

Making Agriculture More Sustainable

Soil degradation threatens the global food supply.
Agricultural innovation is helping secure it.

After the wildfires of 2019-2020, which destroyed 7.4 million hectares of forest and farmland, Australia may never be the same.¹

Above ground, there are signs of recovery—greening woodland, returning wildlife. But below, the devastation lingers. According to ECOS, the reporting arm for Australia's national scientific research agency, the fires' intense heat stripped the soil of vital microbes and rendered it less able to absorb water. When the heavy rains that extinguished the fires came, they washed away ash and topsoil, altering the soil's chemistry and structure and diminishing its potential to support plant growth. "Erosion of soils following bushfire is possibly the greatest hazard to recovery, both to the impacted landscape, but also to land, water and air resources further afield," noted ECOS scientists.²

Australia's land degradation is among the most serious in the world, earning the country a ranking of 81 among the 113 countries monitored for land degradation by the Global Food Security Index (GFSI). Produced annually by the Economist Intelligence Unit (EIU) and sponsored by Corteva Agriscience, the GFSI also ranks Australia as one of the most volatile in terms of agricultural production, another of the 59 indicators of food security that inform the model. Australia's rankings reveal that even high-income countries are becoming less food secure as climate change deepens droughts, intensifies floods and wildfires, and further degrades soils. Indeed, because climate change and resource depletion contribute to reduced food supplies, increased price

volatility, and compromised nutrition, the EIU report that accompanies the index identifies them as the most urgent threats to global food systems. The report makes clear that to reverse the global trend toward food insecurity, we must act now to reverse soil degradation and resource depletion with more sustainable farming practices.

Corteva Agriscience is heeding this call to action. A new kind of agriculture company, it is innovating solutions for farmers that improve their yields and livelihoods while conserving resources and sustaining the land.

Meeting the Sustainability Challenge

Defined as the state in which people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life, food security isn't just an issue for developing countries and subsistence economies. Agricultural land accounted for 14 percent of the area burned by bushfires in Australia. In the United States, which ranks 63rd in the GFSI's land degradation index, wildfires not only destroyed arable land but also, according to the EIU report, made it too hot and smoky for farmers in surrounding areas to plant and harvest their fields. Both Australia and the US are among the 62 countries whose GFSI rankings have deteriorated in 2020 due to the addition of the Natural Resource and Resilience category. The GFSI also shows that in 49 countries, agriculture production is more volatile today than during the previous index period even in rich, food-producing countries like Australia, Norway, and Slovakia. Droughts in

Norway and Denmark and an extreme summer in Sweden resulted in record-low crop production in these countries in 2018, according to the report, with Denmark's crop harvest falling by 40 percent.

These findings underscore the importance of Corteva Agriscience's work to support farmers with tools, technologies and information that conserve resources while sustainably boosting yields.

Corteva strives to further improve its weed, pest, and disease solutions by continuing to develop new molecules with hallmarks of sustainability, including low use rates, low environmental impact and fewer applications.

Best-Practice Training

Corteva has committed to training, over the next ten years, 25 million farmers to optimize productivity while maintaining soil health and conserving nutrients and water. Corteva soil experts and agronomists are educating producers—large and small—on the relationship between soil health, plant health, and micronutrient availability, while showing them how to amend poor soils with inputs already available to them. They're also sharing best practices in field management and soil conservation, such as planting without tilling the soil, sowing cover crops, and adding alfalfa to their crop rotations. Together, these practices prevent erosion from wind and water and keep nutrients where plants can access them.

Corteva has also committed to increasing the productivity, incomes, and sustainable farming practices of 500 million smallholder farmers by 2030. In Tanzania, for example, Corteva is collaborating with USAID and ACDI/VOCA to train over 600,000 smallholder farmers—30 percent of whom are women—in using climate-adaptive seeds, crop protection products, and soil conservation practices. The three-year initiative is boosting yields by 300% on average.

Nitrogen Management

Sustainable, high-yield agriculture depends on practices that better manage nitrogen. Found naturally in soil and in most commercial fertilizers, nitrogen helps plants thrive. But heavy rains and irrigation can wash away this vital nutrient, sending it into aquatic ecosystems. Field management practices that maintain soil structure and prevent erosion help stabilize nitrogen. While investment in irrigation infrastructure and riparian buffers (land along rivers taken out of production) addresses some run-off concerns, additional impacts include deploying effective agricultural management practices such as cover crops, crop rotation, and technologies that help stabilize nitrogen in crop soils.

