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## Maize

Maize (*Zea mays* L.), or corn, is the most important cereal crop in sub-Saharan Africa and, with rice and wheat, one of the three most important cereal crops in the world. Maize is high yielding, easy to process, readily digested, and costs less than other cereals. It is also a versatile crop, allowing it to grow across a range of agroecological zones.



Every part of the maize plant has economic value: the grain, leaves, stalk, tassel, and cob can all be used to produce a large variety of food and non-food products.

In industrialized countries maize is largely used as livestock feed and as a raw material for industrial products, while in low-income countries it is mainly used for human consumption. In sub-Saharan Africa, maize is a staple food for an estimated 50% of the population. It is an important source of carbohydrate, protein, iron, vitamin B, and minerals. Africans consume maize as a starchy base in a wide variety of porridges, pastes, grits, and beer. Green maize (fresh on the cob) is eaten parched, baked, roasted or boiled and plays an important role in filling the hunger gap after the dry season.

### Statistics

According to FAO data, 589 million tonnes of maize were produced worldwide in 2000, on 138 million hectares. The United States was the largest maize producer (43% of world production) followed by Asia (25%) and Latin America and the Caribbean (13%). Africa produced 7% of the world's maize.

The world average yield in 2000 was 4255 kg per hectare. Average yield in the USA was 8600 kg per hectare, while in sub-Saharan Africa it was 1316 kg per hectare.

### How maize is grown

Throughout the tropics and subtropics most maize is grown by small-scale farmers, generally for subsistence as part of agricultural systems that feature several crops and sometimes livestock production. The systems often lack inputs such as fertilizer, improved seed, irrigation, and labor.

Most maize-producing countries in the industrialized world employ intensive input and highly mechanized monocropping production systems. Hybrid maize varieties are commonly used.

## Constraints to maize production

Insects are an important threat to maize production in Africa. Major pests include stem and ear borers, armyworms, cutworms, grain moths, beetles (weevils, grain borers, rootworms, and whitegrubs), and virus vectors (aphids and leafhoppers). A range of pathogens, primarily fungi, also damage the maize plant. Important maize diseases in Africa include downy mildew, rust, leaf blight, stalk and ear rots, leaf spot, and maize streak virus.

Weeds often cause severe maize yield losses because they compete for nutrients, light, and moisture. In the Nigerian savanna, for example, weed-related yield losses ranging from 65% to 92% have been recorded. The parasitic flowering plant *Striga* (witchweed) is a major pest in sub-Saharan Africa. Annually it causes cereal grain losses equivalent to US\$7 billion and adversely affects the lives of 300 million people.

Last but not least, periodic drought caused by irregular rainfall distribution reduces maize yields by an average of 15% each year, which is equivalent to at least US\$ 200 million in foregone grain. The effects of prolonged droughts, such as those that have struck Eastern and Southern Africa in recent years, have been disastrous.

## IITA's work on maize

In collaboration with CIMMYT (Centro Internacional de Mejoramiento de Maíz y Trigo), national agricultural research institutes, NGOs, and research networks, IITA has developed and introduced a range of improved varieties that are disease resistant, stress tolerant, and high yielding. Consequently, maize production in West and Central Africa has more than tripled since the mid-1980s. The new varieties yield up to twice as much as traditional varieties and some varieties are ready for harvest in less than 3 months.

Development of early and extra early maturing varieties has enabled maize production to expand into the Sudan savanna zone. It has been estimated that gains in maize production are sufficient to feed 40 million people annually. This increase represents a minimum of US\$1.2 billion a year.

Major research accomplishments have been made by IITA in controlling the widespread maize streak virus (MSV), and in 1986 the institute received the King Baudouin Award for its work in this area. Combating *Striga* has been one of IITA's focal research areas since the mid-1980s. Major achievements have been made in breeding maize varieties that can not only tolerate *Striga* but also suppress the weed's growth. IITA scientists have also been working to control downy mildew disease using an integrated pest management package of downy mildew-resistant varieties combined with early planting, chemical seed treatment, and good farm sanitation.

IITA's postharvest researchers have been developing effective and simple machines and tools that reduce the traditional processing time and labor as well as production losses. In the area of maize utilization around 500 people have received training and a range of new products has been developed.

Recently, IITA has engaged in research to try to enhance the

micronutrient content of maize and thereby combat the widespread diseases of iron deficiency anemia and corneal blindness caused by vitamin A deficiency.

In West and Central Africa, IITA has been contributing significantly to the capacity building of the national maize research systems. From 1970 to 1998 a total of 490 scientists were trained by IITA in maize-related research.

IITA is strongly involved with the West and Central Collaborative Maize Research Network (WECAMAN), including coordination of international trials of improved germplasm, which are distributed to national programs on request, and promotion of community seed production schemes for farmers.

### **More information**

The following IITA projects include work on maize:

Improving cowpea-cereal systems in the dry savannas

Improving maize-grain legume systems in the moist savanna of West and Central Africa

Conservation and use of plant biodiversity

Integrated management of maize pests



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## Research Projects 2002

In 2001, IITA reorganized its research-for-development programs to make their management more efficient. Instead of 14 separate projects, the research work has been grouped into six themes (called projects), each with a coordinator.

Three follow the traditional research disciplines of IITA's former research divisions (Projects A, B, and C), three are multidisciplinary and based on the agroecoregional zones in which IITA works (Projects D, E, and F).

[Research Projects 2001](#)

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### **Project A Preserving and Enhancing Germplasm and Agrobiodiversity**

 [HTML](#) Highlights

 [PDF](#) Project Annual Report

### **Project B Developing Biological Control Options**

 [HTML](#) Highlights

 [PDF](#) Project Annual Report

### **Project C Impact, Policy, and System Analysis**

 [HTML](#) Highlights

 [PDF](#) Project Annual Report

### **Project D Starchy and Grain Staples in Eastern and Southern Africa**

 [HTML](#) Highlights

 [PDF](#) Project Annual Report

### **Project E Diverse Agricultural Systems in the Humid Zone of West and Central Africa**

 [HTML](#) Highlights

 [PDF](#) Project Annual Report

### **Project F Improving and Intensifying Cereal-Legume Systems in the Moist and Dry Savannas of West and Central Africa**

 [HTML](#) Highlights