CEREALS

Seeds of cultivated grass used in means of cooking or meals is called cereals.

Examples: wheat, Maize, rice, millets- pearl millet, barnyard millet, quinoa, buckwheat etc.

WHEATGRAIN

Botanical name - Triticum

It is composed of three parts namely- bran, endosperm and germ. The fourth layer of the germ (there are six layers of germ) is called 'Testa' which is responsible for giving the colour to the wheat grain and sixth layer consists of 'Aleuron' cells, which contain the enzyme 'Protease' which has a softening action on the insoluble protein in the flour. The endosperm is the major component of the wheat grain and comprises of or consists of flour. The germ needs to be removed while extracting the flour from the wheat as the germ oil hinders the keeping quality of the flour.

Wheat may be classified as hard, medium and soft wheat. Depending upon the amount of insoluble proteins the wheat grain is having hard- more and soft- the least amount of insoluble protein. Accordingly we will get strong flour, medium and weak flour. Strong flour is good for making bread and weak flours are ideally suited for cakes and cookies and tarts. Medium flour are suitable for making pastry.

Milling process

Milling of flour is done in automatic plants and the process is done under six stages

- **Grading of wheat :** When the wheat comes from factory they are identified and graded as hard ,soft or medium .

- **Cleaning:** It involves removal of impurities and is done as under

- **Aspirators:** Air is blown which will air lift the husk and dust.

- **Disc separator:** This will remove Barley and other unwanted seeds from wheat.

- **Magnetic separator**: This will lift any iron particles in the wheat.

- **Washer stoner:** In this high speed rotors circulate wheat and water, which will remove any stones which are present.

- **Conditioning** After passing the water ,the wheat is made to dry under the controlled condition ideally 16 to 17% moisture is ideal for milling. During condition both the bran and the germ becomes hard which will later on peel off in large particles rather than small fragments.

- **Blending** The mixing of various grades of weight is done according to that type of flour that is desired.

- **Milling** In this the wheat is made to pass through a set of or sets of break rolls; each set having two rolls which have diagonal grooves and which move at different speeds in opposite direction from each other. The grooves are so designed and speed of break rolls so adjusted that the wheat kernels (grains) is broken only gradually.

After the wheat passes through first break roll, some bran is separated and air lifted off by air currents. Very small amount of flour known as "Patent flour" is milled and separated large chunk of kernels are further directed to the second set of break rolls where similar process take place and finally the

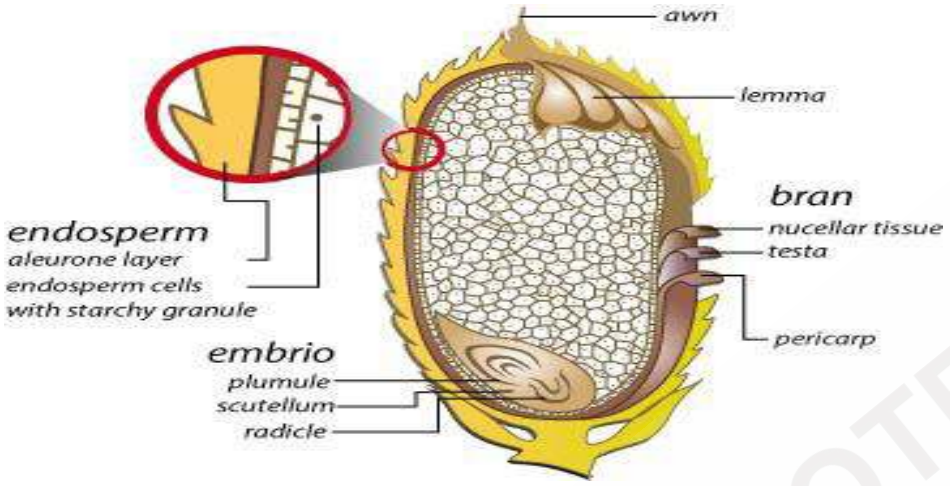
wheat kernel is almost deprived of bran. The product so obtained is known as Suji or Rawa.

