Meridian Institute

Connecting People to Solve Problems

SCIENCE AND INNOVATION FOR AFRICAN AGRICULTURAL VALUE CHAINS

Maize Value Chain Overview

The Science and Innovation for African Agricultural Value Chains project will bring together leading scientists and innovators (Science Team) with key players in the maize, cassava and dairy value chains (Value Chain Partners and Participants) in Africa. The project goal is to identify out-of-the-box innovative technology options that would add significant value for smallholder farmers (i.e., those farmers earning $1 - $2 per day) by reducing primarily post-harvest inefficiencies in these value chains in Africa. A value chain is a chain of activities. Products pass through all activities of the chain in order and at each activity the product gains some value.

The purpose of this paper is to highlight key constraints in the maize value chain. To provide context for those constraints, the paper begins with an overview of the maize sector in Africa, with a focus on Kenya, and highlights key issues such as gender and market dynamics. The paper concludes with a list of market inefficiencies and potential technological innovations that will be the focus for the Science Team. It should be noted that team members will be encouraged to consider potential cross-over technologies between value chains.

The successful adoption by smallholder farmers of technology-based solutions often raises considerable challenges. Meridian Institute has contracted with New Growth International to develop a paper that will include an overview of historic lessons regarding technology development and deployment for smallholder farmers and case studies to illustrate key lessons learned in more detail. The lessons learned paper, combined with information from our value chain and gender partners will help provide important information about current practices, cultural and other contextual aspects that will influence the likelihood of adoption of specific solutions.

Maize Value Chain Overview

Maize is a domesticated form of a strain of teosinte, a wild naturally occurring grass that originated in Mexico. Maize, meaning literally “that which sustains life” in Aztecan and Mayan languages, is widely cultivated throughout the world. In 2004, worldwide production was over 721 million metric tons surpassing both wheat (627 mmt) and rice (605 mmt). While maize is grown primarily as livestock fodder in much of the world, 95 percent of maize produced in Africa is grown for human consumption. Among the twenty-two countries in the world where maize comprises the majority of the diet, sixteen are in Africa.

Maize is the most important staple food in sub-Saharan Africa and is the main food crop in Kenya, representing 3 percent of Kenya's gross domestic product (GDP) and 21 percent of the total value of primary agricultural commodities. Maize thrives in regions where the rainfall average falls between 900-1700 mm, but can grow in as little as 500 mm or as much as 2500 mm rainfall. Grown on an estimated 1.4 million hectares in Kenya by large-scale farmers (25 percent) and smallholders (75 percent) it is both a commercial and subsistence crop. In 2005, the top exporters of maize in sub-Saharan Africa were South Africa, Tanzania, Uganda, Zambia and Swaziland, with the top importers of maize Zimbabwe (a maize exporter until the late 1990s), Angola, Ghana, Kenya and Mozambique. Facing a growing population, several studies (Pingali, 2001) (World Bank, 2003) note that it is critical for Kenya and other African countries to increase maize production in order to feed their people.

Summary of Maize Market Characteristics in sub-Saharan Africa

- Maize is the most important food staple in sub-Saharan Africa, contributing about 16% of caloric intake.
    - Particularly important in eastern and southern Africa. It accounts for 54% of caloric intake in Malawi and 33% in Tanzania.
- In most countries, the vast majority of maize (>95%) is grown by smallholders under rain-fed conditions with volatile production from year to year.
- Use of improved seed and fertilizer is modest, but greater than for other staple food crops.
- Maize prices exhibit substantial intra-year seasonality. Prices are low when the markets are flooded with maize during harvest-time and prices are high prior to the next harvest.
- Milling industry consists of hundreds of small-scale mills serving rural areas and handful of large-scale mills serving urban consumers.
- Complex marketing channels including:
    - Many small-scale under-capitalized traders
    - Minimal storage capacity
    - Few large trading enterprises with national or international operations.
- Political sensitivity of maize prices, leading to attempts to support, suppress, or stabilize prices.

