STRATEGIC PLAN 2017-2022
Improving Livelihoods through Maize and Wheat Science
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CIMMYT - the International Maize and Wheat Improvement Center - is the global leader on publicly-funded maize and wheat research and related farming systems. Headquartered near Mexico City, CIMMYT works with hundreds of partners throughout the developing world to sustainably increase the productivity of maize and wheat cropping systems, thus improving global food security and reducing poverty. CIMMYT is a member of the CGIAR Consortium and leads the CGIAR Research Programs on Maize and Wheat. The Center receives support from national governments, foundations, development banks and other public and private agencies.
IMMYT’s mission is to improve livelihoods through maize and wheat science. We will achieve this through excellent science for impact, carried out by partnerships with strong emphasis on capacity building. “ONE CIMMYT” is our integrating philosophy, which ensures that we work towards a shared mission and vision. It is a powerful unifying concept for our Strategic Plan to 2022.

This strategic plan aligns CIMMYT’s work with the CGIAR Strategy and Results Framework 2016-2030 and outlines our contribution to 10 of the 17 Sustainable Development Goals (SDGs) of the United Nations. Growing challenges, such as climate change and global financial and food crises, have created an opportunity to reframe the global development agenda, so that it addresses the linkages between the economic and environmental drivers behind our efforts to achieve sustained poverty reduction.

To support this global effort, CGIAR has developed an agenda for reform that will enhance the ability of the entire CGIAR System to strengthen linkages between research and development, creating even more impact in farmers’ fields.

Our strategic plan incorporates findings from internal and external consultations that took place between June 2015 and July 2016. The process began with a variety of online and face-to-face consultations with donors and partners, and culminated in facilitated workshops with staff.

Beyond CIMMYT’s “core research,” this strategic plan assigns higher priority to reducing malnutrition, empowering female farmers and sharing knowledge with partners and farmers. It also marks a shift in our focus from commodity-based research to an integrated approach centering on agri-food systems – a change that we believe is critical for working more effectively to strengthen food security, reduce poverty and enhance human nutrition.

Our strategic plan is a living and evolving document, which ensures that we are constantly adapting and reacting to the changing environment around us and to the needs of the poor.

Martin Kropff
Director General, CIMMYT
CIMMYT works throughout the developing world to improve livelihoods and foster more productive, sustainable maize and wheat farming. Through collaborative research, partnerships and training, CIMMYT targets the challenges of food insecurity and malnutrition, climate change and environmental degradation.
VISION

CIMMYT contributes to the development of a world with healthier and more prosperous people – free from the threat of global food crises – and with more resilient agri-food systems.

THE PILLARS OF OUR SUCCESS

Our people

Highly experienced, creative and inspired staff with a passion for CIMMYT’s vision and mission.

Our partners and supporters

Strong and strategic partnerships with the CGIAR, national agricultural research programs, governments, philanthropic organizations, advanced research institutes, development organizations, the private sector, farmers and consumers.

Our knowledge and skills

Integrated, impact-driven research directed towards improved maize and wheat agri-food systems.
THE STATE OF FOOD SECURITY AND POVERTY TODAY
Population growth. Migration. Political instability. Food and nutritional insecurity. Climate change. Inequality. Environmental degradation. Economic development. These are the major challenges of the 21st century. Though great strides have been made to pull millions out of poverty in recent decades, a daunting challenge lies ahead – how to feed more than 9 billion people by 2050.

Research on maize and wheat agri-food systems lies at the heart of the solution. These two staple grains account for a quarter of the total crop area harvested globally and provide 19 percent of the total calories available. Experts forecast that farmers will need to produce at least 60 percent more grain to feed a growing world population, using fewer nutrients as well as less land and water. Lloyd’s of London’s Food System Shock predictive model suggests that, under current production scenarios, crop failures in multiple breadbaskets could result in estimated global losses of up to 7 percent for wheat and 10 percent for maize. The consequences of such shocks on prices could be dramatic, as occurred in 2008 and 2011, with devastating effects for the poor.

In 2008, after decades of stability, food prices jumped more than 80 percent in some regions. Higher prices for key commodities such as maize and wheat adversely affected low-income consumers and created political and social instability in food-importing countries. As food prices have stabilized in recent years, concern about the fragile global food system has diminished, but food price volatility remains a threat. At any time, events like drought or a major crop disease outbreak could send prices skyrocketing anew. In fact, such shocks are already taking place with increasing regularity. In southern Africa, for example, millions have been affected by droughts brought on by the 2015-2016 El Niño, a climate phenomenon that causes extreme weather worldwide and whose impacts have been made more severe by climate change.

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Agri-food systems are the activities and relationships that determine how food is produced, processed, distributed and consumed, together with the human and biological systems that shape these activities at every stage.
CIMMYT’s work better enables maize and wheat agri-food systems to:

- Produce more food and feed with less land and fewer inputs.
- Create sustainable, long-term livelihood opportunities for farmers.
- Support healthy and nutritious diets.
- Use water, other natural resources and nutrients more efficiently.
- Mitigate and adapt to the effects of climate change, reduce deforestation, reverse soil degradation and restore fragile ecosystems.
- Enable equitable access for women and marginalized groups to knowledge, markets, technology and training.
- Engage young people and contribute to creating a new generation of agricultural entrepreneurs.
- Create fair and enabling policy environments for farmers and small-scale enterprises in the developing world.
CIMMYT AND ITS ROLE
This strategic plan sets out the Center’s goals and priorities for the next five years (2017-2022). It details how we will operate and enable our staff to achieve greater impact, working in integrated teams.

Over the past 50 years, CIMMYT has worked with hundreds of partners to improve agricultural production and rural livelihoods. The continuing impact of this collaborative effort provides evidence that science, technology and innovation for sustainable development yield returns that exceed the investment many times over.

CIMMYT’s work is guided by a belief that our science contributes to economically, socially and environmentally sustainable development. To this end, we:

- **Deliver** results that respond to the world’s most pressing agricultural problems.
- **Enhance** livelihoods through maize and wheat science.
- **Pursue** multidisciplinary and partnership approaches.
- **Generate** expertise, innovation and knowledge at the local and global scales.
- **Adapt** to changing environments, challenges and priorities.

2017-2022: What are we going to do differently?

- **ONE CIMMYT.**
- A sharp focus on agri-food systems.
- Stronger alignment with CGIAR.
- More vigorous contributions to an integrated CGIAR research portfolio.
- Additional and different types of donors.
- Greater emphasis on capacity building through the CIMMYT Academy.
- More public-private partnerships.
- Results-based management.
The global development landscape is in flux. As middle-income countries invest more of their own resources in agricultural development, high-income countries have less control over the agenda. The private sector is playing a stronger role in the developing world, helping to make markets work for the poor. CIMMYT must adjust to this changing landscape through new technologies, new partnerships and new ways of working. Business as usual will not suffice.

