distributed by the public sector.

1. Seed saving

¶14 For thousands of years, farmers saved seeds with the most beneficial characteristics to replant for the next harvest.¹³ Many claim the practice of saving seeds is the basis for the contemporary concepts of savings and investments.¹⁴ Until recently, the U.S. Department of Agriculture (“USDA”) not only freely developed and distributed seeds, but encouraged seed saving by farmers.¹⁵ Seed saving is an ingrained part of agriculture, and today it is believed that over eighty percent of farmers in developing nations rely on saved seeds for survival.¹⁶

¹³ Jeremy P. Oczek, *In the Aftermath of the “Terminator” Technology Controversy: Intellectual Property Protections for Genetically Engineered Seeds and the Right to Save and Replant Seeds*, 41 B.C. L. REV 627, 647 (2000).

¹⁴ Laurent Belsie, *Plants Without Seeds Challenge Historic Farming Practices*, CHRISTIAN SCIENCE MONITOR, July 30, 1998, available at 1998 WL 2369524 (“Saving seed shaped more modern notions of savings and investment.”).

¹⁵ Oczek, *supra* note 13, at 631.

¹⁶ Ohlgart, *supra* note 11, at 488.

¶15 Since natural seeds reproduce themselves indefinitely, traditionally, farmers either replanted seeds with successful traits or sold them to other farmers.¹⁷ Seed saving developed because, until very recently, seeds were not viewed as a commodity — crop plant genetics were considered common property.¹⁸ Yet, because seeds were seen as a commons, shared by all, there was little private investment in seed development and therefore a very small seed industry.¹⁹ Seed buyers purchased not only the product (the seed), but also the means of production. Farmers did not need to buy seeds yearly from a company.²⁰

2. Seed sharing

¶16 A nation's self-sufficiency depends on its ability to provide its own labor and food, and the United States is no exception. In the United States, settlers from Europe borrowed seeds, such as maize, from Native Americans when the seeds they transported from Europe failed to produce crops.²¹ In fact, the United States' agricultural industry is built upon sharing seeds from around the world.²² Until recently, there was a Jeffersonian tradition in the United States of sharing and importing genetic seed material.²³ The federal government supported seed collection and sharing in order to build a stable agriculture system.²⁴ In the mid-to-late 1800s, the federal government established a distribution program of free seeds, as well as agriculture schools to collect and distribute seeds.²⁵ The sharing of genetic material from seeds was not only allowed, but encouraged by federal involvement. By 1878, the USDA allocated at least a third of its budget to seed collection and free distribution. In 1879, it distributed over 1.1 billion seed packets.²⁶

3. Commodification

¶17 A commodity is a good that can be sold and does not have the ability to reproduce itself. In other words, the purchaser must return to the seller for the good once it is fully used.²⁷ While the free distribution of seeds was beneficial for federal government objectives, it ran counter to the interests of the fledgling private U.S. seed industry. In

¹⁷ Ewens, *supra* note 7, at 286.

¹⁸ *Id.* See also Ohlgart, *supra* note 11, at 482 (seed saving is an historical and traditional right for farmers).

¹⁹ Keith Aoki, *With Seeds & Deeds: Recent Skirmishes in the Seed Wars*, 11 CARDOZO J. INT'L & COMP. L. 247, 253 (2003).

²⁰ *Id.* at 260.

²¹ Debra L. Blair, *Intellectual Property Protection and Its Impact on the U.S. Seed Industry*, 4 DRAKE J. AGRIC. L. 297, 299 (1999).

²² Oczek, *supra* note 13, at 631.

²³ See Aoki, *supra* note 19, at 264. The term "Jeffersonian" refers to Thomas Jefferson's vision of the United States as an agrarian republic composed of independent farmers. THE READERS COMPANION TO AMERICAN HISTORY: JEFFERSONIAN DEMOCRACY, available at http://college.hmco.com/history/readerscomp/rcah/html/ah_047600_jeffersonian.htm (last visited April 20, 2005).

²⁴ Aoki, *supra* note 19, at 264.

²⁵ *Id.*

²⁶ Blair, *supra* note 21, at 301.

²⁷ Aoki, *supra* note 19, at 250.

1883, the first seed lobbying group was formed, the American Seed Trade Association (“ASTA”).²⁸

¶18 In 1908, the process of seed hybridization developed.²⁹ Hybridization, or scientifically combining and breeding seeds, was the first method by which companies were able to control replanting of seeds.³⁰ For the first time, farmers were able to purchase improved seeds for a better crop. The drawback was that the second generation of crops did not fare as well as the first generation.³¹ Therefore, farmers had annually to return to seed companies to buy the improved product.³² Major hybrid successes (such as a 700% increase in the return on hybrid corn seed investment) meant that seed development was moving to the private from the public sector.³³

¶19 Mounting pressure on the federal government from seed lobbying groups and other parties in the private sector spurred Congress to repeal the free seed distribution program in 1924.³⁴

¶20 The 1980 Supreme Court decision *Diamond v. Chakrabarty* laid the legal groundwork for the “privatization and commodification” of the genetics of seeds.³⁵ The seed industry underwent a rapid change. By 1996, the first patented commercially-grown, genetically-modified food crops were planted in the United States.³⁶ By 1997, U.S. farmers planted more than 8 million acres of genetically engineered soy and more than 3.5 million acres of genetically engineered corn.³⁷

¶21 Commodification also led to massive consolidation in the biotech industry, a trend that continues today, as illustrated by Monsanto’s recent string of acquisitions.³⁸ Since the early nineties, Monsanto has purchased Holden’s Foundation Seed for \$1.2 billion, acquired a forty percent hold on the seed company Dekelo, and gained full ownership of Asgrow, Agracetus, and Global Calgene — all major players in the global seed industry.³⁹

B. Privately Influenced Federal Legislation

¶22 Patent rights are constitutionally guaranteed under Article I, Section 8 of the U.S. Constitution.⁴⁰ The rationale of the patent system is to protect ideas and promote research and innovation.⁴¹ Until 1930, plants and seeds were not seen as patentable material

²⁸ Blair, *supra* note 24, at 302.

²⁹ See Ohlgart, *supra* note 11, at 479.

