July 26, 2017

Andrew Finch
Acting Assistant Attorney General
U.S. Department of Justice Antitrust Division
950 Pennsylvania Avenue, N.W.
Washington, D.C. 20530

Re: Proposed Merger of Monsanto and Bayer

Dear Acting Assistant Attorney General Finch:

The American Antitrust Institute (AAI), Food & Water Watch (FWW), and the National Farmers Union (NFU) have long advocated for competition, farmers, and consumers in American agriculture.[1] This letter provides an analysis of the likely effects of the proposed merger of Monsanto Company (Monsanto) and Bayer AG (Bayer) on competition and the competitive process in important agricultural input and research and development (R&D) markets.[2] Our analysis focuses on three issues that raise potential competitive concerns.

First, the merger is likely to enhance market power in the highly concentrated market for genetically modified ("traited") cottonseed under the Federal Trade Commission (FTC)/U.S. Department of Justice (DOJ) Horizontal Merger Guidelines (Guidelines).[3] Such seed is planted on the majority of cotton acres in growing regions across the U.S. Second, a similar outcome is likely in the markets for genetic "traits" for cotton, soybeans, canola, and corn. Such traits confer on plants a variety of characteristics such as herbicide tolerance, insect resistance, and other functional attributes.[4] Third, the proposed merger will eliminate important competition in R&D markets for agricultural biotechnology, potentially reducing incentives to innovate and degrading the quality of innovation across both traited crop seed *and* non-genetically modified ("conventional") seed.

---

[1] The American Antitrust Institute (AAI) is an independent, nonprofit organization devoted to promoting competition that protects consumers, businesses and society. For more information, *see* www.antitrustinstitute.org. Many thanks to AAI Research Fellow Mark Angland for research assistance. Food & Water Watch (FWW) is a national advocacy organization dedicated to ensuring the food, water and fish we consume is safe, accessible and sustainably produced. For more information, *see* www.foodandwaterwatch.org. National Farmers Union (NFU) advocates for the economic and social well-being and quality of life of family farmers, ranchers, fishermen and consumers and their communities through education, cooperation and legislation. NFU advocates for the sustainable production of food, fiber, feed and fuel. For more information, *see* nfu.org.

[2] The analysis contained herein is based on public information and our conclusions are limited accordingly.

[3] U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, HORIZONTAL MERGER GUIDELINES (2010) [hereinafter GUIDELINES].

[4] *E.g.*, corn for ethanol refining and high-oleic soybeans for deep-frying.

The loss of competition in traited cottonseed, crop traits, and R&D markets from a Monsanto-Bayer merger could have damaging effects. Smaller rivals and potential entrants could struggle to remain viable and face higher entry barriers, respectively. Farmers already cope with higher prices, flattening or declining yields, and growing complexity of patented traited seed technology.[5] Post-merger, they could see even higher prices and less choice in traited and conventional seed products. Consumers could face higher prices for food and other crop products, lower quality, less choice, and a less diversified crop system. Moreover, the merging parties' claims regarding expected cost reductions in traits R&D *amplify*, not ameliorate, concerns about the loss of competition.

The letter begins with a brief look at consolidation in agricultural biotechnology, followed by an overview of the proposed Monsanto-Bayer merger. It then unpacks the effect of the merger on the markets for traited cottonseed; crop traits in cotton, soybeans, canola, and corn; and the market for R&D in agricultural biotechnology. The final section concludes that if the government's investigation confirms the analysis offered here, the DOJ should block the proposed merger. Indeed, the DOJ has recently challenged or signaled their intent to challenge mergers displaying high levels of post-merger concentration.[6] We would expect no less of an enforcement response in this important case.

I. Past Consolidation in Agricultural Biotechnology Industry

Recent mergers in agricultural biotechnology follow two previous waves of consolidation, one in the mid-1980s through late 1990s and a second from the late 1990s through the mid-to-late 2000s.[7] In the second wave, Monsanto alone acquired almost 40 companies, including agricultural biotechnology firms and independent seed companies that historically held the substantial base of germplasm needed by biotechnology developers to breed new crop

---

[5] *See, e.g.,* Diana L. Moss, *Competition, Intellectual Property Rights, and Transgenic Seed*, 58 S.D. L. REV. 543, 551-52 (2013). *See also*, DOUG GURIAN-SHERMAN, FAILURE TO YIELD: EVALUATING THE PERFORMANCE OF GENETICALLY ENGINEERED CROPS, (Union of Concerned Scientists, Apr. 2009), http://www.ucsusa.org/sites/default/files/legacy/assets/documents/food_and_agriculture/failure-to-yield.pdf; JORGE FERNANDEZ-CORNEJO, ET AL., GENETICALLY ENGINEERED CROPS IN THE UNITED STATES 12 (U.S.D.A. Feb. 2014), https://www.ers.usda.gov/webdocs/publications/45179/43668_err162.pdf?v=41690.

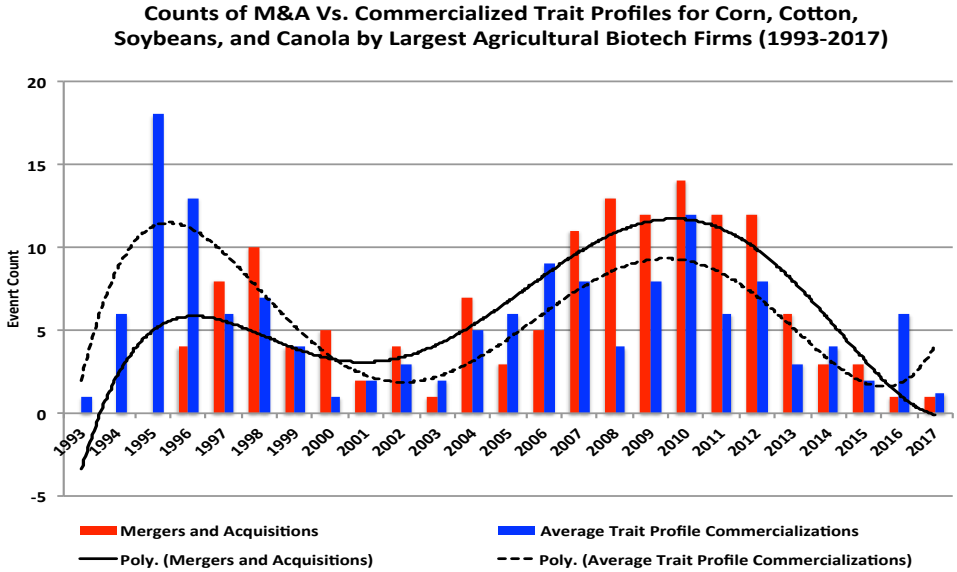
[6] *See e.g.*, Complaint at 5, United States v. Gen. Elec. Co., 1:17-cv-01146 (D. D.C. June 12, 2017) (challenging a proposed merger that would raise HHI in the relevant market from 2,900 to 4,350), https://www.justice.gov/atr/case-document/file/973111/download; Complaint at 7, United States v. Clear Channel Outdoor Holdings, No. 1:16-cv-02497-RDM (D.D.C. Dec. 22, 2016) (challenging a proposed merger which would result in HHI's in excess of 2,500 in various markets), https://www.justice.gov/atr/case-document/file/924896/download; Complaint at 21, United States v. AMC Entm't Holdings Inc., 1:16-cv-02475 (D. D.C. Dec. 20, 2016) (challenging a proposed merger which would raise HHI in local markets from 600 to 5,000 points), https://www.justice.gov/atr/case-document/file/924886/download.

