PLANTED IN POWER: HOW INTELLECTUAL PROPERTY LAW AND MARKET CONCENTRATION CHANGED THE SEED INDUSTRY

"If we will not endure a king as a political power[,] we should not endure a king over the production, transportation, and sale of any of the necessaries of life."

-Senator John Sherman[1]

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1. 21 CONG. REC. S2457 (1890) (statement by Sen. John Sherman).

INTRODUCTION

A seed is the beginning of agriculture. For centuries, farmers have been saving seeds from one harvest to plant for the next season.[2] This practice allowed farmers to develop and preserve locally adapted crops and choose their best harvest for the following year. However, consolidation and expansion of intellectual property (IP) rights in the seed industry have fundamentally changed this tradition. These changes have created a system where farmers are increasingly dependent on four powerful seed companies, who can impose stringent restrictions on seed use through licensing agreements that prohibit saving and researching seeds.

The seed industry's transformation began in earnest with the passage of the Plant Varieties Protection Act (PVPA) in 1970.[3] Before the PVPA, seed breeding and crop improvement were primarily public endeavors driven by universities and government research programs.[4] The PVPA marked a significant shift, granting private companies the right to obtain Plant Variety Protection Certificates (PVPCs), which provided exclusive rights to their seed varieties.[5] Crucially, these certificates still allowed farmers to save seed and conduct research, preserving some degree of independence for agricultural producers.[6] However, subsequent legal developments eroded these farmer exemptions, culminating in the Supreme Court's 1980 decision in *Diamond v. Chakrabarty*, which extended patent protections to genetically modified organisms—eventually including seeds.[7]

In the years following *Diamond v. Chakrabarty*, the seed industry underwent rapid consolidation, with just four companies—BASF, Corteva, Syngenta, and Bayer—now controlling over 70% of the U.S. soybean market, 80% of the corn market, and 90% of the cotton market.[8] These companies enforce their IP rights through restrictive licensing agreements, often called "Technology Use Agreements," which farmers must sign before

2. A. Bryan Endres, *State Authorized Seed Saving: Political Pressures and Constitutional Restraints*, 9 DRAKE J. AGRIC. L. 323, 324, 326 (2004).

3. 7 U.S.C. § 2543.

4. Paulina B. Jenney, Keeping What You Sow: Intellectual Property Rights for Plant Breeders and Seed Growers 7 (May 2022) (Masters professional paper, University of Montana) (on file with University of Montana).

5. 7 U.S.C. §§ 2543–2544.

6. *Id.*

7. 447 U.S. 303 (1980) (establishing the subject matter eligibility of living organisms).

8. BASEL MUSHARBASH, FARM ACTION, "KINGS OVER THE NECESSARIES OF LIFE": MONOPOLIZATION AND THE ELIMINATION OF COMPETITION IN AMERICA'S AGRICULTURE SYSTEM 45 (2024).

purchasing seed.[9] These contracts prohibit seed saving and research, regardless of IP rights.[10] The result is a legal landscape prioritizing corporate control over farmers' rights and consumer choices.

This Note examines the legal implications of this changing market. It argues that these agreements constitute contracts of adhesion, leaving farmers with little bargaining power and undermining the public interest objectives of the PVPA. Part I provides background on the historical practice of seed saving, the establishment of the PVPA, the expansion of IP protections to seeds, and the consolidation of the seed industry. Part II analyzes the legal framework that underpins the current system, including the constitutional basis for IP protections, key Supreme Court decisions, and the enforcement of licensing agreements through contract law. Part III considers the role of antitrust law in addressing the market consolidation that exacerbates these issues, highlighting the potential for enforcement under the Sherman Act and the Federal Trade Commission Act. Finally, Part IV explores policy solutions, including improved labeling requirements to increase transparency around IP protections, enhanced antitrust enforcement to reduce market concentration, and state-level initiatives to protect farmers' rights.

The effects of these issues extend far beyond individual farmers. A few multinational corporations are threatening a resilient and sustainable food system which depends on diverse plant varieties.[11] Rebalancing the legal and economic dynamics of the seed industry is essential to protecting farmers' autonomy, fostering innovation, and ensuring the long-term health of global agriculture.

I. BACKGROUND: FROM THE TRADITION OF SAVING SEED TO LICENSING

Today, farmers do not own the seed they use. Instead, they license the technology from one of four companies every spring.[12] Intellectual property (IP) protection for seeds began to encourage innovation but has evolved into a limiting system seed manufacturers control.[13] Seed companies have continued their overreach through contracts with farmers to maintain control

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9. EMILY SPIEGEL ET AL., VT. L. & GRADUATE SCH.: CTR. FOR AGRIC. & FOOD SYS., SEEDS FOR RENT: THE FARMERS' GUIDE TO TECHNOLOGY USE AGREEMENTS 4 (2025).

10. *Id.* at 18.

11. Claire Kelloway, *USDA Report Highlights Harms of Seed Consolidation and Restrictive IP*, FOOD & POWER (Mar. 23, 2023), https://www.foodandpower.net/latest/usda-seeds-report-3-23.

12. SPIEGEL ET AL., *supra* note 9, at 4.

13. *See infra* Part I.E.

over agriculture's fundamental block—the seed.[14] This Section provides an overview of the history of seed saving, initial legislation to protect the tradition, and case law altering extending IP protections resulting in the implementation of private contracts to close any gaps in companies' seed ownership.

A. Saving Seed is a Centuries-Old Tradition.

Farmers have been saving seed to replant for next season's crop for centuries before the seed industry began acquiring IP rights on their seed traits.[15] Seed saving is the practice of selecting seed from one season's crop to use for future planting.[16] Farmers choose seed from plants with the most desirable traits, and with a steady accumulation of advantageous genes, more productive plants grow.[17] These traits include drought resistance, disease endurance, germination times, and other plant qualities.[18] Indigenous cultures have developed sophisticated methods for collecting, storing, and replanting seed for centuries.[19] The seed industry is often divided into two seed markets: commodity seeds and specialty crop seeds. Commodity seeds include corn, soy, wheat, and cotton which are grown on a larger scale.[20] Specialty crop seeds include fruits, vegetables, and other crops grown on smaller acreage.[21]

Agribusinesses, U.S. land-grant universities, and farmers have invested in seed research and seed saving to increase production.[22] Since 1935, yields

14. *See infra* Part II.B.

15. *See* Keith Fuglie & James M. MacDonald, *Expanded Intellectual Property Protections for Crop Seeds Increase Innovation and Market Power for Companies*, U.S. DEP'T OF AGRIC.: ECON. RSCH. SERV. (Aug. 28, 2023), https://www.ers.usda.gov/amber-waves/2023/august/expanded-intellectual-property-protections-for-crop-seeds-increase-innovation-and-market-power-for-companies.

16. *See* R. DOUGLAS HURT, AMERICAN AGRICULTURE: A BRIEF HISTORY 4 (Purdue Univ. Press rev. ed. 2002).

17. JACK KLOPPENBURG, JR., FIRST THE SEED: THE POLITICAL ECONOMY OF PLANT BIOTECHNOLOGY, 1492–2000, at 2 (Univ. of Wis. Press, 2d ed. 2004) (1988).

18. Kelloway, *supra* note 11.

19. FIRST NATIONS DEVELOPMENT INSTITUTE, SEED SAVING & SEED SOVEREIGNTY 1 (2015) ("Many [I]ndigenous communities developed highly-evolved systems of seed saving that often included optimal season times for seed saving, seed-saving rotations, containers and storage units that lasted for hundreds of years, processes that considered pollination patterns and systems, and associated cultural meaning to the different stages of the seed-saving process.").

20. 7 U.S.C. § 9011.