³⁰ *Id.*

³¹ Ewens, *supra* note 7, at 288.

³² Oczek, *supra* note 13, at 633.

³³ Ohlgart, *supra* note 11, at 480. See also Aoki, *supra* note 19, at 272.

³⁴ Blair, *supra* note 24, at 303. See also Aoki, *supra* note 19, at 267.

³⁵ 447 U.S. 303 (1980); see also RIFKIN, *supra* note 1, at 43.

³⁶ *Id.* at 18.

³⁷ *Id.*

³⁸ This acquisition trend is not limited to the seed industry. Biotechnology companies corner the global market in other biotech areas. Novartis is the world’s largest agrochemical company, the second largest seed company, the second largest pharmaceutical company, and the fourth largest veterinary medical company in the world. RIFKIN, *supra* note 1, at 69.

³⁹ See RIFKIN, *supra* note 1, at 69.

⁴⁰ U.S. CONST. art. I, § 8.

⁴¹ Ewens, *supra* note 7, at 291.

because they were a product of nature and not amenable to the written requirement description for patents.⁴² The realization of commercial potential by private business encouraged Congressional legislation to transition seed development from the public to the private sector.⁴³

¶23 The U.S. Plant Patent Act of 1930 (“PPA”) granted property rights for privately developed plant varieties for asexually reproducing plants.⁴⁴ Patent rights were extended to “distinct and new” asexually reproduced plants for a period of seventeen years.⁴⁵ This legislation departed from traditional U.S. patent law because living things could receive a patent under a more lenient standard than the traditional requirements of being useful, non-obvious, and novel.⁴⁶

¶24 Not fully satisfied with the limitation of asexual reproduction in the PPA, private industry pushed for an extension of patenting rights to sexually reproduced plants.⁴⁷ By the 1950s, private brand name seeds became more ubiquitous than government seeds.⁴⁸ In the U.S. Patent Act of 1952, Congress moved the PPA to a separate section.⁴⁹

¶25 The protection provided by the PPA continued to encourage the privatization of the seed industry, even though seeds were not included under the PPA.⁵⁰ Decades of lobbying coupled with advances in breeding technology provided the momentum for the 1970 Plant Variety Protection Act (“PVPA”).⁵¹ The PVPA provided protection for sexual reproduction in plants, including seed germination.⁵² Most commercial crops were now protected by patent laws for seventeen years.⁵³ While this was a significant victory for private seed industry, it was limited by two major exemptions: seed saving by farmers and for research purposes.⁵⁴ Under the PVPA “brown bag” exemption, farmers could continue to save, replant, and resell protected seeds to other farmers.⁵⁵

¶26 The PVPA was indicative of a growing rift between the United States and foreign countries many of which still recognized the traditions of seed saving and sharing.⁵⁶ The Act set the stage for the creation of today’s large agribusinesses. The 1970s saw the consolidation of large seed businesses followed by phase-out of governmental seed variety release in the 1980s.⁵⁷ In 1998, ten companies controlled thirty percent of the seed trade worldwide.⁵⁸ The issue was next tackled by the courts.

⁴² See Spectar, *supra* note 2. See also Blair, *supra* note 21, at 310.

⁴³ Blair, *supra* note 21, at 232; see also Oczek, *supra* note 13, at 633.

⁴⁴ U.S. Plant Patent Act of 1930, 35 U.S.C. § 161 (2003).

⁴⁵ *Id.*

⁴⁶ Aoki, *supra* note 19, at 280.

⁴⁷ *Id.* at 281.

⁴⁸ *Id.*

⁴⁹ *Id.* at 282.

⁵⁰ Ohlgart, *supra* note 11, at 480; Blair, *supra* note 21, at 310.

⁵¹ Sell, *supra* note 5, at 83; see also Plant Variety Protection Act, 7 U.S.C. § 2321 (2000).

⁵² Spectar, *supra* note 2, at 233; see also Plant Variety Protection Act, 7 U.S.C. § 2321 (2000).

⁵³ Ewens, *supra* note 7, at 292.

⁵⁴ *Id.* at 293.

⁵⁵ Aoki, *supra* note 19, at 284. The research exception provides, “The use and reproduction of a protected variety for plant breeding or other bona fide research shall not constitute an infringement of the protection provided under this Act.” 7 U.S.C.A. § 2544 (1970).

⁵⁶ *Id.* at 283-84.

⁵⁷ Aoki, *supra* note 19, at 285-86.

⁵⁸ Ewens, *supra* note 7, at 288.

C. Judicial Decisions: Opening the Way for Broad Patents

¶27 The 1980 Supreme Court decision *Diamond v. Chakrabarty* set in motion the trend towards the “legal acceptance of the commodification . . . of germplasm.”⁵⁹ The series of biotech patenting cases that followed during the 1980s and 1990s not only greatly expanded the legal boundaries of patentable living matter, but also narrowed the traditional seed saving exemption for farmers codified by the PVPA.⁶⁰ Judicial decisions “were rendered in order to spur biotechnology innovation and progress,” and in doing so, they established “perhaps the most complex and sophisticated [patent] framework in the world.”⁶¹

¶28 In *Diamond v. Chakrabarty*, the Supreme Court laid the legal foundation that would establish the United States as the global biotech patent leader.⁶² In a 5-4 decision, Justice Burger articulated that the threshold question for patentability of an organism was not whether it was inanimate, but whether it was a product of nature or of human invention.⁶³ The court went on to hold that a live, man-made bacterium was patentable under the PPA by interpreting the statutory language broadly.⁶⁴ While this case dealt specifically with a form of bacteria, this holding had clear implications for plant life. The Court’s generous interpretation of the PPA and the passage of the PVPA established a new standard for invention that focused on “natural” products and products of “human effort.”⁶⁵ *Diamond v. Chakrabarty* opened the floodgates for broader definitions of what is patentable.

