

Pesticide, Seed, and Digital Agriculture Industry Concentrates Wealth and Power, Threatens Health

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The pastoral image that "farming" may still conjure for many will suffer a shock as Beyond Pesticides reports, in this Daily News Blog, about developments in the agricultural universe, including massive consolidation in the industries that supply seeds and agrochemicals to conventional farmers. [A January 2023 report](#) from [Philip H. Howard](#), PhD updates previous work of his (see [here](#) and [here](#)) on these trends during the past couple of decades, and focuses on the most-recent (2018–2022) developments. The net conclusion is that the four largest agrochemical companies — Bayer (Monsanto), BASF, Corteva, and Sinochem (which recently subsumed ChemChina/Syngenta) — are exerting increasing leverage over an agricultural system that concentrates power and wealth, while threatening health, the environment, and access to food.

The machinations of these industries for profit, power, market penetration, and privatization of aspects of the natural world are hardly new. The [National Sustainable Agriculture Coalition](#) (NSAC) summarizes some aspects of the situation in saying, "Land and seed once belonged to no one and were shared by all, replicating the giving essence of the natural world. Today, these precious resources are tightly controlled and commoditized inputs. The modern U.S. food and agriculture system is designed [to maximize a narrow concept of economic efficiency](#) which fails to prioritize the well-being of small family farmers, rural communities, or the land."

Increasing mechanization, industrialization, consolidation, and privatization of genetic information and of data all contribute to the dynamic and entropic world in which conventional agriculture currently operates. Aspects of the shifting paradigms in agriculture during the past 75 years can be traced to multiple factors, including World War II innovations in materials science, chemical weapons development, and other technologies; the so-called "Green Revolution"; advances in genetic science and biotechnology in the last couple of decades; and most recently, the advent of uses of Big Data and the technologies that enable it.

To begin with one of those: the dawn of genetically modified seed that would resist the assaults of applied herbicides was a game changer for the agrochemical industry and ratcheted up sector consolidation (see below). Glyphosate-resistant seed meant that farmers could plant the seed and use Roundup (glyphosate) liberally because it would not harm the plant — but would knock down weeds.

[NSAC writes](#): “To create and mass produce a seed that would resist Roundup, Monsanto needed a captive supply of germplasm [seed]. ‘One of their main strategies,’ noted [Kiki] Hubbard [of the [Organic Seed Alliance](#)], ‘was to buy up smaller [seed] firms to access their varieties and simply insert their GE traits without needing to do any of the breeding work themselves. . . . Monsanto thus began to acquire small and regionally based seed companies, exponentially multiplying their supply of germplasm and restricting the distribution of these varieties which had been carefully bred to possess ideal traits. These foundations enabled Monsanto to become the first company to genetically engineer a plant cell and eventually mass produce a Roundup Ready line of seed.”

The company promoted the heck out of this pairing of proprietary seed plus herbicide, and competitors took note. With Monsanto’s development of its flagship glyphosate herbicide (Roundup), and its acquisition of seed companies that resulted in the 1996 debut of “Roundup Ready” soybean seed, the consolidation that now characterizes most parts of the food supply system was off and running. Now, several huge companies (see below) sell genetically modified (GM) seed for use with their herbicide products.

Not so many years ago, there were six large agrochemical companies that sold pesticides and (in some cases) synthetic fertilizers and seeds to agricultural operations. Beyond Pesticides has covered several of the huge mergers of the past decade-plus that have reduced that number to four, including [Bayer’s acquisition of Monsanto](#), the [Dow-DuPont merger](#) (which then reconfigured to DuPont and Corteva), and the [ChemChina acquisition of Syngenta](#) (with ChemChina subsequently acquired by Sinochem in 2021). ChemChina had already been scooping up many smaller seed companies over the past decade; multiple of Bayer’s seed divisions were also sold off to BASF, another chemical giant, in 2018.

Bayer, DowDupont, Sinochem, and BASF now control more than 60% of global proprietary seed sales. Globally, sales are dominated by Corteva and Bayer. Notably, Bayer is the inheritor of the beleaguered but ubiquitous glyphosate herbicides, most notably Roundup, that are still in extensive use around the world and often paired with GM seeds for important commodity crops, such as corn, soy, cotton, and increasingly, wheat and oat crops.

Dr. Howard — [faculty member](#) in the Department of Community Sustainability at Michigan State University, and member of the [International Panel of Experts on Sustainable Food Systems](#) (iPES-Food) — points out in his 2016 book, [Concentration and Power in the Food System: Who Controls What We Eat](#), that control of much of the world’s food supply system by so few entities has enormous impacts on human health, biodiversity, the environment broadly, agricultural workers, and rural communities.

