The Future of Farming After *Bowman v. Monsanto*

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I. INTRODUCTION

The United States Supreme Court and Congress have failed to address the concerns of farmers who wish to save and replant first generation Roundup Ready seed after the patent expires. Due to Monsanto's patented second generation Roundup Ready 2 Yield trait with the same herbicide tolerance, farmers are unable to distinguish between the traits in their fields. The presence of the patented trait in a farmer's field would likely lead to a finding of patent infringement under the current law.

Competing interests between the patent holder and the user have thus far favored the patent holder.[1] The changing landscape of products available in the market presents potential problems for farmers who wish to take advantage of technology that has passed into the public domain after the patents expire.

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1. Since 1997 Monsanto claims it sued 145 farmers; Monsanto claims it won all 11 cases that went to trial. *Saved Seed and Farmer Lawsuits*, MONSANTO, http://www.monsanto.com/newsviews/Pages/saved-seed-farmer-lawsuits.aspx (last visited Jan. 15, 2015).

This Note analyzes hypothetical cases of farmers who have their field contaminated through no act of their own and those farmers who may cause, or contribute to, the contamination of their field. The distinction may be important because greater protection should be offered to the farmer who does not know of, and does not cause, the patent infringement. This Note ultimately recommends that the law be changed, either by the Court or by Congress, to provide protection against patent infringement where the patented trait contaminates the farmer's field.

II. BACKGROUND

The Court's recent *Bowman v. Monsanto* decision raises many questions as to the future of the law controlling patent infringement of self-replicating technologies. This Note addresses some potential pitfalls of the law as it stands. Most importantly, this Note examines potential patent infringement by farmers using Roundup Ready technology after the first generation glyphosate resistant trait loses patent protection in soybeans and other crops.

A. History of Roundup Ready

Monsanto released the first commercial biotech trait in 1996 when it introduced Roundup Ready soybeans.[2] The trait was known internationally as GTS 40-3-2.[3] Roundup Ready soybeans are resistant to the broad spectrum herbicide glyphosate, which Monsanto manufactures under the brand Roundup.[4] The United States Department of Agriculture (USDA) granted regulatory approval for Roundup Ready soybeans in 1994.[5] The United States Patent and Trademark Office (USPTO) granted Monsanto three patents to protect the invention, which allows crops with the traits to survive a glyphosate application.[6]

Farmers quickly adopted the new trait, and by 1999 half of all soybeans that U.S. farmers planted contained the trait.[7] Monsanto achieved almost full market penetration, and by 2005 nearly 87% of soybean acreage was Roundup Ready.[8] In addition to Roundup Ready soybeans, Monsanto released a glyphosate-tolerant variant of most commercial U.S. crops. In 1998, Monsanto released Roundup Ready corn.[9] Adoption was slower, but still

2. *Company History*, MONSANTO, http://www.monsanto.com/whoweare/Pages/monsanto-history.aspx (last visited Jan. 15, 2015).

3. *GM Crop Database*, CENTER FOR ENVTL. RISK ASSESSMENT, http://cera-gmc.org/index.php?action=gm_crop_database&mode=ShowProd&data=GTS%2040-3-2 (last modified Jan. 13, 2014).

4. *Id.*

5. *Company History*, *supra* note 2.

6. The USPTO granted Monsanto patent numbers 5,717,084; 5,728,925; RE39247 for the Roundup Ready trait. *Product Patents*, MONSANTO, http://www.monsanto.com/products/Pages/product-patents.aspx#p2 (last visited Jan. 15, 2015).

7. Charles Benbrook, *Evidence of the Magnitude and Consequences of the Roundup Ready Soybean Yield Drag from University-Based Varietal Trials in 1998*, AG BIOTECH INFONET (July 13, 1999), citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.41.823&rep=rep1&type=pdf.

8. *USDA/APHIS Environmental Assessment*, U.S. DEPARTMENT OF AGRIC. ANIMAL & PLANT HEALTH INSPECTION SERVICE BIOTECHNOLOGY REG. SERVICES, www.aphis.usda.gov/brs/aphisdocs/06_17801p_pea.pdf.

9. *Company History*, *supra* note 2.

significant, reaching approximately 40% of U.S. acres by 2005.[10] Monsanto also released Roundup Ready canola in 1997.[11] Monsanto's patents on Roundup Ready technology expired in 2014, allowing farmers to save certain varieties of seed to replant the following year beginning in 2015.[12]

Monsanto developed and patented a new version of the glyphosate tolerant trait, and first launched Roundup Ready 2 Yield soybeans in 2008.[13] The trait is known internationally as MON-89788-1.[14] On its website, Monsanto lists ten patents that the USPTO granted to it for Roundup Ready 2 Yield,[15] although some of the patents overlap with those granted for the first generation Roundup Ready trait.[16] Monsanto claimed that the Roundup Ready 2 Yield soybeans have a yield increase of 7–11% over first generation Roundup Ready soybeans.[17] The additional yield incentivizes farmers to switch to the new—and patent protected—trait.[18] Both the first and second generation Roundup Ready traits only alter the response to glyphosate; the rest of the phenotypic characteristics of the plant remain unchanged.[19]

Prior to the introduction of Roundup Ready 2 Yield, any crop that survived a normal application of glyphosate perished, leaving only the crops containing the first generation Roundup Ready trait.[20] However, after the introduction of Roundup Ready 2 Yield, plants containing *either* the first or second generation Roundup Ready trait survived a glyphosate application.[21] Currently, there is no way for a person to visually distinguish whether the

10. *Roundup Ready Corn to Reach 40% of US Corn Acres*, AGRICULTURE.COM (Apr. 4, 2006, 1:17 PM), http://www.agriculture.com/news/business/Roundup-Ready-corn-to-reach-40-of-US-corn-acres_5-ar533.

11. *Company History*, *supra* note 2.

12. Travis Dollarhide, *Information on the Roundup Ready® Soybean Patent Expiration - What Does it Mean for the Grower?*, LG SEEDS (Apr. 9, 2013), http://www.lgseeds.com/content/information-roundup-ready%C2%AE-soybean-patent-expiration-what-does-it-mean-grower.

13. *Company History*, *supra* note 2.

14. *GM Crop Database*, CENTER FOR ENVIRONMENTAL RISK ASSESSMENT, http://www.cera-gmc.org/?action=gm_crop_database&mode=ShowProd&data=MON89788 (last visited Jan. 15, 2015).

15. The USPTO granted Monsanto patent numbers 5,717,084; 5,728,925; 6,051,753; 6,660,911; 6,949,696; 7,141,722; 7,608,761; 7,632,985; 8,053,184; RE39247 related to Roundup Ready 2 Yield. *Product Patents*, MONSANTO, http://www.monsanto.com/products/Pages/product-patents.aspx#p2 (last visited Jan. 15, 2015).

16. *See Product Patents*, *supra* note 6 (showing that patent numbers 5,717,084; 5,728,925; RE39247 are not unique to Roundup Ready 2 Yield).

