**Green Revolution** usually refers to the transformation of agriculture that began in 1945. One significant factor in this revolution was the Mexican government's request to establish an agricultural research station to develop more varieties of wheat that could be used to feed the rapidly growing population of the country.

In 1943, Mexico imported half its wheat, but by 1956, the Green Revolution had made Mexico self-sufficient; by 1964, Mexico exported half a million tons of wheat.[1] The associated transformation has continued as the result of programs of agricultural research, extension, and infrastructural development. These programs were instigated and largely funded by the Rockefeller Foundation, along with the Ford Foundation and among other major agencies.[2][3]

The Green Revolution allowed food production to keep pace with worldwide population growth, in turn causing human population to increase.[*citation needed*] The Green Revolution has had major social and ecological impacts, making it a popular topic of study among sociologists.[*citation needed*]

The term "Green Revolution" was first used in 1968 by former USAID director William Gaud, who noted the spread of the new technologies and said,

These and other developments in the field of agriculture contain the makings of a new revolution. It is not a violent Red Revolution like that of the Soviets, nor is it a White Revolution like that of the Shah of Iran. I call it the Green Revolution."[4]

# Contents

[hide]

# [edit] History

### *[edit] Indian success*

Main article: Green Revolution in India

With the experience of agricultural development begun in Mexico by Norman Borlaug in 1943 judged as a success, the Rockefeller Foundation sought to spread it to other nations. The Office of Special Studies in Mexico became an informal international research institution in 1959, and in 1963 it formally became CIMMYT, The International Maize and Wheat Improvement Center.

In 1961 India was on the brink of mass famine[5]. Borlaug was invited to India by the adviser to the Indian minister of agriculture M. S. Swaminathan. Despite bureaucratic hurdles imposed by India's grain monopolies, the Ford Foundation and Indian government collaborated to import wheat seed from CIMMYT. Punjab was selected by the Indian government to be the first site to try the new crops because of its reliable water supply and a history of agricultural success. India began its own Green Revolution program of plant breeding, irrigation development, and financing of agrochemicals.[6]

India soon adopted IR8 - a semi-dwarf rice variety developed by the International Rice Research Institute (IRRI) that could produce more grains of rice per plant when grown with certain fertilizers and irrigation. In 1968, Indian agronomist S.K. De Datta published his findings that IR8 rice yielded about 5 tons per hectare with no fertilizer, and almost 10 tons per hectare under optimal conditions. This was 10 times the yield of traditional rice.[7] IR8 was a success throughout Asia, and dubbed the "Miracle Rice". IR8 was also developed into Semi-dwarf IR36.

In the 1960s, rice yields in India were about two tons per hectare; by the mid-1990s, they had risen to six tons per hectare. In the 1970s, rice cost about $550 a ton; in 2001, it cost under $200 a ton.[8] India became one of the world's most successful rice producers, and is now a major rice exporter, shipping nearly 4.5 million tons in 2006.[9]

### *[edit] IR8 and the Philippines*

In 1960, the Government of the Republic of the Philippines with Ford and Rockefeller Foundations established IRRI (International Rice Research Institute). A rice crossing between Dee-geo-woo-gen and Peta was done at IRRI in 1962. In 1966, one of the breeding lines became a new cultivar, IR8.[10] IR8 required the use of fertilizers and pesticides, but produced substantially higher yields than the traditional cultivars. Annual rice production in the Philippines increased from 3.7 to 7.7 million tonnes in two decades.[11] The switch to IR8 rice made the Philippines a rice exporter for the first time in the 20th century.[12] But the heavy pesticide use reduced the number of fish and frog species found in rice paddies.[*citation needed*]

### *[edit] CGIAR*

In 1970, foundation officials proposed a worldwide network of agricultural research centers under a permanent secretariat. This was further supported and developed by the World Bank; on May 19, 1971, the Consultative Group on International Agricultural Research was established, co-sponsored by the FAO, IFAD and UNDP. CGIAR, has added many research centers throughout the world.

