

An Antitrust Review of a Bayer-Monsanto Merger

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Executive Summary

In this report, we review a potential merger between Bayer and Monsanto under the principal U.S. antitrust statute for mergers, section 7 of the Clayton Act. We find from the publicly-available data that a Bayer-Monsanto merger is presumptively anticompetitive.

The merger would:

- Increase concentration in already concentrated industries for genetic traits, seed, and herbicides. For example, Bayer-Monsanto post-merger would account for approximately 70 percent of the U.S. acreage for cotton, with similar or higher shares in different regions of the U.S.
- Increase Monsanto's already significant market power and increase its dominance in herbicides and genetic traits for seed.
- Eliminate not only the direct competition between Bayer and Monsanto for traits, herbicide, and crop seed, but also the head-to-head competition in agricultural biotechnology innovation markets and reduce opportunities for pro-competitive research and development (R&D) collaborations.
- Likely lead to higher input prices, less choice and higher food prices for consumers, including fewer non-biotechnology options available to farmers and consumers.

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Accordingly, because a Bayer-Monsanto merger would significantly increase concentration in already highly concentrated markets, the merger is presumed to be anticompetitive and should be enjoined. In addition, a Bayer-Monsanto merger would violate a court order that prevents Monsanto from reacquiring the assets it was ordered to divest in order to redress antitrust concerns.

Introduction

No person . . . shall acquire, directly or indirectly, . . . where in any line of commerce or in any activity affecting commerce in any section of the country, the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly.¹

This proscription “is a legislative declaration that an acquisition having such an effect is against the public interest.”² For proposed mergers that violate the Clayton Act, the government or private plaintiff can request, among other things, that the federal court permanently enjoin the companies from carrying out their proposed merger, or from entering into or carrying out any agreement, understanding, or plan, the effect of which would be to combine their businesses or assets.

One of the markets where concentration would be greatly increased by a merger between Bayer and Monsanto is genetically engineered, or transgenic, seeds. Since their commercial introduction in 1995, transgenic seeds have grown to occupy over 90 percent of all corn, cotton, and soybeans planted in the U.S.³ These three cash crops occupy about half of the U.S. farmland dedicated to growing crops. The “Big Six” firms—Monsanto, Bayer, BASF, Syngenta, Dow, and DuPont—held by 2009 more than 95 percent of trait acres for corn, soybeans and cotton in the U.S., with seed containing Monsanto traits accounting for 90 percent of these acres.⁴

Herbicide tolerance is one of the more popular traits engineered into transgenic seeds. As a result, the area sprayed with glyphosate-based herbicides expanded from less than 10 percent of cotton, corn and soybean acres before 1996 to 90 percent or more in 2016. Bayer currently has the leading alternative to Monsanto’s dominant Roundup Ready herbicides and herbicide-tolerant traits. Not only will a merger end the head-to-head competition between Bayer and Monsanto, it significantly reduces the incentives to further develop herbicides and herbicide-tolerant traits.

By 2009, three of the Big Six firms—Monsanto, DuPont/Pioneer, and Syngenta—were the top three seed companies globally, and they also ranked fifth, sixth, and first, respectively, in global sales of crop protection chemicals.⁵ Bayer, by 2009, ranked sixth in global seed sales.⁶ Monsanto, noted its rival DuPont, “owns or controls a major portion of corn, cotton, soybean, canola, and vegetable seed at virtually all levels of the supply chain.”⁷

¹15 U.S.C. § 18.

²U.S. DEP’T OF JUSTICE, ANTITRUST DIVISION, ANTITRUST DIVISION MANUAL IV-17 (5th Edition April 2015).

³U.S. Dep’t of Agriculture, Econ. Res. Serv., Genetically Engineered Seeds Planted on Over 90 Percent of U.S. Corn, Cotton, and Soybean Acres in 2015 (July 20, 2015), <http://www.ers.usda.gov/data-products/chart-gallery/detail.aspx?chartId=53382>.

⁴Letter dated May 31, 2016 from AAI et al. to Renata Hesse, Principal Deputy Assistant Attorney General, U.S. Dep’t of Justice Antitrust Division [hereinafter AAI Letter].

⁵Keith O. Fuglie, Paul W. Heisey, John L. King, Carl E. Pray, Kelly Day-Rubenstein, David Schimmelpennig, Sun Ling Wang, and Rupa Karmarkar-Deshmukh, *Research Investments and Market Structure in the Food Processing, Agricultural Input, and Biofuel Industries Worldwide*, ERR-130, U.S. Dep’t of Agriculture, Econ. Res. Serv. (December 2011), at 30; Bill Wheelhouse, *Seed Companies Fight to Maintain Independence*, HARVEST PUBLIC MEDIA, Apr. 11, 2013, <http://harvestpublicmedia.org/article/seed-companies-fight-maintain-independence>.

⁶Fuglie et al., *supra* note 5, at 30.

⁷Comments of DuPont/Pioneer Hi-Bred International Regarding Agriculture and Antitrust Enforcement Issues in Our 21st Century Economy (2010), at 21.

⁸Chicago Bridge & Iron Co. N.V. v FTC, 534 F.3d 410, 432 n.12 (5th Cir. 2008).

⁹U.S. Dep't of Justice and Federal Trade Comm'n, *Horizontal Merger Guidelines* (Aug. 19, 2010).

¹⁰European Comm'n, *Guidelines on the Assessment of Horizontal Mergers Under the Council Regulation on the Control of Concentrations Between Undertakings*, 2004/C 31/03.

¹¹Matthew Wilde, *Independent Seed Companies A Dying Breed*, THE COURIER, May 31, 2009, http://wfcourier.com/business/local/independent-seed-companies-a-dying-breed/article_7cef1ffc-b0bb-56a8-8d83-faf894bf76ad.html; DuPont/Pioneer Comments, *supra* note 7, at 21.

¹²United States v. Phila. Nat'l Bank, 374 U.S. 321, 362 (1963) (quoting Brown Shoe Co. v. United States, 370 U.S. 294, 317, 322 (1962)).

¹³ *Phila. Nat'l Bank*, 374 U.S. at 363.

¹⁴ *Id.*; see also *Polypore Int'l, Inc. v. FTC*, 686 F.3d 1208, 1213-14 (11th Cir. 2012).

Where, as here, the market trends show that the merging parties “have been the dominant players in the relevant markets and do not indicate any trend of reduced concentration,” the merger should be enjoined.⁸ That is particularly apt here. As the Appendix discusses, the merger would significantly increase concentration in an already highly concentrated industry. With this and the proposed Dow/DuPont merger, the Big Six would dwindle to four firms.

Bayer’s potential acquisition of Monsanto could affect competition in many jurisdictions, including the European Union. Although we focus on the federal merger law and the U.S. Department of Justice (DOJ) and Federal Trade Commission’s 2010 Merger Guidelines,⁹ the European Commission’s Merger Guidelines follow a similar framework.¹⁰ In both the E.U. and U.S., the enforcers seek to prevent mergers that would likely deprive customers of the benefits of competition by significantly increasing the market power of firms. Although a detailed inquiry of market conditions in the E.U. is necessary, the merger, if it raises similar antitrust issues, would likely run afoul of E.U. merger regulations.

The important role of antitrust enforcement in the agricultural industry is well established. The harm to farmers and consumers from anticompetitive mergers was highlighted in 2010 joint hearings conducted by the U.S. Department of Agriculture (USDA) and DOJ. The seed industry has significantly consolidated since 1996, when there were 600 independent seed companies, to reportedly about 100 remaining by 2009.¹¹ Monsanto alone has acquired almost 40 companies, including agricultural biotechnology firms and independent seed companies. The USDA has reported that the crop seed industry has suffered the greatest increase in concentration over time of any of the agricultural inputs studied. Not surprisingly, between 1994-2010 crop seed prices more than doubled relative to the prices farmers received for commodity crops. Accordingly, the antitrust enforcers must not allow this merger to proceed.

I. How a Bayer-Monsanto Merger May Substantially Lessen Competition or Tend to Create a Monopoly

Congress enacted section 7 of the Clayton Act to “arrest anticompetitive tendencies in their ‘incipiency.’”¹² The government does not have to prove that the merger will lessen competition. The “intense congressional concern” with economic concentration counseled against requiring “elaborate proof of market structure, market behavior, or probable anticompetitive effects.”¹³ As the Supreme Court stated,

*a merger which produces a firm controlling an undue percentage share of the relevant market, and results in a significant increase in the concentration of firms in that market is so inherently likely to lessen competition substantially that it must be enjoined in the absence of evidence clearly showing that the merger is not likely to have such anticompetitive effects.*¹⁴

¹⁵United States v. Aluminum Co. of Am., 377 U.S. 271, 280 (1964) (internal citations omitted).