Against this background, the United Nation’s Sustainable Development Goals (SDGs) call for equitable access to resources at a time of unprecedented growth in global consumption. Achieving these goals means enabling millions of people to meet their basic needs and enjoy a better quality of life without compromising the prospects of future generations. The SDGs are intended to create a new global partnership based on solidarity, cooperation and mutual accountability to eradicate extreme poverty by 2030 and deliver on the promise of sustainable development. CIMMYT’s work will contribute to 10 of the 17 SDGs.
**CGIAR’s mission** is to advance agricultural science and innovation to enable poor people, especially women, to better nourish their families, and improve productivity and resilience so they can share in economic growth and manage natural resources in the face of climate change and other challenges.

**CIMMYT and CGIAR**

CIMMYT is one of the founding and lead centers of CGIAR – the only worldwide partnership that applies agricultural research for development (R4D) in a global effort to alleviate poverty, hunger, major nutritional imbalances and environmental degradation. CGIAR’s Strategy and Results Framework 2016-2030 (SRF)\(^5\) sets out the collective goals and strategic actions by which the 15 CGIAR centers will deliver on their shared mission.

CIMMYT contributes to the portfolio of research carried out by CGIAR centers and their partners in support of the CGIAR Strategy and Results Framework and the SDGs. This research is guided by the CGIAR System-Level Outcomes of reducing poverty, improving food and nutrition security and enhancing management of natural resources. The research portfolio encompasses twelve CGIAR Research Programs (CRPs) – eight programs focused on innovation in agri-food systems plus four global integrating programs working with the others on cross-cutting issues. The CRPs are supported by three research platforms designed to manage genetic resources, accelerate research on breeding and manage rapidly growing volumes of scientific data (Big Data). The programs and platforms align the work of centers and partners in major multi-disciplinary initiatives that address the world’s most pressing agricultural development challenges.

CIMMYT focuses on four core areas of research in which the Center has a strong comparative advantage and is uniquely well positioned: genetic resources, genetic improvement, sustainable intensification and socioeconomics. At the same time, CIMMYT addresses cross-cutting issues that are important in its work: climate change, gender and youth, policies and institutions, and capacity building.

CIMMYT leads the CGIAR agri-food system programs MAIZE and WHEAT, and participates in three other programs: Climate Change, Agriculture and Food Security (CCAFS); Agriculture for Nutrition and Health (A4NH); and Policies, Institutions and Markets (PIM). In addition, CIMMYT has taken on a convening role in developing the Excellence in Breeding Platform and will also contribute to the Genebanks and Big Data Platforms.

The CGIAR Research Program on Maize (MAIZE), led by CIMMYT and the International Institute of Tropical Agriculture (IITA), seeks to mobilize global resources in maize research and development to achieve greater impact on maize-based farming systems in Africa, South Asia and Latin America.

The CGIAR Research Program on Wheat (WHEAT), led by CIMMYT and the International Center for Agricultural Research in the Dry Areas (ICARDA), couples advanced science with field research in developing countries to raise the productivity, production and availability of this staple crop for the 2.5 billion who depend on it.
How MAIZE and WHEAT will contribute to the 2030 CGIAR system level outcomes

System level outcome 1: Reduced Poverty

- 29% More farm households to adopt improved varieties or management practices.
- 36% Number of people to be assisted to exit poverty.

System level outcome 2: Improved food and nutrition security for health

- Improve the yield increase rate annually from less than to 2.5% (CGIAR LEVEL)
- 53% More people meet minimum daily dietary requirements.

System level outcome 3: Improved natural resource systems and ecosystem services

- 20% increase in water and nutrient use efficiency. (CGIAR LEVEL)
- 15% reduction in greenhouse gases compared with business as normal. (CGIAR LEVEL)
- 40% Number of forests to be saved from deforestation.

Contribution of MAIZE and WHEAT to CGIAR’s Strategy and Research Framework
CIMMYT has a wide-reaching global presence and has achieved great respect as an apolitical organization and honest broker. The Center has built a proven record of success through strong partnerships, with demonstrated outcomes and impacts. Our people work in integrated teams that combine cutting-edge expertise in the biophysical and socioeconomic sciences across the developing world. Among our central endeavors are to:

- **Hold in trust, use and share a comprehensive collection of maize and wheat genetic resources, and serve as an active partner in a global germplasm conservation network.**
- **Develop new maize and wheat germplasm adapted to the needs of farmers in the developing world and share it routinely as international public goods with hundreds of organizations worldwide.**
- **Deliver solutions for sustainable intensification under farmers’ real conditions**, working with rural communities to select, develop and further adapt interventions, while also enhancing market access.
- **Strengthen the capacity of national research programs and local enterprises through partnerships and training for students, scientists, technicians and other professionals.**
- **Pursue a harmonized approach in which our network of public and private partners constitutes more than simply the sum of its parts.**
- **React quickly to emerging problems through the transfer of knowledge and germplasm, and through collaborative development of timely interventions.**
CIMMYT has a unique ability to conduct cutting-edge research with a wide range of partners, including other CGIAR centers, advanced research institutes, national agricultural research and extension systems, multinational companies, small- and medium-sized enterprises and “last-mile” development organizations in more than 70 countries. Through these partnerships, we foster knowledge sharing and learning, which result in impacts for farmers and consumers.

Today, CIMMYT serves as a central node in an international network of organizations working where maize- and wheat-based agriculture is important for reducing poverty and where private sector research cannot yet be sustained. Center scientists assess stakeholders’ needs, deliver innovations and strengthen the capacities of partners and farming communities to generate improved technologies. By helping to create institutional synergies, CIMMYT helps achieve greater development impact than is possible with traditional partnership models.

Changing core business

CIMMYT’s core business has changed over the last 50 years, from its early focus on germplasm improvement to a more integrated research approach:

1960s Early days: Developed improved germplasm and agronomic practices in collaboration with national agricultural research systems for farmers in the developing world.

1980s Working more closely with farmers: Achieved a better understanding of farmers’ needs, and pioneered and promoted farming systems research.

2000s Tackling new challenges: Broadened our emphasis in genetic improvement from productivity to stress tolerance as well as quality and nutrition, and went beyond farming systems research to focus on enhancing livelihoods.

2010s Impact: Embarked on multidisciplinary and multi-institutional projects, assuming accountability for achieving greater impact more quickly.

2015+ Integrated research approaches: Generating technologies and knowledge that strengthen maize and wheat agri-food systems in line with the SDGs.