[7] The second wave brought a number of large mergers, including the formation of Syngenta from AstraZeneca and Novartis Seeds (2000), Bayer's acquisition of Aventis Crop Sciences (2002) and BASF's takeover of Cyanamid (2000). Seed companies such as Pioneer, DeKalb, Trojan, Northrup-King, Cargill and Golden Harvest were also acquired during this period. *See* Diana L. Moss, *Transgenic Seed Platforms: Competition Between a Rock and a Hard Place?,* AM. ANTITRUST INST. 14 (Oct. 23, 2009), http://antitrustinstitute.org/sites/default/files/AAI_Platforms%20and%20Transgenic%20Seed_102320091053.pdf; *see also* Gregory D. Graff, Gordon C. Rausser & Arthur A. Small, *Agricultural Biotechnology's Complementary Intellectual Assets*, 85 REV. ECON. & STAT. 360-61 (2006).

varieties.[8] Between 1985 and 2000, the then "Big 6" firms – Monsanto, Syngenta, Bayer, DuPont, Dow and BASF – acquired about 75 percent of the small to medium-size enterprises engaged in biotechnology research.[9] Past consolidation highlights a number of important features that are relevant to an antitrust review of the proposed Monsanto-Bayer merger.

A. Consolidation Does Not Necessarily Drive Innovation

Innovation activity and consolidation activity in agricultural biotechnology appear to come in cycles.[10] The figure below shows two data series. One is the average annual number of crop trait "profiles" that have been commercialized in cotton, soybeans, canola, and corn from 1993 to 2016. As discussed in detail later, a trait profile can contain a single trait or multiple ("stacked") traits. The second data series is the number of mergers and acquisitions (M&A) by the Big 6 from 1996 to 2017.[11] The data show that trait profile commercializations and M&A are pro-cyclical (i.e., they track each other). There are two waves of activity, one peaking in the mid-to-late 1990s and a second around 2010. In the first wave, M&A appears to lag commercializations, while in the second wave, the activities are more coincident.



[8] Monsanto acquired biotechnology firms and seed companies such as Agrecetus, Calgene, Holdens, Asgrow and Delta & Pine Land. *See* Carl Pray, James F. Oehmke & Anwar Naseem, *Innovation and Dynamic Efficiency in Plant Biotechnology: An Introduction to the Reserachable Issues*, 8 AGBIOFORUM 52, 60 (2005); U.N. CONF. ON TRADE AND DEV., TRACKING THE TREND TOWARDS MARKET CONCENTRATION: THE CASE OF THE AGRICULTURAL INPUT INDUSTRY 5, 9-10 (Apr. 2006).

[9] Keith Fuglie, John King, Paul Heisey & David Schimmelpfennig, *Rising Concentration in Agricultural Input Industries Influences New Farm Technologies,* AMBER WAVES (Dec. 3, 2012), https://www.ers.usda.gov/amber-waves/2012/december/rising-concentration-in-agricultural-input-industries-influences-new-technologies/.

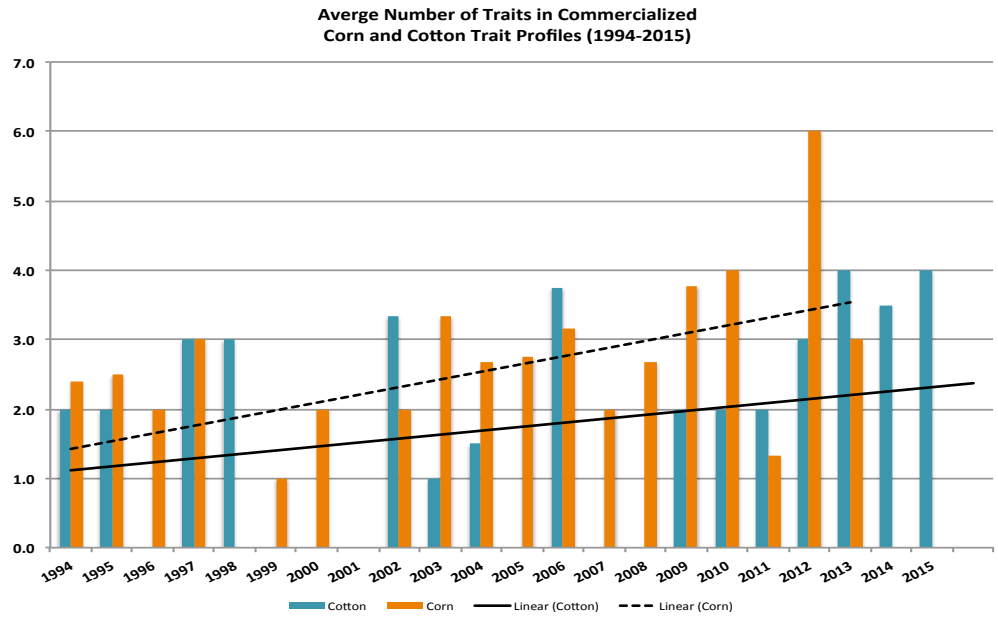
[10] Mahdiyeh Entezarkheir & Saeed Moshiri, *Is Innovation a Factor in Merger Decisions? Evidence from a Panel of U.S. Firms* 17 (July 8, 2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2808059.

[11] In this analysis, a "commercialization" is a trait profile that has advanced to the point where it has been given a trade name based on the records maintained by the International Service for the Acquisition of Agri-Biotech Applications (ISAAA). *See* GM Approval Database, ISAAA (last updated June 29, 2017), http://www.isaaa.org/gmapprovaldatabase/.

The pro-cyclical nature of M&A and innovation raises important questions that have been debated for many years. While the precise nature of the relationship has not been fully explored in agricultural biotechnology, we can say that the largest companies have probably engaged in M&A to proactively or reactively cope with the pressures of continued innovation.[12] Monsanto and Bayer may well raise arguments that the proposed merger is necessary to maintain or generate new innovation. We encourage the DOJ to be particularly skeptical of any such claims.