¹⁶Diana L. Moss, *Transgenic Seed Platforms: Competition Between a Rock and a Hard Place?*—Addendum, American Antitrust Institute, at 5 (April 5, 2010), http://www.antitrustinstitute.org/sites/default/files/Addendum%20to%20AAI%20White%20Paper_Transgenic%20Seed.4.5_040520101107.pdf.

¹⁷*Id.*

¹⁸Letter dated December 31, 2009 from Food & Water Watch to Attorney General Eric Holder and USDA Secretary Tom Vilsack re: Agriculture and Antitrust Enforcement Issues in Our 21st Century Economy at 16 [hereinafter Food & Water Watch Letter].

¹⁹*Id.*

²⁰*Id.*

²¹*Id.*

²²*Id.*

Thus, because a Bayer-Monsanto merger would significantly increase concentration in already highly concentrated markets, the merger is presumed to be anticompetitive. An immediate danger of monopolization is not needed for a merger to be unlawful. The antitrust law, by its own language and Congress’s intent, requires heightened scrutiny of mergers like this one in already concentrated industries with entry barriers.

a. The Merger Would Increase Monsanto’s Already Significant Market Power

One concern is if the merger may help an already dominant firm maintain its dominance or attain even more market power. One aim of the Clayton Act “was to prevent accretions of power which ‘are individually so minute as to make it difficult to use the Sherman Act test against them.’”¹⁵ Thus companies like Monsanto, which already dominate the trait and herbicide industries and many seed markets, cannot acquire smaller competitors. Nor can it be acquired by significant rivals, like Bayer.

Monsanto, as the Appendix explores, is already the dominant developer and licensor of genetically modified biotech seed traits used in corn, cotton, and soybeans crops in the U.S. Monsanto, the American Antitrust Institute found, possessed a 97 percent share for soybean traits, a 75 percent share for corn traits, and a 95 percent share for cotton traits.¹⁶ As the American Antitrust Institute noted, these market shares—by any antitrust metric—would be considered monopolistic.¹⁷

Monsanto, as the dominant owner and developer of patented seed traits, can already exert considerable market power through its cross-licensing agreements.¹⁸ As the consumer rights group Food & Water Watch discussed, many independent seed companies do not hold these desired patented traits. They must enter into licensing agreements with the patent owner to include the patented technology in their seeds.¹⁹ Consequently, given Monsanto’s dominant position with genetic traits, most producers of traited corn, soybean and cotton seeds in the United States must license traits from Monsanto.²⁰ Monsanto is not obligated to cross-license its traits, and can do so at the prices and terms it dictates.²¹ Monsanto can affect how the licensee uses its traits, including whether its traits can be combined, or “stacked”, with competitors’ traits.²² This gives Monsanto a lot of market power, which it can use to thwart competition.

²³Compl. ¶ 27, filed in United States v. Monsanto Co., Case No. 1:07-cv-00992 (D.D.C. filed May 31, 2007).

²⁴*Id.*

²⁵*Id.*

²⁶Competitive Impact Statement at 2, filed in United States v. Monsanto Co., Case No. 1:07-cv-00992 (D.D.C. filed May 31, 2007).

Monsanto's Roundup Ready herbicide-tolerant trait, for example, has been bred into most seeds offered by third party seed developers. As a result of its dominant position, Monsanto can impose on its licensees a variety of anticompetitive restrictions in the way that traits can be used. To foreclose rivals, for example, Monsanto prohibited seed companies from combining, or "stacking," in their seeds non-Monsanto traits. As the DOJ alleged in 2007, "Monsanto's trait licenses with most other cottonseed companies . . . severely restrict the ability of these companies to work with other trait developers."²³ Some of these licenses prohibited "the stacking of cottonseed containing Monsanto traits with another company's traits."²⁴ Monsanto's licensing agreements also subjected "the licensees to severe penalties if they stack[ed] non-Monsanto traits with Monsanto traits."²⁵

Monsanto's anti-stacking restraints were anti-competitive. The DOJ accordingly required Monsanto for 10 years to modify its cottonseed trait licenses with seed companies. Monsanto had "to permit licensees to breed and sell, without penalty, cottonseed containing non-Monsanto traits and cottonseed containing both licensed Monsanto traits and non-Monsanto traits, and modify its Cotton States licenses to remove any provision that allows Monsanto to terminate the license if the licensee sells cottonseed containing other traits."²⁶ The DOJ's demand, however, only applied to cottonseed. Thus, Monsanto is free to impose these anticompetitive restrictions on licensees for other types of traited seeds. Nor will the DOJ's remedy protect farmers and independent cottonseed producers after 2018, when the restriction expires. Thereafter, Monsanto could demand that cottonseed producers not stack its Roundup Ready trait with transgenic traits developed by Monsanto's rivals.

A Bayer-Monsanto merger would likely lessen competition even further. First, a combined Bayer-Monsanto would have a greater (and for cotton a dominant) share of the seed market, where its traits are promoted.

Second, for independent seed producers, a combined Bayer-Monsanto would have even more power and opportunities to foreclose rival traits. Before the merger, Monsanto may not object to the stacking of traits that did not directly compete with its traits. That changes if Bayer and Monsanto were allowed to merge. Bayer-Monsanto could use licensing restrictions to foreclose rivals from stacking their traits on seeds with either Monsanto or Bayer traits. The merger would create a super-platform of traits for seeds and the complementary herbicides. As farmers are already dependent on Bayer's and Monsanto's herbicide-tolerant traits, the super-platform could kick off any competing trait that either Bayer or Monsanto developed. Moreover, Bayer-Monsanto could ensure that other competing seeds or herbicides do not "interoperate" with its super-platform of traits, seeds and herbicides.

²⁷David J. Lynch & Guy Chazan, *Bayer-Monsanto Sows Seeds of Doubt Among Regulators*, FINANCIAL TIMES, May 30, 2016.

²⁸2010 Merger Guidelines at § 2.1.4.

²⁹Link System, https://www.cropscience.bayer.us/products/traits/libertylink/libertylink-system#phcontent_4_divAccordion [hereinafter Bayer LibertyLink].

³⁰*Id.*

³¹*Id.*

³²David Nicklaus, *Antitrust Issues May Force Bayer to Offer Monsanto a Breakup Fee*, ST. LOUIS POST-DISPATCH, May 29, 2016.

³³Bayer LibertyLink, *supra* note 29.

As the *Financial Times* reported, packages of seeds-traits-and-chemicals that only work with one another, such as Monsanto's Roundup Ready package, "already are making it harder for smaller rivals to compete."²⁷ After this merger, even more traits, seeds, and herbicides could be potentially foreclosed. The merger would further limit the farmers' choices of the best seeds to suit their needs and force independent seed producers and customers to rely primarily on Bayer-Monsanto traits. The merger would limit choice, and foreclose competitive alternatives for traited seed.

b. The Merger Will Eliminate the Direct Competition Between Monsanto and Bayer

The federal antitrust agencies also consider "whether the merging firms have been, or likely will become absent the merger, substantial head-to-head competitors."²⁸ A Bayer-Monsanto merger would eliminate the substantial direct competition over traits, seeds, and herbicides.

i. A Bayer-Monsanto Merger Would Eliminate the Direct Competition Over Herbicides and Traits

Monsanto has long been the leading herbicide producer with its Roundup brand. Bayer now threatens to disrupt market conditions with its new herbicide technology. Thus a Bayer-Monsanto merger would likely involve the loss of actual or potential competition.