¶29 With this foundation in place, *Ex Parte Hibberd* helped to complete the process of seed commodification five years later.⁶⁶ In this case, the U.S. Board of Patent Appeals and Interferences reversed the Patent & Trademark Office (“PTO”) decision that held that the PPA and PVPA were the only sources of patent protection for plants. *Hibberd*, which dealt with patenting of maize plant technologies that included seeds, allowed plant patents to be included under the broad category of utility patents.⁶⁷ Utility patents are preferred by plant breeders because they allow patenting of the individual components of varieties.⁶⁸ In *Hibberd*, the claimant made over 260 separate claims for a single item that included DNA sequences and genes.⁶⁹ Even though this was an agency decision, it had a profound effect on germplasm patenting.⁷⁰ After *Hibberd*, the PTO granted over 1800 expansive utility patents for germplasm.⁷¹

⁵⁹ 447 U.S. at 321; *see also* Aoki, *supra* note 19, at 302.

⁶⁰ Aoki, *supra* note 19, at 303.

⁶¹ Shraddha A. Upadhyaya, *The Postmodern Written Description Requirement: An Analysis of the Application of the Heightened Written Description Requirement to Original Claims*, 4 MINN. INTELL. PROP. REV. 65, 108-109 (2002).

⁶² *Id.* at 108.

⁶³ *Chakrabarty*, 447 U.S. at 313.

⁶⁴ *Id.* at 310-314.

⁶⁵ Oczek, *supra* note 13, at 641.

⁶⁶ *Ex Parte Hibberd*, 227 U.S.P.Q. (BNA) 443 (1985); Aoki, *supra* note 19, at 303.

⁶⁷ *Hibberd*, 227 U.S.P.Q. at 443.

⁶⁸ Aoki, *supra* note 19, at 288; Blair, *supra* note 21, at 317.

⁶⁹ Aoki, *supra* note 19, at 288.

⁷⁰ Blair, *supra* note 21, at 317.

⁷¹ Aoki, *supra* note 19, at 288.

- ¶30 Between the 1985 *Hibberd* decision and the 1995 Supreme Court decision in *Asgrow Seed v. Winterboer*,⁷² the U.S. seed industry consolidated even more and became dominated by large agribusinesses such as Monsanto and Dupont.⁷³ Seed industry mergers and acquisitions created an atmosphere ripe for the advent of genetic engineering.⁷⁴
- ¶31 The common law right of saving seeds was further eroded by *Asgrow Seed v. Winterboer*.⁷⁵ In this case, a seed company sued an Iowa farming couple for PVPA violations.⁷⁶ The couple saved the PVPA patented seeds bought from the company and sold the second generation seeds to a third party.⁷⁷ The farmers claimed protection under the PVPA seed saving exemption, but the Supreme Court rejected this claim in an 8-1 decision.⁷⁸ In this decision, the seed saving exemption was narrowed to cover only farmers who saved seeds to replant on his or her own property.⁷⁹ *Asgrow Seed* is indicative of the trend of large businesses suing their small farm customers rather than other large businesses.⁸⁰ The ruling showed that the Supreme Court now viewed seeds as a licensed commodity.⁸¹
- ¶32 In 2001, the Court again expanded the definition of what is patentable and again diluted the PPA and PVPA exemptions. In *J.E.M. AG Supply v. Pioneer Hi-Bred International*, Pioneer Hi-Bred, a large seed company, sued a small Iowa seed supply company, Farm Advantage, for violating patents on hybrid corn seed.⁸² Farm Advantage claimed that as a matter of law, the utility patents were invalid.⁸³ Justice Thomas, writing for the majority, concluded that newly developed plant breeds are covered by expansive utility patents and that neither the PPA nor the PVPA can limit the scope of a utility patent.⁸⁴ The majority's broad interpretation of legislative acts reinforced the position of seed patent holders.⁸⁵
- ¶33 The Court recognized the PVPA exemption for saving seeds, but this restriction is not covered by utility patents.⁸⁶ While the majority relies on *Chakrabarty* as the controlling case, the dissent by Justice Breyer⁸⁷ and concurrence by Justice Scalia⁸⁸ both emphasize that *Chakrabarty* is not the controlling case and does not cover plant patenting. In effect, the majority's ruling in *J.E.M.* would render meaningless not only

⁷² *Asgrow Seed v. Winterboer*, 513 U.S. 179 (1995).

⁷³ *Id.* at 203.

⁷⁴ *Id.* at 289.

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ Aoki, *supra* note 19, at 292.

⁸² *J.E.M. Ag Supply v. Pioneer Hi-Bred International*, 534 U.S. 124, 127 (2001).

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ Ohlgart, *supra* note 11, at 481.

⁸⁶ *J.E.M. Ag Supply*, 534 U.S. at 140.

⁸⁷ *Id.* at 147 (Breyer, J., dissenting).

⁸⁸ *Id.* at 144 (Scalia, J., concurring).

the seed saving exception in the PVPA, but the intent of Congress in passing both the PPA and the PVPA.⁸⁹

D. Terminator Technology

¶34 Once thought of as part of the commons, genetic information had now become a marketable good.⁹⁰ Nothing illustrates this shift more than the development of Terminator Technology.

¶35 One of the major frustrations for the private seed industry is the perseverance of the seed saving tradition among farmers. Large businesses such as Monsanto now require purchasing farmers to sign contracts that prevent the saving of genetically modified seed.⁹¹ However, these contracts only work if farmers abide by them, and enforcement is especially difficult in developing nations.⁹²

¶36 One of the most controversial developments in recent years is the biological means to enforce these paper contracts and also to avoid patent limitations: Terminator Technology.⁹³ In 1998, Delta and Pine Land Company (DPL) partnered with the U.S.DA to patent the Technology Protection System (“Terminator” Technology).⁹⁴ By modifying seeds with certain genes, companies ensure that next generation of seeds self-destructs and is unable to reproduce.⁹⁵ A few days after the patent was issued, Monsanto bid \$1.76 billion to acquire it from DPL, an indication of the high stakes involved with biotechnology patents.⁹⁶ The international protest from farming, environmental, and development agencies was so great that in 1999, Monsanto said it would not market the Terminator Technology.⁹⁷ Despite this promising action, a spokesperson for the USDA, a co-developer of the technology, stated that the terminator process was still several years away from being commercially available, indicating that plans for future use remain.⁹⁸ Other major agriculture businesses in the United States and the United Kingdom are developing their own sterile seeds.⁹⁹

¶37 A Monsanto spokesperson claimed there was no conspiracy by the agriculture industry to create a dependency on seed products and that the technology is simply “a way to protect their [company’s] billions of dollars of investment into research on biologically-engineered products.”¹⁰⁰ Yet, Terminator Technology has brought seed-saving to the forefront of international policy agendas. While businesses espouse the benefits of Terminator Technology by citing, for example, the hope that more innovative and advantageous seeds would be developed and research on staple crops would increase, many international lobbying groups and activists do not see the technology in the same

⁸⁹ *Id.* at 153 (Breyer, J., dissenting).