21. Specialty Crops Competitiveness Act of 2004, 7 U.S.C. § 1621.

22. Keith Aoki, *Seeds of Dispute: Intellectual Property and Agricultural Biodiversity*, 3 GOLDEN GATE UNIV. ENV'T L.J. 79, 85 (2009). A U.S. land grant university is an institution that receives federal funding historically to promote education in agriculture, military tactics, and mechanical arts as established by the Morrill Acts of 1862 and 1890. *Land-Grant University FAQ*, ASS'N OF PUB. & LAND-GRANT UNIVS., https://www.aplu.org/about-us/history-of-aplu/what-is-a-land-grant-university/#:~:text=What%20is%20a%20land%2Dgrant,Grant%20Status%20Act%20of%201994 (last visited Nov. 28, 2025).

of crops such as corn and soy have doubled primarily due to refined genetics.[23] Before 1970, public universities had been doing most crop breeding.[24] Farmers primarily saved their seed and periodically bought new seed to adopt a different variety or strengthen genetics.[25] Cultivators have long been involved in changing seed traits. Farmers could purchase newer varieties then continue to seed save with the assistance of public universities' genetically modified seeds.[26] Public institutions and farmers were primarily altering seed genetics until Congress incentivized private innovation.[27] Initially, Congress incentivized private development of seed genetics while maintaining the right of farmers to save seed.[28]

B. The Plant Varieties Protection Act

With the expansion of seed technology, Congress passed the Plant Varieties Protection Act (PVPA) in 1970.[29] Farmers continued to save the seed for subsequent plantings, leaving private companies with little incentive to research and develop new seed traits.[30] Private industries were granted a limited exclusivity period for new crop varieties after the passage of the PVPA, similar to those with Plant Variety Protection Certificates (PVPCs).[31] In the years preceding the PVPA, the President's Commission on the Patent System acknowledged "the valuable contribution of plant and seed breeders, [but it did] not consider the patent system the proper vehicle for the protection of such subject matter."[32]

Ultimately, the PVPA required a carve-out in the PVPCs to allow farmers to continue saving seed for next season's use.[33] Plant breeders still had the right to use the protected seed in their programs if the new variety was distinct enough from the original.[34] The PVPA aligned the interests of the seed industry, which sought compensation for its technology, with those

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23. KLOPPENBURG, *supra* note 17, at 5.
24. Fuglie & MacDonald, *supra* note 15.
25. *Id.*
26. Aoki, *supra* note 22, at 85.
27. *Id.* at 86.
28. 7 U.S.C § 2543; *see* Jessica Lynd, *Gone with the Wind: Why Even Utility Patents Cannot Fence in Self-Replicating Technologies,* 62 AM. UNIV. L. REV. 663, 673–74 (2013).
29. Aoki, *supra* note 22, at 89.
30. HURT, *supra* note 16, at 3.
31. Jenney, *supra* note 4, at 6.
32. PRESIDENT'S COMM'N ON THE PATENT SYS., "TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS" IN AN AGE OF EXPLODING TECHNOLOGY 13 (1966).
33. 7 U.S.C. § 2543.
34. AGRIC. MKTG. SERV., U.S. DEP'T OF AGRIC., MORE AND BETTER CHOICES FOR FARMERS: PROMOTING FAIR COMPETITION AND INNOVATION IN SEEDS AND OTHER AGRICULTURAL INPUTS 71 (2023) [hereinafter MORE AND BETTER CHOICES REP.].

of farmers and seed breeders, who sought to preserve their traditional rights to save and work with seeds. However, the IP protections continued to expand for the seed industry as companies sought market control.

C. The Expansion of Intellectual Property Protections

After the PVPA's passage, the Supreme Court expanded IP protections to biotechnology in *Diamond v. Chakrabarty*.[35] The Court held, "A live, human-made micro-organism is patentable subject matter . . . ."[36] In the wake of this case, the United States Patent and Trademark Office (USPTO) could grant utility patents for living organisms.[37] This holding became important for seed companies which wanted exclusive control over the profits of seed traits such as drought and chemical resistance.[38] The United States is one of only four countries that allow IP protection for plants.[39] By 2001, the USPTO had granted 1,800 utility patents for plants, plant parts, and seed.[40]

The Supreme Court solidified *Chakrabarty*'s application to the seed industry in *J.E.M. AG Supply, Inc. v. Pioneer Hi-Bred International, Inc.*.[41] The Court held that the PVPA "contains no statement that PVP certificates were to be the exclusive means of protecting sexually reproducing plants."[42] This holding allowed seed companies to seek utility patents and PVPCs for their seed traits. In *J.E.M AG Supply, Inc.*, Justice Breyer and Justice Stevens argued in their dissent: "The Court has advanced no sound reason why Congress would want to destroy the exemptions in the PVPA that Congress created. And the Court's reading would destroy those exemptions."[43] Farmers opposed to utility patents on seed traits knew this holding would fundamentally change farming and give companies total control over a less diverse number of seeds.[44]

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35. 447 U.S. 303 (1980).
36. *Id.* at 305, 318.
37. SPIEGEL ET AL., *supra* note 9, at 4.
38. Kelloway, *supra* note 11.
39. MORE AND BETTER CHOICES REP., *supra* note 34, at 30 (adding that other countries include Japan, Australia, and South Korea).
40. J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124, 127 (2001).
41. *Id.* at 124.
42. *Id.* at 141.
43. *Id.* at 155 (Breyer, J. and Stevens, J., dissenting).
44. Brief for Am. Corn Growers Ass'n & Nat'l Farmers Union as Amici Curiae Supporting Petitioners, J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124 (2001) (No. 99–1996), WL 490944.

The USDA has found it difficult to track down specific IP information—a PVPC and/or utility patent—for a particular seed trait.[45] Seed variety names and numbers linked to the IP protection result in a lack of transparency between the product farmers receive and the IP information of each trait in the seed.[46] In addition, because there is minimal clarity about which IP protection follows the seed, companies require growers to sign private agreements for seed prohibiting all seed saving and research regardless of IP protections. Enforcing these contracts furthers the market power of large seed companies who control the majority of crop seed, agricultural chemical sales, and contribute to the issues of a concentrated market.[47]

D. Enforcement of Licensing Agreements

Growers must sign private contracts, often called licensing agreements, which include onerous terms and conditions.[48] Every licensing agreement by key seed companies includes an overall prohibition on seed research or seed saving, essentially making these contracts as effective as a utility patent on seed saving.[49] Several cases have solidified seed companies' rights to enforce these provisions against farmers. In *Monsanto v. Scruggs*, family farmers argued they should be able to save seed under the doctrine of patent exhaustion in which the first sale of a good exhausts the patent rights of the holder.[50] The Third Circuit held this was not applicable because Monsanto was not selling a seed but only licensing the use to farmers.[51]

In *Monsanto v. McFarlin*, a farmer saved the Monsanto seed and replanted it the following season.[52] The farmer argued the patent could not extend to the second generation of seed, but the Third Circuit held that the

45. MORE AND BETTER CHOICES REP., *supra* note 34, at 35–36.

46. *Id.* at 37–38.

47. Keith Fuglie, *Two Companies Accounted for More than Half of Corn, Soybean, and Cotton Seed Sales in 2018–20*, U.S. DEP'T OF AGRIC.: ECON. RSCH. SERV. (Oct. 2, 2023), https://ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=107516.

48. Debra L. Blair, *Intellectual Property Protection and Its Impact on the U.S. Seed Industry*, 4 DRAKE J. AGRIC. L. 297, 326 (1999).

49. Syngenta Seeds, LLC, *Stewardship Agreement* 1–2 (rev. Feb. 18, 2021), https://www.syngenta-us.com/stewardship/downloads/syngenta_stewardship_agreement_2021%20final.pdf [hereinafter *Syngenta Stewardship Agreement*]; Bayer, *U.S. Technology Stewardship Agreement Terms and Conditions* (2025), https://tug.bayer.com/tsa/united-states/ [hereinafter *Bayer Technology Stewardship Agreement*]; Corteva Agriscience, *Corteva Agriscience Technology Use Agreement*, 2 (2024), https://www.corteva.us/content/dam/dpagco/corteva/na/us/en/files/trait-stewardship/DOC-2024-Sales-Year-Draft-Corteva-TUA-Update-Notification-US.pdf [hereinafter *Corteva Technology Use Agreement*].

