UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF AGRICULTURE

Competition and the Intellectual Property System: Seeds and Other Agricultural Inputs	Docket No. AMS-AMS-22-0025

COMMENTS OF THE AMERICAN ANTITRUST INSTITUTE

The United States Department of Agriculture ("USDA"), in its Request for Public Comments in Docket No. AMS-AMS-22-0025 ("RPC"), seeks comments and information from the public. This information will assist USDA with preparing the report required by President Biden's July 9, 2021, Executive Order titled "Promoting Competition in the American Economy" ("Executive Order") and advancing policy steps on seeds and other agricultural inputs identified in and developed by the report. The American Antitrust Institute's ("AAI") comment specifically addresses the competition and concentration concerns raised by the RPC related to genetic seed traits and transgenic seed ("agricultural biotechnology").

I. The Interest of the American Antitrust Institute

AAI is an independent, nonprofit organization with a mission to promote competition that protects consumers, businesses, and society.[1] We serve the public through research, education, and advocacy on the benefits of competition and the use of antitrust enforcement as a vital component of competition policy. AAI has provided legal and economic analysis, commentary, and testimony on mergers, anticompetitive conduct, agricultural policy, and competition policy involving the food and agriculture sector since the organization's founding in 1998.

[1] *See* https://antitrustinstitute.org for more information.

II. Unchecked Consolidation in Agricultural Biotech

Unchecked consolidation has characterized the agricultural biotechnology industry for decades. Three recent major mergers—Bayer-Monsanto, Dow-DuPont, and ChemChina-Syngenta—have reduced the industry to a tight oligopoly of three mega-firms, with BASF trailing in last place. The mergers, and the fundamental restructuring of global and U.S. agricultural biotechnology markets they have wrought, raise seminal issues for competition in the sector. The adverse effects of higher concentration are being felt at various levels. Growers face lower prices for their commodities as a result of buyer power at the processing levels. Consumers face higher food prices, lower quality, and less innovation as a result of seller power in processing, manufacturing, and retail grocery. And, society faces a less secure and a less stable food supply.

A. The Rise of Genetic Seed Trait Technology

The percentage of acreage planted with genetically modified ("GM" or "transgenic") crop seed has increased dramatically since its introduction in the 1990s. In 2019, almost all corn (92 percent), cotton (98 percent), and soybean (94 percent) acreage was planted with GM varieties.[2] The traits that are incorporated into GM crop seed confer on plants a variety of characteristics such as herbicide tolerance, insect resistance, and other functional attributes (e.g. high oleic soybeans). Increasingly, these attributes are made possible by combining patented genetic events that often result from collaborations between agricultural biotechnology developers that are embodied in cross-licensing agreements. Combinations of genetic events enable different plant traits, which often appear in multiples or "stacks" in GM crop seed. Often, the company sells the GM seed and the

[2] U.S. Dep't. of Agric., Nat'l Agric. Stat. Serv., Acreage (June 30, 2001 and June 30, 2019) https://usda.library.cornell.edu/concern/publications/j098zb09z?locale=en&page=3#release-items. In 2001, only 26 percent of corn acres, 69 percent of cotton acres, and 68 percent of soybean acres were planted with GM varieties.

affiliated herbicide, forcing farmers to purchase both patented seeds and agro-chemicals from the same company.

Trait profiles have increased in complexity over time. This complexity is designed to combat weeds' and insects' growing resistance to an aging mode of action, and purportedly generates higher yields for growers. But stacking is also a function of supply "push" by the agricultural biotechnology industry to introduce newer, purportedly higher value products with commensurately higher profit margins. The average number of traits in commercialized corn and cotton trait profiles increased from two to six and two to four, respectively, between 1995 and 2013. The percentage of U.S. acreage planted with stacked varieties has also increased. Only 1 percent of corn acres and 24 percent of cotton acres were planted with stacked varieties in 2000. By 2019, 80 percent of corn acres and 89 percent of cotton acres were planted with stacked varieties.[3]

B. Consolidation in Agricultural Biotechnology

The "Big 3" agricultural biotechnology firms are the product of a spate of mergers between large incumbents over the last few years. The then-Big 6 were the result of two previous waves of consolidation, one in the mid-1980s through the late 1990s and a second from the late 1990s through the mid-to-late 2000s.[4] Between 1985 and 2000, about 75 percent of the small to medium-size enterprises engaged in biotechnology research were acquired by larger firms.[5] In the second