CGIAR has responded, at least in part, to criticisms of Green Revolution methodologies. This began in the 1980s, and mainly was a result of pressure from donor organizations.[13] Methods like Agroecosystem Analysis and Farming System Research have been adopted to gain a more holistic view of agriculture. Methods like Rapid Rural Appraisal and Participatory Rural Appraisal have been adopted to help scientists understand the problems faced by farmers and even give farmers a role in the development process.

### *[edit] Problems in Africa*

There have been numerous attempts to introduce the successful concepts from the Mexican and Indian projects into Africa. These programs have generally been less successful, for a number of reasons. Reasons cited include widespread corruption, insecurity, a lack of infrastructure, and a general lack of will on the part of the governments. Yet environmental factors, such as the availability of water for irrigation, the high diversity in slope and soil types in one given area are also reasons why the Green Revolution is not so successful in Africa[14].

A recent program in western Africa is attempting to introduce a new high-yield variety of rice known as "New Rice for Africa"(NERICA). NERICAs yield about 30% more rice under normal conditions, and can double yields with small amounts of fertilizer and very basic irrigation. However the program has been beset by problems getting the rice into the hands of farmers, and to date the only success has been in Guinea where it currently accounts for 16% of rice cultivation.[15]

# [edit] Agricultural production and food security

## [edit] Technologies

The projects within the Green Revolution spread technologies that had already existed, but had not been widely used outside industrialized nations. These technologies included pesticides, irrigation projects, synthetic nitrogen fertilizer and improved crop varieties developed through the conventional, science-based methods available at the time.

The novel technological development of the Green Revolution was the production of novel wheat cultivars. Agronomists bred cultivars of maize, wheat, and rice that are generally referred to as HYVs or "high-yielding varieties". HYVs have higher nitrogen-absorbing potential than other varieties. Since cereals that absorbed extra nitrogen would typically lodge, or fall over before harvest, semi-dwarfing genes were bred into their genomes. A Japanese dwarf wheat cultivar (Norin 10 wheat), which was sent to Washington, D.C. by Cecil Salmon, was instrumental in developing Green Revolution wheat cultivars. IR8, the first widely implemented HYV rice to be developed by IRRI, was created through a cross between an Indonesian variety named "Peta" and a Chinese variety named "Dee-geo-woo-gen."

With advances in molecular genetics, the mutant genes responsible for Arabidopsis genes (GA 20-oxidase,[16] *ga1*,[17] *ga1-3*[18]), wheat reduced-height genes (*Rht*)[19] and a rice semidwarf gene (*sd1*)[20] were cloned. These were identified as gibberellin biosynthesis genes or cellular signaling component genes. Stem growth in the mutant background is significantly reduced leading to the dwarf phenotype. Photosynthetic investment in the stem is reduced dramatically as the shorter plants are inherently more stable mechanically. Assimilates become redirected to grain production, amplifying in particular the effect of chemical fertilizers on commercial yield.

HYVs significantly outperform traditional varieties in the presence of adequate irrigation, pesticides, and fertilizers. In the absence of these inputs, traditional varieties may outperform HYVs.

## [edit] Production increases

Cereal production more than doubled in developing nations between the years 1961 – 1985.[21] Yields of rice, maize, and wheat increased steadily during that period.[21] The production increases can be attributed roughly equally to irrigation, fertilizer, and seed development, at least in the case of Asian rice.[21]

While agricultural output increased as a result of the Green Revolution, the energy input to produce a crop has increased faster,[22] so that the ratio of crops produced to energy input has decreased over time. Green Revolution techniques also heavily rely on chemical fertilizers, pesticides and herbicides, some of which must be developed from fossil fuels, making agriculture increasingly reliant on petroleum products.[23] Proponents of the Peak Oil theory fear that a future decline in oil and gas production would lead to a decline in food production or even a Malthusian catastrophe.[24]

## [edit] Effects on food security

Main article: Food security

The effects of the Green Revolution on global food security are difficult to understand because of the complexities involved in food systems.