In his 2023 report, [Recent Changes in the Global Seed Industry and Digital Agriculture Industries](#), Dr. Howard goes on to note that the impacts on people “tend to disproportionately affect the disadvantaged — such as women, young children, recent immigrants, members of minority ethnic groups, and those of lower socioeconomic status — and as a result, reinforce existing inequalities.”

Indeed, a year ago, [a report](#) — written by the [Open Markets Institute](#) and submitted to the U.S. House of Representatives Judiciary Committee Subcommittee on Antitrust, Commercial and Administrative Law by — begins with this: “Food system consolidation is a danger to all Americans.” It goes on to say, “Just a handful of corporations control critical junctures in the U.S. food supply chain, from seeds and fertilizers to processing to grocery shelves. This concentration of capacity and control increases supply chain fragility by putting more production in fewer hands and fewer places. This consolidation is also what gives these corporations the market power necessary to dictate prices paid to producers and push down workers’ wages, even while they charge consumers more.”

Beyond Pesticides would add that this consolidation makes the products agrochemical companies offer, and the harmful practices they engender, even more entrenched in the operations of most conventional farming. These large companies’ size gives them more influence on governmental and commercial decision makers; more leverage in supply chains and their sector marketplace, and thus, more control of what products are available to producers; and deeper pockets with which to fight challenges to their products and business models. This is true in the U.S. and much of the so-called “developed” world, and increasingly, these companies are making inroads into less-Western, less-mechanized, and heretofore less “agrochemically saturated” agricultural areas around the globe. (See more below.)

Behind the retail food outlets (which are themselves being gobbled up by larger and larger “parent” companies) are these behemoth actors in the food system. These entities exist to make money; they do not, unless forced (or sometimes incentivized) to do so, center human or environmental or community health, or equity concerns, in their business models.

The interest of these corporations is now expanding beyond the production and sale of synthetic pesticides and fertilizers, and seeds, often genetically modified. In the face of the issue of [developing organismic resistance](#) to agricultural chemicals’ efficacy, increasing public distaste for the noxious products these companies offer, and more governmental regulation of their products’ use, some have begun investing in firms that specialize in “biologicals” for pest control. Syngenta, Corteva, and Bayer have all entered into this business realm.

[Syngenta’s website characterizes](#) this emerging sector as “harnessing nature to protect and promote plant growth effectively and sustainably,” and notes its entry into both biocontrols (i.e., use of natural pest enemies) and biostimulants (i.e., products with substances or microorganisms to improve growth and boost yield). The company describes biologicals as “derived from or inspired by nature,” which is the “tell.” The companies are likely uninterested in selling [what organic farmers use](#) — largely, naturally occurring substances — but rather, once again, in creating genetically modified organisms and/or synthetic versions of natural “substances or microorganisms” to deploy in agriculture and into the environment. Syngenta speculates that the biologicals market will double in a few short years, and that the company expects to “secure market leadership” by 2025.

In addition, some companies are exploring and/or expanding into the digital agriculture space (i.e., the application of robotics, software, automation, and sophisticated data analysis to agricultural operations). The 2023 report notes some corporate aspirations: “Executives at agricultural machinery firm John Deere, for example, said they want to ‘[build a world of fully autonomous farming by 2030](#),’ and Dan Rykhus, CEO of precision agriculture company Raven Industries, is certain that autonomous machinery is ‘[the future of farming](#).’” A

recently published book by Kelly Bronson, PhD, [The Immaculate Conception of Data](#) suggests, [according to Dr. Howard](#), that “the site of power in the food system has moved from seed and chemicals (or seeds paired to be useful only with chemicals) to data.”

Critics note that the agrochemical and agro-biotech industries have used the myth of the “Green Revolution” of the mid-20th century in their promotion of “the next big things” in agriculture, whether GM seeds paired with herbicides, or synthetic “biologicals,” or über-mechanized and digital farming. Glenn Davis Stone, of Washington University, [revises our understanding of the Green Revolution](#), and comments, “Today the biotechnology industry and its allies zealously promote the legend as a flattering framing for the spread of genetically modified crops. A Monsanto chief even [recounted](#) the aging Borlaug [— Norman Borlaug, credited with the short-stalked wheat with very high yield potential when heavily fertilized that was the linchpin of said revolution in India —] tearing up because while he lived through the Green Revolution, he would not live to see the ‘Gene Revolution’ which might save Africa. . . . [T]he push for a ‘Green Revolution for Africa’ today is very real.” (Note, e.g., [China’s investment](#) in “industrializing” agriculture in multiple African countries. See also, [pushback against United Nations cooperation with industry](#), in order to protect agroecological activity.)