⁹⁰ See RIFKIN, *supra* note 1, at 41.

⁹¹ Aoki, *supra* note 19, at 255.

⁹² Ewens, *supra* note 7, at 306.

⁹³ *Id.* at 306.

⁹⁴ Ohlgart, *supra* note 11, at 473.

⁹⁵ For an extensive discussion on how the technology works, see *id.*

⁹⁶ *Id.* at 477.

⁹⁷ *Id.*

⁹⁸ *Id.* at 484.

⁹⁹ *Id.*

¹⁰⁰ *Id.* at n.67.

light.¹⁰¹ Critics argue that small farmers will be the most affected by the technology – being least able to afford more expensive seeds on a yearly basis.¹⁰² There are also fears that sterile seeds may have a disastrous effect on the global food supply and are a serious problem for developing world farmers, the majority of whom depend on seed saving.¹⁰³

II. INTERNATIONAL TRADE POLICIES: STRONG IP PROTECTIONS CHAMPIONED BY THE USTR

¶38 The biotechnology industry and the development of genetically modified foods is a multi-billion dollar per year industry. According to Merrill Lynch, the market for genetically engineered seeds globally will increase from \$450 million in 1995 to \$6.6 billion in 2005.¹⁰⁴ Wall Street and private investors liken recent developments in biotechnology to the “discovery of fire.”¹⁰⁵ Genetically modified products are hard to avoid; in the United States, sixty to seventy percent of food sold contains some substance developed through biotechnology.¹⁰⁶ Naturally, with such high stakes, agribusinesses continue to advocate for the stringent patent policies that have been beneficial for them.

¶39 The Agreement on Trade-Related Aspects of Intellectual Property Rights (“TRIPS”), adopted in 1994, is the controlling international agreement on patent policy, including plant and seed patents.¹⁰⁷ TRIPS, along with other international agreements, monitors whether domestic policy choices of participating nations meet international norms.¹⁰⁸ The TRIPS agreement came out of the same round of GATT negotiations that established the World Trade Organization (“WTO”), and any nation wishing to participate in the WTO must adhere to TRIPS.¹⁰⁹ The driving force behind the formation of TRIPS was to curb international abuse of patented technology, infringement, and misappropriations.¹¹⁰ These issues are at the forefront of the United States’ trade policy, as the United States is the world leader in the development of intellectual property rights.¹¹¹ Yet, for most of the world, and especially for developing nations, global IP policies as determined by the United States are divergent from national interests and are

¹⁰¹ Oczek, *supra* note 13, at 656.

¹⁰² Daniel Knight, *Agro-Giants Expand ‘Terminator’ Seed Technology*, INTER PRESS SERVICE, February 10, 1999.

¹⁰³ Ewens, *supra* note 7, at 306.

¹⁰⁴ *Id.* at 289.

¹⁰⁵ See RIFKIN, *supra* note 1, at 43 (Stated by an analyst for EF Hutton. To illustrate how lucrative the biotech industry is, Genetech, a small start-up bioengineering company, went public in 1980 at an opening price of \$35 per share. During the first twenty minutes of trading, stocks went up to \$89 per share. By the end of the day, Genetech raised \$36 million and was valued at \$532 million, and the company had yet to produce a marketable product).

¹⁰⁶ Souza, *supra* note 8, at 131.

¹⁰⁷ Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, 33 I.L.M. 81 (1994) [hereinafter TRIPS].

¹⁰⁸ Graeme W. Austin, *Symposium on Constructing International Intellectual Property Law: The Role of National Courts: Valuing ‘Domestic Self-Determination’ in International Intellectual Property Jurisprudence*, 77 CHL.-KENT. L. REV. 1155, 1169 (2002).

¹⁰⁹ Sell, *supra* note 5.

¹¹⁰ Srividhya Ravavan, *Can’t We All Get Along? The Case for a Workable Patent Model*, 35 ARIZ. ST. L.J. 117, 127 (2003).

¹¹¹ *Id.* at 125-126.

inappropriate to national infrastructures.¹¹² Traditionally, IP and patent policies have struck a balance between individual and societal interests.¹¹³ TRIPS indicates how current international standards do not adequately follow this tradition.

¶40 In this section, I first will look at how IP policy was influenced by businesses in the United States and how this policy set the standard for international trade. Second, I will investigate the post-TRIPS actions taken by the United States. Third, I will discuss the resulting tensions created by TRIPS and TRIPS-like trade regimes between the Northern hemisphere (primarily the developed world) and the Southern hemisphere (primarily the developing world).

A. *Business Influence on U.S. IP Policy*

¶41 Patent policies have historically been enacted to further national interests.¹¹⁴ Complex national patent regimes, such as those established in the United States, require time and a developed manufacturing infrastructure.¹¹⁵ Many developing nations' economies are at the same level as the United States during the Great Depression. That is, industrialization and agriculture are not firmly rooted in the economy.¹¹⁶ It took the United States 150 years to establish its own complex patent regime. Most developing nations in Africa only attained independence in the mid-twentieth century.¹¹⁷

¶42 On the other hand, seed businesses have an inherent interest in the potential markets of agriculture-based developing nations. Intellectual property protections imposed through trade are used to protect those markets for these businesses. By imposing patent protections and high licensing fees on new seed products, large seed manufacturers are able not only to capture a large share of the market, but also to earn billions through fees from other organizations. Businesses also use trade to protect their research and development investments abroad.¹¹⁸ The development of TRIPS is a perfect illustration of how businesses influence trade agreements. The journey towards TRIPS began in the U.S. private sector a few decades ago.¹¹⁹

¶43 The perceived decline in U.S. competitiveness in the 1970s and 1980s spurred policy trends that focused on restoring U.S. dominance in trade.¹²⁰ The lucrative potential of the technology sector brought IP interests to the forefront of the United States trade agenda.¹²¹ The USTR became a key office in the U.S. government and a lead agency for

¹¹² *Id.* See also Sell, *supra* note 5.