[3] USDA, *supra* note 2.
[4] *See* Diana L. Moss, *Competition, Intellectual Property Rights, and Transgenic Seed*, 58 S.D. L. REV. 543, 551-52 (2013); *see also* Gregory D. Graff, Gordon C. Rausser & Arthur A. Small, *Agricultural Biotechnology's Complementary Intellectual Assets*, 85 REV. ECON. & STAT. 360-61 (2006).
[5] 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/.

wave, Monsanto alone acquired almost 40 agricultural biotechnology firms and independent seed companies.[6]

The most recent wave of consolidation is distinguished by the sharp reduction in the number of very large rivals in crop traits, GM crop seed, and crop protection, and a parallel spate of acquisitions of small digital farming startups. Relative to other agricultural input sectors, the level of concentration and increases in concentration over time are the highest in crop seed. The market share of the four largest firms more than doubled to 54 percent between 1994 and 2009.[7] After completion of the Syngenta-ChemChina, (2018), Dow-DuPont (2017) and Bayer-Monsanto (2018) mergers, the Big 3 now account for the majority of output in the seed and traits markets for cotton, corn, and soybeans.[8]

The history of Monsanto's and Bayer's agrichemical and agricultural biotechnology M&A before their own merger, shown in the figures below, provides a powerful visual of this consolidation.[9]

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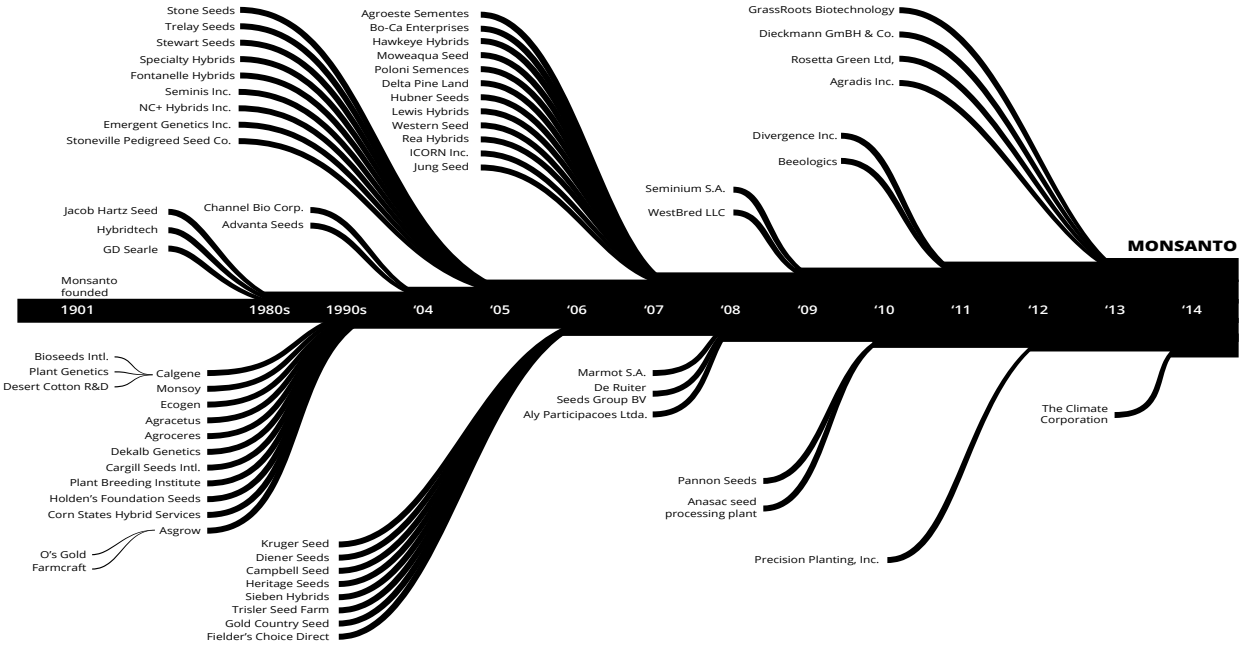
[6] *See* Carl Pray, James F. Oehmke & Anwar Naseem, *Innovation and Dynamic Efficiency in Plant Biotechnology: An Introduction to the Researchable Issues*, 8 AGBIOFORUM 52, 60 (2005); U.N. CONF. ON TRADE AND DEV., TRACKING THE TREND TOWARDS MARKET CONCENTRATION: THE CASE OF THE AGRICULTURAL INPUT INDUSTRY 5, 9-10 (Apr. 2006).
[7] Keith O. Fuglie, et al., *Research Investments and Market Structure in the Food, Processing, Agricultural Input and BioFuels Industries Worldwide,* U.S. Dep't of Agric., Econ. Res. Serv. Rep. No. 130 (Dec. 2011), vi, https://www.ers.usda.gov/webdocs/publications/44951/11777_err130_1_.pdf?v=0.
[8] Letter from AAI, FWW, and NFU to Principal Deputy Assistant Attorney General Renata Hesse (May 21, 2016), https://www.antitrustinstitute.org/wp-content/uploads/2018/08/AAI-FWW-NFU_Dow-Dupont_5.31.16_0.pdf; Letter from AAI, FWW, and NFU to Acting Assistant Attorney General Andrew Finch (Jul. 17, 2017), https://www.antitrustinstitute.org/wp-content/uploads/2018/08/White-Paper_Monsanto-Bayer_7.26.17_0.pdf.
[9] 2017 AAI-NFU Letter, *supra* note 8.

