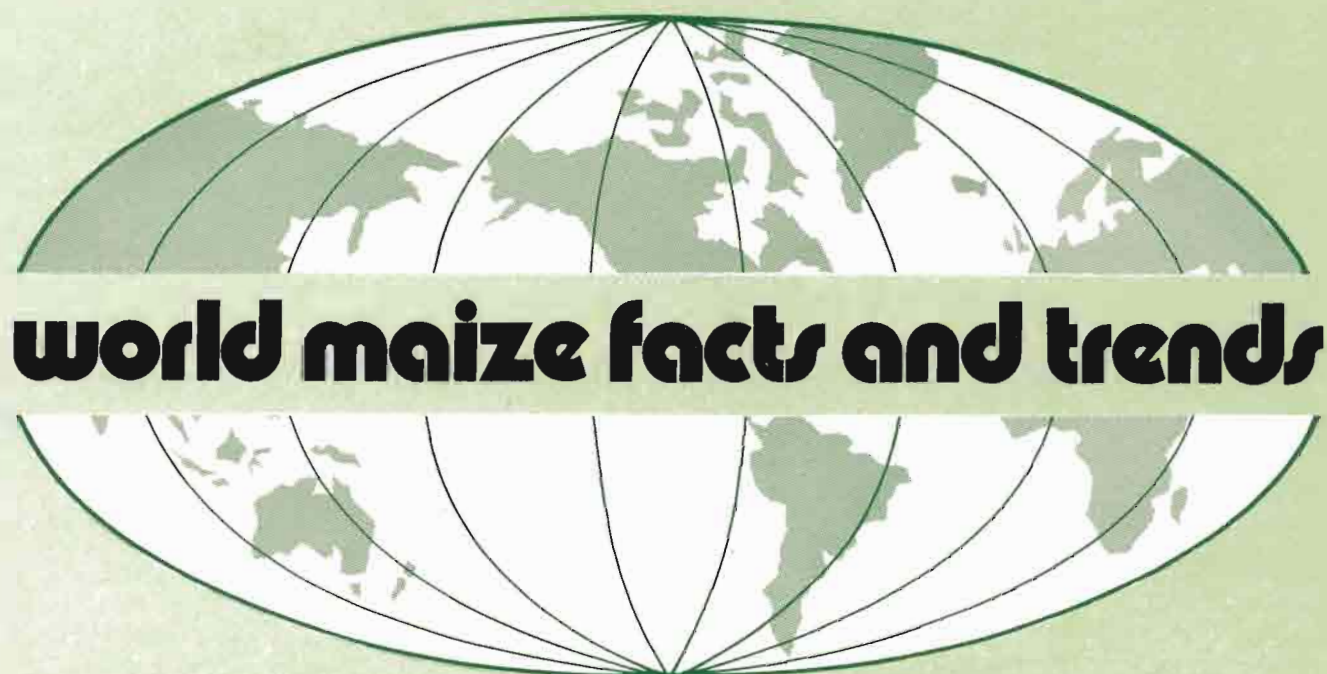


1981



# **world maize facts and trends**

## **CIMMYT REPORT ONE**

*analysis of changes in production, consumption,  
trade, and prices over the last two decades*

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## P R E F A C E

During 1979 and early 1980, CIMMYT staff and trustees developed a long-range plan which looked at a variety of issues of interest to the Center and its collaborators. Among those were the likely production, consumption, and trade trends for wheat and maize. In that process, it became clear that while a considerable quantity of data are available, it is dispersed through several publications from different sources. Further, much of the available data are not presented in a readily digestible form for the busy policy maker, researcher, or administrator.

This publication is an attempt to fill this void with information and analysis about world maize facts and trends. It has been prepared by Derek Byerlee and Donald Winkelmann, utilizing data assembled by Edith Hesse de Polanco and Pedro Santamaria, of the CIMMYT Economics Program. It follows an earlier publication presenting similar information about wheat.

In future years, CIMMYT will update this publication, reporting on different themes such as national pricing policies in selected developing countries, factors affecting the growth of demand for grains, potential progress in the development of biological technologies, and the role of maize in the diet of low-income consumers.

**Robert D. Havener**  
Director General

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# INTRODUCTION

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CIMMYT's mandate covers two of the world's major cereal crops, maize and wheat. Fifty-three countries of the developing world have over 100,000 hectares sown to maize; these countries represent three-fourths of the population in the developing world. In an additional 16 developing countries, maize represents more than 10 percent of total caloric supply in human consumption.

Part I of this report sets forth in summary form a number of important facts about maize production, consumption, trade, and prices, along with trends in these variables over the last two decades. Part II is a fact sheet of 24 variables relating to maize for each developing country in which the maize area exceeds 100,000 ha. For comparison, these variables are also reported for developed countries with over 1,000,000 ha of maize.

To simplify the presentation of data, we have divided the world into a number of producing regions. In the developing countries these consist of Eastern and Southern Africa, Western Africa,

North Africa, Mideast countries of Asia, South Asia, Southeast Asia, East Asia, and three regions of Latin America. The developed countries are divided into Eastern Europe and the USSR, and the Developed Market Economies.<sup>1/</sup>

Unless stated otherwise, we have used data from the Food and Agriculture Organization's computer tapes on production and trade and from the recently published FAO Food Balance Sheets that provide detailed supply and utilization data<sup>2/</sup>. We are grateful to the staff of the FAO Basic Statistics Unit for their generous help in providing and interpreting these data. Nonetheless, we emphasize that FAO is continuously updating and improving their data files on the basis of new information.

Trends over the last two decades have generally been calculated using 1961-65 as the base period and 1978-80 as the final period. Trade data are only available up to 1979; hence, for trade, 1977-79 was used as the final period.

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## PART I maize facts and trends

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### Where the World's Maize is Produced

Maize ranks third in production among the major cereal crops, following close behind wheat and rice. In the period 1978-80, an average of 380 million tons of maize were produced annually on 120 million ha of land representing nearly a quarter of world cereal production. By comparison, 440 million tons of wheat—the most important cereal crop—were produced on 240 million ha of land.

More than 70 countries, including 53 developing countries, currently have over 100,000 ha planted to maize, making it the world's most widely distributed crop (Table 1 and Figure 1). Fifty-eight percent of the world's maize area is found in developing countries. However, the developed countries, with 42 percent of the total maize area, produce two-thirds of the world crop. The USA alone accounts for nearly one-half of world maize production.

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<sup>1/</sup> Regional Disaggregation: **DEVELOPING: Eastern and Southern Africa:** all Sub-Saharan countries east of Angola, Chad, and Zaire but excluding South Africa. **Western Africa:** Angola, Chad, Zaire, and all Sub-Saharan countries to the West. **North Africa:** Morocco to Egypt. **Mideast Countries of Asia:** Turkey to Afghanistan. **South Asia:** Pakistan to Bangladesh and Sri Lanka. **Southeast Asia and Pacific:** Burma to Philippines and Indonesia and Pacific Islands. **East Asia:** China, Korea DPR, and Republic of Korea. **Mexico, Central America, and Caribbean:** Mexico to Panama and Caribbean Islands. **Andean Region:** Bolivia, Colombia, Ecuador, Guayana, Peru, Surinam, and Venezuela. **Southern Cone:** Argentina, Brazil, Chile, Paraguay, and Uruguay. **DEVELOPED: Developed Market Economies:** Australia, Canada, Israel, Japan, New Zealand, South Africa, USA, and Western Europe. **Eastern Europe and USSR.**

<sup>2/</sup> Full sources are listed at the end of the report.

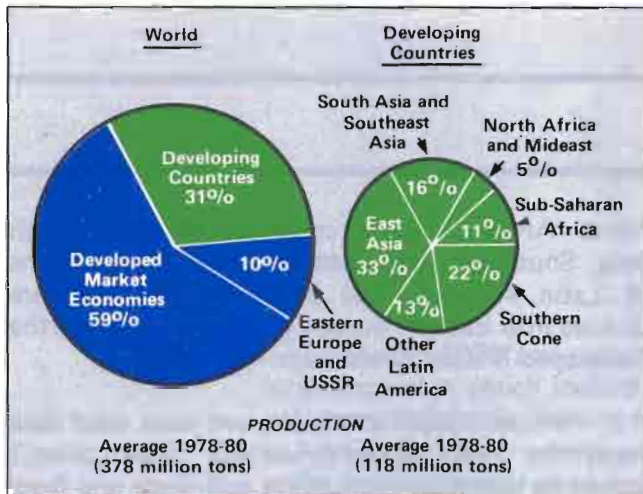


Figure 1. Where the world's maize is produced

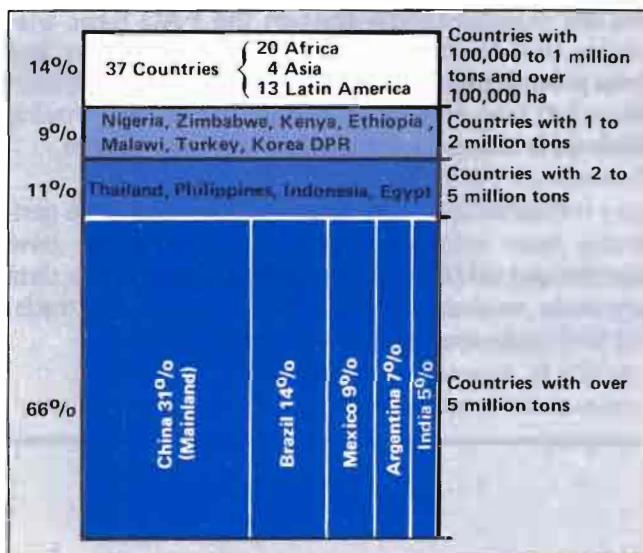


Figure 2. Distribution of maize production in developing countries

In developing countries, maize represents some 15 percent of total cereal production, behind rice (paddy) (48 percent) and wheat (19 percent). Five developing countries—China, Brazil, Argentina, Mexico, and India—account for two-thirds of production in developing countries, with each producing over 5 million tons (Figure 2). Eleven other countries produce over 1 million tons of maize and collectively account for another 20 percent of total developing country production. The remaining 37 developing countries, with over 100,000 ha of maize, most of them in Africa, produce only 14 percent of the developing world's maize.

This pattern is modified slightly when countries are ranked in terms of the proportion of maize in total national cereals production (Figure 3). In Latin America and Sub-Saharan Africa, maize is the most important cereal crop. In the Mideast and North Africa, where wheat is dominant, maize represents about 10 percent of total cereal production. In South, Southeast, and East Asia, maize accounts for about 10 percent of cereal production, well behind rice, the major cereal. Nonetheless, maize is often dominant in non-rice or non-wheat production areas within some countries, or is an important second crop after rice or wheat.

#### Maize Production Environments

The wide distribution of maize production in both the developed and developing world is an indication of its broad environmental adaptation. It is produced under a wide range of circumstances, varying from the equator to over 50 degrees latitude, from sea level to 4,000 meters in altitude, from fully irrigated to semi-arid conditions, and

TABLE 1. World maize area, yield, and production by region, 1978-80

	Area (million ha)	Yield (ton/ha)	Production (million tons)	Percent of Area	Percent of Production
<b>DEVELOPING</b>	70.4	1.7	118.1	58	31
Eastern and Southern Africa	8.6	1.0	8.9	7	2
Western Africa	5.9	0.8	4.5	5	1
North Africa	1.2	2.8	3.4	1	0.9
Mideast Countries of Asia	1.2	1.9	2.4	1	0.6
South Asia	7.0	1.1	7.7	6	2
Southeast Asia and Pacific	8.2	1.3	10.6	7	3
East Asia	12.8	3.1	39.2	11	10
Mexico, Central America, and Caribbean	9.4	1.3	12.6	8	3
Andean	1.9	1.4	2.8	2	0.7
Southern Cone	14.3	1.8	26.0	12	0.7
<b>DEVELOPED</b>	51.2	5.1	260.3	42	69
Developed Market Economies	42.2	5.5	221.3	35	59
Eastern Europe and USSR	8.9	3.5	39.1	7	10
<b>WORLD</b>	121.6	3.1	378.4	100	100

with growing cycles ranging from 3 to 12 months. The maize grain type also varies widely, from floury endosperm to dent or flint, and in color, with white and yellow predominant.

Among developing countries, the vast majority of maize is produced under rainfed conditions, the major exceptions being North Africa, the Mideast, and parts of South Asia and East Asia. Temperature regimes vary from tropical, especially in Sub-Saharan Africa and South and Southeast Asia, to subtropical or temperate in East Asia and the Southern Cone of Latin America, to tropical highland in parts of Mexico and Central America, the Andean Region, and Eastern Africa. By contrast, nearly all maize in developed countries is produced in temperate environments, usually under humid conditions. (CIMMYT is now developing quantitative estimates of the importance of these different maize-producing environments.)

The wide variation in maize-producing environments partly explains the differences in maize yields presented in Table 1. Developing countries can be roughly divided into subtropical/temperate areas (East Asia, East Africa, Mideast/North Africa, the Southern Cone excepting Brazil), and tropical areas. Maize yields in the subtropical/temperate developing areas, while still only a little over half of yields in developed market countries, are nearly three times the yield in the tropical areas (Figure 4). In the tropics, there are often severe problems of soil fertility, pests, moisture supply, and extreme weather variations which limit yields. Furthermore, in the tropics, maize is often pro-

duced as a subsistence or secondary food crop in an unfavorable economic environment.

