



CIMMYT'S 2023 REPORT

# Solving tomorrow's problems, today



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## SUSTAINABLE DEVELOPMENT GOALS

# SUSTAINABLE DEVELOPMENT GOALS

At the Rio+20 Conference, in June 2012, the United Nations (UN) member states agreed to develop Sustainable Development Goals (SDGs), to build on the eight Millennium Development Goals (MDGs) that had been established in 2000, but were slated to expire in 2015. The UN High-level Political Forum on Sustainable Development held its first meeting on 24 September 2013 to follow up on these SDGs.

Ten of the 17 SDGs relate directly to CIMMYT's mandate. The SDGs guide agricultural, social and


economic development until 2030. The entire CGIAR has transformed its work to align with these ambitious goals.

CIMMYT's research for development contributes to a world free of poverty, hunger and environmental degradation. CIMMYT, as part of CGIAR, is striving to help the world reach these goals, such as the empowerment of women, the reduction of greenhouse gas emissions, and the improvement of health and nutrition for the world's poorest people.

**CIMMYT contributes to reaching the following SDGs:**



## ABOUT CIMMYT



The CIMMYT is an international organization focused on non-profit agricultural research and training that empowers farmers through science and innovation to nourish the world in the midst of a climate crisis. Applying high-quality science while building strong partnerships, CIMMYT works to achieve a world with healthier, more prosperous people, free from hunger, and with more resilient agrifood systems. CIMMYT's research brings greater productivity and higher profits to farmers, while mitigating climate change and reducing the environmental impact of agriculture. Besides maize and wheat, CIMMYT now also works with

dryland crops like sorghum, millets, and legumes, to modernize seed production in Africa, while engaging with farmers and breeders.

CIMMYT is a member of CGIAR, a global research partnership for a food-secure future, dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources.

**For more information, visit:**

 [cimmyt.org](https://www.cimmyt.org)



# CIMMYT AROUND THE WORLD

With projects in 88 countries, CIMMYT collaborates with hundreds of partners and is part of the global network of CGIAR Research Centers, delivering science for a food and nutrition secure future.



**88 COUNTRIES WHERE WE HAVE PRESENCE\***

- HEADQUARTERS
- OFFICE
- SATELLITE OFFICE

- |             |              |               |           |            |            |              |                   |                |
|-------------|--------------|---------------|-----------|------------|------------|--------------|-------------------|----------------|
| Afghanistan | Botswana     | Congo         | Ethiopia  | Israel     | Mali       | Pakistan     | Sri Lanka         | USA            |
| Algeria     | Brazil       | (Brazzaville) | France    | Japan      | Mauritius  | Panama       | Sudan             | Uganda         |
| Angola      | Burkina Faso | Costa Rica    | Germany   | Kazakhstan | Mexico     | Peru         | Suriname          | United Kingdom |
| Australia   | Burundi      | Cote d'Ivoire | Ghana     | Kenya      | Morocco    | Philippines  | Sweden            | Uruguay        |
| Argentina   | Cambodia     | Cuba          | Guatemala | Laos       | Mozambique | Rwanda       | Switzerland       | Uzbekistan     |
| Austria     | Cameroon     | DRC           | Honduras  | Lesotho    | Myanmar    | Senegal      | Syria             | Venezuela      |
| Bangladesh  | Canada       | Egypt         | India     | Madagascar | Namibia    | Singapore    | Tanzania          | Vietnam        |
| Benin       | Chile        | El Salvador   | Indonesia | Malawi     | Nepal      | Spain        | Trinidad & Tobago | Zambia         |
| Bhutan      | China        | Eswatini      | Iran**    | Malaysia   | Nicaragua  | South Africa | Turkey            | Zimbabwe       |
| Bolivia     | Colombia     |               | Ireland   | Maldives   | Nigeria    | South Sudan  | UAE               |                |

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## MESSAGE FROM THE CHAIR OF THE BOARD OF TRUSTEES



As the world faces increasing challenges, CIMMYT remains a global leader in agricultural innovation. In 2023, we have seen how science and development can address food insecurity, climate change, and disruptions to global food supplies. These contributions to a healthier, more just world are highlighted in CIMMYT's 2023 Annual Report, which is full of inspiring stories reporting on ground-breaking discoveries and the impactful scaling initiatives which are transforming food systems in the Global South.

CIMMYT's unique strengths are now more important than ever, to deliver solutions that benefit millions of smallholder farmers, and consumers. Together, CIMMYT scientists and partners are developing climate-resilient crops, techniques for irrigation, and conservation agriculture, that boost yields while adapting farming systems to climate change.

A highlight of 2023 was the launch of our 2030 Strategy, "Science and Innovation for a Food and Nutrition Secure World." This ambitious vision is already guiding CIMMYT's progress, with world-class scientific discovery, transforming agrifood systems to feed the world within our planetary boundaries.

I am particularly impressed by CIMMYT's advances in these key areas:

**Climate-Resilient Agriculture:** Developing crops for the newer, harsher climate. CIMMYT is the world leader in breeding

disease-resistant maize and heat-adapted wheat, for example.

**Nutrition, Health, and Food Security:**

Improving the nutritional value of our crops, for healthier diets. CIMMYT is overcoming the hidden hunger of micronutrient deficiency with crops bred to be naturally high in minerals and vitamins.

**Digital Transformation:** Technology for smarter farming. CIMMYT is using Big Data in many new ways, from forecasting crop disease outbreaks before they happen, to creating policy tools to cut greenhouse gas emissions cost-effectively.

**Gender Equity and Social Inclusion:**

Empowering women and youth to play a greater role in agriculture, and a more equitable one. For example, female farmers across the continent are testing the maize varieties for tomorrow. Backbreaking farm work is becoming a thing of the past with smaller machinery, designed to fit women's needs.

I express my sincere gratitude to our dedicated staff, generous donors, and our valued partners for their continued support. Together, we are making a real difference to improve the lives of millions of people around the world. Each day we strive to eradicate food insecurity around the globe with the ambition to then improve livelihoods for all.

As we look to the future, I am confident that CIMMYT will continue to be a global thought leader in agricultural research and development. With innovation, teamwork, creativity, and dedication, CIMMYT stays true to its mission in these challenging times, creating a sustainable, and food-secure future for everyone.

**Margaret Bath**  
CIMMYT Board Chair

## MESSAGE FROM THE DIRECTOR GENERAL



I am pleased to present CIMMYT's annual report for 2023. It shows how CIMMYT is rising to the challenges of a rapidly changing world by leading implementation of groundbreaking initiatives and projects with a systems approach to agricultural transformation in more than 80 countries where we currently work. It is no longer enough to feed the world and its growing population. We must also adapt to climate change, help vulnerable countries remain food secure in the face of geopolitical disruptions, and improve nutrition in some of the poorest parts of the world. In 2023, CIMMYT researchers and partners rose to the occasion, with innovation and collaboration, striving to solve tomorrow's problems today.

The year 2023 saw a renewed global focus on food security. At CIMMYT we stepped up our efforts, prioritizing research that directly addresses the needs of smallholder farmers, particularly those in vulnerable regions. Following our first and very successful Science & Innovation Week in March, we finalized our 2030 strategy Science and Innovation for a Food and Nutrition Secure World in August, 2023. As a result, our strategic pillars – Discovery, SystemDev, and Inc. – have become the cornerstones of our continued success.

