

# Foodcrops

**C**AN THE WORLD go on feeding itself as populations continue to increase in the poorest, most hungry nations? Eliminating local poverty may be as important as boosting global food yields. But achieving both will ultimately depend on adopting more sustainable methods of agriculture.

Over the past four decades, worldwide food production has more than kept pace with the doubling of world population. There is currently an average of 2 790 calories of food available each day for every human on the planet – 23 percent more than in 1961 and enough to feed everyone. Moreover, there is potential slack in the system. If only a third of the cereals fed to livestock were put instead directly onto human plates, the per-capita calories available daily would rise to 3 000<sup>1</sup>.

Gains in food availability have been greatest in the developing world, where the green revolution enabled a rise of 38 percent between 1961 and 1998 to 2 660 calories per person daily.

The increase in food production, however, has been unable to overcome inequalities of food distribution. The developed world, with a quarter of the world's population, still takes some 49 percent of the world's agricultural products, partly because it converts more grain to meat. Even so, differences in food availability within the developing world are now greater than between typical developed and developing countries.

Outright famines still occur, both because of local failures in food production, often caused by environmental degradation, and because of failures in the global trade and emergency aid systems. But there is a wider problem of persistent malnourishment. Some 790 million people do not have access to enough food to live healthy and productive lives.

Malnourishment contributes to at least a third of child deaths. In 1998, there were 78 low-income countries that neither grew enough food to feed their populations, nor had the resources to make up the deficit with imports. Of these, more than half were in Africa<sup>2</sup>. Here, population growth rates are highest and poverty is greatest, soils are generally most vulnerable to degradation and modern advances in agricultural technology have had the least impact<sup>3</sup>. The World Food Summit pledged in 1996 to halve malnutrition within 20 years. But the Food and Agriculture Organization of the United Nations (FAO) predicts that in some regions of the world chronic undernourishment is likely to persist, rising to 30 percent of the population of sub-Saharan Africa in 2010.

Poverty and hunger frequently cause a cycle of environmental decline that further undermines food security. Environmental degradation often occurs when poor nations, and poor communities within nations, cannot feed themselves without disregarding the future fertility of the land. They overcultivate or overgraze land to meet immediate needs, or annexe inappropriate land with steep slopes, and shallow, infertile, stony, toxic or poorly drained soils. In the process they are often forced to invade natural ecosystems.

The world's reserves of uncultivated land are largely in the two regions still containing substantial tropical forests: sub-Saharan Africa with 750 million hectares, and Latin America with 800 million hectares. Addressing the needs of the poorest farmers is vital to the protection of these forests.



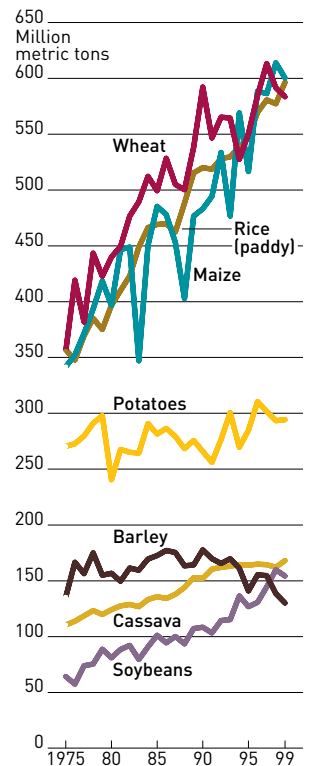


### THE WORLD'S BIGGEST CEREAL PRODUCERS, 1999

	Million tons of cereal	% of world pro-duction	% of world popu-lation
China	457.04	22.14	21.19
USA	336.03	16.28	4.62
India	230.04	11.14	16.69
France	64.76	3.14	0.98
Indonesia	58.67	2.84	3.50
Russia	53.78	2.61	2.46
Canada	53.78	2.61	0.52
Brazil	47.64	2.31	2.81
Germany	44.33	2.15	1.37
Argentina	33.43	1.62	0.61
Vietnam	33.15	1.61	1.32
Bangladesh	31.83	1.54	0.31
Australia	31.12	1.51	1.10
Turkey	30.28	1.47	1.10
Mexico	28.65	1.39	1.63

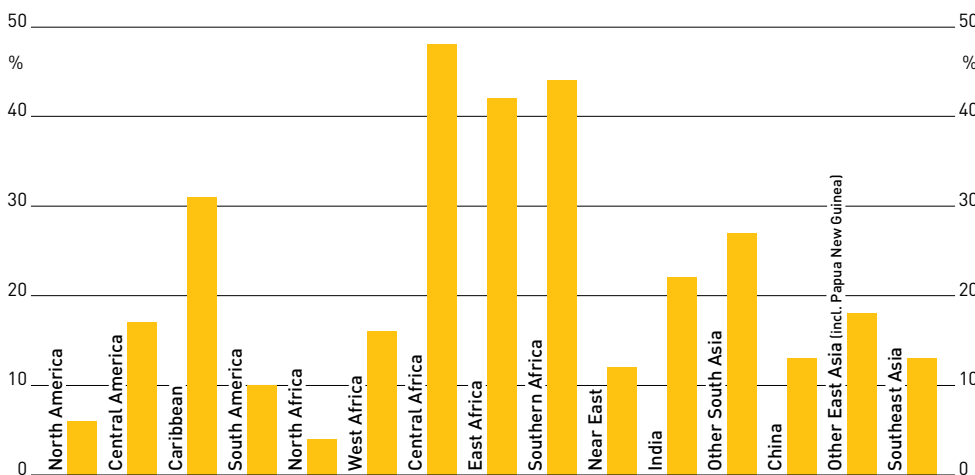
Source: FAO; UNPD.