B. Increasing Complexity of Crop Traits is Not Necessarily in the Interest of Farmers

Crop trait profiles have become more complex over time as more traits have been stacked together. This trend is shown for cotton and corn in the figure below. There were, on average, two traits in a commercialized corn trait profile in 1995. By 2013, this had increased to almost six traits. In cotton, trait profiles commercialized in 1995 contained, on average, two traits. By 2013, this had doubled to four traits. While an increased *variety* of traits in general is a positive development, stacked traits may be costly to farmers if they must buy seeds with traits that they do not need or want. This constrains choice and drives up prices because farmers pay for undesired traits such as resistance to insects that are not regionally common or tolerance to herbicides that they do not intend to use.



Monsanto and Bayer state that "R&D synergies," or cuts to traits research, are among the three major categories of cost synergies expected from their merger.[13] By eliminating independent rivals and cutting traits development programs, the proposed merger will likely reduce incentives for Monsanto-Bayer and the few remaining agricultural biotechnology

[12] James F. Oehmke & Christopher A. Wolf, *Measuring Concentration in the Biotechnology R&D Industry: Adjusting for Interfirm Transfer of Generic Materials*, 6 AGBIOFORUM 134 (2003).
[13] *See* Creating a Global Leader in Agriculture, Investor Conference Call ("Investor Handout") (Sept. 14, 2016), 20, https://www.advancingtogether.com/en/home/.

firms to develop crop trait profiles that *best* meet the needs of farmers for specific growing regions and climates. With the elimination of traits development programs, farmers could well see lower quality innovation and trait profiles that potentially do not address their needs. An antitrust review of the proposed merger should focus on these important non-price dimensions of competition.

C. Choices in Traited and Conventional Seed Have Been Constrained Over Time

Consolidation in agricultural biotechnology has affected price, availability, and choice in *both* traited seeds and conventional seeds. When the largest agricultural biotechnology companies absorbed the majority of independent conventional and hybrid seed breeders, they obtained the intellectual property from their seeds and germplasm. Among other effects, this constrained conventional commodity crop seed lines, limiting choice for farmers who often cannot find conventional seeds and, in turn, for consumers that may prefer non-genetically engineered foods and products. *Corn & Soybean Digest* reported in 2009 that "[s]eed companies have either cut back on non-biotech offerings or have dropped them."[14] Over the past decades, Monsanto has repeatedly discontinued the seed lines of the companies it has acquired.[15]

Farmers that want to buy conventional, hybrid corn, and soybean seeds cannot always find them or face higher search costs to secure the seeds they want.[16] A 2015 survey found that in countries that cultivate genetically modified cotton, including the United States, 60% of farmers had difficulty securing conventional seeds.[17] And a 2013 study found that the number of available corn varieties was lower in European countries that allowed for patented biotechnology seeds than in countries that restricted biotechnology cultivation.[18] This has resulted in fewer seed choices appropriate to specific regional conditions or climate. We encourage the DOJ to consider the effect of the proposed merger on accelerating the potential loss of choice across traited and conventional seed.

---

[14] Lynn Grooms, *Non-Biotech Soybean Seed: Is There Enough?*, CORN & SOYBEAN DIGEST (Apr. 1, 2009), http://www.cornandsoybeandigest.com/non-biotech-soybean-seed-there-enough.

[15] *See:* Monsanto Co., 2002 Annual Report 28, http://www.annualreports.com/HostedData/AnnualReportArchive/m/NYSE_MON_2002.pdf; Monsanto Co., Quarterly Report (Form 10-Q) at 37 (July 2, 2010), https://www.sec.gov/Archives/edgar/data/1110783/000095012310063363/c58885e10vq.htm; Monsanto Co., Annual Report (Form 10-K) at 68 (Nov. 11, 2011), https://otp.investis.com/clients/us/monsanto/SEC/sec-show.aspx?Type=html&FilingId=8240001&CIK=0001110783&Index=10000.

[16] Grooms, *supra* note 14; Liz Morrison, *Is Conventional Corn Worth Considering?*, CORN & SOYBEAN DIGEST (Apr. 21, 2013), http://www.cornandsoybeandigest.com/corn/conventional-corn-worth-considering.

[17] LOUIS BOLK INST., SEED AVAILABILITY FOR NON-GM COTTON PRODUCTION 11 (Mar. 2015), http://orgprints.org/28910/1/Seed-Availability-for-non-GM-Cotton-Production_final_30042015-LouisBolkInstitute.pdf.

[18] Angelika Hilbeck et al., *Farmers Choice of Seeds in Four EU Countries Under Different Levels of GM Crop Adoption*, 25:12 ENVTL. SCI. EUR. (May 20, 2013), https://enveurope.springeropen.com/track/pdf/10.1186/2190-4715-25-12?site=enveurope.springeropen.com.

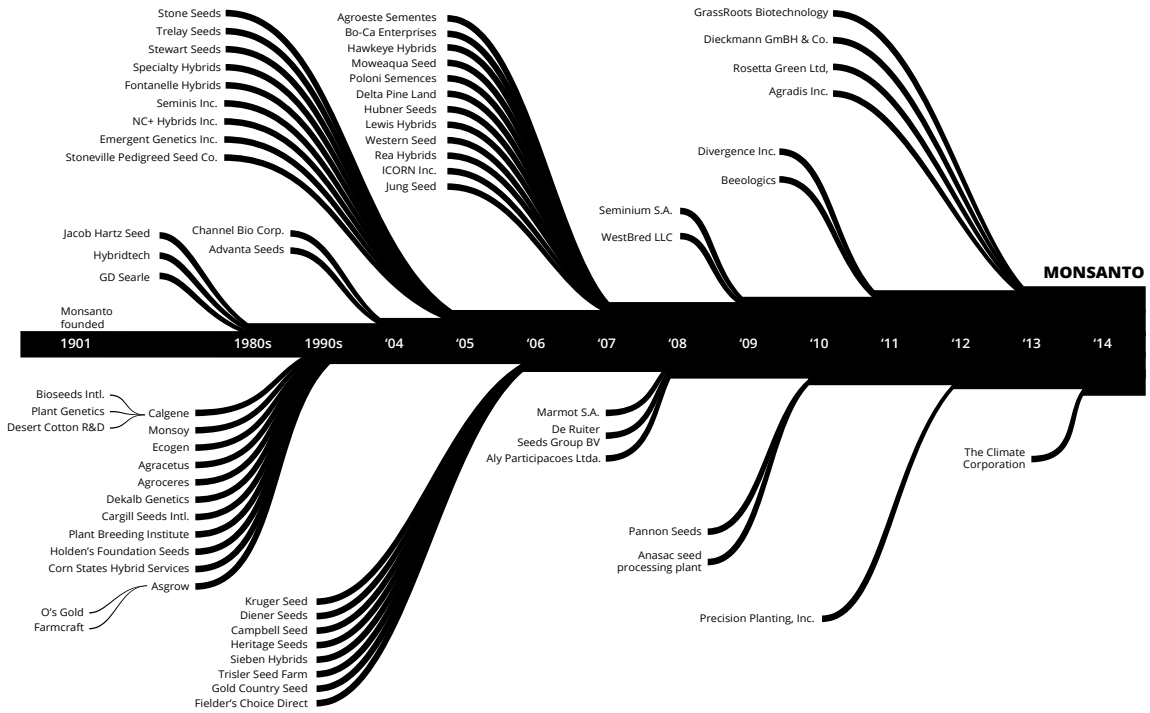
II. The Proposed Merger of Monsanto and Bayer