The world population has grown by about four billion since the beginning of the Green Revolution and many believe that, without the Revolution, there would have been greater famine and malnutrition. India saw annual wheat production rise from 10 million tons in the 1960s to 73 million in 2006.[25] The average person in the developing world consumes roughly 25% more calories per day now than before the Green Revolution.[21] Between 1950 and 1984, as the Green Revolution transformed agriculture around the globe, world grain production increased by over 250%[26]

The production increases fostered by the Green Revolution are widely credited with having helped to avoid widespread famine, and for feeding billions of people.[27]

There are several claims about how the Green Revolution may have decreased food security for some people. One claim involves the shift of subsistence-oriented cropland to cropland oriented towards production of grain for export or animal feed. For example, the Green Revolution replaced much of the land used for pulses that fed Indian peasants for wheat, which did not make up a large portion of the peasant diet.[28]

# [edit] Criticisms

## [edit] Food security

### *[edit] Malthusian criticism*

Some criticisms generally involve some variation of the Malthusian principle of population. Such concerns often revolve around the idea that the Green Revolution is unsustainable,[29][30][31] and argue that humanity is now in a state of overpopulation with regards to the sustainable carrying capacity of Earth.

Malthusian predictions have frequently failed to materialize. In 1798 Thomas Malthus made his prediction of impending famine.[32] The world's population had doubled by 1923 and doubled again by 1973 without fulfilling Malthus' prediction. Malthusian Paul R. Ehrlich, in his 1968 book *The Population Bomb*, said that India would never feed itself and claimed that "India couldn't possibly feed two hundred million more people by 1980" and "Hundreds of millions of people will starve to death in spite of any crash programs."[32] Ehrlich's predictions failed to materialize when India became self-sustaining in cereal production in 1974 (six years later) as a result of the introduction of Norman Borlaug's dwarf wheat varieties.[32]

### *[edit] Is food production related to famine?*

To some modern Western sociologists and writers, increasing food production is not synonymous with increasing food security, and is only part of a larger equation. For example, Harvard professor Amartya Sen claimed large historic famines were not caused by decreases in food supply, but by socioeconomic dynamics and a failure of public action.[33]. However, economist Peter Bowbrcik refutes that Sen's theory is incorrect as Sen relies on inconsistent arguments, and contradicting available information, including sources that Sen himself cited.[34] Bowbrick further argues that Sen's views coincide with that of the Bengal government at the time of the Bengal famine of 1943 and the policies Sen advocates failed to relieve the famine.[34]

### *[edit] Quality of diet*

Some have challenged the value of the increased food production of Green Revolution agriculture. Miguel A. Altieri, (a pioneer of agroecology and peasant-advocate), writes that the comparison between traditional systems of agriculture and Green Revolution agriculture has been unfair, because Green Revolution agriculture produces monocultures of cereal grains, while traditional agriculture usually incorporates polycultures.[35]

These monoculture crops are often used for export, feed for animals, or conversion into biofuel. According to Emile Frison of Biodiversity International, the Green Revolution has also lead to a change in dietary habits, as less people are affected by hunger and die from starvation, but many are affected by malnutrition such as iron or vitamin-A deficiencies.[14] Frison further asserts that almost 60% of yearly deaths of children under age five in developing countries are related to malnutrition.[14]

High-yield rice (HYR), introduced since 1964 to poverty-ridden Asian countries, (such as the Philippines), was found to have inferior flavor and be more glutinous and less savory than

their native varieties[citation needed]. This caused its price to be lower than the average market value.[36]

The introduction of pesticides to rice production poisoned and killed off fish and weedy green vegetables that traditionally coexisted in rice paddies. These were nutritious food sources for Filipino farmers prior to the introduction of pesticides, further impacting the diets of locals.[citation needed].

### *[edit] Political impacts*

The Green Revolution is unpopular among many leftists[citation needed] because of its context within the Cold War. A major critic[citation needed] of the Green Revolution, U.S. investigative journalist Mark Dowie, writes[citation needed]:

The primary objective of the program was geopolitical: to provide food for the populace in underdeveloped countries and so bring social stability and weaken the fomenting of communist insurgency.

