



## Building A More Resilient Food System

The 2022 Global Food Security Index shows a clear need for gains in agricultural production—an area in which Corteva Agriscience is uniquely suited to help

In a world struggling for long-term solutions to stave off hunger, South Korea has transformed itself into a model of food security. According to the 2022 Global Food Security Index (GFSI) report from Economist Impact, the Asian nation has dedicated itself to building the agricultural component of its food system: the realm of agricultural production.

This year, Economist Impact's GFSI, an annual, data-driven model of food security sponsored by Corteva Agriscience, zeroed in on farming metrics, with 14 new indicators providing a deeper look at the stability of that initial stage of food production—and it's no coincidence that South Korea's overall ranking soared. It scored first in agricultural R&D and sat among the top of the model's 113 nations when it comes to farming innovation. In contrast to many of the countries listed in the new report, South Korea's approach is systemwide and far-reaching: its rural development administration employs more than 1,000 people and boasts a budget of US\$997 million. This deeply committed strategy for building stable agricultural systems has had a dramatic impact. From 1970 to 2020, the nation boosted productivity by 65.4% while decreasing labor hours by 92.3%.

Unfortunately, South Korea is a rare bright spot in the otherwise unsettling picture. Economist Impact's GFSI was introduced in 2012 to better understand the drivers of persistent global food insecurity and to serve as a resource for those engaged in addressing these challenges. The index examines 68 indicators of food security in 113 countries and groups them in four categories: accessibility, affordability, quality and safety, sustainability and adaptation.

The 2022 index shows that global food security is deteriorating after hitting its peak in 2019, as the world faced skyrocketing food prices and hunger on an unprecedented scale. Driven by systemic shocks—for example, Russia's invasion of Ukraine, global inflation, and ongoing supply-chain volatility—and regressive food policies wherein many countries pulled back investments in food safety-net programs and nutritional standards, the world is backsliding. Food prices went up by 11.4%, while other key markers dipped. "The economic and socio-political shocks of the past few years have only exacerbated an already-weakening food environment," the report from Economist Impact states. "...Political upheaval and worsening climate change threaten to pull these pillars down further."

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While the index reflected some good news, the new indicators also exposed worrisome vulnerabilities. Economist Impact's report highlights ongoing weaknesses in sustainability and adaptation, calling for stronger government commitment to managing exposure to climate-related threats, enhancing soil organic quality, and improving the quantity and quality of water for agriculture, including bolstering irrigation infrastructure and providing greater protections for oceans, rivers, and lakes. The index also reveals low scores for agriculture producer prices, irrigation infrastructure, and poor soil organic content

After several years of improvement, food affordability dropped between 2019 and 2022, driven by escalating food costs and the struggle to fund governmental food safety net programs. The GFSI also noted how support for women farmers remains low across the globe, with a global average score of 28.3 out of 100.

Economist Impact's report calls out an alarming slowdown in research and development. At a time when the world needs food- and farm-focused innovation, spending on agricultural R&D has dropped by 10% since the index's inception in 2012. These shortfalls in investment in agricultural production come as farmers increasingly struggle with the long-term effects of climate change and declining natural resources.

One major call out in Economist Impact's 2022 GFSI report: Food security systems can only be strengthened and secured by effectively managing short-term shocks—while also addressing the longer-term issues threatening agricultural production. While the report lauds individual efforts to achieve food security and net-zero climate goals, regional solutions aren't enough, because, as Economist Impact notes in its report, "what works in Europe won't work elsewhere." What the world needs are solutions that can be successful everywhere food

is grown, coupled with science-based, predictable global regulatory policies that support access to new, innovative solutions.

### **Corteva Agriscience offers important innovations**

Corteva is an agricultural technology company focused on bringing value to farmers around the world so they can increase productivity, produce nutritious and healthy food, and drive sustainability on their farms.

The company sponsors Economist Impact's GFSI report to provide policymakers, NGOs, communities, and business with data that helps them take informed action to build a more secure global food system. With its farmer-first focus, Corteva applies agricultural science and technology to develop innovative solutions that farmers rely on to run operations that ultimately provide greater food security.