Monsanto-Bayer is one of several recent merger proposals in markets with a sharply declining number of rivals.[19] The Dow-DuPont and Syngenta-ChemChina deals are now consummated. The ranking of the largest agricultural biotechnology firms by total sales from seeds, traits, and crop protection is: Syngenta ($17.3 billion), Dow-DuPont ($17.0 billion), Monsanto ($14.8 billion), Bayer ($12.1 billion), and BASF ($6.7 billion).[20] The proposed merger of Monsanto and Bayer would combine the third and fourth largest firms, moving the merged firm to the top with $26.9 billion in combined revenue – 40% of combined industry revenue. If approved, the resulting industry structure would create a "Big 3," dominated by Monsanto-Bayer, Syngenta-ChemChina, and Dow-DuPont. BASF would be a distant fourth. Before the current wave of mergers, a mere two years ago, there were six major rivals in agricultural biotechnology.

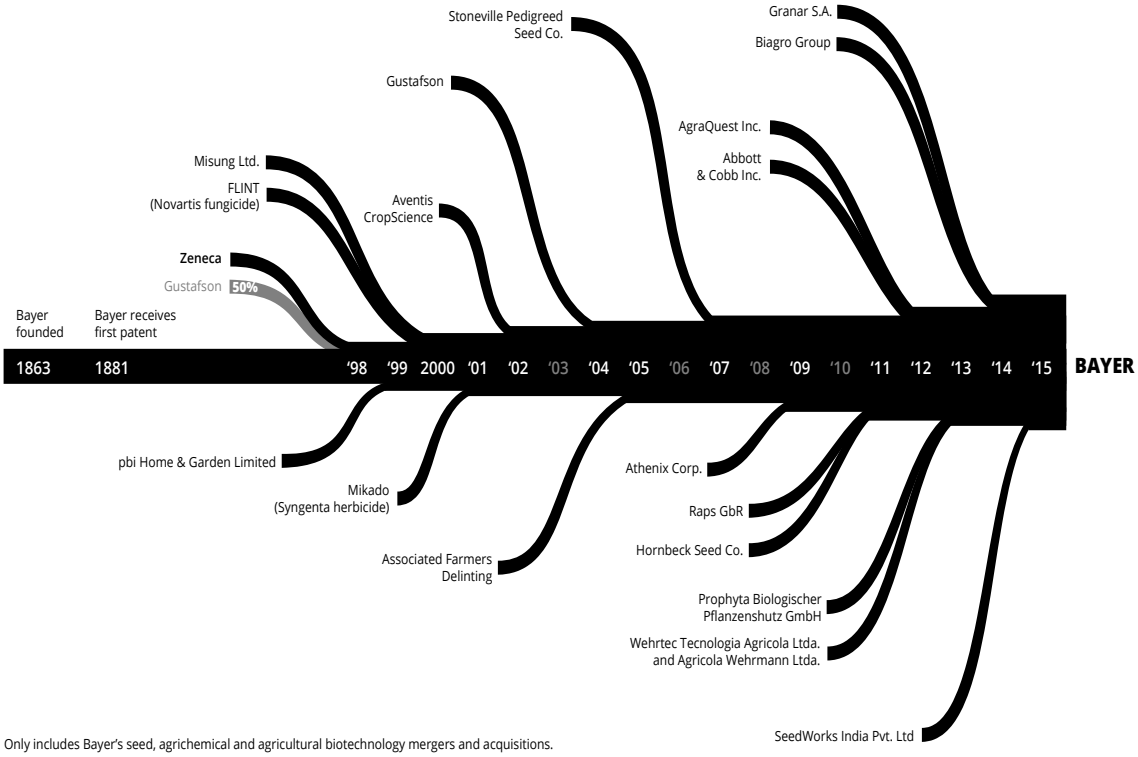
Monsanto and Bayer investor documents show that their product portfolios compete head-to-head. They show overlaps in seed and traits for soybeans, crop protection for corn and soybeans, and "digital farming."[21] Absent from these documents, however, is *any relevant* information on cotton and canola, where they have significant overlaps, as discussed in the body of this white paper. The history of Monsanto's and Bayer's agrichemical and agricultural biotechnology M&A shown in the figures below provides some context for areas in which significant head-to-head competition will be eliminated by the proposed merger. They demonstrate, particularly for Monsanto, an aggressive expansion strategy over time, driven primarily by acquiring competitors, as opposed to organic growth. Over the period, for example, Monsanto acquired over 60 seed and genomics companies.

[19] *See, e.g.*, Mike Verdin, *Bayer Unveils $62bn Offer for 'Perfect Match' Monsanto*, AGRIMONEY (May 23, 2016), http://www.agrimoney.com/news/bayer-unveils-$62bn-offer-perfect-match-monsanto--9576.html.
[20] Investor Handout, *supra* note 13 at 9 (Based on 2015 pro forma sales data. Euros converted to U.S. dollars based on current exchange rates. Dow-DuPont revenues do not account for the value of any divestitures required by the U.S. Department of Justice or the European Commission in their recent enforcement decisions.).
[21] *Id.* at 14.

Monsanto Mergers and Acquisitions (1980s - 2014)



Bayer Mergers and Acquisitions (late 1990s - 2015)



Only includes Bayer's seed, agrichemical and agricultural biotechnology mergers and acquisitions.

III. The Proposed Merger Will Substantially Reduce Competition in Traited Cottonseed

The proposed merger of Monsanto and Bayer will combine the two largest sellers of traited cottonseed in the U.S. and regional geographic cotton growing areas. In *United States v. Monsanto Co.* (Monsanto and Delta and Pine Land), the DOJ alleged that the proposed merger would eliminate competition in the development, breeding, and sale of traited cottonseed, in violation of Section 7 of the Clayton Act.[22] Such a market should also be defined in Monsanto-Bayer.