### GROWTH IN WORLD PRODUCTION Selected crops



Source: FAO.

### PROPORTION OF UNDERNOURISHED, BY REGION, LATE 1990s



Source: FAO.

## BIODIVERSITY FOR FOOD

The world currently uses only a tiny fraction of the genetic resources available for food. Of 270 000 plants known to science only around 120 are cultivated today and just nine of them provide 80 percent of our food<sup>10</sup>. For thousands of years, farmers have bred new crop varieties and tailored their farming methods to maintain both food supply and their land's fertility. The result was a huge diversity of plant varieties and farming methods. In the drive to standardize on a few high-yielding crop varieties, much of this diversity was lost, not only to farms but also to gene banks, though this trend is now reversing. A similar story can be told for livestock farming. Future advances in farming are likely to require tailoring crop varieties and farming methods more precisely to local conditions.

Meeting the immediate needs of the poor is a major environmental as well as humanitarian challenge<sup>4</sup>. But the pursuit of sustainable agriculture also requires the world to find ways of reorganizing food trade and farming subsidies to reduce the environmental impacts of intensive agriculture in rich nations.

Overintensive agriculture to supply a fast-growing global market in food is a major cause of the degradation of natural resources. The direct environmental costs of British agriculture, for instance, have been assessed at US\$3.9 billion, or US\$350 per hectare per year. The costs include cleaning pesticides and nitrogen from drinking water, restoring lost habitats and eroded soils, and combating emissions of greenhouse gases<sup>5</sup>.

While many developing countries, particularly in Asia, have seen steady increases in agricultural productivity, others have fared less well. In Africa overall, agricultural productivity has actually gone down since the 1960s, while the population has continued to rise. There is also concern that there may be a slackening of yield growth even in those areas where yields rose consistently through the 1970s and 1980s. The gains in rice productivity in Asia appeared to falter in the 1990s, with growth in rice yields down from 3 percent a year in the 1970s to less than 2 percent in the 1990s<sup>4</sup>.

Some analysts see this as a turning point beyond which degradation of land and water resources will result in the world running increasingly short of food. China, for instance, may be forced to become a major importer of grain, disrupting world markets and reducing the supplies available for other, poorer grain-short nations, particularly in Africa<sup>7</sup>. Others argue that this could revive the declining agricultural sector in much of the developed world without disrupting supplies to poorer nations. A third viewpoint is that the slackening merely reflects declining population growth rates in Asia and the operation of market forces as supply catches up with demand<sup>8</sup>.

Whatever the truth, the environmental constraints on farming will themselves change in the 21st century. Climate change will begin to have a profound effect on food production around the world, leading to famine and outward migration in some communities, but to additional wealth and inward migration in others. Recent assessments suggest that global warming will increase crop yields at high and mid-latitudes – largely comprising countries that already feed themselves and have low rates of future population growth. Increases may be most marked in North America and China, where more rainfall is predicted. Meanwhile increased heat stress and evaporation of moisture from soils is likely to reduce yields in lower latitudes – where food shortages are already greatest and predicted population growth rates highest. Studies again single out Africa as likely to suffer the greatest yield reductions, with up to 70 million more people at risk of hunger<sup>9</sup>.

## REDUCTION OF DIVERSITY IN FRUITS AND VEGETABLES \*

Vegetable	Taxonomic name	Number held in 1903	Number held in 1983	% loss
Asparagus	<i>Asparagus officinalis</i>	46	1	97.8
Bean	<i>Phaseolus vulgaris</i>	578	32	94.5
Beet	<i>Beta vulgaris</i>	288	17	94.1
Carrot	<i>Daucus carota</i>	287	21	92.7
Leek	<i>Allium ampeloprasum</i>	39	5	87.2
Lettuce	<i>Lactuca sativa</i>	487	36	92.6
Onion	<i>Allium cepa</i>	357	21	94.1
Parsnip	<i>Pastinaca sativa</i>	75	5	93.3
Pea	<i>Pisum sativum</i>	408	25	93.9
Radish	<i>Raphanus sativus</i>	463	27	94.2
Spinach	<i>Spinacia oleracea</i>	109	7	93.6
Squash	<i>Cucurbita spp.</i>	341	40	88.3
Turnip	<i>Brassica rapa</i>	237	24	89.9

\* Varieties held at the US National Seed Storage Laboratory, Colorado State University

Source: WRI.