

Deep roots and innovations strengthen maize farming systems

CIMMYT has worked since 1975 with Colombian farmers and partners, fostering sustainable development in agriculture and particularly in the production of maize, a major crop in national agrifood systems.

More than 60 percent of Colombia's maize is consumed by humans and a large portion is used in feeds and forage. Still the country imports upwards of 70 percent of its maize requirement, much of that low-priced yellow grain from the US used in animal feeds, and national maize grain yields average only 3.6 tons per hectare. Colombia's dependence on maize imports makes it vulnerable to natural disasters and conflicts that affect global grain trade and prices. According to "[Maize for Colombia: 2030 Vision](#)," a 2019 strategy published by CIMMYT and the [Alliance of Bioversity International and CIAT](#), the challenge for Colombia is to raise national maize productivity and competitiveness, particularly from traditional farms, while conserving the environment and natural resources and improving rural livelihoods.



CIMMYT scientist Natalia Palacios assessing pro-Vitamin A content in maize kernels, as part of breeding biofortified maize. (Photo: Alfonso Cortés/CIMMYT)

Breeding to benefit Colombia's maize farmers

Over the years, more than 130 high-yielding, disease-resistant maize varieties (including 53 hybrids) derived from CIMMYT breeding have been released to farmers in Colombia.

Since the early 2000s, CIMMYT has worked with the National Federation of Colombian Coffee Growers ([FNC](#)) and the National Federation of Cereal, Legume, and Soy Farmers ([FENALCE](#)), testing and deploying maize hybrids to grow between rows of pruned coffee plants, as a source of additional income for coffee plantations and field workers.

CIMMYT partnerships with [HarvestPlus](#) and the Alliance of Bioversity and CIAT have [developed and spread three maize varieties](#) that are "biofortified" through conventional breeding to provide enhanced grain levels of zinc, a crucial micronutrient lacking in the diets of more than 20 percent of Colombians.



Left to right: Miguel Lengua, director general of Maxi Semillas S.A.S; Bram Govaerts, director general, CIMMYT; Martin Kropff, former CIMMYT director general; Howdy Bouis, interim HarvestPlus CEO; and Felix San Vicente, CIMMYT maize breeder; at the launch of new biofortified zinc maize. (Photo: Jennifer Johnson/CIMMYT)

The grain of one such maize hybrid offers over 30 percent more zinc than other maize varieties, in addition to yielding as much as 8 tons per hectare and being resistant to common maize diseases. Since 2018, more than 75 tons of seed of zinc-biofortified maize has been marketed, benefiting more than 24,000 rural families.

Studying and using Colombia's native maize diversity

Crop genetic diversity, conserved in formal seed collections or in farmer-bred varieties still grown, represents a rich source of genes to breed more nutritious and climate- and disease-resilient varieties. Climate change, socioeconomic pressures, and the out-migration of smallholder farmers

seeking better livelihoods are driving the disappearance of native crop varieties and the unique genetic qualities they embody.

As part of Colombia's efforts to update seed collections and knowledge of its native maize races and to better preserve them, in 2007 CIMMYT shared with Colombian scientists seed from 66 CIMMYT germplasm bank collections of 22 Colombian maize races, most from samples gathered and classified by international researchers in the 1950s with funding from the US National Academy of Sciences - National Research Council.

A group of CIMMYT specialists and Colombian organizations have been [studying regional maize value chains](#)

to establish effective strategies for the conservation and production of native maize. One approach is to link farmers with niche markets for grain and other products of farmers' native maize varieties, thereby helping farmers to profit from continuing to grow the varieties. This builds on a model already working in Mexico, whereby restaurants in Mexico City and tourist areas are sourcing blue maize and other local grain types directly from farmers, in mutually beneficial arrangements. CIMMYT scientists and partners have also visited smallholder farmers and native maize seed custodians in [Valle del Cauca](#) to learn about their maize diversity conservation methods and discuss grain storage innovations and the participatory selection of native maize varieties.

Innovations for resilient agrifood systems

CIMMYT is taking part in the “Sustainable Agrifood Colombia: Adaptation to Climate Change” project, which brings together the Ministry of Agriculture and Rural Development (MADR), the Bioversity International Alliance and CIAT, the AGROSAVIA Corporation, the Center for Research in Sustainable Agricultural Production Systems (CIPAV), and numerous other Colombian entities. Financed by the Green Climate Fund (GCF), the Development Bank of Latin America and the Caribbean (CAF), MADR, and participants, work will implement technologies for sustainable production by smallholders, while strengthening climate risk management, reducing greenhouse gas emissions from agriculture, and help ensure sufficient and stable availability of quality food.



A farmer in Nariño, Colombia on a diversified chagra with native maize, potato, oca, squash, fava bean, and other perennial and wild crop harvests. (Photo: González, Alpala, Pinzón, Rodríguez, Bolaños, Romero, González)

CIMMYT participation to date has included testing new, drought-tolerant maize varieties, helping train farmers in the use of pioneering digital tools to record agronomic data, and – supplementing the CGIAR [AgriLAC Resiliente initiative](#) – operating innovation hubs that allow the speedy testing of farmer-tailored solutions. CIMMYT was also part of a 2024 training workshop on the selection and evaluation of maize germplasm, with a focus on tolerance to heat, drought, and waterlogging; challenges daily faced by farmers.

As part of AgriLAC Resiliente and [Nature-Positive Solutions](#), among other initiatives, CIMMYT, indigenous farmers, and the Alliance of Bioversity and CIAT are finding and promoting

practices that conserve agrobiodiversity while sustaining natural resources and managing agricultural waste. A key focus for maize, one of the many crops these farmers grow in complex cropping systems that offer resilience and food security, is improved post-harvest practices to conserve undamaged, nutritious grain.

CIMMYT has also worked with AGROSAVIA to stage major scientific events in Colombia, such as the 23rd Latin American Maize Reunion and 4th Seed Congress in 2019, as well as to provide training and regionwide professional linkages for Colombian women scientists and to study the role of women in conserving the diversity of native and farmer maize varieties in smallholder settings.



About CIMMYT

CIMMYT is a cutting edge, non-profit, international organization dedicated to solving tomorrow's problems today. It is entrusted with fostering improved quantity, quality, and dependability of production systems and basic cereals such as maize, wheat, triticale, sorghum, millets, and associated crops through applied agricultural science, particularly in the Global South, by building strong partnerships.

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