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Pressure Cooker:
Competition Issues in the Seed & Fertilizer Industries

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Before the United States Senate
Committee on the Judiciary

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Thank you Chairman Grassley, Ranking Member Durbin, and Members of the committee. It is an honor to be here today to lend the Progressive Policy Institute's (PPI's) perspective to competition issues in the seed and fertilizer industries. PPI is a catalyst for policy innovation and advocates for competition policies that support consumers and workers, with pragmatic proposals that champion the economic prospects and outlook for working Americans.[1] PPI applauds Senate lawmakers for turning their attention to the question of competition in critical agricultural input markets and how uncompetitive markets harm American farmers, working families, and innovation.

I. High Input Costs Put the Squeeze on U.S. Farmers and Consumers

Agricultural supply chains for crops such as corn, cotton, soybeans, canola, and vegetables are increasingly complex. They can vary in scope from small systems to large networks. Farmers in these supply chains often share one thing in common – they are reliant on agricultural inputs to produce and distribute their commodities. These inputs can be costly, often accounting for a significant portion of a grower's cost of production.

Agricultural input costs are driven by the prices paid by farmers to suppliers for fertilizers, seed technologies conventional and genetically modified (GM) (or "transgenic") seed containing genetic traits for herbicide tolerance or insect resistance, agrochemicals, equipment, and digital farming technologies and systems. These costs affect both small and large agricultural supply chains and vary with plantings, weather, soils, and natural resources.

Input costs for crop farmers are affected by any number of factors, including: (1) the dynamics of supply and demand (i.e., surpluses and shortages), (2) consolidation and anticompetitive business practices in concentrated markets that raise prices to businesses and consumers. (3) shocks to regional, national, and global supply chains resulting from weather, disease, and political events; and (4) U.S. trade policies such as import tariffs and retaliatory responses to those policies by other countries.

[1] For more information, please see www.progressivepolicy.org.

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Regardless of the source, two major stakeholder groups bear the brunt of higher input costs for fertilizers and seeds: U.S. farmers and consumers. Perversely, farmers and consumers represent the two groups with the least amount of economic power in the markets that make up the food and agricultural supply chains. For example, farmers pay steep technology fees for GM seed for corn, cotton, soybeans, and canola, and high prices for fertilizers, with little choice in suppliers and cropping systems.

High input prices squeeze farm margins. The cost of intermediate inputs such as seed, pesticides, and fertilizers and soil treatments accounted for between 36-39% of total intermediate production costs for U.S. farmers between 2016-2025.[2] The average price farmers paid for seed rose by 270% between 1990-2020.[3] For crops planted predominately with GM seed, such as corn, soybeans, and cotton, seed prices rose by an average of 463%.[4] These price increases compared with commodity price inflation of 56% over the same period.[5]

Between 2016-2024, the all-farm index for the prices farmers receive for their commodities such as crops and livestock has remained consistently *below* the index for prices paid by farmers for feed, fuels, seeds, and fertilizers.[6] This gap is *even bigger* for the crop farm index.[7] Farmers also have little price transparency due to the practice of rolling seed technology prices into the total price of GM crop seed, making it harder to compare seed costs over time. Farmers also see lower quality as previous generations of technology begin to lose their effectiveness.

At the other end of the supply chains are consumers. Based on 2023 U.S. Census data, consumers spend 13% of their limited budgets on food.[8] Food is the third largest budget item for the average U.S. consumer, behind housing and transportation. As measured by the volume of internet searches, public interest in U.S. food prices stepped up in mid-2017, with another marked surge in early 2022.[9] Concern has been rising even since. Consumers are heavily affected by food price inflation. And as they grapple with the high