Technology is also a major factor explaining yield differences. Most of the past effort to improve maize technologies has focused on temperate regions. Improved maize varieties which offer potential for increasing yields in tropical and subtropical environments are only beginning to become available to farmers. Fertilizer, a major factor in high yields in developed countries, is also used at very low levels on maize in most developing countries.

### Trends in Maize Production in Developed and Developing Countries

For the world as a whole, maize production has increased at an annual rate of 3.4 percent per year over the last two decades. This compares favorably with annual production increases of 3.4 percent and 2.6 percent, respectively, for wheat and rice (Figure 5). For all three cereals, yield increases accounted for about two-thirds of production changes and area increases for the remaining one-third.

There are major differences between developed and developing countries in trends in maize production (Figure 5). In developed countries, maize production increased by 3.8 percent annually with yield increases accounting for three quarters of the increase. On the other hand, in developing countries, production increased by 2.5 percent annually with area expansion and yield increases equally important in explaining production changes.

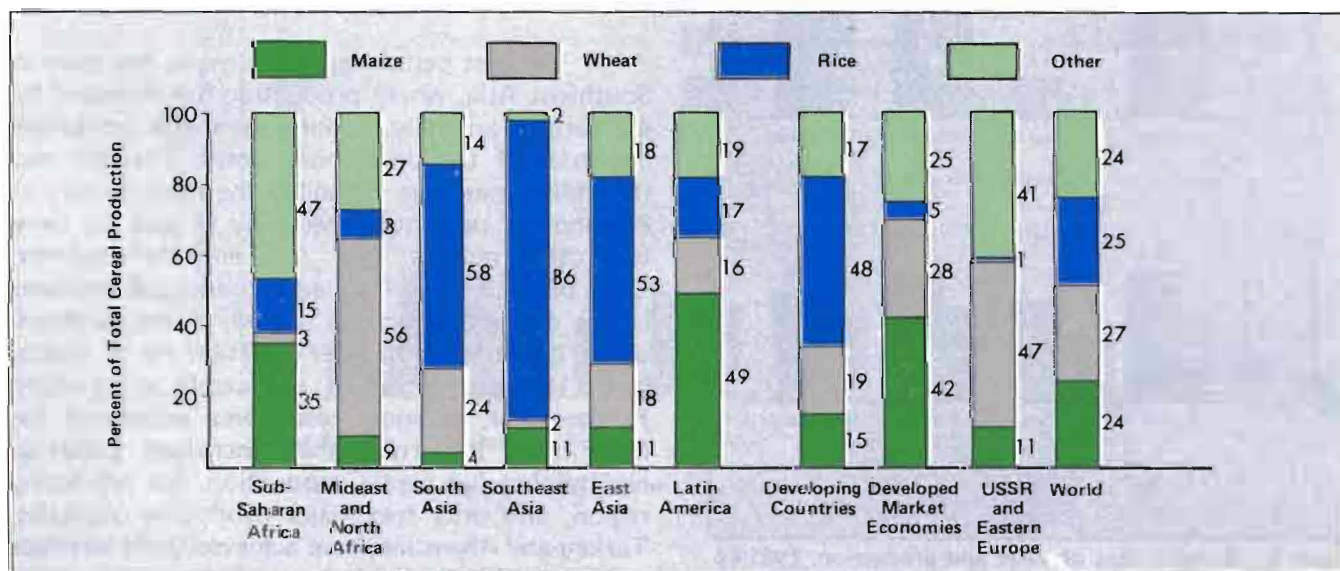


Figure 3. Maize production as a share of total cereal production by region, 1977-79

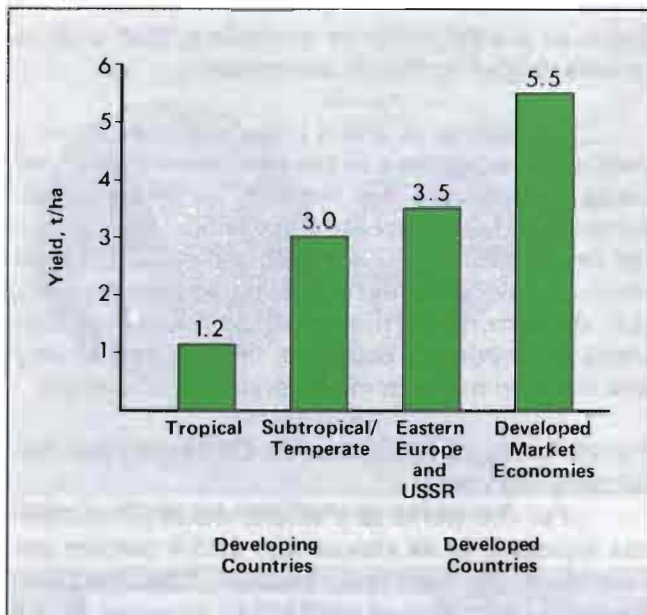


Figure 4. Maize yields by major zones, 1978-80

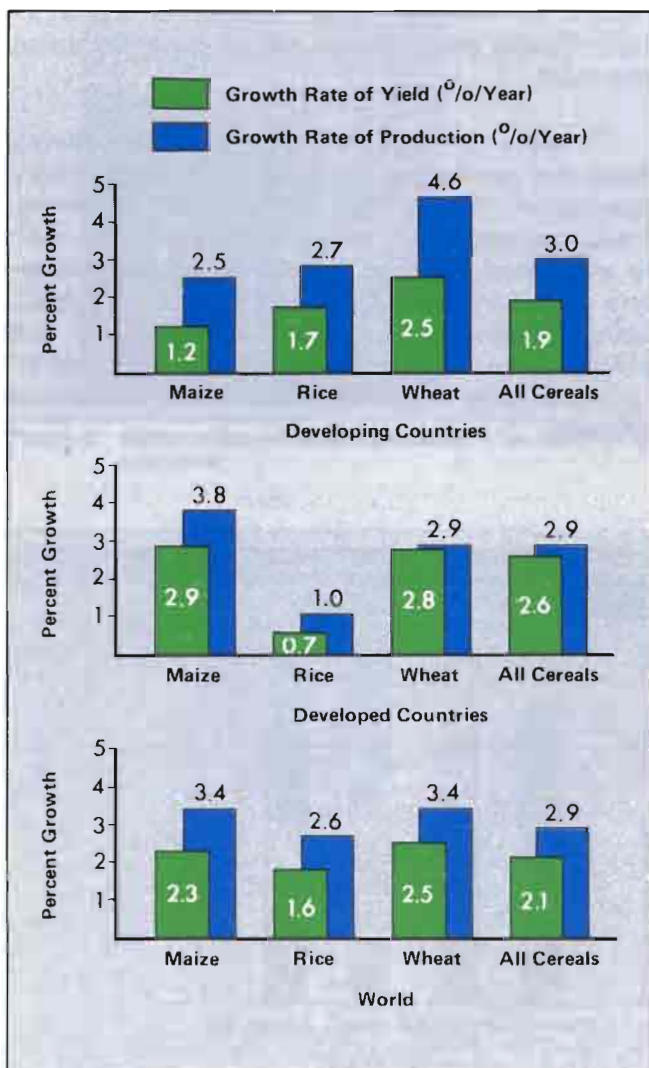


Figure 5. Growth rates of yield and production, 1961-65 to 1978-80

Yields in developing countries increased at less than half the rate of those of developed countries. In absolute terms, yields have increased by about 0.3 t/ha in developing countries over the last two decades compared to an increase of nearly 2 t/ha in developed countries. These trends contrast sharply with wheat yields, which increased by 2.5 percent annually in developing countries compared to 2.8 percent in developed countries. Equally significant, annual rates of production changes of wheat in developing countries were well above increases in developed countries. It should be noted, however, that wheat production environments are more alike in developed and developing countries than are maize production environments.

In summary, over the period 1961-65 to 1978-80, world maize area increased by 20 million hectares. Two-thirds of this area expansion occurred in developing countries. Over the same period, production increased by 158 million tons, with only one-quarter of this increase occurring in developing countries. With these trends, developed countries have increased their share of world maize production—the USA alone has more than doubled production over the last two decades and increased its share from 43 to 49 percent of world maize production.

#### Variation Among Developing Countries

Compared to rates of increase in production of 6 percent or more for the important wheat-growing areas of South Asia and East Asia, none of the major maize-producing regions of the developing world has experienced very rapid increases in production over the last two decades. For developing countries as a whole, maize production has kept pace with population changes, but substantial variation among countries is evident.

The best performance for maize has been in Southeast Asia, where production has increased by 4.2 percent annually. Among the major producing countries of the developing world, Thailand and the Philippines have expanded the most rapidly at 8.3 and 5.7 percent, respectively (Figure 6). Only two other regions, East Asia and the Southern Cone of Latin America, have experienced increases in per capita production. Indeed, of the 53 developing countries with over 100,000 ha of maize, only 18 have increased per capita production. Furthermore, in most cases, area expansion has been more important than increased yields in maintaining per capita production. No producing region, and only two major producing countries, Turkey and Argentina, have achieved yield increases exceeding the population growth rate. Meanwhile,

14 countries, representing 23 percent of the maize area in developing countries, experienced a decline in yields, perhaps as a consequence of expanding to less desirable areas and reduced length of fallow periods.

The relative importance of area and yield in increased production varies substantially by region. Using the previous division of developing countries into tropical and subtropical/temperate environments, most production increases in tropical environments are due to area expansion, while yield increases in subtropical/temperate environments account for most of the increased production.

There is cause for concern about long-run trends in maize production in developing countries. Comparing the two decades of the 1960s and the 1970s, there was a general slowdown in production expansion in developing countries (Figure 7). This was most noticeable in Sub-Saharan Africa, South Asia, and Latin America, where both area and yield expansion slowed in the 1970s. Of particular concern was a decline in yields of one percent annually in Sub-Saharan Africa in the 1970s, although this may partly reflect drought and political turmoil in some countries in recent years. Only in Southeast Asia and East Asia were increases in maize production more rapid in the 1970s than in the 1960s, and this was a result of a more rapid expansion of area.

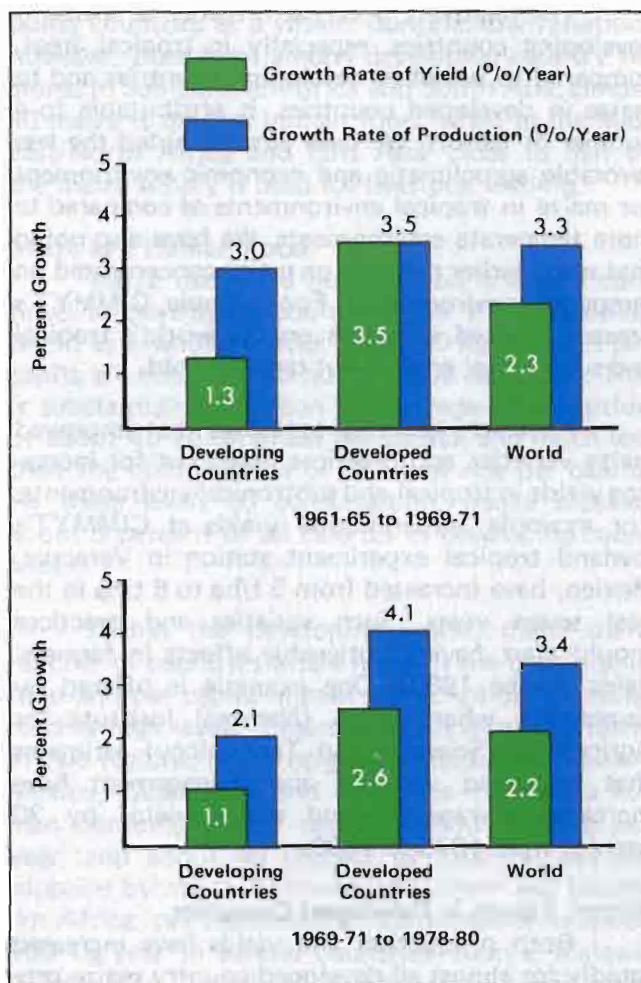


Figure 7. Growth rates of yield and production of maize, 1961-65 to 1969-71 and 1969-71 to 1978-80