Through Discovery, CIMMYT listened to the experts in African food systems to identify the traits needed for tomorrow's climate-adapted varieties of crops, such as maize, as well as dryland crop like millets and legumes. Our science shows how plant

breeders need to develop wheat adapted to warmer nights, not just hotter days. In Nepal, nutritious new maize hybrids are helping to fight the hidden hunger of micronutrient deficiency. Our groundbreaking research revealed that it may soon be possible to breed maize that releases less nitrogen into the atmosphere. Through SystemDev, CIMMYT is collaborating with women and men farmers to deploy heat-adapted crop varieties, as countries like Pakistan and Bhutan become more self-sufficient in cereals. Maize and wheat farmers in India and Mexico were adapting to climate change with conservation agriculture. New data tools are crafting policy to lower greenhouse gas emissions from agriculture, and giving advanced warning to plant disease outbreaks, as appropriate machinery is helping to make farming a sustainable and attractive career option in many countries.

CIMMYT is a global thought leader and change agent for climate resilience, sustainable and inclusive agricultural development for a food- and nutrition-secure future. That is our Vision, which we fulfill by living our core values of respect, excellence and teamwork.

CIMMYT's impact wouldn't be possible without the dedication of our incredible partners around the world. From national research institutions to universities, private companies, and farmer organizations, our collaborative approach allows us to combine scientific expertise

with on-the-ground knowledge, as we co-create solutions that are locally relevant and sustainable.

As we move forward, CIMMYT remains laser-focused on delivering our 2030 strategy objectives. We are addressing critical development issues, advancing knowledge, gender equity and inclusion, building strong partnerships, and ensuring a broader legacy for future generations. We have expressed in this annual report some further steps needed to increase impacts and scientific breakthroughs.

Our work relies on the unwavering support of our donors and collaborators. Your investments allow us to continue developing innovative solutions that empower smallholders, adapt to and mitigate climate change, while creating a food-secure future for all. We express our sincere gratitude for your continued partnership.

**Bram Govaerts**  
**Director General, CIMMYT**



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## DISCOVERY

# Building up food security in a warmer world within planetary boundaries

CIMMYT's accomplishments in 2023 show how agriculture can mitigate climate change, and adapt to it. CIMMYT is working with leaders in Africa to confirm the crop traits that farmers there will need to adapt to climate change. CIMMYT's groundbreaking work on wheat anticipates how warmer nights will rob the crop of its yield. Genetic advances will help future plant breeders develop maize that releases less nitrogen into the atmosphere. CIMMYT and partners are breeding maize varieties that improve nutrition, by avoiding anemia and vitamin A deficiency. As a global thought leader, CIMMYT is helping farmers to nourish the world in the midst of a climate crisis, ensuring food and nutrition security, especially for vulnerable regions of the Global South.



## Breeding crops today for tomorrow's climate

### The challenge.

CIMMYT's 2030 strategy aims to achieve food and nutrition security in a changing climate. The crop varieties for 2030 have to be bred now. CIMMYT is identifying the traits that these crops will need.

### Achievements in 2023.

**CIMMYT and partners surveyed nearly 600 agricultural experts in East and West Africa**, asking which plant traits would allow food crops to adapt to climate change. CIMMYT led the study in strategic partnership with national agricultural research programs in Burkina Faso, Ethiopia, Nigeria, Tanzania and Uganda, and with two CGIAR centers: the Alliance of Bioversity International and CIAT, and the International Institute of Tropical Agriculture (IITA). The 588 surveyed experts considered six staple African food crops: maize, sorghum, pearl millet, groundnut, cowpea, and common bean. Experts predicted that most current breeding priorities will remain important, but that rates of genetic gain must increase to keep pace with climate challenges and consumer demands. Crops must also become more water-efficient, and able to thrive in intercropped fields, which is how smallholders plant their crops. New varieties also need to enhance microbial diversity in the soil, for more efficient nutrient and water use. "Future breeding will have to be bolder, smarter, and faster," explained CIMMYT's Dryland Crops Program Director, Kevin Pixley.

### Forward-thinking for 2024 and beyond.

Using social science techniques, like surveys, to place the needs of smallholders on plant breeding agendas is an example of CIMMYT's transdisciplinary work to become an innovative partner, transforming agrifood systems to become more inclusive, efficient, productive, sustainable and climate-resilient. CIMMYT is uniquely able to partner with research institutions and experts across Africa, making such a survey possible. This work showcases a renewed interest in product-oriented trait discovery and pre-breeding activities, as outlined in CIMMYT's 2030 strategy. Following up on the survey, CIMMYT is using cutting-edge breeding techniques like genomic selection, gene editing, and speed breeding to rapidly create climate-resilient crop varieties. Besides the new crop traits mentioned in this case, the world will also need wheat bred to withstand warmer nighttime temperatures.

## Wheat for the warmer nights of 2030

### The challenge.

Nighttime temperatures are rising faster than daytime ones. Previous studies have suggested that a 1°C increase in nighttime lows could cut wheat yields by 3 to 8%. In 2023, in partnership with the University of Nottingham and the Instituto Tecnológico de Sonora, Mexico, CIMMYT applied its scientific skills to quantify the impact of warmer nights on wheat yields.

### Achievements in 2023.

CIMMYT researchers held day-time temperatures constant, while artificially warming the nights. **A 1°C rise in nighttime temperature lowered wheat yields by an average of 1.9%**. Paradoxically, heat-tolerant varieties lost the most yield. This is worrying, because these are the varieties being recommended to farmers to manage the heat, but this advice was based only on daytime temperatures. Planting the wrong varieties for warmer nights could jeopardize food security and farmers' livelihoods.

### Forward-thinking for 2024 and beyond.

Understanding that even heat-tolerant wheat varieties lose yield on warm nights is a major discovery. "In the future, plant breeders will need to create wheat varieties that are adapted to warmer nights, as well as hotter days," says CIMMYT's Head of Wheat Physiology, Matthew Reynolds. Those future varieties will have to be scalable worldwide, to ensure that smallholder farmers and their livelihood trajectories are resilient and significantly improved. Another discovery by CIMMYT and partners may help to breed maize that releases less nitrogen.



# Maize that loses less nitrogen may help mitigate climate change

## The challenge.

Since the 1970s, chemical nitrogen fertilizer has boosted crop yields. But the nitrogen has also polluted water, degraded the soil's long-term fertility, and become a major greenhouse gas. CIMMYT's global leadership in science may help to change that in the coming years.