17. Kevin E. Noonan, *Monsanto Announces New Policy Regarding Roundup Ready® Seeds*, PATENT DOCS (Dec. 23, 2009), http://www.patentdocs.org/2009/12/monsanto-announces-new-policy-regarding-roundupready-seeds.html.

18. See Part IV.A for a more in depth analysis on this issue.

19. Pubescence color, plant height, maturity, and hilum color are the main visual differences among soybeans. *See Soybean Agronomic Characteristics*, STINE SEED, http://www.stineseed.com/soybeans/information/soybean-agronomic-characteristics/ (last visited Jan. 15, 2015) (containing a full list of the variances among soybeans). Both first and second generation Roundup Ready soybeans contain a wide variety of phenotypic traits. *See Stine Soybeans Variety Comparison*, STINE SEED, http://www.stineseed.com/soybeans/tools/soybean-comparison/ (last visited Jan. 15, 2015) (listing some of the phenotypic traits of first and second generation Roundup Ready soybeans). Monsanto does not produce first generation Roundup Ready soybeans and has moved completely to the patented second generation, thus making it impossible to compare the phenotypic traits of first and second generation Roundup Ready soybeans that are currently offered. *Frequently Asked Questions*, ROUNDUP READY SOYBEAN PATENT EXPIRATION, http://www.soybeans.com/faq.aspx (last visited Jan. 15, 2015).

20. *Roundup Ready System*, MONSANTO, http://www.monsanto.com/weedmanagement/Pages/roundup-ready-system.aspx (last visited Jan. 15, 2015).

21. *Id.*

plant contains the soon-to-be unprotected first generation or the patented second generation Roundup Ready trait.[22] Genetic testing allows a scientist in a genetic lab to determine which generation of Roundup Ready trait the plant contains.[23]

B. Saving and Replanting Seed

After Monsanto's first generation Roundup Ready soybeans lose patent protection, farmers will be able to save and replant seed without infringing.[24] The issue of saving seed is complex because Monsanto possesses legal protections beyond the utility patent on the gene for commercial varieties of seed containing the Roundup Ready trait, such as Plant Variety Protection Act (PVP).[25] Monsanto has agreed not to enforce its PVP rights against farmers who choose to save and replant seed, but the exception extends only to certain Monsanto varieties.[26] The actual number of farmers that save and replant seed is yet to be seen, but given the challenges and availability of a higher yielding alternative, many farmers may choose to buy new seed each year instead of replanting.[27]

1. Agronomic Practices

Farmers grew soybeans, scientific name *glycine max*, on an estimated 76.1 million acres in 2012.[28] The dominant American crop is corn, scientific name *zea mays*, which farmers grew on an estimated 96.4 million acres in 2012.[29] While the numbers fluctuate, soybeans are the second leading crop behind corn.[30] A much less widespread crop is

22. *See Soybean Agronomic Characteristics*, *supra* note 19 (noting the wide variety of phenotypic characteristics displayed by Roundup Ready soybeans which are shared among all soybeans).

23. Genetic analysis can detect the differences because the generations of Roundup Ready traits are different from one another. *See generally How to Test for a GMO*, HUDSON ALPHA, http://www.hudsonalpha.org/education/kits/gmod/gmo-test (last visited Jan. 15, 2015) (describing the testing process for identification of genetically modified organisms).

24. "We have long held that after the expiration of a federal patent, the subject matter of the patent passes to the free use of the public as a matter of federal law." Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 152 (1989).

25. The PVP is codified at 7 U.S.C. §§ 2321–2582 (2014). The PVP system is another form of intellectual property protection that the USDA administers, instead of the USPTO, for sexually reproduced plants that do not fall within the basic utility patents (which exclude non-genetically-modified living organisms) and plant patents (which are only for asexually reproducing plants). *Can IP Rights Protect Plants?*, BIOS, www.bios.net/daisy/bios/1234#plant_patents (last visited Jan. 15, 2015). It is also important to note that the PVP system has a limited exception built-in allowing farmers to save and replant seed so long as it is not sold to third parties for reproduction. *Id.*

26. Roundup Ready Soybean Patent Expiration, MONSANTO, http://www.monsanto.com/newsviews/pages/roundup-ready-patent-expiration.aspx (last visited Jan. 15, 2015).

27. Many factors go into the decision of whether it would be economically advantageous to save seed. *Saving Soybean Seed*, ROUNDUP READY SOYBEAN PATENT EXPIRATION, http://soybeans.com/saving-seed.aspx (last visited Jan. 15, 2015). In response, Monsanto developed a decision tree to aid farmers in choosing to repurchase instead of saving seed. *Id.*

28. *Acreage 06/29/2012*, U.S. DEPT. OF AGRIC., http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1000.

29. *Id.*

30. *Id.*

canola, scientific names *brassica napus* and *brassica campestris*, which farmers grew on 1.77 million acres in 2012.[31]

2. Breeding Methods

Corn and soybeans are prevalent in the United States, but their breeding methods are different.[32] Canola uses breeding methods that are similar to either corn or soybean, due to the recent introduction of hybrid canola varieties.[33] Corn is a hybrid crop, which means that it is a result of the crossing of two different varieties and when farmers plant the hybrid seed, they are planting seeds containing one set of genes from each parent. The hybrid plant expresses a mixture of the two genomes.[34] Soybeans are an inbred crop, where the plant contains two identical genetic copies and the plant expresses the single genome.[35] Canola is still commercially grown in both hybrid and inbred varieties.[36]

The difference between hybrid and inbred seeds is important to the ability of farmers to save and replant seed. Inbred seeds are the same from generation to generation (excluding mutations), and therefore the farmer can save and replant seed knowing that the next generation will be the same as the first.[37] Hybrid seeds produce a genetic hodgepodge that is effectively useless to replant for the next season.[38] In reality, the only seeds that a farmer would be able to save and replant are inbreds.[39] This Note, therefore, focuses on soybeans and canola.

3. Reproduction Methods

How crops reproduce is important because it affects the likelihood that a farmer's field may become contaminated through wind-borne pollen transfer.[40] Soybeans are a self-pollinating plant, which results in very little pollen transfer to other plants outside the

31. *Crop Production*, U.S. CANOLA ASS'N, http://www.uscanola.com/crop-production/ (last visited Jan. 15, 2015).

32. *See* P.K. GUPTA, PLANT BREEDING 8 (2009) (noting soybeans are self-pollinated while corn is cross-pollinated).

33. Sean Pratt, *Canola Yields Poised for Breakthrough*, THE WESTERN PRODUCER, http://www.producer.com/2013/09/canola-yields-poised-for-breakthrough/ (last visited Jan. 15, 2015) ("Corn hybrids have been around since the 1940s, compared to only the last 10 years for canola."); *Canola Facts*, SOYATECH, http://www.soyatech.com/canola_facts.htm (last visited Jan. 15, 2015) (stating that farmers grew hybrids in 80% of the 2007 Canadian canola crop).