The following table shows market shares for the 2016 Upland cotton crop in various growing regions of the U.S. and for the U.S. as a whole.[23] Monsanto is already the largest supplier of traited cottonseed in the U.S. and in two of the four major U.S. growing regions. The combination of Monsanto and Bayer will create a firm with substantial markets shares in all four growing regions and in the U.S. These shares are particularly high in the Southeast (73%), South Central (65%), and Far West (67%). Merger-induced increases in market concentration vastly exceed the thresholds set forth in the Guidelines for highly concentrated markets.[24] Post-merger market concentration for the U.S. national market is about 4,000 HHI, almost 5,800 HHI for the Southeast, about 4,700 HHI for the South Central region, almost 3,700 HHI for the Southwest, and about 5,000 HHI for the Far West.

[22] Complaint at 10-11, United States v. Monsanto Co., 1:07-cv-00992 at 10-11 (D. D.C. May 21, 2007), https://www.justice.gov/atr/case-document/complaint-161. As part of the consent order, the DOJ required (among other things) Monsanto to sell Delta and Pine Land's Stoneville cotton asset. Final Judgment at 4-8, United States v. Monsanto Co., 1:07-cv-00992 (D. D.C. Nov. 6, 2008), https://www.justice.gov/atr/case-document/final-judgment-136. Stoneville was sold to Bayer. *Monsanto Sells Cottonseed Brand to Bayer Cropscience*, AGRICULTURE (June 1, 2007), http://www.agriculture.com/news/business/Monsanto-sells-cottonseed-brand-to-Bayer-CropScience_5-ar2710. The proposed merger of Monsanto and Bayer would potentially bring Stoneville full circle, back under the ownership of the merged company.

[23] *See* U.S. DEP'T OF AGRIC., AGRIC. MARKETING SERV. COTTON AND TOBACCO PROGRAM MEMPHIS, TENNESSEE COTTON VARIETIES PLANTED, 2016 CROP, (Sept. 14, 2016), https://www.ams.usda.gov/mnreports/cnavar.pdf. Phytogen are attributed to Dow. Phytogen is a joint venture formed in 1998 by Mycogen (a Dow Subsidiary) and J.G. Boswell. Mycogen has a 51% interest in the joint venture. *See* Form 10-Q filed with the Securities and Exchange Commission (Jul. 10, 1998), at 6, http://pdf.secdatabase.com/2321/0001017062-98-001520.pdf

[24] GUIDELINES, *supra* note 3 § 5.3.

TABLE 1: EFFECT OF THE MONSANTO-BAYER MERGER ON TRAITED COTTONSEED MARKETS (2016)

Company	U.S.	Southeast	South Central	Southwest	Far West
	Market Shares				
Bayer	25.0	10.6	15.3	32.7	35.2
Monsanto	32.6	62.0	50.3	16.8	31.5
Dow-DuPont	12.9	21.8	15.8	8.4	22.9
Americot	22.4	2.6	13.7	33.1	1.2
All-Tex/Dyna-Gro	5.9	1.3	4.4	8.1	5.9
Croplan Genetics	0.5	1.5	0.2	0.2	0.0
Seed Source Genetics	0.0	0.0	0.1	0.0	0.0
Other	0.6	0.1	0.2	0.8	3.3
Total	100.0	100.0	100.0	100.0	100.0
Monsanto + Bayer	**57.6**	**72.6**	**65.5**	**49.5**	**66.7**
	HHI				
Pre-Merger HHI	2,395	4,444	3,217	2,583	2,800
Increase in HHI	**1,631**	**1,321**	**1,536**	**1,097**	**2,215**
Post-Merger HHI	**4,026**	**5,765**	**4,753**	**3,680**	**5,015**

The merger would create, by all measures, a dominant firm in traited cottonseed. In Monsanto and Delta and Pine Land, the DOJ alleged that the proposed merger would reduce choice and increase prices for farmers.[25] A combined Monsanto-Bayer would have equal, if not more powerful incentives. In such highly concentrated markets, as the DOJ also explained in Monsanto and Delta and Pine Land, entry into the breeding of transgenic varieties and development of traits would require many years and investments of tens of millions of dollars.[26] Entry here would be equally if not more untimely, unlikely, and insufficient.

IV. The Proposed Merger Will Eliminate Important Competition in Crop Traits

The proposed merger will have potentially significant adverse effects on competition in the market for crop traits. In Monsanto-Delta and Pine Land, the DOJ identified traits for cottonseed as a relevant line of commerce.[27] In Monsanto-Bayer, individual markets for traits for cotton, soybeans, canola, and corn can also be identified as relevant lines of commerce. We also encourage the DOJ to define crop traits as individual relevant product markets. Crop traits have proliferated over the last several years, as have stacked trait profiles, creating differentiated products for seed companies and ultimately the farmers they sell to.

[25] Complaint at 11-12, United States v. Monsanto Co., 1:07-cv-00992 (D. D.C. May 21, 2007), https://www.justice.gov/atr/case-document/complaint-161.
[26] *Id.* at 12.
[27] *Id.* at 4-5.

A. Market Shares for Crop Traits

A crop trait is created by combining one or more genetically modified events ("GM events" or "events") that confer specific characteristics on a plant. Such GM events are can be uniquely identified by their developer. As noted earlier, a crop trait profile can contain one trait or multiple or stacked traits. Stacks are often the result of collaborations between developers that agree to license their patented technologies.[28] In corn, for example, Syngenta's Agrisure Duracade 5222 corn trait profile contains five separate GM events developed by three different companies (Syngenta, Monsanto, and Dow).[29] Those five events confer on the plant six different traits, for a variety of herbicide tolerances, insect resistances, and metabolic characteristics.

To get a sense of competition in the markets for crop traits, we collected data for cotton, soybeans, canola, and corn.[30] We identified the GM events (and their associated developer) that make up single and stacked trait profiles that were approved and subsequently commercialized over the period 1993 to 2016.[31] Six different traits appear for cotton, nine for soybeans, eight for canola, and fourteen for corn. These include, depending on the crop, traits such as herbicide tolerance (e.g., glyphosate, glufosinate, etc.), insect resistance (e.g., coleopteran, lepidopteron, etc.), antibiotic resistance, modified oil/fatty acid, and fertility restoration. Some stacked trait profiles include multiple insect resistance or herbicide tolerance traits. This addresses the problem of growing resistance to insecticides and herbicides by doubling up on traits that confer similar and overlapping characteristics in the plant.