¹¹³ Keith Aoki, *Neocolonialism, Anticommons Property, And Biopiracy in the (Not-So-Brave) New World Order of International Intellectual Property Protection*, 6 *IND. J. GLOBAL LEGAL STUD.* 11, 27 (1998).

¹¹⁴ Ravavan, *supra* note 110, at 122 (In thirteenth-century Venice, patents were used to encourage local economic development. In the United Kingdom, Queen Elizabeth I granted patents in order to cultivate domestic production).

¹¹⁵ *Id.* at 149.

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ Sell, *supra* note 5, at 82-84.

¹¹⁹ *Id.* at 81.

¹²⁰ *Id.* at 82-84.

¹²¹ *Id.* at 83.

investment and trade issues in the 1970s.¹²² Through this office, private businesses increased their influence on U.S. trade policy.¹²³

¶44 U.S. companies saw success in exploiting influence with the USTR to promote protectionist IP policies abroad.¹²⁴ In the early 1980s, CEOs of major technology, chemical, and agricultural companies successfully organized into a powerful lobbying machine.¹²⁵ Under pressure from high-level private sector officials, the USTR began a series of meetings focusing on IP protections with various countries that were viewed as a threat to U.S. IP interests.¹²⁶ During the Reagan administration, private sector players had easy access to high level policy developers. Bodies such as the Advisory Committee for Trade Negotiations (“ACTN”), composed of U.S. business leaders, established official lines of communication between the public and private sector. Following the advice of these committees, the U.S. government focused more on IP as a way to maintain U.S. competitiveness.¹²⁷

¶45 The Intellectual Property Committee (“IPC”), composed of major business CEOs, was formed in 1984 to advise the USTR on the IP issues of the GATT agenda. Jacques Gorlin, a private sector consultant for the IPC, authored a paper which became the private sector IP mantra and the basis of U.S. IP policy to this day.¹²⁸ The paper focused the United States on three goals for its IP policy: international minimum standards, an enforcement mechanism, and a dispute settlement mechanism.¹²⁹ Developing countries were opposed to the inclusion of IP in any international agreements.¹³⁰ One of the most controversial aspects of the Uruguay Round of GATT negotiations (which resulted in the WTO and TRIPS, 1986-1994) was the United States’ insistence of IP jurisdiction based on the goals articulated by U.S. private interests.¹³¹ The objection of developing nations was overridden by the developed countries and the Gorlin paper goals were codified in the final TRIPS agreement. TRIPS established minimum IP standards for countries and created an international enforcement mechanism.¹³² According to Gorlin, the “IPC got 95% of what it wanted [in TRIPS].”¹³³

¹²² *Id.*

¹²³ *Id.* (1979 amendments to the Trade Agreement Act “significantly enlarged the scope of private sector participation in U.S. trade policy.”).

¹²⁴ See *id.* for a discussion regarding Monsanto convinced the U.S. government to put pressure on the Hungarian government to stop piracy in the late 1970s. Companies such as DuPont, IBM, and Levi-Strauss started investigating avenues to increase IP protection abroad.

¹²⁵ *Id.* at 83. CEOs of Pfizer, and IBM among others formed the Anti-Counterfeiting Coalition that joined with the Copyright Alliance.

¹²⁶ Sell, *supra* note 5, at 83.

¹²⁷ Jacques Gorlin, *A Trade-Based Approach for the International Copyright Protection for Computer Software* (1985). For full discussion, see Sell, *supra* note 5, at 90.

¹²⁸ Sell, *supra* note 5, at 91.

¹²⁹ *Id.*

¹³⁰ Robert J. Pechman, *Seeking Multilateral Protection for Intellectual Property: The United States “TRIPS” over Special 301*, 7 MINN. J. GLOBAL TRADE 179, 183 (1998) (“The United States provided the impetus for the development of the TRIPS Agreement, in part because its economic incentives to push for strong intellectual property protection are large,” but many developing countries opposed the inclusion of IP in GATT negotiations).

¹³¹ Sell, *supra* note 5, at 95; see also Ewens, *supra* note 7, at 301.

¹³² Ravavan, *supra* note 110, at 124; see also Pechman, *supra* note 130, at 184.

¹³³ Sell, *supra* note 5, at 97.

¶46 In 1988, American businesses had another controversial legislative victory with the creation of Section 182 of the Omnibus Trade Act of 1974, more commonly known as Special 301.¹³⁴ Dissatisfied with the available international implementation mechanisms at the time, the United States was able to secure, in Special 301, another mechanism for protecting its private industry by allowing it to identify countries that do not provide adequate IP protections.¹³⁵ Special 301 then encourages these identified countries to improve their practices.¹³⁶

¶47 TRIPS was an overwhelming success for commercial interests, and private industry's aggressive tactics continue to play a major role in U.S. IP policy development.¹³⁷ The USTR "has been remarkably responsive to the expressed wishes of these key private sector actors."¹³⁸ In 1998, the USTR stated that TRIPS Council meetings were useful tools to keep developing nations in line with U.S. interpretations of TRIPS.¹³⁹

B. Post TRIPS Strategy

¶48 While many view TRIPS compliance as too much of a burden on the developing world, many businesses see the agreement as too generous.¹⁴⁰ TRIPS provides an extended compliance period for developing nations, which some view as excessive.¹⁴¹ In addition, TRIPS provides assistance for developing nations in implementing its minimum standards.¹⁴² Article 27 of TRIPS provides certain patent exceptions for agri-chemicals and plants and for public policy, health, and environmental reasons.¹⁴³ While advocates for developing nations say these exceptions will not be very effective, the USTR argued for the stricter exemptions articulated in *Ex Parte Hibberd*.¹⁴⁴

¶49 Because businesses view TRIPS as not going far enough, they have a well-organized strategy to ensure strict implementation of the agreement. The three main private sector post-TRIPS strategies are: (1) the use of the WTO dispute settlement

¹³⁴ Penchman, *supra* note 130, at 195.