Understanding the Challenge of Maize

Maize is predominately a cross-pollinating rather than a self-pollinating crop, which means when rates of cross-pollination are high, genetic material is exchanged via the flow of pollen among neighboring plants. Unless carefully controlled, maize plants in a field will differ from one generation to another and from each other. Farmers make choices in what type of seed to plant. Subsistence farmers choose between less expensive open pollinated varieties (OPV) of seed, or spend often precious resources on more expensive hybrid seed. Open pollinated varieties have traditionally lower yields, but the harvested seed can be saved and planted the next season reducing farmer's costs.

When maize self-fertilizes, the offspring (or progeny) often have undesirable traits, but when cross-fertilized can demonstrate significant yield advantages relative to their parents (called "hybrid vigor"). When rates of cross-pollination are high, genetic material is exchanged and neighboring plants share the pollen that flows between them. Hybrid vigor is very important for the African smallholder farmer. The advantages of F1 seed[1] of maize hybrids can degenerate rapidly when farmers save the seed and replant it – depending on the type of hybrid. Due to market imperfections and cash constraints, African smallholders often "recycle" F1 seed (Smale and Jayne, 2003).

According to researchers from the International Food Policy Research Institute (IFPRI), in order for African smallholder farmers to sustain yields they must rely on the seed industry in a way that neither rice nor wheat farmers of Asia's "green revolution" ever experienced. In fact, a hybrid-based maize sector often requires large-scale commercial seed enterprises (and fertilizer enterprises), whose profits are sustained by an annual demand for seed purchased by farmers. However, maize varieties produced for temperate climates are not always easily adapted to the non-temperate growing climates of the developing world. This means gains achieved by private seed companies in the United States, Europe and some parts of China have not transferred to the smallholder farmers in developing countries growing maize in the wide range of microclimates and technologies (Morris, 2001).

Key impediments to maize production amongst smallholder farmers include:

Production:

- Few farmers use fertilizer or purchase improved seeds.
- Uncertainty about rainfall (which affects returns) and lack of credit are constraining factors.[2]

Lack of storage:

- Sharp seasonal fluctuations in maize prices (particularly in remote areas) suggests insufficient storage by farmers and traders.
- Storage is limited by liquidity constraints, capacity, and high storage losses (storage losses are higher for maize than for other crops).

Fragmented sales by small numbers of farmers:

- Less than one-quarter of maize farmers sell any maize.
- Farmers are predominantly selling small amounts of maize in the village to traders.
- Aggregation is time consuming and costly, contributing to low farm prices.
- Farmers lack information about prices in nearby markets and also lack cost-effective means of transporting maize individually. However low levels of trust between farmers limit collective sales or transportation.

[1] F1 stands for Filial 1, the first filial generation seeds/plants or animal offspring resulting from a cross mating of distinctly different parental types.
[2] BMGF and other organizations are exploring affordable water management and irrigation methods for smallholder farmers.

Improper drying and lack of grades:

- Maize is often not fully dried at the farm nor is it fumigated, resulting in the need for further drying and sometimes fumigation by traders.
- The absence of standardized grades requires the quality of produce to be manually checked. As a result of both of these factors, maize is repeatedly packed and unpacked during marketing, creating inefficiencies in the market chain.
- Poor drying at initial stages in the marketing chain can result in high levels of aflatoxins which are unobserved throughout the rest of the marketing chain.

Government Policies and Market Access

In the past, maize production and government policies in Kenya favored the interests of the large-scale commercial farmers and were until the 1990s characterized by heavy state involvement. This heavy involvement changed as the donor community encouraged agricultural market liberalization in order to increase efficiency and the types of technology available to farmers. In Kenya these strategies proved to be only moderately successful (De Groote et. al., 2005) due to a number of reasons, including: the quasi-monopoly power in Kenya's seed sector (creating a situation where the release of new varieties continues to be expensive and time consuming), a poor transportation infrastructure (deteriorating over the past 10-15 years) and a lack of a formal distribution network. However in part due to the liberalization of agricultural markets there are now a greater number of private seed companies releasing new varieties. According to a 2005 study by scientists from the International Maize and Wheat Improvement Center (CIMMYT) and the Kenyan Agricultural Research Institute (KARI), the increase in the number of new firms entering the seed sector produced an increase in seed varieties for the mid-altitudes and transitional zones, but not as many new seed varieties for the highlands where growing conditions are less favorable. The liberalization policies were accompanied by a decrease in government support of agricultural services. According to the study (De Groote, et. al., 2005) government spending on research and extension was substantially reduced along with formal credit for farmers.