Corn has the largest number of trait profiles (60) that were commercialized between 1995 and 2014. Corn is followed by cotton, with 35 commercialized profiles between 1994 and 2015. Dow's Widestrike Roundup Ready Flex Vipcot cotton profile, for example, contains four traits and received approval in 2013.[32] Next is canola, with 31 profiles commercialized between 1994 and 2016. Seventeen trait profiles were commercialized in soybeans between 1993 and 2014. Monsanto's Intacta Roundup Ready 2 Pro soybean profile, for example,

---

[28] Since the mid 2000s, biotechnology innovators have agreed to cross-license their technologies in numerous instances for corn, soybeans, cotton and canola. *See, e.g.*, Press Release, Monsanto, Dow AgroSciences, Monsanto Cross-License Advanced Corn Trait Technology, Designed to Provide Exceptional New Tools for Weed and Insect Management (Apr. 11, 2013), http://news.monsanto.com/press-release/corporate/dow-agrosciences-monsanto-cross-license-advanced-corn-trait-technology-desig; Matt Hopkins, Dow AgroSciences, Syngenta To Cross License Traits, CropLife (Apr. 7, 2009), http://www.croplife.com/crop-inputs/seed-biotech/dow-agrosciences-syngenta-to-cross-license-traits/; Press Release, Soyatech, Dow AgroSciences, Bayer CropScience to Cross-License Cotton Technology (May 20, 2010), http://www.soyatech.com/news_story.php?id=18654; News Release, DuPont, DuPont and Syngenta Form Joint Venture to facilitate The Out-Licensing of Seed Genetics and Biotech Traits (Apr. 10, 2006), http://www2.dupont.com/Media_Center/en_US/news_releases/2006/article20060410b.html.

[29] Event Name: 5307 x Mir604 x Bt11 x TC1507 x GA21 x MIR162, ISAAA, http://www.isaaa.org/gmapprovaldatabase/event/default.asp?EventID=331 (last visited July 20, 2017).

[30] GM Approval Database, *supra* note 11.

[31] Dates are assigned to each trait profile based on the year in which it was approved for cultivation use anywhere in the world. If cultivation use was not available, we used the earliest year for approval for use in either food or feed. There were a very small number of instances in which this substitution was made.

[32] Event Name: 3006-210-23 x 281-23-236 x MON88913 x COT102, ISAAA, http://www.isaaa.org/gmapprovaldatabase/event/default.asp?EventID=374 (last visited July 24, 2017)

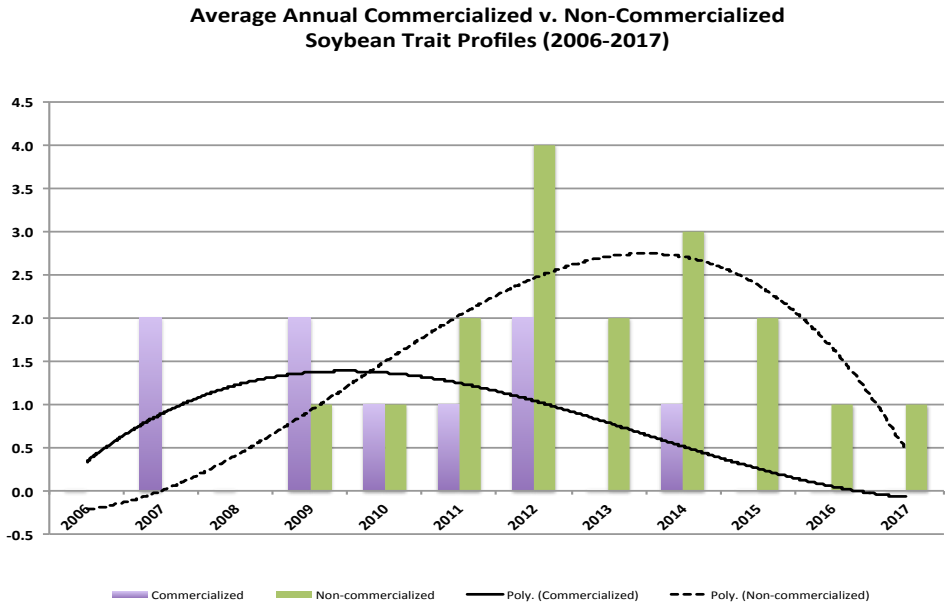
contains two traits and was approved in 2010.[33]

Our approach calculates market shares based on a company's percentage of *total events* appearing in all commercialized trait profiles in the dataset, adjusted for mergers and acquisitions over time.[34] This multi-year "stock" approach (as opposed to assessing shares on an annual basis) is consistent with the fact that trait profile commercialization is very "lumpy." Years can go by without a commercialized product. In cotton, for example, no trait profiles were commercialized between 1999 and 2001 and, on average, less than one firm per year commercialized a cotton trait profile.[35]

Product development pipelines in agricultural biotechnology can also span multiple years, which makes it more difficult and potentially less accurate to measure market shares for crop traits on an annual basis. Commercialized crop traits are the product of many steps, including obtaining patents, performing field trials, gaining regulatory approvals, commercializing new products, and penetrating markets. The adoption of new technologies by farmers takes time due to crop planning and switching costs. Farmers must wait until the next planting season to deploy new traited seed products. And they will generally not plant crops for which regulatory approvals for export markets have not yet been obtained.[36]

The length of the product development pipeline is particularly apparent in the lags between commercialized trait profiles and those that have not yet been commercialized. As shown in the figure below, the peak of the most recent cycle of commercialized trait profiles for soybeans was around 2009, while the peak for non-commercialized trait profiles was 2013. This lag between commercialized and non-commercialized products supports the notion that firms' shares of crop traits markets are more accurately assessed over a longer period of time.

[33] Event Name: MON87701 x MON89788, ISAAA http://www.isaaa.org/gmapprovaldatabase/event/default.asp?EventID=159 (last visited July 24, 2017).
[34] This is undoubtedly not the only approach to measuring market shares in crop traits. We relied on publicly available information on trait profiles with trade names as a proxy for commercialization.
[35] Similarly low rates of trait profile commercializations are apparent in soybeans and canola, with a somewhat higher rate in corn.
[36] This includes the slow and protracted approval processes in China or Europe, which can delay widespread trait adoption.



B. The Proposed Merger Will Substantially Eliminate Competition in Crop Traits and Tighten Existing Oligopolies

The table below summarizes market shares based on GM events contained in commercialized crop traits in cotton, soybeans, canola, and corn. The results highlight the already limited competition in markets for crop traits for cotton, soybeans, and canola. Cotton has four players (Monsanto, Syngenta, Dow, and Bayer). There are only two major players (Monsanto and Bayer) in soybeans and Bayer dominates canola, with Monsanto as a secondary player. The merger would significantly consolidate these markets. Post merger, Monsanto-Bayer would hold 58% of cotton events appearing in commercialized crop trait profiles, 72% soybeans, and 97% of canola. The merger substantially increases market concentration to levels above the Guidelines' thresholds in crop traits markets. For example, post-merger concentration in cotton is about 4,300 HHI, about 5,400 HHI for soybeans, and 9,500 HHI for canola.