While the world must address short-term shocks now roiling food systems, Corteva believes it is also imperative to drive innovation and launch initiatives that boost the long-term health and security of farm fields across the globe. Corteva is creating innovations that enable farmers to produce more with less—to grow sustainable yields with limited resources—and to raise reliable annual crops while safeguarding the long-term sustainability of their fields. All of these measures help to ensure a food-secure future for future generations.



### **Four ways forward**

Corteva's breakthrough innovations in agricultural science and technology represent concrete steps in shoring up agricultural weaknesses cited in Economist Impact's GFSI report. The company's breakthroughs are transforming farming, making growing more sustainable and resilient in the face of looming challenges.



### 1. Advanced seed breeding

Climate change introduces imposing challenges that many countries are not adequately prepared for. However, Economist Impact concludes in its GFSI report that, “innovation is essential to building resilience.”

By developing seeds that will survive and thrive in increasingly transformed environments, Corteva Agriscience is in the vanguard of cutting-edge efforts to innovate. The company recently patented<sup>1</sup> a new seed-breeding approach that can precisely edit a plant’s DNA.

In the past, scientists were limited in what they could do to leverage a seed’s own genetics. Seed breeders could, for example, either armor it against a specific disease or gear it toward improving crop yield. This new gene-editing technology, by contrast, bundles the plant’s most powerful natural disease-resistant traits on one end of a corn genome, leaving breeders space to bolster other natural positive traits—such as for high yield and drought resistance—in other areas of the seed’s DNA. The result is a crop that can be both fortified against disease and geared toward potential high yields. Better still: The process can be customized for the characteristics and threats of the region in which the crop is grown.

Though the method—propelled by Corteva’s world-class agriscience and its vast germplasm library—is a decade or more away from commercialization, it represents a vast breakthrough. Farmers will be less reliant on multiple crop protection applications while growing crops that are naturally disease resistant, productive, and resilient in a sustainable way.

### 2. Improving a critical food source

Corteva offers present-day solutions as well. AcreNext<sup>® 2</sup> next generation rice farming is an integrated, direct-seeded hybrid rice program that allows farmers to raise high yield-potential crops without flooding their fields—a resource-saving innovation that will prove particularly valuable in areas where climate change has altered the water table. This product, introduced in Asia in 2020,

provides more resilient cultivation, precision weed control, and greater potential for overall farmer prosperity.

### 3. Protecting productivity from insects

Arizona farmer Steve Alameda, who runs a large vegetable farm with his two brothers, says his crops are an all-or-nothing proposition: Either he harvests produce free of insect damage, or he doesn’t go to market at all. “You’re not going to sell it,” he says. “They won’t even take it out of your field if it’s not clean.”

Economist Impact’s GFSI report showed relative optimism with regard to pest infestation and disease mitigation, with scores showing an 11.3% overall improvement over 2021. But Alameda’s worries are nearly universal: Each year, as much as 40% of the world’s food supply is lost to pests, which means there is still vast room for improvement. As the report observes, “Any weakness of production... has repercussions for the rest of the food system.”

Facing those sorts of high stakes, Alameda turned to Radiant<sup>®</sup> SC insecticide, one of the two spinosyn insecticide products that Corteva has innovated using fermentation processes to help protect plants from insects and disease. Radiant<sup>®</sup> is built around Jemvelva™, an active ingredient produced from naturally occurring soil bacteria<sup>3</sup>. Both Jemvelva™ active and Qalcova™ active, Corteva’s other spinosyn insecticide, are [Green Chemistry Challenge Award](#) winners that provide farmers worldwide with effective and environmentally friendly insect control options for more than 250 crops, including fruits, vegetables, soybeans, corn, and rice<sup>4</sup>.