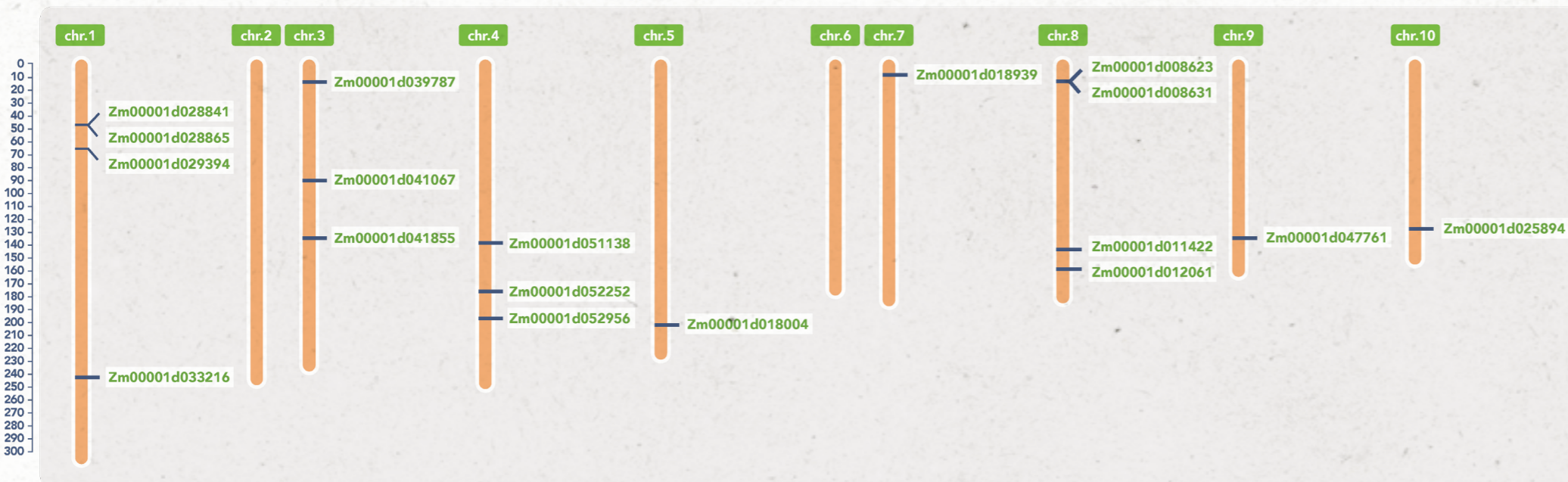
## Achievements in 2023.

In a **2023 paper in *Scientific Reports***, researchers from CIMMYT, the Japan International Research Center for Agricultural Science (JIRCAS), and the Universidad de la República (Uruguay) report a breakthrough with biological nitrification inhibition (BNI). Many plants release antibiotics through their roots that inhibit nitrifying bacteria in soil. BNI holds more nitrogen in the soil instead of gassing it off, thus reducing fertilizer demand. Farmers can buy chemical nitrification inhibitors, but they are expensive. A better option would be to breed new maize varieties with naturally high BNI. The CIMMYT-JIRCAS team identified six genes that may be linked to BNI (see figure below).

## Forward-thinking for 2024 and beyond.

More genetic research is needed, but in the future it may be possible to breed maize that naturally keeps more nitrogen in the soil, releasing less

of it into the atmosphere. "We are now building on the promising results from our research, refining the genetic map for BNI activity in maize," said César Petrolí, a CIMMYT scientist, and senior author of the paper in *Scientific Reports*. Genetic science to reduce the fertilizer requirements of maize will help to reduce nitrogen-based greenhouse gases in the atmosphere. CIMMYT is a global leader in climate-smart innovation, continuously improving its human and infrastructural capacities to solve the worldwide challenge of reducing agricultural emissions. CIMMYT's innovations are applicable globally, contributing to sustainable agriculture (and mitigating climate change) worldwide. Similar advances are being made with wheat. The Novo Nordisk Foundation will soon invest in CropSustain, a visionary BNI platform being created by CIMMYT. This platform will develop wheat varieties enhanced with the BNI trait, which suppresses soil nitrification and curbs the excessive use of synthetic nitrogen fertilizer. This pioneering approach has the potential to reduce nitrogen fertilizer use in wheat by up to 20%, mitigating soil degradation and greenhouse gas emissions.



Source: Petrolí et al. 2023



# Strategic partnerships for transformative maize breeding in East Africa

## The challenge.

Maize is the daily bread in much of East Africa, but a viral disease, maize lethal necrosis (MLN), emerged in 2011. MLN could devastate whole fields, and CIMMYT scientists realized that most of the commercial maize in East Africa was susceptible to the disease. Africa urgently needed new MLN-resistant maize hybrids, but that required intensive screening of germplasm, and breeding MLN-resistant maize lines and hybrids. The maize would need other adaptive traits as well.

## Achievements in 2023.

In 2023, CIMMYT and partners **celebrated the tenth anniversary of two centers of scientific excellence**, which play key roles in developing improved maize varieties for sub-Saharan Africa. The MLN screening facility in Naivasha, and the Maize Doubled-Haploid (DH) facility in Kiboko, are both hosted by the Kenya Agriculture and Livestock Research Organization (KALRO). Both facilities were built with support from the Bill & Melinda Gates Foundation. The MLN screening facility, which has also received funding from the Syngenta Foundation, quickly identifies maize germplasm that is resistant to the deadly viral disease. The facility has given African farmers access to over 20 maize hybrids that are tolerant or resistant to MLN, and played a key role in the release of **Bazooka, the first-generation MLN-tolerant hybrid** in Uganda, to minimize economic losses from the disease. The DH process doubles maize chromosomes in the laboratory, creating pure breeding lines in two seasons, instead of seven or eight. This saves years of work (and resources) when breeding elite maize hybrids. In Africa, several CIMMYT partners, including public and private-sector institutions, have embraced the new DH technology, using it to breed many of the new hybrids released across the continent. CIMMYT and KALRO distribute the new seed in collaboration with other public and private partners, including Seed Co Ltd (Kenya), Kenya Seed Company Ltd., COSTEC and Meru-Agro (Tanzania), the National Agricultural Research Organization (NARO) and NASECO Seeds (Uganda).

## Forward-thinking for 2024 and beyond.

Through these two facilities, CIMMYT supports a key national research partner in Kenya, KALRO, while enhancing breeding programs across

Africa, developing high-yielding maize, as stakeholders embrace excellence in science and innovation for positive and transformative change in agrifood systems. The breeding is translated into impact for farmers through strategic partnerships with government agencies and private companies to distribute disease-resistant seed. CIMMYT's Director General Bram Govaerts explains that "These two facilities demonstrate the holistic methods which are key to working towards a more productive, inclusive and resilient agrifood system." CIMMYT also aims to secure funding to double the production of drought-tolerant, certified maize seed in sub-Saharan Africa from 208,000 metric tons in 2023 to 400,000 by 2033. This will more than double the area sown to drought-tolerant maize in the region from 8.5 million hectares to about 17 million hectares. Besides breeding maize that is healthier and adapted to climate change, CIMMYT is also developing more nutritious varieties, for example, in Nepal.



# Ecological solution eases hidden hunger in Nepal

## The challenge.

Across much of sub-Saharan Africa and South Asia, millions of people are lacking in essential micronutrients, contributing to the mortality of mothers and children. For example, in Nepal, a third of the children under five are stunted because of zinc and vitamin A deficiencies. In partnership with Nepal Agricultural Research Council (NARC), CIMMYT is developing high-yielding maize varieties that are rich in zinc and vitamin A.

## Achievements in 2023.

Trials by CIMMYT and NARC since 2020 compared new hybrid maize with local varieties. The new maize was **biofortified**, bred to be naturally high in essential micronutrients like zinc and vitamin A. Field trials found that the improved maize had high levels of zinc and carotenoid (the material that human bodies use to make vitamin A): between 14.2 and 24.8 mg/kg for zinc and between 1.8 and 3.6 mg/100 for carotenoid. This maize could be a valuable source of essential micronutrients, improving food and nutrition security. The new maize varieties also yielded 2% to 55% more than popular hybrids. Similarly, CIMMYT and the Pakistan Agricultural Research Council (PARC) have developed **zinc-enriched wheat varieties that have reached 13 million farm families in Pakistan**. Biofortification is an ecological solution, being rapidly scaled to make diets healthier (for farmers and consumers).