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[2] USDA-Economic Research Service (ERS), Farm Income and Wealth Statistics - Production expenses, updated Sep. 9.2025, https://data.ers.usda.gov/reports.aspx?ID=4059#P02f2458c0f2342aca5b31bd4a78131cb_3_xA.
[3] James M. MacDonald, Xiao Dong, and Keith O. Fuglie, *Concentration and Competition in U.S. Agribusiness*, USDA-ERS, https://ers.usda.gov/sites/default/files/_laserfiche/publications/106795/EIB-256.pdf?v=43762.
[4] *Id.*
[5] *Id.*
[6] USDA-National Agricultural Statistics Service (NASS), Prices Paid and Received: All Farm Index by Month, US, https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/allprpd.php.
[7] USDA-NASS, Prices Paid and Received: Crop Farm Index by Month, US, https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/cropfarm.php.
[8] Diana L. Moss, *Can Antitrust Be Doing More to Protect Consumers?* Progressive Policy Institute, Dec. 2024, https://www.progressivepolicy.org/wp-content/uploads/2024/12/PPI-Antitrust-Consumers-1210.pdf.
[9] https://trends.google.com/trends?geo=US&hl=en-US.

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cost of living, only 14% said in a recent poll that they are not concerned at all about food prices.[10]

Both farmers and consumers are now well-versed in the fallout from shocks to the agriculture and food supply chains. The collapse of the beef packing supply chain during the COVID-19 pandemic, resulting in empty meat cases and high beef prices.[11] This exposed the grim reality that highly concentrated markets in supply chains cause "market power bottlenecks," threatening their stability and resiliency when subjected to an outside shock.

II. GM Seed Markets are Highly Concentrated With Significant Price Increases

The impact of technology in increasing yields in the U.S. and globally is reflected in the prevalence of U.S. crop acreage planted with GM crop seed. Since about 2013, the percentage of acreage planted with GM crop seed for corn, cotton, soybean, and canola has exceeded 90%.[12] Traits that are incorporated into GM crop seed, which carry significant intellectual property protections, confer a variety of characteristics on plants, such as herbicide tolerance, insect resistance, and other functional attributes (e.g., high oleic soybeans). The complexity of "trait profiles," or combinations of patented genetic events through "stacking," has increased over time, largely to combat growing resistance of weeds and insects to an aging mode of action. In 2019, 80% of corn acres and 89% of cotton acres were planted with stacked varieties.[13]

A. The Current Landscape in Ag-Biotech

The three large agricultural biotechnology firms that dominate the genetic traits, GM seed, agrochemical, and digital farming markets are the product of three mergers. These mergers — Monsanto-Bayer (now Bayer), Dow-DuPont (now Corteva), and Syngenta-ChemChina (now Syngenta) — occurred in quick succession between 2016-2018. Before them, the then six largest agricultural biotechnology firms were formed from two previous waves of consolidation.[14] Between 1985-2000, for example, about 75% of the small to medium-size enterprises engaged in biotechnology research were acquired by

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[10] Chris Clark, *Grocery prices a major stress for majority of Americans — with only 14% able to say they're not worried at all*, Yahoo Finance, Sep. 20, 2025, https://finance.yahoo.com/news/grocery-prices-major-stress-majority-110000472.html.
[11] Sanya Mansoor, *'The Food Supply Chain Is Breaking.' Tyson Foods Warns of Meat Shortage as Plants Close Due to COVID-19,* Apr. 26, 2020, https://time.com/5827631/tyson-foods-meat-shortage/; and Taylor Telford, Kimberly Kindy and Jacob Bogage; and *Trump orders meat plants to stay open in pandemic*, Apr. 29, 2020, https://www.washingtonpost.com/business/2020/04/28/trump-meat-plants-dpa/.
[12] MacDonald, et al., *supra* note 3.
[13] USDA-NASS, Acreage (June 30, 2001 and June 30, 2019), https://downloads.usda.library.cornell.edu/usdaesmis/files/j098zb09z/0k225n39n/jw827p632/acrg0619.pdf.
[14] *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).

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larger firms.[15] In the second wave, Monsanto alone acquired almost 40 agricultural biotechnology firms and independent seed companies.[16] Today, Bayer and Corteva control about 72% of the corn seed market and 66% of the soybean market.[17] Bayer, Corteva, and Americot control about 83% of the cotton seed market.[18] These combined shares signal extremely high levels of market concentration, which is generally associated with higher prices, lower quality, and less innovation.