Bringing people together

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Institutional challenges and opportunities

Stable and diverse funding:

As the need for science to address complex global issues grows, funding for this work is becoming more fragmented and unpredictable, with support focusing more on issue-specific, short-term projects. Agricultural research funding increased in response to the 2008 food price crisis. Sustained investment in agricultural R&D is needed today to ensure food security over the next three decades in the face of population growth, climate change and natural resource degradation.

While cultivating strong relationships with the funders who have consistently supported our activities, CIMMYT will need to engage with additional supporters, including emerging economies and the private sector, in search of new approaches and models to ensure sustainable and improved funding. Long-term support for CIMMYT’s germplasm bank and for maize and wheat breeding is especially important.

New partnerships:

CIMMYT actively pursues new partnerships for upstream research and capacity building, while also developing strategic alliances with a wider range of last-mile development organizations.

We also seek partnerships that support the use of our knowledge and products in national strategies and action plans as well as by development organizations.

In addition, we improve our skills in business development to further strengthen our public-private partnerships and catalyze value chain development.

Enhancing organizational effectiveness

CIMMYT has grown three-fold in the last five years and greatly extended its global reach. A bigger and more decentralized organization means more complex administrative demands. In a strategic reorientation, we will further professionalize our administrative and governance support to enhance the Center’s efficiency and effectiveness.

*‘Kingbird’ wheat harvested from the Kulumsa Research Station, Ethiopia*  
CIMMYT/Peter Lowe
CIMMYT’s areas of work

To play the significant role that CIMMYT envisions for itself in addressing global agricultural development challenges, we must:

- Continue to show strong leadership in CGIAR, while gaining increased recognition as a center of excellence in germplasm and agri-food systems research.
- Attract and retain the best and most passionate staff and partners, and create an enabling environment in which they feel motivated and empowered.
- Undertake new large-scale, co-designed partnerships in both the public and private sectors, focused on cutting-edge research and removing barriers to farmer adoption of new technologies and know-how.
- Achieve greater impact and reach more beneficiaries in increasingly complex settings.
- Adapt to a changing donor environment by using new approaches to obtain stable funding.
- Use funds effectively and report transparently to donors, the research community and other key audiences.

CIMMYT will realize its aspirations by working in our closely connected areas of scientific excellence, with emphasis on impact through partnerships and capacity building. Central to this endeavor is our “One CIMMYT” concept for integrating all of the Center’s work.
SCIENTIFIC EXCELLENCE
At CIMMYT, we conduct science of the highest quality and create innovations that farmers can readily put to use. We work with them as partners, listening to their knowledge and needs, and responding with the latest developments and insights from genomics, precision agriculture, advanced breeding, agronomy and socioeconomics.

Five strategic goals and three cross-cutting themes reflect the priorities that will guide CIMMYT’s work over the next five years. Building on our core expertise, these priorities represent our commitment to conserving and using biodiversity, delivering solutions for development, scaling out technologies and reaching rural communities.

**Strategic goals**

1. Increasing research impact
2. Accelerating genetic gains through novel diversity and tools
3. Developing and improving access to stress-tolerant varieties
4. Sustainable intensification for improved livelihoods
5. Enhancing nutrition and processing quality

**Cross-cutting themes**

1. Big Data
2. Open access
3. Gender and youth
1. Increasing research impact

While building on our traditional strengths, CIMMYT continuously seeks new opportunities across the maize and wheat value chains to monitor and evaluate the Center’s collaborative research, assess its impact and foster learning. Our aim is to enhance the effectiveness of maize and wheat interventions through better prioritization and targeting, emphasize the inclusion of women and disadvantaged groups, find ways to challenge young farmers and entrepreneurs, as well as provide practical and actionable policy recommendations. Foresight and ex-post analysis inform our priority setting and provide new insights into farmer adoption of improved technology. We integrate socioeconomic research into our work on germplasm improvement, systems agronomy and technology scaling. Together, these measures will improve our use of scarce resources, accelerate the uptake of innovations and enhance their impact, especially for poor producers and consumers.

CIMMYT’S SCIENTIFIC COMPETENCIES

- Foresight and targeting of research for development
- Technology adoption and impact through learning, based on monitoring and evaluation
- Gender and social inclusiveness in the research process and outcomes
- Identification of opportunities in maize and wheat value chains to enhance the livelihoods of smallholder farmers

2022 OBJECTIVES

- CIMMYT will have documented theories of change for its major innovation pipelines, taking into account different geographical contexts as well as gender, social inclusion and poverty perspectives.
- The Center will monitor the scaling out of all its core products to gauge quality, progress and adoption, using data disaggregated by income and gender.
- Center scientists will generate substantive ex-ante or ex-post studies to guide research prioritization or document the impacts of past research, respectively.
2. Accelerating genetic gains through novel diversity and tools

CIMMYT applies advanced tools from genomics, phenomics and informatics to characterize the vast genetic diversity of the 28,000 maize and 140,000 wheat accessions held in its germplasm bank. The objective of this work is to speed the identification and use of novel diversity for the development of improved varieties containing genetic traits that, for example, raise yield potential, reduce the risk of malnutrition, and contribute to drought and heat tolerance as well as durable disease resistance. We will use bioinformatics and molecular tools to efficiently mine these genetic resources and facilitate their use for breeding crop varieties that respond to current and future challenges.

In our breeding activities, we will accelerate rates of genetic gain through the discovery and deployment of allelic diversity and molecular markers for key traits, and by developing more accurate high-throughput phenotyping and breeding methods, such as genomic selection. We will also contribute to the development of new open-access tools for electronic data capture, data analysis and decision support.

In addition, we will assess and selectively implement gene editing and transformation techniques, in collaboration with organizations that can provide key traits and with stakeholders in countries that express demand for these traits and have proper biosafety legislation in place.

### CIMMYT’S SCIENTIFIC COMPETENCIES

- Informatics, database management and decision support
- Development of novel tools for germplasm improvement
- Trait exploration and gene discovery to unlock genetic diversity
- Pre-breeding for the development of germplasm resources
- Innovative and integrated use of technologies to accelerate genetic gains

### 2022 OBJECTIVES

- CIMMYT scientists will phenotype and genotype an increasing proportion of our germplasm bank accessions for important traits.
- We will make a genetic resources data and informatics platform readily available for breeders worldwide to identify and access valuable diversity for use in developing maize and wheat varieties that address production challenges, including changing climate impacts.
- The Center will regularly provide breeding programs with “bridging germplasm,” which incorporates crucial traits (such as drought and heat tolerance, and disease resistance) from landraces and unimproved populations into elite germplasm.
- Our researchers will enhance the efficiency of maize and wheat breeding through tools and methods that better enable breeders to implement scientific advances in genetics (such as doubled haploids, genomic selection, remote sensing and bioinformatics).
- We will apply modern biotechnology techniques, such as gene editing, to develop varieties that match the priorities of low-income maize and wheat farmers.
CIMMYT aggressively pursues the development of resilient maize and wheat germplasm for sub-Saharan Africa, Asia and Latin America. Working through global germplasm improvement networks, we use a wide variety of advanced technologies, such as new alleles from crop landraces and wild relatives, precision and high-throughput phenotyping, doubled haploids, single-seed descent and molecular markers. Recent advances in genomics and informatics, coupled with the Big Data revolution, have created new opportunities for us to enhance genetic gains and breeding efficiency, so we can more quickly deliver new maize and wheat varieties that are adapted to climate change-related stresses and resistant to emerging diseases and insect pests, while also showing enhanced nutritional and end-use quality.