## Forward-thinking for 2024 and beyond.

Innovations like biofortified wheat and maize are more than just a solution for today, and they go far beyond Nepal and Pakistan. These advances are part of a larger strategy to reshape global food systems by 2030. Breeding biofortified crops to alleviate childhood malnutrition is a key part of CIMMYT's core competence, and it aligns with our 2030 vision of food security within planetary boundaries.



SYSTEM DEV

# Transforming climate-smart agrifood systems

CIMMYT is transforming agrifood systems to become climate-smart, resilient and inclusive. For example, fostering collaboration between machine manufacturers and farmers in India and in Benin to co-design the equipment that smallholders need to make farming an attractive career. This international partnership is a systemic change, to meet smallholder farmers' needs for innovation in the future. Pakistani farmers are now planting heat-adapted wheat varieties on a massive scale, transforming the country's agrifood system towards self-sufficiency in cereals. In India and Mexico, wheat and maize farmers are transforming their agrifood systems with conservation agriculture, to improve soil fertility, save water, and produce more food while adapting to climate change. Breeding and delivering the latest maize hybrids require new national seed systems, as CIMMYT and partners are building in Bhutan. Systems thinking is necessary to link producers with seed supplies, machinery, and markets, as is being explored with a farmers' hub in Nigeria.

# Using big data to forecast outbreaks of wheat disease, and avoid hunger

## The challenge.

In 2021, an early warning system helped to prevent a rust disease outbreak on wheat in Ethiopia, allowing farmers to reap a record-breaking harvest. In 2023, CIMMYT and partners expanded crop disease surveillance systems to protect wheat in food-vulnerable areas of East Africa and South Asia, and to monitor maize lethal necrosis (MLN) in East and Southern Africa.

## Achievements in 2023.

CIMMYT partnered with Cornell University to launch the **Wheat Disease Early Warning Advisory System** (Wheat DEWAS), funded by the Bill & Melinda Gates Foundation and the United Kingdom's Foreign, Commonwealth & Development Office (FCDO). Relying on expertise from 23 research and academic organizations from sub-Saharan Africa, South Asia, Europe, the United States, and Mexico, Wheat DEWAS rapidly forecasts outbreaks of rust and blast diseases.

## Forward-thinking for 2024 and beyond.

Through Wheat DEWAS, CIMMYT is actively engaged with partners to promote strategic alignment around common goals.

CIMMYT partners with national governments and global institutions to scale up innovative forecasting of crop disease, using big data and new ICT infrastructure to transform agrifood systems. For example, the Global Rust Reference Center, Aarhus University, Penn State University, Cornell, the University of Minnesota, Cambridge University, and Bangabandhu Sheikh Mujibur Rahman Agricultural University are helping to manage large data sets. They are reducing gaps in knowledge management to support evidence-based decision making.

**Discoveries made by Wheat DEWAS will also benefit future surveillance systems for other pathogens, in other crops.**

Another big data tool by CIMMYT gives policymakers insights into cost-effective ways to make agriculture part of the solution to climate change.





# A climate resilience tool for global policymakers

## The challenge.

A quarter of the greenhouse gas emitted by humans comes from agriculture, livestock and forestry. As a global thought leader in climate resilience, CIMMYT realized that there was an opportunity to design agricultural policy that would help meet the Paris Agreement's 2030 climate goals. Policy makers needed a practical tool to identify promising strategies for climate-friendly farming.

## Achievements in 2023.

CIMMYT created **a rapid assessment tool to find cost-effective ways to reduce agricultural emissions**. As a large country with a crucial farming sector, Mexico was ideally suited to test this global innovation. CIMMYT found that Mexico's total emissions from crop and livestock production were about 147.45 million tons of carbon. However, these emissions were slightly offset by sequestrations from forestry and other land use (FOLU) of about 148.35 million tons. This left a small net sequestration of about 0.90 million tons of carbon. CIMMYT's assessment tool determined that Mexico could cut a further 88 million tons of carbon emissions annually. This would make agriculture, livestock and forestry an important sink of greenhouse gases. The transition could be made fairly painlessly, by phasing out fertilizer subsidies, which reward the inefficient use of nitrogen, and contribute to greenhouse gas emissions. Adopting proven CIMMYT practices like minimum tillage and precision leveling of fields will also lower emissions by optimizing fuel, fertilizer, and irrigation water. Methane emissions from livestock can be managed with composting and biodigesters. "Adopting these practices will not only reduce greenhouse gas emissions, but they will also help increase productivity," said CIMMYT's retired Principal Scientist, Iván Ortiz-Monasterio.

## Forward-thinking for 2024 and beyond.

Results from India, Bangladesh, Nepal, and Thailand show that CIMMYT's framework is applicable far beyond Mexico. The framework uses big data for agricultural research and development, reflecting CIMMYT's capacity to implement an ICT infrastructure, handle data and support evidence-based decision making. The tool will help decision makers recognize that agrifood systems are interlinked agroecosystems that sustain and enhance biodiversity, soil health and environmental quality. Any country can use the tool to find cost-effective ways to mitigate climate change. Sharing this tool with the global community will help to meet the Paris Agreement's 2030 climate goals by giving decision makers a method to craft national policy that lowers greenhouse gas emissions from agriculture, livestock and forestry. CIMMYT's big data models are informed by a deep experience, transforming agrifood systems across the world, from Mexico, to Malawi, and India.



# Mexico finds ecological solutions to improve food production

## The challenge.

Since 2010, at least **33,348 farmers have participated in demonstration events** organized by CIMMYT's **MasAgro** initiative. By training 5,935 technicians and extension agents, MasAgro helped some 500,000 farmers to adopt improved maize and wheat varieties and soil and water conservation techniques on over one million hectares in 30 states of Mexico. These farmers are producing more food and improving their livelihoods, as they have boosted maize yields by 20%, with a 23% increase in income. Wheat farmers improved their yields by 3% and their incomes by 4%. In 2023 the question was how to sustain this momentum?

## Achievements in 2023.

In 2023 the governor of the state of Guanajuato visited CIMMYT to review progress and agree on future activities with MasAgro, which is supported by CIMMYT in partnership with Mexico's Secretariat of Agriculture and Rural Development (SADER), and Mexican state governments. Service centers rent and repair machinery, so farmers can adopt conservation agriculture practices, such as zero tillage and using crop residues as mulch. Impressive achievements in data management, such as mapping the soil on over 100,000 hectares, have helped Guanajuato farmers to cut costs, use fertilizer more efficiently, and to stop burning crop residues. This improves soil and water management, helping farmers to adapt to climate change.

**MasAgro has been cited as a model** by the Inter-American Development Bank (IDB), the Organization for Economic Cooperation and Development (OECD), by the United States Agency for International Development (USAID), and at the G20 summit of 2018. MasAgro demonstrates how CIMMYT's vision on

agrifood systems is underpinning strategic dialog and informing policy. CIMMYT's Director General, Bram Govaerts, received the 2014 Norman Borlaug Field Award for leading MasAgro's farmer outreach component. As Govaerts explains, "CIMMYT's integrated development approach overcomes government transitions, annual budget constraints, and win-or-lose rivalries between stakeholders, in favor of equity, profitability, and resilience."