34. GUPTA, *supra* note 32, at 36.

35. *See id.* at 28 (discussing self-fertilizing plants).

36. *See* Pratt, *supra* note 33 (noting the recent development of hybrid canola and its prevalence).

37. *Corn Breeding: Lessons From the Past: in Breeding, Hybrid Vigor, and Hybrid Corn*, PLANT & SOIL SCIENCES ELIBRARY, http://passel.unl.edu/pages/informationmodule.php?idinformationmodule=1075412493&topicorder=9&maxto=12 (last visited Jan. 15, 2015) (noting that "if an inbred is self-pollinated, all of the progeny will be genetically identical to each other and to the inbred parent").

38. Neil Wubben et al., *F1/F2 Corn Variety Study*, ISU NORTHERN RESEARCH AND DEMONSTRATION FARM, http://www.ag.iastate.edu/farms/2001reports/ne/F1F2Cornvariety.pdf (last visited Jan. 15, 2015) (noting that planting hybrid seeds is not common practice in the United States and quantifying the yield loss at 17%).

39. *Id.*

40. *See Wind Pollination (Anemophily)*, http://www.pollinator.ca/canpolin/wind_pollination.html (last visited Jan. 15, 2015) (discussing wind pollination and how it influences plant development).

immediate vicinity.[41] Corn and canola are cross-pollinating plants, which result in pollen that can travel much greater distances.[42]

The separation distances for confined field trials that the USDA requires reflect the type of pollination for different crops.[43] The USDA requires a separation distance of ten feet for soybeans between regulated and non-regulated varieties to prevent the trait from migrating to nearby plants.[44] This distance is 660 feet for corn and up to 1320 feet for certain types of canola.[45] While it is possible for soybean pollen to travel short distances, it is unlikely that farmers will be concerned about their fields being contaminated with a neighbor's pollen. Corn is subject to much more significant pollen travel, which may contaminate neighboring fields, but because farmers do not save seed due to agronomic practices, the issue is moot.[46] Canola presents the most significant risk of contamination of a patented trait through wind disbursement onto a neighboring field.[47] Canola also presents a large risk of patent infringement when contamination occurs because many farmers use seed that can be saved and replanted.[48]

C. Judicial Consideration in Bowman v. Monsanto

Until now, courts have only considered patent infringement of crops where there was no unpatented alternative trait with a phenotypically identical unpatented gene.[49] In *Bowman v. Monsanto*, the Court held that the patent exhaustion's doctrine does not apply to self-replicating technologies.[50] Patent exhaustion is the theory that once a patent holder sells a patented invention, the patent holder can no longer enforce the right to make use of the patent with respect to that particular item, even if that item is later sold to another person.[51]

Monsanto requires farmers who purchase seed with the Roundup Ready trait, whether sold directly by Monsanto or sold by third parties, to sign a special licensing agreement that prevents a farmer from saving and replanting the seed in the following year.[52] The

41. GUPTA, *supra* note 32, at 8.

42. *Id.*

43. *See Biotechnology*, U.S. DEPARTMENT OF AGRICULTURE ANIMAL & PLANT HEALTH INSPECTION SERVICE, http://www.aphis.usda.gov/biotechnology/compliance_history.shtml (last visited Jan. 15, 2015) (noting the vast increase in required isolation between soybeans and corn or canola).

44. *Id.*

45. *Id.*

46. *See* Wubben et al., *supra* note 38 (noting that saving corn is not a common practice in the United States).

47. *See Canola Facts*, *supra* note 33 and accompanying text (stating that canola has the widest isolation area and implying that the pollen is capable of traveling the farthest).

48. *See* Pratt, *supra* note 33 (stating that 80% of canola seed was hybrid, which would leave 20% as inbred that could easily be saved and replanted).

49. Roundup Ready was the first widely adopted patented genetically modified herbicide resistance trait for crops and therefore is the first to lose patent protection. *See* Janet Carpenter & Leonard Gianessi, *Herbicide Tolerant Soybeans: Why Growers Are Adopting Roundup Ready Varieties*, 2 AGBIOFORUM 65, 65 (1999), *available at* http://agbioforum.org/v2n2/v2n2a02-carpenter.pdf (noting that sulfonylurea tolerant soybeans were released before Roundup Ready soybeans, but the vast majority of the biotech-developed varieties were Roundup Ready). In addition, it is the first case where a subsequent patented trait has a nearly identical phenotype. *See Soybean Agronomic Characteristics*, *supra* note 19 (noting the wide characteristics and overlap of visual characteristics of Roundup Ready and Roundup Ready 2 Yield soybeans).

50. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1764 (2013).

51. DONALD S. CHISUM, 1-SA02 CHISUM ON PATENTS § 5.

52. *Bowman*, 133 S. Ct. at 1763.

soybean farmer in *Bowman*, Vernon Bowman from Indiana, purchased commodity seed[53] from a local grain elevator and planted it in his field without obtaining permission from Monsanto.[54] When Mr. Bowman sprayed Roundup over his field, most of the crop survived showing that the seed he used predominately contained the patented gene that allows the plant to survive an application of Roundup.[55] In doing so, he killed all of the soybeans that do not contain the gene for Roundup resistance. At harvest, he had segregated the crop to contain only the soybeans with the patented herbicide tolerance trait and "produced a new crop of glyphosate-resistant—i.e., Roundup Ready—soybeans."[56]

Now having a crop of only Roundup resistant soybeans, he harvested and saved the seed to replant the next year.[57] He planted the seed with a trait that he did not pay for, and then purchased much less seed from Monsanto. Monsanto then sued Mr. Bowman for patent infringement.[58] The Court found for Monsanto and Justice Kagan, writing in the unanimous decision, stated that "if the purchaser of that article could make and sell endless copies, the patent would effectively protect the invention for just a single sale."[59] The Court determined that the protection available under the PVP Act does not foreclose the ability to obtain a patent on a plant.[60] In addition, even though the seed itself was responsible for the subsequent generations, the Court rejected the "blame-the-bean defense,"[61] because Mr. Bowman was not a "passive observer" in the reproduction of the soybeans.[62] The opinion was explicitly narrow and came to the following conclusion:

> Our holding today is limited—addressing the situation before us, rather than every one involving a self-replicating product. We recognize that such inventions are becoming ever more prevalent, complex, and diverse. In another case, the article's self-replication might occur outside the purchaser's control. Or it might be a necessary but incidental step in using the item for another purpose.[63]

While the Court did not limit itself to the scenarios presented in the following sections of this Note, it underscores the rights of a patent holder to protect his invention, even when the invention itself provides the mechanism to reproduce by itself.

