COVER STORY

Seed Savior?

Emboldened by its ownership of Syngenta, the global agribusiness giant, China seems to be crossing the rubicon when it comes to high-tech agriculture.

BY ISABELLA BORSHOFF — SEPTEMBER 25, 2022

In 2018, a cluster of buildings resembling a Silicon Valley corporate campus popped up in the middle of Chongzhou County, a farming region in southwest China. Owned and operated by Syngenta Group, one of the world's largest agribusiness conglomerates, the buildings house something called a Modern Agriculture Platform (MAP), and inside, Syngenta employees encourage local farmers to accelerate "modernization and rural revitalization in China."

In various MAP hubs across the country — complete with scientific labs, high-tech greenhouses, and classrooms splashed with the words "In Science We Trust" on their walls — Syngenta staffers run soil samples, suggest suitable crops for individual plots of land and provide crop protection advice, digital imaging and drone services. They also sell seeds, fertilizers and pesticides. The idea, as Syngenta chief executive J. Erik Fyrwald told Chinese state media, is to deliver a "full service solution center for farmers."

MAP Center in Chongzhou, Sichuan. *Credit: Syngenta*

More than 500 such agri-tech hubs have popped up across rural China since Syngenta was acquired by China's state-owned chemicals company ChemChina in 2017. Originally a Swiss company and still headquartered in Basel, Syngenta's $43 billion sale to ChemChina — now

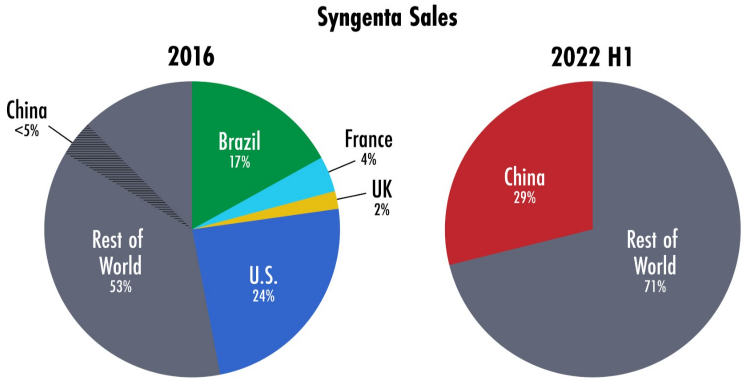
known as Sinochem Holdings after a 2021 merger with its rival — was the largest ever purchase by a Chinese company overseas, and it stirred controversy on multiple fronts.[1]

In the U.S., which represented 24 percent of Syngenta's sales at the time, Senator Chuck Grassley (R-IA) said that giving a Chinese state-owned enterprise a stake in U.S. agriculture was "alarming." In Europe, critics worried about antitrust implications. And in China, the population's skepticism about genetically modified organisms (GMOs) — one of Syngenta's key product lines — coupled with ChemChina's heavy borrowing to finance the deal, led some observers to question the logic of the purchase. China's ambassador to Switzerland, Gen Wenbin, infamously denigrated it two years after the fact as a "bad deal" for China.

But now, at least in China, with Syngenta's MAP centers dotting the countryside and Beijing seemingly moving closer to approving and even promoting GMO products, the historic deal hardly looks like a blunder. In fact, Syngenta is ready for its big China debut. The company is planning to list on the Shanghai STAR Market, the technology-focused stock exchange known for its alignment with Beijing's policy priorities, by the end of the year with a proposed 65 billion RMB, or approximately $10 billion, initial public offering (IPO)[2] — which would make it the third largest IPO globally in the past two years.[3]

Through Syngenta's MAP Centers, "farmers learn modern, environmentally friendly farming techniques, have access to the latest crop protection, seeds, crop nutrition, and the best agronomic advice including the safe use of these products."

Although part of the motivation for the IPO is to help pay down the company's debt, Syngenta's transition to being a Chinese company seems to have been good for business overall. The company declined to make extensive comments for this article, citing the IPO "quiet period," but in the limited financial results that Syngenta has released, China now makes up about a third of the company's sales; roughly double what Syngenta was getting from the entire Asia-Pacific region in 2016. Syngenta's China sales grew 41 percent year-on-year in 2021.