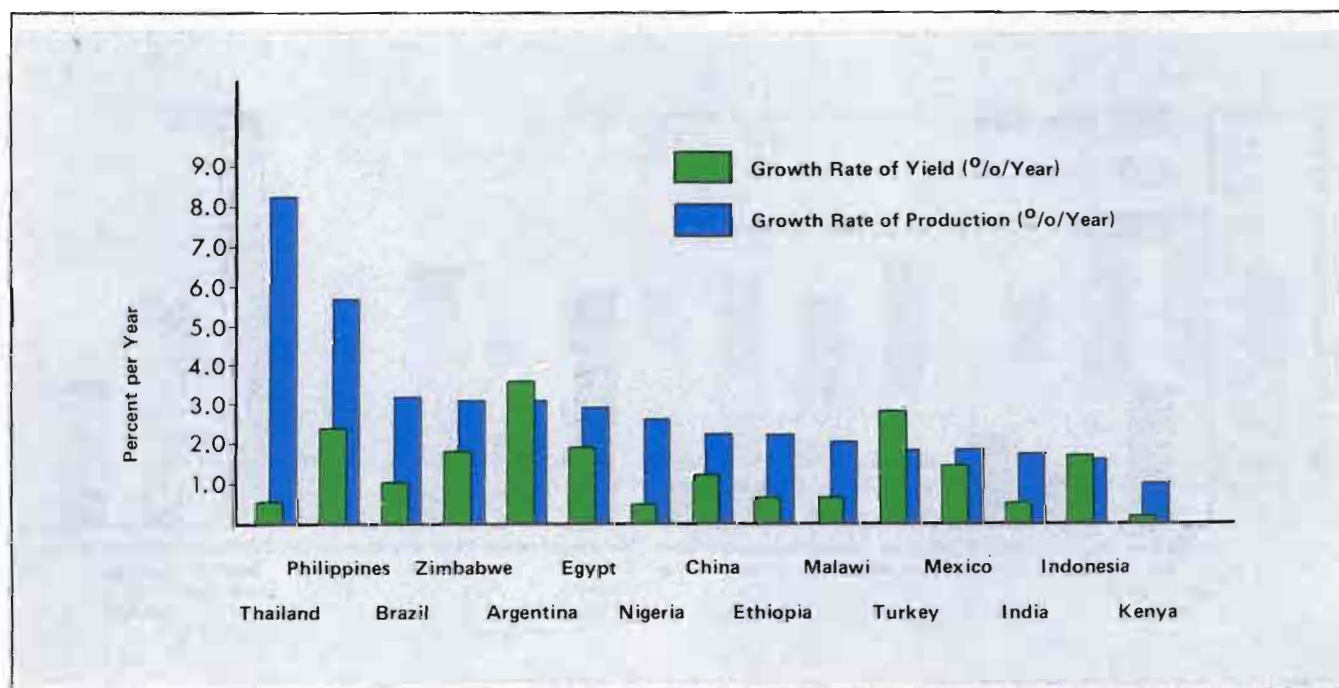


Figure 6. Growth rates of maize yields and production in some important maize-producing countries, 1961-65 to 1978-80



The relatively poor performance of maize in developing countries, especially in tropical areas, compared to wheat in developing countries and to maize in developed countries, is attributable to a number of factors. We have already noted the less favorable agroclimatic and economic environment for maize in tropical environments as compared to more temperate environments. We have also noted that most earlier research on maize concentrated on temperate environments. For example, CIMMYT's present marked emphasis on the world's tropical and subtropical areas is but ten years old.

However, there is optimism that improved maize varieties and practices now exist for increasing yields in tropical and subtropical environments. For example, experimental yields at CIMMYT's lowland tropical experiment station in Veracruz, Mexico, have increased from 5 t/ha to 6 t/ha in the past seven years. Such varieties and practices should start having noticeable effects in farmers' fields in the 1980s. One example is offered by Guatemala, where ICTA (National Institute for Agricultural Sciences and Technology) estimates that improved varieties and management have increased average lowland maize yields by 30 percent from 1975 to 1980.

#### Recent Trends in Developed Countries

Both production and yields have increased rapidly for almost all developed country maize producers. While nearly 90 percent of the maize area

in the developing world experienced yield increases of less than 2 percent annually, 80 percent of the maize area in developed countries showed yield increases of more than 2 percent annually. Production increases were lowest in the Eastern European countries and the USSR, largely due to a significant decline in maize area in these countries and a recent poor yield performance in the USSR.

A closer look at the impact of improved maize varieties and technology in the USA also reveals that US yield increases are a relatively new phenomenon. In 1940, the average maize yield was 1.8 t/ha, roughly equal to current average yields in developing countries. Over the last 40 years, while the total maize area in the USA declined by 18 percent, average yield levels increased by 289 percent, leading to a near tripling of national production over the last 40 years. This rapid increase in US maize production, while occurring in a more favorable production environment than found in developing countries, is perhaps an indication of the impact that yield-increasing technologies can have in the developing world in the years ahead.

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## MAIZE UTILIZATION

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### Maize as a Multipurpose Crop

Because of its worldwide distribution and lower price relative to other cereals, maize has a

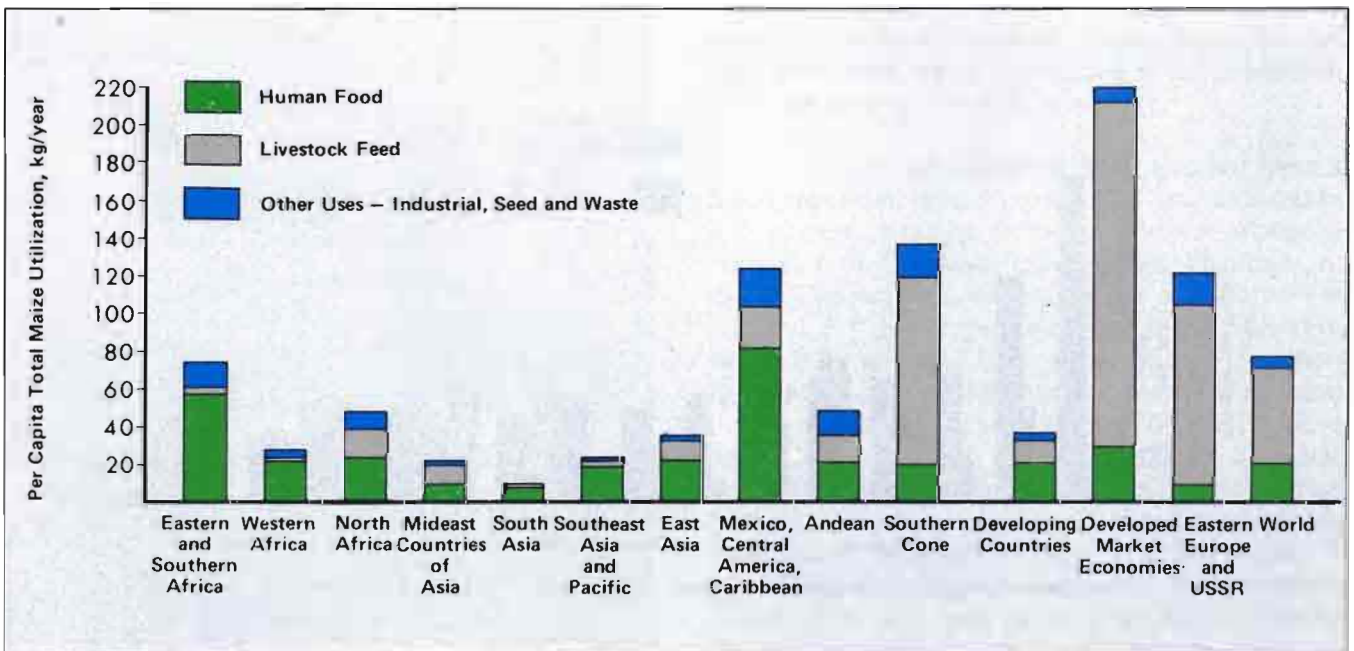


Figure 8. Maize utilization by region

wider range of uses than any other cereal. Maize is used in direct human consumption, in industrially processed foods, as a livestock feed, and in industrial non-food products such as starches. Recently, there also has been interest in using maize for ethanol production as a substitute for petroleum-based fuels.

Data on the allocation of maize between these various uses—especially between human food and animal feed in developing countries—is subject to considerable error. Approximate utilization, however, is shown in Figure 8. For the world as a whole, roughly 65 percent of maize is used as animal feed, some 27 percent as human food (direct consumption and industrial), and the remainder for non-food industrial uses, seed, or waste. These utilization figures reflect the dominance of the developed countries, where over 80 percent of maize is used for livestock feeding. The use of maize for industrial products, such as starch and sweeteners, is also higher in developed countries, especially in the USA.

Except for the Southern Cone of Latin America, where maize utilization patterns are similar to developed countries, two-thirds of maize in developing countries is destined for human consumption. However, the use of maize in the developing world for livestock feeding is also important, accounting for some 20 percent of utilization without the Southern Cone, and 30 percent for devel-

oping countries as a whole. Considerable variation, however, does exist among developing country regions. In Sub-Saharan Africa and South Asia, almost all maize is used as human food, while in the Middle-east/North Africa and East Asia, close to half of the maize supply is used for livestock feeding.

### Maize as a Human Food

Maize used as a human food is largely confined to developing countries. For the developing world as a whole, a little under 20 kg of maize per capita are consumed as human food each year. This is substantially less than the average consumption of about 45 kg of wheat per capita, and much less than the consumption of 82 kg of rice per capita. At these levels of consumption, maize supplies about 8 percent of all calories in developing countries.

Within the developing world, there are a number of countries where maize is the basic staple food and per capita human consumption of maize reaches high levels (Figure 9). This is most evident in two regions. In the original homeland of maize—Mexico, Guatemala, and Honduras—per capita human consumption of maize is about 100 kg per year, and about 40 percent of total calories are supplied by maize. Likewise, in Eastern and Southern Africa, per capita human consumption is about 100 kg/year in several countries—Kenya, Malawi, Zambia, and Zimbabwe. In these areas, maize is the basic staple food; its importance as a human food

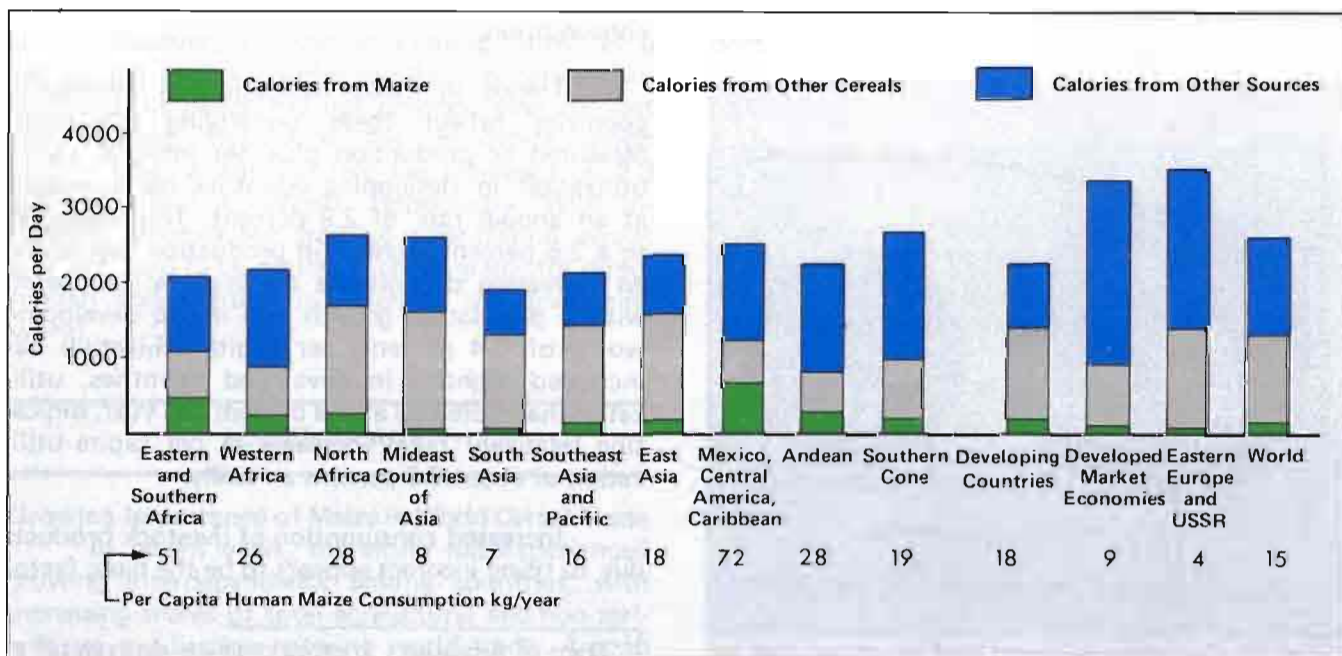


Figure 9. Role of maize in the average diet in selected regions, 1975-77

is similar in magnitude to wheat in the Mideast and North Africa, and to rice in Southeast Asia.

In addition, there are a number of countries where per capita human consumption of maize is about 40 kg/year and where maize accounts for about 20 percent of the total supply of calories. These include a number of countries in Sub-Saharan Africa, such as Tanzania, Mozambique, Benin, Togo, and Cameroon, where maize is the most important cereal crop, although root and tuber crops are still the most important source of calories. Similar levels of maize consumption are also found in Egypt, and in the Philippines and Nepal, where maize is the second most important cereal crop after rice or wheat.

Finally, maize consumption of between 25 and 40 kg/year, representing over 10 percent of total calorie supply, occurs in several other African countries and in the countries of the Andean Region (Figure 9).