D. Judicial Consideration in Monsanto v. Schmeiser

Another highly publicized Monsanto case involves canola pollen transfer in Canada. Percy Schmeiser was a farmer who planted inbred conventional canola and claimed that the Roundup Ready trait must have occurred when pollen from his neighbor's field drifted

53. Commodity seed is the bulk seed sold to grain elevators which contains a mixture of all varieties and genetic traits that local farmers have delivered. Deniza Gertsberg, *Monsanto Wins Against Indiana Farmer Over Seed Saving*, GMO JOURNAL, http://gmo-journal.com/2011/09/26/monsanto-wins-against-indiana-farmer-over-seed-saving/ (last visited Jan. 15, 2015).

54. *Id.*

55. *Id.* at 3.

56. *Id.*

57. *Id.*

58. Gertsberg, *supra* note 53, at 3.

59. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1766 (2013).

60. *Id.* at 1767.

61. Mr. Bowman argued that he was not responsible for replicating the patented genes and it was the bean itself that was responsible for the replication. *Id.* at 1769.

62. *Id.*

63. *Id.*

onto his field.[64] He saved and replanted the seed, which he would have normally been allowed to do, because his original crop did not contain any patented genes. When Monsanto genetically tested Schmeiser's crop, it found 95–98% contamination.[65]

While the case was decided under Canadian law, the reasoning is analogous to that used by U.S. courts applying American law. The court reasoned that it was unlikely that such extensive contamination would be present due to pollen drift alone.[66] Schmeiser claimed that he sprayed Roundup on three acres of his field to test for contamination, and then used the seed from the surviving plants to plant his next crop.[67] The court rejected all of his defenses, including the "stray bull" defense, where any offspring fathered by a stray bull would be the property of the farmer that owns the mother.[68] Similar to *Bowman*, the farmer deliberately segregated the crop to give him a trait that he did not pay to receive and was therefore guilty of patent infringement.[69]

E. Commonalities Between Bowman *and* Schmeiser

Pollen transfer is common in canola, so it is likely that farmers growing conventional canola often face problems with contamination.[70] The common thread in the patent infringement cases of self-replicating technologies appears to be the overt action by the infringer to reproduce a patented trait, for which he has not compensated Monsanto. While the Supreme Court in *Bowman* chose to leave itself open to applying patent exhaustion differently in cases occurring outside of the farmer's control, the language of the patent statute does not seem to support an alternative finding.

III. ANALYSIS

This Part discusses the potential outcomes of *Bowman* and similar cases in 2015—the year in which the first generation Roundup Ready trait will no longer be protected by a patent—and beyond.[71] Unless otherwise specified, the crop in the hypothetical cases will be canola, because it is the most likely to be subject to inadvertent contamination. This Part limits the discussion to patent infringement. Monsanto and other agricultural companies

64. Monsanto Can. Inc. v. Schmeiser, 2001 F.C.T. 256 (Can., Ont.), ¶ 38–39, *available at* http://decisions.fct-cf.gc.ca/fc-cf/decisions/en/item/38991/index.do.

65. Schmeiser, 2001 F.C.T. 256, ¶ 53.

66. Schmeiser, 2001 F.C.T. 256, ¶ 118.

67. *Percy Schmeiser*, MONSANTO, http://www.monsanto.com/newsviews/Pages/percy-schmeiser.aspx (last visited Jan. 15, 2015).

68. Stephanie M. Bernhardt, *High Plains Drifting: Wind-Blown Seeds and the Intellectual Property Implications of the GMO Revolution*, 4 NW. J. TECH. & INTELL. PROP. 1, 5 (2005).

69. Schmeiser v. Monsanto, [2004] 1 S.C.R. 902 (Can.).

70. The author was unable to find any cases that actually went to court where Monsanto pursued a farmer if he did not perform an act of segregation and used the Roundup Ready trait without obtaining a license or paying the fees. Brennan Delaney, *What Happens When the Gene Gets Out of the Bottle?: The Necessity of An Intent Element for Infringement of Patents Claiming Genetically Modified Organisms*, 76 UMKC L. REV. 553, 555 (2007) ("For example, Glen Eaton, an Arkansas farmer, was sued by Monsanto in 1999 even though he claimed he did not know how his field became contaminated with GMOs. The judge reportedly agreed that Eaton's claim was irrefutable, but Eaton still settled with Monsanto.").

71. Similar theories have been published after this Note was written, but prior to its publication. *See generally* Daryl Lim, *Self-Replicating Technologies and the Challenge for the Patent and Antitrust Laws*, 32 CARDOZO ARTS & ENT. L.J. 131 (2013); Tabetha Marie Peavey, *Bowman v. Monsanto: Bowman, The Producer and the End User*, 29 BERKELEY TECH. L.J. 465 (2014).

have various other methods of controlling a farmer's ability to save and replant seed other than patents, and those methods of protection will still be in effect after the patent protection expires.[72]

The Court's decision in *Bowman* was unanimous, but the holding was quite narrow so it is difficult to predict how the Court will rule in future cases where the patent infringement occurs outside of the control of the infringer, or without her knowledge. This Part discusses some of the potential ways the Court may rule on innocent or unknowing infringers. The Court may be able to differentiate between infringers who had no knowledge of the infringement because it happened completely outside of their control, and infringers that had no knowledge of the infringement because they did not realize the consequences of their actions. An example of the first scenario, which is referred to as "unknowing infringers," is the farmer who has pollen transferred onto her field by wind or insects, and does not know or have any reason to suspect that a patent infringement has occurred. An example of the second, which is referred to as "innocent infringers," is the farmer who grows some first generation seed that she saves and some second generation seed that she buys each year, but through some mistake, mixes some second generation seed into her first. This Note analyzes both types of infringers separately, because the outcomes may differ depending on the reasoning the Court chooses to apply.

A. Intent to "Make or Use"

One theory on which the Court may base its reasoning would be a lack of intent to "make or use."[73] The idea of eliminating an intent requirement in patent infringement for self-replicating technologies has been proposed in the past by Prof. Brennan Delaney.[74] In the time since the Delaney Article was published, there have been several important changes in the landscape of saving seed and patented genes.[75] Most importantly, the analysis in this Note is focused on multiple traits with the same function, with one of them being patented and one being unpatented, while Delaney focuses on the introduction of patented genes where there were none before.[76] The difference may seem immaterial at first, but the existence of multiple traits with the same function eliminates the possibility of testing for the patented gene without resorting to examining the genome of the plant.[77] In Roundup Ready crops, it is relatively easy to spray a small area with the herbicide to confirm a kill when there is no alternate glyphosate resistance. While the idea of crop contamination with patented genes is not new, the changes in the marketplace and legal

72. *Frequently Asked Questions*, ROUNDUP READY SOYBEAN PATENT EXPIRATION, http://www.soybeans.com/faq.aspx (last visited Jan. 15, 2015) (stating that "[a]fter the Roundup Ready biotech trait expires, most Roundup Ready® seed in the United States will still likely be covered by other forms of intellectual property, including variety patents and plant variety protection certificates").

73. *See infra* note 78 and accompanying text (noting that intent in infringement cases is irrelevant).

