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## News Feature

### Scenario Projects 10 Percent Fall in Developing Country Maize Production

#### **But Better Crop Varieties and Land Management Systems Could Lessen the Blow**

12 May 2003 — Cali, Colombia and Nairobi, Kenya — Scientists announced that climate change could potentially lead to a 10 percent drop in developing-country maize production over the next 50 years.

In a report published in the journal *Global Environmental Change*, the researchers forecast possible annual losses of up to 10 million tons, enough grain to feed 140 million people.

Maize, known as corn in the United States and Canada, is the world's third most important crop after rice and wheat. About half is grown in developing countries, where maize flour is a staple food for poor people and maize stalks provide dry-season feed for farm animals.

The projections were made by geographer Peter Jones at the International Center for Tropical Agriculture, [CIAT](#), in Cali, Colombia, and economist Philip Thornton of the International Livestock Research Institute, [ILRI](#), in Nairobi, Kenya. CIAT and ILRI are Future Harvest Centers of the Consultative Group on International Agricultural Research, [CGIAR](#).

#### **Rising Temperatures, Shifting Rainfall**

The team's findings are based on results from a computer model called [MarkSim](#) that simulates weather conditions at different locations based on data from thousands of weather stations worldwide.

"The decline in production will not be across the board or evenly spread, however," says Thornton. "Our simulations suggest that rising temperatures and shifting rainfall patterns will vary widely from one agro-ecosystem to another."

"In the worst-case scenario, if we do nothing to meet this challenge, climate change could lead to a 10 percent drop in tropical maize production," adds Jones. "The message to be derived from the data, however, is that there will be many places where yield reductions can be handled by new varieties or agricultural practices, some where yields will increase due to climate change, and still others where crops will effectively no longer



Two climate change centers, Cali, Colombia and Nairobi, Kenya, are working to improve maize production. [DANNY KATHUNA](#) (left)



Harvesting maize in South Africa. [JOHN LINDSEY](#)

grow."

The team's predictions show, for example, that large maize-producing countries such as Brazil and Mexico will be hard hit, while Chile and Ecuador will likely be relatively unaffected. Overall, according to predictions, Latin America will likely see a reduction approaching 25 percent due to higher temperatures and decreasing rainfall.

In Sub-Saharan Africa, the researchers forecast that Nigeria, South Africa, and Tanzania will lose upwards of 20 percent of total production.

According to the UN Food and Agriculture Organization, maize yields currently average 1.5 tons per hectare in Africa and slightly more than 3 tons per hectare in Latin America.

**New Varieties, New Solutions**

"A ten-per-hectare yield loss when farmers are producing just 1.5 tons of maize would be disastrous," says Masa Iwanaga, director general of the International Maize and Wheat Improvement Center, CIMMYT, "but these consequences can probably be avoided if we step up research."

CIMMYT, a Future Harvest center of the CGIAR, is based in Mexico with field offices in more than 20 developing countries.

Iwanaga notes that CIMMYT scientists working in southern and eastern Africa have already developed drought-tolerant maize plants that produce 20- to 35-percent more grain than most contemporary varieties. The new plant types are currently grown on more than 75,000 hectares in countries such as Angola, Malawi, Mozambique, South Africa, Tanzania, Zambia, and Zimbabwe.

"It's a good start, but what we need to do is find ways to make sure that these new varieties reach farmers quickly," Iwanaga cautions. "It can take up to 10 years for a new cultivar to reach all of the farmers who want to use it. Climate change doesn't give us that kind of time to respond."

Jones says that much harm can be avoided with a focus on research and efforts to adapt agriculture to climate change. "While climate change is certainly a dangerous phenomena, crop losses need not become catastrophic," he says. "Researchers around the world are not standing still. Given that climate change is a reality, scientists are focused on doing something to adapt."

More than 50 development agencies are accelerating the testing and distribution of the new cultivars as part of the *Southern African Drought and Low Soil Fertility Project*. Cooperating organizations include the German Agency for Technical Cooperation, GTZ, which has decided to supply farmers exclusively with seed tested under



CGIAR/IFPRI  
Maize Production  
Source:  
CIMMYT  
Lima

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project auspices. The initiative is funded by the Government of Switzerland ([SDC](#)), the [Rockefeller Foundation](#), and the US Agency for International Development (USAID).