B. High Concentration is Not Needed to Drive Innovation

Contrary to claims that higher concentration is needed to spur investment in R&D necessary to innovate, economic analysis supports the concern that concentration can produce the opposite result, or stifle incentives to innovate.[19] For example, the U.S. Department of Agriculture Economic Research Service observed that R&D intensity, as measured by the ratio of R&D investment to net sales, was 11% in 1994, increased to 15% in 2000, then declined to 10.0% in 2009.[20]

The decrease in R&D to net sales ratio occurred at the same time that concentration was rising rapidly in genetic traits and GM crop seed. One reason why innovation may slow down with high concentration is that firms can appropriate returns from innovation more easily with less competition. New product development increases the risk that an innovator cannibalizes its sales of existing products or loses out to a rival's new product, both of which dampens incentives to stay ahead of the innovation curve.

C. Mega-Mergers Raise Several Competitive Concerns

The mega-mergers that produced the Big 3 agricultural biotechnology firms were all approved by the U.S. Department of Justice (DOJ) and Federal Trade Commission (FTC). Instead of moving to enjoin these large, complex transactions in light of past significant price increases and loss of choice for farmers, the agencies required limited divestitures to address overlaps in narrow markets. At the time the mergers that produced

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[15] 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/.

[16] 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. Conference on Trade and Development, *Tracking the Trend Towards Market Concentration: The Case of the Agricultural Input Industry*, Apr. 2006.

[17] MacDonald, et al., *supra* note 3.

[18] *Id.*

[19] 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/.

[20] Keith O. Fuglie, et al., *Research Investments and Market Structure in the Food, Processing, Agricultural Input and BioFuels Industries Worldwide,* USDA-ERS, Report No. 130, Dec. 2011, http://www.ers.usda.gov/media/193646/eib90_1_.pdf., at 15.

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Bayer, Corteva, and Syngenta were proposed, competition advocates raised several competitive concerns. Aside from likely adverse effects on farmers, through higher input prices and limited choice, and on consumers, through higher prices and less choice in how their food is grown and sourced, opponents of the mergers raised other concerns.[21]

1. Risk of Tacit or Explicit Agreements to "Specialize" in Trait Collaborations

One concern is that the collapse of the industry into three large companies increased the risk of tacit or explicit coordination where firms would "agree" to specialize in certain crops or traits. Most stacked trait products require collaborations between the large developers by cross-licensing traits. Without competitive incentives driving these pro-competitive collaborations, and instead strong incentives to maximize profits by dividing up markets, there would be less choice in stacked trait profiles, or profiles that are less likely to meet the growing region or climate-appropriate needs of farmers.

2. Delaying Generic Entry of GM Seed

A second concern over the high concentration created by the ag-biotech mega-mergers is staving off entry of smaller traits, GM seed, or agrochemical innovators. In borrowing a page from the pharmaceutical industry, the large ag-biotechs have dabbled in ways to block generic seed entrants. 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.[22] Monsanto's "hard switch" strategy met with some resistance, but apparently was successful, since only one generic soybean using the RR1 trait was introduced in 2015.[23] The FTC also opened a case in 2023 against Corteva and Syngenta for using loyalty discounts for pesticide products that have the effect of raising prices to consumers and delaying generic entry.[24]

3. Proprietary Cropping Systems That Lock in Farmers

Third, the ag-biotech mega-mergers have created behemoth integrated, proprietary cropping systems of traits, GM crop seed, and crop protection. Such systems are engineered to work only with other proprietary products, which are often bundled together, eliminating switching opportunities for farmers and locking them into single

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[21] Diana L. Moss, *Consolidation and Concentration in Agricultural Biotechnology: Next Generation Competition Issues*, CPI Antirust Chronicle, Jan. 2020.
[22] Diana L. Moss, *Generic Competition in Transgenic Soybeans,* American Antitrust Institute, Aug. 16, 2011, https://www.antitrustinstitute.org/wp-content/uploads/2018/08/AAI-Paper-generic-comp-TG-seed8.16.11.pdf.
[23] The University of Arkansas released UA 5414RR. *See,* Seedworld.com, June 2015, http://www.seedworld.com/flipbook_june2015//files/inc/c409c86a78.pdf.
[24] FTC v. Syngenta and Corteva, Federal Trade Commission, https://www.ftc.gov/legal-library/browse/cases-proceedings/191-0031-syngenta-corteva-ftc-v.