50. Monsanto Co. v. Scruggs, 459 F.3d 1328, 1336 (Fed. Cir. 2006).

51. *Id.*

52. *Id.*

Technology Use Agreement was not beyond the scope of Monsanto's patent rights.[53] In this case, the licensing agreement between the farmer and the seed company was considered legitimate, standardizing the industry's authority to use blanket protection for seed saving regardless of IP protections.[54] These licensing agreements grant companies greater IP protection than Congress authorized in the PVPA.[55] They also allow for coverage of traits in seeds without utility patent coverage.[56]

Given the IP component, federal law could have jurisdiction over these licensing agreements between farmers and companies. These licensing agreements are contracts, and contract law treats seeds as goods.[57] Farmers are required to sign licensing agreements with each purchase of seed. Farmers accept the agreement terms by opening a bag, planting a seed, or "continu[ing] use" of a seed.[58] Seed companies may unilaterally change the terms of the agreement at any time, and continued use of the seed—even if planted—constitutes acceptance.[59] Farmers are left with unequal bargaining power in the licensing agreements because of the few choices in the seed market. These contracts offer stronger IP protection than a PVPC or certainty of a utility patent on every trait.

Courts have held that the seed industry cannot be subjected to other interpretations of one-time use restrictions on patented technology. In *Mallinckrodt v. Medipart*, the Federal Circuit held that a medical device with a label allowing purchasers a one-time use was a valid restrictive use of their patent.[60] The Court did not find the medical device company engaged in any "anticompetitive" behavior in its single-use restriction.[61] Thus, this was not a misuse of patent law.[62] However, the seed market is one of the most consolidated industries. In licensing agreements that restrict seed saving, farmers face more anticompetitive players than the defendants in *Medipart*, distinguishing the holding from the reality of the seed industry. Consolidation in the seed industry has only grown in recent years.

53. *Id.* at 1339.
54. Aoki, *supra* note 22, at 104.
55. SPIEGEL ET AL., *supra* note 9, at 9.
56. MORE AND BETTER CHOICES REP., *supra* note 34, at 52.
57. U.C.C. § 2-A103(1)(k) (AM. L. INST. & UNIF. L. COMM'N 2003).
58. *Syngenta Stewardship Agreement, supra* note 49, at 2; *Bayer Technology Stewardship Agreement, supra* note 49; *Corteva Technology Use Agreement, supra* note 49, at 2.
59. *Id.*
60. Mallinckrodt Inc. v. Medipart Inc., 976 F.2d 700, 704 (Fed. Cir. 1992).
61. *Id.* at 708.
62. *Id.* at 709.

E. Consolidation in the Seed Industry

Four companies monopolize the seed industry: BASF, Corteva, Syngenta, and Bayer—also known as the "Big Four."[63] These agribusinesses dominate the commodity seed industry.[64] At the same time, seed prices have skyrocketed. Between 1990 and 2020, seed prices for crops grown with modified traits rose by 463%, substantially surpassing the prices farmers receive for commodities such as corn, soy, and wheat, which have only grown 56% in the same years.[65] Between 1975 and 2022, there were 492 historic mergers in the seed industry, resulting in the Big Four holding 95% of corn IP and 84% of soy IP.[66] The USDA writes:

> Economic theory suggests that some degree of market power . . . is necessary to incentivize private R&D. *However*, too much market concentration may reduce R&D if the lack of competition takes away firms' incentive to innovate. If new product introduction entails high fixed cost . . . , there can be significant barriers to entry for new firms, further limiting competition and potential new sources of innovation.[67]

In 2021, President Biden issued an Executive Order, "Promoting Competition in the American Economy."[68] The Executive Order required the Secretary of Agriculture to "help ensure that the intellectual property system, while incentivizing innovation, does not unnecessarily reduce competition in seed and other input markets beyond that reasonably contemplated by the Patent Act . . . ."[69] Since the 1990s, when genetically modified traits entered

63. *See generally* BASEL MUSHARBASH, *supra* note 8.
64. *Id.*
65. JAMES M. MACDONALD ET AL., U.S. DEP'T OF AGRIC.: ECON. RSCH. SERV., CONCENTRATION AND COMPETITION IN U.S. AGRIBUSINESS 15 (2023).
66. MORE AND BETTER CHOICES REP., *supra* note 34, at 42, 74.
67. MACDONALD ET AL., *supra* note 65, at 15 (emphasis added).
68. Exec. Order No. 14,036, 86 Fed. Reg. 36987 (July 14, 2021). In August 2025, the Trump Administration revoked this executive order. Exec. Order No. 14,337, 90 Fed. Reg. 40227 (Aug. 19, 2025). However, the Trump Administration is still pursing antitrust litigation in different agricultural industries such as pesticides and farm equipment repairs. *See, e.g.*, *Syngenta and Corteva, FTC v.*, FED. TRADE COMM'N, https://www.ftc.gov/legal-library/browse/cases-proceedings/191-0031-syngenta-corteva-ftc-v (last updated Jan. 12, 2024); *Deere & Company, FTC v.*, FED. TRADE COMM'N, https://www.ftc.gov/legal-library/browse/cases-proceedings/211-0191-deere-company-ftc-v (last updated June 11, 2025).
69. Exec. Order No. 14,036, 86 Fed. Reg. at 36993; *see* 35 U.S.C. §§ 100–103; 7 U.S.C. § 2321.

the seed market, over 200 companies selling commodity seeds have gone out of business or been acquired.[70]

When commodity growers are looking to purchase seed, they are limited to a few companies. Commodity growers must sign their licensing agreements, which have little variety between the terms and conditions. Not only do the Big Four hold most IP protections on their seed traits, but farmers must also adhere to an overarching private agreement not to save seed or conduct seed research despite congressional carve-outs in the PVPA.

As case law and private contracts have chipped away at the historical practice of saving seed in farming, the seed market became more consolidated. However, IP protections and contract law require a deep analysis, along with case law, to understand the legality of seed companies' enforcement of licensing agreements and the effects of market consolidation on consumers.

II. Legal Analysis of Intellectual Property Law in the Seed Industry

U.S. intellectual property (IP) law contributed to and reinforced the commodification of seeds for the Big Four. Congress began incentivizing seed research on a commercial scale beginning in the 1930s. Seed research was incentivized on a commercial scale beginning in the 1930s.[71] Major Supreme Court decisions guaranteed farmers would have little say regarding the development of seeds and become no more than renters of major corporations.[72] This Section further explores the IP protections for the seed industry, which were primarily achieved through case law. In addition, this Section analyzes contract law and the legality of the licensing agreement between farmers and seed companies.

A. Intellectual Property Protections in the Seed Industry

Congress did not intend for the seed industry's current IP protections and contracting schemes.[73] U.S. patent law stems from an express power to

70. Philip H. Howard, Concentration and Power in the Food System: Who Controls What We Eat? 109 (David Goodman & Michael K. Goodman eds., rev. ed. 2021).

71. *See* Endres, *supra* note 2, at 329 ("In response to pressure from the nursery industry to curb competitors' reproduction of valuable plant varieties . . . Congress passed the first *sui generis* intellectual property scheme for plants, the Plant Patent Act of 1930.").

72. *Id.* at 331.

73. 126 Cong. Rec. H29941 (1980) (statement of Rep. De La Garza) ("The Plant Variety Protection Act does not restrict farmers or gardeners from growing certain varieties of crops. The act has no regulatory function. It merely gives breeders exclusive rights to try to market their new varieties for a period of time.").

Congress under the U.S. Constitution to promote the "[p]rogress of Science and useful Arts."[74] The United States Patent and Trademark Office (USPTO) regulates IP under the United States Patent Act and grants "utility" patents if the subject is considered novel, nonobvious, and useful.[75] Before *Diamond v. Chakrabarty*, the Commissioner of Patents did not consider plants subject to patent law since they were the "handiwork of nature" and not inventions.[76] With the evolution of genetic engineering in plants, plant breeders could alter the genes in seeds to create indistinguishable characteristics by sight.

The U.S. government has played a key role in seed development. Beginning in the 1860s, the Morrill Act established public land-grant universities for the aid of colleges of "agriculture and mechanic arts" which contributed substantially to seed development for much of the 20th century.[77] In 1862, Congress established the USDA.[78] Until the 1920s, the agency mail-delivered millions of free seeds to farmers to promote agricultural growth.[79] The public sector's investment in seeds deterred large-scale agribusiness from capitalizing on the development and research of new seed technology.