Taken together, Dr. Howard writes in this [2023 report](#), the trends cited above “have blurred previously distinct boundaries between seeds, agrochemicals, and biotechnology, and more recently, between other sectors, including biologicals (‘[plant protection and strengthening products that are derived from or inspired by nature](#)’) and [digital agriculture](#) (the growth of robotics, software, automation, and sophisticated data analysis in agriculture).”

Taken together, these trends reflect an intensifying industrialization of agriculture and a landscape that some economists might readily deem an “oligopoly.” Control over more parts of the food supply system translates to more power to set prices, dictate practices, and more. [Dr. Howard adds](#), “Such high levels of concentration can also threaten political sovereignty, or lead to additional consequences, including negative impacts on communities, labor, human health, animal welfare, and the environment.”

[The Open Markets Institute report](#) is not a fan of consolidation; it asserts, “Food companies and some economic analyses argue that decades of consolidation promoted efficiency and brought down food prices. Recent supply chain disruptions reveal the tradeoffs of prioritizing efficiency over resiliency, diversity, and safety nets. . . . Rebuilding a resilient, sustainable, and equitable food supply chain requires rules of fair competition that encourage businesses to focus on socially beneficial innovation and investing in workers and infrastructure rather than exploiting their brute bargaining power to wring cash out of other people’s pockets. It requires strict assurances of safety and dignity on the job as well as a living wage for workers. And it requires changes in corporate governance to hold corporations accountable to invest in capacity and act in the interests of the public rather than the interests of financiers.”

These industrialization and consolidation trends continue to be very concerning. As long ago as 1999, scientist-researchers at the University of Missouri, led by Dr. William Heffernan, [wrote this](#): “New firm names emerge, often the result of new joint ventures, and old names disappear. But underlying these changes is a continuing concentration of ownership and control of the food system. These structural changes are so strong that they often

undermine the desired and expected outcomes of much of the agricultural policy developed over the past couple of decades. These structural changes, often referred to as ‘the industrialization of agriculture,’ have progressed to the point that some agricultural economists now refer to the agricultural stage of the food system as ‘food manufacturing’. . . One often hears the statement that agriculture is changing and we must adapt to the changes. Few persons who repeat the statement really understand the magnitude of the changes and the implications of them for agriculture and for the long-term sustainability of the food system. It is almost heresy to ask if these changes are what the people of our country really want or, if they are not what is desired, how we might redirect the change. The changes are the result of notoriously short sighted market forces and not the result of public dialogue, the foundation of a democracy.”

In the face of these trends, and the power of the corporations that shape how agriculture is deployed, both in the U.S. and globally, the importance of protecting and promoting alternative approaches is greater than ever. Beyond Pesticides works for the advancement of [organic regenerative agricultural strategies](#) that genuinely work with natural systems, do not use synthetic petrochemical inputs (fertilizers and pesticides), and have at their heart the health and welfare of people, communities, soil, environment, biodiversity, and more. It is critical that small- and medium-scale [organic agriculture](#) holds true to its origins and principles, and serves as an increasingly robust and viable alternative and counterpoint to the agrochemical and agro-biotech industries, which do not serve or protect consumers, [farmers](#), the environment, or planetary sustainability.

A recent [Substack post by Charles Eisenstein](#) offers relevant inspiration. “The core of the old story is hollowing out. . . . The void beneath the power, the wealth, the control, the comfort grows intolerable. . . . Cracks spread through the superstructure. Truths long denied seep out through the cracks. Contradictions erupt through the broken crust. People stop believing the stories that held the world in place. . . . [A]ll of us were born with a biologically encoded Great Expectation which the modern world falls far short of. Yet that expectation never truly dies. It can go dormant for years, for decades, but its ember stays alive at the center of the cold ash of innumerable disappointments. Today many of us are gently brushing away the ash and blowing on the coal within. It bursts back into flame. It is the flame of hope — not the false hope of wishful thinking and ignorance of reality, but the true hope that is a premonition of an authentic possibility, a possibility we have agency in creating. . . . [T]here are two basic kinds of work we may do. . . . The first is to dismantle the structures, habits, beliefs, and powers of the old story. . . . The second is to grow the structures of the new story” — which can build, as he writes, “the more beautiful world our hearts know is possible.”

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