CIMMYT works with diverse partners to monitor aggressive pests and diseases, and respond rapidly to major outbreaks. Particularly exciting is our new research on resistance genes that are not pathogen-specific and therefore provide resistance to several diseases.

In maize breeding, we will maintain the flow of improved germplasm with tolerance to drought and other stresses as well as enhanced nutritional quality, while also pursuing intensive collaborative efforts to breed maize varieties that respond to evolving threats, such as maize lethal necrosis or the parasitic weed Striga. In wheat breeding, we will expand our precision phenotyping networks, which are paramount for efficient selection and gene discovery by CGIAR centers and national partners. In this work, we will mainly target 8 out of 12 wheat mega-environments (i.e., geographical areas in which wheat growing conditions are quite similar), where more than 80 percent of poor wheat consumers live.

The private seed industry tends to focus on larger, more profitable markets, leaving many farmers in the developing world without ready access to high-quality seed. In response, CIMMYT has formed strong partnerships with more than 200 small- and medium-sized seed companies, with the aim of expanding delivery of improved maize seed to the 40-50 percent of smallholders that do not have regular access to improved seed. Working with these companies as well as public sector organizations, CIMMYT will ramp up its effort to reach farmers in stress-prone areas. Private sector involvement in developing and disseminating improved wheat seed is limited because of low price incentives. To ensure that improved seed is multiplied and made widely available to farmers, CIMMYT will carry out targeted campaigns with national programs and other development partners.
Development of climate-resilient maize and wheat varieties

Rapid response to emerging diseases and pests

Precision and high-throughput field-based phenotyping

Development and monitoring of durable disease resistance

Mainstreaming of molecular tools in maize and wheat breeding

New varieties and hybrids that are stress tolerant, disease resistant, nutrient-use efficient and nutritious will be widely commercialized by seed companies, replacing old, less productive varieties.

Local and regional seed companies will produce and market growing quantities of quality seed of stress-tolerant varieties to smallholder farmers in Africa, Asia and Latin America.

Farmers in Africa, South Asia and Latin America will rapidly adopt climate-resilient hybrids and varieties with tolerance to heat, drought and/or waterlogging.

Varieties resistant to maize lethal necrosis or tar spot will improve the livelihoods of farmers in Africa and Latin America, respectively.

Rapidly growing proportions of farmers in Afghanistan, Bangladesh, Ethiopia, India, Iran, Kazakhstan, Mexico, Nepal, Kenya, Sudan and Pakistan, plus the Middle East and North Africa, will gain access to seed of the most recent wheat varieties.

Increasing numbers of farmers in South Asia will adopt new heat-tolerant wheat varieties.

Increasing numbers of farmers in eastern Africa will use seeds resistant to stem rust pathogen Ug99 and its evolving variants, and growing numbers in Central and South Asia will adopt yellow rust-resistant varieties.

The adoption of wheat blast-resistant varieties will avert a potential food crisis in South Asia.
Building on decades of farming systems research, CIMMYT has in recent years undertaken the complex but vital task of achieving sustainable intensification of maize- and wheat-based systems. This has required that our scientists adopt new approaches, which consider maize and wheat in the context of multiple crops as well as livestock, trees and off-farm employment, and tackle production constraints in a wider social, economic and environmental context. To deliver lasting improvements in rural livelihoods, we will focus on improving not just crop yields but the resilience, stability and profitability of whole systems.

Our scientists work through community-based innovation platforms that involve participatory research with multiple stakeholders and thousands of farmers in Africa, Asia and Latin America. Emphasizing co-creation of technological innovations, the platforms provide a solid framework for shared learning about new options such as improved crop varieties, resource-conserving technologies, crop diversification, appropriate mechanization and better postharvest practices. To scale out innovations from specific sites to the regional and global levels, we will work through strategic public-private partnerships that mobilize last-mile providers of products and services, while also supporting young entrepreneurs. In this process, we will employ various analytical tools, such as bio-economic models, trade-off analysis (e.g., for better decisions about food versus feed uses of crop residues) and geospatial analysis for improved targeting of research, innovations and investments.

A key imperative of this work is more efficient use of scarce capital and labor as well as rapidly dwindling land and nutrients. More prudent management of nitrogen fertilizer in particular (through crop breeding and better crop management) is critical for climate change mitigation, given the detrimental effects of nitrous oxide on the atmosphere.
CIMMYT’S SCIENTIFIC COMPETENCIES

- Analysis of farming systems to identify constraints and opportunities
- Participatory research on improved technologies to enhance rural livelihoods
- Development and field testing of improved crop management practices
- Scaling out innovations by means of capacity building and new knowledge created with the aid of advanced analytical tools

2022 OBJECTIVES

- CIMMYT’s work will heighten awareness of technical innovations (such as conservation agriculture, laser land leveling and site-specific nutrient recommendations) among key development partners and lead to more rapid farmer adoption of these practices.
- Our research will also contribute significantly to a reduction in agriculture-related greenhouse gas emissions, compared to a business-as-usual scenario.
- We will help achieve more efficient water and nutrient use in maize and wheat systems.
In many developing countries, obesity and related diseases are on the rise, even as hunger and malnutrition persist. CIMMYT addresses these problems by fostering crop and diet diversification, and by developing maize and wheat varieties with more nutritious grain. Products such as quality protein maize, provitamin A-enriched maize and high-kernel zinc wheat are already being tested and adopted in several countries. From this experience, we are learning how such “biofortified” products can be integrated into value chains to boost incomes and meet consumer demand for more nutritious, healthier foods. To achieve these ends, we analyze consumer demands and dietary needs, while fostering more integrated value chains that provide sustainable sources of maize and wheat for agri-food businesses.

CIMMYT will expand its research on wheat quality, identifying lines that show enhanced health properties and are well suited for processing and consumption. We will contribute to higher dietary fiber in human diets by developing lines with improved processing and end-use quality traits, using genomic selection and molecular markers. We will also develop biofortified wheat with enhanced iron and zinc concentrations in the grain and higher bioavailability of these micronutrients in whole grain and white flour.