It wasn't until the 1930s that Congress began enacting legislation to incentivize private sector seed research while maintaining the right to seed saving—a cornerstone of agriculture.[80] However, courts continued that momentum by extending IP protections beyond the scope constructed by Congress.

1. Plant Patent Act and Plant Variety Protection Act

Private seed companies quickly began seeking IP protections for genetically altered seeds. Congress responded with the Plant Patent Act (PPA) of 1930.[81] This law only referred to plants that reproduced asexually, not plants—like corn or soybeans—that produced sexually.[82] After lobbying from the American Seed Trade Association, Congress enacted The Plant

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74. U.S. CONST. art. I, § 8, cl. 8 (granting Congress the broad power to legislate to "promote the Progress of Science useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries").

75. 35 U.S.C. §§ 101–103.

76. 447 U.S. 303, 310 (1980).

77. 7 U.S.C. § 301; Aoki, *supra* note 22, at 85.

78. Department of Agriculture Organic Act of 1862, ch. 72, 12 Stat. 387 (codified as amended at 7 U.S.C. §§ 2201–2209d). President Lincoln signed the legislation that created the USDA into law, calling it "The People's Department." *USDA Celebrates 150 Years*, U.S. DEP'T OF AGRIC., https://www.usda.gov/about-usda/general-information/usda-celebrates-150-years (last visited Nov. 28, 2025).

79. Aoki, *supra* note 22, at 86.

80. 35 U.S.C. §§ 161, 163.

81. 35 U.S.C. § 161.

82. Blair, *supra* note 48, at 310.

Variety Protection Act (PVPA) in 1970, incentivizing large companies to receive patent-like protections in the form of a "certificate."[83]

The PVPA's purpose was "to encourage the development of novel varieties of sexually reproduced plants and to make them available to the public, providing protection available to those who breed, develop, or discover them, and thereby promoting progress in agriculture in the public interest."[84] Receiving a PVPA certificate meant the holder has a legal right to exclude "others from reproducing, selling, importing, or exporting the protected variety for a period of twenty years."[85] Importantly, Congress allowed the continued use of seed saving and seed research for these new seed varieties in the PVPA, so as not to disrupt the bedrock of agricultural practices.[86] The PVPA's instructions regarding IP protections allowed farmers to continue seed saving practices. However, the Supreme Court essentially overturned these carve-outs in *Diamond v. Chakrabarty*.[87]

2. *Diamond v. Chakrabarty*

Securing utility patents on living organisms was possible after the Supreme Court's major decision in *Diamond v. Chakrabarty*. In *Chakrabarty*, the Court held that a bacterium that broke down crude oil, invented by a scientist working for General Electric, was patentable.[88] Because the bacterium had "markedly different characteristics from any found in nature and [has] the potential for significant utility," the USPTO had the authority to issue IP protections for the living organism.[89]

A utility patent offers much greater protection than a Plant Variety Protection Certificate (PVPC). It allows plant breeders to claim not only the whole plant as their property but also specific components of the plant DNA such as tissue culture, specific plant parts, or genes.[90] The patent owner can exclude others from making or using the subject during the patent term.[91] Unlike the PVPA, there is no farmer exception: "Farmers are no more exempt from the legal obligation to respect the property rights of developers of patented seed than are their corporate competitors."[92] This meant that farmers

83. *Id.*
84. Aoki, *supra* note 22, at 99.
85. *Id.* at 100.
86. 7 U.S.C. § 2543.
87. 447 U.S. 303, 322 (1980) (allowing for living organisms to be patented).
88. *Id.* at 305.
89. *Id.* at 310.
90. Blair, *supra* note 48, at 318.
91. 35 U.S.C. § 101.
92. KLOPPENBURG, *supra* note 17, at 265.

could no longer continue saving seed if a company placed a utility patent on one of the traits. Companies now claimed the qualities they engineered into seeds as their own property and restricted how farmers could use those seed. *J.E.M Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.* answered the question of whether utility patents could be extended to sexually reproducing plants.

3. *J.E.M Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.*

In 2001, the Supreme Court applied its understanding in *Chakrabarty* to seeds in *J.E.M Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc*. J.E.M. argued that the USPTO incorrectly granted Pioneer a utility patent for sexually reproducing plants because they lacked congressional approval.[93] Justice Thomas, writing for the majority, held that since the PVPA did not explicitly prohibit the USPTO from issuing utility patents for seeds, Pioneer was free to hold utility patents on the seed traits they developed.[94]

Joined by Justice Stevens, Justice Breyer dissented.[95] Justice Breyer argued the majority erred for three reasons: (1) the plain meaning of the PVPA, PPA, and the United States Patent Act explicitly includes language that specifically protects plants from utility patent coverage; (2) allowing utility patents for seeds creates a conflict with the provision allowing for seed saving and seed research granted to farmers in the PVPA; (3) Congress had enacted the PPA and PVPA to address challenges with protecting plants, which suggests that the United States Patent Act did not intend to apply in such cases.[96]

Justice Breyer and Justice Thomas employed textualist approaches to construe how seeds should apply under Section 101 of the United States Patent Act. Justice Thomas applied the holding in *Chakrabarty* and relied on an expansive definition of "manufacture" and "composition of matter" in Section 101.[97] He argued that genetically modified seeds fit squarely in the USPTO statutory control.[98] Meanwhile, Justice Breyer argued that the statute's plain meaning should be read narrowly to emphasize statutory coherence with existing statutory schemes (the PPA and the PVPA).[99]

93. 534 U.S. 124, 129 (2001).
94. *Id.* at 144–45; *see* BASEL MUSHARBASH, *supra* note 8 (explaining that Pioneer merged with Dupont to become Corteva Agrisciences in 2019, now controlling nearly 40% of the corn seed market and nearly 40% of the soybean market).
95. *Pioneer Hi-Bred*, 534 U.S. at 147 (Breyer, J. and Stevens, J., dissenting).
96. *Id.* (Breyer, J. and Stevens, J. dissenting).
97. *Id.* at 130.
98. *Id.* at 132.
99. *Id.* at 148 (Breyer, J. and Stevens, J. dissenting).

Chakrabarty and *J.E.M. Ag Supply, Inc.* have solidified the seed industry's legal right to apply utility patents to seed traits despite Congress's attempt to protect farmers from overreaching IP protections. "In enforcing their patent rights, seed companies will have to avoid unnecessarily antagonizing the farmer, who is, paradoxically, both the competitor and customer."[100] These IP protections have given seed companies an unfair upper hand in their seed agreements with farmers. The Amicus Brief submitted to the Court in *J.E.M. Ag. Supply, Inc.* from the National Corn Growers and National Farmers Union provided a lengthy argument against Pioneer.[101] It concluded by saying:

> Congress never envisioned turning the American farmer into a 'poster child' for patent infringement. Instead, it acted to strike a balance with the PVPA by allowing limited intellectual property rights to seed producers in exchange for exemptions that allow farmers and plant breeders to remain more than corporate 'serfs' renting the limited available germplasm from a handful of companies.[102]

IP laws now commonly govern seeds. However, patenting traits is imperfect as a means of total control over how seeds are used and sold. Utility patents become public domain after 20 years unless modifications are made.[103] In addition, the "patent exhaustion doctrine" provides that a patent is "exhausted" after the first legal sale of the patented product.[104] Under this doctrine, the first lawful purchaser of a good with a patent may also use or resell the invention without permission from, or compensation to, the patent holder.[105] For example, if a farmer resells a tractor with patents held by John Deere to a neighbor, the farmer has no obligation to pay or notify John Deere of the sale. By this logic, seeds cannot fit into the patent exhaustion doctrine

100. KLOPPENBURG, *supra* note 17, at 266.

101. Brief for American Corn Growers Association & National Farmers Union as Amici Curiae Supporting Petitioners, J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124 (2001) (No. 99-1996), 2001 WL 490944.

102. *Id.* at 30.

103. Paulina Jenney*, A Guide to Seed Intellectual Property Rights*, ORGANIC SEED ALL. (June 30, 2023), https://seedalliance.org/publications/a-guide-to-seed-intellectual-property-rights/.