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<sup>1</sup> <https://www.corteva.com>

<sup>2</sup> <https://www.corteva.com/resources/media-center/corteva-commits-to-help-rice-farmers-through-the-acrenext-next-generation-rice-farming-program.html>

<sup>3</sup> <https://www.corteva.com/our-impact/innovation/activeingredients/qalcovaandjemvelva.html>

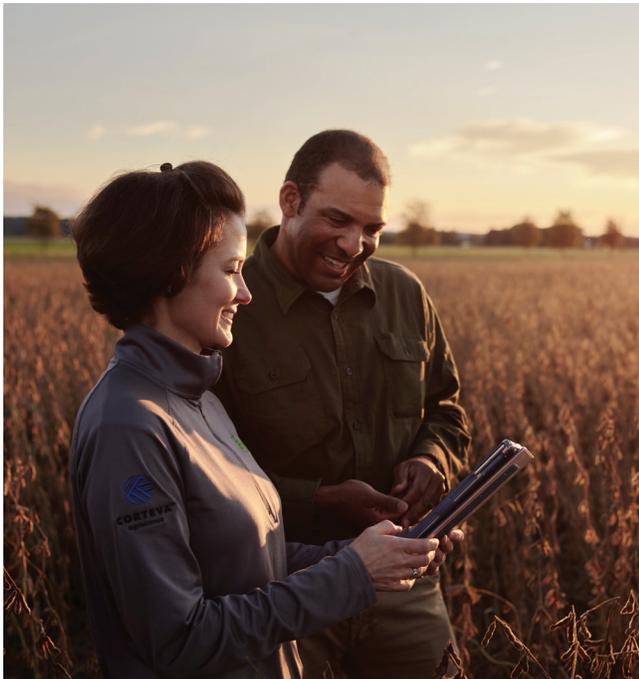
<sup>4</sup> <https://www.epa.gov/greenchemistry/presidential-green-chemistry-challenge-2016-greener-reaction-conditions-award>

Because Jemvelva™ active and Qalcova™ active derive from natural processes, Radiant® SC insecticide possess low toxicity levels that mitigate concerns about exposure for tractor drivers, irrigators, and other employees. “It’s just peace of mind that we’re easy on our employees, easier on the environment, and everything that we’re working with,” Alameda says.

And because of the reduced environmental impact of Jemvelva™ active and Qalcova™ active, crews can continue farm work after only four hours—a huge improvement over the two-day shutdowns the operation previously endured. “That harvest flexibility is really important to us,” Alameda says. “I really appreciate that we have that tool in our toolbox.”

#### 4. Maximizing nutrients

At a foundational level, farming—and thus, food systems—can’t succeed reliably unless the soil in which farmers plant their crops is healthy and fertile. High levels of organic carbon stabilize soil structure, reduce erosion, improve fertility, and enhance supplies of groundwater. But the 113 nations ranked in the index scored poorly when it came to this measure, revealing that globally soil organic quality is a huge issue, as is the problem of land degradation and eutrophication of oceans, rivers, and lakes through loss of fertilizer. “Urgent investment is needed here



*Minnesota-based farmer Clair Schmidt has found that Instinct NXTGEN®, one of the nitrogen stabilizers derived from Optinyte™ technology, has been transformative.*

too to boost levels of organic carbon to stabilize soil structure, reduce erosion, improve soil fertility and enhance its ability to hold water,” Economist Impact’s GFSI reported.

Corteva Agriscience innovation is making a difference in building nutrient-rich soil that can more reliably produce stronger yields while also enhancing sustainability, limiting reliance on fertilizer, and protecting the environment. One product delivering strong results is a nitrogen stabilizer called Optinyte™ technology. After 45 years and more than 1,000 field trials<sup>5</sup>, this product is at work on farms in many agricultural markets around the world, increasing yields by up to 5.2% in spring and 7% in fall, reducing greenhouse gas emissions from denitrification by 51%, and protecting watersheds and natural habitats<sup>6</sup>. Optinyte™ technology works by helping nitrogen retain its more stable ammonium form, cutting down on the amount of nitrogen that leaches into groundwater and disperses into the air as nitrous oxide.

Minnesota-based farmer Clair Schmidt has found that Instinct NXTGEN®, one of the nitrogen stabilizers derived from Optinyte™ technology, has been transformative<sup>7</sup>. “It’s the right thing to do environmentally,” he says, because “it helps us lower rates of manure and keep it where it’s supposed to be in the soil, so that the crop can use it in the spring. We’re getting better yields now with less manure put on.”

Optinyte™ technology, available in multiple proven brands, boosts the health of fields across a wide variety of geographical settings and soil types.