Data: Syngenta

"They [Syngenta] were never strong in China before," says Shane Thomas, an agribusiness consultant and author of the newsletter Upstream Ag Insights. "The growth has been absolutely insane. Some of it has been about just accessing the [China] market and having more buy-in from the Chinese government. But these MAPs have also been an incredible driver of growth. China has very small farms; there hasn't been a lot of infrastructure put in place in terms of knowledge or solid assets. Now Syngenta is enabling them with

agronomists and digital infrastructure."

When it comes to Beijing's technological ambitions, high profile hardware like semiconductors and electric vehicles tend to dominate global headlines. But in China, where almost 20 percent of the global population lives on 8.5 percent of the world's arable land, finding innovative ways to reap more food from every hectare of seeds sown has long been one of the government's highest priorities.

"Chinese agriculture and food demand is in inherent conflict," says Wendong Zhang, an assistant professor at Cornell University's Dyson School of Applied Economics and Management and a specialist in China's agricultural development. "China won't be able to have more land. They won't be able to have better quality soil. The thing they can control is technology."

A worker in a Syngenta greenhouse. *Credit: Syngenta*

Beijing's realization that technology would be key to increasing its food self-sufficiency is what made Syngenta such a valuable target for ChemChina. Syngenta, after all, is the world-leader in crop protection products and globally the number three producer of seeds, including selectively-bred "hybrids" and genetically modified seeds. Alongside rivals like Germany's Bayer and America's Corteva (formerly DowDupont), the company is pushing the boundaries of seed genomics using CRISPR-Cas9, a tool that allows researchers to tweak the genetics of living organisms.

Historically, China has placed strict limits on the use of genetically modified seeds, which experts attribute to the Chinese public's staunch opposition to GM foods as well as government concerns about the country's over-reliance on European and American agribusinesses. But circumstances have changed in recent years, especially with Russia's war in Ukraine affecting global food supplies, China's trade wars with the U.S. and Australia restricting Beijing's import options and climate change-induced droughts — like the record heat-wave that hit China this year — threatening crop output.

Emboldened by its ownership of Syngenta, China seems to be crossing the rubicon when it comes to high-tech agriculture. Officials are now calling cutting-edge seeds "agriculture microchips," according to Chinese state media. And safety approvals for GM seeds appear to be speeding up: in early 2022, Beijing's Ministry of Agriculture and Rural Affairs (MARA) granted safety certificates to three Syngenta GM corn seeds as well as a seed from the domestic firm Hangzhou Ruifeng Bio-Tech Company and several others from Chinese universities. In June, MARA also released guidelines, for the first time, that could pave the way for companies to begin commercial planting of GM products.

> **"There are technologies that will be very useful for feeding large populations, [but, in China] you can't just import technology and assume it's going to act the way you expect it to."**
>
> *— Bill Tracy, a professor of agronomy at the University of Wisconsin-Madison*

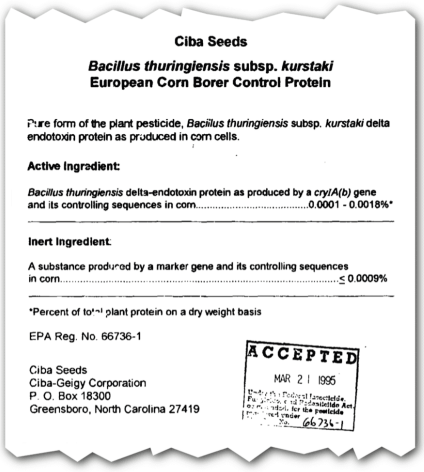
Beijing's embrace of what state media calls "bio-based breeding" in agriculture will likely be a boon to Syngenta, which is well poised to unleash its seed products across the country, helping it catch up to global seed leaders Bayer and .[4] But to fill "the rice bowl of Chinese people mainly with Chinese grain," as Xi Jinping put it in March, experts warn that China will need a lot more than technology.

"There are technologies that will be very useful for feeding large populations," says Bill Tracy, a professor of agronomy at the University of Wisconsin-Madison. But, in China, he says, "you can't just import technology and assume it's going to act the way you expect it to."

'WHO WILL FEED CHINA?'

