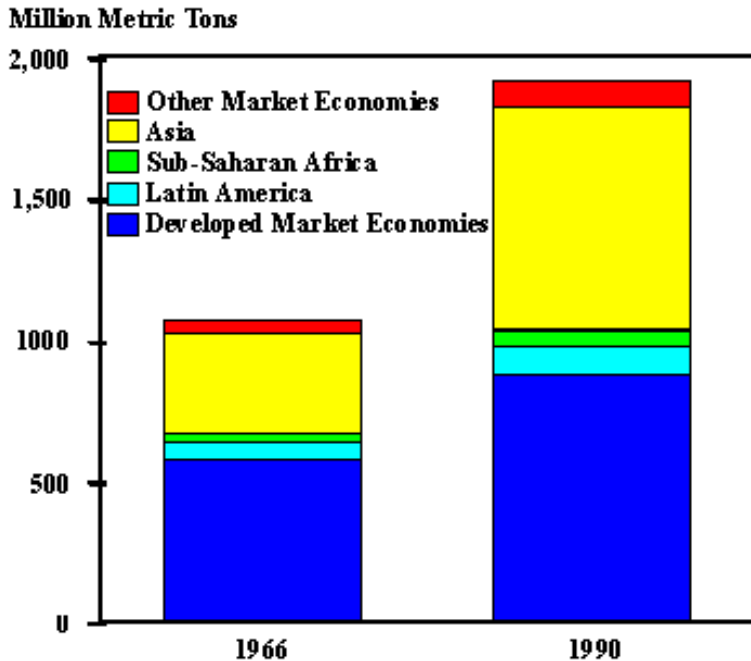


## World Production of Cereals, 1966-90

by Mercedita C. Agcaoili and Mark W. Rosegran

Figure 1--World cereal production by region, 1966 and 1990



Source: FAO, Agrostat-PC database.

Note: Other market economies are primarily North Africa and the Middle East.

### Trends in Cereal Production

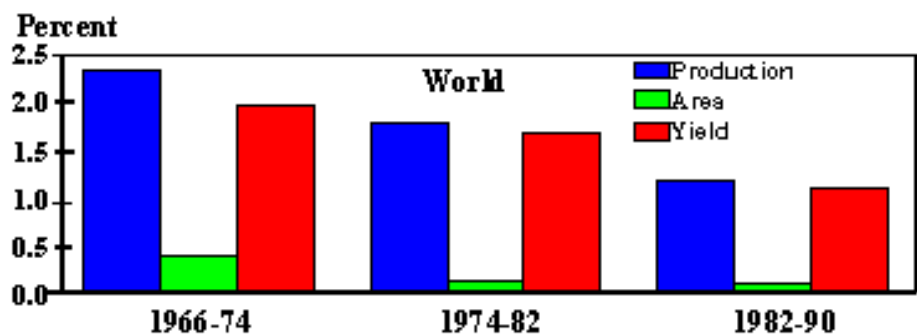
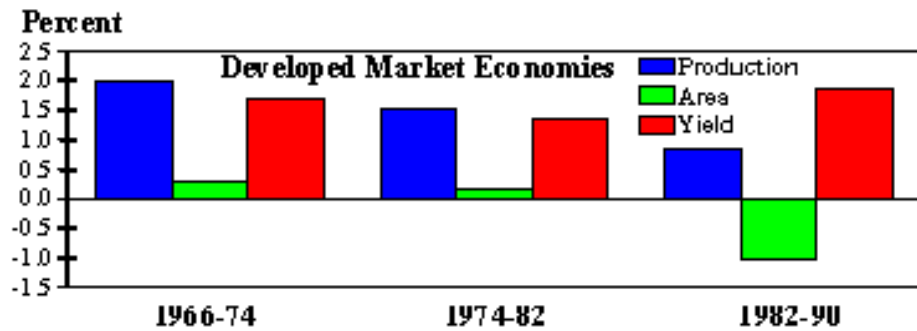
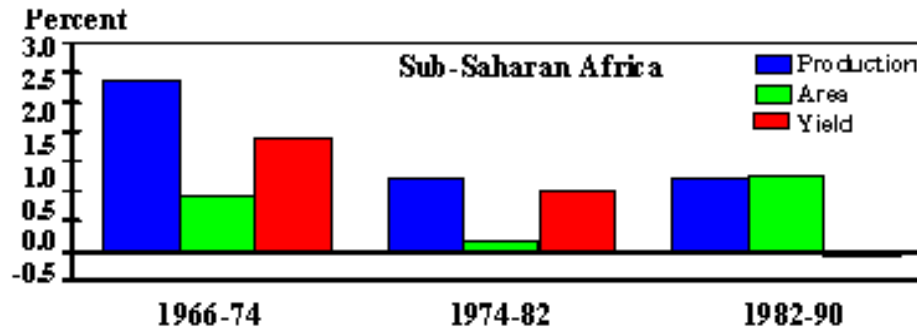
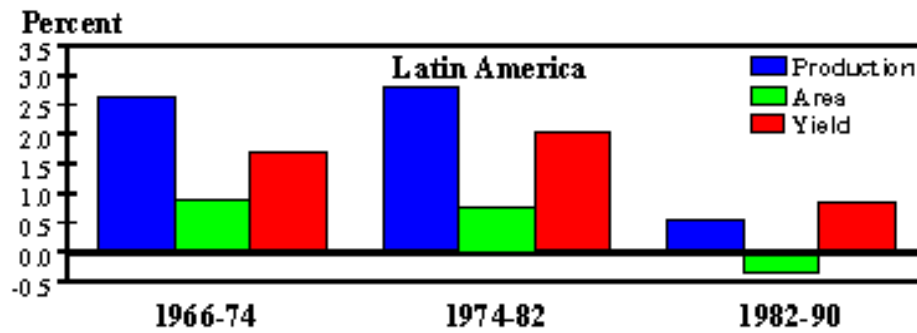
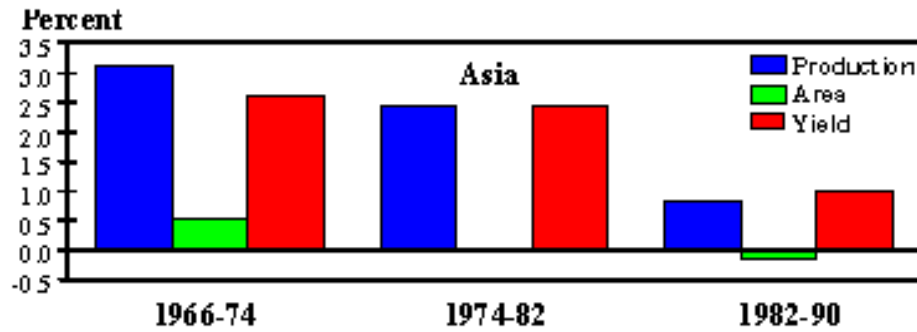
World production of cereals increased from 1,075.8 million tons in 1966 to 1,913.2 million tons in 1990, representing an average annual growth rate of 3.9 percent during the period (Figure 1). Although the developed market economies (DME) produced the bulk of world cereals, their share decreased from 54 percent in 1966 to 46 percent by 1990. At the same time, the developing countries' share in total production increased, primarily in Asia, which is the major contributor to cereal production. Asia's share increased from 33 percent in 1966 to 41 percent in 1990. Paddy rice, 90 percent of which came from Asia, accounted for most of this gain. The shares of many other developing countries rose slightly, except Sub-Saharan African countries, which maintained a 3 percent share throughout the period.