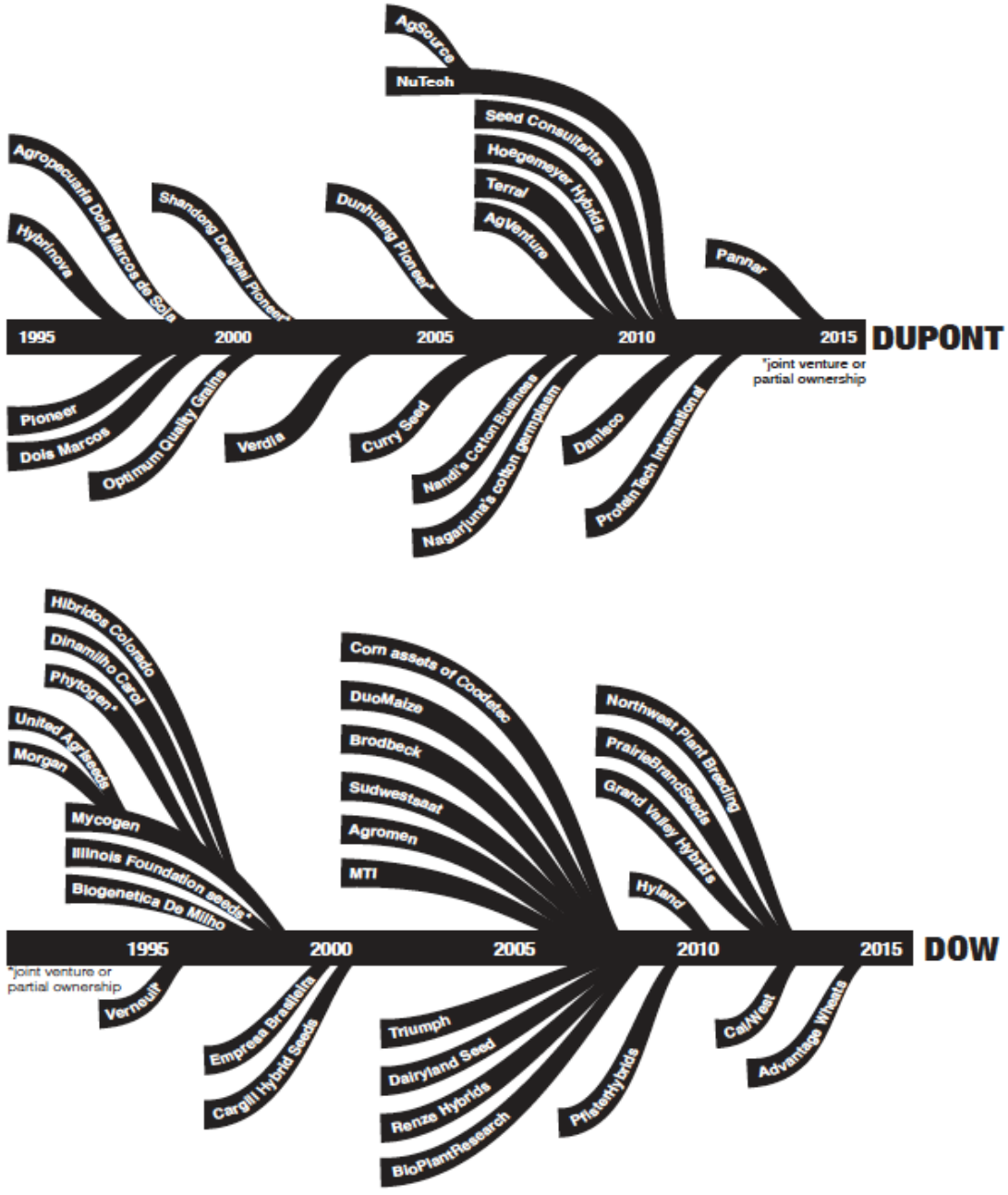
Monsanto Mergers and Acquisitions: 1901-2014