104. Endres, *supra* note 2, at 332.

105. *Id.*; *see* United States v. Univis Lens Co., 316 U.S. 241, 250 (1942) ("The full extent of the monopoly is the patentee's 'exclusive right to make, use, and vend the invention or discovery.' The patentee may surrender his monopoly in whole by the sale of his patent or in part by the sale of an article embodying the invention. His monopoly remains so long as he retains the ownership of the patented article. But sale of it exhausts the monopoly in that article and the patentee may not thereafter, by virtue of his patent, control the use or disposition of the article.").

because they can replicate themselves year after year if replanted. However, the Supreme Court has determined that the patent exhaustion doctrine does not apply to replanting.[106] Seed companies now rely heavily on contracting in the form of Technology Use Agreements to create the "broadest protection" for seeds.[107]

B. Enforcing Licensing Agreements Between Seed Companies and Farmers

Because utility patents are not solely prohibiting farmers from saving seed for future plantings, seed companies have multiple methods for guaranteeing future purchasing. Two ways seed companies contract around IP law are the "bag tag" method and licensing agreements. First, the bag tag is an agreement printed directly on the purchaser's seed package.[108] By opening the bag, the farmer agrees to the terms and conditions.[109] Second, seed companies can secure repurchasing through licensing agreements. Licensing agreements can also stipulate how farmers use seeds.[110] These stipulations may go beyond a seed company's PVPCs or utility patents.[111]

Seed companies have not hesitated to sue farmers to enforce their licensing agreements. In the early years of Monsanto's launch of Round-Up Ready seed, the company warned that it is "vigorously pursuing growers who pirate any brand or variety of its genetically enhanced seed."[112] Monsanto demanded strict compliance with the Technology Use Agreement—which all farmers must sign before purchasing its seed.[113] Monsanto even had a hotline number on its website for neighbors to report farmers they suspected of saving seed.[114] In less than two years, the company had over

106. *See* Bowman v. Monsanto, 569 U.S. 278, 283–89 (2013) (holding that a farmer who buys patented seeds may not reproduce them through planting and harvesting without the patent holder's permission under the patent exhaustion doctrine); Monsanto Co. v. Scruggs, 459 F.3d 1328, 1336 (Fed. Cir. 2006) (holding that saved seed does not fall under the patent exhaustion doctrine because Monsanto was not selling a seed but only licensing the use to farmers).

107. Rita S. Heimes, *Post-Sale Restrictions on Patented Seeds: Which Law Governs?*, 10 WAKE FOREST INTELL. PROP. L.J. 98, 111 (2010).

108. MORE AND BETTER CHOICES REP., *supra* note 34, at 33.

109. *Id.*

110. *See generally* SPIEGEL ET AL., *supra* note 9.

111. *Id.* at 15.

112. KLOPPENBURG, *supra* note 17, at 321. In 2018, Bayer completed a $62.5 billion acquisition of Monsanto. Claire Kelloway, *Bayer-Monsanto Deal Closes as Farmers Warn of Higher Prices and Less Resiliency*, FOOD & POWER (June 7, 2018), https://www.foodandpower.net/latest/2018/06/07/bayer-monsanto-deal-closes-as-farmers-warn-of-higher-prices-and-less-resiliency.

113. ROBERT G. HARTZLER, ET AL., COMPARISON OF DIFFERENT GLYPHOSATE BRANDS IN ROUNDUP READY® SOYBEANS (2002) (explaining that Roundup Ready—used in over 60% of Iowa's soybean acreage—is a gene genetically modified in seeds that produces an enzyme not inhibited by glyphosate making it resistant in weed controlling herbicides).

114. KLOPPENBURG, *supra* note 17, at 322.

250 investigations in 20 states regarding breach of Technology Use Agreements.[115]

The licensing agreements have strictly enforced the seed-saving and seed-research provisions on all seed—not just seeds with IP protections. These agreements have taken advantage of the few options available to farmers for purchasing seed in various terms and agreements.

1. Licensing Agreement Terms and Conditions

Every major seed company requires growers to sign a licensing agreement before purchasing seed each year. These agreements include terms prohibiting all seed saving and seed research, regardless of their PVPC or utility patent status.[116] In addition, the licensing agreements of Corteva, Bayer, and Syngenta allow the company to change the terms of the agreements unilaterally.[117] Corteva's and Bayer's contracts characterize the grower's continued use of the seed as acceptance of any unilaterally changed terms in the licensing agreements.[118] The grower's continued use of the seed is explicitly mentioned as constituting acceptance of the changing terms in Corteva's and Bayer's contracts.[119] Growers also consent to the seed company entering their property, including their seed-storage containers, with varying notice requirements.[120]

Corteva and Bayer require arbitration and force the farmer to waive their right to join a class action lawsuit against them.[121] Syngenta, Corteva, and Bayer require the farmer to pay attorney's fees.[122] These three major seed

115. *Id.*

116. *Syngenta Stewarship Agreement, supra* note 49, at 2; *Bayer Technology Stewardship Agreement*, *supra* note 49; *Corteva Technology Use Agreement*, *supra* note 49.

117. *Id.*

118. *Id.*

119. *Id.*

120. Syngenta does not have any notice requirement. *Syngenta Stewardship Agreement, supra* note 49, at 2. Bayer has a seven-days' notice requirement. *Bayer Technology Stewardship Agreement*, *supra* note 49. Corteva has a three-days' notice requirement and grants access to videos and photos of farming activities. *Corteva Technology Use Agreement*, *supra* note 49, at 2.

121. *Corteva Technology Use Agreement*, *supra* note 49, at 2; *Bayer Technology Stewardship Agreement*, *supra* note 49.

122. *Syngenta Stewardship Agreement, supra* note 49, at 2 ("Grower agrees that Syngenta and any owners of the Patents shall be entitled to recover any costs or expenses, including reasonable attorney's fees, incurred in enforcing its or their rights under this Agreement"); *Corteva Technology Use Agreement*, *supra* note 49, at 2 ("Grower agrees that Corteva and any owners of the patents covered by the Agreement shall be entitled to recover any costs or expenses, including, but not limited to, court costs or reasonable attorneys' fees, it incurs in enforcing its rights under the Agreement if the Grower is determined to be at fault."); *Bayer Technology Stewardship Agreement*, *supra* note 49 ("If Grower is found by any court to have infringed one or more of the United States patents or PVPs covering Bayer Technologies, or otherwise to have breached this Agreement, Grower agrees to pay Bayer, the licensed

companies have choice-of-law provisions that require legal disputes to be settled in the state of the seed companies' choice.[123] Bayer is the only seed company with damages predetermined in its licensing agreements for violations.[124] Seed companies are using contracts to cover holes in their IP protections. The licensing agreements are contracts with unequal bargaining power given the limited choices commodity farmers have for genetically modified seeds.

2. Licensing Agreements Under Contract Law

While the Uniform Commercial Code (UCC) does not define a "contract of adhesion," these licensing agreements would be considered unconscionable contract clauses.[125] A court cannot enforce a contract made "by adverse construction of language, by manipulation of the rules of offer and acceptance or by determinations that the clause is contrary to public policy or to the dominant purpose of the contract."[126] Put simply, a contract that harms public policy is no good. Adhesion contracts frequently involve unequal bargaining power between a large corporation and an individual.[127]

In *Monsanto Co. v. McFarling*, the dissent argued on the point of contract law when it wrote, "[i]t cannot seriously be disputed that by signing the Technology Agreement McFarling became attached to a contract of adhesion."[128] The lopsided contract terms are only amplified when a farmer has few choices for seeds that carry the herbicide resistance so ubiquitous in conventional farming.[129] In the case of *McFarling*, the Missouri farmer had

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Bayer Technologies provider(s), and Dow AgroSciences, as appropriate, their attorneys' fees and costs related to the case plus any other expenses incurred in the investigation of the breach and/or infringement.").

123. *Bayer Technology Stewardship Agreement*, *supra* note 49, at 3 (generally Minnesota, but it depends on the type of seed purchased); *Corteva Technology Use Agreement*, *supra* note 49, at 4 (Iowa); *Syngenta Stewardship Agreement*, *supra* note 49, at 2 (Minnesota).

124. $250 per unit of soybean seed, $1,000 per unit of herbicide tolerant cotton seed, $2,000 per unit of insect protected/herbicide tolerant cotton seed, $50 per bushel of wheat seed. *Bayer Technology Stewardship Agreement*, *supra* note 49.