Corteva Agriscience's nitrogen stabilizers with Optinyte® technology, for example, are scientifically proven to keep nitrogen in the root zone and improve its utilization, helping to maximize crop yields while minimizing the risk of nitrogen leeching into water supplies. And digital tools like Granular Agronomy can help farmers apply nitrogen with greater precision, minimizing waste and maximizing efficient uptake through custom prescriptions and application timing recommendations, ultimately increasing efficiencies with agronomic inputs and operational resources with more precise management.

Sustainable Pest and Disease Control

Helping farmers maximize yields extends far beyond soil management. Farmers also need tools for managing weeds, insects, and disease that help them produce the food society will demand, in the way that society demands it.

Corteva supports farmers' need for tools and choice with a full range of crop protection offerings that, in total, protect more than 250 varieties of plants in more than 130 counties. With more than 20 years as leaders in green chemistry, Corteva provides farmers with the largest portfolio of natural and naturally derived products in the industry such as its fungicide Inatreq™ active or its Spinosad-based, organic-approved insect controls.

Additionally, as part of its commitment to sustainability, Corteva strives to further improve its weed, pest, and disease solutions by continuing to develop new molecules with hallmarks of sustainability, including low use rates, low environmental impact and fewer applications. Corteva's expansion into

biologicals reflects this commitment. Derived from living organisms, biologicals, when used together with conventional pesticides, can help produce healthy food and naturally enhance soil health and farm resilience.

Carbon Capture

While nitrogen management and a holistic crop protection strategy can make high-yield farming more sustainable, they also help sustain farmers' livelihoods by monetizing the carbon that their operations capture. Healthy soils that remain covered by vegetation act as a carbon sink, helping compensate for the greenhouse gases emitted by industry, motor vehicles, and human activity. That makes farmland valuable in the burgeoning carbon markets, where industries pay for offsets to their carbon emissions.

Corteva is simplifying and expanding farmers' access to carbon sequestration efforts, developing protocols and standardized measurements as an intermediary, and providing buyers with standards, verification and a registry in order to make the greatest impact at scale. Farmers will be able to easily calculate just how much carbon their operations are sequestering at their fingertips with Granular, Corteva's digital farm management software platform. The more money they make capturing carbon, the more likely they are to maintain pasture and plant cover crops, both of which help restore soils. Ultimately, by rewarding farmers for their environmental stewardship, carbon sequestration focuses growers on the environmental outcomes of their practices, rather than just the physical commodities.

Sustainability demands sustained effort

It will take concerted effort on the part of governments and non-governmental organizations, as well as businesses, to reverse the decline in food security that has gained momentum since 2019. That's why Corteva Agriscience sponsors the GFSI, a dynamic quantitative and qualitative benchmarking model produced each year by the EIU. Constructed from 59 unique indicators

that measure the drivers of food security across both developing and developed countries, the Index, now in its ninth year, alerts policy makers, program implementors, and scientists to some of the greatest threats to increased food insecurity: climate change, natural resource degradation, and population growth.

Agricultural innovation offers solutions to all three of those challenges. By helping farmers grow food sustainably, and by sustaining farmers' livelihoods, agricultural innovators like Corteva are helping increase food security worldwide.

Why Corteva Agriscience Sponsors the GFSI

The Global Food Security Index (GFSI) is produced annually by the Economist Intelligence Unit (EIU), an independent research entity. The GFSI has proven to be a trusted resource for governments, NGOs, and private enterprise worldwide, equipping them with reliable data to take informed and meaningful action. Corteva's eight-year sponsorship of the GFSI aims to support these efforts.

GFSI 2020 highlights the need for agricultural innovation by showing we must collectively work to address:

- The threats to agricultural production posed by climate change and natural-resource scarcity;
- The demand for not just more food, but more nutritious food –and more responsive food supply chains;
- The potential of innovation and technology to improve the sustainability of agriculture.

As an agricultural innovator, Corteva is doing its part. Its solutions make food systems more resilient, smart, and sustainable, helping secure the global food supply and increase global food security.

Footnotes:

1. <https://ecos.csiro.au/soil-fire-recovery/>
2. <https://ecos.csiro.au/soil-fire-recovery/>