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cropping systems, with limited flexibility and choice.[25] Early consolidation foreshadowed this problem when farmers complained that they could not mix chemicals with other companies' products to remedy Monsanto's Roundup glyphosate herbicide resistance for first-generation transgenic soybean technology. This level of vertical integration raises entry barriers for unintegrated rivals competing in seeds or crop protection and who cannot enter at multiple levels.

4. Digital Farming Systems That Appropriate Grower Data

Fourth, the mega-mergers spurred the development of "integrated systems" through digital farming services that are tightly integrated into traits, seeds, and agrochemicals.[26] Digital farming is defined as the use of "[e]xtensive data collection and computation" and "[p]redictive analytics"…to provide data-based insights to optimize field-specific decision-making.[27] While partly innovative in nature, digital farming is also another way to combat flagging yields and resistance with more complex and expensive products.

Digital farming will also 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 will strengthen them and increase the lock-in effect for farmers. With a tight oligopoly, the Big 3 have stronger incentives to appropriate data from farmers through terms and conditions of licensing and technology agreements.

III. Fertilizer Markets Are Highly Concentrated and Price Spikes May Signal Tacit or Explicit Coordinated Conduct

Fertilizers are a critical input in the agricultural sector. Industrial farming in much of the world is heavily dependent on external inputs of nitrogen, phosphorus, and potassium or potash. Following an industry shakeout from 1998 to 2004, fertilizer prices increased dramatically in 2008, dipped in 2009, increased again in 2010 to peak in 2012, then gradually fell between 2013 and 2020.[28] However, in Fall of 2021, through the Spring of 2022, anhydrous ammonia prices in the U.S. more than doubled, topping out at a record-high $1,300/ton, squeezing U.S. corn producers.[29]

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[25] 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.

[26] DuPont and Dow to Combine in Merger of Equals, Dec. 15, 2015, http://www.dow.com/en-us/investor-relations/investor-presentations; and Creating a Global Leader in Agriculture, Sept. 14, 2016, https://www.investor.bayer.de/en/handouts/archive-investor-handouts/.

[27] *Id.*

[28] C. Robert Taylor and Diana L. Moss, *The Fertilizer Oligopoly: The Case for Global Antitrust Enforcement,* 2013, https://www.antitrustinstitute.org/wpcontent/uploads/2013/10/FertilizerMonograph.pdf.

[29] Bart L. Fischer, Joe L. Outlaw, Henry L. Bryant, J. Marc Raulston, and George M. Knapek, *Concentration and Competition in the U.S. Fertilizer Industry*, Texas A&M University, Agricultural and Food Policy Center, Briefing Paper 24-1, Mar. 2024.

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These trends in fertilizer prices over the last 25 years signal a potentially troubling pattern. Numerous studies have established that price changes are not totally accounted for by changes in demand for crop commodities, or by changes in input costs, such as fuels needed to produce fertilizers (e.g., natural gas for nitrogen). Instead, price patterns marked by an unexplainable price spike, followed by a price decrease, then another price spike, may well indicate anticompetitive coordination.

These dynamics may reflect the formation of a tacit or explicit agreement among producers, followed by a breakdown due to a defection(s) from the agreement, followed by the reconstitution of the agreement. At the same time, other dynamics may have been in play in past fertilizer price changes, especially the role of large buyers of fertilizer such as China and India in putting downward pressure on high prices. Analysis of collusive behavior would look at the possibility of regional cartels or a global "super" cartel among fertilizer producers, or the more complex interaction between private companies, government sanctioned export cartels, and governments themselves.[30]

For example, fertilizers are produced by, among others, U.S. firms (CF Industries), Canadian firms (Nutrien and Mosaic), a state-owned Moroccan company OCP; and by various companies in Russia and Belarus. That market power has likely played a role in fertilizer prices is especially salient in light of the highly concentrated nature of the U.S. market. For example, most domestically consumer nitrogen fertilizer is produced by foreign companies and reliance on imports has decreased since 2014.