Citing internal Foundation documents, Dowie states that the Ford Foundation had a greater concern than Rockefeller in this area.[37]

There is significant evidence that the Green Revolution weakened socialist movements in many nations. In countries such as India, Mexico, and the Philippines, *technological solutions* were sought as an alternative to expanding *agrarian reform* initiatives, the latter of which were often linked to socialist politics.[38]

### *[edit] Socioeconomic impacts*

The transition from traditional agriculture, in which inputs were generated on-farm, to Green Revolution agriculture, which required the purchase of inputs, led to the widespread establishment of rural credit institutions. Smaller farmers often went into debt, which in many cases results in a loss of their farmland.[13][39] The increased level of mechanization on larger farms made possible by the Green Revolution removed a large source of employment from the rural economy.[13] Because wealthier farmers had better access to credit and land, the Green Revolution increased class disparities. Because some regions were able to adopt Green Revolution agriculture more readily than others (for political or geographical reasons), interregional economic disparities increased as well. Many small farmers are hurt by the dropping prices resulting from increased production overall.[citation needed]

The new economic difficulties of small holder farmers and landless farm workers led to increased rural-urban migration. The increase in food production led to a cheaper food for urban dwellers, and the increase in urban population increased the potential for industrialization.[citation needed]

### *[edit] Globalization*

In the most basic sense, the Green Revolution was a product of globalization as evidenced in the creation of international agricultural research centers that shared information, and with transnational funding from groups like the Rockefeller Foundation, Ford Foundation, and United States Agency for International Development (USAID). Additionally, the inputs required in Green Revolution agriculture created new markets for seed and chemical

corporations, many of which were based in the United States. For example, Standard Oil of New Jersey established hundreds of distributors in the Philippines to sell agricultural packages composed of HYV seed, fertilizer, and pesticides.

## [edit] Environmental impacts

### *[edit] Pesticides*

Main article: Green revolution and cancer

Green Revolution agriculture relies on extensive use of pesticides, which are necessary to limit the high levels of pest damage that inevitably occur in monocropping - the practice of producing or growing one single crop over a wide area.

### *[edit] Water*

Industrialized agriculture with its high yield varieties are extremely water intensive. In the US, agriculture consumes 85% of all fresh water resources. For example, the Southwest uses 36% of the nations water while at the same time only receiving 6% of the country's rainfall.[*citation needed*] Only 60% of the water used for irrigation comes from surface water supplies. The other 40% comes from underground aquifers that are being used up in a way similar to topsoil that makes the aquifers,[*citation needed*] as Pfeiffer says, "for all intents and purposes non renewable resources."[*citation needed*] The Ogallala Aquifer is essential to a huge portion of central and southwest plain states, but has been at annual overdrafts of 130-160% in excess of replacement. This irrigation source for America's bread basket will become entirely unproductive in another 30 years or so.[*citation needed*]

Likewise, rivers are drying up at an alarming rate. In 1997, the lower parts of China's Yellow River were dry for a record 226 days. Over the past ten years, it has gone dry an average of 70 days a year.[*citation needed*] Famous lifelines such as the Nile and Ganges along with countless other rivers are sharing in the same fate.[*citation needed*] The Aral Sea has lost half its area and two-thirds its volume due to river diversion for cotton production.

Also the water quality is being compromised. In the Aral Sea, water salinization has wiped out all native fish, leaving an economy even more dependent on the agricultural model that originated the problem.[*citation needed*]

Fish are disappearing through another form of agricultural run off as well.[*citation needed*] When nitrogen-intensive fertilizers wash into waterways it results in an explosion of algae and other microorganisms that lead to oxygen depletion resulting in "dead zones", killing off fish and other creatures.[*citation needed*]

### *[edit] Biodiversity*

The spread of Green Revolution agriculture affected both agricultural biodiversity and wild biodiversity[*citation needed*]. There is little disagreement[*citation needed*] that the Green Revolution acted to reduce agricultural biodiversity, as it relied on just a few high-yield varieties of each crop.

This has led to concerns about the susceptibility of a food supply to pathogens that cannot be controlled by agrochemicals, as well as the permanent loss of many valuable genetic traits bred into traditional varieties over thousands of years. To address these concerns, massive

seed banks such as Consultative Group on International Agricultural Research's (CGIAR) International Plant Genetic Resources Institute (now Bioversity International) have been established (see Svalbard Global Seed Vault).