Monsanto's history demonstrates an aggressive expansion strategy, driven primarily by acquiring competitors, as opposed to organic growth. Over the period, for example, Monsanto acquired over 60 seed and genomics companies. Bayer likewise engaged in aggressive consolidation from the late 90's until its merger with Monsanto in 2018.

Dow and Dupont undertook similar merger-driven strategies prior to their 2017 merger, as illustrated below.[10]

[10] 2016 AAI-NFU Letter, *supra* note 8.



The significantly enhanced market power held by the Big 3, whether exercised unilaterally or in coordination, is felt directly by growers and ultimately by consumers. Growers already pay persistently high prices for GM crop seed, even for earlier generation technologies.

C. Consolidation Has Reduced Choice

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 of consolidation, this constrained conventional commodity crop seed lines, limiting choice for farmers who often cannot find conventional seeds and, in turn, for consumers who 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."[11]

Over the past decades, Monsanto has repeatedly discontinued the seed lines of the companies it has acquired.[12] Farmers that want to buy conventional corn and soybean seeds cannot always find them or face higher search costs to secure the seeds they want.[13] A 2015 survey found that in countries that cultivate genetically modified cotton, including the United States, 60% of farmers had difficulty securing conventional seeds.[14] And a 2013 study found that the number of available corn varieties was lower in European countries that allowed for patented biotechnology

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[11] 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.

[12] *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://www.sec.gov/Archives/edgar/data/1110783/000119312511309780/d244954d10ka.htm.

[13] Grooms, *supra* note 11; Liz Morrison, *Is Conventional Corn Worth Considering?*, CORN & SOYBEAN DIGEST (Apr. 21, 2013), http://www.cornandsoybeandigest.com/corn/conventional-corn-worth-considering.

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

seeds than in countries that restricted biotechnology cultivation.[15] This has resulted in fewer seed choices appropriate to specific regional conditions or climate.

D. Consolidation Has Increased Price

Advances in biotechnology have come with a high price tag. The U.S. Government Accountability Office ("GAO") observed significant price differentials between transgenic and conventional seed over 20 years ago, noting that "Monsanto's U.S. patents for Roundup Ready soybean seeds have given it and the companies to whom it has licensed the technology greater control over seed prices and has enabled them to restrict the availability and use of seeds."[16] This a troubling dynamic in markets with few rivals and where competition is shaped by strategic decisions about how, when and to whom they license their IP.[17]

The level of concentration and increases in concentration over time in crop seed are among the highest of all agricultural input sectors.[18] For example, the market share of the four largest firms more than doubled to 54% between 1994 and 2009.[19] In 2007, the four largest companies accounted for an estimated 72% of the U.S. market for corn seed and 55% of soybean seed, with Monsanto's share in corn and soybeans close to 65%.[20] In 2009, the top four companies held 95% of the U.S. market for cottonseed, with Monsanto and Bayer accounting for the lion's share.[21] In the traits markets in 2009, the Big 6 held greater than 95% of trait acres for corn, soybeans and cotton in the

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[15] 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.

[16] *See* U.S. Gen. Acct. Off., *Information on Prices of Genetically Modified Seeds in the United States and Argentina* 12 (Jan. 2000), https://www.gao.gov/products/t-rcednsiad-00-228.

[17] *See* Peter Carstensen, *Post-Sale Restraints via Patent Licensing: A "Seedcentric" Perspective*, 16 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1053, 1073 (2006); Diana L. Moss, *Competition, Intellectual Property Rights and Transgenic Seed*, 58 S. DAKOTA L.R. 543 (2013). *See also* U.S. Dep't of Agric., Econ. Res. Serv., *Adoption of Genetically Eng'r Crops in the U.S.*, https://www.ers.usda.gov/publications/pub-details/?pubid=45182.

[18] USDA (2011), *supra* note 7 at vi.

[19] *Id.* at 14.

[20] *Id.* at 35; Moss, *supra* note 4 at 13-14.

