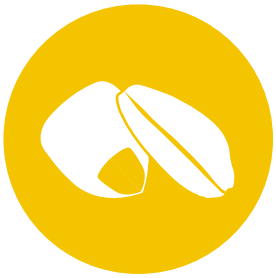
Seeds of DISCOVERY

Efficient, reliable and sustainable production of nutritious staple foods - wheat and maize - means better lives and more livelihood options for farmers and consumers.

The **Seeds of Discovery (SeeD)** initiative works to unlock and utilize novel genetic diversity held in genebanks to accelerate the development of maize and wheat varieties to meet the demands of a growing population in a changing climate. By characterizing the genetic makeup of maize and wheat collections, **SeeD** has generated "fingerprints" describing the diversity of two of humankind's major food crops. To multiply the impacts of these results, **SeeD** has created a "genetic resources utilization platform" for breeders and researchers, made up of publicly available data and software tools.

SeeD's "genetic resources utilization platform" includes:



Seeds

The **CIMMYT** genebank contains more than 28,000 maize and 140,000 wheat samples full of untapped genetic potential. **SeeD** has genotyped 99% of these maize and 45% of these wheat samples in search of novel diversity to add to breeding programs, and is making this genotypic information publicly available.

Data

Germinate is a queryable data system where **SeeD** houses and makes publicly available the phenotypic, genotypic, and other descriptive data for maize and wheat genetic resources. Germinate also provides links to other **SeeD** data and educational resources.

Capacity development

SeeD provides research and development opportunities to ensure that this platform is equitably, effectively and extensively used. Public and private sector researchers, professors and students participate in workshops, training courses, distance learning and research projects, thereby learning and validating the utility of **SeeD's** platform.

POPULATION GROWTH WILL DEMAND A 60% increase in MAIZE AND WHEAT production by 2050

CLIMATE CHANGE will challenge crop production with HEAT, DROUGHT AND NEW PEST AND DISEASE PROBLEMS

MAIZE AND WHEAT COLLECTIONS held in genebanks contain genes that may be ESSENTIAL TO FEED FUTURE GENERATIONS

MAIZE AND WHEAT PROVIDE 24% of the world's **CALORIES AND PROTEIN**

COMPETING DEMANDS for land and water **REQUIRE MAIZE AND WHEAT** varieties that are **MORE EFFICIENT AND PRODUCTIVE**

NUTRITIOUS WHEAT AND MAIZE -with more vitamins, minerals and better proteins- **WILL CONTRIBUTE TO HEALTHIER LIVES**

Bridging germplasm

SeeD develops *'bridging germplasm'* by transferring useful genetic variation from the wild and exotic wheats and maizes held in genebanks into plant types or lines that breeders can readily use to develop improved varieties grown by farmers.

Software tools

SeeD offers free genetic analysis software tools that facilitate the interpretation, visualization and understanding of data released by the project. These software tools were developed with or by partners.

Knowledge

Information on what genetic variation and what germplasm is most relevant and important for a specific challenge is constantly generated and presented to the scientific community through publications and **SeeD's** website, **www.seedsofdiscovery.org.**

Since the project began in 2012, SeeD has:

- **Genotyped** 80,000 wheat and 31,000 maize samples, including all of CIMMYT's maize genebank.
- **Conducted** 15 workshops and courses, training 230 investigators.
- **Delivered** 1,000 wheat bridging germplasm lines to partners in Mexico and South Asia.
- More than **30 Ph.D., M.Sc. and B.Sc.** students have conducted their research within SeeD.
- **Identified and shared** selected sets of wheat landraces and sources for yellow rust resistance and heat tolerance with partners around the world.
- **Evaluated** 5,000 maize landraces for high value breeding traits, 395 of which have been used in developing bridging germplasm with disease resistances, drought tolerance and improved nutritional and quality traits.

SeeD is a pioneering partner of the **Diversity Seek** (www.divseek.org) initiative, leading the way for other crops to unlock the potential of genetic diversity stored in genebanks around the globe and make it available to all for use in enhancing the productivity, sustainability and resilience of crops and agricultural systems.

"This project is a tool that will allow us to move forward at a speed that would be impossible to reach through traditional means."

– **Maria Esther Rivas**, Director *BIDASEM* (seed company, Mexico)

SeeD is a multi-project initiative comprising: MasAgro Biodiversidad, a joint initiative of CIMMYT and the Mexican Ministry of Agriculture (SAGARPA) through the MasAgro (Sustainable Modernization of Traditional Agriculture) project; the CGIAR Research Programs on Maize (MAIZE CRP) and Wheat (WHEAT CRP); and a computation infrastructure and data analysis project supported by the UK's Biotechnology and Biological Sciences Research Council (BBSRC).
For more information please contact Kevin Pixley (k.pixley@cgiar.org) and visit www.seedsofdiscovery.org

International Maize and Wheat Improvement Center (CIMMYT)
Apdo. Postal 6-641
CDMX, Mexico 06600
Tel: +52 (55) 5804 2004
www.cimmyt.org