Cereal

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Oats, barley, and some products made from them

Cereal crops are mostly grasses cultivated for their edible grains or seeds (actually a fruit called a caryopsis). Cereal grains are grown in greater quantities worldwide than any other type of crop and provide more food energy to the human race than any other crop. In some developing nations, cereal grains constitute practically the entire diet of common folk. In developed nations, cereal consumption is more moderate but still substantial. The word *cereal* derives from *Ceres*, the name of the Roman goddess of harvest and agriculture. Grains are traditionally called *corn* in the United Kingdom, though that word became specified for *maize* in the United States, Canada, New Zealand, and Australia.

Production

The following table shows annual production of major cereal grains, in 1961 and 2005, ranked by 2005 production.All but buckwheat and quinoa are true grasses (these two are **pseudocereals**).

Grain	2005 (Mt)	1961 (Mt)	
Maize	694,575,552	205,004,683	A staple food of peoples in North America, South America, and Africa and of livestock worldwide; called "corn" or "Indian corn" in North America and Australia.
Wheat	628,101,035	222,357,231	The primary cereal of temperate regions
Rice[2]	618,534,989	215,654,697	The primary cereal of tropical regions
Barley	137,302,263	72,411,104	Grown for malting and livestock on land too poor or too cold for wheat
Sorghums	58,620,842	40,931,625	Important staple food in Asia and Africa and popular worldwide for livestock
Millets	27,388,444	25,703,968	A group of similar but distinct cereals that form an important staple food in Asia and Africa.
Oats	23,972,508	49,588,769	Formerly the staple food of Scotland and popular worldwide for livestock
Rye	15,605,370	35,109,990	Important in cold climates
Triticale	13,473,141	0	Hybrid of wheat and rye, grown similarly to rye
Buckwheat	2,529,794	2,478,596	Used in Europe and Asia. Major uses include various pancakes and groats
Fonio	264,508	178,483	Several varieties of which are grown as food crops in Africa
Quinoa	51,152	32,435	Ancient pseudocereal, grown in the Andes

Maize, wheat and rice, between them, accounted for 87% of all grain production, worldwide, and 43% of all food calories in 2003. Other grains that are important in some places, but that have little production globally (and are not included in FAO statistics), include:

- Teff, popular in Ethiopia but scarcely known elsewhere
- Wild rice, grown in small amounts in North America
- Spelt, a close relative of wheat
- Grain amaranth, ancient pseudocereal, formerly the staple crop of the Aztec Empire
- Kañiwa, close relative of quinoa, to which it is quite similar

Cultivation

A wheat field in Dorset, England.

While each individual species has its own peculiarities, the cultivation of all cereals crops is similar. All are annual plants; consequently one planting yields one harvest. Wheat, rye, triticale, oats, barley, and spelt are the **cool-season** cereals. These are hardy plants that grow well in moderate weather and cease to grow in hot weather (approximately 30 °C but this varies by species and variety). The other **warm-season** cereals are tender and prefer hot weather.

Barley and rye are the hardiest cereals, able to overwinter in the subarctic and Siberia. Wheat is the most popular. All cool-season cereals are grown in the tropics, but only in the cool highlands, where it may be possible to grow multiple crops in a year.

Planting

The warm-season cereals are grown in tropical lowlands year-round and in temperate climates during the frost-free season.

Cool-season cereals are well-adapted to temperate climates. Most varieties of a particular species are either **winter** or **spring** types. Winter varieties are sown in the autumn, germinate and grow vegetatively, then become dormant during winter. They resume growing in the springtime and mature in late spring or early summer. This cultivation system makes optimal use of water and frees the land for another crop early in the growing season. Winter varieties do not flower until springtime because they require **vernalization** (exposure to low temperature for a genetically determined length of time). Where winters are too warm for vernalization or exceed the hardiness of the crop (which varies by species and variety), farmers grow spring varieties. Spring cereals are planted in early springtime and mature later that same summer, without vernalization. Spring cereals typically require more irrigation and yield less than winter cereals.

Harvest

Once the cereal plants have grown their seeds, they have completed their life cycle. The plants die and become brown and dry. As soon as the parent plants and their seed kernels are reasonably dry, harvest can begin.

In developed countries, cereal crops are universally machine-harvested, typically using a combine harvester, which cuts, threshes, and winnows the grain during a single pass across the field. In developing countries, a variety of harvesting methods are in use, from combines to hand tools such as scythes.

If a crop is harvested during wet weather, the grain may not dry adequately in the field to prevent spoilage during its storage. In this case, the grain is sent to a dehydrating facility, where artificial heat dries it.

In North America, farmers commonly deliver their newly harvested grain to a grain elevator, a large storage facility that consolidates the crops of many farmers. The farmer may sell the grain at the time of delivery or maintain ownership of a share of grain in the pool for later sale.

Food value

Chickens are often fed grains such as wheat

Cereal grains supply most of their food energy as starch. They are also a significant source of protein, though the amino acid balance is not optimal. Whole grains (see below) are good sources of dietary fiber, essential fatty acids, and other important nutrients.

Rice is eaten as cooked entire grains, although rice flour is also produced. Oats are rolled, ground, or cut into bits (steel-cut oats) and cooked into porridge. Most other cereals are ground into flour or meal, that is **milled**. The outer layers of bran and germ are removed (see seed). This lessens the nutritional value but makes the grain more resistant to degradation and makes the grain more appealing to many palates. Health-conscious people tend to prefer whole grains, which are not milled. Overconsumption of milled cereals is sometimes blamed for obesity. Milled grains do keep better because the outer layers of the grains are rich in rancidity-prone fats. The waste from milling is sometimes mixed into a prepared animal feed.

Once (optionally) milled and ground, the resulting flour is made into bread, pasta, desserts, dumplings, and many other products. Besides cereals, flour is sometimes made from potatoes, chestnuts and pulses (especially chickpeas).

Cereals are the main source of energy providing about 350 kcal per 100 grams. Cereal proteins are typically poor in nutritive quality, being deficient in essential amino acid lysine. The proteins of maize are particularly poor, being deficient in lysine and tryptophan (a precursor of niacin). Rice proteins are richer in lysine than other common cereal proteins and for this reason, rice protein is considered to be of better quality. Rice is a good source of B group vitamins, especially thiamine. It is devoid of vitamins A, D, C and is a poor source of calcium and iron.

In English, cold breakfast cereals and porridges are simply called **cereal**.