### Maize as an Animal Feed

Countries of the Southern Cone of Latin America are among the highest per capita users of maize in the developing world (about 150 kg/year in Brazil and Argentina), reflecting high levels of maize use in livestock feeding of over 100 kg/year per capita<sup>1/</sup>. In the Mideast, North Africa, East Asia, Mexico/Central America, and the Andean Region, some 10 to 20 kg of maize per capita are used for animal feed. These are all regions with a significant number of middle-income countries where relatively high per capita incomes (over US\$1,000

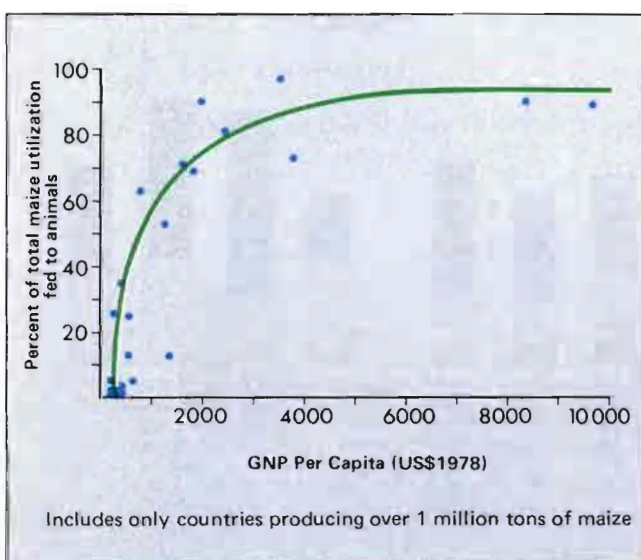


Figure 10. Proportion of maize used for animal feed for countries at different per capita income levels

per capita) have created a demand for livestock products.

Developed countries also show a high per capita utilization of maize because of high consumption of livestock products and the importance of maize in livestock feeding. Per capita maize utilization in Eastern Europe and the USSR is over 90 kg/year, and in developed market economies as a group over 200 kg/year. The USA has one of the world's highest per capita maize utilization levels, at 480 kg/year, with some 430 kg per capita/year used for feeding livestock.

In general, the proportion of maize destined to livestock feed increases rapidly with per capita income. Figure 10 shows that in countries with per capita incomes below US\$300 per year, the percentage of maize used for livestock feed is small. However, this percentage increases rapidly for the middle-income developing countries with per capita incomes above US\$650 per year and is over 80 percent for most high-income countries.

### Trends in Maize Utilization

Demand for a commodity such as maize tends to increase in proportion to population. This trend is modified by the effect of changes in per capita income—as income increases, the demand for most commodities also increases. For maize, however, increasing incomes appear to add little to its use in direct consumption but have a marked effect on its use as livestock feed. In general, as real incomes rise, the demand for livestock products increases much more rapidly than the demand for cereals for direct human consumption.

Trends in maize utilization in developing countries reflect these underlying influences. Measured as production plus net imports, maize utilization in developing countries has increased at an annual rate of 2.9 percent. This compares to a 2.5 percent increase in production, indicating an increasing dependence on imports. Compared with a population growth rate in the developing world of 2.4 percent, per capita utilization has increased slightly. In developed countries, utilization has increased at 3.8 percent per year, indicating relatively rapid increases in per capita utilization of about 2.9 percent annually.

Increased consumption of livestock products due to rising incomes appears to be the basic factor

<sup>1/</sup> Some of Argentina's livestock products are exported so these figures over-estimate total domestic utilization.

affecting trends in world maize utilization. Certainly this is true in the developed countries where over 80 percent of maize is used as animal feed and rapid increases in per capita utilization reflect the rising demand for livestock products. In developing countries as well, livestock feeding of maize also seems to underlie trends in utilization. Countries where per capita utilization has increased appreciably tend to be countries with relatively high or rapidly rising incomes, where demand for livestock products would be expected to be increasing quickly. These include the Mideast Region, especially Lebanon, Iran, Saudi Arabia, and Syria, some countries of Southeast and East Asia, especially the Republic of Korea, Singapore, Malaysia, and countries in Latin America, especially Venezuela.

Rapid increases in poultry consumption in many developing countries is a major factor behind the increased use of maize for livestock feeding. For example, in developing countries as a whole, poultry consumption expanded at an annual rate of 12 percent per year between 1967 and 1977, compared to a 2.2 percent per year increase for all livestock products. In some higher-income developing countries, rates of growth of poultry consumption have been even more rapid. Nearly all of this increase comes from grain-fed poultry.

There are, however, some countries where per capita human consumption also is increasing. According to the FAO Food Balance Sheets, per capita calories supplied by maize have increased significantly (2 percent or more/year) in some African countries such as Zimbabwe, Ghana, and Zaire, and in Southeast Asia, especially the Philippines. However, for the developing world as a whole, per capita calories supplied by direct consumption of maize has not changed over the last two decades. Meanwhile, the per capita caloric supply from wheat and rice has increased by 2.3 percent and 0.4 percent, respectively. With increasing incomes and growing urbanization, wheat and rice tend to be preferred cereal grains for direct human consumption in much of the developing world.

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## MAIZE TRADE

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### Growing Importance of Maize in World Cereal Trade

In recent years, the world has experienced growing interdependence among countries, with increasing shares of total agricultural and non-agricultural production entering world trade. Among cereal grains, maize trade has expanded most ra-

pidly, increasing from 20 million tons in 1961-65 to 66 million tons in 1977-79 (Figure 11). This is equivalent to an annual rate of increase of 8 percent. The proportion of world maize production traded increased from just under 10 percent to nearly 20 percent during this period. Annual wheat trade at 80 million tons in 1977-79 exceeds maize trade; but, by contrast, wheat trade has increased at 3.5 percent per year and the proportion of world wheat production entering world trade has remained steady at about 16 percent. Rice traded also has increased at about the same rate as production, but world rice trade at 11 million tons of milled rice in 1977-79 represents less than 5 percent of world rice production.

Unlike wheat, the bulk of the 45 million ton increase in world maize trade over the last two decades went to developed countries (Figure 12). Imports by developed market and centrally planned economies each accounted for about 40 percent of the increased maize trade. Developing country imports made up the remaining 20 percent of maize imports.

Although imports of maize by developing countries are still only a small proportion of total maize trade, these imports have increased rapidly over the last two decades, from only 1.7 million tons in 1961-65 to over 14 million tons in 1977-79—an annual rate of increase of 15 percent. This rate of increase is exceeded only by that of Eastern Europe and the USSR, whose imports grew at 20 percent annually. Imports by developed market economies, while still accounting for the majority of maize imports, grew at a relatively slower 5 percent per annum.

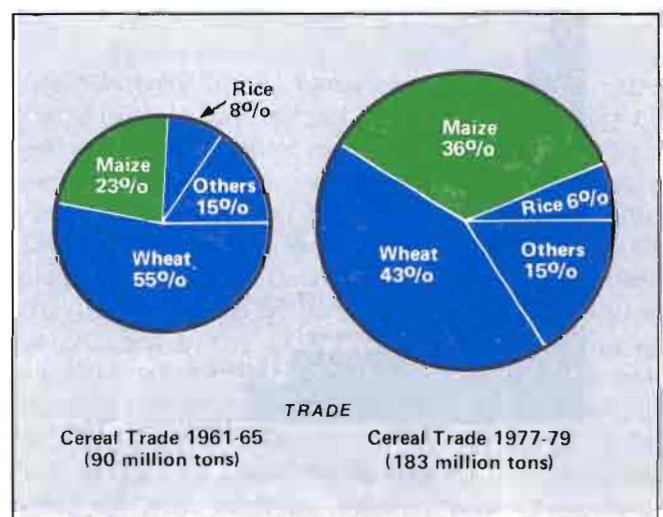


Figure 11. Changing share of maize in total cereal trade

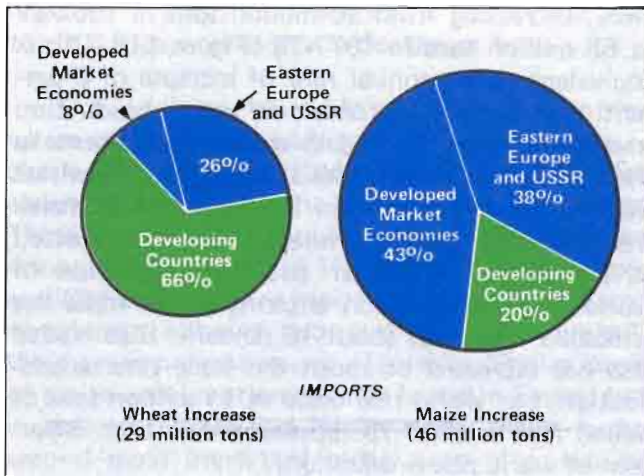


Figure 12. Destination of increases in maize and wheat imports, 1961-65 to 1977-79

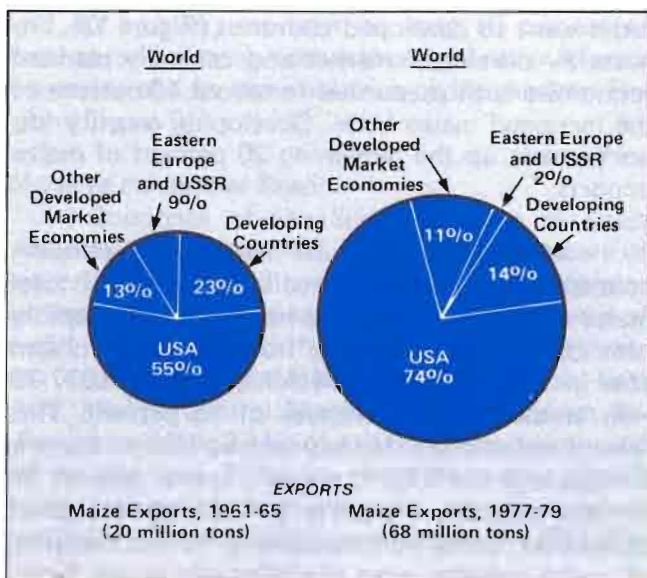


Figure 13. Share of world maize exports, 1961-65 and 1977-79

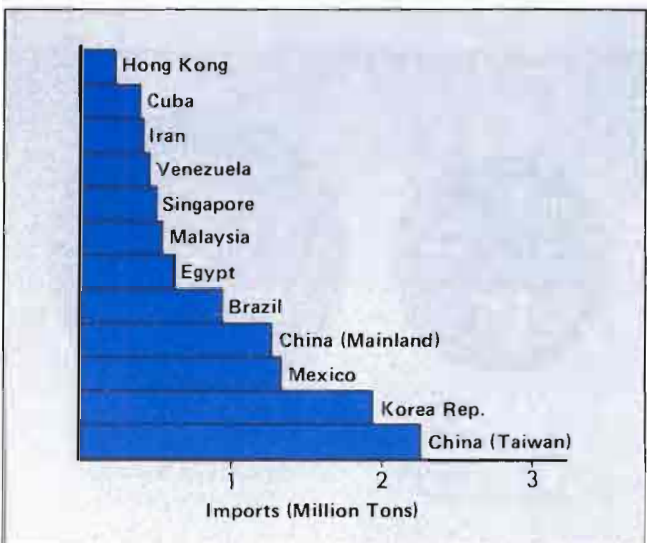


Figure 14. Developing economies importing over 0.25 million tons of maize annually, 1977-79

### The Maize Exporters

The USA dominates world maize exports, accounting for some 50 million tons in 1977-79. Over the last two decades, the USA has increased its share of world maize exports from 55 to 74 percent. Two developing countries, Argentina and Thailand, together make up a little over 10 percent of maize exports. The share of exports from developing countries has decreased, and Eastern Europe and the USSR have virtually ceased to export maize (Figure 13).

### Characteristics of Importers

Almost all maize imported by developed countries is for livestock feed. The rapid rise in maize imports by Japan, Eastern Europe, and the USSR reflects the efforts of these countries to satisfy the demand for livestock products generated by increasing incomes. At the same time, an examination of maize imports by developing countries also shows the importance of livestock feeding as the principal motive for importing maize.

In 1977-79, there were 12 developing economies importing over 250,000 tons of maize; together they accounted for 75 percent of developing-country maize imports (Figure 14)<sup>1/</sup>. Ten of these importing economies had per capita incomes above US\$1,000 per annum. Imports by this group increased at an annual rate of 15 percent over the last two decades. Almost all of these imports are destined for livestock feed. In fact, human consumption of maize for most of these importing economies is negligible. Even for the two remaining economies, China and Egypt, both classified as low-income developing economies, we believe most imported maize is being used as animal feed.

Furthermore, the bulk of the remaining 25 percent of imports by developing countries with imports of less than 250,000 tons per year goes to middle-income countries; for example, Morocco, Algeria, Lebanon, Iraq, Saudi Arabia, Jamaica, Peru, and Chile, again, apparently, primarily in support of livestock feeding. The major developing country importers of maize, where maize is important for human consumption, are Mexico and Zaire. However, even in Mexico in most years, domestic production considerably exceeds the quantity of maize used for human consumption—hence imports allow maize to be used for animal feed and industrial uses. In sum, we estimate that well over 80 percent of maize imports by devel-

<sup>1/</sup> Because of the higher income levels of China (Taiwan) relative to mainland China, China (Taiwan) is treated separately in this analysis.

oping countries is used for livestock feed. In contrast, nearly all wheat and rice imports by developing countries are destined for human consumption.