74. Delaney, *supra* note 70, at 555.

75. *See supra* note 26 and accompanying text (discussing Monsanto waiving the PVP rights allowing farmers to save first generation Roundup Ready seed after the patent expires); *supra* Part II.C (discussing *Bowman v. Monsanto*, which is the first case the Supreme Court has heard on this issue).

76. *See generally* Delaney, *supra* note 70 (focusing on inadvertent introduction of patented Monsanto traits).

77. Since there is no visual difference between first and second generation Roundup Ready products and the distinguishing characteristic of surviving an application of Roundup is shared, there is no way for a farmer to differentiate them. *See supra* note 19 and accompanying text.

landscape make it very different than it was even five years ago. Considering the intent to "make or use" is even more important today because of the risk to farmers who have their crop contaminated and are unable to determine the presence of the patented trait.

The lack of an intent requirement seems to point to the Court choosing not to make a distinction between those that infringe with the intent of infringing and those that infringe without knowing that they are infringing. Generally, the intent of the infringer is not relevant in patent infringement cases.[78] Direct patent infringement is codified as "whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States . . . any patented invention during the term of the patent therefor, infringes the patent."[79] The American Intellectual Property Law Association proposed model jury instructions state "[s]omeone can directly infringe a patent without knowing that what they are doing is an infringement of the patent. They also may directly infringe a patent even though they believe in good faith that what they are doing is not an infringement of any patent."[80] The lack of an intent requirement is logical for patents outside the realm of self-replicating technologies. The "making or using" language of patent infringement implies the intent to make or use the patented invention, but it does not require the intent to infringe on the patent. The infringer must always have an intent to make or use because the patented invention cannot make or use itself. In situations of both unknowing and innocent infringers, there is at a minimum an intent to make or use the patented invention, which may be why the Court chooses not to consider intent at all.

However, with self-replicating technologies, the "making or using" of a patented invention can happen outside of the user's control, depriving this prospective infringer of any intent to make or use the invention. The invention is the one making, and sometimes using, itself. Even if an infringer of a self-replicating technology is aware of its patent protection, she may infringe without intending to make or use the invention.

Even if an unknowing infringer does not intend to make or use the patented invention, the infringer does act in a manner that facilitates the infringement. For example, a farmer that plants and cares for a crop before harvesting and saves seed to replant affirmatively acts in the growing, harvesting, and saving of the crop. The important distinction here is that all of those acts are necessary to farming and would occur without any infringement. An unknowing infringer does not act with the intent to make or use the patented invention. Similarly, an innocent infringer does not act with the intent to make or use the patented invention. It seems to be rather immaterial to the analysis how the contamination was introduced, so long as the farmer does not act with an intention to make or use the patented invention.

The implied intent to make or use has thus far been found or implied in all patent infringement cases involving self-replicating technologies.[81] In *Bowman*, Mr. Bowman segregated his crop containing only the patented gene and replanted future generations

78. DONALD S. CHISUM, 5-17 CHISUM ON PATENTS § 17.01.

79. 35 U.S.C. § 271(a) (2010).

80. AIPLA'S MODEL PATENT JURY INSTRUCTIONS 15 (Am. Intellectual Prop. Law Ass'n 2012), *available at* http://www.aipla.org/learningcenter/library/books/other-pubs/Documents/2012%20final%20model%20jury%20instructions.docx.

81. The author has done an extensive review of patent infringement cases involving self-replicating technologies and has not discovered a single instance in which a court found non-infringement solely based on a lack of an express or implied intent to make or use.

containing that trait.[82] Similarly in *Schmeiser*, the farmer actively segregated the crop and intended to use the trait without purchasing or licensing the trait.[83] In both of these cases, the farmers acted with the intent to make and use the patented invention.

The Court has two options: continue to imply an intent requirement whenever a potential infringer uses a patented invention or limit the intent requirement to cases where the infringer intended to use the invention whether or not she knew she was infringing. By limiting the *Bowman* decision to the facts of the case, the Court has left itself open to consider the second possibility. The Court has not yet considered whether the lack of intent applies to all patent infringement cases, or whether it is implied in non-self-replicating technologies because, intrinsically, there must always be an intent to make or use the patented invention.

B. Actions

The second possibility for the Court to differentiate between self-replicating and non-self-replicating technologies would be with the action of the infringer. Implied in the "makes or uses" requirement is some action to make or use. The *Bowman* Court stated that "Bowman was not a passive observer of his soybeans' multiplication; or put another way, the seeds he purchased (miraculous though they might be in other respects) did not spontaneously create eight successive soybean crops."[84] This "blame-the-bean" defense did not shield Mr. Bowman in large part because of his actions to segregate and save the seed for future planting.[85] Where the farmer does not act to segregate the seed, the argument for infringement is much weaker. Although an infringer must act to grow her crop, her actions are merely ancillary to the infringement.

In asserting a defense against infringement for a lack of action, one must separately consider an unknowing and innocent infringer. In the case of an unknowing infringer, her crop would infringe without any action on her part to facilitate the infringement. It is true that a farmer has to act to plant, harvest, save seed, and replant, but those actions would be identical whether the crop was contaminated with the second generation patented Roundup Ready trait or not. Those acts are likely not sufficient to constitute infringement if the crop is contaminated with a patented trait. The defense against infringement due to a lack of action by an unknowing infringer is much stronger because all of her actions were incidental to farming itself and she did not do anything that would cause the infringement. It is true that the unknowing infringer's acts ultimately facilitated the infringement, but they would be acts related generally to farming and not to specifically make or use the patented invention.

In the case of an innocent infringer, the defense of a lack of an action to make or use the patented invention is weaker, but may still prevail. In this scenario, the farmer also does not act to make or use the patented invention, but the cause of the infringement is one of her actions. The proximate cause of infringement in this case would be the farmer's own actions, but because the actions are not designed to make or use the patented invention, they too would not be considered actions of infringement. In addition, it would be difficult

82. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1763 (2013).

83. *See* Monsanto Can. Inc. v. Schmeiser, 2001 F.C.T. 256 (Can. Ont.), ¶ 58, *available at* http://decisions.fct-cf.gc.ca/fc-cf/decisions/en/item/38991/index.do.

84. *Bowman*, 133 S. Ct. at 1769.

85. *Id.*

to determine the exact cause of the contamination, so in practice it may be possible to group both the unknowing and innocent infringers into the same category so long as they have not acted out of the ordinary to make or use the patented invention. The Court may not be persuaded by this argument, because it stated that "it was Bowman, and not the bean, who controlled the reproduction (unto the eighth generation) of Monsanto's patented invention."[86] Under this line of reasoning, any action by either an unknowing or innocent infringer to facilitate the growth and reproduction of a self-replicating technology may be liable for patent infringement.