In the early 1990s, scientists at Ciba Seeds in Sioux Falls, South Dakota, made a breakthrough with a new kind of corn seed. For decades, American cornfields had been plagued by a particularly destructive caterpillar. Many farmers tried to fight the bugs off with pesticides, but advances in genetic modification during the 1970s and 1980s triggered a new way of thinking about the problem among agricultural companies. What if a plant gene could be tweaked to overcome the caterpillar threat?

From 1992 to 1994, Ciba Seeds — which would later morph into a new company called Syngenta — ran field tests experimenting with a soil bacterium called Bacillus thuringiensis, or Bt for short, which was well understood in the industry as toxic to many insects, particularly the pesky corn-boring caterpillar. Ciba's breakthrough — alongside its partner, Mycogen, which would later become a subsidiary of seed giant Corteva — was managing to splice Bt genes *into* the corn genome.



Ciba Seeds

Bacillus thuringiensis* subsp. *kurstaki
European Corn Borer Control Protein

Pure form of the plant pesticide, *Bacillus thuringiensis* subsp. *kurstaki* delta endotoxin protein as produced in corn cells.

Active Ingredient:

Bacillus thuringiensis delta-endotoxin protein as produced by a *cry(A(b)* gene and its controlling sequences in corn.....0.0001 - 0.0018%*

Inert Ingredient:

A substance produced by a marker gene and its controlling sequences in corn.....≤ 0.0009%

*Percent of total plant protein on a dry weight basis

EPA Reg. No. 66736-1

Ciba Seeds
Ciba-Geigy Corporation
P. O. Box 18300
Greensboro, North Carolina 27419

ACCEPTED
MAR 21 1995
66736-1

Bt's approval document. *Credit: U.S. EPA*

"It creates an insecticide that's human safe within the plant, so when certain insects feed on the plant, they die," says Thomas, who notes that almost all of the corn planted in the U.S. today is genetically modified.

Ciba began selling Bt corn to farmers across America in 1996. It wasn't the first genetically modified product to be sold on the American market — that honor went to a tomato, introduced by Calgene Inc. in 1994 — but the introduction of genetic modification to staple grains ushered in a new era of American agriculture and resulted in rapid growth for agrichemical businesses.

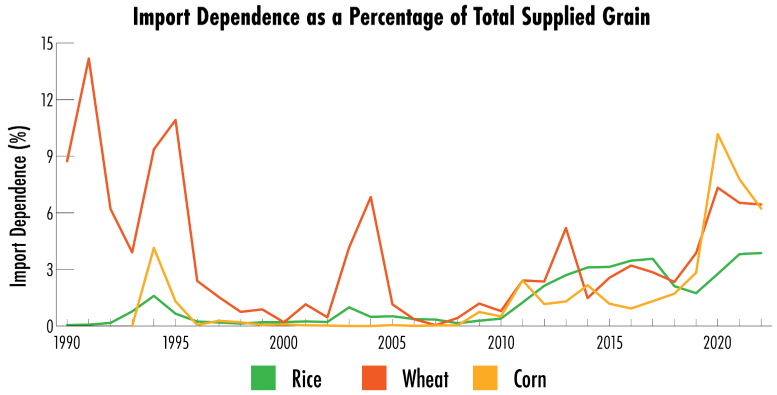
In 2001, the year after Syngenta was formed through a series of mergers involving Ciba Seeds, its sales were just over $6 billion; by 2016, they'd doubled to $12.8 billion. Similarly, Monsanto, an American rival to Syngenta, had sales of $5.5 billion in 2001, which tripled to $15 billion in 2015, the year before Bayer made a bid to acquire Monsanto.[5]

At the same time that American agriculture was being revolutionized, however, questions about China's agricultural system were being raised. In 1995, American environmentalist Lester Brown sent shockwaves through the global food security community with his treatise "Who Will Feed China?" China, Brown noted, was on the precipice of a boom. Would the country's insatiable appetite up-end global food markets?

Such questions had long been on the minds of the country's leaders, many of whom suffered through the Great Chinese Famine, a result of Mao Zedong's failed Great Leap Forward policy, which, by some estimates, killed more than 30 million people.