As farmers increasingly relied on Monsanto's glyphosate-based herbicides and seeds with glyphosate-tolerant traits, their crops ironically became more vulnerable to weeds that are resistant to glyphosate. Glyphosate-resistant weeds like pigweed, waterhemp and giant ragweed have spread across the U.S. As Bayer reported, "In 2012, glyphosate-resistant weeds were reported on 61 million acres."²⁹ By 2014, that increased to 84 million acres.³⁰

Bayer promotes an alternative to Monsanto's glyphosate-based herbicides. Bayer's glufosinate-based herbicide, Liberty, and its glufosinate-tolerant traits sold under the brand, "Liberty Link," are currently the most direct competitors to Monsanto's Roundup and Roundup Ready seed. As Bayer states, "Twentieth-century weed control is no longer effective. Glyphosate was a game-changer 20 years ago, but we can no longer spray the same chemistry multiple times on the same acre, year in and year out, and expect the same results."³¹ In both systems, the seeds are genetically modified so they can survive application of the company's weed killer.³²

As further evidence of its direct competition, Bayer promotes how its technology delivers greater crop yields than Monsanto's technology: "University research trials confirm LibertyLink soybeans" have a 2.1 bushel yield advantage over Roundup Ready 2 Yield[®] soybeans."³³

³⁴*Id.*

³⁵*Id.*

³⁶Gerson Freitas Jr., *Bayer Plans to Take on Monsanto in Brazil with GMO Soybean Seeds*, BLOOMBERG, March 10, 2016, <http://www.bloomberg.com/news/articles/2016-03-09/bayer-plans-to-take-on-monsanto-in-brazil-with-gmo-soybean-seeds>.

³⁷Larry Steckel, Weed Scientist, University of Tennessee, *Tennessee Survey Indicates Scale of PPO-Resistant Pigweed*, DELTA FARM PRESS, June 16, 2016.

³⁸Nicklaus, *supra* note 32.

³⁹U.S. Dep’t of Agriculture, Agricultural Marketing Service—Cotton and Tobacco Program 1 (Sept. 15, 2015).

⁴⁰*Id.*

⁴¹*Id.*

Moreover, the direct competition between Bayer and Monsanto spills into traits. Bayer, for example, has introduced under its LibertyLink brand canola seed that is glufosinate-tolerant, which has already “achieved a minor but notable position in both Canadian and U.S. canola production.”³⁴ Over 60 million acres of corn, cotton, soybeans and canola now have Bayer’s LibertyLink trait, and Bayer anticipates that “the number of acres will double across multiple crops in the next few years.”³⁵ In early 2016, Bayer announced its selling traited soybean varieties that tolerate glufosinate-based herbicides in Brazil, a market long dominated by Monsanto’s glyphosate-tolerant traits.³⁶

As one 2016 article observed, “We are clearly in the midst of a changing of the guard from Roundup Ready to LibertyLink technology in soybeans.”³⁷ This head-to-head competition would end post-merger. Bayer-Monsanto would control both the leading herbicide and herbicide-tolerant trait as well as the most significant competitive alternative. As the antitrust scholar Peter Carstensen observed, “One of the worst things you could do is to link Liberty and Roundup in the same company. . . . There’s no incentive for somebody to develop a third alternative.”³⁸

ii. A Bayer-Monsanto Merger Would Eliminate Direct Competition in the Seed Markets

The merger would also eliminate the direct competition over traited seeds. One notable example is cotton, where Monsanto and Bayer have the first-, second- and third-ranked cottonseed brands in the U.S. Monsanto’s Deltapine brand varieties of cottonseed, according to the USDA, were the most popular planted in 2015, accounting for 31.2 percent of the U.S. acreage.³⁹ Bayer’s Fibermax brand varieties were the second most popular planted in 2015, accounting for 21.6 percent of the United States acreage.⁴⁰ Bayer’s Stoneville brand varieties were the third most popular planted in 2015, accounting for 16.9 percent of the United States acreage.⁴¹ As Table 1 reflects, Bayer-Monsanto post-merger would account for approximately 70 percent of the U.S. acreage for cotton, and the increase in market concentration resulting from the merger in the cotton market is unacceptably high by antitrust standards.

Table 1: Market Concentration for Cotton Before and After a Monsanto-Bayer Merger

Supplier	% of US Acreage for Cotton	Herfindahl– Hirschman Index (HHI) of Market Concentration
Monsanto	31.15%	970
Bayer	38.54%	1485
Phytogen	15.26%	233
Other Suppliers	15.05%	41
Pre-merger		2760
Post-merger	69.69%	5161
Increase in HHI for cottonseed market		2401

The increase in market concentration following a Bayer-Monsanto merger exceeds acceptable levels. Source: U.S. Dep’t of Agriculture, Agricultural Marketing Service—Cotton and Tobacco Program 1 (Sept. 15, 2015).

⁴² *FTC v. OSF Healthcare Sys.*, 852 F. Supp. 2d 1069, 1078 (N.D. Ill. 2012) (quoting *FTC v. Univ. Health, Inc.*, 938 F.2d 1206, 1211 n. 12 (11th Cir. 1991)).

⁴³ *OSF Healthcare Sys.*, 852 F. Supp. 2d at 1079.

⁴⁴ 2010 Merger Guidelines § 5.3.

⁴⁵ *ProMedica Health Sys., Inc. v. FTC*, 749 F.3d 559, 570 (6th Cir. 2014), cert. denied, 135 S. Ct. 2049, 191 L. Ed. 2d 956 (2015).

⁴⁶ *FTC v. H.J. Heinz Co.*, 246 F.3d 708, 716 (D.C. Cir. 2001); see also *OSF Healthcare Sys.*, 852 F. Supp. 2d at 1080.

⁴⁷ See, e.g., *Heinz*, 246 F.3d at 716 (HHI increased by 510 points); *Univ. Health*, 938 F.2d at 1211 n. 12 (HHI increased by 630 points); *FTC v. PPG Indus., Inc.*, 798 F.2d 1500, 1502-03 (D.C. Cir. 1986) (HHI increased by 1,352 points); *United States v. H & R Block, Inc.*, 833 F. Supp. 2d 36, 72-73 (D.D.C. 2011) (HHI increased by approximately 400 points); *FTC v. CCC Holdings Inc.*, 605 F. Supp. 2d 26, 45-46 (D.D.C. 2009) (HHI increased by 2,035 points in one market and 545 points in a second market); *FTC v. Cardinal Health, Inc.*, 12 F. Supp. 2d 34, 53-54 (D.D.C. 1998) (HHI increased between 629 to 1,733 points depending on market definitions).

⁴⁸ Final Judgment at 20, entered in *United States v. Monsanto Co.*, Case No. 1:07-cv-00992 (D.D.C. entered Nov. 6, 2008).

Moreover, the merger would significantly increase concentration in an already concentrated cottonseed industry. As courts recognize, the “most prominent method of measuring market concentration is the Herfindahl–Hirschman Index (HHI).”⁴² One calculates the HHI by summing the squares of the individual firms’ market shares. So the HHI of an industry with ten firms each with a 10 percent market share would be 1,000. High levels of concentration raise anticompetitive concerns, and the HHI calculation provides one way to identify mergers that are likely to invoke these concerns.⁴³ According to the DOJ and FTC’s Merger Guidelines, an HHI above 2,500 signifies a highly concentrated market, and “[m]ergers resulting in highly concentrated markets that involve an increase in the HHI of more than 200 points will be presumed to be likely to enhance market power.”⁴⁴

As the U.S. Court of Appeals for the Sixth Circuit recently noted, when the HHI numbers are “multiples of the numbers necessary for the presumption of illegality,” it suggests that the merger would enhance the firm’s “market power even more, to levels rarely tolerated in antitrust law.”⁴⁵ Likewise in *Heinz*, the U.S. Court of Appeals for the D.C. Circuit recognized that an increase in HHI by 510 points “creates, by a wide margin, a presumption that the merger will lessen competition.”⁴⁶

In this case, the cottonseed market, when viewed nationally or by regions, is already highly concentrated, and a Bayer-Monsanto merger would substantially increase the level of concentration. In the regional cottonseed markets, the increase in the HHI would be between 8.5 and 13.6 times as great as the 200-point increase required to raise the presumption of enhanced market power under the Merger Guidelines. Indeed the increase in the HHI — between 1,705 to 2,723 points in various parts of the country — is much higher than many other cases in which the United States has demonstrated a prima facie case.⁴⁷

c. A Bayer-Monsanto Merger Would Violate a Court Order

Not only would a Bayer-Monsanto merger likely violate the Clayton Act, but it would violate the specific terms of a court order. When Monsanto sought to acquire Delta and Pine Land Company in 2007, the DOJ raised several antitrust concerns. To satisfy these concerns, Monsanto agreed, among other things, to divest certain cottonseed and cotton breeding assets to a buyer which, in the United States’ judgement, would maintain competition. Monsanto ultimately sold these assets to Bayer. The Final Judgment specifically prohibits Monsanto or its successor from acquiring any of the divested assets during the 10-year term of the 2008 judgment.⁴⁸ Moreover, the federal district court retains jurisdiction to enforce Monsanto’s compliance with the Final Judgment and to punish any violations of its provisions. Thus, Monsanto after its merger with Bayer would reacquire the divested assets, in violation of the specific terms of the Final Judgment.