There are varying opinions about the effect of the Green Revolution on wild biodiversity. One hypothesis speculates that by increasing production per unit of land area, agriculture will not need to expand into new, uncultivated areas to feed a growing human population[*citation needed*]. A counter-hypothesis speculates that biodiversity was sacrificed because traditional systems of agriculture that were displaced sometimes incorporated practices to preserve wild biodiversity, and because the Green Revolution expanded agricultural development into new areas where it was once unprofitable or too arid.[*citation needed*]

Nevertheless, the world community has clearly acknowledged the negative aspects of agricultural expansion as the 1992 Rio Treaty, signed by 189 nations, has generated numerous national Biodiversity Action Plans which assign significant biodiversity loss to agriculture's expansion into new domains[*citation needed*].

## [edit] Norman Borlaug's reply to alternative interpretations of the Green Revolution

Norman Borlaug has dismissed certain claims of critics, but does take other concerns seriously. He states that his work has been:

"a change in the right direction, but it has not transformed the world into a Utopia [40].

Of environmental lobbyists he has stated:

"some of the environmental lobbyists of the Western nations are the salt of the earth, but many of them are elitists. They've never experienced the physical sensation of hunger. They do their lobbying from comfortable office suites in Washington or Brussels. If they lived just one month amid the misery of the developing world, as I have for fifty years, they'd be crying out for tractors and fertilizer and irrigation canals and be outraged that fashionable elitists back home were trying to deny them these things".[41]

## [edit] See also

- Food security
- Genetic pollution
- Green revolution and cancer
- British Agricultural Revolution
- Neolithic Revolution

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Categories: Industrial agriculture | International development | Rockefeller Foundation | Revolutions

Als **Grüne Revolution** wird die in den späten 1950er Jahren begonnene Entwicklung moderner landwirtschaftlicher Hochleistungssorten und deren erfolgreiche Verbreitung in Entwicklungsländern bezeichnet.

## Geschichte [Bearbeiten]

Moderne Reis- und Weizensorten (Hochleistungssorten) mit größerem Korn-Stroh-Verhältnis und besserer Verwertung von Dünger wurden Mitte der 1960er Jahre von Wissenschaftlern (u.a. Norman Ernest Borlaug) gezüchtet und dann an Bauern in Lateinamerika und Asien weitergegeben. Diese Sorten setzten sich in tropischen und subtropischen Regionen mit guten Bewässerungssystemen oder verlässlichem Niederschlag sehr schnell durch. Die Sorten wurden anfangs von zwei internationalen landwirtschaftlichen Forschungszentren, dem International Center for Wheat and Maize Improvement in Mexiko (CIMMYT) sowie dem International Rice Research Institute auf den Philippinen (IRRI) produziert. Heute gibt es insgesamt 16 dieser internationalen Forschungszentren, die der Consultative Group on International Agricultural Research (CGIAR) unterstehen.[1]

In den darauffolgenden Jahrzehnten wurden mit steigenden Raten weitere Hochleistungssorten entwickelt und weiter verbreitet, auch in zuvor vernachlässigten Regionen wie dem Nahen Osten, Nordafrika und Subsahara-Afrika. Bis zum Jahr 2000 wurden durch über 400 öffentliche Forschungsprogramme in über 100 Ländern ca. 8000 Sorten zugelassen, für Reis, Weizen, Mais, Sorghumhirsen, Perlhirse, Gerste, Bohnen, Linsen, Erdnüsse, Kartoffeln und Maniok.[1]

## Folgen [Bearbeiten]

Die Grüne Revolution hat die landwirtschaftlichen Erträge erhöht, wovon Bauern und Konsumenten weltweit profitierten. Es wird geschätzt, dass die Grüne Revolution die Mangelernährungs- und Kindersterblichkeitsraten signifikant gesenkt hat. Ohne die Grüne Revolution würden sich für Entwicklungsländern heute um 22% niedrigere Erträge, um 29% höhere Nahrungsmittelimporte, um 14% niedrigerer Pro-Kopf-Kalorienkonsum, sowie zusätzliche 187 Millionen hungernde Menschen ergeben.[1]

Ohne die grüne Revolution wäre die landwirtschaftliche Nutzfläche in Entwicklungsländern um schätzungsweise 3-5% höher als sie heute ist.[1]