Of the many developing countries experiencing food deficits, few turn to maize imports. Despite lower world prices for maize, most countries import wheat, and to a lesser extent rice, to make-up food deficits. This is due to a number of factors. First, the largest food grain deficits occur in North Africa and the Mideast, where wheat is a staple food. Second, grain imports are usually for urban consumers who tend to prefer wheat products; maize is more often consumed by the rural population. Finally, the local maize preferences for a particular grain type or color complicate the use of maize imports for human consumption. For example, most maize used as human food is white maize while most maize available in the world market is yellow maize. Still, to the extent that maize flour can substitute for wheat flour in baking, there is potential for wheat importers to use maize as a partial substitute.

#### **Maize as Part of Total Coarse Grain Trade**

Given that maize is traded largely as livestock feed, a more complete picture of the demand for maize is provided by considering maize in relation to competing animal feeds—particularly the other coarse grains such as barley and sorghum. Average animal coarse grain trade in 1977-79 was 93 million tons, of which 20 million tons went to developing countries. Maize's share of total coarse grains trade has tended to rise and now accounts for over 70 percent of the total coarse grain trade. The share of barley and sorghum in 1977-79 was 15 and 11 percent, respectively.

About 20 percent of world trade in sorghum and barley goes to developing economies. Nearly all the sorghum is imported by Mexico, Venezuela, and China (Taiwan). Barley importers are concentrated in countries of the Mideast and North Africa, such as Algeria, Syria, and Iraq. For the coarse grains, then, most imports are destined to middle-income countries, again underlining the importance of the growing demand for livestock products as the driving force behind patterns of world trade in coarse grains.

#### **Maize Self-Sufficiency in Developing Countries**

Taking maize imports and exports together, developing countries have changed from net exporters of 2.8 million tons of maize in 1961-65 to net importers of 5.3 million tons in 1977-79. Ex-

cluding Argentina and Thailand—the major developing country exporters—developing countries as a whole import a little over 10 percent of their total maize utilized, compared to a little over 20 percent for wheat. The greatest dependence on imported maize occurs in the Mideast and North Africa, in Mexico/Central America, and in the Andean Region of South America. With the rapid increase in maize imports, the proportion of developing country maize utilization that is imported is also increasing rapidly.

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## **MAIZE PRICES**

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### **Long-Term Trends in Maize Prices**

Because of the dominance of the USA in world maize trade, the best measure of world maize prices is the USA cash price. Over the last two decades, real maize prices in the USA, adjusted for inflation, have changed little, and real prices in the late 1970s were roughly equal to prices in the early 1960s (Figure 15). The price of maize has risen slightly, relative to the price of wheat, but fallen relative to that of rice (Figure 16).

This stability in the long-term trend in maize prices indicates that both supply and demand for maize have changed at about the same rate. On the supply side, cost-reducing changes in technology, especially in developed countries, have made possible the doubling of maize production without increases in real prices. At the same time, increased demand, especially for livestock feed, generated by rising incomes and population growth, has absorbed this increased production and maintained real prices.

### **Variability in Maize Prices**

During the 1960s, the world price of maize was relatively stable. Large carry-over stocks, especially in the USA, helped to reduce the effects on prices of fluctuations in supply and demand. During the 1970s, maize prices were far more variable, ranging from below US\$50/t to over US\$120/t (Figure 15). Several factors contributed to this increased variability. Clearly, a major factor has been the USSR's decision to increase cereal imports so as to reduce the effect on livestock output of weather-induced variations in domestic crop production. This occurred at the same time that the US government reduced its financial support for the holding of grain stocks and its concessionary sales of grain overseas. Finally, with so much of maize entering international trade, its price is

sensitive to fluctuations in foreign exchange markets, and these were quite unstable in the 1970s. The sharp decline of the dollar in relation to other currencies in the 1970s has reduced the cost of US maize for many importers.

### Relative Prices of Maize and Fertilizer

As with grain prices, the price of fertilizer has fluctuated widely over the past two decades. More importantly, the price of nitrogen fertilizers, relative to that of maize, has also varied substantially, from about twice to over five times the price of maize (Figure 17). In general, the relative price of nitrogen fertilizers trended downward until the 1973-75 shortage, reflecting lower cost technology in fertilizer manufacturing. However, since then, higher petroleum prices have increased the relative price of nitrogen. There are indications that there is adequate manufacturing capacity for nitrogen fertilizers until 1982/83, and the maize fertilizer price ratio should remain roughly steady over the next two to three years.

The relative prices of nitrogen and maize are important measures of the incentives for farmers to increase productivity. Relative prices to US farmers are usually a good measure of world prices. In the USA, nitrogen from urea is currently about four times the price of maize. Relative prices in developing countries are shown in Table 2. In some countries, relative prices of nitrogen are high. These include important maize producers such as Brazil, Malawi, Kenya, and the Philippines. In Brazil, Malawi, and Zimbabwe, maize prices are well below world prices. Many other countries such as Ghana, India, Indonesia, Mexico, and Pakistan provide strong price incentives to farmers to use fertilizer, usually by subsidizing fertilizer prices. However, problems of distribution and availability of fertilizer often prevent farmers from taking full advantage of these price incentives.

### Relative Prices of Maize and Ocean Freight

With a large and growing proportion of maize production entering world trade, the cost of ocean freight is also an important consideration for many countries. Relative to the price of maize, freight rates have increased substantially over the last two decades (Figure 17). For example, the cost of transporting maize from the USA to Egypt increased by 50 percent relative to maize prices. Real freight rates are again rising and are unlikely to diminish in the near future. Recently, for example, freight rates from Gulf Ports to South Asia added roughly 40 percent to maize prices while in the early 1970s they were under 20 percent of maize prices.

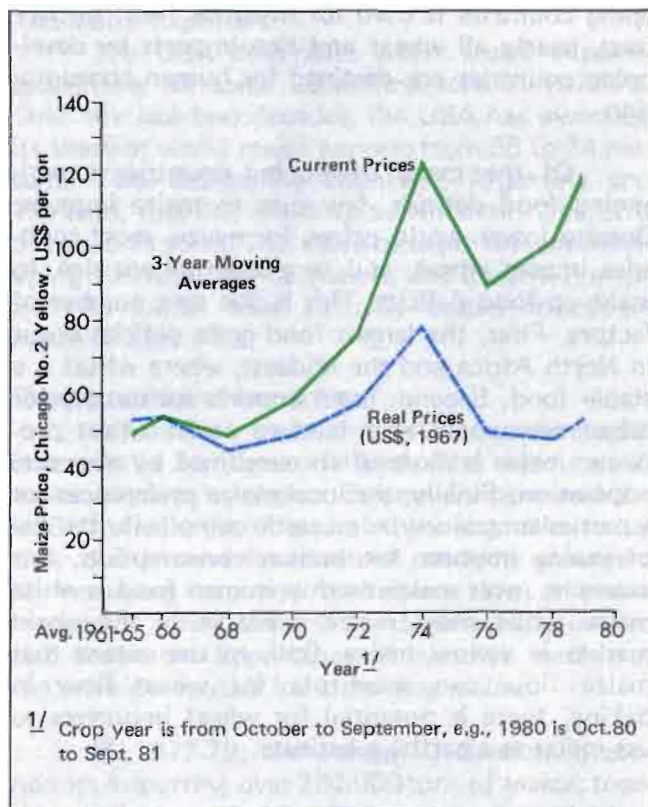


Figure 15. Current and real prices of maize

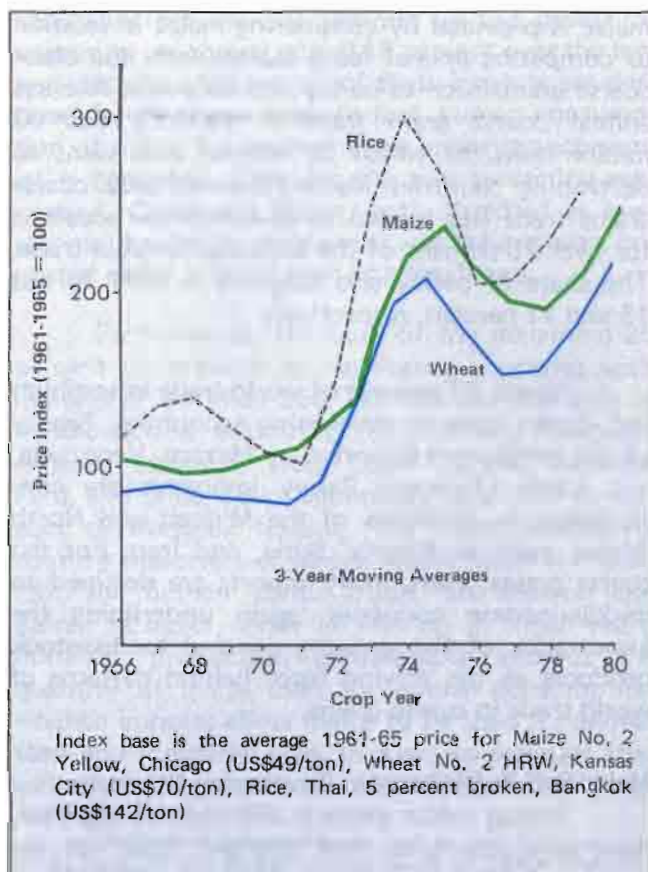


Figure 16. Indices of changes in maize, wheat, and rice prices

## CURRENT SITUATION AND FUTURE TRENDS

### Current Situation

World maize production in 1980 was estimated at 366 million tons, well below the record 1979 harvest of 400 million tons, and five percent below the trend line. Total coarse grain production was 3.5 percent below the record level of 1979. With reduced harvests and rising utilization, inventories of coarse grains fell to low levels, reaching roughly 12 percent of annual utilization for the crop year 1980-81.

As a result, maize prices rose, peaking in January 1981 at over US\$140/t (Chicago, No. 2 Yellow). From January to late August, the price declined a bit, even in the face of apparent scarcity, as the rising price of the US dollar in international markets and the slow growth of the world economy limited demand for feed grains.

While still too early to fix 1981 US maize production, it is likely to be well above 1980 with a potential record harvest, some 20 percent above 1980 levels. For all coarse grains, experts are forecasting record world production for the crop year July 1981 to June 1982, with increases in US production offsetting disappointing harvests in the USSR and Europe. These larger harvests, together with the stronger dollar and a continued sluggish global economic performance, caused a marked decline in maize prices to the US\$100/t range (Chicago, No. 2 Yellow) by late October 1981.

World trade in coarse grains is expected to set still another record in 1981/82, six percent above 1980/81, led by a large increase in imports by the USSR after three consecutive below-average harvests. Developing countries are expected to take some 30 percent of the record trade with the absolute amount slightly below 1980/81 levels. Among the developing countries, Mexico is expected to be the largest importer but at levels below the record of 1980/81. Imports by middle-income developing countries (exclusive of Mexico) are expected to grow by 13 percent over 1980/81 levels.

The projected increases in production and trade point to increased utilization. Even so, modest increases in stocks of coarse grains are anticipated, with inventories as a percent of utilization expected to reach 14 percent, well above their mid-1970s levels. Futures markets currently show maize prices ranging towards US\$120/t in July 1982.

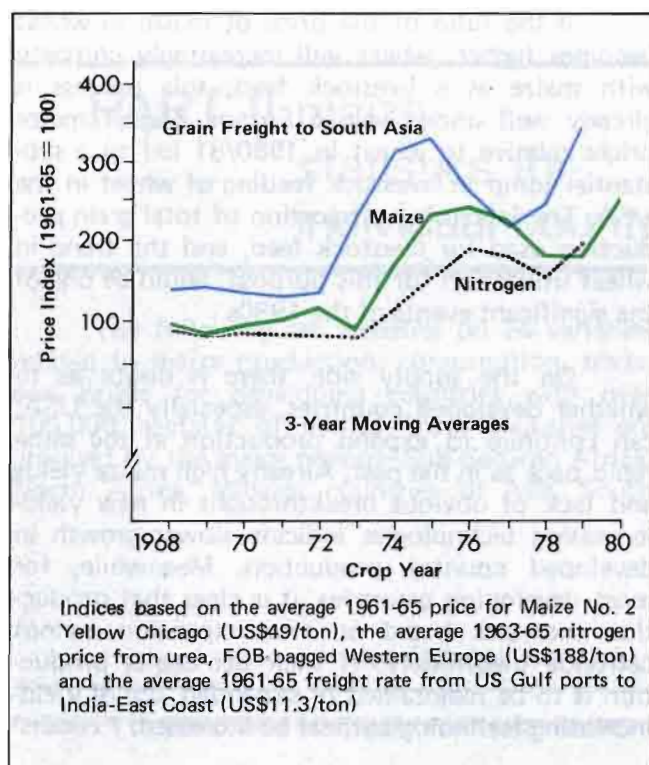


Figure 17. Indices of changes in freight rates, nitrogen fertilizer, and maize prices

TABLE 2. Farm-level prices of maize and nitrogen in some major maize-producing countries, 1980 crop cycle

Country	Maize Price US\$/t	N Price US\$/t	Price Ratio N/maize
Argentina	102	498	4.9
Brazil	90	525	5.8
Ecuador	315	644	2.0
Egypt <sup>1/</sup>	93	478	5.1
El Salvador	156	846	8.8
Ghana	1091	416	0.4
Guatemala <sup>1/</sup>	150	720	4.8
Honduras	165	804	4.9
India	150	283	1.9
Indonesia	133	254	1.9
Ivory Coast	167	779	4.7
Kenya	137	918	6.7
Malawi	77	701	8.7
Mexico	235	344	1.5
Nepal	121	581	4.8
Pakistan	125	133	1.1
Peru	263	1112	4.2
Philippines	160	1430	8.9
Tanzania	244	988	4.1
Zaire	668	699	1.0
Zambia	169	665	3.9
Zimbabwe	76	494	6.5
France	184	562	3.1
USA (urea)	119	520	4.4
USA (anhydrous ammonia)	119	290	2.4

<sup>1/</sup> Prices are for 1979 crop year



## Future Trends

World demand for coarse grains, especially maize, should continue to expand rapidly as increasing numbers of consumers with higher incomes demand livestock products. Consumers in developing countries, particularly middle-income countries, will be increasingly important in this expanded livestock demand. Per capita grain use for livestock production in these countries, although expanding rapidly, is still at low levels compared to developed countries.