⁴⁹2010 Merger Guidelines § 6.4.

⁵⁰Bayer LibertyLink, *supra* note 29.

⁵¹Bayer 2015 Annual Report, at 60, <http://www.annualreport2015.bayer.com/>.

⁵²2010 Merger Guidelines § 6.4.

⁵³Lynch & Chazan, *supra* note 27.

⁵⁴*Id.*

d. A Bayer-Monsanto Merger Will Eliminate Head-To-Head Competition in Agricultural Biotechnology Innovation Markets and Reduce Opportunities for Pro-Competitive Research and Development (R&D) Collaborations.

As their 2010 Merger Guidelines state, the FTC and DOJ consider whether a merger is likely “to diminish innovation competition by encouraging the merged firm to curtail its innovative efforts below the level that would prevail in the absence of the merger. That curtailment of innovation could take the form of reduced incentive to continue with an existing product-development effort or reduced incentive to initiate development of new products.”⁴⁹

This would likely happen here. Bayer, as discussed above, is engaging in efforts to introduce its LibertyLink trait for more varieties of crops. Bayer has announced an investment of nearly \$500 million globally “to double the production and supply of Liberty to meet demand. Production is set to begin in mid-2017.”⁵⁰ Its LibertyLink products would capture substantial revenues from Monsanto’s Roundup Ready business. As evident by its recent rollout in Brazil, Bayer is also planning to establish a competitive positions in soybean, where Monsanto dominates.⁵¹ Thus the antitrust agencies would likely evaluate the extent to which successful innovation by Bayer is likely to take sales from Monsanto, and “the extent to which post-merger incentives for future innovation will be lower than those that would prevail in the absence of the merger.”⁵²

Antitrust officials are also likely to raise issues beyond competition in particular trait, seed, and herbicide markets. If the Big Six shrink to four companies, the number of independent research and development laboratories will likewise diminish.⁵³ “That’s the real story in these deals,” noted Diana Moss of the American Antitrust Institute, “the elimination of parallel paths in R&D, the elimination of head-to-head competition in research and development, in traits and potentially even in chemicals.”⁵⁴

Moreover, Monsanto, Dow and Syngenta through their licensing agreements can stifle innovation by limiting scientific inquiry on their traited seeds. As *Scientific American* reported,

To purchase genetically modified seeds, a customer must sign an agreement that limits what can be done with them. . . . Agreements are considered necessary to protect a company’s intellectual property, and they justifiably preclude the replication of the genetic enhancements that make the seeds unique. But agritech companies such as Monsanto, Pioneer and Syngenta go further. For a decade their user agreements have explicitly forbidden the use of the seeds for any independent research. Under the threat of litigation, scientists cannot test a seed to explore the different conditions under which it thrives or fails. They cannot compare seeds from one company against those from another company. And perhaps most important, they cannot examine whether the genetically modified crops lead to unintended environmental side effects.

⁵⁵*Do Seed Companies Control GM Crop Research?*, SCIENTIFIC AMERICAN, Aug. 1, 2009, <http://www.scientificamerican.com/article/do-seed-companies-control-gm-crop-research/>.

⁵⁶Keith Fuglie, Paul Heisey, John King, and David Schimmelpfennig, *Rising Concentration in Agricultural Input Industries Influences New Farm Technologies*, USDA Economic Research Service (Dec. 3, 2012), <http://www.ers.usda.gov/amber-waves/2012-december/rising-concentration-in-agricultural-input-industries-influences-new-technologies.aspx>.

⁵⁷*Id.*

⁵⁸*Id.*

⁵⁹2010 Merger Guidelines § 10.

⁶⁰*Id.*

⁶¹*Id.*

Research on genetically modified seeds is still published, of course. But only studies that the seed companies have approved ever see the light of a peer-reviewed journal. In a number of cases, experiments that had the implicit go-ahead from the seed company were later blocked from publication because the results were not flattering. "It is important to understand that it is not always simply a matter of blanket denial of all research requests, which is bad enough," wrote Elson J. Shields, an entomologist at Cornell University, in a letter to an official at the Environmental Protection Agency (the body tasked with regulating the environmental consequences of genetically modified crops), "but selective denials and permissions based on industry perceptions of how 'friendly' or 'hostile' a particular scientist may be toward [seed-enhancement] technology."⁵⁵

The increasing concentration in the traits, seed, and herbicide markets means far fewer firms are responsible for many of the new innovations that drive growth in agricultural productivity. As the USDA found, the share of private research and development performed by the largest firms is even larger than their share of sales.⁵⁶ "In crop seed and biotechnology, eight seed-biotechnology companies accounted for 76 percent of all R&D spending by this industry in 2010."⁵⁷ And in agricultural chemicals, "five companies (each with over \$2 billion sales in 2010) were responsible for over 74 percent of the R&D in this sector."⁵⁸ Thus innovations in seed, traits and herbicides will be concentrated in only a handful of firms.

II. Any Claimed Efficiencies Would Likely Be Insufficient to Justify the Proposed Merger

Although the lower U.S. courts (but not the Supreme Court to date) have recognized an efficiencies defense, none have relied upon it to permit a problematic merger.

Under the efficiencies defense set out in the 2010 Merger Guidelines, the merging parties must first show that the efficiencies are merger-specific, that is, the firms cannot reasonably achieve these efficiencies by other means.⁵⁹

Second, the efficiencies must be verifiable. As the Merger Guidelines recognize, "[e]fficiencies are difficult to verify and quantify, in part because much of the information relating to efficiencies is uniquely in the possession of the merging firms. Moreover, efficiencies projected reasonably and in good faith by the merging firms may not be realized."⁶⁰ Consequently, the merging parties have "to substantiate efficiency claims so that the Agencies can verify by reasonable means the likelihood and magnitude of each asserted efficiency, how and when each would be achieved (and any costs of doing so), how each would enhance the merged firm's ability and incentive to compete, and why each would be merger-specific."⁶¹

⁶²*Id.*

⁶³*Id.*

⁶⁴Lynch & Chazan, *supra* note 27.

⁶⁵Jacob Bunge and Jesse Newman, *Bayer's Bid for Monsanto Faces Hurdles: Wave of Consolidation in Agricultural Sector Would Give Significant Power to Three Companies*, WALL STREET JOURNAL, May 19, 2016.

⁶⁶Alex Black, *US Farmers Unsettled by Prospect of Bayer-Monsanto Merger*, FG INSIGHT, June 7, 2016; see also National Farmers Union, Press Release: NFU Stands Firm Against Further Market Consolidation in Opposition to Latest Bayer/Monsanto Merger Proposal, July 14, 2016, <http://nfu.org/nfu-stands-firm-against-further-market-consolidation-in-opposition-to-latest-bayermonsanto-merger-proposal/5084>.

⁶⁷*Washington: Grassley Sends Letter Asking for Careful Examination of the Proposed Dow DuPont Merger*, US OFFICIAL NEWS (Pak.), June 15, 2016.

Third, the efficiencies must benefit consumers. The cognizable efficiencies must be sufficient to reverse the merger's potential to harm consumers in the relevant market, for example, by preventing price increases in that market.⁶²

Consequently, efficiencies are more likely to make a difference when the likely adverse competitive effects, absent the efficiencies, are not great. The greater the anticompetitive concerns, the greater and likelier the claimed efficiencies must be. "Efficiencies almost never justify a merger to monopoly or near-monopoly."⁶³

It remains to be seen what evidence of efficiencies Bayer and Monsanto claim. But any efficiencies claim must be viewed skeptically given (a) the merger to monopoly in several markets and (b) that farmers and consumers have not significantly benefitted to date from the mergers by the Big Six that have made these markets highly concentrated. Instead, farmer have paid higher prices and have fewer choices.