## Forward-thinking for 2024 and beyond.

MasAgro gathered over 2 billion data points of maize and wheat genetics, the largest sample ever taken. The world's scientists can now **access this data online**. This ICT infrastructure typifies CIMMYT's global leadership in digital transformation and capacity to exploit big data for research for development (R4D). Building on MasAgro, CIMMYT is a major partner in the CGIAR initiative, **AgriLAC Resiliente**, which will benefit vulnerable communities by improving food security, and mitigating climate hazards in Colombia, El Salvador, Honduras, Mexico, Nicaragua, and Peru. In this way, MasAgro's model will contribute to curbing migration from Central America by offering local farmers proven pathways to develop more productive, resilient and inclusive farming systems. MasAgro's insights are also being adapted to tropical rainfed conditions in eastern and southern Africa, encouraging smallholder farmers to co-develop and adopt proven, and locally-tested innovations. CIMMYT's experience with vulnerable communities is also highlighted by decades of participatory research in Malawi.



# Co-creation: research with local farmers to meet SDG goals

## The challenge.

Global mandates, like the **United Nations Sustainable Development Goals (SDG)**, often operate at a scale too broad to be easily grasped by local stakeholders. CIMMYT researchers asked if participatory action research (PAR), a method for systematically engaging scientists with stakeholders, could bridge the SDGs with local needs.

## Achievements in 2023.

A **2023 article published in *Frontiers in Ecology and the Environment*** describes 20 years of PAR in Malawi by CIMMYT and partners, including the US Department of Agriculture, Michigan State University, Cornell University, the University of Zimbabwe, Taylor University, Lilongwe University of Agriculture and Natural Resources, as well as Soil, Food and Healthy Communities (Malawi). "PAR gives a voice to farmers, speeding up impact," said Sieglinde Snapp, lead author and director of the Sustainable Agrifood Systems program at CIMMYT. "This study showed that scientific contributions are possible through PAR, which generates knowledge step-by-step. Stakeholders co-create flexible solutions with researchers." For example, PAR in Malawi showed that farmers preferred agro-forestry plots that included shrubby food crops, which also enhance soil fertility. The research involved hundreds of communities, on many topics. For example, Malawi has spent millions of dollars subsidizing fertilizer for hybrid maize. One farmer, B. Maleko, exemplifies the collaboration with CIMMYT scientists. At her experimental plot in Mwansambo in Malawi, she explained how in 2006, only five households in her community had adopted conservation agriculture, on a mere 1.5 hectares. But by 2012, work by experimenting farmers had shown that conservation agriculture and intercropping with groundnuts and other legumes could save on production costs, while producing more food. In the end, 947 households adopted this sustainable, scalable solution on 786.4 hectares, contributing to SDG goal 1 (No Poverty) and goal 2 (Zero Hunger).

## Forward-thinking for 2024 and beyond.

Two decades of experience with PAR show how the aspirations of smallholder farmers can drive the agrifood research agenda. Farmer-researcher partnerships have honed innovations like conservation agriculture and intercropping with legumes, enabling farmers to produce enough food to feed their families, while staying within planetary boundaries. PAR has demonstrated the value of transdisciplinary and participatory research in various other countries in sub-Saharan Africa, Latin America, and Asia. PAR takes research to scale, highlighting CIMMYT's global leadership in systems transformation to be more inclusive and resilient. Malawi is just one of many examples of CIMMYT's collegial relationship with innovative farmers, including smallholders in India who are transforming their agrifood system with climate-smart farming practices.



# Mitigating climate change with conservation agriculture in Bihar

## The challenge.

In Bihar, India, wheat yields are threatened by rising temperatures, erratic rainfall, soil erosion, and depleted water tables. In India, 14% of greenhouse gas emissions are linked to agriculture.

## Achievements in 2023.

CIMMYT promotes conservation agriculture in South Asia with zero tillage to manage soil erosion, crop rotation to improve soil fertility, and mulching with crop residues to hold in soil moisture. Conservation agriculture also reduces farmers' costs. Planting wheat early increases yields by allowing plants to mature during cooler weather. In India, Bangladesh and Nepal, CIMMYT is leading a strategic partnership with other CGIAR centers: the International Rice Research Institute (IRRI) and the International Food Policy

Research Institute (IFPRI), with funding from the United States Agency for International Development (USAID) and the Bill & Melinda Gates Foundation. CIMMYT and CGIAR have been promoting conservation agriculture in Bihar since 2010, in partnership with farmer centers (KVKs), and government extension agents from the local agriculture departments. **In Rajapur village, 100% of the farmers have adopted zero tillage in wheat.** Farmer Rahul Rai first met CIMMYT and KVK scientists in 2011, who were promoting conservation agriculture in a village near his home. Overcome by curiosity, he immediately planted a few acres of his family's farm to early, zero-tillage wheat. He also adopted early sowing, doubling his wheat yield. Data from his farm shows steady improvement in yields. Until 2014, his wheat yield was about 3.5 to 4 tons/hectare, rising to around 5.5 tons/hectare in 2023 (see figure below). These

innovations helped Rahul Rai and other farmers to save on input costs while avoiding some of the labor-intensive practices of conventional tillage. CIMMYT and partners are now sharing these innovations widely through exposure visits, demonstration trials on farmers' fields, and support for machines and quality seeds, in collaboration with private service providers. Rahul Rai hosts one of these demonstration plots on his own farm. He proudly explains, "The data from my fields on the benefits of conservation agriculture help to promote best practices across our state."

## Forward-thinking for 2024 and beyond.

CIMMYT is now collaborating with more farmers and policymakers to expand conservation agriculture across South Asia. One farm, and one village at a time, conservation agriculture is steadily expanding across the region, producing more food, and conserving soil, while lowering greenhouse gas emissions. Conservation agriculture in Bihar will improve soil health and water use for generations, reducing dependency on inputs and mitigating climate risks. This is a clear example of progress towards CIMMYT's 2030 vision of resilient agrifood systems, involving farmers in a participatory research agenda. Elsewhere, CIMMYT and partners are scaling up participatory research, as plant breeders include women and men across Africa in trials to find the best maize for the continent's future.

WHEAT				
Farmer: Rahul Rai   Village: Rajapur   District: Buxar, Bihar				
CROPPING YEAR	ESTABLISHMENT	SOWING	VARIETY GROWN	YIELD (t/ha)
				WHEAT
2012 -13	Zero tillage	09 - Nov - 12	PBW343	5.5
2012 -14	Zero tillage	25 - Nov - 13	HD 2967	4.56
2012 -15	Zero tillage	03 - Dec - 14	HD 2967	4.35
2012 -16	Zero tillage	21 - Nov - 15	HD 2967	4.97
2012 -17	Zero tillage	11 - Nov - 16	HD 2967	5.9
2012 -18	Zero tillage	10 - Nov - 17	HD 2967	6.59
2012 -19	Zero tillage	15 - Nov - 18	HD 2967	5.55
2012 -20	Zero tillage	10 - Nov - 19	HD 2967	5.97
2012 -21	Zero tillage	05 - Nov - 20	HD 2967	6.55
2012 -22	Zero tillage	21 - Nov - 21	HD 2967	5.3
2012 -23	Zero tillage	11 - Nov - 22	HD 2967	6.65

Source: *Conservation agriculture helps smallholder farmers to be more resource efficient*

# Women farmers conduct research trials for new maize in Africa

## The challenge.

Women farmers in Africa are some of the hardest hit by climate change. However, new climate-resilient maize varieties can help farm communities achieve food security, sustainably. CIMMYT plant breeders are already creating crop varieties that include the traits demanded by women. However, CIMMYT also realizes that gendered differences in farming practices still lead to lower yields for many female farmers.