Policy uncertainty is a major limiting factor for maize production across sub-Saharan Africa. Given the importance of maize in national consumption and production governments often justify intervening in the marketing of maize to ensure food security. This can be in the form of export or import bans, or national food security stocks of maize. For example, export bans are introduced by the Tanzanian government when maize shortages are forecast, maize is the primary commodity stored in national food security stocks of the governments of Benin and Tanzania, and in Malawi the government-run marketing body guarantees a set price band for maize. Furthermore, government and donor interventions can also cause uncertainty and provide market advantages to private sector traders who gain contracts to supply public entities with maize.

Challenges facing Kenya's agricultural production, and particularly maize include:

- The need for farmers to increase yields on existing land

- Access to improved technologies, including improved varieties
- Increased use of fertilizers or the application of new management techniques
- Increased access by farmers to information about new technologies and how to use them
- In light of limited government extension, enabling non-government organizations (NGOs) to provide extension services, credit, micro-finance and informal credit and loan assistance

Food consumption patterns, food insecurity, and nutrition

Maize is the basic staple of the Kenyan diet. *Ugali*, the main dish, is a thick porridge of maize meal that is usually eaten with a sauce of vegetables or meat or served with fermented milk. Dishes of boiled maize and beans (*githeri*) and maize, beans, vegetables and potatoes (*irio*) are also common. Mashed plantain (*matoke*) is served as an alternative to maize. Kenya is a low-income food-deficit country. In 2004 it was estimated that more than 10 million Kenyans experienced chronic hunger annually, representing a third of Kenyan's total population.

Food insecurity in Kenya is a result of problems in food availability because of the poor performance of the agricultural sector, but problems related to *access to food* also play a role because of inadequate market and transport infrastructure and low income and purchasing power due to poverty.

Seasonal food insecurity affects households in rural areas before the start of the harvest. An assessment conducted in 2005 by the Government of Kenya and the World Food Program indicated that there was a significant deterioration in household food security in most parts of north-eastern Kenya (Wajir, Garissa and Tana River districts) and in farming households in the south-eastern and coastal marginal districts (World Food Program, 2005).

The main maize products for food use are derived from dry milling and include flaking grits, coarse or fine grits, maize cones and maize flour. They are products from which the pericarp (outer lining of the seed) and germ have been eliminated and they differ from each other in granulation, with flaking grits having the largest particle size and flour the smallest.

Maize constitutes an important source of carbohydrates, protein, vitamin B, and minerals. As an energy source, it compares favorably with root and tuber crops, and it is similar in energy value to dried legumes. Furthermore, it is an excellent source of carbohydrate and is complete in nutrients compared to other cereals. The nutritional quality of maize is further determined by the amino acid makeup of its protein. Maize is deficient in two essential amino acids: lysine and tryptophan, making it a poor protein food. Furthermore, the protein quality of dry-milled maize products is inferior to that of the original whole grain. Deficiencies in maize protein have motivated researchers to develop quality protein maize (QPM) varieties to increase concentrations of these essential amino acids in its protein (Latham, 1997).