CIMMYT will develop maize varieties with improved nutritional and end-use quality traits and promote diverse crop uses in the food and feed industries. This will create new income opportunities for farmers and processors, particularly women, while helping to reduce waste. In response to growing market demand for specialty maize (such as blue maize, sweet corn, popcorn and baby corn) in urban and peri-urban areas, CIMMYT will explore opportunities to develop specialty varieties, particularly for Latin America and Asia. In addition, we will continue research on food safety, developing maize and wheat varieties with reduced mycotoxins.
CIMMYT will develop maize varieties with high kernel lysine and tryptophan content, enhanced provitamin A and kernel zinc concentration, and wheat varieties with high kernel zinc and iron content, and actively promote their adoption in target countries.

Center scientists will foster crop and dietary diversification through sustainable intensification of maize and wheat agri-food systems in priority countries.

Our work will help rising numbers of people meet minimum dietary requirements.

CIMMYT’S CORE COMPETENCIES

- Developing nutritional quality and end-use traits in elite germplasm
- Breeding maize and wheat varieties with reduced mycotoxins
- Integrating nutritional aspects into our approaches for achieving sustainable intensification

2022 OBJECTIVES

- CIMMYT will develop maize varieties with high kernel lysine and tryptophan content, enhanced provitamin A and kernel zinc concentration, and wheat varieties with high kernel zinc and iron content, and actively promote their adoption in target countries.
- Center scientists will foster crop and dietary diversification through sustainable intensification of maize and wheat agri-food systems in priority countries.
- Our work will help rising numbers of people meet minimum dietary requirements.
1. Big Data

With Big Data approaches now a reality, the volume, variety and velocity of data coming into CIMMYT’s research programs have reached unprecedented levels. The challenge is to store, curate, transfer, visualize and analyze the enormous datasets generated by activities such as high-throughput genotyping and phenotyping, remote sensing and geoinformatics, so these data can be made available as public goods.

Our aim is to harness Big Data for greater research impact. What matters is not just the amount of data we compile, but the purposes they serve, such as helping CIMMYT breeders accelerate genetic gains and get improved varieties to farmers more quickly, or gaining a better understanding of technology adoption through the analysis of gender-disaggregated data.

This also means finding ways to deliver real-time data as valuable information to smallholder farmers, making them key beneficiaries of the data revolution in agriculture.

To deliver Big Data as public goods requires ambitious upstream and downstream partnerships with public and private sectors outside CGIAR. CIMMYT will work with other CGIAR centers to develop the Excellence in Breeding Platform, establish data management processes and deploy software tools that enable breeders to make better decisions. In addition, we will play an active role in CGIAR’s Big Data Platform, working on Big Data science and helping to achieve compliance with common data standards, platforms and processes.
2. Open and Equitable Access for Intellectual Assets

CIMMYT is committed to effective and efficient management of Intellectual Assets for wide dissemination of research outputs to increase impact. We fully support the CGIAR Principles for the Management of Intellectual Assets and the CGIAR Open Access and Data Management Policy, which are critical for delivering international public goods, safeguarding and promoting the use of genetic resources, and strengthening research capacity.

We use Intellectual Assets Management as a tool for disseminating research results as international public goods through different licensing schemes, open-access repositories, targeted information channels, capacity development, public-private partnerships, and participatory research. We will encourage and work with partners to implement open-access and open-data principles.

3. Gender and Youth

CIMMYT gives close attention to agriculture’s social context – of which gender is a key part – and to the constraints farmers face when adopting new practices and crop varieties. Our gender strategy follows a two-pronged approach. The first involves integrative gender research, in which we apply gender analysis as part of crop improvement research or research on socioeconomics, seed systems or crop management, while the second consists of strategic gender research aimed at creating new knowledge about gender, specifically in maize- and wheat-based systems.

Building on current work, we will integrate gender considerations into all stages of our projects and strengthen the capacity of CIMMYT scientists to apply a gender lens to their work. In addition, the Center will increasingly address research questions related to the role of youth in maize and wheat agri-food systems. CIMMYT will explore new channels for attracting young people to the agri-food sector by making it more entrepreneurial and technology driven. We will develop a strategic framework for engagement with young people and for addressing youth-related issues, while implementing standards for both sex and age disaggregation in data collection and analysis.
IMPACT THROUGH PARTNERSHIPS

Farmers’ group leader Lughano Mwegowo helps her neighbour Rute Juwa, Malawi. CIMMYT/Peter Lowe
A single organization has the capacity to turn research into impact. This can only be achieved through mutually beneficial cooperation, focused on enhancing livelihoods. For this reason, CIMMYT will steadily improve the scope and quality of its partnerships, with a special focus on South-South and public-private cooperation. We will choose and develop our partnerships with care to ensure that the knowledge we generate results in real improvements in people’s lives, with a particular focus on generating greater equity for women and other socially excluded groups.

CIMMYT’s global partnership network is essential for addressing cross-border challenges through co-innovation and dissemination of public goods, and we allocate 25-30 percent of our budget to the collaborative activities of partners. Capacity development, training and sharing of information and other resources are high priorities in our partnerships.

Partners often look to CIMMYT for support in addressing new challenges, such as adapting agriculture to climate change, accelerating breeding gains and using scarce natural resources more efficiently.

In line with the CGIAR Strategy and Results Framework, our future partnerships will be guided by these principles:

- **A common agenda**
- **Shared measurement and learning**
- **Mutually reinforcing activities**
- **Effective communication**

CIMMYT partners make diverse and valued contributions to innovation, while also validating and deploying new technologies. Partners also provide feedback, which helps us assess impact and set research priorities.
CIMMYT works with other CGIAR centers and CRPs, with emphasis on joint monitoring, evaluation and learning and on strategic projects aimed at integrating our systems research. Over the next five years, the Center will strengthen this collaboration, including country coordination, to foster synergy and shared research prioritization.

Engaging in research on cropping systems and value chains with advanced research institutes (ARIs) and universities

CIMMYT draws on expertise from many ARIs and universities in strategic farming systems research, aimed at providing development partners with new knowledge and decision-support systems. These products better enable our partners to scale out technologies designed to enhance the performance and sustainability of farming systems. Over the next five years, we will strengthen our collaboration with ARIs and universities in crop modeling, development of decision-support tools and Big Data Analytics.

Helping national agricultural research systems and governments conduct research for impact

CIMMYT’s main research partners are national agricultural research systems (NARS). The Center consults with them closely and often plays a catalytic role in their links with the private sector. NARS vary considerably in terms of their research capacity and resources. We recognize these differences and adapt our research activities and support accordingly, giving rise to different types of partnerships. As the NARS change, so do our relationships with them.