## Achievements in 2023.

Asking women what they want in a new crop variety is necessary, but it's not enough. Women farmers must also be involved in testing the new maize before breeders release it. CIMMYT has regional maize breeding networks across eastern and southern Africa, in partnership with the National Agricultural Research and Extension Systems (NARES). CIMMYT's leadership in these networks ensures that smallholders will have nutritious maize varieties, bred to be climate-resilient, and responsive to women's demands. To test new maize hybrids under real farm conditions, **the CIMMYT-NARES network held trials on 400 farms in southern Africa, and more in eastern Africa.** Over 40% of these experiments were managed by women farmers, who evaluated the new maize using their own practices, giving valuable feedback to the breeders. Another 30% of the trials were jointly managed by women and men, which CIMMYT research has shown is common in the region. In 2023, a remarkable 208,343 metric tons of certified seed of CGIAR-related, stress-tolerant maize varieties were produced. Planted by about 9.2 million households on 8.5 million hectares, across 13 African countries, this maize helped to feed some 56 million people. A widely-accepted maize variety scales up innovation to millions of people.

## Forward-thinking for 2024 and beyond.

CIMMYT-NARES networks are transforming gender-inclusive research, collaborating with empowered women farmers to conduct trials of new maize. CIMMYT's global leadership ensures that improved maize meets the needs of all farmers, and makes sustainable farming more rewarding for men and women farmers. CIMMYT's strategic partnerships within CGIAR, and with NARES across Africa are proving to be an effective environment for co-creating and scaling relevant, accessible technologies. While plant breeding is crucial, to be effective it must often be backstopped by creating new seed systems, like the one now transforming agrifood systems in Bhutan.



## Breeding maize and creating a seed system to feed Bhutan

### The challenge.

In Bhutan, maize was the second food crop, after rice. Yet farmers often failed to find the seed of varieties they wanted. Maize yields fell between 2016 and 2021. At the same time, rural-urban migration, the growth of cities, and climate change removed two-thirds (64%) of the land devoted to maize, and half (55%) of the rice area. Bhutan was then forced to import grains. To foster self-sufficiency, and food security, in 2020, Bhutan released its first climate-resilient maize hybrid, **Wengkhari Hybrid Maize-1 (WHM-1)**, which was sourced from CIMMYT. However, Bhutan needed to strengthen its seed system's capacity to produce hybrid maize seed.

### Achievements in 2023.

CIMMYT joined with the Agriculture Research & Development Center (ARDC) in Bhutan, to host a three-day training workshop. 30 participants from partners including the National Seed Center, the College of Natural Resources, the Bhutan Food and Drug Authority, and other agriculture research and development centers, learned about producing quality hybrid maize seed. The attendees seized the opportunity to propose a formal maize seed system. "This was my first training on hybrid maize seed production, and it was relevant, action-oriented, and applicable to our conditions in Bhutan," said Kinley Sithup, a researcher at ARDC. Creating a new seed system in Bhutan shows how CIMMYT provides the environments for co-creating and scaling relevant technologies and disruptive solutions, through strategic partnerships.

### Forward-thinking for 2024 and beyond.

During the hybrid maize seed workshop in Bhutan, attendees planned a seed production group, to launch in January 2024. Meanwhile, **the country's ARDC is breeding more hybrid maize with genetic material from CIMMYT**. Some of these upcoming hybrids promise to double farmers' yields. Bhutan and CIMMYT have taken a bold step to develop an entire new seed system for the country. In Pakistan, CIMMYT is helping farmers acquire new seeds as one way of adapting to climate change.

## The seeds of climate-resilient farming in Pakistan

### The challenge.

For many years, Pakistan imported wheat. Now CIMMYT is proudly supporting Pakistan's goal of achieving self-sufficiency in wheat production, strengthening the national economy, and helping to ensure food and nutrition security in the Global South, within planetary boundaries.

### Achievements in 2023.

From 2021 to 2023, Pakistan released 31 wheat varieties that were well adapted to warmer weather, including **26 new varieties bred from CIMMYT materials**. In field trials around the country, over several years, the new varieties yielded about seven tons per hectare, up to 20% higher than popular varieties. The grain quality was ideal for making chapatis, a favorite flat bread of South Asia. The new wheats were resistant to rust diseases, and they could be easily rotated with rice or cotton. Many of the varieties were also biofortified to be high in zinc, helping to fight malnutrition, especially among women and children. The 31 new varieties are just starting to move into the agrifood system, but based on past experience, their use will be transformative. For example, Akbar-2019, a biofortified variety released in 2019, is now sown on nearly 3.8 million hectares. Farmers value its rust resistance, excellent flavor, and its 8 to 10% increase in yields.

### Forward-thinking for 2024 and beyond.

The next step will be to produce and distribute enough seed to plant the 31 new varieties on Pakistan's nine million hectares of wheat land (an area slightly larger than Austria). "Producing and distributing all that seed would be too ambitious for Pakistan's public sector alone," explained Javed Ahmad, chief scientist at the Wheat Research Institute, a CIMMYT partner. "Fortunately, our new, fast-track, seed multiplication program collaborates with private companies to multiply seed for Pakistani farmers as quickly as possible." New seeds and crop varieties help to farm within our planetary limits, especially when combined with appropriate machinery.



# Small machinery improves livelihoods and conserves biodiversity

## The challenge.

In Nepal's mid-hills, steep terrain, small fields and a lack of labor make it difficult to plant on time, so maize yields are often low. Machinery can replace lost labor, but tractors need room to turn around, often compelling farmers to remove trees that shelter birds and other wild animals. In Nepal, farmers are starting to use five- to nine-horsepower mini-tillers, which are even smaller than two-wheel tractors.

## Achievements in 2023.

Two separate studies by CIMMYT show the value of smaller equipment. In Ethiopia, down-sized machines can work on small plots, and under tree canopies, without destroying the habitat that nurtures wildlife, according to a [paper published in Biological Conservation](#), by CIMMYT and partners: the University of Hohenheim, and the University of KwaZulu-Natal. In Nepal, CIMMYT and partners (the Asian Development Bank, and Cornell University) surveyed 1,000 households to determine the benefits of mini-tillers. The mini-tillers helped farmers cut tillage and labor costs. Timely planting increased maize yields, and profits, as reported in [the Journal of Economics and Development](#). This pioneering study was the first to document the correlation between machinery designed for small farms and the UN Sustainable Development Goals: No Poverty (SDG-1) and Zero Hunger (SDG-2).