Smallholder Farmers' Market Participation and the Development of Collective Action

Over the past few years changes in the global agricultural economy provided smallholder

farmers with new challenges and opportunities. Gaining access to new markets often requires farmers to adopt new marketing skills and strategies. In the case of smallholders, collective action is often the route chosen to meet basic market requirements for minimum quantities, quality and frequency of supply which they could not achieve individually (Kaganzi et.al, 2009). New markets are emerging globally that seek more exacting standards, trustworthy products, at consistent prices. This applies in developed and developing countries and applies to modernized food outlets (such as fast food restaurants, hotels, tourism companies). These trends are evident in Eastern Africa and include growth of supermarket outlets in Kenya (such as Uchumi and Nakomatt). Estimates suggest that supermarkets control up to 30 percent of the food retail trade in urban Kenya and 55 percent in South Africa, capturing the higher income consumers (FAO, 2005).

One study in Uganda (Kaganzi, et.al., 2009) reviewed factors that enable groups of smallholder farmers to engage more effectively with dynamic and higher value market opportunities. Their findings confirmed the need for "change agents" to impart the skills required to engage with markets and highlight the necessary social and technical innovations needed for smallholder farmer groups to achieve long-term market linkages. The study concluded that marketing strategies combined with collective action can accelerate innovation, streamline interventions and improve the efficiency of service provision to poor, loosely organized farming communities. Another study (Markelova et. al., 2009) concluded:

- Acting collectively for market access can help correct some of the market imperfections, such as high transaction costs and missing credit markets;
- Farmers are able to obtain information, reach quality standards and operate on a larger scale when they pool financial and labor resources, enabling them to sell to new domestic or international markets previously unaccessible;
- The study stressed the importance of groups being able to develop their own rules, rather than having rules externally-imposed;
- Higher value products which involve processing or are perishable require greater technical skills but also offer greater returns to collective marketing;
- However, the study cautioned that incentives and enabling conditions for famer groups were needed in order for collective marketing to be profitable or sustainable. This was esstenial in helping realize the objectives of "pro-poor market development."

Gender

On its "Gender and Food Security/Agriculture" website, the Food and Agriculture Organization (FAO) notes: "Rural women in particular are responsible for half of the world's food production and produce between 60 and 80 percent of the food in most developing countries. Yet, despite their contribution to global food security, women farmers are frequently underestimated and overlooked in development strategies. Rural women are the main producers of the world's staple crops—rice, wheat and maize—which provide up to 90 percent of the rural poor's food intake." (http://www/fao.org/gender/en/agri-e.htm).

Women make up 20 to 70 percent of the workforce in agricultural production and postharvest

activities worldwide. Despite progress made in national and international policies since the first world conference on women in 1975, the International Assessment of Agriculture Knowledge, Scienc e and Technology Development (IAASTD, 2009) reported urgent action is still necessary to implement gender and social equity in policies and practices in order to better address gender issues as integral to the development process.

It is important to note that Kenya is one of the African countries that recognizes the independent land rights of women (IAASTD, 2009). Similarly, in Ghana the major constraint that all women face is access to land for farming, and must be adequately addressed when considering project design or implementation. The issue is one of urgency because market development rewards those who own the factors of production. Increased market access will not benefit women and men equally unless the institutional, legal and normative issues are effectively and appropriately addressed.

The lack of access to storage facilities and roads contributes to high food costs and low selling prices as well as high post-harvest storage losses caused by weevils and the larger grain borer. The trend, as witnessed in Kenya with trade liberalization and privatization, has led to a dismantling of many marketing services that were once available to rural farmers. Women farmers in particular have felt this loss. The decline in investment in rural infrastructure, such as roads that link rural areas to markets impact access to membership in marketing organizations and ultimately limit women's ability to sell their produce (InterAcademy Council, 2004).

Market Inefficiencies & Potential Technologies/Approaches

This section provides an overview of inefficiencies or constraints in the maize value chain and potential technologies or approaches to address the constraints. The project will focus on technological enhancements and innovations that can contribute to higher incomes for smallholder farmers through their adoption primarily in the dominant traditional markets. The project will primarily focus on post-harvest technologies.[3] For purposes of this project, it is important to recognize that labor saving devices are not a high priority and the focus will need to be on technologies that increase value or output without adding significant cost.