[21] *Id.*

U.S., with Monsanto alone accounting for 90% of these acres.[22] This concentration has only risen with the more recent mergers of Bayer-Monsanto and Dow-Dupont.

Technology fees represent a significant proportion of seed costs. USDA notes that the prices of farm inputs, led by crop seed, generally have risen faster over the last 20 years than the prices U.S. farmers have received for their crops and livestock.[23] Were that not enough, seed price increases have outpaced yield increases over time—the very problem that biotechnology is purportedly designed to solve.[24]

E. The "Concentration Drives Innovation" Fallacy

Contrary to long-standing claims that higher concentration is needed to spur investments in research and development ("R&D"), empirical analysis of the agricultural biotechnology sector supports the notion that concentration can actually stifle incentives to innovate. This calls into question long-standing arguments that concentration is needed to generate economies of scale in R&D.[25]

For example, USDA observed in 2012 that spending on R&D in crop seed and biotechnology between 1994 and 2010 grew 138%—the most significant rate observed across major agricultural input sectors.[26] USDA noted that R&D intensity (measured as a percentage of industry sales) increased from the late 1990s to early 2000s as biotechnology crops were introduced. But by

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[22] USDA (2012), *supra* note 5 at 4.
[23] *Id.* at 12-13.
[24] *See* Moss supra note 4. Data are derived from U.S. Dep't of Agric., Econ. Res. Serv., Commodity Costs and Returns, https://www.ers.usda.gov/data-products/commodity-costs-%20and-returns.aspx and U.S. Dep't of Agric., Nat'l Agric. Stat. Serv., Quick Stat., http://quickstats.nass.usda.gov. While the yield data is for all crop seed, penetration rates for transgenic varieties are high and provide a fairly accurate indication of transgenic yields.
[25] *See e.g.*, Nicholas Kalaitzandonakes, *Biotechnology and the Restructuring of the Agricultural Supply Chain*, 1 AGBIOFORUM 40, 40 (1998); Rachel E. Goodhue, et al., *Biotechnology, Intellectual Property and Value Differentiation* in AGRICULTURE, Department of Agricultural and Resource Economics, Calif., Working Paper 901R at 15 (2002); Graff, et al., *supra* note 4; USDA (2012), *supra* note 5 at 16 and 36.
[26] USDA (2011), supra note 7 at 16.

the late 2000s, R&D intensity had dropped to the mid-1990s level, leading the agency to note that increasing levels of concentration in agricultural input markets are no longer generally associated with higher R&D or a permanent rise in R&D intensity.[27] The industry's response to declining effectiveness of genetic technologies has been to develop more expensive, complex traits that combat resistance but do not improve yields.

As noted by the ERS, increases in concentration do not persistently lead to greater incentives to innovate. Moreover, "beyond some high level of concentration, further increases could actually reduce the incentive to innovate."[28] A number of factors support this proposition. First, firms reap fewer returns from innovation with less competition. Rather than stealing sales from rivals in more competitive markets, new product development with fewer rivals increases the risk that an innovator cannibalizes its own sales of existing products. This deters innovation.

There is also less fear of losing to an innovative rival's new product with less competition, which dampens incentives to stay ahead of the innovation curve and enhances incentives to use intellectual property to shape or control competition. For example, well in advance of Roundup Ready 1 soybeans coming off patent in 2014, Monsanto attempted to switch farmers to the newly patented, marginally different, and more expensive Roundup Ready 2 soybeans.[29] This "hard switch" strategy met with some resistance, but apparently was successful, since only one generic soybean using the RR1 trait was introduced in 2015.[30]

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[27] *Id.* at 2, 15. USDA examined whether market concentration was correlated with the share of industry revenues invested in R&D.

[28] 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/.

[29] *See* Diana L. Moss, *Generic Competition in Transgenic Soybeans*, AM. ANTITRUST INST. (Aug. 16, 2011), https://www.antitrustinstitute.org/wp-content/uploads/2018/08/AAI-Paper-generic-comp-TG-seed8.16.11.pdf; *see also* Daryl Lim, *Living with Monsanto*, 2015 MICH. ST. L. REV. 559, 584 n.134 (2015).

[30] The University of Arkansas released UA 5414RR. *See* Seedworld.com (June 2015), 15,

In addition, 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.