TABLE 2: EFFECT OF THE MONSANTO-BAYER MERGER ON CROP TRAIT MARKETS FOR COTTON, SOYBEANS, CANOLA, AND CORN

Cotton (1994-2015)		Soybeans (1993-2014)	
Company	**Share (%)**	**Company**	**Share (%)**
Monsanto	30.9	Monsanto	33.3
Syngenta	20.0	Syngenta	5.6
Dow-DuPont	21.8	Dow-DuPont	16.7
Bayer	27.3	Bayer	38.9
-	-	BASF	5.6
Total	100.0	Total	100.0
Monsanto + Bayer	**58.2**	**Monsanto + Bayer**	**72.2**
Merger-Related Changes	**HHI**	**Merger-Related Changes**	**HHI**
Pre-Merger HHI	2,575	Pre-Merger HHI	2,840
Increase in HHI	**1,686**	**Increase in HHI**	**2,593**
Post-Merger HHI	**4,261**	**Post-Merger HHI**	**5,432**
Canola (1994-2016)		**Corn (1995-2016)**	
Company	**Share (%)**	**Company**	**Share (%)**
Monsanto	20.5	Monsanto	28.9
Dow-DuPont	2.6	Syngenta	39.7
Bayer	76.9	Dow-DuPont	23.1
-	-	Bayer	5.8
-	-	Other	2.5
Total	100.0	Total	100.0
Monsanto + Bayer	**97.4**	**Monsanto + Bayer**	**34.7**
Merger-Related Changes	**HHI**		
Pre-Merger HHI	6,345	Pre-Merger HHI	2,914
Increase in HHI	**3,156**	**Increase in HHI**	**335**
Post-Merger HHI	**9,500**	**Post-Merger HHI**	**3,249**

The data also show that the proposed merger will fundamentally restructure several of the crop traits markets. Dow-DuPont and Monsanto-Bayer would have a duopoly on traits in cotton, with a combined share of almost 80%. They would also have duopolies in soybeans and canola, with a combined share of almost 90% and 100%, respectively. It is well known that oligopoly markets are more conducive to anticompetitive outcomes through coordinated conduct, not only in terms of price, but non-price dimensions of competition as well.

C. The Merger Would Reduce Opportunities for Pro-Competitive Collaborations In Developing New Crop Traits

The proposed Monsanto-Bayer merger will also eliminate opportunities for independent biotechnology firms with strong incentives to engage in pro-competitive collaborations to develop new trait profiles. The growing complexity of crop trait profiles emphasizes the importance of maintaining a field of rival developers to protect the competitive process of collaboration and licensing. The loss of competition in R&D could well change the dynamics of how licensing occurs. Competition minimizes incentives to refuse to license or to impose discriminatory restrictions in technology licensing agreements. Moreover, competition limits incentives for just a few large players in a tight oligopoly to tacitly or even explicitly "agree" not to compete. Such agreements could range from deciding which firms specialize in certain crops or traits, to coming to agreement on market "rules," such as restrictive cross-licensing

terms and conditions.[37]

Farmers benefit most when there are competing, affordable stacked profiles to choose from that contain region and climate-appropriate seeds to raise food crops. By reducing the field of rivals, the Monsanto-Bayer merger could lead to higher prices for traited seed and trait profiles that do not meet the needs of farmers, because they contain traits that they do not want or need. Likewise, food consumers benefit from crops have not been disrupted by pests or weed infestations driven by growing resistance to ubiquitous traits. Less diversity in the crop system could magnify shocks, weather, disease, or even acts of bio-terrorism. These outcomes would be detrimental to the competitive process, smaller innovative firms attempting to enter the market, farmers, and food consumers.

V. The Merger is Likely to Eliminate Important Competition in R&D Markets

A. The DOJ's Focus on R&D Markets Also Applies Here

The Guidelines take seriously the potential adverse effect of a merger on R&D competition.[38] They note that competition "often spurs firms to innovate" and that a merger may diminish innovation competition through curtailment of "innovative efforts below the level that would prevail in the absence of the merger."[39] The Guidelines go on to explain that adverse effects on innovation are particularly likely when the merging firms are "two of a very small number of firms with the strongest capabilities to successfully innovate in a specific direction."[40]

The antitrust agencies have opposed mergers on the basis of eliminating R&D competition. In the proposed merger of Applied Materials and Tokyo Electron, for example, the parties abandoned the merger after DOJ objected on the ground that the deal "would have combined the two largest competitors with the necessary know-how, resources and ability to develop [next-generation] and supply high-volume non-lithography semiconductor manufacturing equipment."[41] In *United States v. Halliburton* the DOJ objected to the deal, explaining that it would harm innovation by combining companies that "compete to . . . develop next generation technologies that will allow them to drill deeper and operate in ever-more challenging conditions."[42]

In a fact pattern similar to other merger cases opposed by the government, Monsanto and Bayer are two of a very small number of rivals with the strongest capabilities to successfully innovate. Company documents reveal that their R&D pipelines overlap substantially across

---

[37] *See, e.g.*, Robert H. Lande and Howard P. Marvel, *Collusion Over Rules*, 16 ANTITRUST 36 (2002).
[38] *See* GUIDELINES, *supra* note 3 § 6.4.
[39] *Id.*
[40] *Id.*
[41] Press Release, U.S. Dep't of Justice, Applied Materials Inc. and Tokyo Electron Ltd. Abandon Merger Plans After Justice Department Rejected Their Proposed Remedy (Apr. 27, 2015), https://www.justice.gov/opa/pr/applied-materials-inc-and-tokyo-electron-ltd-abandon-merger-plans-after-justice-department.
[42] Complaint at 2, United States v. Halliburton Co., 1:16-cv-00233-UNA (D. Del. Apr. 6, 2016), https://www.justice.gov/atr/file/838661/download.

seeds, traits, and crop protection.[43] Their R&D capabilities are associated with their specific assets and characteristics in genetics, plant breeding, and germplasm programs. Accordingly, it would be appropriate to define an R&D market.[44] And the industry's push to package together their own crop traits, seeds, and crop protection chemicals into "integrated" systems (presumably to compete against rivals' integrated systems) supports the notion that innovation capability is firm specific.[45]

As noted earlier, Monsanto and Bayer anticipate cuts to traits research as a major area of cost synergies. We encourage the DOJ to view this claim in the context of the potential anticompetitive effects of the proposed merger. As the Guidelines state: "Explicit or implicit evidence that the merging parties intend to raise prices . . . or curtail research and development efforts after the merger[] can be highly informative in evaluating the likely effects of a merger."[46] The parties should have a high burden to show that this is an efficiency, not an anticompetitive harm.

