

A close-up photograph of a hand holding a piece of corn, with a purple and pink text overlay. The text reads: "Humans grow maize and maize grows humans".

*"Humans grow maize
and maize **grows**
humans"*

Solving the Maize

The world is more interconnected than it has ever been before. Issues in food production can have a significant impact on the livelihood of people on the other side of the world. But how did this happen? The short answer: corn.

0:12

Text box: Food complexity, food fragility; map highlighting Eastern Europe

Photo of men loading trucks; text boxes: 12 % of global calories, 16 % of world's maize, 14% of world wheat

Text box: Arif Husain; photo of Husain; text box: quote by Husain

1:03

Map with Russia and Ukraine highlighted

Timeline of maize

1:50

Text box: Cultivation of maize; text box: Maize Grows Humanity; transition music; text box: John Arthur; text box: Teosinte to the Columbian Exchange

Photo of teosinte; illustrations of people planting teosinte

Photos of stonework

A thousand years ago, a conflict in Eastern Europe would not have affected the family living in the Arabian Peninsula. Today, a war in Ukraine means tens of thousands of people in Yemen face starvation.

How did we get here? How did our global systems of food production become so complex and intertwined that one war in one place threatens the entire global food system? For starters, Ukraine and Russia together produce 12 percent of global calories. Ukraine alone produces 16 percent of global maize exports and 14 percent of our wheat.

According to Arif Husain, the chief economist for the United Nations' World Food Program, Ukraine is a country of 40 million people, but they produce food for 400 million.

As sanctions fall on Russia and Russian tanks roll across Ukraine, shortages of other crops and fertilizers from the two countries threatens farming and livestock in places as far away as Brazil and Texas.

Feeding ourselves has never been so complex. Thanks to globalization, the food we eat often comes from, or is dependent on, far away places. The webs of finance and shipping that connect our global food system are incredibly complex. Unfortunately, the more complex the system gets, the more fragile it becomes. All this complexity might seem very recent, but it's the product of a long history of how humans learn to feed themselves

To understand that history, and to search for answers to the challenges we face today and will encounter tomorrow, let's explore the big history of one of the world's most important grains: maize. For over 10,000 years, maize has been a key factor in our population growth. Everywhere it spread, it brought new levels of complexity to human societies.

This odd looking grass is called teosinte, also known as the Mother of Corn. About 10,000 years ago, people living in Southern Mexico gradually began developing this crop, artificially selecting certain properties that would eventually lead to the cultivation of maize as we know it today.

As these Mesoamerican communities moved and interacted with others, they formed networks of exchange that slowly spread domesticated maize across South and North America.

2:47

Animated world map

Over the course of thousands of years, Indigenous societies adapted the plant to suit their environments, selecting varieties that could grow in wetter or drier conditions or at higher altitudes. In every society it touched, maize transformed the ways that people lived and the food they ate, sparking agricultural revolutions from Argentina to Canada.

Photos of pottery; photos of Native American civilizations

As people stored, distributed, and traded goods, they transformed into more complex societies with huge cities, complex belief systems, monumental architecture, and new social complexity. But that complexity meant that, in some ways, societies grew more fragile, as well. A climate shift or drought could cause large agricultural societies to collapse, sending thousands into crisis and famine.

3:39

Clip of ships sailing; illustrations and photos of the Native American Empires

Foraging societies, however, could more easily relocate and continue to feed their much smaller populations. When Europeans arrived in the Americas in the late 15th century, they encountered advanced empires and extensive trade networks, mostly thanks to maize. These societies and networks were devastated by the arrival of the conquerors and the diseases they carried.

Clip of ruins

Tens of millions of Indigenous Americans died over the next century. Many communities lost up to 95 percent of their people in this tragedy, yet maize remained, and soon it left the Americas and transformed the world yet again.

World map depicting the Columbian Exchange

In a global process known as the Columbian Exchange, Europeans transported maize across oceans where new societies adopted and adapted the crop to suit their needs.

4:33

World map depicting maize growth

One of the keys to its spread was maize's incredible adaptability. It thrived in the warmer climates of Southern Europe, Western Africa, and Southern Asia.

