Preface

Bakery science and cereal technology is one of the important courses being offered to undergraduate students as a professional elective. Through this course the students shall acquire adequate knowledge of structure, nutrient composition and processing of various cereals particularly those which are used in bakery industry, milling of wheat, physico-chemical and functional properties of cereals, role and storage of ingredients used in baking, types and grades of flour, baked products prepared by hard and soft wheat viz. bread, cakes, crackers, cookies, wafers etc, losses in baking, quality evaluation, standards, packaging and sale of bakery products, and prospects and problems of bakery industry. This book containing the above information can also be used as a technical guide and reference book to personnel engaged in bakeries.

We sincerely feel that this ready reference study material shall prove to be very useful and handy to the students.

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Chapter 1
Importance of Cereals

The cereals comprise a group of plants from the grass family, Gramineae whose seeds are valuable for food for both man and domestic animals. Cereal grains are among the first crops to be planted and harvested by mankind. Long before the beginning of the historic period, man learnt to use cereals (Fig. 1.1). Ancient civilizations flourished partly due to their abilities to produce, store and distribute these cereal grains. In the Western hemisphere, maize was the cereal domesticated in America by the early Indians, even before the arrival of Europeans. When Columbus discovered America, maize was growing in most of the region by the inhabitants. Afterwards, it was introduced into Europe. In ancient Mexico, the harvest festival was held in honour of the goddess of Maize, or the ‘long-haired mother’ as she was called. The festival began at the time when the plant had attained its full growth and the tassel at the top of the cob indicated that the grain was full formed. At this festival, the women and men wore their hair long to imitate maize tassels and they danced tossing their hair to encourage the tassels to grow large and in profusion so that the grain might be correspondingly large and fat, that the people might have abundance.

Rice and wheat were the important early cereals developed in Asia Minor and Asia. These cereals had important place in the great Asian civilizations. Records show that from about 2300 to 1750 BC, wheat, barley and rice were grown by the inhabitants of northern India. In all these ancient societies, cereals continued to be among the preferred crops right through to the Egyptians and to the modern farms of our time. Since wheat was grown in the prehistoric times, geneticists as yet are not aware of the fact what wild seeds were the parents of today’s high yielding varieties of wheat. Barley had its origin in Ethiopia and northeast Africa. The use of barley in both ancient Hindu and ancient Greek religious rites suggests that barley cultivation is ancient. This has been confirmed by remains found at Stone Age lake-dweller sites in Europe.

Cereals form the main bulk of the food supply consumed by mankind especially in developing countries as they are the inexpensive source of food energy and protein. They are used directly or in modified form. Cereals are also used as animal feed and hence, converted into meat, milk and eggs. They are also used for industrial purposes.

The principal cereal grains grown in the world are corn, rice, wheat, sorghum, barley, oats, rye and millets. A new cereal of considerable interest is triticale which is a cross hybrid of wheat and rye. Different cereals grow under different agro-climatic conditions e.g. sorghum and millets grow well in semi-arid conditions, deep water rice in arid regions while rye and oats require cold climates. Cereal plants range in height from 30 cm (e.g., teff) to 300 cm (pearl millet and sorghum). Most cereals are thin-stemmed grassy plants, but maize, sorghum and pearl millet have thick stems more similar to sugarcane than grass. Cereal crops provide the farmer with straw for fodder and thatch, as well as grain for the family and the market.

Each cereal grain is a seed and hence, a living entity. If not damaged, it is viable and has all the characteristics expected of a living organism. The grain has genetic information, all the complex biochemical substances required for biosynthetic machinery and energy stores which help the grain to germinate under optimum condition.
Cereal Production and Importance

The world production of major cereals has improved over the years. The data in Table 1.1 represents the major cereal producing countries in the world during 1997-1999. The cereal production was maximum in USA followed by India and Africa.

Table 1.1: Major Cereal Producing Countries of the World

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Countries</th>
<th>Total Cereal Production (000 metric tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1997</td>
</tr>
<tr>
<td>1.</td>
<td>USA</td>
<td>336502</td>
</tr>
<tr>
<td>2.</td>
<td>India</td>
<td>226646</td>
</tr>
<tr>
<td>3.</td>
<td>Africa</td>
<td>110891</td>
</tr>
<tr>
<td>4.</td>
<td>France</td>
<td>63432</td>
</tr>
<tr>
<td>5.</td>
<td>Canada</td>
<td>49526</td>
</tr>
<tr>
<td>6.</td>
<td>Russia</td>
<td>86802</td>
</tr>
<tr>
<td>7.</td>
<td>Germany</td>
<td>45486</td>
</tr>
<tr>
<td>8.</td>
<td>Brazil</td>
<td>47321</td>
</tr>
<tr>
<td>9.</td>
<td>Australia</td>
<td>30829</td>
</tr>
</tbody>
</table>


The data in Table 1.2 shows the production of principal cereal crops in different states of India in the year 1996-1997. The major cereal crops are wheat and rice followed by maize and bajra. Barley and jawar remained at the bottom. Total cereal production was maximum in UP followed by Punjab, MP, West Bengal and Bihar. Haryana stands at number eight. As far as wheat production is concerned, UP produced maximum followed by Punjab and Haryana. Fig. 1.2 depicts the wheat production trends over the years in India.

The per cent increase in the production of cereals has been greater than the increase in the area of cultivation. It is due to the improved methods of agriculture and use of high yielding varieties of cereals.

Energy

Cereals are the staple food for majority of the global population. They supply the bulk of the food consumed by the humans, as they are the cheapest and excellent source of food energy especially in developing nations. In the infants’ diet, cereal is the first food to be added. In adult’s diet, most of the calories are recommended to be derived from complex carbohydrates present in cereals. Whole grains provide about 350 Kcals per 100 g. Cereals provide 70-80 per cent of the daily energy intake of large section of the population in India.