B. The Merger Could Stifle Incentives to Innovate or Lead to Lower-Quality Innovation

Proponents of consolidation have long argued that expansion through merger is necessary to maintain or generate higher levels of R&D. We urge the DOJ to be skeptical of any claim that higher levels of concentration (through merger) are necessary to maintain or generate new innovation. This argument has been rebutted by recent research by the U.S. Department of Agriculture (USDA) Economic Research Service (ERS). In 2012, for example, the agency reported findings that the four-firm concentration ratio in crop seed and traits increased from about 21% in 1994, to 33.5% in 2000, to 54% in 2009. At the same time, R&D intensity (as measured by the R&D-to-sales ratio) was 11% in 1994, increased to 15% in 2000, but declined precipitously to 10.0% in 2009.[47]

There are compelling reasons why a Monsanto-Bayer merger could stifle incentives to innovate or lead to lower quality innovation. For example, "parallel path" innovation by rival companies is important. Two leading economists have noted in regard to pharmaceutical R&D that "[t]echnological progress is best achieved in a field like pharmaceuticals when there is widespread dispersion of R&D initiatives both across companies and within them through the exploration of multiple technical paths."[48] There is a lesson here for agricultural

---

[43] *See, e.g.,* Annual R&D Pipeline Review, Monsanto (Jan. 2017), at 13-15, https://monsanto.com/app/uploads/2017/05/2017.01.05_q1f17_mon_pipeline_update.pdf. *See also* Annual Report 2016, 1.3 - Focus on Innovation, Table A 1.3/6, http://www.annualreport2016.bayer.com/management-report-annexes/about-the-group/research-development-innovation/crop-science.html.

[44] *See* U.S. DEP'T OF JUSTICE & FEDERAL TRADE COMM'N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY § 3.2.3 (2017).

[45] Investor Handout, *supra* note 13, at 12.

[46] GUIDELINES, *supra* note 3 at 2.2.1.

[47] KEITH O. FUGLIE ET AL., ECON. RESEARCH SERV., USDA, REPORT NO. 130, RESEARCH INVESTMENTS AND MARKET STRUCTURE IN THE FOOD PROCESSING, AGRICULTURAL INPUT, AND BIOFUEL INDUSTRIES WORLDWIDE, 15 (2011), https://www.ers.usda.gov/webdocs/publications/44951/11777_err130_1_.pdf?v=41499.

[48] William S. Comanor & F.M. Scherer, *Mergers and innovation in the pharmaceutical industry*, 32 J. HEALTH ECON. 106, 107 (2013).

biotechnology. Maintaining parallel path competition in R&D is essential for ensuring that incentives remain strong to continue existing and prospective product development programs.

Moreover, as noted in recent USDA research, there is "good reason to think that increases in concentration do not persistently lead to greater incentives to innovate; rather, beyond some high level of concentration, further increases could actually reduce the incentive to innovate."[49] There are a number of possible reasons for this, notwithstanding the fact that firms can appropriate returns from innovation more easily with less competition. One, with robust competition, new product development is done with an eye toward stealing sales from rivals. But with fewer rivals and consolidated or reduced numbers of product lines, new product development can increase the risk that the innovator cannibalizes its own sales of existing products.[50]

Two, there is less fear of losing to an innovative rival's new product when there is less competition, thus dampening incentives to stay ahead of the innovation curve.[51] For example, Monsanto's Roundup Ready 1 (RR1) soybeans came off patent in 2014. Well in advance of that, Monsanto attempted to switch farmers from RR1 to Roundup Ready 2 soybeans, a new patented technology that was marginally different from RR1.[52] Three, with a tight oligopoly in agricultural biotechnology, there are more incentives for firms to engage in anticompetitive coordination. Such coordination can involve innovation, ranging from agreeing to "divide" R&D markets into specific functions and crop areas, to agreeing on the terms and conditions of cross-licensing technologies.

These factors collectively support the notion that diminished competition can dampen incentives to engage in R&D, or to degrade its quality, leading to more expensive trait technologies or those that do not meet the needs of farmers. This analysis counters any arguments that proposed Monsanto-Bayer merger will enhance R&D capability or productivity. It undercuts claims that combining overlapping or complementary agricultural biotechnology R&D pipelines can produce significant efficiencies. Any R&D efficiencies that are merger specific and cognizable would presumably be overwhelmed by the potential anticompetitive effects of the proposed merger.[53]

---

[49] James. M. MacDonald, *Mergers and Competition in Seed and Agricultural Chemical Markets*, AMBER WAVES (Apr. 3, 2017), https://www.ers.usda.gov/amber-waves/2017/april/mergers-and-competition-in-seed-and-agricultural-chemical-markets/.

[50] *Id.*

[51] *Id.*

[52] Arguably, Monsanto's strategy was also to stave off generic competition in RR1 soybeans, which never materialized on a sizeable scale. *See* Diana L. Moss, *Generic Competition in Transgenic Soybeans*, AM. ANTITRUST INST. (Aug. 16, 2011), http://www.antitrustinstitute.org/sites/default/files/AAI%20Paper%20generic%20comp%20TG%20seed8.16.11.pdf; *see also* Frank Morris, *Monsanto GMO Ignites Big Seed War*, NPR (Jan. 12, 2010), http://www.npr.org/templates/story/story.php?storyId=122498255; *See also* Daryl Lim, *Living with Monsanto*, 2015 MICH. ST. L. REV. 559, 584 n.134 (2015); Daryl Lim, *Self-Replicating Technologies and the Challenge for the Patent and Antitrust Laws*, 32 Cardozo Arts & Ent. L.J. 131, 218 (2013).

[53] *Cf.* United States v. Anthem, Inc., 855 F.3d 345, 364 (D.C. Cir. 2017) ("[T]he district court reasonably determined that Anthem failed to show the kind of 'extraordinary efficiencies' that would be needed to constrain price increases in this highly concentrated market, and to mitigate the threatened loss of innovation.").

VI. Conclusion

The foregoing analysis illustrates the potential detrimental effects of a Monsanto-Bayer combination on competition, the competitive process, farmers, and consumers. We urge the DOJ to carefully assess and scrutinize its possible effects, as explained in our analysis above. The American farmer depends on traited, as well as conventional, seed to grow a diverse portfolio of high quality, affordable products for consumers. Farmers already pay high prices for seed technology and increasingly struggle with products that contain unwanted or unneeded traits. The proposed merger will likely worsen this situation, and consumers could see reduced quality, reduced choice, and higher prices.

Moreover, the adverse effects of the proposed merger could not easily be remedied with divestitures. In already highly concentrated markets, it would be difficult to find viable buyers who could successfully maintain cottonseed, traits, and R&D assets without also reducing competition. A game of "musical chairs" among a dwindling set of players is a not a prescription for healthy, competitive agricultural input markets. Based on the analysis suggested here, the DOJ should just say "no."