III. Recommendations

Farmers have already voiced concern over a Bayer-Monsanto merger. As the *Financial Times* reported, "Farmers in the US are already starting to worry about the impact of reduced competition and choice. Crop prices have more than halved over the past three years, putting pressure on farm incomes, so they are particularly vulnerable to higher prices for inputs such as seeds."⁶⁴ "There will almost certainly be much less competition in the marketplace, and as a direct result of that farmers will end up paying higher prices than they otherwise would be paying," said Roger Johnson, president of the National Farmers Union, a Washington-based lobby group for farmers and ranchers.⁶⁵ The NFUUS president added: "Seed costs are the highest input expense for farmers. While some of the cost can be attributed to more sophisticated technology, we have seen time and again that consolidation and market restructuring has increased the cost of crop inputs. In a lagging farm economy with multi-year trends of low commodity prices, additional cost increases for crop inputs could cripple a lot of family farms in this country."⁶⁶

The increasing concentration has also attracted the attention of several U.S. senators. Senator Chuck Grassley (R-IA), for example, said, "I continue to hear farmers express concerns about how a more consolidated agricultural biotech and seed industry will impact them. . . . Federal regulators need to thoroughly consider the implications on agriculture, farmers and consumers of such a seismic shift to this industry before they sign off on any transactions."⁶⁷ "For some time, concerns have been raised that

⁶⁸*Id.*

⁶⁹Press Release, *Senators Commit to Oversight of Consolidation in Agri-Chem Industry*, May 23, 2016, <http://www.lee.senate.gov/public/index.cfm/2016/5/senators-commit-to-oversight-of-consolidation-in-agri-chem-industry>.

⁷⁰*Id.*

the recent proposed seed company mergers could create a domino effect and consolidate the industry,” said Grassley. “The Bayer-Monsanto talks only heighten the possibility that the industry, farmers and consumers could be adversely impacted by this consolidation trend. The Justice Department’s role to ensure a competitive marketplace is even more critical as it studies how these proposed deals play into the big picture in the seed and chemical industry. I’ll be watching closely for any developments that may negatively impact Iowa farmers and consumers.”⁶⁸

Sen. Mike Lee (R-UT) said, “The accelerating trend of consolidation in the agricultural space should be of deep concern to American consumers, touching as it does on the competitiveness of the industry that provides most of our nation’s food. As Chairman of the Antitrust Subcommittee, I will be undertaking close oversight of these deals and the antitrust enforcement agencies’ review of them to ensure that competition remains vibrant in one of the largest and most important sectors of the American economy.”⁶⁹

Finally, Sen. Amy Klobuchar (D-MN) said, “The current wave of consolidations across our economy raises many concerns for American consumers and why I have fought—and will continue to fight— hard to promote competition across all sectors and industries. . . . As Ranking Member of the Antitrust Subcommittee, I take seriously my responsibility to provide oversight over potential consolidations and to ensure that antitrust laws are vigorously enforced to protect competition.”⁷⁰

A Bayer/Monsanto merger is not inevitable. Companies will seek to merge if they can avoid competition and increase profits. But the primary function of the antitrust laws is to prevent industries from becoming even more concentrated. In the financial industry, the merger wave led to banks deemed too-big-to-fail. In the trait, seed, and herbicide industries, the merger wave has led to the Big Six, which today shape what seeds are offered, the herbicides that are used, and the food we eat. After acquiring smaller seed and biotechnology research enterprises, the Big Six now seek to consolidate to the Big Four. Farmers are being squeezed with higher prices and fewer choices. A Bayer/Monsanto merger is presumptively anticompetitive. Efficiencies are rarely sufficient to warrant such increases in concentration and market power. Accordingly, the DOJ should prevent the companies from carrying out any proposed merger, or entering into or carrying out any agreement, understanding, or plan, the effect of which would be to combine their businesses or assets.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ Monsanto, Agricultural Seeds, <http://www.monsanto.com/products/pages/monsanto-agricultural-seeds.aspx>

⁷⁵ Bayer 2015 Annual Report, at 60.

⁷⁶ Bayer, Nunhems USA and Canada, http://nunhemsusa.com/www/NunhemsInternet.nsf/id/US_EN_Home; De Ruiter, Vegetable Plants, Seeds and Products, <http://www.deruiterseeds.com/global/us/products/Pages/default.aspx>.

⁷⁷ DOJ Monsanto Compl., *supra* note 23, at ¶ 2.

⁷⁸ Attorneys General of the States of Montana, Iowa, Maine, Maryland, Mississippi, New Hampshire, New Mexico, Ohio, Oklahoma, Oregon, South Dakota, Tennessee, Vermont, and West Virginia, *Comments Regarding Competition in the Agriculture Industry in the United States Department of Agriculture and United States Department of Justice Competition's Agriculture Industry Workshops 2* (March 11, 2010) [hereinafter State AG Comments].

⁷⁹ Monsanto, Agricultural Seeds, <http://www.monsanto.com/products/pages/monsanto-agricultural-seeds.aspx>.

APPENDIX 1: Detail on Industry Background and Market Structure

I. INDUSTRY BACKGROUND

A. Seeds

Historically seed producers experimented through decades of breeding in developing seed for particular crops, like cotton, for desired traits. Through cross-breeding, seed is developed for a particular region's weather conditions and soil types, to be more resistant to pests, and to optimize yield. Seed that might perform well in one region might fare poorly in other regions of the country. Thus variety is key, in enabling farmers to identify the seed that performs the best for their fields and needs. One key component of a successful breeding program is the "quantity and quality of available breeding materials, i.e., germplasm." A seed producer with "a large collection of high quality, or elite, germplasm has a competitive advantage."⁷² This is because the seed producer can identify "the best genetic material and use it in a wide variety of possible crossing combinations, resulting in a greater likelihood of developing a successful variety."⁷³

Both Bayer and Monsanto provide seeds to farmers. Monsanto offers seeds for alfalfa, canola, corn, cotton, sorghum, soybeans, sugarbeets and wheat.⁷⁴ Bayer offers seed for established crops—cotton, oilseed rape/canola, and rice—and plans to establish competitive positions in soybeans and wheat.⁷⁵ Both companies also offer seed varieties for vegetable crops.⁷⁶

B. Genetic Traits

Historically, farmers relied on seed with naturally occurring characteristics. With the innovations in hybrid germplasm came in the 1990s the introduction of transgenic technology. As the DOJ discussed, traited seed arises from combining the plant germplasm that has attractive growing characteristics for that region (such as producing a high yield per acre) with performance traits foreign to that crop that are inserted through genetic engineering.⁷⁷

The transgenic traits are also licensed to other seed developers which breed them into the germplasm.⁷⁸ Among the popular traits offered today are: (i) *Herbicide tolerance* (e.g., Monsanto's Roundup Ready crops); (ii) *Insect resistance* (e.g., Monsanto's Bollgard II cotton); and (iii) *Drought tolerance* (e.g., Monsanto's DroughtGard Hybrids).⁷⁹ When using seeds with the herbicide tolerance trait, farmers can spray fields with a particular brand of herbicide (such as a glyphosate- or glufosinate-based herbicide) to kill weeds

⁸⁰Fuglie et al., *supra* note 5, at 59-60.

⁸¹*Id.* at 60.

⁸²*Id.*

⁸³DuPont/Pioneer Comments, *supra* note 7, at 8.

⁸⁴*Id.*

⁸⁵ Fuglie et al., *supra* note 5, at 26.

⁸⁶ *Id.* at 59.

⁸⁷ *Id.* at 26.

⁸⁸DOJ Monsanto Compl., *supra* note 23, at ¶ 22.

⁸⁹Jorge Fernandez-Cornejo, Seth Wechsler, Mike Livingston, and Lorraine Mitchell, *Genetically Engineered Crops in the United States*, ERR-162 U.S. Dep't of Agriculture, Economic Research Service, Feb. 2014, at iii.

⁹⁰Food & Water Watch Letter, *supra* note 18, at 15.

⁹¹U.S. Dep't of Agriculture, Economic Research Service, *Genetically Engineered Seeds Planted on Over 90 Percent of U.S. Corn, Cotton, and Soybean Acres in 2015* (July 20, 2015), <http://usda.mannlib.cornell.edu/usda/current/Acre/Acre-06-30-2015.pdf>.

⁹²Monsanto, *What is Glyphosate?* (Aug. 2014), <http://www.monsanto.com/sitecollectiondocuments/glyphosate-safety-health.pdf>

⁹³ Monsanto, *Glyphosate and Roundup Brand Herbicides*, <http://www.monsanto.com/glyphosate/pages/default.aspx>.