Training and capacity building are key to success in our partnerships with NARS and conducted at all levels, from discovering traits in our germplasm banks to promoting the adoption of new technology and working on value chains.
Supporting development partners to achieve technology validation, dissemination and adoption

CIMMYT’s development partners include extension agencies, non-governmental organizations and farmer associations. They figure among CIMMYT’s most recent partnerships and offer the most scope for new ways of working. We will explore further opportunities to engage with development organizations, primarily for accelerating technology adoption. Stronger partnerships with farmer organizations will make our research more responsive to farmers’ needs and priorities.

Co-development of business models and technology dissemination with the private sector

The private sector is an increasingly important player in maize research for the developing world. Our partnerships with seed companies, both large and small, help us develop novel tools for crop breeding and increased genetic gains. In continuing this fruitful collaboration, we will focus on germplasm development, technology co-innovation, multi-locational testing, delivery of improved maize varieties and better integration of nutritional concerns into value chains.

Although the private sector recently increased its involvement in wheat research, this work still takes place overwhelmingly in the public sector. Private companies offer new opportunities for joint and commissioned research (e.g., on wheat hybrids) and co-development of business models for appropriate mechanization. There is much scope for working with seed companies to disseminate improved varieties as well as to develop national capacities and share knowledge.
CAPACITY BUILDING FOR LASTING IMPACT

CIMMYT socioeconomist Elahi Baksh interacts with a farmer during a training session, Bangladesh
CIMMYT/S. Mojumder
Training and capacity building are pillars of CIMMYT’s work and key to sustaining its global network. Each year thousands of scientists, students, extension workers and farmers come to the Center for courses, workshops, visiting scientist appointments and field days. These events can last from one day to an entire year. These activities will be incorporated into the CIMMYT Academy, a new institutional initiative for training and capacity development with students, partners and Center staff.

By creating agricultural knowledge communities, CIMMYT empowers collaborators to help farmers advance towards a more food-secure, sustainable future. CIMMYT will continue to build capacity at the individual and organizational level by:

- Attracting bright young university students and post-docs to conduct research in line with CIMMYT’s scientific priorities
- Developing the capacity of national partners through cooperation and training to use cutting-edge science in support of their national development goals
- Maintaining and expanding international training programs
- Strengthening capacity for large-scale dissemination of new technology

2022 OBJECTIVES

- CIMMYT will significantly increase the number of Ph.D. students it hosts or co-advises.
- Ph.D. and post-doctoral research projects will be closely integrated to provide mutual support and strengthen our science.
- The Center will develop and nurture talent in national research organizations as well as small- and medium-sized enterprises.
- We will develop train-the-trainer initiatives and connect groups of trainers with local initiatives.
- We will create a community of practice among trainees for learning and sharing knowledge.
- CIMMYT will strengthen its ties with alumni and create a new generation of ambassadors in support of our mission.
The CIMMYT Academy - A new institutional initiative for training and capacity building

CIMMYT’s training and capacity development have diverse objectives and involve large numbers of professionals. More than 10,000 scientists from across the globe have received training at CIMMYT in connection with their university studies or post-doctoral research, and many have gone on to become key leaders and decision makers, becoming a significant force for agricultural change in their countries. CIMMYT’s hands-on training – much in demand for early-career researchers – is helping to build a new generation of scientists among our national partners, while also empowering extension workers, small- and medium-scale entrepreneurs and farmers. In addition, we offer multiple training opportunities for our own staff to support continuous learning and career development.

The “CIMMYT Academy” reflects a new vision for consolidating our training and capacity building efforts, in order to maximize learning and build an international cadre of top agricultural scientists and development practitioners.
Through the Academy, CIMMYT will maintain and create new partnerships with world-class universities in high-income and developing countries, national agricultural research and extension systems, the private sector and researchers from other organizations. The Academy will have four interconnected components: (1) involvement of graduate students, post-doctoral fellows and visiting scientists in cutting-edge, impact-oriented research; (2) focused capacity development activities with partners, rooted in a strong theory of change; (3) internal staff training programs to help build attractive careers and strengthen the institution; and (4) an online learning management system.
ONE CIMMYT: more than just a philosophy
CIMMYT staff are fully committed to the Center’s humanitarian values and mission, which call for scientific excellence, teamwork and capacity building to achieve impact through partnerships. This requires an enabling environment in which our teams can deliver innovations based on critical thinking.

The ONE CIMMYT concept goes beyond our organizational philosophy and implementation strategy. It is about building a common understanding across projects and regions, based on a unifying vision and mission, and developing integrated teams in a supportive environment. The objectives of ONE CIMMYT are to:

- **Apply the values of humanitarianism and excellence across the organization.**
- **Work together in integrated teams across all programs and service units.**
- **Stand together as one organization with a strong identity in the public arena.**
- **Foster a culture of reflection and debate within the organization.**
- **Use standard branding for all projects and regions.**
- **Apply policies, standards and processes consistently across the organization.**

ONE CIMMYT will help transform CIMMYT’s multiple projects and offices into a truly international, joined-up confederation in all areas of our work, regardless of geography, scientific discipline or department. This will mean developing a new and inclusive workplace culture.

ONE CIMMYT encompasses three connected core values: excellence, teamwork and integrity.
CIMMYT’s values

EXCELLENCE
We endeavor to exceed expectations in everything we do.
- Developing innovative ideas and putting them into action.
- Delivering impact in farmers’ fields through partnerships.
- Being flexible to change and quickly adapting to new agricultural development challenges.
- Achieving excellence in administrative services.

INTEGRITY
Respect, trust, honesty and ethics are at the core of our organization.
- Taking the initiative and holding ourselves accountable for our actions.
- All staff are guided by personal integrity and strong principles.

TEAMWORK
The best solutions come from working together with colleagues, partners and clients. Effective teamwork demands strong and reciprocal relationships, mutual respect and sharing.
- Fostering an inclusive environment where each individual’s contribution is valued.
- Creating a positive environment in which people can develop and succeed.
- Building long-term relationships with our partners and donors.
- Respecting diverse cultures, communities and points of view.
A clear research strategy, stronger partnerships and capacity development are crucial for achieving our mission and vision. But they are not enough. Institutional effectiveness is also essential. This requires an efficient, effective and transparent organization where cooperation and flexibility are the norm, talent and teamwork are nurtured, and staff are united by the drive to achieve impact. Our approach to institutional change is detailed below in five steps:

- **New business models**
- **Working in coordination, not isolation**
- **Streamlining financial and project management**
- **Improved human resources functions**
- **Communicating our impact and building our future**

**Funding from CGIAR Fund donors and other investors allows CIMMYT and its partners worldwide to offer farmers in developing countries innovative technology and knowledge. This work better equips farmers to address the shocks of shifting markets, climate change, rising demand, land degradation and resource scarcity.** We are grateful to our current donors for their ongoing support and look forward to finding new ways to work with them.
With its current portfolio of projects in over 70 countries, CIMMYT maintains a global reach through its administrative offices in 15 countries and is a strong cooperator in global and local initiatives. All of our large-scale projects integrate the work of multiple partners, including other CGIAR centers, to develop solutions from both a livelihood and value chain perspective. By and large, impact through local partners can only be maximized when the interactions are purposeful and intense, and high-quality research is conducted locally whenever possible.