125. J.W. Looney & Anita K. Poole, *Adhesion Contracts, Bad Faith, and Economically Faulty Contracts*, 4 DRAKE J. AGRIC. L. 177, 191 (1999).

126. U.C.C. § 2-302 cmt. 1(AM. L. INST. & UNIF. L. COMM'N 1989).

127. 2001 Okla. Op. Att'y Gen. 17, ¶ 2–3 (2001); *see, e.g.,* Mullis v. Speight Seed Farms, Inc., 505 S.E.2d 818, 821 (Ga. Ct. App. 1998) (finding that a farmer did not have equal bargaining power against a seed company in the agreement on the seed label).

128. Monsanto Co. v. McFarling, 302 F.3d 1292, 1300 (Fed. Cir. 2002) (Clevenger, J., dissenting).

129. *Adoption of Genetically Engineered Crops in the United States - Recent Trends in GE Adoption*, U.S. DEP'T AGRIC.: ECON. RSCH. SERV., https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-united-states/recent-trends-in-ge-adoption/ (last updated Jan. 1,

to submit to a jurisdiction of Monsanto's choosing, agree to Monsanto's damages, bear the costs of Monsanto's legal fees, and refrain from replanting any seed even if there were no IP protections.[130] Although a patent holder has every right to institute a licensing agreement with terms most favorable to them, the terms in this case were one-sided instead of bargained for.

3. Contracts of Adhesion in Agriculture

To determine if a contract of adhesion is enforceable, one may need to consider unconscionability. Section 2-302 of the UCC set out this understanding:

> If the court as a matter of law finds the contract or any clause of the contract to have been unconscionable at the time it was made the court may refuse to enforce the contract, or it may enforce the remainder of the contract without the unconscionable clause, or it may so limit the application of any unconscionable clause as to avoid any unconscionable result.[131]

In two cases at the South Dakota Supreme Court, seed contracts were found unconscionable under UCC Section 2-302 because the farmer was unable to bargain for more favorable terms and conduct seed research to test the seed.[132] In *Hanson v. Funk Seeds International*, the Court found the bag tags contained a warranty disclaimer and limitations of remedy language to be unconscionable.[133] The Court declared: "One-sided agreements whereby one party is left without a remedy for another party's breach are oppressive and should be declared unconscionable."[134] Similarly, in *Schmaltz v. Nissen*, the Court again found the terms of disclaimers on warranties and limitation of damages on the seed bag unconscionable.[135] Three of the Big Four disclaim warranties in their licensing agreements.[136] This means these seed

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2025) (as of 2024, over 90% of U.S. corn, soybeans, and cotton are produced using seeds with genetic engineering).

130. *McFarling*, 302 F.3d at 1299–300.

131. U.C.C. § 2-302(1) (AM. L. INST. & UNIF. L. COMM'N 1989).

132. Looney & Poole, *supra* note 125.

133. Hanson v. Funk Seeds Int'l, 373 N.W.2d 30, 35 (S.D. 1985).

134. *Id.* (citing Rozeboom v. Northwestern Bell Tel. Co., 358 N.W.2d 241 (S.D. 1984)).

135. Schmaltz v. Nissen, 431 N.W.2d 657, 657 (S.D. 1988).

136. *Syngenta Stewardship Agreement*, *supra* note 49, at 2; *Bayer Technology Stewardship Agreement*, *supra* note 49; *Corteva Technology Use Agreement*, *supra* note 49, at 2.

companies are protected from legal action if the seed does not perform as the farmer expects.

This Section analyzed the enforcement and controlling law of the licensing agreements. Given the little market choice, farmers could challenge these contracts as contracts of adhesion. However, there are also federal challenges to the seed market under antitrust and consumer protection law.

III. LEGAL ANALYSIS UNDER ANTITRUST AND CONSUMER PROTECTION LAWS

In 1973, U.S. Secretary of Agriculture Earl Butz told family farmers to "get big or get out."[137] Decades later, federal antitrust enforcers are attempting to reign in the effects of a market dominated by big players. In 2024, the Federal Trade Commission (FTC) and the Department of Justice (DOJ) have brought antitrust cases against large agribusinesses such as John Deere, Syngenta, Corteva, and AgriStats.[138] The concentration of the seed industry, the skyrocketing prices, and the restrictive licensing agreements raised many red flags. This Section will analyze how the market became so concentrated and address the different federal antitrust statutes applicable to the seed industry.

A. Consolidation in the Seed Industry

Following the legal shift allowing seed companies to place utility patents on seeds, genetically modified seeds flooded the market. Within ten years, roughly 52% of corn, 79% of cotton, and 87% of soybean acreage in the United States were planted with genetically engineered seeds now eligible for heightened intellectual property (IP) protections.[139] After companies leveraged their patent power to monopolize the seed market, a series of

137. Peter Welte, *Considering the Lessons of Earl Butz*, AGWEEK (Apr. 1, 2018), https://www.agweek.com/opinion/considering-the-lessons-of-earl-butz.

138. *Justice Department Sues Agri Stats for Operating Extensive Information Exchanges Among Meat Processors*, DEP'T OF JUST. (Sept. 28, 2023), https://www.justice.gov/opa/pr/justice-department-sues-agri-stats-operating-extensive-information-exchanges-among-meat; *FTC, States Sue Deere & Company to Protect Farmers From Unfair Corporate Tactics, High Repair Costs*, FED. TRADE COMM'N (Jan. 15, 2025), https://www.ftc.gov/news-events/news/press-releases/2025/01/ftc-states-sue-deere-company-protect-farmers-unfair-corporate-tactics-high-repair-costs; *FTC and State Partners Sue Pesticide Giants Syngenta and Corteva for Using Illegal Pay-to-Block Scheme to Inflate Prices for Farmers* FED. TRADE COMM'N, (Sept. 29, 2022), https://www.ftc.gov/news-events/news/press-releases/2022/09/ftc-state-partners-sue-pesticide-giants-syngenta-corteva-using-illegal-pay-block-scheme-inflate.

139. Rebecca Bratspies, *Owning All the Seeds: Consolidation and Control in Agbiotech*, 47 ENV'T L. 583, 589 (2017).

mergers started.[140] Mergers between what was formerly the "Big Six" became the "Big Four" in the span of roughly one year.[141] Dow and DuPont merged into a new $130 billion company called Corteva in December 2015.[142] Two months later, ChemChina purchased Syngenta for $4.3 billion.[143] Finally, that fall, Monsanto accepted a $66 billion merger with Bayer.[144] BASF is the only company that has not engaged in a mega-merger. However, BASF is the most likely absorber of any subsidiaries the other companies must divest to obtain merger approval from antitrust enforcers.[145]

Farmers' choices for licensing agreements are largely limited to Corteva, Bayer, and Syngenta. By expanding their IP protections, commodity farmers have little choice in choosing seed for each year's planting. The industry has only grown more consolidated since *J.E.M. Supply Inc.*, *McFarling*, and *Scruggs*.[146] The market has been under tight scrutiny from the DOJ and FTC for antitrust violations of the Sherman Act and the Clayton Act.[147] To address the harmful effects of consolidation, a few avenues of antitrust law may apply, such as Section 5(a) of the FTC Act and Section 2 of the Sherman Act.[148]

B. Consumer Protection Violations for Unfair or Deceptive Acts

The FTC has the federal authority to protect farmers from heavily concentrated market players wielding broad authority in their licensing agreements. Seed companies can enforce unconscionable terms while gathering more seed IP rights. The FTC may "prosecute any inquiry

140. *Id.*

141. *Id.* at 584, 608; Amos Stromberg & Philip H. Howard, *Recent Changes in the Global Seed Industry and Digital Agriculture Industries,* PHILIP HOWARD (Jan. 2023), https://philhoward.net/2023/01/04/seed-digital/.

142. Bratspies, *supra* note 139, at 584.

143. *Id.*

144. *Id.*

145. *Id.* at 585.

146. *See generally* Fuglie, *supra* note 47 (describing that concentration can be traced to the expansion of intellectual property rights to private companies for seed improvements in the 1970s and 1980s).