Per capita human consumption of maize has been roughly constant in developing countries. A few countries show increases and a few show decreases, most of these in Latin America, but for most countries per capita consumption is stable. With gains in per capita incomes, direct human consumption can be expected to decline in many countries as consumers switch to the higher value cereals, wheat and rice, or substitute vegetable and animal products for cereals.

Industrial uses of maize, especially in the USA, have increased rapidly. Use of maize for starches and sweeteners became more important in the 1970s. Also, with rising petroleum prices, there is interest in the use of maize for ethanol production as a substitute for petroleum-based fuels. Currently, there are large subsidies in the USA for ethanol production, which, if continued, might lead to significant amounts of maize being used for this purpose by 1990. However, with the recent leveling-off of oil prices, interest in ethanol production from maize has diminished. Even so, at current prices for maize, industrial uses can be expected to increase, especially in high-income countries.

If the ratio of the price of maize to wheat becomes higher, wheat will increasingly compete with maize as a livestock feed; this process is already well under way in Europe. Higher maize prices relative to wheat in 1980/81 led to a substantial jump in livestock feeding of wheat in the USA. The increasing proportion of total grain production used for livestock feed, and the trend in wheat utilization for this purpose, could be one of the significant events of the 1980s.

On the supply side, there is doubt as to whether developed countries, especially the USA, can continue to expand production at the same rapid pace as in the past. Already high maize yields and lack of obvious breakthroughs in new yield-increasing technologies indicate slower growth in developed country production. Meanwhile, for most developing countries, it is clear that production increases based on area expansion cannot continue indefinitely. If their per capita production is to be maintained or expanded, use of yield-increasing technologies must be increased.

Even with a more rapid increase in production in developing countries, we expect that their demand for maize generated by livestock feeding will expand faster than production, leading to greater dependence on imports. Assuming that wheat does not increasingly become a competitor to maize and that world economic performance maintains desired levels, the expansion in the feed use of maize combined with the potential slowdown in the expansion of maize exports by developed countries, point toward a continuing strong world market for maize in the coming years.

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## PART II maize statistics for individual countries and regions

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The following are statistics on 24 variables related to maize production, consumption, trade, and prices for developing countries with over 100,000 hectares of maize. These countries are grouped by the major regions—Sub-Saharan Africa, North Africa, Mideast countries of Asia, South

Asia, East Asia, and three regions of Latin America. Explanatory notes and sources are listed following the statistics. Also included are the same variables for developed countries with over 1,000,000 ha of maize. Finally, summary data for all variables are presented for each of the major producing regions.

### NOTES ON VARIABLES INCLUDED IN PART II

**Variables 1 to 6:** Source: FAO Tape of Production Statistics.

**Variables 7 to 9:** Calculated from preceding variables as:  $g=100 * [\ln (x_t/x_{t_0})]/t$  where  $x_t$  is the average for the period  $t$ , 1978-80,  $x_{t_0}$  is the average for the period  $t_0$ , 1961-65, and  $t$  is the number of years between the midpoint of the two periods (i.e., 16).

**Variables 10 to 14:** Source: FAO Food Balance Sheets, 1980. Data are averages for 1975-77. Total utilization includes all domestic uses of maize, i.e., human consumption, animal feed, industrial uses, seed, and waste. Maize used for animal feed includes only maize produced for animals but excludes byproducts from milling maize for human consumption. These byproducts are usually fed to animals.

**Variables 15 and 16:** Source: World Development Report, 1980.

**Variable 17:** Calculated from total utilization (production plus net imports) using the same method as for variables 7 to 9 but with 1977-79 as the end period.

**Variable 18:** Source: FAO Food Balance Sheets, 1980. Based on change in per capita caloric intake from maize from 1961-65 to 1975-77.

**Variable 19:** Source: FAO Tape of Trade Statistics.

**Variables 20 and 21:** Source: FAO Tapes of Production and Trade Statistics. Total utilization is production plus net imports. If the country is an exporter, the statistic refers to percent of total production exported and is denoted by a negative sign.

**Variables 22 to 24:** Source: CIMMYT Economics. Survey of scientists who are in frequent contact with farmers. Data refer to the maize crop cycle harvested in 1980 or in early 1981 for a major maize-producing region within the country. The maize price is the post-harvest price received by farmers. Nitrogen price is the price paid by farmers for the most common nitrogen fertilizer, usually urea. Labor price is the price paid for unskilled labor for farm work per day. Currency conversions were made at the prevailing official exchange rate.

na: Data not available.

MAIZE STATISTICS		Burundi	Ethiopia	Kenya	Lesotho	Madagascar	Malawi		
EASTERN AND SOUTHERN AFRICA									
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	101	777	1250	142	102	848	
		2. Average 1978-80 (1,000 ha)	125	1006	1463	116	111	1067	
	YIELD	3. Average 1961-65 (ton/ha)	1.0	1.0	1.3	0.7	1.2	1.0	
		4. Average 1978-80 (ton/ha)	1.1	1.1	1.3	1.1	1.0	1.1	
		PRODUCTION	5. Average 1961-65 (1,000 ton)	98	743	1650	103	117	847
			6. Average 1978-80 (1,000 ton)	140	1064	1956	122	108	1167
	GROWTH RATES	7. Area 1961-80 (°/o per year)	1.3	1.6	1.0	-1.3	0.5	1.4	
		8. Yield 1961-80 (°/o per year)	0.9	0.6	0.1	2.4	-1.0	0.6	
		9. Production 1961-80 (°/o per year)	2.2	2.2	1.1	1.1	-0.5	2.0	
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	29	33	98	78	11	166		
	11. Percent of total calories from cereals	26	69	56	77	63	70		
	12. Percent cereal calories from maize	49	27	79	47	7	92		
	13. Per capita total domestic maize supply (kg/year)	34	36	164	103	16	214		
	14. Percent used for animals	2	0	3	8	2	5		
	15. Population growth rate 1970-78 (°/o per year)	2.0	2.5	3.3	2.3	2.5	2.9		
	16. Per capita income growth rate 1960-78 (°/o per year)	2.2	1.5	2.2	5.9	-0.3	2.9		
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	2.4	1.9	1.6	1.5	-0.4	2.8		
	18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	1.0	0.8	-0.1	-1.3	-1.7	0.3		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	0	0	-50	0	-4	0		
	20. Percent of total utilization imported - average 1961-65	0	0	1	0	-2	-2		
	21. Percent of total utilization imported - average 1977-79	0	0	-2	0	-4	0		
PRICES	22. Farm price of maize (US \$ per ton)	na	na	137	na	na	80		
	23. Ratio of farm level nitrogen price to maize price	na	na	6.7	na	na	8.7		
	24. Farm wage rate in kg of maize	na	na	5.15	na	na	4.3		

MAIZE STATISTICS								
EASTERN AND SOUTHERN AFRICA (Con't)		Mozam- bique	Somalia	Tanzania	Uganda	Zambia	Zimbabwe	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	409	104	836	197	872	700
		2. Average 1978-80 (1,000 ha)	600	150	1300	550	967	868
	YIELD	3. Average 1961-65 (ton/ha)	0.9	0.9	0.8	1.1	0.8	1.2
		4. Average 1978-80 (ton/ha)	0.6	0.7	0.7	1.0	0.8	1.6
	PRODUC- TION	5. Average 1961-65 (1,000 ton)	361	93	690	215	736	815
		6. Average 1978-80 (1,000 ton)	350	98	914	570	817	1344
	GROWTH RATES	7. Area 1961-80 (°/o per year)	2.4	2.3	2.8	6.4	0.6	1.3
		8. Yield 1961-80 (°/o per year)	-2.6	-1.9	-1.0	-0.3	0	1.8
		9. Production 1961-80 (°/o per year)	-0.2	0.3	1.8	6.1	0.7	3.1
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	38	41	52	29	113	145	
	11. Percent of total calories from cereals	37	44	36	28	68	72	
	12. Percent cereal calories from maize	51	43	67	48	78	76	
	13. Per capita total domestic maize supply (kg/year)	45	47	63	43	198	202	
	14. Percent used for animals	2	0	3	8	6	13	
	15. Population growth rate 1970-78 (°/o per year)	2.5	2.3	3.0	2.9	3.0	3.3	
	16. Per capita income growth rate 1960-78 (°/o per year)	0.4	-0.5	2.7	0.7	1.2	1.2	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	-4.7	1.4	1.9	6.6	1.3	3.8	
18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	-1.1	1.5	0.3	6.0	-0.4	1.9		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	-174	19	-17	0	10	-298	
	20. Percent of total utilization imported - average 1961-65	8	4	4	-4	-1	-19	
	21. Percent of total utilization imported - average 1977-79	-55	16	-3	0	1	-20	
PRICES	22. Farm price of maize (US \$ per ton)	na	na	244	na	169	76	
	23. Ratio of farm level nitrogen price to maize price	na	na	4.1	na	3.9	6.5	
	24. Farm wage rate in kg of maize	na	na	6.0	na	7.7	4.2	

		MAIZE STATISTICS						
		WESTERN AFRICA						
		Angola	Benir	Cameroon	Ghana	Guinea	Ivory Coast	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	516	405	270	210	328	238
		2. Average 1978-80 (1,000 ha)	600	380	535	330	420	570
	YIELD	3. Average 1961-65 (ton/ha)	0.8	0.5	1.0	1.0	1.0	0.7
		4. Average 1978-80 (ton/ha)	0.6	0.7	0.9	1.0	0.8	0.5
	PRODUCTION	5. Average 1961-65 (1,000 ton)	432	219	263	202	281	163
		6. Average 1978-80 (1,000 ton)	340	268	480	325	320	278
	GROWTH RATES	7. Area 1961-80 (°/o per year)	0.9	-0.4	4.3	2.8	1.5	5.5
		8. Yield 1961-80 (°/o per year)	-2.4	1.6	-0.5	0.2	-0.7	-2.1
		9. Production 1961-80 (°/o per year)	-1.5	1.3	3.8	3.0	0.8	3.3
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	45	53	36	27	42	25	
	11. Percent of total calories from cereals	35	37	33	27	58	33	
	12. Percent cereal calories from maize	60	65	44	48	37	29	
	13. Per capita total domestic maize supply (kg/year)	64	71	51	36	77	37	
	14. Percent used for animals	11	0	7	9	15	7	
	15. Population growth rate 1970-78 (°/o per year)	2.3	2.8	2.2	3.0	2.9	5.6	
	16. Per capita income growth rate 1960-78 (°/o per year)	1.2	0.4	2.9	-0.5	0.6	2.5	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	1.6	1.6	4.0	4.4	0.6	3.6	
	18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	0.1	-1.6	3.2	1.9	-0.6	-1.6	
TRADE	19. Net imports - average 1977-79 (1,000 ton)	51	5	0	56	4	14	
	20. Percent of total utilization imported - average 1961-65	-27	0	0	0	0	0	
	21. Percent of total utilization imported - average 1977-79	13	2	0	14	1	5	
PRICES	22. Farm price of maize (US \$ per ton)	na	na	na	1091	na	167	
	23. Ratio of farm level nitrogen price to maize price	na	na	na	0.4	na	4.7	
	24. Farm wage rate in kg of maize	na	na	na	5.8	na	6.3	

MAIZE STATISTICS								
WESTERN AFRICA (Con't)		Nigeria	Togo	Upper Volta	Zaire	Central African Rep.	Namibia	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	1171	157	160	508	59	80
		2. Average 1978-80 (1,000 ha)	1656	120	130	669	103	110
	YIELD	3. Average 1961-65 (ton/ha)	0.9	0.5	0.6	0.7	0.5	0.4
		4. Average 1978-80 (ton/ha)	0.9	1.3	0.8	0.7	0.4	0.4
	PRODUCTION	5. Average 1961-65 (1,000 ton)	997	75	100	340	32	30
		6. Average 1978-80 (1,000 ton)	1510	150	99	477	36	38
	GROWTH RATES	7. Area 1961-80 (°/o per year)	2.2	-1.7	-1.3	1.7	3.5	2.0
		8. Yield 1961-80 (°/o per year)	0.4	6.0	1.2	0.4	-2.7	-0.5
		9. Production 1961-80 (°/o per year)	2.6	4.3	-0.1	2.1	0.8	1.5
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	14	41	11	22	13	14	
	11. Percent of total calories from cereals	42	40	73	14	17	48	
	12. Percent cereal calories from maize	15	48	7	63	35	13	
	13. Per capita total domestic maize supply (kg/year)	20	57	12	27	18	18	
	14. Percent used for animals	5	0	0	2	0	0	
	15. Population growth rate 1970-78 (°/o per year)	2.5	2.7	1.6	2.7	2.2	2.8	
	16. Per capita income growth rate 1960-78 (°/o per year)	3.6	5.0	1.3	1.1	0.7	0.6	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	2.8	4.4	-0.7	4.0	0.2	1.6	
18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	-0.1	2.4	-4.1	2.5	-0.6	2.8		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	65	3	0	204	0	na	
	20. Percent of total utilization imported - average 1961-65	0	0	1	10	na	na	
	21. Percent of total utilization imported - average 1977-79	4	2	0	30	na	na	
PRICES	22. Farm price of maize (US \$ per ton)	na	na	na	668	na	na	
	23. Ratio of farm level nitrogen price to maize price	na	na	na	1.0	na	na	
	24. Farm wage rate in kg of maize	na	na	na	8.8	na	na	