But this would be a slippery slope upon which the Court may not wish to embark. If any action to facilitate the growth and reproduction of a patented self-replicating technology made farmers liable for infringement, what activities, if any, would fail to meet that test? Would farmers also be liable for infringement when they do not save and replant seed, but when seed from a neighboring farm is planted on their farm by mistake and they unknowingly facilitate the growth of the seed through ordinary farming practices? The Court should be careful to limit the farmer's actions to those that are outside of typical agronomic practices for that crop. One clear example of an action outside typical agronomic practices is spraying Roundup onto a field where the farmer has not purchased or licensed any Roundup Ready technology.

C. No Actual Use

A third possibility for the Court to find non-infringement for unknowing and innocent infringers is that they do not use the invention. This would be a much narrower ruling and would be limited to cases where the traits are either not used, or the first and second generation Roundup Ready traits were contained within the individual plants. It would still provide some protection where farmers cannot distinguish between infringing and non-infringing crops, and provide more protection for the patent holder than the two previous possibilities. It may also be more difficult to put into practice as there are many scenarios where courts may find unknowing and innocent infringers liable.

It is common practice among agricultural seed companies to stack multiple patented genes within the same seed in certain crops.[87] If contamination were to occur through either pollen drift or unintended mechanical mixing, all of the traits from the donor seed would likely transfer to the farmer's non-infringing crop. It is probable that by the 2015 growing season, many crops will contain multiple traits to resist different herbicides stacked

86. *Id.*

87. *See* Kameswara Rao, *Genuity-Smartstax, The Eight Transgene Corn: An Amazing Advancement In Crop Genetic Engic*, FOUND. FOR BIOTECHNOLOGY AWARENESS & EDUC. (Aug. 22, 2009), http://fbae.org/2009/FBAE/website/origins_of_genetic_engineering.html (discussing stacked agricultural products including the most recent development of Genuity Smartstax corn which contains eight different transgenes for insect and herbicide resistances).

together.[88] In addition, herbicide resistance traits are often stacked with insect resistance traits.[89]

One hypothetical is where a farmer either does not use the gene at all or her use is wholly encompassed by the non-patented trait. One example is herbicide protection for a herbicide that the farmer never applies. If the patented gene is for something that the farmer never benefits from, she would not use it and therefore not be liable for infringement. Another example is where a crop contains two generations of a single trait designed to resist a single herbicide. It is not necessary to have both genes present, as either alone would provide the plant with protection against the herbicide. In this scenario, the farmer may not actually "use" the second generation patented gene because all of the protection comes from the first. So if the two genes serve an identical purpose, the farmer may be using only the unpatented gene and therefore she is not liable for infringement.

But may a farmer benefit from the use of the patented gene, even though she is not aware of it? One example is an insect resistance gene. It may be impossible for the farmer to learn of the presence of the gene, but she may nonetheless benefit by her crop being free of insects or require less pesticide. In addition, Roundup Ready 2 Yield has a second benefit—the yield increase.[90] This creates a question of whether the farmer is using the yield increase from the patented gene resulting in potential liability. The situation can become very muddy and application of a non-use based defense may be very difficult to assert in practice.

D. Public Policy

Finally, the Court may distinguish self-replicating from non-self-replicating technologies under the theory that the assertion of patent rights over an unknowing or innocent infringer goes against public policy. The Court may choose to read a narrow exception to circumstances in which the infringer did not act in a manner that does or likely would lead to infringement. This exception would be novel, but grounded in the purposes underlying patent protection.

The overarching goal of patent rights is to promote innovation and to grant an inventor rights to exclusively use and sell her invention for a limited period of time.[91] The benefit to the public is disclosure of the ideas and the passage of the ideas into the public domain

88. *See* Karen McMahon, *Monsanto to Add Dicamba-Tolerant Trait to RR Soybeans*, FARM INDUSTRY NEWS (Mar. 1, 2012), http://farmindustrynews.com/biotech-traits/monsanto-add-dicamba-tolerant-trait-rr-soybeans (stating that the dicamba tolerant trait would be stacked with the Roundup Ready trait in 2014); Darren Hefty, *New Soybean Traits*, AG-PHD (Jan. 6, 2012), http://www.agphd.com/blog/ag-phd-newsletter/january-2012/2012/01/06/new-soybean-traits/ (noting the upcoming traits for resistance to dicamba and 2-4-d and their ability to be stacked with other herbicide tolerant traits).

89. This practice is quite common in corn. *See Herbicide- and Insect-resistant Corn Hybrids*, PENN STATE EXTENSION, http://extension.psu.edu/agronomy-guide/pm/sec2/sec21a (last visited Jan. 15, 2015) (listing the different traits available in corn for insect and herbicide tolerance). It is rare in soybeans because there has not been a need for integrated pest management in North America—although Monsanto has developed an insect and herbicide tolerant stack for use in South America. *INTACTA RR2 PRO Soybeans, First Crop Season Shows Good Results*, MONSANTO, http://www.monsanto.com/products/pages/intacta-rr2-pro-soybeans.aspx (last visited Mar. 26, 2015).

90. *See supra* note 17 and accompanying text.

91. Sara Boettiger & Cecilia Chi-Ham, *Defensive Publishing and the Public Domain*, IP HANDBOOK OF BEST PRACTICES, http://www.iphandbook.org/handbook/ch10/p01/ (last visited Jan. 15, 2015).

after a specified period of time.[92] Here, a finding of patent infringement would not further either goal of patent protection and could harm the public at the expense of patent-holders.

First, there would be no harm to an inventor's incentive to innovate. In the case of unknowing and innocent infringers of self-replicating technologies, their infringement only affects their personal use. Neither the innocent nor the unknowing infringers are aware of the infringement or have a feasible way to discover the infringement, so they would not injure the inventor in any manner. Unlike the farmers in *Bowman* and *Schmeiser*, an unknowing or innocent infringer does not intend to use the invention without compensating the patent-holder. A finding of infringement would be a windfall to Monsanto because either an award of damages or the sales due to the inability to save seed would be money from which Monsanto would not be deprived. In this example, Monsanto did not and would not lose any sales because of the unknowing or innocent patent infringement.

Finding infringement for unknowing and innocent infringers would only serve to frighten farmers who may wish to save seed. This fear could in turn limit the attractiveness of saving seed and require farmers to buy seed to protect against a lawsuit. This tendency to purchase seed would likely frustrate the purpose of inventions passing into the public domain after their patent protection expires.

Furthermore, innocent and unknowing infringers by definition do not intend to be infringers. They are attempting to use the first generation Roundup Ready trait for the very purpose of using the technology while not infringing upon Monsanto's second generation patent protected trait. It is likely that many of them do not wish to have the patented trait in their crop, or at the very least are indifferent to the presence of it. It would be inequitable to find for infringement when farmers do not want the trait, especially if they take reasonable steps to reduce contamination.