1. Consolidation Eliminates "Parallel Path" R&D and Pro-Competitive Collaborations

The U.S. Department of Justice ("DOJ") and Federal Trade Commission ("FTC") Horizontal Merger Guidelines articulate concerns over the effects of mergers on R&D competition.[31] They explain that a merger may diminish competition by reducing "innovative efforts below the level that would prevail in the absence of the merger."[32] The Guidelines explain that adverse effects on innovation are particularly likely when the merging parties are "two of a very small number of firms with the strongest capabilities to successfully innovate in a specific direction" and that "…[e]xplicit or implicit evidence that the merging parties intend to…curtail research and development efforts after the merger[] can be highly informative in evaluating the likely effects of a merger."[33] The "parallel path" R&D that is implicitly identified by the Guidelines is vitally important. Two leading economists explain, for example, that in pharmaceutical R&D "[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."[34]

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http://www.seedworld.com/flipbook_june2015//files/inc/c409c86a78.pdf.

[31] U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, HORIZONTAL MERGER GUIDELINES (2010) [hereinafter GUIDELINES], § 6.4.

[32] *Id.*

[33] GUIDELINES, *supra* note 31, at 2.2.1.

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

Rivalry in agricultural biotechnology innovation is essential for maintaining incentives to continue existing and prospective product development programs. This is particularly true when the time required to perform R&D, field-test, obtain regulatory approvals, and market new technology to growers collectively create a long pipeline to commercialization and market penetration. Before the mergers of Dow-DuPont and Bayer-Monsanto, each standalone company had strong capabilities to successfully innovate. For example, the Monsanto and Bayer R&D pipelines were associated with specific assets and features in genetics, plant breeding, and germplasm programs.[35] R&D "synergies," which can translate directly to cuts in R&D, were identified as major categories of cost savings in both mergers, highlighting the Guidelines' admonition that the loss of R&D competition and evidence of curtailing R&D efforts factor prominently into evaluating the likely effects of mergers.[36]

Consolidation also eliminates opportunities for independent rivals to engage in pro-competitive R&D collaborations to develop new stacked trait profiles. The effects of these more limited collaboration opportunities among a tight oligopoly of rivals could have a number of effects. These include refusals to license technology or to license it on discriminatory terms. With a tight oligopoly, there are also stronger incentives to tacitly agree, for example, on which firms specialize in certain crops and traits. This could lead to trait profiles that do not meet the growing region or climate-specific needs of growers, such as resistance to insects that are not regionally common or tolerance to herbicides that they do not intend to use.

[35] Annual R&D Pipeline Review, Monsanto (Jan. 2017), 13-15, https://monsanto.com/app/uploads/2017/05/2017.01.05_q1f17_mon_pipeline_update.pdf (no longer active).
[36] DuPont and Dow to Combine in Merger of Equals, (Dec. 15, 2015), 7, https://www.paint.org/coatingstech-magazine/articles/dupont-and-dow-to-combine-in-merger-of-equals/; Creating a Global Leader in Agriculture (Sept. 14, 2016), 20, https://www.prnewswire.com/news-releases/bayer-and-monsanto-to-create-a-global-leader-in-agriculture-300327863.html.

2. Increasing Complexity in Crop Traits Is Not Necessarily in the Interests of Farmers

Information gathered by AAI from farmers indicate that high prices and the waning effectiveness of biotechnology weigh heavily on farmers, with direct implications for the adverse effects of consolidation. For example, the costs of early generation corn technologies remain high, despite farmers' perception that biotechnology companies should already have recouped their R&D investments. More generally, seed costs have not fallen, despite lower commodity prices. For example, corn seed prices have been flat for the last year. Moreover, farmers see little price transparency. Technology fees, which in the past were a line item on the bill, are now rolled into the total cost of the seed. Farmers find it very difficult to compare seed costs over time because of the variability in traits offered and the complex rebate system used by large firms.

Farmers also expressed significant concern about the reduction in innovation due to a lack of competition. The seed companies have fostered a dependence on seed and chemical cropping systems with declining effectiveness, but the industry's response has been to develop newer and more expensive traits. The declining performance of some of these biotechnology traits appears largely related to the widespread adoption of herbicide-tolerant and insect-resistant crops that has fostered growing and expensive emergence of weeds and insects that have developed resistance to these traits.

The industry response to growing resistance has been to promote a new generation of crops tolerant to different herbicides, which, in turn, will likely foster new resistant weeds. Because of consolidation in the seed industry, there are few alternatives for farmers other than buying high-priced patented seeds and affiliated patented herbicides. As a result, farmers now spend more time and money on weed control. They also explain that it sometimes takes years for the promises of a

new technology to catch up with reality. Even then, some of the yield boosts are a result of harvesting practices rather than the technology itself.