"Our research can help guide investments by developing countries, supporting rural people who wish to remain on the farm and make a go of it," explained Gokul P. Paudel, a researcher at CIMMYT and at Leibniz University, who led the study. The adopters and non-adopters were chosen from households of similar economic situations, to ensure a valid comparison. As the following table shows, the adopters of mini-tillers lowered their land preparation costs, their labor costs, and variable production costs, while ramping up their yields and profits. The mini-tiller adopters reported enhanced food security.

## Forward-thinking for 2024 and beyond.

CIMMYT's research shows that machinery adapted to small farms can transform agrifood systems, making them more productive, while conserving biodiversity. Affordable, smaller machinery improves farmers' livelihoods. This appropriate equipment is easier for female farmers and youth to use, helping to make farming an attractive career, especially for youth and women. CIMMYT will continue to be a global thought leader, transforming agrifood systems by helping governments, NGOs, manufacturers, dealers, and mechanics to foster the right sized machinery. Machinery design may also benefit from other new ideas, for example when people from countries as different as India and Benin put their heads together.

TABLE: COSTS, YIELDS, PROFITS AND FOOD SECURITY OF ADOPTERS AND NON-ADOPTERS OF MINI-TILLERS IN NEPAL

	ADOPTERS OF MINI-TILLERS	NON-ADOPTERS
LAND PREPARATION COST PER ha	US\$ 108	US\$ 159
LAND COSTS PER ha	US\$ 213	US\$ 278
TOTAL VARIABLE COSTS PER ha	US\$ 555	US\$ 654
MAIZE YIELD	3,429 kg/ha	3,016 kg/ha
PROFITS PER ha	US\$ 210	US\$ 189
HOUSEHOLDS SELF-SUFFICIENT IN FOOD	50%	21%

Source: adapted from Paudel et al. 2023



# New partnerships with India and Benin transform agrifood systems

## The challenge.

In partnership with CIMMYT, the Green Innovation Centers for the Agriculture and Food Sector (GIC), funded by the German Government, are fostering collaboration between 14 nations in Africa and two in Asia. In 2017, CIMMYT and GIC partnered with Rohitkrishi Industries, an equipment manufacturer, to design machinery for smallholders in India. Based on this success, in 2023 CIMMYT set out to adapt the improved Indian machinery for West Africa.

## Achievements in 2023.

In 2023, CIMMYT partnered with the Programme Centres d'Innovations Vertes pour le secteur agro-alimentaire (ProCIVA), and a machinery manufacturer, Techno Agro Industrie (TAI) **to test Indian six-row seeders in Benin**, West Africa. This transformative collaboration between actors in the Global South has led to practical, scalable innovation. "When developing countries with similar contexts forge alliances to share knowledge with each other, this kind of direct South-South collaboration produces the most sustainable advances in agricultural production, food security, and job creation," said Rabe Yahaya, agricultural mechanization specialist at CIMMYT.

## Forward-thinking for 2024 and beyond.

The collaboration between manufacturers in Benin and India will reshape the agricultural ecosystem of West Africa, as smallholder farming becomes more productive and profitable. CIMMYT is now accelerating South-South collaboration and win-win partnerships between public- and private-sector actors in other countries, to mitigate climate change, resource degradation, and shocks to global food supply chains. New machinery, like water pumps, are also crucial for irrigation, with its transformative power to improve yields, and adapt to climate change.





# Irrigation responds to conflict and climate disruptions in Nepal

## The challenge.

Nepal's food security has been jeopardized by the war in Ukraine. Russia and Ukraine are top exporters of maize, wheat, fertilizers, food oils, and petroleum. The war (and climate change) have imposed hardships on low-income countries like Nepal, which rely on food imports. In Nepal, food prices increased by 10% since 2012, while the price of diesel skyrocketed by 500%. CIMMYT found a solution with small-scale irrigation.

## Achievements in 2023.

Irrigation can double or triple harvests, improving food security even as conflict disrupts global grain distribution. Most of Nepal's groundwater is under-used, so CIMMYT advises farmers, governments, and donors on accessing appropriate engineering solutions, while teaching smallholders how to finance irrigation services. There is an emphasis on reaching women and young farmers. Some aquifers run dry when they are over-pumped, so groundwater data must be collected and monitored. CIMMYT has partnered with the International Food Policy Research Institute (IFPRI), the International Water Management Institute (IWMI), the International Rice Research Institute (IRRI), and the Government of Nepal's Groundwater Resources Development Board (GWRDB) to develop a novel, digital groundwater monitoring system, reflecting CIMMYT's capacity to handle big data and reduce the gaps in knowledge management to support evidence-based decision making. Sustainable irrigation is an ecological solution to improve climate resilience and economic benefits for smallholder farmers.

## Forward-thinking for 2024 and beyond.

Farmers and the Government of Nepal are improving their access to key agricultural innovations. As the Nepal experience evolves to boost yields with sustainable irrigation, farmers will strengthen their food security and their resilience to climate change—an example that can be taken to a global scale. In 2024, CIMMYT and partners will improve rental systems for wells and pumps in Nepal, to benefit **20,000 farm households** (including 40% women, youth, and marginalized groups). By 2025, CIMMYT will increase GWRDB's capacity to monitor groundwater in five districts in Nepal, an experience that will be applicable across South Asia. Sustainable irrigation, especially when combined with productive crop varieties and appropriate machinery, showcases CIMMYT's global leadership in systems transformation, leading to higher yields and profits for smallholders. In West Africa, CIMMYT is helping smallholders to transition to farming as a career, with another kind of new network: farmers' hubs.



## Greater resilience with a farmers' hub in Nigeria

### The challenge.

Poor access to information, technology, seeds, and markets hinders the ability of Nigerian smallholders to produce food. CIMMYT aimed to address this in 2023 with a farmers' hub in Nigeria that would improve and add resilience to smallholder farmers' livelihood trajectories.

### Achievements in 2023.

CIMMYT partnered with the Syngenta Foundation to launch a farmers' hub in Murya Community, in Nasarawa State, Nigeria. **The hub is a one-stop shop for quality seeds, fertilizers, and pesticides.** The hub helps farmers process and sell their produce, especially food security crops like cowpea, sorghum, groundnuts, and pearl millet, which thrive in warm, dry climates. Farmers who want to get more involved in commercial agriculture can take training courses, rent equipment, process their grain, apply for loans, and receive price information and weather forecasts. The farmers' hub also partners with universities, governments and the International Institute of Tropical Agriculture (IITA). Collaboration with local stakeholders and international organizations like IITA is crucial for scaling up the model across Africa. CIMMYT partnerships like this one fuel innovation and create sustainable solutions.

### Forward-thinking for 2024 and beyond.

If the farmers' hub in Nigeria links farmers to markets, seeds, and other inputs, the model can be replicated elsewhere. The hub anticipates and addresses changes in value chains, allowing farmers to participate in them to improve their livelihoods. A key challenge will be ensuring fair trade practices for farmers. As the hub both buys and sells products, it will be crucial to establish transparent pricing mechanisms and contractual agreements that protect farmers' interests and enable them to maintain sustainable livelihoods.