IV. RECOMMENDATIONS

Monsanto may attempt to retain as much control and influence over the farmers that choose the save and replant seed as possible. There are two logical reasons identified in this Note that Monsanto may choose to waive the PVP protection on varieties that contain the first generation Roundup Ready trait. First, the Supreme Court or Congress could provide additional protection for this limited class of infringers. Additionally, the Court or Congress could draw a distinction between innocent and unknowing infringers and choose to treat them similarly or differently. This Note makes recommendations for ways that farmers can reduce contamination and, in doing so, reduce potential patent infringement lawsuits.

A. Public Relations Benefit to Monsanto

One reason that Monsanto may choose to allow farmers to save and replant seed without additional payments is the public relations benefit. It is no secret that Monsanto is not well liked by a small but vocal group of Americans.[93] One criticism of Monsanto is its

92. Stephan Kinsella, *"The" Purpose of Patent Law*, CENTER FOR THE STUDY OF INNOVATIVE FREEDOM (Dec. 6, 2010), http://c4sif.org/2010/12/the-purpose-of-patent-law/.

93. For examples of groups that are against Monsanto, see the following sources: Donald L. Barlett & James B. Steele, *Monsanto's Harvest of Fear*, VANITY FAIR (May 2008),

policy that prohibits replanting seed.[94] Because of the economic benefits of purchasing the patented second-generation Roundup Ready seed, many farmers are likely to repurchase new seed.[95] The public relations benefit would be a rather low cost to Monsanto if most farmers choose to buy seed instead of saving and replanting.

Monsanto was not breeding any new first generation Roundup Ready varieties for commercial release when the author began working there in 2008. Because it takes at least six to eight years to develop a variety,[96] there were still some first generation Roundup Ready varieties that were released after that time. Yield gains over time, in addition to the boost inherent in the second generation Roundup Ready trait, have the potential to more than make up for the cost of the seed. Yield gains of 0.3 bushels per year over five years, plus the advertised 7–11% gains, would result in an increase from 50 bushels per acre to 55–57 bushels per acre.[97] Throughout 2013, soybean prices have remained above $13.00 per bushel,[98] so that a five to seven bushel increase would lead to an increase profit per acre of $65.00 to $91.00. Soybean seed prices per acre depend on the variety planted and a host of other factors, but are generally at least $50.00.[99] In purely economic terms, farmers would likely be better off investing in new seed every year. Over time, the yield gains will continue to grow, further reducing the incentive to save and replant seed. If soybeans prices fall, the benefit gained from additional yield will be diminished.[100]

The one place where farmers would benefit the most from reducing seed input costs, even in years with high soybean prices, is in years that the yield is low. Because most farmers choose to purchase crop insurance that establishes a yield floor,[101] farmers that are reasonably certain that their production will not meet the price floor would see no benefit from planting higher-priced seed. In 2013, farmers in Northern Iowa were not able to plant their crop on time, and some farmers were not able to plant a crop at all.[102] With the reduced

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http://www.vanityfair.com/politics/features/2008/05/monsanto200805; *Millions Against Monsanto*, ORGANICS CONSUMERS ASSOCIATION, http://www.organicconsumers.org/monsanto/ (last visited Jan. 15, 2015); FOOD INC. (Magnolia Home Entertainment 2009); *Anti-Monsanto Project*, FACEBOOK, https://www.facebook.com/Anti.Monsanto (last visited Jan. 15, 2015); MARCH AGAINST MONSANTO, http://www.march-against-monsanto.com/ (last visited Jan. 15, 2015); OCCUPY MONSANTO, http://occupy-monsanto.com/ (last visited Jan. 15, 2015).

94. Richard Schiffman, *Life in the Rural Police State of Monsanto*, TRUTHOUT (Jun. 19, 2013), http://www.truth-out.org/news/item/16985-life-in-the-rural-police-state-of-monsanto ("By aggressively enforcing its 'no replant policy,' Monsanto has initiated a permanent low-grade war against farmers.").

95. *See infra* notes 96–99 and accompanying text (noting the economic advantages of buying new seed).

96. *Timelines*, STINE SEED, http://www.stineseed.com/flash/timelines/soy.php (last Jan. 15, 2015) (showing a seven-year timeline for Stine soybean seeds).

97. Brian Diers, *Gains From 80 Years of Soybean Breeding*, AGRONOMY DAY 2010, http://agronomyday.cropsci.illinois.edu/2010/tours/b5breed/ (last visited Jan. 15, 2015).

98. Chicago Mercantile Exchange, *2013 Soybeans Historical Prices / Charts*, TRADINGCHARTS.COM, http://futures.tradingcharts.com/historical/SB/2013/0/continuous.html (last visited Jan. 15, 2015).

99. Aviva Shen, *How One 75-Year-Old Soybean Farmer Could Deal a Blow To Monsanto's Empire Today*, THINKPROGRESS (Feb. 19. 2013), http://thinkprogress.org/health/2013/02/19/1607161/monsanto-supreme-court-hearing/ (noting the average cost to plant one acre of soybeans has risen to $56.58).

100. As recently as August 2006, soybean prices were an average of $4.84. *Iowa Cash Corn and Soybean Prices*, IOWA STATE EXTENSION (Nov. 2013) http://www.extension.iastate.edu/agdm/crops/pdf/a2-11.pdf.

101. *See About Crop Insurance*, CROP INSURANCE, http://www.cropinsuranceinamerica.org/about-crop-insurance/#.VLfkM9LF_49 (last visited Jan. 15, 2015) (noting that 89% of farmland is protected by federal crop insurance).

102. Kent Thiesse, *Prevented Planting Becomes the Focus of Farmers*, CORN & SOYBEAN DIGEST (June 4, 2013), http://cornandsoybeandigest.com/blog/prevented-planting-becomes-focus-farmers.

yield expectations due to the late planting, many farmers were expecting to rely on crop insurance instead of their harvest.[103] In this scenario, any reduction in costs would increase net profits because any increase in yield below the yield floor would not result in any additional income. So while normal crop years may see an increase in profits by purchasing the second generation Roundup Ready seed, years in which farmers expect yields to be below the crop insurance yield floor would benefit the farmers that choose to save and replant first generation Roundup Ready seed.

B. Legal Benefit to Monsanto

Another possible reason for Monsanto to choose to allow farmers to save seed could be the result of a legal strategy. The Court does not allow patent holders to continue their monopoly after their patent expires.[104] In the case of patented genes, the traits by themselves do not have any value to farmers. The only value to consumers is added when patented genes are included in the germplasm of crops. It is not clear how the Court would react to Monsanto effectively extending the term of the patent by relying on the legal protections afforded to the variety itself. It may be that by allowing farmers to save and replant first generation Roundup Ready seeds, Monsanto is avoiding a potential reduction in the rights of future genetic patents.

Monsanto's allowance of saving and replanting first generation Roundup Ready seeds may come with some strings still attached. Monsanto also relies on contract protection for its seed.[105] It is possible, although there is no evidence, that Monsanto may condition the farmer's ability to save and replant first generation Roundup Ready seeds on a contract that spells out any rights that Monsanto retains. One right that Monsanto would potentially retain is the ability to test the farmer's field at any time for the presence of patented genes. It would be one possible way that Monsanto would be able to better police farmers who choose to replant seed. As mentioned in this Note, it would be difficult for Monsanto to determine which generation of Roundup Ready protection the farmer that saves and replants seed is using. An allowance to genetically test farmer's fields would allow Monsanto better protection from farmer's attempting to save and replant patented second generation Roundup Ready traits.