Finally, reductions in seed options weigh heavily on producers' minds as concentration risks further reductions in seed portfolios. Crop trait profiles have become more complex over time as more traits have been stacked together. 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.

The foregoing developments have constrained choice 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. The elimination of independent rivals and subsequent reduction or elimination of traits development programs has therefore reduced the incentives for the few remaining agricultural biotechnology firms to develop crop trait profiles that best meet the needs of farmers for specific growing regions and climates.

F. Integrated Proprietary Systems Restrain Competition

The rise of integrated proprietary systems for seeds and traits has had several negative repercussions for competition, concentration, and innovation. The growing importance of farming data plays a central role in this issue and helps explain why the large agricultural biotechnology firms have made numerous, strategic acquisitions of smaller digital farming firms.

1. Increased market shares, barriers to entry, and system-level lock-in

The advent of integrated proprietary traits, seeds, and agrochemical systems has transformed the sector. Indeed, there is now less emphasis on competition in markets for seeds and traits and more focus on control of vertically-integrated markets for entire "systems." This transformation has several significant implications for competition.

First, economic evidence from soybeans and cotton indicates that seed prices under vertical integration tend to be higher than under licensing arrangements across firms. This suggests that vertical integration may increase the exercise of market power and firms' ability to extract economic benefits from seed dealers and farmers.[37] Second, integration enhances both the ability and incentive to bundle proprietary products in proprietary systems that do not interoperate with rival technologies.[38] This type of hurdle is similar to the requirement of two-level entry described in the government's non-horizontal merger guidelines.[39] This is likely to raise entry barriers for unintegrated rivals competing at standalone levels such as seeds or crop protection and that cannot enter at multiple levels. Such smaller rivals may be victims of exclusionary conduct, for example, if the Big 3 induce distributors to accept bundled products.

A third problem is that proprietary systems of integrated, proprietary technologies shifts the competitive paradigm from competition at the individual levels of traits, GM crop seed, and crop protection to competition *between* systems. A sector dominated by only three large firms does not provide sufficient head-to-head competition between systems to facilitate beneficial market outcomes. This poses significant risks for growers, who could be locked into single proprietary

[37] Kyle W. Stiegert, Guanming Shi & Jean Paul Chavas, *Innovation, Integration and the Biotechnology Revolution in U.S. Seed Markets*, CHOICES MAGAZINE (2nd Q. 2010), https://ageconsearch.umn.edu/record/94755/usage.
[38] 2017 AAI-NFU Letter, *supra* note 8.
[39] U.S. Department of Justice & Federal Trade Commission, Vertical Merger Guidelines, §4.a (2020), https://www.justice.gov/atr/page/file/1290686/download.

cropping systems at higher prices, with limited flexibility and choice. It also harms consumers, who could pay higher prices and lose choice in how their food is grown and sourced.

2. The Growing Importance of Farming Data Adds to These Problems

Digital farming falls at the intersection of agriculture and big data. The field of companies that specialize in agricultural data analytics and intelligence has expanded over the last decade. Digital farming is defined as the use of extensive data collection and computation and predictive analytics to provide data-based insights to optimize field-specific decision-making."[40] It encompasses data collection through satellite or other aerial monitoring, on the ground sensors, historical crop yield data, weather data, and soil databases; and data capture and analysis. Collectively, these functions facilitate decision-making on what varieties growers should plant, appropriate nutrients, plant protection, and when and how to optimize a harvest.[41]

Digital farming featured centrally in the mergers that produced the Big 3. Bayer and Monsanto explained that their merger would enable the buildout and strengthening of a digital farming platform that would generate numerous benefits, including "convenience, improved sourcing, improved yields, optimized inputs, and sustainable farming."[42] While touted as innovation, these claims are in reality a response to a need to combat flagging yields and resistance with more complex and expensive products.

Farming data has quickly become a critical input for the Big 3. As one scholar wrote: "By amassing huge quantities of previously proprietary, private, or untapped farming data, companies are gaining a privileged position with unique insights into what farmers are doing around the clock, on a

[40] Diana L. Moss, *Consolidation and Concentration in Agricultural Biotechnology: Next Generation Competition Issues*, at 6, Competition Policy Int'l Antitrust Chronicle (Jan. 2020)..
[41] *Id.* at 15.
[42] *Id.* at 10-12.

field-by-field, crop-by-crop basis[,] into what is currently a third or more of the U.S. farmland."[43] The integration of traits, GM crop seed, and crop protection are inextricably linked to digital farming. For example, digital farming will likely enhance incentives to amass and appropriate valuable farm data for potential use as a strategic competitive asset. Leveraging data across integrated, proprietary cropping systems is likely to strengthen them and increase the lock-in effect for growers.