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#### **Livestock at Risk**

"Right now eastern and southern Africa are our biggest concern," says ILRI Director General Carlos Seré. "This new research signals important changes for millions of farmers who rely on maize to feed both their families and their farm animals."

In Africa, lack of feed for livestock will quickly become a human problem, Seré notes. Animals contribute as much as 80 percent of farm cash income and provide draught power, fuel, and tradable credits.

"Less maize means less grain for poor people, less feed for farm animals, and less milk and meat for hungry households," Seré adds. An estimated 170 million Africans currently depend on maize grown in what's called a mixed crop-and-livestock farming system, a number that is expected to grow to nearly 270 million by the year 2020, he says.

Thornton says that big picture projections available in the past often tend to hide the fact that the impacts of climate change on maize production could be disastrous for some resource-poor households on the local level.

Ecologist Robin Reid from ILRI supports this view. "In parts of southern Africa, particularly in much of Zambia, farmers are so dependent on maize for survival that this projected drop in production would signify more than an 80 percent reduction of the calories now consumed in poor households," she says.

To assess the potential impact of climate change on local crops and feed supplies, scientists will need to provide not only more efficient technologies, but also better and more localized information of the kind generated by software like MarkSim. "The aim of our research is to provide that information," says Jones. "What MarkSim does is sharpen the ability of standard crop models to predict the behavior of different food crops under diverse climatic and crop management conditions and allow us to continue zeroing in on local effects." In the future, we'll be applying it to other crops as well, such as rice and wheat, he adds.

"Our ultimate objective is to arm the poorest and most vulnerable members of society with coping strategies geared to their locations," says Jones. "If we can provide quality information on local climate effects and encourage policymakers to act on this information, farmers will likely suffer less from crop losses due to climate change."

For more information about MarkSim please [click](#)

[here](#) or contact [p.jones@cgiar.org](mailto:p.jones@cgiar.org)

Read: [The potential impacts of climate change on maize production in Africa and Latin America in 2055](#)

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The Future Harvest Foundation promotes integrated policy and science based solutions to eradicate hunger, improve livelihoods and ensure sustainability of the world's critical biodiversity and natural resources. Future Harvest is an initiative of 16 food and environmental research centers supported by the Consultative Group on International Agricultural Research. [www.futureharvest.org](http://www.futureharvest.org)

The Consultative Group on International Agricultural Research (CGIAR) is a strategic alliance of 62 members, four cosponsors, 12 international organizations, 16 Future Harvest Centers, and many hundreds of civil society organizations. The CGIAR alliance mobilizes cutting-edge agricultural science to create agricultural growth, improve food security, human nutrition, and health, and protect the environment. The knowledge generated by the CGIAR is made freely available to all. [www.cgiar.org](http://www.cgiar.org)

The International Center for Tropical Agriculture (CIAT) is a not-for-profit organization that conducts socially and environmentally progressive research aimed at relieving hunger and poverty and preserving natural resources in developing countries. [www.ciat.org](http://www.ciat.org)

The International Livestock Research Institute (ILRI) works in partnerships to improve the well-being of people in developing countries by enhancing the diverse and essential contributions livestock make to smallholder farming. Two-thirds of the world's domestic animals are kept in developing countries, where over 90% are owned by rural smallholders. ILRI research products are helping to solve the severe problems that hold back animal agriculture, sustainable food production and economic development in the tropics. [www.ilri.org](http://www.ilri.org)

CIMMYT is the world's leading maize and wheat research center and employs more than 100 scientific staff from over 40 different nations. Headquartered near Mexico City, CIMMYT scientists work in more than 100 countries and with thousands of scientists and farmers worldwide. CIMMYT is a Future Harvest Center and receives funding from public and private foundations as well as more than 58 countries, with the majority of funds administered through the Consultative Group on International Agricultural Research (CGIAR) [www.cimmyt.cgiar.org](http://www.cimmyt.cgiar.org)

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