⁹⁴ Monsanto, *Glyphosate*, *supra* note 92.

without killing the crops.⁸⁰ An insect resistance trait introduces genes that cause plants to secrete proteins that are harmful to certain kinds of crop pests.⁸¹ These “plant-incorporated pesticides” have been adapted to secrete a wider variety of proteins in different locations on plants (e.g., leaves and roots).⁸²

Once a gene of interest has been identified, it must be transformed into a “biotech trait,” and then through an extended, multi-year process of breeding, incorporated into elite germplasm to create a marketable seed product.⁸³ “Researchers work to identify genes that provide the desired functionality, such as herbicide tolerance or insect resistance.”⁸⁴

The first significant commercial sales of proprietary traited seed occurred in 1995.⁸⁵ Market sales of transgenic seed have increased rapidly thereafter, primarily seeds with herbicide tolerance and insect resistance traits.⁸⁶ Since 2006, traited seed have exceeded 40 percent of the total sales value of proprietary seed.⁸⁷ By 2007, the DOJ noted, “almost all cottonseed varieties planted in the United States” were traited, and, “in 2006, over 96% of the traited cottonseed sold in the United States contained traits developed by Monsanto.”⁸⁸ Three crops (corn, cotton and soybeans) account for about half of the total farm land used to grow crops.⁸⁹ Farmers overwhelmingly use genetically-engineered seed for these three cash crops. By 2009, transgenic seeds accounted for 80 percent of all corn planted in the U.S., 92 percent of all soybeans planted, and 86 percent of all cotton planted.⁹⁰ In 2015, farmers planted 94 percent of the soybean acreage with herbicide tolerance seed varieties. Adoption of traited seed, including those with herbicide tolerance, insect resistance, or stacked traits, accounted for 94 percent of cotton acreage and 92 percent of corn acreage planted in the United States.⁹¹

C. Herbicides

Herbicides are used to kill unwanted plants in and around a farmer’s fields and homestead.⁹² In 1974, Monsanto developed its herbicide, Roundup. A majority of Roundup brand herbicides contain three components: the active ingredient glyphosate, water, and a soap-like surfactant blend.⁹³ Glyphosate is a “non-selective” herbicide; its application will kill most plants.⁹⁴ So when Roundup is sprayed on weeds and crops, it will kill both.

Monsanto developed and marketed traited crop seed that was Roundup Ready, meaning a genetic trait was added to the germplasm that made that crop survive Roundup. The glyphosate-tolerant trait fundamentally changed how farmers could apply Roundup. Before the glyphosate-tolerant trait technology, farmers

⁹⁵Charles M. Benbrook, *Trends in Glyphosate Herbicide Use in the United States and Globally*, 28:3 ENVIRON. SCI. EUR. (2016), <http://enveurope.springeropen.com/articles/10.1186/s12302-016-0070-0>.

⁹⁶*Id.*

⁹⁷*Id.*

⁹⁸U.S. Dep’t of Justice, *Competition and Agriculture: Voices from the Workshops on Agriculture and Antitrust Enforcement in our 21st Century Economy and Thoughts on the Way Forward 2* (May 2012).

⁹⁹*Id.*

¹⁰⁰*Id.*

¹⁰¹*Id.*

could spray herbicides before the crops emerged from the ground, or after harvest to kill late-season weeds.⁹⁵ But with Roundup Ready traited seed, farmers could spray Roundup after the crop emerged, killing the weeds, while leaving the crop unharmed. As one study found, this “historically significant technological advance set the stage for unprecedented and rapid growth in the area planted to [Roundup Ready] crops and sprayed with glyphosate (from usually less than 10 % of cotton, maize, and soybean acres pre-1996, to 90 % or more [in 2016]).”⁹⁶ Since 1974 in the U.S., the study found, “over 1.6 billion kilograms of glyphosate active ingredient have been applied, or 19% of estimated global use of glyphosate (8.6 billion kilograms). Globally, glyphosate use has risen almost 15-fold since so-called ‘Roundup Ready,’ genetically engineered glyphosate-tolerant crops were introduced in 1996.”⁹⁷

II. BENEFITS OF COMPETITION IN THE SEED, TRAITS AND HERBICIDE INDUSTRIES

Farmers, independent seed, trait and herbicide producers, and consumers benefit from healthy competition in the seed, trait, and herbicide industries with lower prices, better quality, greater product variety, and more innovation. In a competitive market, seed producers can choose among the available traits and germplasm; farmers can choose which seed and herbicide best match their needs, including the product that would work best for their specific kind of soil, in their particular climate, for their individually designed planting schedule, and for issues with particular weeds and pests. The range of competitive options and continual innovation can help farmers improve their crop yield and lower their costs.

The DOJ and the USDA observed the key role of antitrust in their 2010 hearings concerning the agricultural industry. A wide spectrum of interested parties, including farmers, ranchers, processors, retailers, workers, academics, law enforcers, regulators, and other federal, state, and local government officials, attended the hearings across the country to share their perspectives.⁹⁸ “A clear lesson of the workshops,” the DOJ reported, “is that antitrust enforcement has a crucial role to play in fostering a healthy and competitive agriculture sector.”⁹⁹ Both farmers and antitrust officials “stressed the importance of vigorous antitrust enforcement and detailed the ways that anticompetitive mergers and conduct can harm producers, consumers, and others.”¹⁰⁰ The DOJ-USDA hearings confirmed that “a healthy agricultural sector requires competition and, consequently, vigorous antitrust enforcement.”¹⁰¹ Unfortunately, as the hearings reveal and next part outlines, that competition weakened as the seed, trait, and herbicide industries became more concentrated.

¹⁰²United States v Pabst Brewing Co., 384 U.S. 546, 551 (1966), quoting United States v Von's Grocery Co., 384 U.S. 270, 276 (1966).

¹⁰³State AG Comments, *supra* note 78, at 2.

¹⁰⁴Fuglie et al., *supra* note 5, at 34.

¹⁰⁵Between 1995 and 1998, the largest seed, pharmaceutical and agrochemical companies acquired or entered into joint ventures with almost seventy smaller seed companies. Food & Water Watch Letter, *supra* note 18, at 15.

¹⁰⁶DuPont/Pioneer Comments, *supra* note 7, at 21.

¹⁰⁷Wilde, *supra* note 11.

¹⁰⁸Food & Water Watch Letter, *supra* note 18, at 15.

¹⁰⁹U.S. Dep't of Agriculture, Econ. Res. Serv., *Mergers and Acquisitions Rose in the Past Three Decades, in THE SEED INDUSTRY IN U.S. AGRICULTURE*, http://www.ers.usda.gov/media/260683/aib786h_1_.pdf.

¹¹⁰AAI Letter, *supra* note 4.

¹¹¹Fuglie, Heisey, King, and Schimmelpfennig, *supra* note 56.

¹¹²*Id.*

¹¹³*Id.*

III. LACK OF COMPETITION TODAY IN THE SEED, TRAIT AND HERBICIDE INDUSTRIES

One way to preserve competition is to prevent the industry from becoming highly concentrated, where it is effectively dominated by a few firms. Congress, in enacting and later amending section 7 of the Clayton Act, saw the dangers of concentrated economic and political power. Congress thus sought to arrest these threats in their incipiency. To halt the “rising tide” of concentration in American business,” Congress decided “to clamp down with vigor on mergers.”¹⁰² Congress’ premise was that mergers tend to accelerate concentration in an industry, and the Clayton Act seeks to arrest restraints of trade in their incipiency and before they develop into full-fledged restraints violative of the other key antitrust statute, the Sherman Act. Consequently, antitrust enforcement under the Clayton Act must consider any trend toward concentration.