Kritiker weisen auf umweltschädigende Folgen der Grünen Revolution durch die Intensivierung des Anbaus hin, z.B. Bodendegradierung (z.B. durch Versalzung), chemische Verunreinigung und stärkere Beanspruchung von Grundwasserleitern, welche auftraten, obwohl die Forschungszentren neben der Bekämpfung von Armut und Hunger auch zum Ziel hatten, umweltfreundliche Anbaumethoden zu entwickeln und verbreiten.[1]

## Einzelnachweise [Bearbeiten]


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he **Consultative Group on International Agricultural Research** (CGIAR) was originally created at the initiative of the Rockefeller Foundation, which had sponsored international

meetings of agronomists at its *Bellagio Conference Center* in Lake Como, Italy, from 1968 onwards.

In 1970, foundation officials proposed a worldwide network of agricultural research centers under a permanent secretariat. This was further supported and developed by the World Bank; on May 19, 1971, with the FAO, IFAD and UNDP as co-sponsors, the CGIAR was established. By 1983 there were thirteen research centers around the world under its umbrella.[1] CGIAR now has 64 governmental and nongovernmental members and 15 research centres.

At the time of its establishment there was widespread concern that developing countries would succumb to famine; the successes of the Green Revolution had started in Asia and the Pearson Commission on International Development had urged that the international community undertake "intensive international effort" to support "research specializing in food supplies and tropical agriculture". CGIAR was formed for the coordination of international agricultural research with the goals of poverty reduction and achieving food security in developing countries through agricultural research.

| Active CGIAR Centres | Headquarters location |
|---|---|
| International Center for Tropical Agriculture (CIAT) | Cali, Colombia |
| Center for International Forestry Research (CIFOR) | Bogor, Indonesia |
| International Maize and Wheat Improvement Center (CIMMYT) | El Batán, Mexico State, Mexico |
| International Potato Center (CIP) | Lima, Peru |
| International Center for Agricultural Research in the Dry Areas (ICARDA) | Aleppo, Syria |
| WorldFish Center (International Center for Living Aquatic Resources Management, ICLARM) | Penang, Malaysia |
| World Agroforestry Centre (International Centre for Research in Agroforestry, ICRAF) | Nairobi, Kenya |
| International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) | Hyderabad, India |
| International Food Policy Research Institute (IFPRI) | Washington, D.C., United States |
| International Water Management Institute (IWMI) | Battaramulla, Sri Lanka |
| International Institute of Tropical Agriculture (IITA) | Ibadan, Nigeria |
| International Livestock Research Institute (ILRI) | Nairobi, Kenya |
| Bioversity International | Maccarese, Rome, Italy |
| International Rice Research Institute (IRRI) | Los Baños, Laguna, Philippines |
| Africa Rice Center (West Africa Rice Development Association, WARDA) | Bouaké, Côte d'Ivoire / Cotonou, Benin |

| Defunct CGIAR Centres | Headquarters | Change |
|---|---|---|
| International Livestock Centre for Africa (ILCA) | Addis Ababa, Ethiopia | 1994: merged with ILRAD to become ILRI |
| International Laboratory for Research on Animal Diseases (ILRAD) | Nairobi, Kenya | 1994: merged with ILCA to become ILRI |
| International Network for the Improvement of Banana and Plantain (INIBAP) | Montpellier, France | 1994: became a programme of Bioversity International |
| International Service for National Agricultural Research (ISNAR) | The Hague, Netherlands | 2004: dissolved, main programmes moved to IFPRI |

CGIAR also organises a number of inter-Center initiatives and Systemwide Programmes (SP), and Challenge Programmes (CP). The Initiatives and SPs cover cross-Center issues. The CPs are time-bound, independently-governed programs of high-impact research, executed in a partnership among a wide range of institutions. Currently there are three in operation: the Generation Challenge Programme, Harvest Plus and Water and Food.