¹³⁵ *Id.*

¹³⁶ *Id.* at 196.

¹³⁷ Sell, *supra* note 5, at 193. ("The 1994 Agreement on Trade-Related Aspects of Intellectual Property (TRIPS) was a stunning triumph for commercial interests and intellectual property (IP) industry lobbyists who worked tirelessly to achieve the global agreement. TRIPS institutionalized a conception of IP based on protection and exclusion rather than competition and diffusion."). See also Ewens, *supra* note 7, at 306 ("The de facto solution has been in favor of private, corporate interests and indicates a growing tendency in intellectual property protection towards support of stronger private property rights over the recognition of the need for equitable global management of finite resources.").

¹³⁸ Sell, *supra* note 5, at 198.

¹³⁹ *Id.* at 196.

¹⁴⁰ Penchman, *supra* note 130, at 190.

¹⁴¹ *Id.* at 190-191.

¹⁴² *Id.* at 191.

¹⁴³ *Id.* at 192; see also Ewens, *supra* note 7, at 302.

¹⁴⁴ Ewens, *supra* note 7, at 302. See also USTR Zoellick Urges WTO Negotiators to Focus on More Market Access, AFRICAN NEWS, Sept. 10, 2003 (An agreement on AIDS pharmaceuticals "was a demonstration that the intellectual property rules could be flexible enough to serve humanitarian needs. And that's a very important message for the WTO. Of course, it requires a balance, because the companies that produce the life-saving drugs of tomorrow are the ones being asked to help deal with the crises today.").

mechanism, (2) the use of the TRIPS Council Process, and (3) the execution of Special 301.

¶50 In order to set strong precedents under WTO IP jurisprudence, industry lobbyists carefully select which infringement cases they will pursue.¹⁴⁵ Since private companies do not have standing under the WTO, they depend on the USTR to bring their suits.¹⁴⁶ A former Counselor to the USTR said that when filing suits, USTR lawyers work very closely with the counsels of the private parties, i.e. large businesses.¹⁴⁷ This close collaboration has made the United States the most strident enforcer of TRIPS. Through the alliance of the USTR and private industry, the United States has filed more TRIPS complaints than all other WTO countries combined.¹⁴⁸

¶51 The United States has also been uncompromising in its application of Special 301, despite WTO member protests. Special 301, “has done more than any other provision of U.S. trade law to improve the level of worldwide protection of U.S. products embodying copyright.”¹⁴⁹ Yet WTO members protest the use of Special 301 to enforce TRIPS compliance because they believe it exceeded the GATT mandate.¹⁵⁰

¶52 Trade policy is meant to seek compensation when TRIPS is violated and also ensure future compliance. U.S. companies stand to lose billions of dollars a year if TRIPS is not aggressively enforced.¹⁵¹

C. *Effects of Current International Policy: North v. South*

¶53 TRIPS and similar policies that encourage strong IP protections benefit developed nations. But their effects on developing nations are less obvious. The “North” (the developed Northern hemisphere such as the United States and European Union countries) and the “South” (the developing nations of the Southern hemisphere, including African and Asian nations) are in conflict over the issue.¹⁵²

¶54 The tropics and subtropics of the South have most of the world’s natural genetic resources, yet most patent holders of genetically modified seeds are in the North.¹⁵³ Northern corporations are able to freely acquire Southern genetic resources based on the Southern hemisphere concept of a “common heritage framework” that sees genes as common property.¹⁵⁴ The result is a “one way valve for property claims” — there is an uncompensated exchange of information between the North and South.¹⁵⁵ Northern companies take Southern genetic resources, engineer them to create a patentable seed,

¹⁴⁵ Sell, *supra* note 5, at 99.

¹⁴⁶ *Id.* at 101

¹⁴⁷ *Id.* at 102.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.* at 197.

¹⁵⁰ Penchman, *supra* note 130, at 184.

¹⁵¹ *Id.* at 204-205.

¹⁵² See generally Spectar, *supra* note 2; Edgar J. Asebey and Jill D. Kempenaar, *Biodiversity: Opportunities and Obligations: The Intellectual Property Perspective on Biodiversity: Biodiversity Prospecting: Fulfilling the Mandate of the Biodiversity Convention*, 28 VAND. J. TRANSNAT’L L. 703 (1995).

¹⁵³ Spectar, *supra* note 5, 231.

¹⁵⁴ Asebey, *supra* note 152, at 708.

¹⁵⁵ Ewens, *supra* note 7, at 298.

and then sell the patented product back to the South. Northern companies claim “natural rights” to protect their information and products.¹⁵⁶

¶155 The marketing of the thaumatin plant, an indigenous plant of West Africa, illustrates this point. Thaumatin is the sweetest substance on earth and has been used for centuries by local villagers in West Africa.¹⁵⁷ In 1993, a patent was awarded to a Korean corporation in partnership with a U.S. university.¹⁵⁸ Billions will be collected by the patent holders from the low-calorie sweetener industry, while West Africa will not receive any of the profits.¹⁵⁹

¶156 TRIPS standardized this process of patenting internationally.¹⁶⁰ The value of the patent is lucrative for the North, but the value of the patent system in the South is controversial at best. First, developing nations bear the enormous cost of systematizing foreign patent concepts in their own judiciaries. Secondly, many farmers in the South lack the capital to buy the improved seeds sold to them by the North.¹⁶¹ Third, Southern seed innovations passed down from generation to generation are not compensated.¹⁶² In the next section, I will look at current international efforts aimed at closing this rift.

III. LOOKING AHEAD: PUBLIC AND PRIVATE PARTNERSHIPS

¶157 There are roughly 840 million people worldwide who do not receive enough energy through food to live actively.¹⁶³ Many of these people are concentrated in the world’s poorest seventy countries.¹⁶⁴ Malnutrition plays a significant role in nearly 12 million deaths per year of children under five.¹⁶⁵ While there are 80 million new people to feed yearly, world grain production growth decreased from three to one percent over the last decade.¹⁶⁶

¶158 Genetically modifying technology plays a significant role in food growth and production.¹⁶⁷ Strong IP protections on the products of this technology are important to foster the development of improved seeds that are resistant to insects, diseases, droughts, and pesticides while increasing crop yield and nutritional content.¹⁶⁸ Yet, in order for

¹⁵⁶ *Id.*

¹⁵⁷ RIFKIN, *supra* note 1, at 53.