		<i>MAIZE STATISTICS</i>			
		NORTH AFRICA		Egypt	Morocco
	AREA	1. Average 1961-65 (1,000 ha)		678	507
		2. Average 1978-80 (1,000 ha)		795	411
PRODUCTION	YIELD	3. Average 1961-65 (ton/ha)		2.8	0.8
		4. Average 1978-80 (ton/ha)		3.9	0.9
	PRODUC-TION	5. Average 1961-65 (1,000 ton)		1913	405
		6. Average 1978-80 (1,000 ton)		3063	359
GROWTH RATES		7. Area 1961-80 (°/o per year)		1.0	-1.3
		8. Yield 1961-80 (°/o per year)		1.9	0.6
		9. Production 1961-80 (°/o per year)		2.9	-0.8
CONSUMPTION		10. Per capita supply of maize for food (kg/year)		40	13
		11. Percent of total calories from cereals		67	67
		12. Percent cereal calories from maize		29	8
		13. Per capita total domestic maize supply (kg/year)		72	21
		14. Percent used for animals		35	21
		15. Population growth rate 1970-78 (°/o per year)		2.2	2.9
		16. Per capita income growth rate 1960-78 (°/o per year)		3.3	2.5
		17. Growth rate of total maize utilization 1961-79 (°/o per year)		3.4	0.3
	18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)		-0.4	1.0	
TRADE		19. Net imports - average 1977-79 (1,000 ton)		605	73
		20. Percent of total utilization imported - average 1961-65		10	-13
		21. Percent of total utilization imported - average 1977-79		17	20
PRICES		22. Farm price of maize (US \$ per ton)		93	na
		23. Ratio of farm level nitrogen price to maize price		5.1	na
		24. Farm wage rate in kg of maize		16.6	na

		MAIZE STATISTICS		Afghanistan	Turkey
		MIDEAST COUNTRIES OF ASIA			
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)		501	674
		2. Average 1978-80 (1,000 ha)		467	572
	YIELD	3. Average 1961-65 (ton/ha)		1.4	1.4
		4. Average 1978-80 (ton/ha)		1.8	2.2
	PRODUCTION	5. Average 1961-65 (1,000 ton)		711	950
		6. Average 1978-80 (1,000 ton)		779	1267
	GROWTH RATES	7. Area 1961-80 ( <sup>o</sup> /o per year)		-0.4	-1.0
		8. Yield 1961-80 ( <sup>o</sup> /o per year)		1.0	2.8
		9. Production 1961-80 ( <sup>o</sup> /o per year)		0.6	1.8
CONSUMPTION		10. Per capita supply of maize for food (kg/year)		30	9
		11. Percent of total calories from cereals		82	56
		12. Percent cereal calories from maize		19	5
		13. Per capita total domestic maize supply (kg/year)		39	30
		14. Percent used for animals		10	53
		15. Population growth rate 1970-78 ( <sup>o</sup> /o per year)		2.2	2.5
		16. Per capita income growth rate 1960-78 ( <sup>o</sup> /o per year)		0.4	4.0
		17. Growth rate of total maize utilization 1961-79 ( <sup>o</sup> /o per year)		0.5	2.1
	18. Growth rate of per capita maize supply for food, 1961-77 ( <sup>o</sup> /o per year)		-1.6	0.2	
TRADE		19. Net imports - average 1977-79 (1,000 ton)		0	0
		20. Percent of total utilization imported - average 1961-65		0	1
		21. Percent of total utilization imported - average 1977-79		0	0
PRICES		22. Farm price of maize (US \$ per ton)		na	na
		23. Ratio of farm level nitrogen price to maize price		na	na
		24. Farm wage rate in kg of maize		na	na



		MAIZE STATISTICS			
		India	Nepal	Pakistan	
		SOUTH ASIA			
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	4630	437	492
		2. Average 1978-80 (1,000 ha)	5777	448	655
	YIELD	3. Average 1961-65 (ton/ha)	1.0	1.9	1.0
		4. Average 1978-80 (ton/ha)	1.1	1.5	1.3
	PRODUCTION	5. Average 1961-65 (1,000 ton)	4593	849	514
		6. Average 1978-80 (1,000 ton)	6066	665	832
	GROWTH RATES	7. Area 1961-80 (% per year)	1.4	0.2	1.8
		8. Yield 1961-80 (% per year)	0.4	-1.7	1.2
		9. Production 1961-80 (% per year)	1.7	-1.5	3.0
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	7	42	7	
	11. Percent of total calories from cereals	65	84	64	
	12. Percent cereal calories from maize	6	24	5	
	13. Per capita total domestic maize supply (kg/year)	10	55	11	
	14. Percent used for animals	2	0	5	
	15. Population growth rate 1970-78 (% per year)	2.0	2.2	3.1	
	16. Per capita income growth rate 1960-78 (% per year)	1.4	0.8	2.8	
	17. Growth rate of total maize utilization 1961-79 (% per year)	1.6	-1.5	3.1	
18. Growth rate of per capita maize supply for food, 1961-77 (% per year)	0.3	-3.4	0.5		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	18	-3	-1	
	20. Percent of total utilization imported - average 1961-65	2	0	0	
	21. Percent of total utilization imported - average 1977-79	0	0	0	
PRICES	22. Farm price of maize (US \$ per ton)	150	121	125	
	23. Ratio of farm level nitrogen price to maize price	1.9	4.8	1.1	
	24. Farm wage rate in kg of maize	5.0	4.3	7.2	

MAIZE STATISTICS			
EAST ASIA		China	Korea DPR
AREA	1. Average 1961-65 (1,000 ha)	10500	270
	2. Average 1978-80 (1,000 ha)	12333	340
YIELD	3. Average 1961-65 (ton/ha)	2.5	4.1
	4. Average 1978-80 (ton/ha)	3.0	5.4
PRODUCTION	5. Average 1961-65 (1,000 ton)	26100	1106
	6. Average 1978-80 (1,000 ton)	37000	2000
GROWTH RATES	7. Area 1961-80 (°/o per year)	1.0	2.0
	8. Yield 1961-80 (°/o per year)	1.2	1.7
	9. Production 1961-80 (°/o per year)	2.2	3.7
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	18	10
	11. Percent of total calories from cereals	65	69
	12. Percent cereal calories from maize	12	5
	13. Per capita total domestic maize supply (kg/year)	33	92
	14. Percent used for animals	26	63
	15. Population growth rate 1970-78 (°/o per year)	1.6	2.6
	16. Per capita income growth rate 1960-78 (°/o per year)	3.7	4.5
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	1.8	2.6
18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	-0.2	-2.6	
TRADE	19. Net imports - average 1977-79 (1,000 ton)	1205	-233
	20. Percent of total utilization imported - average 1961-65	0	1
	21. Percent of total utilization imported - average 1977-79	4	-12
PRICES	22. Farm price of maize (US \$ per ton)	na	na
	23. Ratio of farm level nitrogen price to maize price	na	na
	24. Farm wage rate in kg of maize	na	na

		MAIZE STATISTICS				
		SOUTHEAST ASIA AND PACIFIC				
		Indonesia	Philippines	Thailand	Vietnam	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	2870	1966	422	262
		2. Average 1978-80 (1,000 ha)	2833	3369	1467	424
	YIELD	3. Average 1961-65 (ton/ha)	1.0	0.7	1.9	1.2
		4. Average 1978-80 (ton/ha)	1.3	1.0	2.1	1.2
	PRODUCTION	5. Average 1961-65 (1,000 ton)	2804	1273	816	304
		6. Average 1978-80 (1,000 ton)	3645	3187	3097	500
	GROWTH RATES	7. Area 1961-80 (% per year)	-0.1	3.4	7.8	3.0
		8. Yield 1961-80 (% per year)	1.7	2.4	0.5	0.1
		9. Production 1961-80 (% per year)	1.6	5.7	8.3	3.1
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	18	37	2	6	
	11. Percent of total calories from cereals	66	62	70	75	
	12. Percent cereal calories from maize	12	28	1	4	
	13. Per capita total domestic maize supply (kg/year)	20	62	7	9	
	14. Percent used for animals	2	13	25	18	
	15. Population growth rate 1970-78 (% per year)	1.8	2.7	2.7	2.9	
	16. Per capita income growth rate 1960-78 (% per year)	4.1	2.6	4.6	na	
	17. Growth rate of total maize utilization 1961-79 (% per year)	1.5	6.1	15.5	3.0	
18. Growth rate of per capita maize supply for food, 1961-77 (% per year)	-1.8	3.3	23.7	-1.5		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	35	96	-1818	104	
	20. Percent of total utilization imported - average 1961-65	0	0	-91	14	
	21. Percent of total utilization imported - average 1977-79	1	3	-70	19	
PRICES	22. Farm price of maize (US \$ per ton)	133	160	na	na	
	23. Ratio of farm level nitrogen price to maize price	1.9	8.9	na	na	
	24. Farm wage rate in kg of maize	6.6	8.3	na	na	

		<i>MAIZE STATISTICS</i>						
		MEXICO, CENTRAL AMERICA, AND CARIBBEAN						
		El Salvador	Guatemala	Haiti	Honduras	Mexico	Nicaragua	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	184	665	222	275	6960	174
		2. Average 1978-80 (1,000 ha)	272	630	246	391	7477	188
	YIELD	3. Average 1961-65 (ton/ha)	1.1	0.9	1.0	1.1	1.1	0.9
		4. Average 1978-80 (ton/ha)	1.9	1.3	1.0	1.0	1.3	1.2
	PRODUC-TION	5. Average 1961-65 (1,000 ton)	198	590	231	298	7369	152
		6. Average 1978-80 (1,000 ton)	517	803	247	407	10055	217
	GROWTH RATES	7. Area 1961-80 (°/o per year)	2.4	-0.3	0.6	2.1	0.4	0.5
		8. Yield 1961-80 (°/o per year)	3.6	2.3	-0.2	-0.2	1.4	1.7
		9. Production 1961-80 (°/o per year)	6.0	2.0	0.4	1.8	1.8	2.2
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	78	98	32	94	101	70	
	11. Percent of total calories from cereals	56	58	48	56	50	42	
	12. Percent cereal calories from maize	66	82	31	80	73	67	
	13. Per capita total domestic maize supply (kg/year)	96	119	44	119	154	91	
	14. Percent used for animals	12	10	18	13	13	13	
	15. Population growth rate 1970-78 (°/o per year)	2.9	2.9	1.7	3.3	3.3	3.3	
	16. Per capita income growth rate 1960-78 (°/o per year)	1.8	2.9	0.2	1.1	2.7	2.3	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	5.3	2.4	1.4	3.7	3.1	1.9	
	18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	1.1	-1.1	-2.2	-0.1	-0.4	-0.3	
TRADE	19. Net imports - average 1977-79 (1,000 ton)	35	66	17	31	1306	8	
	20. Percent of total utilization imported - average 1961-65	13	2	0	-13	-4	3	
	21. Percent of total utilization imported - average 1977-79	7	8	6	7	11	4	
PRICES	22. Farm price of maize (US \$ per ton)	156	150	240	165	235	na	
	23. Ratio of farm level nitrogen price to maize price	8.8	4.8	0.4	9.2	1.5	na	
	24. Farm wage rate in kg of maize	15.4	19.0	2.5	18.2	18.2	na	