A. Trend Toward Concentration Since the 1990s in the Seed, Trait and Herbicide Industries and Rise of the Big Six

Historically farmers obtained the traits they desire in their seeds from seed companies, which were often small, family-owned businesses.¹⁰³ Since the 1990s, however, the number of independent seed producers has dramatically declined. As large chemical companies opted to commercialize their own biotechnology research or to buy seed company research, they sought access to the seed companies through direct acquisitions, joint-ventures, and licensing agreements.¹⁰⁴ In the 1990s, the largest seed, pharmaceutical and agrochemical companies acquired or entered into joint ventures with many small and mid-sized seed companies.¹⁰⁵ Between 1996 and 2006, for example, the number of independent seed companies decreased from 600 to fewer than 250.¹⁰⁶ By 2009, there were approximately 100 independent seed companies left.¹⁰⁷ Between 1998 and 2003, there were \$15 billion in seed mergers, many at price levels above the underlying corporate value.¹⁰⁸

Since the 1990s, the seed and trait business has become increasingly concentrated in the hands of six firms: Monsanto, Bayer, BASF, Syngenta, Dow, and DuPont. The Big Six’s growth came from mergers.¹⁰⁹ They acquired many small to medium-size enterprises (SMEs) engaged in biotechnology research.¹¹⁰ As these new SME startups “tend to specialize in commercial development of a new research tool, genetic trait, or both,” the seed-biotechnology industry had been reliant on these SMEs as sources of new innovation.¹¹¹ But in the mid-2000s, the number of SMEs exiting the market surpassed the number entering the market; “by 2008 just over 30 SMEs specializing in crop biotechnology were still active.”¹¹² The majority of the exits from the industry were the result of acquisition by the Big Six firms: “Of 27 crop biotechnology SMEs that were acquired between 1985 and 2009, 20 were acquired either directly by one of the Big 6 or by a company that itself was eventually acquired by a Big 6 company.”¹¹³

¹¹⁴Wheelhouse, *supra* note 5.

¹¹⁵Fuglie et al., *supra* note 5, at 34.

¹¹⁶AAI Letter, *supra* note 4.

¹¹⁷Fuglie et al., *supra* note 5, at 30, 34.

¹¹⁸ 2015 Bayer Annual Report, at 60.

¹¹⁹Fuglie et al., *supra* note 5, at 35.

¹²⁰DuPont/Pioneer Comments, *supra* note 7, at 9.

¹²¹*Id.* at 8.

¹²²Food & Water Watch Letter, *supra* note 18, at 15.

¹²³K. Sauer, *What is Corn States?*, Monsanto, Dec. 8, 2009, <http://www.monsanto.com/newsviews/pages/what-is-corn-states.aspx>.

¹²⁴ Fuglie et al., *supra* note 5, at 38.

¹²⁵E. I. du Pont de Nemours and Company Form 10-K for the Fiscal Year 2015, at 4, http://s2.q4cdn.com/752917794/files/doc_financials/2015/annual/DD-12.31.2015-10K-FINAL-FILED.pdf.

Monsanto epitomizes this growth through acquisitions. It wasn't a competitive force in the seed business in 1990.¹¹⁴ But of the Big Six, Monsanto made by far the greatest number of large acquisitions of seed and related companies.¹¹⁵ Monsanto acquired almost 40 companies, including agricultural biotechnology firms and independent seed companies that had historically held the substantial base of germplasm needed by biotechnology developers to breed new varieties.¹¹⁶

Bayer entered the seed market in 2002 with its acquisition of Aventis Crop Science.¹¹⁷ Bayer intends to continue acquiring other seed and biotechnology firms. In its 2015 annual report, Bayer states it will “gain long-term access to high-quality breeding material through acquisitions, in-licensing and partnerships and to steadily expand [its] existing breeding expertise.”¹¹⁸

Three of the Big Six became major players in the global market for vegetable seeds largely through acquisitions—Monsanto with its acquisition of Seminis in 2005, Syngenta acquiring parts of the Advanta Seed Group in 2004, and Bayer acquiring Aventis/ Nunhems in 2002.¹¹⁹

Nationally, in 2010, the independent seed producers only accounted for about 32 percent of the soybean seed sales and 25 percent of the corn seed sales.¹²⁰ Of the remaining independent seed producers, many are dependent on the Big Six firms. Many independents that sell corn and/or soybean seed, for example, do not have their own trait development program or their own breeding programs for developing germplasm.¹²¹ They have cross-licensing agreements with the Big Six to sell seeds with specific combinations of traits.¹²² Monsanto, for example, licenses its germplasm and traits to approximately 200 seed companies and distributors across the U.S. – allowing them to integrate Monsanto seed germplasm and/or biotech traits into their own brands of corn, soybean, cotton, sorghum and canola seeds, among others.¹²³ These cross-licensing agreements can be used to foreclose rivals and emerging competitive threats.

The Big Six firms also have significant joint ventures and licensing agreements with each other. For example, Monsanto has cross-licensing agreements with all the other Big Six companies; Dow with four of the other five, and DuPont and Syngenta with three of the other companies.¹²⁴ In 2015, the majority of DuPont/Pioneer's corn hybrids and soybean varieties that were sold to customers contained “biotechnology traits licensed from third parties under . . . long term licenses.”¹²⁵ BASF since 2007 has had a number of research collaboration and licensing agreements with Monsanto and other seed companies for commercialization of future

¹²⁶Fuglie et al., *supra* note 5, at 34.

¹²⁷Press Release, DuPont and Monsanto Reach Technology Licensing Agreements on Next-Generation Soybean Technologies (March 26, 2013), <http://news.monsanto.com/press-release/corporate/dupont-and-monsanto-reach-technology-licensing-agreements-next-generation-so>.

¹²⁸Syngenta US › Seeds › GreenLeaf › About, Meet market demands and realize business success, <http://www.syngenta-us.com/greenleaf-genetics/about>.

¹²⁹Dow AgroSciences, Bayer CropScience Sign Global Cotton Technology Cross-Licensing Agreements: New Choices for Growers Worldwide, Thursday, May 20, 2010, <http://newsroom.dowagro.com/press-release/dow-agrosciences-bayer-cropscience-sign-global-cotton-technology-cross-licensing-agree>.

¹³⁰Fuglie et al., *supra* note 5, at 35.

¹³¹*Id.* at 35.

¹³²Food & Water Watch Letter, *supra* note 18, at 14.

¹³³AAI Letter, *supra* note 4.

¹³⁴*Id.*

¹³⁵*Id.*

¹³⁶Fuglie et al., *supra* note 5, at 30; Wheelhouse, *supra* note 5.

¹³⁷Fuglie et al., *supra* note 5, at 30.

biotechnologies that BASF may develop.¹²⁶ In 2013, DuPont and Monsanto settled their legal claims (antitrust and patent infringement, respectively) with a series of technology licensing agreements. As Monsanto's president and chief commercial officer commented, "This signals a new approach to our companies doing business together, allowing two of the leaders in the industry to focus on bringing farmers the best products possible while working to advance innovation and long-term opportunity for agriculture."¹²⁷ In 2007, DuPont/Pioneer Hi-Bred and Syngenta formed GreenLeaf Genetics, a joint venture that offers corn, soybean and wheat genetics to seed companies.¹²⁸ In 2010, Dow and Bayer entered into cross-licensing agreements regarding cotton technologies.¹²⁹ These cross-licensing agreements also have the potential to dampen competition among the Big Six.

B. The Seed, Trait and Herbicide Industries Are Highly Concentrated

The increase in concentration in the crop seed industry has far outpaced other agricultural industries. According to a USDA report, the crop seed industry, relative to other agricultural input sectors, witnessed both the highest level of concentration and greatest increase in concentration over time.¹³⁰ By 2009, the top four seed companies accounted for 54 percent of the global commercial seed industry (including public sector commercial seed), and the top eight companies accounted for 63 percent of total commercial seed sales.¹³¹ In 1994, these shares were 21 percent and 29 percent, respectively. Farmers as a result are now dependent on far fewer firms for their seeds for corn, soybeans, cotton and other crops.¹³²

Many of the regional U.S. seed markets are even more concentrated. By 2007, the four largest companies accounted for an estimated 72 percent of the U.S. market for corn seed and 55 percent of soybean seed, with Monsanto's share in corn and soybeans close to 65 percent.¹³³ By 2009, the top four companies held 95 percent of the U.S. market for cottonseed, with Monsanto and Bayer accounting for the overwhelming majority.¹³⁴

In the traits markets, the Big Six firms held by 2009 more than 95 percent of trait acres for corn, soybeans and cotton in the U.S., with seed with Monsanto traits accounting for 90 percent of these acres.¹³⁵ By 2009, three of the Big Six firms—Monsanto, DuPont/Pioneer, and Syngenta—were the top three seed companies globally, and they also ranked fifth, sixth, and first, respectively, in global sales of crop protection chemicals.¹³⁶ Bayer, by 2009, ranked sixth in global seed sales.¹³⁷

¹³⁸FTC v. Sysco Corp., 113 F. Supp. 3d 1, 15 (D.D.C. 2015).