With a tight oligopoly, the Big 3 have stronger incentives to appropriate data from farmers through terms and conditions of licensing and technology agreements. The Big 3 have swept up digital farming startups. One industry commentator noted that "[f]ollowing the recent purchase of Climate Corp. [in 2013], Monsanto is currently the most prominent biotech agribusiness to buy into big data."[44] Other large biotechs have joined the acquisition spree. In 2017, BASF acquired U.S.-based ZedX, a leader in digital agriculture intelligence.[45] Also in 2017, DuPont agreed to acquire U.S.-based Granular, a "leading provider of software and analytics tools that help farms improve efficiency, profitability and sustainability."[46] Acquisitions of small startups often fall below the federal merger reporting requirements and contribute to a model of "growth by acquisition" that is typical in the digital sector as a whole. Moreover, it is important to note that had they not been acquired by large and powerful firms, these startups could potentially grow into significant rivals.

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[43] Isabelle M. Carbonell, *The Ethics of Big Data in Big Agriculture* 5 INTERNET POLICY REVIEW 2 (Mar. 31, 2016), https://policyreview.info/articles/analysis/ethics-big-data-big-agriculture.
[44] *Id.* at 2.
[45] https://www.basf.com/us/en/media/news-releases/2017/04/P-US-17-039.html.
[46] *DuPont Acquires Ag Software Company Granular to Accelerate Digital Ag Strategy and Help Farmers Operate More Profitable Businesses*, DUPONT (Aug. 8, 2017), http://www.dupont.com/corporate-functions/media-center/press-releases/dupont-acquires-ag-software-company-granular-to-accelerate-digital-ag-strategy.html.

III. Conclusion

For the reasons outlined above, AAI respectfully recommends that the USDA consider the following policy recommendations:

- **Enhanced coordination on merger review between USDA and the antitrust agencies:** The USDA, DOJ, and FTC should develop a more formal method of coordination in reviewing mergers involving agricultural biotechnology. Such an arrangement could be modeled on the DOJ's current coordination with the Federal Communications Commission on telecommunications mergers.
- **Increased scrutiny of horizontal and vertical mergers:** USDA, DOJ, and FTC should carefully scrutinize *all* mergers and acquisitions touching on agricultural biotechnology. Federal agencies should be particularly alert to any further acquisitions by the Big 3 that are motivated by neutralizing a nascent potential competitor.
- **Expanded approaches to defining markets in mergers:** Given concerns around the maintenance of proprietary systems of vertically integrated traits, seeds, and agro-chemicals, federal agencies should consider that some highly interconnected agricultural biotechnology markets can be viewed as a "cluster" market. This approach will better flag consolidation that reduces competition between systems of traits, seeds, and agro-chemicals and promotes harmful lock-in effects and lack of interoperability between rival technologies.
- **Focus on demonstrable pass-through of merger-related benefits to farmers and consumers:** In evaluating potential benefits from mergers, the USDA and antitrust agencies should focus on demonstrable pass-through of benefits to farmers and consumers from carefully vetted, merger-specific and cognizable efficiencies claims. The agencies should consider

requiring reporting from companies post-merger to verify that claimed efficiencies have been realized and passed on to farmers and consumers.

- **Definition of property rights involving farming data:** Competition based on data has been hampered by the lack of clear, positive, legally-enforceable data rights. Uncertainty about data ownership facilitates its exploitation by those that are able to collect and enrich it. The current framework—essentially 'finders keepers, losers weepers'—does not facilitate competitive negotiation and compensation for valuable data rights. The USDA, in collaboration with other government agencies, should work to establish a framework for data ownership and data privacy in agricultural biotechnology.
- **Rules to facilitate switching/portability:** To mitigate the threat of lock-in posed by proprietary systems and data practices, the USDA should work with other relevant federal agencies to develop tools and standards that facilitate data portability and switching capacity between large systems.
- **Development of technological standards and open-source resources to promote interoperability:** To facilitate competition at the individual levels of traits, GM crop seed, and crop protection, the USDA should work with other relevant federal agencies to develop technological standards and open-source resources to facilitate interoperability. If systems operate on common standards, farmers will be able to mix-and-match individual components from the available systems to better suit their individual needs.

Respectfully submitted,

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