## [edit] Notes

1. ^ Establishment of CGIAR - see Mark Dowie, *American Foundations: An Investigative History*, Cambridge, Massachusetts: MIT Press, 2001, (p.114)

## [edit] External links

- CGIAR
- Generation Challenge Programme
- HarvestPlus Challenge Programme
- CGIAR Challenge Program on Water and Food
- Institutional Learning and Change (ILAC)
- Central Advisory Service on Intellectual Property
- ICT-KM: the CGIAR program on ICT and Knowledge Management
- CGIAR Systemwide Program on Collective Action and Property Rights (CAPRi)

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**Consultative Group on International Agricultural Research (CGIAR) Centers**

International Center for Tropical Agriculture (CIAT) · Center for International Forestry Research (CIFOR) · International Maize and Wheat Improvement Center (CIMMYT) · International Potato Center (CIP) · International Center for Agricultural Research in the Dry Areas (ICARDA) · International Center for Living Aquatic Resources Management (ICLARM) · International Centre for Research in Agroforestry (ICRAF) · International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) · International Food Policy Research Institute (IFPRI) · International Water Management Institute (IWMI) · International Institute of Tropical Agriculture (IITA) · International Livestock Research Institute (ILRI) · Bioversity International · International Rice Research Institute (IRRI) · West Africa Rice Development Association (WARDA)

Categories: Agriculture organizations | Rockefeller Foundation | World Bank | Agricultural research institutes

# International Maize and Wheat Improvement Center

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### International Maize and Wheat Improvement Center

***Centro Internacional de Mejoramiento de Maíz y Trigo, CIMMYT***


Front gates of CIMMYT in El Batán. Maize test fields seen far-center.

| | |
|---|---|
| **Formation** | 1943 [1] |
| **Type** | Non-profit research and training center [1] |
| **Purpose/focus** | To develop improved varieties of wheat and maize. [1] |
| **Location** | El Batán, Edo Mex, Mexico |
| **Parent organization** | Consultative Group on International Agricultural Research (CGIAR) |
| **Staff** | 100 specialized research staff and 500 support staff from about 40 countries. [1] |
| **Website** | cimmyt.org |

The **International Maize and Wheat Improvement Center** (in Spanish: ***Centro Internacional de Mejoramiento de Maíz y Trigo, CIMMYT***) is a non-profit research and training institution dedicated to both the development of improved varieties of wheat and

maize, and introducing improved agricultural practices to farmers, thereby improving their livelihoods.[1] It is also one of the 15 non-profit, research and training institutions affiliated with the Consultative Group on International Agricultural Research (CGIAR).[1]

## Contents

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## [edit] Origins

The first step toward the creation of CIMMYT were taken in 1943 when cooperative efforts of the Mexican government and the Rockefeller Foundation led to the founding of the Office of Special Studies, an organization within the Mexican Secretariat of Agriculture. The office's goal was to ensure food security in Mexico and abroad through select plant breeding and crop improvement.

The project developed into a collaboration with Mexican and international researchers. It established global networks to test experimental crop varieties. One of its researchers, Norman Borlaug, developed shorter wheat varieties that put more energy into grain production and responded better to fertilizer than older varieties. With improvements such as this, Mexico became self-sufficient in wheat production by the late 1950s, its success attracting worldwide attention. The program was renamed and morphed into CIMMYT in 1963, though it was still under the Secretariat of Agriculture's jurisdiction. As international demand grew and it became apparent CIMMYT required internal organization and increased funding, the center was reorganized and established as a non-profit scientific and educational institution in its own right in 1966.

The success inspired project researchers to become passionate advocates for the Mexican innovation model in other countries. In 1966, having survived one poor harvest but facing another, India took the extraordinary step of importing 18,000 tons of wheat seed from Mexico. The first evidence of success was the Indian wheat harvest of 16.5 million tons in 1968, compared with 11.3 million tons in 1967. Pakistan also began importing Mexican wheat seeds. These two countries doubled their wheat production between 1966 and 1971. The Green Revolution — which had by now extended to rice as well — had begun. The social and economic achievements of this movement were recognized worldwide when the Nobel Peace Prize was awarded to Norman Borlaug in 1970.

The following year, a small cadre of development organizations, national sponsors, and private foundations organized the Consultative Group on International Agricultural Research (CGIAR) to further spread the impact of agricultural research to more nations. CIMMYT

became one of the first international research centers to be supported through the CGIAR. Today, the CGIAR comprises 15 such centers, all dedicated to sustainable food security through scientific research.