"That particular experience has basically reinforced the entire idea [in China] of self sufficiency and explains why Xi Jinping has said … when you have food shortages, money will be useless," says Zhang Hongzhou, a research fellow who studies China's food security at the Rajaratnam School of International Studies (RSIS) in Singapore.

Beijing's first official food self-sufficiency policy, a 1996 white paper called The Grain Issue in China, was widely understood as China's response to Brown's book. The paper articulated China's goals of generating 95 percent of the country's staple foods domestically and improving yields through technological progress.

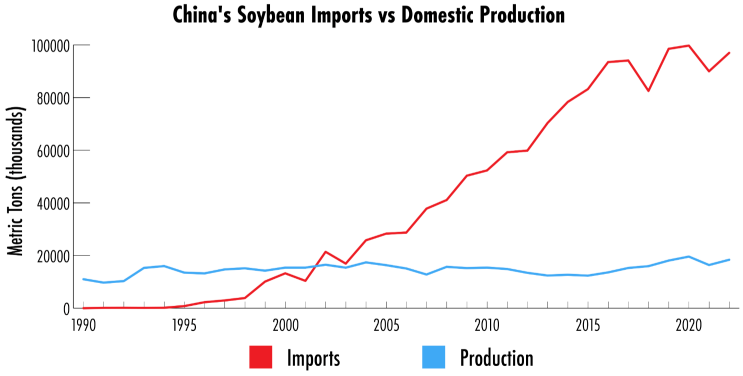


Data: Author's calculations, USDA data via Sitonia Consulting

The policy, for the most part, delivered: China's import reliance for wheat, for example, dropped from 14 percent in 1991 to 6.5 percent in 2022. But increased domestic production has come at a cost. China's agricultural land — already dwindling due to the industrialization of the last three decades — has been intensively farmed and overfertilized, rendering it less productive. A 2013 joint report by the UN's Food and Agriculture Organization and the OECD claimed that, as a result of intensive agriculture, including overfertilization, about 40 percent of China's arable land was degraded.

Despite almost three decades of effort, China's crop yields — a measure of grain produced per hectare of land — remain stubbornly low. Its corn yield, for example, is an estimated 40 percent lower than the U.S.'s, according to Goldman Sachs.

According to Zhang from RSIS, 2013 marked a turning point for Beijing. China's population had not only grown in number, it was also increasing in affluence, bolstering demand for meat, particularly pork. And more pigs meant more soybeans and corn for livestock feed. The realization that China's land use was unsustainable, coupled with what Zhang calls a relatively "benign" global environment, led Xi Jinping to relax the self-sufficiency requirement slightly and officially include "moderate imports" as part of the country's new food security strategy.



Data: USDA

Beijing also turned to technology. That year, Xi made a landmark speech suggesting China should become a global leader in GM seeds. "The research and innovation shall be bold, so we can take the commanding heights in biotechnology, and not let large foreign companies dominate the agricultural biotechnology product market," he told the Central Conference on Rural Work, according to a report by the U.S. Department of Agriculture's Foreign Agricultural Service.

But Xi faced a challenge. China's population is believed to be vehemently opposed to GM foods. A spate of food safety scandals — including the 2008 infant formula scandal, in which six Chinese babies reporrtedly died and many more were poisoned by products laced with chemicals — had left the population deeply sensitive to any chemical or biological meddling when it comes to food.

The then Premier Wen Jiabao meets a child sickened by tainted milk powder at Beijing Children's Hospital in Beijing, September 21, 2008. *Credit: Rao Aimin via AP Images*

For much of the 2000s, the government sat by, as anti-GMO sentiment proved a useful tool for denigrating American crops, bolstering support for China's self-sufficiency drive, and justifying blocking powerful foreign firms from embedding themselves in China's agricultural market and reaping the financial benefits. Several analysts *The Wire* spoke to mentioned a popular Chinese conspiracy theory that American GMO crops are bioweapons targeting the Chinese people.

"I think the government probably didn't moderate this [conspiratorial] dialogue before, because they wanted to use it [for political gain]," says Zhang, from Cornell.

Xi tried to acknowledge this lightly in the same speech, stating, "biotechnology attracts social disputes and doubts, which is normal. For this issue, I want to emphasize two aspects: one is guaranteeing safety and the second is indigenous innovation. That is, we shall be bold in research, but cautious in commercialization."