At CIMMYT, we coordinate a number of international processes between our headquarters and regional offices. For example, CIMMYT sends more than half a million seed packages from our facilities in Colombia, Ethiopia, Kenya, Mexico, Turkey and Zimbabwe to breeders worldwide for use in breeding research and dissemination. This is just one example of how our regional presence allows us to have a global impact.

Financing research for development is becoming increasingly complex. The dynamics in the regions where we work are constantly changing, as are the priorities of governments and other donors. To address this, we will continue to engage with current donors, seeking to inspire their trust and confidence, while proactively seeking new donors and novel ways to diversify and secure our funding base. We will develop a robust resource mobilization plan that includes large initiatives as well as specific plans for increasing unrestricted and flexible funding in a manner that includes public-private partnerships as a major thrust. Internally, this means preparing and sharing donor intelligence, identifying funding opportunities and coordinating engagement with donors. Externally, we will engage donors with consistent and customized communication that illustrates CIMMYT’s impacts and shows appreciation for donors’ contributions. CIMMYT takes stewardship of the public and private funding entrusted to us very seriously. We will continue to strengthen accountability to all donors through an improved and integrated project management system, including solid financial and human resources management systems, and “management dashboards” to support data-driven decisions at all levels.

New business models

Working in coordination, not isolation

Regional focus

Africa 40%
Asia 40%
Latin America 20%

Regional focus

Shipment of germplasm to the Global Cold Vault in Svalbard, Norway
CIMMYT/Xochiquetzal Fonseca
Streamlining financial and project management

As a project-funded research-for-development institution, CIMMYT aims for greater efficiency in the delivery of management and support services to reduce transaction costs and minimize the administrative burden. We ensure that our institutional structure appropriately matches funding streams, while reducing and managing organizational risk. We are accountable to our donors and transparent to all our stakeholders.

Our proposed approach is to bring together four centers of expertise that will increase the quality and impact of our work, with improved effectiveness in:

- Setting policies, standards and procedures to oversee compliance and quality control, and build project management capacity across the organization
- Delivering advice and tools for developing theories of change, monitoring performance and preparing evaluation and learning plans
- Developing and implementing a stronger fundraising strategy and approach for donor relations
- Providing quality control of concept notes, proposals, contracts, invoices and financial and technical reports, with better management of grant information and documentation

Important improvements have been made over the last two years in our budgeting, financial procedures and reporting systems, including the adoption of International Financial Reporting Standards. We have lifted our performance to deliver results effectively, responsively and with greater cost efficiency to CIMMYT projects and donors.

The recently implemented Integrated Management Reporting Package (IMRP) aims to deliver key management data at both the program and institutional levels, and will be continually refined and expanded for program managers and project leaders with key real-time financial and non-financial information to support them in managing their day-to-day research and project activities, while also controlling risks.

CIMMYT will continue to optimize the management of funding streams, and improve the transparency and consistency of project costing, including the way we manage our overhead costs. Effective collaboration between the Finance Department, programs, regional offices and field stations is crucial for delivering quality services, and we are making significant strides in this area.

CIMMYT is making systematic, organization-wide investment in an improved Microsoft Dynamics AX Enterprise Resourcing Planning system to meet the demands of our global organization. This system addresses internal control gaps and automates work flows.
CIMMYT’s most important asset is its staff. Our aim is for staff to feel part of ONE CIMMYT, with mutual accountability and respect. We are committed to attracting and retaining the best and most passionate staff. We create an enabling environment where people want to work and feel empowered and stimulated to learn and collaborate, develop and achieve impact. This strategic plan will put in place improvements in staff relations, performance management, organizational development and training, and support to the regional offices.

We depend on our staff and, therefore, we value, understand and develop their capabilities. To ensure this, we will identify and nurture talent and support our staff, so that they may become CIMMYT’s future leaders. We value diversity and will support the advancement of women and national staff into leadership positions. Our key objective over the next two years is to develop a Talent and Career Management Plan. Key tools are already being put in place to help design clear career paths for all staff across the organization, including:

- A job-grading system
- Implementation of the new Dynamics Human Resource Management (HRM)
- A new online system for performance evaluation
- Recruitment, internal mobility and promotion policies

To strengthen CIMMYT’s human resources functions, we will exploit the potential of Dynamics HRM to ensure a single integrated system that is compatible with our finance functions.
Communicating our impact

We value a culture of quality communications. This can only be accomplished through excellent internal and external communications, coupled with clear and supportive policies and procedures.

A stronger communications team will provide expertise and strategic guidance to CIMMYT researchers, the organization and its partners to enhance our effectiveness, impact, public image and donor support through these and related activities:

- **Manage branding to strategically position CIMMYT and foster Center cohesion.**
- **Provide strategic support for donor relations and fundraising.**
- **Support effective communications among CIMMYT staff and regions.**

**Support for programs and CRPs.** CIMMYT’s five research programs are the basis for organizing and delivering the Center’s research. A high priority is to ensure that each program has access to the necessary communications support and expertise. CRPs are central to the delivery of funds and results across CGIAR. Communications will help ensure that partners’ work is properly documented, reported and communicated, and that the CRPs benefit from CIMMYT communications expertise and capacities.

**Partnerships.** A key role of communications is to support the quality and effectiveness of Center partnerships, and to help ensure strong engagement of partners in Center aims and activities. With support from CIMMYT research leaders and management, we will accomplish this by: (1) maintaining an awareness of partners’ concerns and sensibilities and reflecting these appropriately in our communications products; (2) providing full and proper attribution for all who have contributed to our work and success, in stories, reports and other external communications; and (3) providing relevant support and strategic guidance for partners’ own communications about shared activities.