147. In 2001, the DOJ investigated violations of Section 7 of the Clayton Act regarding Monsanto's acquisitions of DeKalb. In 1998, the DOJ Antitrust Division investigated Monsanto's proposed acquisition of DeKalb Genetics Corporation under violation of Section 7 of the Clayton Act. Douglas Ross, Special Couns. for Agric., U.S. Dep't of Just.: Antitrust Div., Antitrust Enforcement and Agriculture, Address Before the Organization for Competitive Markets, at 7–8 (July 20, 2001). In 2018, the DOJ filed a complaint against Bayer for their acquisition of Monsanto under Section 7 of the Clayton Act. United States v. Bayer AG & Monsanto Co.; Proposed Final Judgment and Competitive Impact Statement, 83 Fed. Reg. 27652, 27652 (June 13, 2018).

148. 15 U.S.C. § 45(a); 15 U.S.C. § 2.

necessary to its duties in any part of the United States."[149] Congress authorized the agency "to gather and compile information concerning, and to investigate from time to time the organization, business, conduct, practices, and management of any person, partnership, or corporation engaged in or whose business affects commerce."[150]

Section 5(a) of the FTC Act provides that "unfair or deceptive acts or practices in or affecting commerce . . . are . . . declared unlawful."[151] An act or practice is "unfair" if it "causes or is likely to cause substantial injury to consumers which is not reasonably avoidable by consumers themselves and not outweighed by countervailing benefits to consumers or to competition."[152]

The licensing agreements that seed companies require farmers to sign to purchase seed generally forbid saving seed or conducting research on the seed. The agreement covers any seed—with or without a patent.[153] In addition, even if a farmer wishes to create a generic seed to avoid re-signing and repurchasing seed every year, it is nearly impossible to find IP protections on individual seed traits.[154] Given farmers' few choices for commodity seed, the seed industry unfairly wields its market power by creating ambiguity around IP protections on the seed's traits.

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149. 15 U.S.C. § 43.

150. *Id.* § 46(a)(1).

151. *Id.* § 45(a)(1).

152. *Id.* § 45(n).

153. MORE AND BETTER CHOICES REP., *supra* note 34, at 36. One plant breeder interviewed by the USDA for the More and Better Choices stated:

[C]ompanies might sometimes exploit the lack of transparency to extend the scope of their patent beyond what the application claimed. For example, some plant breeders we interviewed noted that companies have acquired patents on traits such as disease resistances, then retroactively claimed to have IP rights on varieties that contain those traits, even though the varieties have been on the market for many decades. A plant breeder and founder of an independent seed company commented that he has encountered bag tags on an heirloom variety that was not protected by any form of IP at all. He wrote that this practice, "in the absence of a publicly available list of patented varieties, creates the impression that 'everything is patented' . . . This leads to people restricting their own fair use of public domain varieties, a kind of self-censorship, for fear of legal consequences."

Id.

154. In one public comment to the USDA a plant breeder wrote:

There is often also no indication of the presence of a patent on the seed packaging or in the description of the variety in a seed catalog. There is often not even any information about the existence of a patent on the website of the breeder of the variety . . . Sometimes the patent applications refer to the variety only by internal firm numbers or codes, and there is no mention anywhere of the name that the variety is actually to be sold to the public under. In these cases, even if a prospective plant breeder spends weeks looking up and reading patents on the crop of interest, there is no way they can tell whether the varieties they are hoping to use to breed from are patented or not.

Id.

C. Antitrust Violations in the Seed Market

This Section will analyze possible antitrust violations in the seed market. A lack of transparency, higher prices for consumers, and loyalty programs that penalize independent seed retailers from offering generic brands to farmers, demonstrate possible indicators of market abuse. Section 2 of the Sherman Act makes it unlawful for any person to "monopolize, or attempt to monopolize" commerce.[155] The statute fails to define "monopolize." Instead, the Sherman Act expects "courts to give shape to the statute's broad mandate by drawing on the common-law tradition."[156] The Supreme Court defined monopolization as both "(1) the possession of monopoly power in the relevant market and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident."[157] Section 2 of the Sherman Act is not meant to penalize monopolization of a market. Instead, the Act is meant to protect competition, which would be ineffective if large firms were required to "lie down and play dead" once it achieved market success.[158]

In one of the first monopolization cases before the Supreme Court, *Standard Oil Co. of N.J. v. United States*, the Court observed that the Act does not prohibit monopolies in the concrete.[159] In the Second Circuit, Judge Hand re-emphasized *Standard Oil*'s point in *United States v. Aluminum Co.*: that mere "size does not determine guilt."[160] What determines guilt under Section 2 is: unfairly achieved monopoly power that creates higher consumer prices, poorer quality goods and services, and reduced output.[161] Additionally, a monopoly's existence can slow innovation.[162]

1. Rising Prices and Lack of Transparency

While the Big Four's monopolization of the seed industry is not a per se violation of the Sherman Act under Section 2; its harm to competition and consumers is. Higher prices for seed, specifically for genetically modified seed, and the lack of diversity in the seed-breeding industry harms the industry. Amidst the concentration in the industry, commodity seed prices

155. 15 U.S.C. § 2.
156. Nat'l Soc'y of Pro. Eng'rs v. United States, 435 U.S. 679, 688 (1978).
157. United States v. Grinnell Corp., 384 U.S. 563, 570–71 (1966).
158. Goldwasser v. Ameritech Corp., 222 F.3d 390, 397 (7th Cir. 2000).
159. Standard Oil Co. of N.J. v. United States, 221 U.S. 1, 62 (1911).
160. United States v. Aluminum Co. of Am., 148 F.2d 416, 429 (2d Cir. 1945).
161. RICHARD A. POSNER, ANTITRUST LAW 9–32 (2d ed. 2001).
162. *Id.* at 20.

have risen faster than the price of selling commodities.[163] Between 1990 and 2020, the average price farmers paid for seed rose by 270%, compared with commodity price inflation of 56%.[164] For crops planted predominately with genetically modified seed, such as corn, soybeans, and cotton, prices rose by an average of 463%.[165] Companies have justified higher seed prices by investing in research and development into higher-yielding seeds. They claim that the burden of higher prices for farmers results in a long-term benefit for seed innovation.[166]

However, the licensing agreements that dictate price of seed lack transparency.[167] The American Antitrust Institute, in a public comment, wrote these "technology fees, which in the past were a line item on the bill, are now rolled into the total cost of the seed."[168] A more significant cost is passed onto the consumer without clear reasoning.

2. Loyalty Programs and the Loss of Choices

The seed market has lost independent seed retailers, leaving farmers with fewer buying choices.[169] Rebate systems used by large companies and the variability of seed traits make it difficult for farmers to compare seed costs over time.[170] In addition, the Big Four's loyalty programs and incentives attempt to "box out competition and protect brand loyalty."[171] Bayer has used bundling programs to punish independent seed retailers from selling competitive products.[172] For example, a 2018 Bayer bundling program took away corn rebates to independent seed retailers if that company "isn't loyal."[173] The Big Four's market power means independent retailers are not able to sell generic products to farmers without being penalized.[174] As of September 2022, the FTC and ten partner states filed a complaint against Corteva and Syngenta alleging that their so-called "loyalty" programs violate

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163. MACDONALD ET AL., *supra* note 65, at 15.
164. *Id.*
165. *Id.*
166. *Id.*
167. MORE AND BETTER CHOICES REP., *supra* note 34, at 47.
168. Am. Antitrust Inst., Comment Letter on Competition and the Intellectual Property System: Seeds and Other Agricultural Inputs (Mar. 17, 2022), at 13.
169. MORE AND BETTER CHOICES REP., *supra* note 34, at 49.
170. Comment Letter on Competition and the Intellectual Property System: Seeds and Other Agricultural Inputs, at 13.
171. MORE AND BETTER CHOICES REP., *supra* note 34, at 50.
172. Comment Letter on Competition and the Intellectual Property System: Seeds and Other Agricultural Inputs, at 13.
173. Indep. Pro. Seed Ass'n, Comment Letter on Competition and the Intellectual Property System: Seeds and Other Agricultural Inputs (June 15, 2022), at 18.
174. *Id.*

Section 5(a) of the FTC Act, Section 3 of the Clayton Act, and Sections 1 and 2 of the Sherman Act.[175] The complaint asserts these programs block and restrict generic competition from pesticide markets, leaving farmers to pay elevated prices for crop protection.[176] These same companies could be subject to further antitrust action in the seed market for implementing similar practices in their crop protection market.