> **"It's a very commoditized business. You need to have the scale to invest in the seeds and research to bring novel and unique technologies to market."**

— *Shane Thomas, an agribusiness consultant*

But building "indigenous innovation" that would be globally competitive was a serious challenge. China is not without its homegrown seed companies — including Beijing DBN Technology Group, which is infamous for its involvement in IP theft in the U.S., and Long Ping High-Tech, which is backed by state-owned conglomerate CITIC Group — but they lacked the research and development depth of the major western companies.

Experts note that the barriers to entry in agribusiness are high. The global agribusiness giants have grown through mergers and acquisitions, whittling down the number of firms in the market to just six majors by 2015.[6]

"If you look at basically every segment of the value chain, there's oligopolies," says Thomas, the agribusiness consultant. "It's a very commoditized business. You need to have the scale to invest in the seeds and research to bring novel and unique technologies to market."

China, it seems, decided to cut to the chase. ChemChina had been on an overseas acquisition spree for much of the decade: in 2015, it diversified its chemicals portfolio by scooping up Italian tiremaker Pirelli for $7.7 billion, and in early 2016, it acquired German industrial equipment maker KraussMaffei for $1 billion.

Ren Jianxin, right, shakes hands with Pirelli Chief Executive Marco Tronchetti Provera at a conference in Beijing, May 8, 2018. *Credit: Jason Lee via Alamy*

It was also an attractive time to consolidate in the agribusiness sector: slowing industry growth was driving an industry restructuring, with buyers and sellers alike on the alert for opportunities. Monsanto, one of Syngenta's key rivals and the world's largest player in seeds, made several bids for Syngenta in early 2015, including a $47 billion cash-and-shares offer, but Syngenta stood its ground, claiming Monsanto was undervaluing the company.

ChemChina's founder, Ren Jianxin, who enjoys an entrepreneurial reputation unusual among SOE executives, had long had his eye on Syngenta. One ChemChina staff member told Reuters in 2016 that "To ChemChina, Syngenta and Dow were goddesses that we hoped one day we could win."

In 2016, he proposed a cash deal that valued the company at around $43 billion. The purchase, which took 16 months to close due to the challenging financing requirements and several approval processes, including the Committee on Foreign Investment in the United States (CFIUS), remains the largest ever Chinese overseas acquisition by a long shot — far surpassing the $15 billion purchase of Canadian oil company Nexen by state-owned China National Offshore Oil Corporation in 2012.

Ren Jianxin from ChemChina, left, and Michel Demare from Syngenta, right, during a press conference after Syngenta's acquisition by ChemChina, June 27, 2017. *Credit: Laurent Gillieron/Keystone via AP Images*

It was also, from ChemChina's perspective, just in the nick of time. In 2020, then-U.S. President Donald Trump unveiled an executive order curbing U.S. investment in so-called "Communist China Military Companies," an extensive list that included ChemChina.[7] Souring bilateral relationships between the world's two superpowers suddenly made future deals like the Syngenta-ChemChina tie-up seem improbable.

"The political climate now toward foreign purchases by any country in the U.S. is more restrictive, and if the funds are coming from China, there's even more opposition," says Zhang, from Cornell. "[China is] probably happy to have made the purchase earlier. If you imagine that it's after the trade war, even if they want to buy Syngenta with a higher price, they probably cannot do it."

'THE TECHNOLOGY TREADMILL'

Today Syngenta Group is a unique company on the world stage: a state-owned Chinese firm with an American CEO. Its executive team remains largely Western, and it is still anchored in Switzerland, despite operating under the Sinochem umbrella.[8] In an interview with the Wall Street Journal Global Food Forum in June 2022, CEO Fyrwald stressed that Syngenta's board is "more non-Chinese than Chinese" and that the leadership team, with the exception of Hengde Qin, who runs Syngenta Group China, are also non-Chinese. "So we've maintained our globalness and we've maintained our non-politicalness," he said.

J. Erik Fyrwald, Syngenta International CEO, speaking during the session "The Next Upheaval: Food Crisis" at the Annual Meetin of the World Economic Forum in Davos, January 25, 2019. *Credit: World Economic Forum via Flickr*

Still, Syngenta is undoubtedly becoming more China-centric. Under its new structure, 17,000 of the company's 53,000 employees work for the Syngenta Group China division.