Despite the first positive effects of the Green Revolution in Mexico in the fifties and sixties, the country returned to be increasingly dependent on imported wheat and maize from the mid seventies on, mainly from the United States. According to the last available data (2006) Mexico now imports around 60% of its total domestic maize consumption [2].

# [edit] World Hunger, Poverty and how CIMMYT programs and units

## [edit] Global Wheat Program

Wheat is the number two staple crop in the developing world, supplies 21% of the world's food, and from the humid lowlands of northern Mexico to the dry plains of Kazakhstan, is sown on more than 200 million hectares of farmland worldwide. While many wheat farmers grow their crops on relatively large farms, others own little land and have few resources, especially in the eastern Indo-Gangetic Plains of India, Bangladesh, and Nepal. In addition, a rising demand for products like bread and chapatti in developing countries has increased alongside a rising population and urbanization rate, putting strain on the environment. CIMMYT works to ensure these farm families of the developing world who depend on wheat for their livelihoods have the best research support behind them.

## [edit] Global Maize Program

Maize is the most important cereal crop for food in sub-Saharan Africa and Latin America, and a key feed crop in Asia. However, climate change and degraded soils threaten the food security of millions, especially in sub-Saharan African. Lack of access to seed and other inputs, underdeveloped markets, and low investment in research and extension worsen farmers' marginalization in low-income countries. CIMMYT's Global Maize Program faces these challenges in the following ways:

- Uses maize genetic resources to provide diverse, high-yielding varieties that withstand drought, infertile soils, insect pests, and diseases.
- Conducts crop and natural resource management research to help farmers exploit the full potential of improved seed and to preserve and enhance soil and water resources.
- Explores new market opportunities for smallholder farmers.
- Works with a range of partners to generate and share knowledge and techniques, ensuring that research results reach farmers' fields and make a difference.
- Offers a rich assortment of training opportunities in maize breeding and crop management research (in-service courses, visiting scientist appointments, pre- and post-doctoral fellowships, among others).

## [edit] Genetic Resources and Enhancement Unit

The Genetic Resources and Enhancement Unit (GREU) is support unit that holds the maize and wheat collections of CIMMYT in trust for humanity under UN-FAO agreements. The program works on genetic traits that are identified as priorities by the eco-regional programs, such as drought tolerance. GREU units include theCrop research informatics lab (CRIL),the

Germplasm bank, the Applied biotechnology center, theSeed inspection and distribution unit, and the Seed health lab.

Specific GREU activities include:

- Collect and conserve maize and wheat genetic resources, including wild relatives, cytogenetic stocks and genetic populations, and molecular materials.
- Study the on-farm management of maize and wheat genetic diversity and support of farmers who grow landraces.
- Characterize genetic resources to identify useful diversity and make it available to breeders and other researchers in usable forms.
- Develop and provide new technologies to facilitate breeding.
- Develop germplasm with new genes for desirable traits through conventional and molecular technologies.
- Fingerprint maize and wheat germplasm.
- Conduct research on applications of genomics.
- Assemble, manage, and make available to diverse partners information on maize and wheat genetic resources, in particular linking data from genomics research to pedigrees, trial results, and agronomic and socioeconomic data.
- Conduct food safety and toxicology studies.
- Manage intellectual property associated with germplasm.
- Assess the economic value of genetic resources and analyze policies relating to genetic resources and diversity.

# [edit] Regional locations and donors

CIMMYT has offices in 14 different countries including Afghanistan, Bangladesh, China, Colombia, Ethiopia, Georgia, India, Iran, Kazakhstan, Kenya, Nepal, Turkey, Zimbabwe, and Mexico.

Main donors include the World Bank, the Rockefeller Foundation, the European Commission and the national governments of the United States, Switzerland, Japan and Mexico.[1]

# [edit] See also

- Green revolution

# [edit] References


1. ^ *a b c d e f g* "About Us". Centro Internacional de Mejoramiento de Maíz y Trigo. http://www.cimmyt.org/english/wps/about/index.htm. Retrieved 2008-10-11.
2. ^ faostat.fao.org


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