Building our future

Thanks to major donor investments, we have built and/or renovated nearly 20,000 square meters of infrastructure, including much needed advanced laboratories, greenhouses and training facilities. They are being used for cutting-edge research to help enhance developing country farmers’ access to the benefits of science and innovation. Our focus is on ensuring optimal use of these facilities by both CIMMYT scientists and our research partners. Currently, we are working to ensure that our facilities in Africa, Asia and Latin America are up to date. In many regions, we share facilities with other CGIAR centers and work from partners’ facilities whenever possible to foster site integration and create synergy.
IMPLEMENTATION AND MEASURING PROGRESS

Research associate Chhavi Tiwara takes data from a wheat field in Bhurkuru, India. CIMMYT/Julia Carmesi.
To achieve its ambitions, CIMMYT will plan, measure progress, be responsive and adapt.

Implementing a plan of action

Every year we will prepare an implementation plan presenting specific and prioritized objectives. It will also indicate roles and responsibilities, deliverables and associated timelines, with progress being monitored throughout the year.

Funding our ambitions

We will implement a fundraising plan that is demand-driven, supports our important core functions and includes actions for building strong, long-term relationships with donors. The plan will present clear and engaging arguments as to why donors should fund CIMMYT, identify and analyze current and potential trends, and structure fundraising by source and focus.

Measuring progress

We will measure progress in relation to our implementation and fund-raising plans, and in the achievement of the ambitions and targets described in this strategy. We will prepare a monitoring plan that will further detail targets and indicators, include data sources and data collection methods as well as roles, responsibilities and timelines for data collection and reporting.

Reviewing our strategy

We will implement a review process for this strategy to ensure that we reflect on lessons learned from its implementation and adjust to new challenges and priorities after 2.5 years (mid-term) of implementation. A more comprehensive review will be performed in 2021, with a strong focus on analyzing key performance indicators.
The Office of Special Studies (OSS) is established to raise Mexico’s agricultural productivity.

Dr. Norman Borlaug joins the OSS as a wheat pathologist.

Expansion to South Asia, the Green Revolution.

CIMMYT goes global, beginning a new day for world agriculture.

Norman Borlaug is awarded the Nobel Peace Prize.

CGIAR is launched.
1996
CIMMYT’s Wellhausen–Anderson Genetic Resources Center opens.

2000
Former CIMMYT scientists Surinder Vasal and Evangelina Villegas win the Millennium World Food Prize for the development of quality protein maize (QPM).

2011–12
MAIZE and WHEAT are launched as CGIAR Research Programs. CIMMYT launches several South-South alliances, including Mexico and India.

2013
New labs open at CIMMYT HQ, built with generous grants from the Carlos Slim Foundation and the Bill & Melinda Gates Foundation.

2014
Former CIMMYT Wheat Director Sanjaya Rajaram wins the World Food Prize for his scientific research.

2016
CIMMYT turns 50: CIMMYT’s work provides more than US$ 2 billion in annual benefits to farmers in developing countries.
CIMMYT AT A GLANCE

CIMMYT is a unique organization that works across the developing world, helping to improve livelihoods as well as the productivity and sustainability of maize- and wheat-based farming systems. Through collaborative research and partnerships, we offer expertise in research, development and training to help countries strengthen their national agricultural research and extension services, as well as support the development of a strong local private sector for agriculture.

Established in 1966 as an international center, today CIMMYT has over 1,200 employees based in 17 countries worldwide. As a member of CGIAR, a consortium of 15 agricultural research centers, CIMMYT leads the CGIAR Research Programs MAIZE and WHEAT, streamlining R4D activities for those crops and aligning research goals among more than 500 partners.

THE BIG IMPACT

CIMMYT GENERATES BENEFITS of $3.5-4.0 BILLION annually

50% of maize and wheat grown in the developing world is based on CIMMYT VARIETIES

More than 10,000 agricultural experts and scientists have trained at CIMMYT

CIMMYT AROUND THE WORLD

Projects in over 40 countries

Countries with offices:
Afghanistan
Bangladesh
China
Colombia
Ethiopia
Guatemala
India
Iran
Kazakhstan
Kenya
Mexico
Nepal
Pakistan
Turkey
Zimbabwe
ACRONYMS

A4NH   CRP on Agriculture for Nutrition and Health
ARI    Advanced research institute
CCAFS  CRP on Climate Change, Agriculture and Food Security
CIMMYT International Maize and Wheat Improvement Center
CRP    CGIAR Research Program
DNA    Deoxyribonucleic acid
HRM    Dynamics Human Resource Management
IA     Intellectual assets
ICARDA International Center for Agricultural Research in the Dry Areas
ICT    Information and communication technologies
IITA   International Institute of Tropical Agriculture
IMRP   Integrated Management Reporting Package
NARS   National agricultural research systems
MEL    Monitoring, evaluation and learning
MLN    Maize lethal necrosis
NGO    Non-governmental organization
PIM    CRP on Policies, Institutions and Markets
R4D    Research for development
SDG    Sustainable Development Goal
SRF    Strategy and Results Framework
SSA    Sub-Saharan Africa

GLOSSARY OF COMMONLY USED SCIENTIFIC TERMS

Abiotic stress – environmental conditions that reduce growth and yield under optimum conditions.

Big Data – the volume, variety and velocity of data and how we use it.

Biotic stress – the damage done to a plant by other living organisms, including diseases and parasites.

Breeding - the act of bringing together two specific parent plants to produce a new offspring plant to produce plant varieties with particular desired trait.

Doubled haploids - a genotype formed when haploid cells undergo chromosome doubling, enabling the rapid development of homozygous maize lines.

GxExMxS – the concept that increased yield in farmers’ fields is a function of genotype x environment x management x socioeconomics interactions.

Gene (or genome) editing – the insertion, deletion or replacement of DNA at a specific site in the genome of an organism or cell.

Genetic gain – the extent of change that can be achieved through breeding for any particular trait.

Genomic selection – the selection of plants based on genetic markers. It is one area of molecular breeding.

Genotyping – the process of determining the outward, visible features of a plant.

Impact pathway – emphasizing and visualizing the contribution of research outputs towards development outcomes.

Landrace – a locally adapted, traditional variety that has been developed over many years through adaptation to its local environment.

Maize lethal necrosis – a devastating disease affecting maize chiefly in East Africa.

Molecular breeding – genetic manipulation performed at DNA molecular levels to improve traits of interest in plants.

Molecular marker – a fragment of DNA that is associated with a certain location within the genome.

Phenotyping – the process of determining the outward, visible features of a plant.

Remote sensing – the science of obtaining information about plants or fields from a distance.

Scaling up or out – leads to benefits reaching more people over a wider geographical area.

Stem rust – the most damaging disease of wheat.

Tar spot – a fungal disease affecting maize plants.

Trait – a distinguishing quality or characteristic a breeder and/or farmer will want in a plant, for example, yield, heat tolerance and high zinc content.

Ug99 – a deadly strain of stem rust.

Wheat blast – a deadly wheat disease that spread to South Asia in 2016.
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