And with its high-profile Shanghai listing, Syngenta might help the Chinese government out of a dilemma of its own making: convincing the general public that GMOs are safe. At the very least, the company can't be viewed as a trojan horse for U.S. bioweapons.

Syngenta's MAP program has even introduced QR codes on food packaging so consumers can scan their food and see a photo of the Chinese farmer who grew it.

To help itself out of its GMO bind, Beijing is also positioning its efforts in direct gene editing as a kind of technological leapfrogging — these newer engineering methods do not require the introduction of foreign DNA, unlike today's genetic modification, in which bacteria from one organism is transplanted into another (á la the Bt genes added into the corn genome). As Thomas, the analyst, notes, the industry as a whole is moving towards this more precise kind of genetic tweaking.

"The old way was kind of a shotgun approach where it's not as accurate," he says. "But now, you can almost go in with a pair of tweezers and really precisely adjust something. They [Beijing] are trying to make sure that this is perceived as better for the environment."

Indeed, China seems well positioned to lead in this space: the country has become a prolific producer of CRISPR patents and research, and Syngenta has made industry breakthroughs in direct seed genome alterations.

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>
> — *Darin Friedrichs from Sitonia Consulting*

Still, many experts warn that high-tech seeds alone won't solve China's agricultural woes. One of the biggest challenges to increasing agricultural output in China remains its small landholding structure.

Thanks to a longstanding government policy that farmland cannot be owned (and thus bought or sold), Chinese farmers are prevented from consolidating plots and working with economies of scale. Attempts by the government to create a quasi-market — by allowing farmers to lease land to others or to larger businesses — haven't made a significant difference, says Darin Friedrichs, a partner at Chinese agriculture consultancy Sitonia Consulting.

"If you're looking at the U.S. or Brazil, they have several hundred-acre farms with large equipment that's very efficient," says Friedrichs. "You really don't have that in China. Land reform is something they've been trying to do for decades and not really making a ton of progress on it."

On top of that, China is facing an uphill demographic battle. Its farming population is aging, and young people — now wealthier and more educated than 20 years ago — are much less likely to go into rural work.

"If you go to a Chinese farm, we have almost 60-year-old people doing agriculture," says David Li, a business manager with Beijing-based SPM Biosciences Inc. "The older people are cultivating for the full country. It's not sustainable."

Labor is China's biggest bottleneck, says Fulco Wijdooge, general manager for China at the Dutch horticulture firm Ridder. "We can get technology here … but if you don't have the right skilled labor, it's all for nothing," he says.

Syngenta, it seems, hopes to sidestep this hurdle with its Modern Agriculture Platforms. By "modernizing" farming — including better integrating digital productivity — the MAPs can help educate farmers and guide them to more efficient and sustainable practices. CEO Erik Fyrwald likes to tell the story of a farmer in Henan Province who thought his entire corn crop was ruined after flooding last year. After reaching out to a local MAP, Syngenta deployed drones over the farmer's plot, identified where the water was draining first, and then used drones to spray that area with biostimulants and crop protection products to help the crop stave off flood-related diseases. The farmer, Fyrwald told Chinese state media, was able to save 65 percent of his crop — a feat, the CEO said, that would have been "impossible" two years ago in China.

A drone flying over an MAP rice field. *Credit: Syngenta*

Some experts, though, warn that such happy endings are mere "quick fixes" — and could lead to more intransigent problems for both agriculture and food security.

"Techno-optimists are very good at seizing on the latest fashionable narrative," says David C. Rose, a professor of sustainable agricultural systems at Cranfield University in the UK. "We've had lots of shocks to food production and food security … and companies seize upon these narratives to push their technologies and make you think it's going to be a quick fix."

Indeed, critics of Syngenta and its competitors have long claimed that the agribusiness model — which is based on patenting new technologies and aggressively guarding them — does not actually deliver the best outcomes and may be actively harmful by disempowering farmers and contributing to environmental damage. Monsanto, for example, infamously sued farmers for patent infringement relating to their seeds. And Syngenta is embroiled in a lengthy U.S. court battle over allegations that one of its key herbicide causes Parkinson's Disease. Environmentalists and some scientists have also alleged that another type of pesticide sold by Syngenta contributes to declining bee health.