### Sources of Growth

Yield growth primarily accounted for cereal production increases, particularly in paddy rice and

wheat (Figure 2). Area expansion contributed about a third during 1966-74 but virtually halted after that. Productivity growth rose to its peak in 1974-82, the period when green revolution technology became widespread, especially in Asia. The synergistic interaction of irrigation, high-yielding varieties, and fertilizer, the main components of the new technology, increased yield levels of paddy rice from 2 tons per hectare in 1966, the early years of the green revolution, to

more than 3 tons per hectare in the 1980s.



Irrigation expansion was extremely rapid in Asia, especially during 1966-74. By the end of the 1980s, 136 million hectares of arable land in the region was under irrigation. This represented about 78 percent of total irrigated area in all developing countries. Growth in irrigated area paved the way for wider adoption of the modern seed varieties. By the end of the 1980s, some countries--the Philippines, Indonesia, and Sri Lanka--in Asia had about 75 percent or more of their rice farms covered with high-yielding rice seeds. Fertilizer use grew at about 12 percent per year between 1964-88, with some countries increasing their rates of application to 260 kilograms per hectare.

Not all countries in Asia, however, had the resources available during this period to increase productivity levels. South Asian countries seem to be catching up, however, as indicated by the dramatic increases in rice and wheat yield growth rates in the 1980s. This is due to the relatively rapid spread of high-yielding varieties during the decade and the continued increases in irrigated area, mainly through investments in surface water systems in India and private investments in tubewells in Bangladesh.

### **Sustaining Productivity Growth**

After 1982, growth in aggregate cereal output, particularly rice and wheat, started to decline. A number of factors contributed to this slowdown. The deterioration of commodity prices reduced incentives to invest in the development of more irrigation and other infrastructure facilities as well as in research and extension. Reduction in expenditures for irrigation was accompanied by a decline in the quality and performance of irrigation systems. Another set of factors related to the decline in yield potential due to inefficiency of fertilizer use and increased crop losses from pests. Maintaining yield growth has become increasingly difficult and costly. Nevertheless, research efforts are under way to develop new technology that would break through present yield potentials. One research undertaking in progress is the development of a hybrid rice in China, which yields 15-20 percent more than the semi-dwarf varieties.

To sustain these efforts, however, the following innovations in policies are required:

- invest more in research and extension and increase farmer input and feedback into technology generation and the dissemination process;
- shift fertilizer policy from an emphasis on increasing the level of use to improving efficiency of nutrient balance and timing and placement of fertilizer;
- shift crop protection policy from dissemination of chemical pesticides to use of integrated pest management;
- shift emphasis in irrigation policy from investment in new systems to improvement of water-use efficiency and productivity in existing systems;
- adopt appropriate economic incentives through price policies that keep domestic prices in line with long-term world price trends; and
- reform trade and macroeconomic policy regimes that penalize agriculture to stimulate production by improving short-term input-use efficiency and encourage long-term investment and technological change in the agriculture sector.

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"A 2020 Vision for Food, Agriculture, and the Environment" is an initiative of the International Food Policy Research Institute (IFPRI) to develop a shared vision and consensus for action on how to meet future world food needs while reducing poverty and protecting the environment. Through the 2020 Vision initiative, IFPRI is bringing together divergent schools of thought on these issues, generating research, and identifying recommendations. The *2020 Briefs* present information on various aspects of the issues.