The seed industry has unfairly monopolized a market by charging farmers higher prices, offering fewer options from where they can buy seed, and enforcing one-sided licensing agreements. The major seed companies rationalize these injustices by asserting legal ownership over traits in seeds—arguably ones that originate in nature. This private ownership of seeds replaced publicly financed institutions, like the USDA or land-grant universities, which provided their seed inventions freely to farmers.[177] Seed prices have risen, and the fees for licensing the technology have been rolled onto the consumer. Meanwhile, independent seed retailers are struggling to offer generic seed options without the Big Four's retaliation in the form of loyalty programs.

IV. STRENGTHENING POLICIES FOR A MORE TRANSPARENT AND DIVERSE SEED MARKET

There are many layers of intellectual property (IP) protections, varieties, and brand names of seeds. This has made it extremely difficult for farmers and plant breeders to decipher which seed they purchase, and the IP protections attached to it. This is especially true since the Federal Seed Act is loosely enforced by the USDA and has not been updated by Congress to include IP disclosures.[178] This Section explores stronger enforcement and amendments to the Federal Seed Act (FSA) to clarify the legal rights of those hoping to do plant research and seed saving. In addition, this Section addresses how a more transparent and fair seed market will create a stronger, more resilient food system.

A. Intellectual Property Transparency Through the Federal Seed Act

IP protections, such as utility patents and Plant Variety Protection Certificates (PVPCs), expire.[179] After expiration, the innovation becomes

175. Complaint at 2, Fed. Trade Comm'n v. Syngenta Crop Prot. AG, 711 F. Supp. 3d 545 (M.D.N.C. 2024) (No. 1:22-cv-00828).
176. Complaint at 2, *Syngenta Crop Prot. AG*, 711 F. Supp. 3d (No. 1:22-cv-00828).
177. Aoki, *supra* note 22, at 86–89.
178. MORE AND BETTER CHOICES REP., *supra* note 34, at 39–40.
179. *Id.* at 34.

public and can be further developed and modified.[180] Technically, farmers and plant breeders can legally use varieties and traits that are no longer protected by IP rights and those that never had IP protections in the first place. However, it is difficult to assess the outdated seed if the seed company takes the variety off the market, if there are licensing agreements barring any seed research, or if accessing the information about the specific IP mechanisms applied to each type of seed is complicated to find.[181]

The use of multiple IP mechanisms becomes even more confusing to farmers, plant breeders, and retail buyers when seed companies sell seed in bulk and retailers repackage it.[182] The variety names and numbers used in commercial sales may be different from those used in applications for utility patent protection. This obscures the link between the patent and the marketed product.[183]

Labeling and seed packaging from different companies marketing the same variety further complicates the search for IP rights that apply to a particular variety.[184] Seed companies that intentionally keep their IP protections veiled may be subject to Section 5 of the Federal Trade Commission (FTC) Act for unfair or deceptive practices.[185]

The FSA controls interstate and foreign commerce of seeds.[186] The FSA has specific requirements for seed labeling to prevent the misrepresentation of seeds.[187] Amended in 1958, the FSA's primary labeling requirements include information on the seed, such as kind and variety identification.[188] Under the FSA, label requirements ensure that farmers can access all legally required information. To ensure farmers have crucial information, such as which brand and variety they are purchasing and the IP information for that seed, the FSA must be strongly enforced by the USDA and updated by Congress to include patent and other IP disclosures.

B. Biodiversity in the Seed Industry

Addressing IP issues and anticompetitive behavior in the seed industry directly establishes a resilient seed system. Resiliency is "generally

180. Jenney, *supra* note 4, at 40.
181. MORE AND BETTER CHOICES REP., *supra* note 34, at 36–37.
182. *Id.* at 37.
183. *Id.*
184. MACDONALD ET AL., *supra* note 65, at 37.
185. 15 U.S.C. § 45(a)(1).
186. 7 U.S.C. §§ 1551–1611.
187. *Id.*
188. *Id.*

understood as the ability to recover from or adapt to change."[189] Our food system must adapt to different environmental conditions, weather events, and diseases.[190] Fair competition will empower companies of varying sizes to emerge and create resiliency in the seed market. Agriculture globally has lost around 75% of crop genetic diversity in the last century.[191] In the United States, two seed companies, Bayer and Corteva, accounted for 72% of planted corn acres and 66% of planted soybean acres from 2018 to 2020.[192] This steep decline in agricultural biodiversity goes hand in hand with the consolidation of the seed industry. More players in the seed industry are crucial to keep our food system resilient.[193]

A policy fix to the FSA could provide more transparency to seed breeders and farmers. By updating the seed labels with the patent number, other market players could genetically modify seed traits without the fear of patent infringement or roadblocks of untangling brands, varieties, and patent assignees. Finally, there is a strong policy argument that concentration in the seed industry is not only resulting in illegal practices, but also harming national security. Genetic biodiversity of crops is crucial to combat a changing climate and evolving plant threats.

CONCLUSION

The evolution of intellectual property (IP) protections in the seed industry and rapid consolidation have contributed to a system that has given farmers and consumers alike higher prices, fewer choices, and less agricultural biodiversity. With the expansion of IP protections for major companies and the enforcement of restrictive licensing agreements, seed companies have circumvented farmer protections originally envisioned in the Plant Varieties Protection Act and used market dominance to dictate terms that harm consumers.

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189. Julie Dawson, Address at Proceedings of the 8th Organic Seed Growers Conference, Building Resilient Seed Systems: Implications for Germplasm Conservation, Plant Breeding, and the Organic Seed Community, at 136 (2016).

190. *Id.*

191. CYDNEE V. BENCE & EMILY J. SPIEGEL, A BREED APART: THE PLANT BREEDER'S GUIDE TO PREVENTING PATENTS THROUGH DEFENSIVE PUBLICATION 6 (2019).

192. MACDONALD ET AL., *supra* note 65, at 11.

193. A larger global food sovereignty movement has erupted, advocating for people's rights to save and share seed, particularly those in global seed banks and shielded by patents. In the United States, there has also been a growing number of seed libraries as part of this movement. Integrated into public libraries, these local seed banks boast varieties that have been micro-climatized to their respective regions. *See* Bridget Shirvell, *Public Libraries Are Making It Easy to Check Out Seeds—and Plant a Garden*, CIVIL EATS (Apr. 25, 2022), https://civileats.com/2022/04/25/public-libraries-are-making-it-easy-to-check-out-seeds-and-plant-a-garden/.

The interplay between IP law and antitrust law has left farmers with little bargaining power and few market choices. To address these issues, agencies must enhance enforcement of Section 5 of the Federal Trade Commission Act and Section 2 of the Sherman Act to correct monopolistic practices and promote competition within the seed industry. In addition, greater enforcement and strengthening of the Federal Seed Act would provide the transparency needed for more diversity in the seed-breeding industry.

Senator John Sherman stood before his colleagues in Congress in 1890, determined to free the American economy from the grip of anticompetitive practices and entities.[194] Monopolization is inconsistent with our form of government. If we should not "submit to an emperor, we should not submit to an autocrat of trade."[195] Today, a cornerstone industry in our country—agriculture—is struggling to live up to Senator Sherman's interpretations. For a strong and resilient agricultural system, anticompetitive practices need to be corrected to protect farmers and consumers from exploitation.

*-Julia Wickham**

194. 21 CONG. REC. S2457 (1890) (statement of Sen. John Sherman).
195. *Id.*

* Vermont Journal of Environmental Law Note Competition Winner 2025. J.D. Candidate 2026, Vermont Law & Graduate School. B.A. in History and Political Science, University of St. Thomas 2020. I want to dedicate this Note to the farmers who are my neighbors, family, and friends. Here's to you, and the belief that farming is a profession of hope. I would also like to thank organizations like the Center for Agriculture and Food Systems at Vermont Law School and the Minnesota Farmers Union who have inspired me to dig into these issues.