Bottlenecks in Seed Supplies

Even though the project will not focus on seed and other inputs, several important studies based in Kenya have emerged over the last few years focused on the seed industry for dryland crops in Kenya that provide important indicators for the underlying causes of the poorly functioning maize value chain in Kenya. For instance, an analysis of the maize seed sector from 2003 through 2008, concluding with *An Analysis of the Bottlenecks Affecting the Production and Deployment of Maize Seed in Eastern and Southern Africa* (Langyintuo, 2005) (Muhammad, 2003) (Langyintuo et. al, 2008), found a shortfall in supply of seed attributed partly to institutional bottlenecks affecting the maize seed value chain.

[3] Post-harvest: The period between maturity of the crop and the time of its final consumption.

The overall findings suggested that a number of institutional bottlenecks hamper the effective functioning of the maize seed sector in Africa in general. The need for a coordinated policy effort for policy makers, regulatory agencies, national research and extension organizations, seed companies and associations (including NGOs and farmer organizations) was recommended. Other hurdles identified included cumbersome varietal release, registration and seed certification regulations, a weak seed producer base, slow access for farmers to the best germplasm (used to develop seed material), uncompetitive prices in local grain markets, low adoption rates of improved varieties, restriction on cross-border trade in seed and as mentioned earlier, poor infrastructure (including roads and access to markets) (CIMMYT, 2008).

Harvest and Post-Harvest Bottlenecks

Earlier studies have highlighted a variety of issues regarding the success of post-harvest technologies and acceptance by local populations in Africa. A review of the failures encountered in various technology extension projects in Africa (FAO, 1994) produced the following list of bottlenecks to be avoided:

- A technology which is not adapted to the production or processing requirements of the end-users: either because maintenance is too difficult (due to problems in obtaining spare parts) or the technique is not appropriate for the local varieties (the case with certain de-hullers);
- A technology which does not respond to the socio-cultural characteristics of the end user (taste and preferences);
- A technology which is either too sophisticated or over-sized, with high operational and maintenance costs;
- Organizational and managerial problem resulting in a lack of participation of those people involved, and an insufficient managerial capacity;
- A lack of enterprise to search for financial resources and a limited knowledge of marketing for such activities.

While there are a broad range of key issues, the following list provides the focus areas for this project. The list was generated in consultation with the the Value Chain Partners and experts in Africa. This project will focus primarily on the following post-harvest elements for maize:

- Storage
- Processing
- Quality Management and Control
- Packaging, Labeling and Marketing

Brief descriptions of these bottlenecks and potential technology considerations are described in the following section.

Storage

Post-harvest insect pests jeopardize food security throughout the developing world. Small-

scale maize farmers, who generally store their grain as whole ears in slatted bins, in adobe rooms, among the rafters of their dwellings, or even in the field, are especially hard hit. The two most damaging species for maize are the maize weevil, *Sitophilus zeamais*, and the larger grain borer (LGB), *Prostephanus truncatus*. The maize weevil is ubiquitous and first colonizes maize ears in the field. Farmers restrict weevil attacks somewhat through use of varieties with closed, sturdy husks and through practices that regulate the storage temperature and humidity of the grain, such as sun drying or keeping ears above hearth fires. The LGB, though, is nearly impervious to these simple control measures. The larger grain borer can destroy an entire grain store within five months. Adult beetles also penetrate and survive in the wooden frames of highly infested stores, complicating control.

Traditionally clay-lined maize grain silos are used for storage in Africa. In each instance, subsistence farmers and agribusiness alike must take into account the difficulties of storing maize at optimal conditions and balance humidity, the moisture content of the kernels, and the potential for pest infestations.

- Technology considerations: New and innovative technologies, for instance: adaptation of metal silos that have been used very successfully in Central America (CIMMYT project funded by the Swiss Agency for Development and Cooperation), or enhancements and adaptation of "super bag" or cowpea "triple bag" technology.