Drawings of enslaved people and slave ships

In the 16th century, maize became a staple crop in the rain forests of Africa's interior. This new source of food sparked a population boom just as the Transatlantic Slave Trade decimated many African communities by enslaving 12 million Africans to work on American plantations. The environmental historian, Alfred Crosby, suggested that the cultivation of maize in West and Central Africa is what allowed the Slave Trade to continue as long as it did.

5:17

World map

That's a big claim. If it's true, then the whole of the American plantation system, which fueled the Industrial Revolution and European colonial expansion, depended on maize grown in Africa.

Text box with quote: China's population...

Maize also grows in dry and mountainous regions such as Western and North and China, where wheat and rice could not. The introduction of maize to China transformed the region: China's population quadrupled between the 17th and 19th centuries thanks to maize. In the province of Sichuan alone, the population rose from 9 million to 24 million as maize increased the available farmland by 60 percent.

As maize spread to new places, millions of people began to rely on it, which generated complex, new relationships.

6:07

Text box: Maize and the Global Economy of Today; transitional music; world map; text box: Top 30 producing countries

Text box: 1.2 billion tons of maize; text boxes: 10 percent of the corn we grow for food, 45 percent for livestock

7:02

Photos of goods produced by corn

Graphs showing effects of sanctions on Russia

7:54

Text box: Fragility and Promise: Maize Tomorrow; transition music

Genetically modified corn

8:48

Clips and photos of corn growing; clip of an industrialized farm; photo of gas pump

However, the new connections in larger systems meant that a change in one place, like poor harvest due to a drought, could affect millions living in other places. Maize is a key ingredient of complexity in the human past, but it continues to add complexity to our world today. We grow more maize than any other grain and we grow it everywhere. Of the top 30 corn producing nations in the world, only six are in the Americas and 11 are in Africa.

In 2021, humanity grew 1.2 billion tons of maize globally. That number is expected to increase. Why? Because there's corn in everything. Of course we use it for food, but in the world's largest maize grower, the United States, we only use about 10 percent of the corn we grow for food.

About 45 percent we feed the livestock and corn is also used in biofuels and ethanol fuel, it's used to make batteries, bourbon, diapers, cough syrup, matches, textiles, adhesives and all sorts of plastics.

As the inclusion of maize and varied products has increased in complexity, so has its fragility. Therefore, if there is a disruption in the supply of maize, dozens of industries in hundreds of countries would falter, for example: while maize is an adaptable crop that grows in different environments, fertilizers are a necessary ingredient that help maize to grow and thrive.

Sanctions on Russia and its neighbor, Belarus, two of the main exporters of fertilizers, due to the invasion of Ukraine, are making farmers around the world very nervous, especially as the planting season looms closer.

Fertilizer prices were already at record highs before the war, but now those prices are expected to grow even higher and last for many more months.

Maize has inserted itself into every facet of our lives. Any vision of the human future will involve maize. As we seek to build more resilient systems, maize offers many solutions and challenges: it can grow in many environments, it is nearly unrivaled in the amount of calories it can produce per acre. As our populations grow and our climates change, maize will continue to be a key ingredient in feeding our species.

Scientists have genetically modified corn varieties to be more drought tolerant, so as droughts become more prevalent in some regions of the world, maize might prevent climate change-induced famine.

On the other hand, corn is not immune from a variety of diseases and pests that can affect the crop at various stages of the planting and growing process. As climate change results in more stress on the environment, corn could be negatively impacted. In addition, the production and processing of maize, especially into high ethanol gasoline, emits a lot of carbon into our atmosphere, which increases the effects of climate change.

Our food systems today are incredibly complex and fragile, and corn is a big part of the long history that brought us here. The decisions we make today about how we grow and use corn will be crucial to our future as a species as we strive to feed ourselves and save our world from crises of war, disease, and climate change.

Photos of current events

Few plants have shaped human history as maize has.

*Photo of corn; text box
with quote*

In the words of anthropologist Michael Blake, "By being genetically flexible, maize has persuaded humans to move its seed around the globe faster and farther than any other plant in history... our global human economy depends on it just as it depends on us. Humans grow maize, and maize grows humans."



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