"The problem with biotechnology is it's very difficult to engineer for traits we care about, things like drought resistance," says Rebecca Bratspies, a law professor at the City University of New York and an expert in the regulation of new agricultural technologies. "The engineering that has happened is engineering that is lucrative to the companies: engineering to be resistant to herbicides they will sell you, or pesticides that they will sell you."

Miguel Altieri, a professor of agroecology at the University of California, Berkeley, calls this business model a kind of "technology treadmill," noting that agrichemical companies make farmers increasingly dependent on insecticides, which then raises production costs. At the same time, he says, pests and weeds inevitably develop more resistance and, eventually, the crops reach their "ecological limits."

In an emailed statement to *The Wire*, a Syngenta spokesperson said that their products are in demand because they bring enormous benefits to farms and society while also providing a safe, secure, affordable and sustainable food supply. "Global hunger has fallen by more than 35 percent in developing countries since 1970, partly because of the availability of better seeds, more targeted crop protection, and improved farming techniques," the statement reads.

> **"They genuinely know what it is to go to bed hungry, which I am sure is something that one never forgets…"**

— *J. Erik Fyrwald*

How China adjusts its pace to the technology treadmill remains to be seen. But experts note that its ability to stay upright on its own has global implications. China's appetite, after all, is so large that it compounds any disruption in the global food supply — such as Russia's invasion of Ukraine. Ukraine exported $2.5 billion worth of cereal grain to China in 2021, according to UN Comtrade.

Xi Jinping talks with villagers at a corn field in Qinglongchang Village, Sichuan Province. *Credit: Huang Jingwen via AP Images*

What you don't want, notes Genevieve Donnellon-May, a China food security expert and masters candidate at Oxford University, is for countries like Egypt and Bangladesh, which are facing enormous economic crises, having "to fight against countries like China to be able to secure limited [global] wheat supplies."

China's leadership doesn't want this either, and Syngenta, for its part, seems to understand the mission Beijing has set for it. In his remarks at an event hosted by the United States Heartland China Association, a non-government organization that promotes agricultural trade between the U.S. and China, Fyrwald notes that then-Syngenta chairman Frank Ning and Chinese President Xi Jinping "share a terribly sad history" of not getting enough food to eat as children.

"They genuinely know what it is to go to bed hungry, which I am sure is something that one never forgets and why they want to see all of us successful to make sure there is always enough food for everyone."

Isabella Borshoff is a staff writer based in London. Previously, she worked as a climate policy adviser in Australia's federal public service. She earned her Master's in Public Policy at Harvard's Kennedy School. Her writing has been published in *POLITICO Europe*. *@iborshoff*

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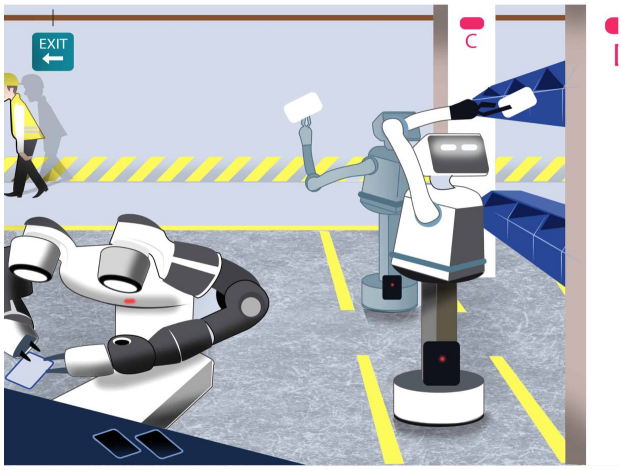

China's Bot Boom

BY ISABELLA BORSHOFF

China became "the world's factory" in large part due to its demographics: a tidal wave of young, hungry workers drove growth by churning out low value goods. But between rapidly changing demographics and rising wages, those days are over. For China to maintain its reputation as a manufacturing powerhouse, it needs robots — lots of them. But can advanced manufacturing be a panacea for China's slowing economy?

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