Processing and drying of maize

Maize drying often takes place in the middle of the rainy season. Therefore, while the relative humidity remains around 80 percent for several weeks after the harvest, it is difficult without additional heat, to reduce the moisture content of the maize to 13-15 percent at which it can be stored. A drying phase of varying length occurs in the field, on the stalk, although this practice leads to losses from predators. Also, after harvest, removal from field to homestead is delayed through waiting for transport. The result is considerable loss from fungal attack on the too moist grain (FAO, 1994). Maize drying is often accomplished using diesel generators, but the process is time intensive and costly. Moisture content is often inconsistent, and may not meet the desired quality standards.

- Technology considerations: innovations to reduce the time it takes and the cost of drying maize; innovations to ensure consistent moisture content; innovations to improve maize flavor to differentiate products with added value.

Quality Management and Control

Traditionally in African countries where grains (maize, millet and sorghum) are consumed, the flour has to have precise characteristics adapted to each dish. Culinary quality depends on the skill and experience of the cook, and on the quality of the raw materials used. There are several predominant criteria to include:

- Color -- The milled product will be the same in the cooked product. In general, light colored products (white, yellow, pink) are preferred to dark colors (grey or red).

- Granularity -- This depends on the size of the grains in the final product and the coarseness of semolina or fineness of flour.[4]
- Texture -- The texture of a product is linked to its capacity to absorb water. It is important to determine the influence of the varieties and the milling technique employed on the quality of the final cooked product.

Grading, segregating, and maintaining maize quality is often cumbersome, especially when small quantities produced by many smallholder farmers are aggregated.

- Technology considerations: innovations to facilitate grading and segregation of maize; innovations to maintain maize quality during transportation and marketing; fumigation or other techniques to prevent losses during and after bulking.

Packaging, Labeling, and Marketing

In developed and developing countries alike, maize is processed into a wide array of consumer products ranging from corn on the cob and popcorn to cornstarch, corn oils, automotive fuels, such as ethanol and gasohol, and alcoholic beverages, including corn beer and whiskey. As mentioned earlier, packaging to reduce post-harvest losses after maize processing and through the marketing chain could add value. Other measures could be taken to differentiate markets according to maize quality and increase revenues through branding local, quality products.

- Technology considerations: extremely affordable packaging to prevent losses and ensure quality of processes maize; packaging and labeling to create product identity and market product quality.

Additional Considerations

In exploring potential technologies and innovations, the following contextual issues will be kept at the forefront for consideration.

- Technology adoption and dissemination
  - Will the technology be cost-effective and provide a long-term solution for African farmers, especially smallholders?
  - How can new or enhanced technologies be "scaled up"?
  - How will new technologies transfer from one region to another?
  - How to effectively establish connections with the private sector?
- Institutional and policy dimensions associated with the maize value chain
  - What would increased maize production or increased use of maize for starch and oil production mean for smallholder farmers and for the types of technologies needed?
  - Who would benefit and what factors need to be included when looking into local or

[4] The measure of granularity is easily achieved with the aid of standard mesh sieves available on the market. Grain is often milled in town, where the grain is milled dry or processed in mini-mills. It is difficult to produce a flour or semolina (correctly de-germed and ground for conservation of 1 to 2 months) which provides the same cooking quality as a fresh product.

imported production?
    - What policies can impede or enhance the efficiency of value chains and make the chains more equitable i.e. ensure that smallholder producers gain from the added value in the chain?
- Technologies for surplus or deficit production areas
    - What technologies are relevant to surplus and deficit producing areas? Some farmers may generally be able to produce surpluses that they sell on the market. Others may suffer from chronic food shortages. In yet other situations, farmers may be able to produce a 'surplus' immediately after the harvest, but with limited storage capacity and with the need for cash, farmers may sell their maize. However, a few months later there may be a shortage of maize and these same farmers are then forced to buy maize at higher prices than immediately after the harvest.
    - Farmers think in terms of livelihoods (and not in terms of value chains). Ensure the project is relevant to the needs of farmers. One size does not fit all.