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ Ewens, *supra* note 7, at 304.

¹⁶¹ Spectar, *supra* note 2, at 238.

¹⁶² Ewens, *supra* note 7, at 298. “The hypocrisy of western demand for intellectual property is twofold: not only do developing countries pay a high premium for the patented products that are reintroduced in their countries (yet made from local resources), but developing countries are unable to use the intellectual property framework to protect against the piracy of their own indigenous and local resources and knowledge.” *Id.* at 305.

¹⁶³ Walter P. Falcon, *Sustainable Science for a Sustainable Environment: Comments: Searching for Sustainability*, 27 *ECOLOGY L.Q.* 1163, 1165 (2001).

¹⁶⁴ *Id.*

¹⁶⁵ Royal Society of London, U.S. N.A.S., Brazilian Academy of Sciences, Indian National Science Academy, Mexican Academy of Sciences, and the Third World Academy of Sciences, *Transgenic Plants and World Agriculture Report*, National Academy Press (2000) [hereinafter *World Agriculture Report*], available at <http://www.nap.edu/html/transgenic/> (last visited April 20, 2005).

¹⁶⁶ Ewens, *supra* note 7, at 295.

¹⁶⁷ *World Agriculture Report*, *supra* note 165, at 3.

¹⁶⁸ Ewens, *supra* note 7, at 295.

these improvements to be effective, products must be made available to the people who need them the most. A balance must be struck between these two diverging interests.

¶159 First, I will look at how genetically modified seeds can potentially alleviate some of the challenges facing the developing world. Second, I will look at how public and private partnerships can be successful vehicles for change. Partnerships can balance the need for strong IP protections for businesses while maintaining developing world access to genetically modified seeds.

A. Agriculture and Developing Nations

¶160 Agriculture products, staple crops in particular, are a fundamental resource for the poor. Drought, poor soil, plant disease, and political instability all contribute to the dangers of malnutrition and poverty.¹⁶⁹ Genetically engineered seeds potentially have the ability to combat malnutrition and poverty by creating specialty crops with high productivity, better nutritional value, and enhanced resistance to disease.¹⁷⁰ Currently, crop yields in Africa are far below their genetic potential. Grain imports now comprise twenty-five percent of grain consumption in Africa—a dependency that has only increased over the past three decades.¹⁷¹

¶161 Rising agricultural productivity is directly related to economic growth in developing nations.¹⁷² Agriculture is not only important for producing enough food, but it is key to job creation and employment in most agriculturally based developing nation economies.¹⁷³ Small farms are the “engine for progress” in rural areas.¹⁷⁴ In many developing nations, sixty to ninety percent of citizens depend on farming for their livelihood.¹⁷⁵ Developing nations also need to increase agriculture exports in order to spur economic growth.¹⁷⁶ Fair access to trade is therefore fundamental for developing nations. Trade issues are closely connected to social and economic issues, “policies without immediate economic gain will upset the fragile economic and social balance in developing nations.”¹⁷⁷ Unfortunately, it is not clear developing nations will experience immediate economic gain from TRIPS.

¹⁶⁹ PIPRA: Public Intellectual Property Resources for Agriculture, available at <http://www.pipra.org/purpose.htm> (last visited April 20, 2005).

¹⁷⁰ *Id.*

¹⁷¹ Robert W. Herdt, *Assisting Developing Countries Towards Food Self-Reliance*, available at <http://www.rockfound.org/display.asp?context=3&collection=0&subcollection=0&DocID=89&SectionTypeID=17&Preview=0&ARCurrent=1> (last visited April 20, 2005).

¹⁷² *Id.* (“History shows that rising agricultural productivity has been the key to economic growth and development in every country that was once poor and once had a high proportion of its population dependent on farming.”).

¹⁷³ Walter P. Falcon, *Sustainable Science for A Sustainable Environment: Comments: Searching for Sustainability*, 27 *ECOLOGY L.Q.* 1163, 1164 (2001).

¹⁷⁴ World Agriculture Report, *supra* note 165, at 4.

¹⁷⁵ Herdt, *supra* note 171.

¹⁷⁶ *Id.* (“An examination of developing countries between 1971 and 1991 shows that when agricultural growth rates are high, general economic growth is high, and that each \$1 of general economic growth generates \$32 of total imports. Furthermore, each \$1 increase in agricultural output generates \$.17 in agricultural imports. The 25% of fastest growing countries imported \$.54 of agricultural imports for every \$1 of agricultural production increase The explanation is simple: when poor countries grow rapidly, their demand for food generally grows more rapidly than they can meet it. When countries reach high income levels their food demand grows much more slowly.”).

¹⁷⁷ Ravavan, *supra* note 110, at 151.

¶162 TRIPS provisions on genetically modified materials create policies highly unpopular with the populations of developing nations, making enforcement difficult.¹⁷⁸ Resistance to TRIPS has been growing for years in developing nations, some of which has turned violent. In India in 1998, protesters set fire to Monsanto trial fields during a disobedience operation called “Operation Cremation Monsanto”.¹⁷⁹ Following the India protests and similar protests in Bangladesh, farmers in the Philippines staged violent protests at the offices of Monsanto.¹⁸⁰ This additional instability in developing nations is not only troublesome for fragile governments, but also economically detrimental in the long and short term. These reactions also dissuade foreign companies from investing in countries that react violently to their policies and products, thereby keeping valuable capital and jobs out of the country.¹⁸¹

B. Partnerships

¶163 Private firms now lead in research and development of GM seeds—a role once dominated by governments and international public institutions.¹⁸² This poses a variety of challenges for developing nations. While the aim of the private sector is to increase profits, the priorities of developing nations are to fight poverty and protect public health.¹⁸³ The long-term decline in public sector research diminished the incentives for sharing access and genetic information on newly developed seeds.¹⁸⁴

¶164 There is an international movement to increase public sector efforts to create crops that benefit poor farmers.¹⁸⁵ In order to make this a reality, the private sector must share the latest technological advances with the public sector.¹⁸⁶ The recognition that research must also focus on public needs spurred a number of partnerships in the public and private sectors.¹⁸⁷

¶165 The Consultative Group for International Agriculture Research (“CGIAR”) is perhaps the biggest player on public seed access on the international front. The CGIAR system consists of sixteen international research centers that focus on staple crops similar to wheat, maize, and potatoes.¹⁸⁸ CGIAR is responsible for the development of “Golden Rice,” a vitamin A enriched rice that takes genes from daffodils and micro-organisms.¹⁸⁹

¹⁷⁸ *Id.* at 171.