## TOP FUNDERS 2023

*(in thousands of U.S. dollars, based on 2022 research execution)***FUNDER**

<b>Bill &amp; Melinda Gates Foundation, USA</b>	40,813
<b>United States Agency for International Development (USAID)</b>	36,599
<b>CGIAR Research Initiatives/ Platforms (Note 1)</b>	32,761
<b>Federal Ministry for Economic Cooperation and Development (BMZ), Germany</b>	6,493
<b>Foundation for Food and Agriculture Research (FFAR), USA</b>	3,433
<b>Food and Agriculture Organization of the United Nations (FAO)</b>	873
<b>Ministry of Agriculture and Farmers Welfare, India</b>	802
<b>Walmart Foundation, USA</b>	791
<b>Cervezas Cuauhtémoc Moctezuma, S.A. de C.V., Mexico</b>	711
<b>Ministry of Agriculture and Rural Affairs, China</b>	692
<b>Context Global Development (CGD), USA</b>	674

*(amounts exclude deferred depreciation)*

**Note 1:** Australia, Belgium, Bill & Melinda Gates Foundation, Canada, Denmark, European Commission, France, Germany, India, Ireland, Japan, Republic of Korea, The Netherlands, New Zealand, Norway, Switzerland, UK (FCDO), United States Agency for International Development (USAID) and World Bank.

## OTHER FUNDERS IN 2023

**African Agricultural Technology Foundation, (AATF)**

**Agrovegetal, S.A.**

**Alliance for a Green Revolution in Africa (AGRA)**

**AMAZONE-Stiftung**

**Australian Centre for International Agricultural Research (ACIAR)**

**Biotechnology and Biological Sciences Research Council (BBSRC)**

**Borlaug Institute for South Asia (BISA)**

**French Agricultural Research Centre for International Development (CIRAD)**

**Centro de Estudio Andinos Bartolomé de Las Casas (CBC)**

**Centro Internacional de Agricultura Tropical (CIAT)**

**Cereals & Grains Association**

**Compañía Nacional Almacenadora, S.A. de C.V.**

**Corporacion Colombiana de Investigacion Agropecuaria (Agrosavia)**

**Development Fund, Norway**

**Digital Green Foundation (DGF)**

**Global Center on Adaptation (GCA)**

**Global Crop Diveristy Trust**

**Grupo Bimbo, S.A.B de C.V.**

**Embassy of Ireland**

**Grupo Trimex, S.A. de C.V. (Trimex), and PepsiCo, Inc. (PepsiCo)**

**Henan Agricultural University**

**Indian Council of Agricultural Research**

**Ingredion Mexico, S. A. de C. V.**

**Instituto de Investigacion y Capacitacion Agropecuaria, Acuicola y Forestal del Estado de Mexico**

**International Fertilizer Development Center (IFDC)**



## OTHER FUNDERS IN 2023

International Institute of Tropical  
Agriculture (IITA)

International Livestock Research Institute  
(ILRI)

International Potato Center (CIP)

International Rice Research Institute (IRRI)

Join Hope Seeds Co., Ltd

Kansas State University

Kellogg Company Mexico

Kobe University

KOCH Agronomic Services LLC

EFFEM México, Inc. y Compañía, S. en  
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Ministry of Agriculture and Forestry,  
Turkey

Ministry of Agriculture, Forestry and  
Fisheries, Japan

National Research Institute for Agriculture,  
Food and Environment (INRAE)

Nestlé México S.A. de C.V.

Norwegian University of Life Sciences

Novo Nordisk Foundation (NNF)

Provivi Inc.

Purdue University

Rothamsted Research

Gobierno del Estado de Quintana Roo  
Secretaría del Campo del estado de Zacatecas  
(SECAMPO)

Syngenta Foundation For Sustainable  
Agriculture

Commonwealth Scientific and Industrial  
Research Organisation (CSIRO)

Groupement d'intérêt économique Blé dur (GIE  
Blé dur)

The Nature Conservancy

The Pennsylvania State University

The Rockefeller Foundation

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(USDA)

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Varios private-sector companies, México

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University

Williams College

World Food Programme



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Served during 2023\*

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### Kevin Pixley

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\*Leadership Team members and job  
titles in this list reflect membership  
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## BOARD OF TRUSTEES 2023

### FUNCTIONS

The CIMMYT Board of Trustees plays a pivotal role in guiding the organization's mission and ensuring its success. The Board is responsible for setting the objectives and overall strategic direction of CIMMYT. This includes reviewing and approving the Center's strategy, business plan, and annual budget.

In addition to these strategic responsibilities, the Board closely monitors a range of metrics to assess the Center's management and performance. A critical function of the Board is the appointment and oversight of the Director General, ensuring that CIMMYT's leadership aligns with its goals and values, and drives the organization toward impactful outcomes.

Members of the CIMMYT Board of Trustees are committed to upholding the highest standards of professional and ethical conduct. They act with integrity and in good faith, always prioritizing CIMMYT's best interests. In every decision and action, Board members adhere strictly to all applicable policies, rules, procedures, and legal requirements.

Beyond their ethical obligations, Board members are expected to engage actively, responsibly, and constructively in the Board's work. Their participation is crucial in guiding CIMMYT's mission and ensuring the organization's continued impact and success on a global scale.

### ORGANIZATION AND STRUCTURE

CIMMYT's Board of Trustees is composed of a distinguished group of globally recognized experts, each bringing a wealth of experience across a wide range of disciplines. The Board members collectively represent a diverse array of expertise, including agricultural science, development policy, financial management, business management, economics, and other key professional fields.

The Board is structured to include up to 12 voting members, ensuring a balanced and comprehensive governance approach. Of these, one member is appointed directly by the Government of Mexico.

In addition to the voting members, the Board includes four non-voting members who play a crucial advisory role. Among these non-voting members are a representative from the Government of Mexico's Ministry of Foreign Affairs and CIMMYT's Director General, ensuring that key perspectives are included in discussions.

The Board's leadership is further enhanced by the role of Mexico's Secretary of Agriculture, who serves as the Honorary Chair, underscoring the strong partnership between CIMMYT and the Mexican government.

Through this diverse and highly experienced Board, CIMMYT continues to drive its mission forward, fostering innovation and impact in agricultural research and development on a global scale.

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## ACRONYMS

<b>CIMMYT</b>	International Maize and Wheat Improvement Center (Centro Internacional de Mejoramiento de Maíz y Trigo)
<b>MLN</b>	Maize Lethal Necrosis
<b>ICT</b>	Information and Communication Technology
<b>IDB</b>	Inter-American Development Bank
<b>OECD</b>	Organization for Economic Cooperation and Development
<b>USAID</b>	United States Agency for International Development
<b>SADER</b>	Secretaría de Agricultura y Desarrollo Rural (Mexico)
<b>CGIAR</b>	Consultative Group on International Agricultural Research
<b>ICARDA</b>	International Center for Agricultural Research in the Dry Areas
<b>PAR</b>	Participatory Action Research
<b>KVK</b>	Krishi Vigyan Kendra (farm science centers in India)
<b>BNI</b>	Biological Nitrification Inhibition
<b>JIRCAS</b>	Japan International Research Center for Agricultural Sciences
<b>NARC</b>	Nepal Agricultural Research Council
<b>PARC</b>	Pakistan Agricultural Research Council
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FCDO</b>	Foreign, Commonwealth & Development Office
<b>FFAR</b>	Foundation for Food & Agriculture Research
<b>GIZ</b>	German Agency for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit)
<b>SDGs</b>	Sustainable Development Goals
<b>AFRC</b>	Audit Finance and Risk Committee





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