Potential Crossovers

To inform technology identification, prioritization, and business plan development, Meridian may work with local experts to create so-called "market maps" describing relationships between various stakeholders in the maize value chain, highlighting bottlenecks in the maize value chain(s) and identifying suitable private and public sector actors who can provide the services that different stakeholders requires. During the idea generation and business plan development phases of this project, Project Partners should consider technology enhancements and innovations in the context of the overall maize producing system (i.e., systems view). As described in more detail in the Lessons Learned document, there are numerous non-technical factors that affect the adoption of new technologies. Furthermore, potential technologies that could benefit more than one value chain should be considered. While this project focuses specifically on the maize, cassava and dairy value chains, cross-over opportunities with other value chains and processes should be considered. It is likely that ideas generated during the field trip will be considered outside the scope of this project. While these ideas will not be advanced through the business planning stage, they will be captured and noted for potential future projects.

Project Partners

East African Grain Council
The Eastern Africa Grain Council (EAGC) is a membership-based organization registered in Kenya as a Company Limited by Guarantee and without share capital. It will operate as a non-profit, non-political, non-denominational organization, which will prepare, disseminate, and promote the exchange of information on matters affecting the regional grain industry.

The mission statement of Eastern Africa Grain Council is:

" EAGC is the recognized regional grain trade organization dedicated to the task of improving the policy and trade environment for the betterment of the grain sector from producer to consumer".

The council expects to achieve this by creating long-term solutions that will address the various issues and constraints of the grain industry in the region.

The objectives of the Council include:

- Build cooperation, interaction, partnerships, alliances, networks and market linkages
- Promote a well functioning regional grain supply chain, focusing on trade issues affecting all sectors of the chain, and building a platform for reducing constraints in regional grain trade
- Collect market data, generate information exchange and share regional expertise
- Promote investment in structured marketing systems including warehouse receipts and commodity exchanges.
- Act as main certification authority in structured systems; and provide commercial services as needed
- Recognize and support accepted principles of international codes of corporate conduct
- Facilitate awareness of new technologies
- Represent the regional membership at national, regional and international forums, and lead advocacy and lobbying actions for best interests of Council members

The International Maize and Wheat Improvement Center (CIMMYT)
CIMMYT is committed to improving livelihoods in developing countries. Through strong science and effective partnerships, CIMMYT creates, shares, and uses knowledge and technology to increase food security, improve the productivity and profitability of maize- and wheat-based farming systems, and sustain natural resources.

CIMMYT is a non-profit research and training center with direct links to about 100 developing countries through offices in Asia, Africa, and Latin America. CIMMYT participate in an extensive global network of people and organizations who share similar development goals, including the public and private sector, non-governmental and civil society organizations, relief and health agencies, farmers, and the development assistance community.

The abbreviation "CIMMYT" is derived from the Spanish version of their name: Centro Internacional de Mejoramiento de Maíz y Trigo.

How CIMMYT Helps:

- Develop better seed and cropping practices: Improved maize and wheat seed can produce plants that naturally resist diseases and pests, tolerate too much or too little water, overcome the limitations of poor soils, survive excessive cold or heat, offer more nutrition, are more marketable, and yield more grain for food or sale. Better cropping practices save water, land, and other natural resources, aside from raising yields.

- Help the world conserve and use the great diversity in maize, wheat, and related species. Through CIMMYT's genebank, important worldwide collections of maize and wheat are held in trust for future generations. The genes in these seeds will help solve emerging food production problems, such as those caused by climate change.
- Build capacity and share knowledge to promote development. CIMMYT trains and mentors researchers. They teach farm households and rural communities to use new farming practices and produce seed. CIMMYT provides technical information and support that helps researchers, policymakers, and development workers worldwide. CIMMYT advocates appropriate policies to foster food and income security and carries out impact assessments to determine the poverty reduction impact of technology adoption. Research results are shared worldwide and made publicly available.
- Speed the recovery from natural disasters and civil strife. CIMMYT advises government agencies, relief organizations, and health organizations about appropriate seed and cropping practices to help farm households recover from famine, drought, floods, war, and other disasters. CIMMYT helps nations restore agricultural research material and infrastructure. These activities reduce the threat of continuing food shortages and long-term dependence on food aid.

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