¹⁷⁹ *Eco Surroundings*, THE GUARDIAN, December 2, 1998, page 5.

¹⁸⁰ Organic Consumers Association, *Thousands of Asia Farmers May ‘Evict’ Monsanto in Philippines*, at <http://www.organicconsumers.org/monsanto/asiaevection.cfm> (last visited April 20, 2005).

¹⁸¹ Ravavan, *supra* note 110, at 171.

¹⁸² Philip Pardey, Brian D. Wright & Carol Nottenburg, *Are Intellectual Property Rights Stifling Agricultural Biotechnology in Developing Countries?*, IFPRI ANNUAL REPORT (1999-2000), available at http://www.ifpri.org/pubs/books/ar2000/ar2000_essay02.htm (last visited April 20, 2005).

¹⁸³ *Transgenic Plants and World Agriculture*, available at http://www.nap.edu/html/transgenic/intel_prop.html (last visited April 20, 2005).

¹⁸⁴ *Id.*

¹⁸⁵ World Agriculture Report, *supra* note 165, at 1.

¹⁸⁶ *Id.*

¹⁸⁷ See generally Henrique Freire de Oliveira Souza, *Genetically modified Plants: A Need for International Regulation*, 6 ANN. SURV. INT’L & COMP. L. 129 (2000) (discussing the benefits and importance of non-governmental organizations and intergovernmental organizations).

¹⁸⁸ See generally Consultative Group on International Agricultural Research: CGIAR Online, available at <http://www.cgiar.org/> (last visited April 20, 2005).

¹⁸⁹ Press Release, CGIAR, Science Aimed at Helping Poor Farmers is Key to Solving Hunger,

Vitamin A depletion is a critical cause of malnutrition, and Golden Rice has the potential to save many lives.

¶166 CGIAR is also an umbrella organization for other efforts to alleviate poverty and strengthen food security in Africa. The African Rice Center (“WARDA”) is funded by CGIAR and based in the Ivory Coast.¹⁹⁰ WARDA encourages partnerships on all levels to increase the productivity and profitability of rice. In particular, they are working on a variety of hybrid rice that combines African genetic traits with productive Asian species (“NERICA”).¹⁹¹ In trials, use of NERICAs increased productivity by about twenty-five to two hundred and fifty percent.¹⁹²

¶167 The Public Intellectual Property Resource for Agriculture (“PIPRA”) is another example of a public/private partnership formed to alleviate the difficulties experienced by the public sector in securing access to technologies.¹⁹³ The organization’s purpose is to aid “public sector agriculture resource institutions [in] achiev[ing] their public mission by ensuring access to intellectual property to develop and distribute improved staple and specialty crops.”¹⁹⁴ PIPRA is working with the USDA and foreign agencies to create an IP asset database of all patented agriculture technologies. This would allow public sector researchers to stay informed about who holds patents and who is currently conducting research.¹⁹⁵

¶168 The Meridian Institute is another non-governmental organization with a mission to solve problems and conflicts that result from international environmental, health, economic, and social issues. The Meridian Institute hopes to start a dialogue about agriculture issues between policy-makers, industry representatives, NGOs, scientists, academics, and other key players.¹⁹⁶

¶169 Efforts such as these demonstrate how strong IP protections can be balanced with the needs of the developing world.

IV. CONCLUSION

¶170 The long and complex history of intellectual property rights and seed technology illustrates how political and business motives play an integral role in deciding policy. It also illustrates the importance of legal decisions and interpretation. Judicial decisions in the United States played a major role in developing intellectual property rights not only for the United States, but for the world. Many of today’s large agribusinesses are founded upon American case law.

Malnutrition, and Poverty (Oct. 29, 2001) *available at* <http://www.worldbank.org/html/cgiar/press/news10292001.pdf> (last visited April 20, 2005).

¹⁹⁰ See generally WARDA: The African Rice Center, *available at* <http://www.warda.cgiar.org/> (last visited April 20, 2005).

¹⁹¹ WARDA, *New Rice for Africa (NERICA) Offers Hope to Women Farmers and Millions More*, *available at* <http://www.warda.cgiar.org/warda1/main/Achievements/nerica.htm> (last visited April 20, 2005).

¹⁹² *Id.*

¹⁹³ See generally PIPRA: PUBLIC INTELLECTUAL PROPERTY RESOURCES FOR AGRICULTURE, *available at* <http://www.pipra.org/> (last visited April 5, 2004).

¹⁹⁴ *Id.*

¹⁹⁵ *Id.*

¹⁹⁶ See generally MERIDIAN INSTITUTE, *available at* <http://www.merid.org/fs-agbiotech/> (last visited April 2, 2004).

¶71 Domestically, the United States developed a complex IP regime over a long period of time. Many developing nations are just beginning this process. Despite this, there is pressure from developed nations to accelerate this process and implement sophisticated IP regulations. As the world leader in IP protections for the life sciences, the United States, through the USTR, exerts this pressure on developing nations and maintains its dominance through strict trade agreements like TRIPS.

¶72 Strong IP protections for genetically modified seeds are partly responsible for the rapid growth and ingenuity of new seed varieties. Yet, while TRIPS resulted in great benefits for science and large agribusinesses, developing nations do not stand to gain nearly as much from groundbreaking technological advances. An imbalance exists between the benefits derived by the Northern hemisphere and the toll taken on the Southern hemisphere with respect to knowledge transfer.

¶73 Public-private partnerships have the potential to even out this imbalance. These partnerships can fill the void left by the private sector in addressing public needs. As illustrated by existing partnerships, developing nations can benefit from genetic technological advances while still satisfying the needs of the private sector.