<sup>5</sup> [https://www.corteva.us/products-and-solutions/crop-protection/Nitrogen-Stabilizers.html?cid=mkch:sem\\_mktg:gsh\\_ctry:us\\_brnd:cph\\_agny:IHA\\_mkdv:pd\\_objv:cod\\_audn:frm\\_prct:cp\\_cpds:ADW-CP-NMAX-NMAX-Search-General\\_cpky:11001s\\_kwcid=AL194801315053752698181b!!g!!toptinyte&gclid=EAlaQobChMI\\_n5jqXB-QlViQmICR2pWAOyEAAyASAAEgLIgFD\\_BwE](https://www.corteva.us/products-and-solutions/crop-protection/Nitrogen-Stabilizers.html?cid=mkch:sem_mktg:gsh_ctry:us_brnd:cph_agny:IHA_mkdv:pd_objv:cod_audn:frm_prct:cp_cpds:ADW-CP-NMAX-NMAX-Search-General_cpky:11001s_kwcid=AL194801315053752698181b!!g!!toptinyte&gclid=EAlaQobChMI_n5jqXB-QlViQmICR2pWAOyEAAyASAAEgLIgFD_BwE)

<sup>6</sup> *ibid*

<sup>7</sup> <https://www.youtube.com/watch?v=VJmYh5vmjDY&list=PLJH446RiTtpboSzhvUormPM7GTJ4QfK7i&index=12>

As the active ingredient in N-Serve® nitrogen stabilizer, it protects anhydrous ammonia nitrogen fertilizer by keeping nitrogen in the soil during corn's key growth stages, maximizing yield potential and return on investment for farmers. Optinyte™ technology products deliver six-to-eight more weeks of nitrogen availability in the soil, an average revenue increase of \$21 per acre, and 28% greater soil retention<sup>8</sup>.

Another key Corteva Agriscience innovation is Sosdia™ Stress abiotic stress mitigator. This product triggers a natural biological process that enables staple crops such as corn, soybean, and wheat to thrive in environmentally stressful conditions—drought, heat, salinity, and ultraviolet light, among others<sup>9</sup>. Sosdia™ Stress contains naturally occurring proline and potassium to protect plant cells, reduce water loss, and improve stomata function. These traits serve a valuable role as climate change presents an increasingly challenging menu of growing conditions.

Economist Impact's 2022 GFSI report leaves little question that the world is at an inflection point for food security. Humanity faces challenges that are virtually unprecedented in modern history, and now is the time to face them head-on. Leaders must double down on ever-critical agricultural production to ensure the success of farmers and agricultural fields around the planet. Many tools, such as those supplied by Corteva, now exist to safeguard and grow those systems, and others are in development. With the right kind of investment in and dedication to healthy and sustainable growing systems, and global regulatory policies that help promote the invention and delivery of innovative technology solutions, farmers will be able to reliably feed future generations.

To learn more, visit [gfsi.corteva.com](https://gfsi.corteva.com).

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<sup>8</sup>[https://www.corteva.us/products-and-solutions/crop-protection/Nitrogen-Stabilizers.html?cid=mkch:sem\\_mktg:gsh\\_ctry:us\\_brnd:cph\\_agny:IHA\\_mkdv:pd\\_objv:cod\\_audn:frm\\_prct:cp\\_cpds:ADW-CP-NMAX-NMAX-Search-General\\_cpky:11001s\\_kwcid=AL19480131505375269818!b!g!optinyte&gclid=EAlalQobChMI\\_n5jqXB-QlViQmICR2pWAOyEAAYASAAEgLIgfD\\_BwE](https://www.corteva.us/products-and-solutions/crop-protection/Nitrogen-Stabilizers.html?cid=mkch:sem_mktg:gsh_ctry:us_brnd:cph_agny:IHA_mkdv:pd_objv:cod_audn:frm_prct:cp_cpds:ADW-CP-NMAX-NMAX-Search-General_cpky:11001s_kwcid=AL19480131505375269818!b!g!optinyte&gclid=EAlalQobChMI_n5jqXB-QlViQmICR2pWAOyEAAYASAAEgLIgfD_BwE)

<sup>9</sup><https://www.corteva.us/products-and-solutions/crop-protection/sosdia-stress.html>