C. Avenues for Change

How the Court will deal with farmers' crops contaminated with patented traits is an open question. It is possible that the Court may choose to find an exception to the strict requirements of patent infringement and add some sort of intent element into infringement for self-replicating organisms. While this would be a balanced outcome, there is relatively little precedent on which they could choose to add this additional requirement. The Court may find itself bound by the traditional notion that patent infringement does not contain

103. Ben Berkowitz & Tom Polansek, *Record Number of Farmers Expected to File Crop Insurance Claims*, INS. J. (July 20, 2012) http://www.insurancejournal.com/news/national/2012/07/20/256578.htm.

104. Jean Scheid, *How Long Is Your Patent Valid and What Can You Do to Extend It?*, BRIGHT HUB (May 31, 2011), http://www.brighthub.com/office/entrepreneurs/articles/42924.aspx.

105. *Technology Use Guides*, MONSANTO, http://www.monsanto.com/products/Pages/technology-use-guides.aspx (last visited Jan. 15, 2015) (noting the requirement of a Monsanto Technology/Stewardship Agreement to purchase or plant seed with Monsanto technologies).

any intent elements[106] and therefore be required to find infringement for unintentional contamination.

Another possible solution to this problem is legislative. Congress could choose to provide additional protections for farmers who have their non-patented crops contaminated with patented traits. This would be the best solution because Congress is not bound by the same precedential constraints as the courts.

In either event, the Court or Congress would be able to determine if only contamination outside of the farmer's control is eligible for protection, or if any contamination that was not the intent of the farmer would apply. This distinction would be important in cases in which a farmer inadvertently mixes patented seed that she purchased with seed saved for replant. Farmers should be protected only from suits of patent infringement for contamination outside of their control. It is also important to make the punishment less severe where farmers do not intend to infringe. One possible solution is for the Court to only hold farmers liable for the percentage of contamination attributed to her own actions. For example, if a farmer was to introduce ten percent contamination through mechanical mixing and the patent holder cannot demonstrate the farmer's intent to infringe, the farmer would only be liable for the percentage actually infringed. The costs of taking the action to trial incurred by the farmer would encourage a settlement that is in line with the actual damages suffered. This potential damages award would likely reduce infringement because farmers would have a strong incentive to take precautions to prevent mechanical contamination.[107] It is important to provide protection for Monsanto or any patent holder against farmers who willingly infringe and also to provide an incentive for farmers to responsibly save seed for replanting. It would be a balance of fairness that would limit the liability of farmers that infringe either unknowingly or unintentionally, but provide additional protection when the farmer did not cause the infringement.

D. Best Practices for Farmers

There are also many things that farmers who wish to save and replant seed could do to prevent contamination. As previously stated, the travel of pollen, even in canola, is limited in distance.[108] Farmers wishing to save seed would be able to buffer the seed they wish to save with seed they sell. Only a small percentage of seed needs to be saved for the next season. In soybeans, only about 2% of the seed would need to be saved for replant.[109] In an 80 acre field, a farmer would need to save the seed from less than two acres. A farmer

106. *See supra* note 78 and accompanying text (noting the lack of an intent requirement for patent infringement).

107. *See infra* Part IV.D (presenting recommendations for farmers).

108. *See supra* notes 44–45 and accompanying text (noting that soybean regulations only require ten feet of isolation and canola regulations require 1320 feet of separation to prevent outcrossing).

109. Approximately one bushel of soybean seed is required to plant one acre, and with soybean yields of nearly 50 bushels per acre, only one bushel per acre would be required to replant the next planting season. *See Plant Populations and Seeding Rates for Soybeans*, PURDUE EXTENSION, http://www.extension.purdue.edu/extmedia/AY/AY-217-W.pdf (last visited Jan. 15, 2015) (showing recommended seeding rates of 163,350 seeds per acre for 11–20 inch row spacings); *Bushel Weights/Seeds Per Pound*, PENN STATE EXTENSION, http://extension.psu.edu/agronomy-guide/average-bushel-weights (last visited Jan. 15, 2015) (showing an average of 60 pounds per bushel of soybeans and an average 2500 seeds per pound, result in 150,000 seeds per bushel); *Iowa Corn and Soybean County Yields*, IOWA STATE EXTENSION, http://www.extension.iastate.edu/agdm/crops/pdf/a1-14.pdf (last visited Jan. 15, 2015) (showing state average soybean yields for 48 bushels per acre).

would be able to harvest two acres from the center of the field for replant, increasing the distance from neighboring fields. In addition, if neighboring farmers are not planting crops that could be possible sources of contamination, the farmer would be able to harvest her seed from replant at an even greater distance from sources of contamination.

In addition to field placement, farmers choosing to save and replant seed should clean equipment used to harvest, transport, and store grain for replant to reduce possible contamination. This would be especially important if a farmer chooses to save and replant only a portion of her crop and purchases patented seed for the rest. Proper identification and handling would be critical to prevent mechanical contamination of her crop. This would be especially important if the Court or Congress removed the intent element. It is possible that any policy changes would apply only to contamination introduced outside of the farmer's control. Mechanical contamination, while it may not be the intent of the farmer, would be an action for which she is directly responsible.

Farmers need protection from overbearing corporations that may assert patent rights when the farmer does not have the intent to infringe and, in some cases, knowledge of the infringement. Farmers do not and will not possess the ability to differentiate between the two generations of Roundup Ready traits. Only through genetic analysis will farmers learn of their infringement. It is important to weigh the rights of a patent holder against the rights of a farmer to save and replant unpatented seed. The Court or Congress should strike a balance that limits the ability of patent holders to bring suit against infringers where the infringement happened outside of their control, and where the infringers have not acted to facilitate or further infringement. In cases where farmers infringe without an intent to infringe, the penalty should be in line with the offense, most notably a damage award that calculates only for actual contamination caused by a farmer.

V. CONCLUSION

The ability of farmers to save and replant seed may be greatly hindered if farmers are under constant threat of litigation over patent infringement for traits that they are unable to distinguish from traits they are legally allowed to use. The law must adapt to better protect farmers' rights when the farmer does not know, and in some cases does not cause, the contamination of their crop with patented genes. The amount of farmers that wish to save and replant first generation Roundup Ready seed is unknown, but it should be a choice that is left to the farmer untainted by threats of infringement. It is also important for farmers to take reasonable actions to maintain the purity of their crop. Through proper precautions by the farmer and a relaxed legal standard, farmers would be able to safely replant first generation Roundup Ready seed while still largely maintaining the ability of Monsanto and other patent holders to protect their inventions.