		MAIZE STATISTICS					
		ANDEAN					
		Bolivia	Colombia	Ecuador	Peru	Venezuela	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	215	747	259	337	441
		2. Average 1978-80 (1,000 ha)	247	637	204	327	519
	YIELD	3. Average 1961-65 (ton/ha)	1.3	1.1	0.6	1.5	1.1
		4. Average 1978-80 (ton/ha)	1.3	1.3	1.0	1.7	1.6
	PRODUCTION	5. Average 1961-65 (1,000 ton)	269	826	159	490	477
		6. Average 1978-80 (1,000 ton)	315	848	209	565	851
	GROWTH RATES	7. Area 1961-80 (% per year)	0.9	-1.0	-1.5	-0.2	1.0
		8. Yield 1961-80 (% per year)	0.1	1.2	3.2	1.1	2.6
		9. Production 1961-80 (% per year)	1.0	0.2	1.7	0.9	3.6
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	27	27	20	22	38	
	11. Percent of total calories from cereals	39	31	33	42	35	
	12. Percent cereal calories from maize	30	38	29	23	44	
	13. Per capita total domestic maize supply (kg/year)	63	34	34	55	65	
	14. Percent used for animals	52	10	21	51	23	
	15. Population growth rate 1970-78 (% per year)	2.6	2.3	3.3	2.7	3.3	
	16. Per capita income growth rate 1960-78 (% per year)	2.2	3.0	4.3	2.0	2.7	
	17. Growth rate of total maize utilization 1961-79 (% per year)	1.0	0.6	2.0	3.4	5.9	
18. Growth rate of per capita maize supply for food, 1961-77 (% per year)	-3.1	-2.6	0.1	0.8	0.2		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	0	90	10	160	472	
	20. Percent of total utilization imported - average 1961-65	0	1	-1	2	10	
	21. Percent of total utilization imported - average 1977-79	0	10	5	19	37	
PRICES	22. Farm price of maize (US \$ per ton)	600	na	315	263	na	
	23. Ratio of farm level nitrogen price to maize price	na	na	2.0	4.2	na	
	24. Farm wage rate in kg of maize	4.0	na	7.1	4.0	na	

		MAIZE STATISTICS					
		SOUTHERN CONE, LATIN AMERICA					
		Argentina	Brazil	Chile	Paraguay	Uruguay	
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	2836	7814	86	121	229
		2. Average 1978-80 (1,000 ha)	2624	11042	113	343	130
	YIELD	3. Average 1961-65 (ton/ha)	1.8	1.3	2.4	1.3	0.7
		4. Average 1978-80 (ton/ha)	3.1	1.5	3.4	1.5	0.9
	PRODUC-TION	5. Average 1961-65 (1,000 ton)	4984	10112	204	154	148
		6. Average 1978-80 (1,000 ton)	8203	16784	384	502	121
	GROWTH RATES	7. Area 1961-80 (°/o per year)	-0.5	2.2	1.7	6.5	-3.6
		8. Yield 1961-80 (°/o per year)	3.6	1.0	2.2	0.9	2.3
		9. Production 1961-80 (°/o per year)	3.1	3.2	3.9	7.4	-1.3
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	5	21	5	56	9	
	11. Percent of total calories from cereals	30	36	51	31	33	
	12. Percent cereal calories from maize	4	23	3	64	9	
	13. Per capita total domestic maize supply (kg/year)	144	145	37	121	53	
	14. Percent used for animals	90	71	82	34	63	
	15. Population growth rate 1970-78 (°/o per year)	1.3	2.8	1.7	2.8	0.3	
	16. Per capita income growth rate 1960-78 (°/o per year)	2.6	4.9	1.0	2.6	0.7	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	1.8	3.6	6.3	7.3	-1.2	
	18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	2.6	-0.5	4.8	3.8	6.5	
TRADE	19. Net imports - average 1977-79 (1,000 ton)	-5762	448	179	0	14	
	20. Percent of total utilization imported - average 1961-65	-53	-3	4	-5	9	
	21. Percent of total utilization imported - average 1977-79	-65	3	33	0	10	
PRICES	22. Farm price of maize (US \$ per ton)	102	90	na	na	na	
	23. Ratio of farm level nitrogen price to maize price	4.9	5.8	na	na	na	
	24. Farm wage rate in kg of maize	24.8	22.2	na	na	na	

		MAIZE STATISTICS						
		SELECTED DEVELOPED COUNTRIES	USA	France	Hungary	Rumania	Yugoslavia	USSR
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	22933	914	1281	3308	2474	5887
		2. Average 1978-80 (1,000 ha)	29325	1861	1338	3263	2188	3244
	PRODUCTION	3. Average 1961-65 (ton/ha)	4.2	3.0	2.6	1.8	2.3	2.2
		4. Average 1978-80 (ton/ha)	6.3	5.3	5.2	3.3	4.1	2.6
		5. Average 1961-65 (1,000 ton)	95561	2760	3350	5853	5618	13122
		6. Average 1978-80 (1,000 ton)	185041	9824	7017	10711	8925	8275
	GROWTH RATES	7. Area 1961-80 (°/o per year)	1.5	4.4	0.3	-0.1	-0.8	-3.7
		8. Yield 1961-80 (°/o per year)	2.6	3.5	4.4	3.9	3.7	0.8
		9. Production 1961-80 (°/o per year)	4.1	7.9	4.6	3.8	2.9	-2.9
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	18	3	0	57	21	0	
	11. Percent of total calories from cereals	17	22	34	50	48	40	
	12. Percent cereal calories from maize	13	1	na	33	13	0	
	13. Per capita total domestic maize supply (kg/year)	483	117	536	434	377	63	
	14. Percent used for animals	89	90	97	69	81	73	
	15. Population growth rate 1970-78 (°/o per year)	0.8	0.6	0.4	0.9	0.9	0.9	
	16. Per capita income growth rate 1960-78 (°/o per year)	2.4	4.0	5.0	8.6	5.4	4.3	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	3.1	7.5	4.3	5.0	3.5	3.1	
18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	0.5	5.3	na	0	-2.0	0		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	-49904	-1216	-23	-383	229	10378	
	20. Percent of total utilization imported - average 1961-65	-12	-19	4	-15	-2	-6	
	21. Percent of total utilization imported - average 1977-79	-27	-23	-3	-8	2	52	
PRICES	22. Farm price of maize (US \$ per ton)	140	184	na	na	na	na	
	23. Ratio of farm level nitrogen price to maize price	3.7	3.1	na	na	na	na	
	24. Farm wage rate in kg of maize	na	317	na	na	na	na	

<i>MAIZE STATISTICS</i>		Developing Countries	Developed Market Economies	Eastern Europe and USSR	World	
REGIONAL CLASSIFICATIONS						
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	57331	33208	11434	101973
		2. Average 1978-80 (1,000 ha)	70514	42209	8862	121586
	YIELD	3. Average 1961-65 (ton/ha)	1.4	3.5	2.1	2.2
		4. Average 1978-80 (ton/ha)	1.7	5.5	3.4	3.1
	PRODUCTION	5. Average 1961-65 (1,000 ton)	79655	116408	24583	220646
		6. Average 1978-80 (1,000 ton)	118084	230187	30129	378400
	GROWTH RATES	7. Area 1961-80 (°/o per year)	1.3	1.5	-1.6	1.1
		8. Yield 1961-80 (°/o per year)	1.2	2.8	3.0	2.3
		9. Production 1961-80 (°/o per year)	2.5	4.3	1.3	3.4
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	21	29	9	21	
	11. Percent of total calories from cereals	61	27	39	50	
	12. Percent cereal calories from maize	13	10	3	12	
	13. Per capita total domestic maize supply (kg/year)	37	221	122	78	
	14. Percent used for animals	31	84	79	65	
	15. Population growth rate 1963-78 (°/o per year)	2.4	0.9	0.7	2.0	
	16. Per capita income growth rate 1960-78 (°/o per year)	-	-	-	-	
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	2.9	3.8	4.1	3.2	
18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	0	1.4	-0.2	0.4		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	5253	-21089	14189	-	
	20. Percent of total utilization imported - average 1961-65	-6	3	-6	4	
	21. Percent of total utilization imported - average 1977-79	4	-26	26	-18	
PRICES	22. Farm price of maize (US \$ per ton)	na	na	na	na	
	23. Ratio of farm level nitrogen price to maize price	na	na	na	na	
	24. Farm wage rate in kg of maize	na	na	na	na	



MAIZE STATISTICS			Eastern and Southern Africa	Western Africa	Mideast Countries of Asia	North Africa	South Asia	Southeast Asia and Pacific
REGIONAL CLASSIFICATIONS (Con't)								
PRODUCTION	AREA	1. Average 1961-65 (1,000 ha)	6476	4331	1219	1191	5737	5673
		2. Average 1978-80 (1,000 ha)	8557	5866	1217	1209	7039	8222
	YIELD	3. Average 1961-65 (ton/ha)	1.0	0.8	1.4	2.0	1.1	1.0
		4. Average 1978-80 (ton/ha)	1.0	0.8	1.9	2.8	1.1	1.3
	PRODUCTION	5. Average 1961-65 (1,000 ton)	6558	3328	1724	2324	6070	5415
		6. Average 1978-80 (1,000 ton)	8869	4543	2363	3425	7722	10575
	GROWTH RATES	7. Area 1961-80 (% per year)	1.7	1.9	0	0.1	1.3	2.3
		8. Yield 1961-80 (% per year)	0.1	0	2.0	2.3	0.2	1.9
		9. Production 1961-80 (% per year)	1.9	1.9	2.0	2.4	1.5	4.2
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	58	22	10	24	8	19	
	11. Percent of total calories from cereals	53	40	62	64	68	66	
	12. Percent cereal calories from maize	44	28	5	16	5	11	
	13. Per capita total domestic maize supply (kg/year)	73	28	21	49	10	34	
	14. Percent used for animals	5	6	46	30	2	16	
	15. Population growth rate 1963-78 (% per year)	2.7	3.0	2.6	2.6	2.4	2.5	
	16. Per capita income growth rate 1960-78 (% per year)	-	-	-	-	-	-	
	17. Growth rate of total maize utilization 1961-79 (% per year)	2.1	2.7	4.6	3.5	1.4	4.3	
18. Growth rate of per capita maize supply for food, 1961-77 (% per year)	0.8	0.5	-0.3	-0.9	-0.2	0.1		
TRADE	19. Net imports - average 1977-79 (1,000 ton)	-495	510	1532	988	24	-451	
	20. Percent of total utilization imported - average 1961-65	-4	-3	13	7	2	-17	
	21. Percent of total utilization imported - average 1977-79	-6	10	39	23	3	-21	
PRICES	22. Farm price of maize (US \$ per ton)	na	na	na	na	na	na	
	23. Ratio of farm level nitrogen price to maize price	na	na	na	na	na	na	
	24. Farm wage rate in kg of maize	na	na	na	na	na	na	

MAIZE STATISTICS		East Asia	Mexico, Central America, Caribbean	Andean	Southern Cone
REGIONAL CLASSIFICATIONS (Con't)					
PRODUCTION	AREA				
	1. Average 1961-65 (1,000 ha)	10823	8794	2001	11086
	2. Average 1978-80 (1,000 ha)	12771	9446	1935	14252
	YIELD				
	3. Average 1961-65 (ton/ha)	2.5	1.0	1.1	1.4
	4. Average 1978-80 (ton/ha)	3.1	1.3	1.4	1.8
	PRODUC-TION				
	5. Average 1961-65 (1,000 ton)	27263	9148	2223	15602
	6. Average 1978-80 (1,000 ton)	39240	12564	2791	25994
GROWTH RATES	7. Area 1961-80 (°/o per year)	1.0	0.4	-0.2	1.6
	8. Yield 1961-80 (°/o per year)	1.2	1.5	1.6	1.6
	9. Production 1961-80 (°/o per year)	2.3	2.0	1.4	3.2
CONSUMPTION	10. Per capita supply of maize for food (kg/year)	22	83	21	20
	11. Percent of total calories from cereals	66	48	36	36
	12. Percent cereal calories from maize	11	57	33	19
	13. Per capita total domestic maize supply (kg/year)	35	124	48	137
	14. Percent used for animals	29	18	30	73
	15. Population growth rate 1963-78 (°/o per year)	2.1	2.9	2.8	2.7
	16. Per capita income growth rate 1960-78 (°/o per year)	-	-	-	-
	17. Growth rate of total maize utilization 1961-79 (°/o per year)	2.6	3.3	2.8	3.4
	18. Growth rate of per capita maize supply for food, 1961-77 (°/o per year)	-0.2	-0.3	-1.1	0.2
TRADE	19. Net imports - average 1977-79 (1,000 ton)	5186	2312	768	-5121
	20. Percent of total utilization imported - average 1961-65	0.4	-4	3	-19
	21. Percent of total utilization imported - average 1977-79	13	16	21	-24
PRICES	22. Farm price of maize (US \$ per ton)	na	na	na	na
	23. Ratio of farm level nitrogen price to maize price	na	na	na	na
	24. Farm wage rate in kg of maize	na	na	na	na

## SOURCES

*Green Markets*, Fertilizer Market Intelligence Weekly, Washington, various issues.

FAO, *Commodity Projections 1985; Coarse Grains: Supply, Demand and Trade Projections*, Commodities and Trade Division, Economic and Social Policy Department, FAO, Rome, 1978.

FAO, *Food Balance Sheets 1975-77*, Rome, 1980.

FAO, *Food Outlook*, Rome, various issues.

FAO, *Production Yearbook*, Rome, various issues.

FAO, *Trade Yearbook*, Rome, various issues.

International Wheat Council, *World Wheat Statistics*, London, various issues.

USDA, *Feed Situation*, Economics, Statistics and Cooperative Service, Washington, various issues.

USDA, *Fertilizer Situation*, Economics, Statistics, and Cooperative Service, Washington, various issues.

USDA, *Foreign Agriculture Circular, Grains*, various issues.

USDA, *Wheat Situation*, Economics, Statistics, and Cooperative Service, Washington, various issues.

*The Wall Street Journal*, New York, various issues.

World Bank, *World Development Report*, Oxford University Press, Washington, 1980.

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