¹³⁹DOJ, Competition and Agriculture, *supra* note 98, at 5.

¹⁴⁰*Id.* at 6.

¹⁴¹Food & Water Watch Letter, *supra* note 18, at 14.

¹⁴²Fuglie et al., *supra* note 5, at 11, 13.

¹⁴³Food & Water Watch Letter, *supra* note 18, at 16.

¹⁴⁴Fuglie et al., *supra* note 5, at 13.

Congress passed the Clayton Act “to enable the federal government to halt mergers in their incipency that likely would result in high market concentrations. Congress was especially concerned with large combinations that would impact everyday consumers across the country.”¹³⁸ We are already well beyond that point. Farmers and consumers, as the next part discusses, are now paying the price.

IV. ANTICOMPETITIVE EFFECTS IN TODAY’S MARKETPLACE

Not surprisingly, a recurring issue at the DOJ-USDA workshops was the level of concentration, irrespective of the cause, in agricultural markets generally, and the seed industries in particular.¹³⁹ At the workshops, “many producers lamented a lack of options in buying seeds. For example, during the public comments in Iowa, a farmer and seed dealer related that ‘thirty-four years ago, there were fifty seed companies’ but that ‘[a]t the present time there are four.’ He opined that ‘it was way better to have more seed companies involved than to have fewer seed companies at present time and pay through the nose for a seed.’”¹⁴⁰

With the Big Six firms dominating the seed, trait and herbicide industries, farmers have suffered with higher prices and fewer options.

A. Higher Prices

As the seed, trait and herbicide industries became significantly more concentrated, customers had fewer choices, and prices for seed, genetic traits, and herbicide have escalated.¹⁴¹

According to the USDA, prices for seed have increased far more than for other agricultural inputs. The USDA compared the prices paid by farmers in the United States for five categories of agricultural inputs. The largest increase during 1994-2010 was in crop seed prices, which more than doubled relative to the price received for agricultural commodities sold by farmers.¹⁴² Seed’s share of a farmer’s costs has almost doubled over 20 years, from 2.6 percent in 1988 to 4.9 percent in 2008.¹⁴³ Thus, the prices U.S. farmers have paid for their inputs generally have risen faster than the prices they received for their crops. A major culprit was seed prices.

Much of the price increase in seed is attributable to increasing fees for the genetic traits. Between 32 and 74 percent of the price of seed for corn, soybeans, cotton, and sugar beets in the United States and the European Union were estimated to reflect technology fees or the cost of seed treatments.¹⁴⁴

¹⁴⁵Food & Water Watch Letter, *supra* note 18, at 16.

¹⁴⁶*Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1764-65, 185 L. Ed. 2d 931 (2013).

¹⁴⁷*Id.*

¹⁴⁸Food & Water Watch Letter, *supra* note 18, at 16.

¹⁴⁹ Fuglie et al., *supra* note 5, at 62.

¹⁵⁰Food & Water Watch Letter, *supra* note 18, at 17.

¹⁵¹Monsanto Form 10-K for 2015, at 17.

¹⁵² Benbrook, *supra* note 95.

¹⁵³Monsanto Form 10-K for 2015, at 5.

¹⁵⁴ *Id.* at 30.

¹⁵⁵Food & Water Watch Letter, *supra* note 18, at 15.

¹⁵⁶Jorge Fernandez-Cornejo, Seth Wechsler, Mike Livingston, and Lorraine Mitchell, *Genetically Engineered Crops in the United States*, ERR-162 U.S. Dep't of Agriculture, Economic Research Service, Feb. 2014, at 16.

¹⁵⁷ *Id.*

¹⁵⁸*Id.* at 22.

Moreover, farmers cannot reuse traited seed. The Big Six in selling patented traited seeds or licensing their traits typically allow farmers to plant the seeds for only one crop season.¹⁴⁵ For example, Monsanto sells, and allows other companies to sell, Roundup Ready soybean seeds to growers who assent to a special licensing agreement. The grower is permitted to plant the purchased seeds in one (and only one) season.¹⁴⁶ Monsanto obligates the farmer not to save any of the harvested soybeans for replanting, or supply them to anyone else for that purpose.¹⁴⁷ Thus the farmer must purchase seed from Monsanto (or another seed producer) the following season, and bear the brunt of even higher seed prices.¹⁴⁸

Herbicide prices have also increased. The growth in crops with herbicide-tolerance traits have increased the demand for glyphosate- and glufosinate-based herbicides while reducing the need for other types of herbicides.¹⁴⁹ Monsanto, with its herbicide Roundup, was a beneficiary in this shift in demand. Between 2006 and 2009, Roundup prices nearly doubled from between \$11-\$13 to more than \$20 a gallon.¹⁵⁰ Even after Monsanto's initial patent protection for its herbicide expired, and after generics entered with glyphosate-based herbicides, Monsanto's Roundup herbicides remain as of 2015 the largest crop protection brand globally.¹⁵¹ As a reflection of its significant market power, Monsanto has largely avoided price competition. For example it has bundled the purchase of its higher-price Roundup herbicides with the purchase of Monsanto herbicide-tolerant seeds.¹⁵² It has also migrated most of its customers and licensees for soybeans to its second generation Roundup Ready 2 Yield trait where its patents extend into the next decade.¹⁵³ As it told its investors, Monsanto expects to maintain its branded herbicide prices "at a slight premium over generic products," and believes its "Roundup herbicide business will continue to be a sustainable source of cash and gross profit."¹⁵⁴

The pricing for genetically engineered seed has escalated compared to conventional seed. While the increase in traited seed may be offset by savings in other inputs or other additives, it is unclear to what extent rising transgenic seed prices have led to sufficient corresponding benefits to farmers.¹⁵⁵ The empirical evidence regarding the effect of herbicide-tolerant ("HT") soybean, corn, and cotton seeds on crop yields, one USDA study concluded, was mixed.¹⁵⁶ "Several researchers found no significant difference between the yields of adopters and nonadopters of HT; some found that HT adopters had higher yields, while others found that adopters had lower yields."¹⁵⁷ Likewise the evidence on the impact of herbicide-tolerant seeds (for corn, cotton, and soybeans) on the farmers' net returns was "mixed": "Overall, the empirical evidence on the impact of adopting herbicide-tolerant soybeans on net returns is inconclusive."¹⁵⁸ So prices for traited seed and herbicides are escalating, without any strong evidence that farmers are overall benefitting with higher yields or greater returns for their crops.

¹⁵⁹AAI Letter, *supra* note 4.

¹⁶⁰Wilde, *supra* note 11.

¹⁶¹Kristina Hubbard, *Out of Hand: Farmers Face the Consequences of a Consolidated Seed Industry, Farmer to Farmer Campaign on Genetic Engineering* 5 (Dec. 2009).

¹⁶²*Id.* at 28-29.

¹⁶³ *Id.* at 29.

¹⁶⁴AAI Letter, *supra* note 4.

¹⁶⁵DOJ, *Competition and Agriculture*, *supra* note 98, at 13-14.

B. Fewer Options

Besides higher prices, the accelerating trend toward concentration also means that farmers and independent seed producers are increasingly dependent on the Big Six firms for innovation in germplasm, traits and herbicides. So with greater concentration, farmers' choices have been reduced.

One concern is that after the Big Six acquired so many independent conventional and hybrid seed producers, they significantly constrained non-biotechnology (i.e., conventional) commodity crop seed lines.¹⁵⁹ After the independent seed companies have been purchased, "that particular dealer will only push the parent company's products - genetics, weed and insect control, etc. - even though they might not be as good for a producer's operation."¹⁶⁰

Another concern is that the increase in concentration brought a dearth of choices of genetically modified and conventional seeds.¹⁶¹ One complaint is that farmers must buy bundles of traits, including ones they do not want.¹⁶² The concern is that the best and newest seed will only be introduced with expensive patented traits stacked into them.¹⁶³ It is harder for farmers to find conventional seeds that meet their needs, and for consumers that prefer non-genetically engineered foods.¹⁶⁴ These concerns arose in the DOJ-USDA workshops where a farmer noted how the advent of genetically modified seeds "has reduced my options for non-GMO seeds" and "increased my costs to raise corn."¹⁶⁵