The 4-firm concentration ratio for nitrogen in the U.S. (including CF Industries, Koch, Nutrien, and Yara-USA) was 77% in 2018-2019.[31] The 4-firm ratio for potash and phosphate is 100%.[32] As noted earlier, highly concentrated markets with just a few players are far more conducive to high prices because of coordinated interaction. Supra-competitive fertilizer prices initially harm farmers and quickly translate into higher food prices throughout the world. This problem raises related strategic, food sustainability, and environmental issues for the U.S. and other countries. As such, it transcends traditional competition policy concerns.

Despite strong evidence of potentially anticompetitive behavior and consumer harm, however, antitrust authorities throughout the world have done little on the enforcement front. The FTC has investigated mergers in fertilizer markets, including the Canadian PotashCorp and Agrium merger (2018), which it challenged and settled with divestitures. After Koch Industries' recent buyout of the Iowa Fertilizer Company, CF Industries, Koch, and Nutrien control 74-82% of the nitrogen fertilizer production capacity in the U.S.

[30] Taylor and Moss, supra note 23.
[31] Fischer, et al, *supra* note 24.
[32] *Id.*

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IV. Stronger Antitrust Enforcement and Competition Policy In Ag-Biotech Should be a Public Policy Priority

Promoting competition in U.S. agricultural and food markets, and protecting farmers and consumers should garner broad bipartisan support. U.S. farmers should be able to count on fair commodity prices and input costs, sustainable margins, and choice in inputs. They should also expect consistency and transparency in regulatory and trade policy designed to support sustainable, stable, resilient, and safe food supply chains. This directly benefits consumers through competitive food prices, which keep down an already high cost of living, and promotes choice in food products and systems.

Antitrust's role in the agricultural input markets since the turn of the century has been diminutive. Large mergers have been allowed with minimal fixes and concerns over price fixing or market manipulation have gone largely unpursued. Together, a permissive antirust stance on agricultural input mergers and business practices have fostered highly concentrated markets in supply chains that feature little competition and weak incentives to compete hard on price, quality and innovation. This scenario is opposite that of a stable food system that features competition at multiple levels and resiliency in adjusting to unexpected shocks.

At the time of the 2010 DOJ Workshops on agriculture and antitrust enforcement, U.S. farmers held out much hope that the abuses an inequities they witnessed in input and other agriculture markets would be addressed by federal enforcers.[33] This was generally not the case. After multiple field hearings, many of the farmers around the U.S. that spent valuable savings to attend the workshops were disappointed when antitrust enforcement did not appear to invigorate or step up in any way.

Fast-forwarding 15 years, the agricultural input sectors are even more concentrated and less competitive. This shines the light on antitrust's traditionally narrow focus in going market-by-market to assess potential harms, versus considering both market-level effects and those related to the formation of monolithic, vertically integrated ag-biotech systems. Such systems lock in farmers to proprietary technologies, at great expense; lock out smaller rivals that can only compete at one or two levels; and foster information sharing and coordination that reduces competition. Moreover, most of the buyer-side, or monopsony, effects of past mergers on farmers were not fully recognized.

It is time for a more coherent public policy approach to promoting competition in U.S. food systems and the key market participants – farmers and consumers – that stake out either end. This may require more or different coordination between the DOJ, FTC, and the U.S. Department of Agriculture (USDA) to consult on potential investigations and improve data collection, especially on prices and costs. It may also means giving USDA

[33] Voices from the Workshops on Agriculture and Antitrust Enforcement in our 21st Century Economy and Thoughts on the Way Forward, U.S. Department of Justice, May 2012, https://www.justice.gov/archives/media/1244621/dl?inline.

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more authority to challenge systemic competition concerns and supply chain safety, stability, and resiliency issues that do not fall within antitrust's relatively narrow ambit. Finally, it also means acknowledging that trade policies that heavily impact farmers by slashing grower incomes may result in the permanent damage and loss to U.S. agricultural productive capacity, making the U.S. more reliant on imports where regulators have less oversight of food safety and quality issues.

I appreciate the opportunity to submit testimony for this hearing and look forward to answering questions from the committee members.

Respectfully submitted,

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