After the wheat passes through first set of break rolls , it Breaks into pieces of different sizes which are separated by "Plan-Sifter". The plan sifter contains a set of Seive, has smallest holes. Each seive separates the chunks of similar size which are directed through channel to join with similar size chunks from other break rolls from other processing. After passing through various sets the flour is obtained. Different grades of flour may be mix and the flour obtained is called Straight Run flour.

- **Maturing**

The flour obtained is bleached and made to measure chemically or naturally for about 10 to 15 days after which it is packed and marketed.

Rice



Rice is the cereal which is consumed worldwide. Chinese claims to have started producing rice first although the claim is debatable. It is said that rice was produced around 3500 years back and over the years many more varieties have been developed. In India around 70% of the population are rice eaters and Tamil Nadu is known as the "Rice bowl of India". India is second largest exporter of rice after China.

Rice may be classified as:-

- Literal meaning of Basmati→ queen of fragnance.
- Glutinous rice→ sticky rice→ high level of starch.
- Wild rice is a variety of grass not technically a rice.
- Shinmai is from China.

Cooking of rice

The husk of the rice grain has to be removed first. And in the market it is available as polished and unpolished rice. Polish means that the bran has been removed and it is less nutritive as compared to unpolished rice. But appearance wise it is considered much better.

Rice is cooked in two ways:-

- Draining method: In this the starch gets removed from the grain as the excess water is drained off. For this approximately 4 litres of water/liquid is suitable for cooking about 500 gram of rice. Rice may also be washed as it removes the outer dirt and also washes away a part of the starch.

- Absorption method: In this process the entire liquid gets absorbed by the rice grain and most of the starch gets retained. The amount of liquid depends on the WAP (water absorption power) of the grain and it ranges from 1.5 times to 2.5 Times.

Othertypesofriceavailable orriceproducts

- **Rice flakes or pressed rice:-** In this rice , rice is first boiled, water is drained or starch gets drained and then the rice is pressed between rollers and then Sun dried.

- **Puffed rice:-** The rice grain is made to puff up by griddling/broiling. Thus rice gets puffed up.

- **Rice flour:-** It is used as a thickening agent and used for making rice based pudding like "PHIRNEY" and snack; example: Phulwadi.

- **Parboiled rice:-** Rice is milled and husk is removed; then it is soaked then steamed under controlled conditions so that it does not swell up and the vitamin B moves from the outer surface towards the centre of the grain. The rice is slightly yellowish in colour and after cooking turns Whitish.

- **Rice bran:-** This is mostly used in Japan as an animal feed. It is also used for pickling vegetables after fermenting.

- **Rice wine:-** Sake and Mirim are the two varieties of rice wines popular in the world, wildly used in Chinese and Oriental cuisine.

- **Rice vinegar:-** A byproduct of rice wine.

- Rice noodle or rice vermicelli.

VARIOUS GRAINS/ CEREALS:

Corn: Corn is the only grain that is eaten fresh as vegetables.
Cornmeal: it is made by drying and grinding a special type of corn known as dent, which is yellow, white or blue. Cornmeal is often used in breads, as coating for fried foods.

Hominy: it is dried corn that has been soaked in hydrated lime.
Massa harina is finely ground flour made from hominy, used for making breads and tortilla.

Grits: these are traditionally made by grinding dried hominy. These tiny white granules are used in breakfast dishes.

Rice: it is the starchy seeds of semi aquatic grass. Rice is divided into three types- long grain rice, medium grain rice and short grain rice.

Wheat: wheat is most often milled into wide ranges of flour.

- Cracked wheat – it is whole wheat kernel broken into varying coarseness.
- Bulgur- these are wheat berry that has the bran removed.
- Couscous- it is made by removing the bran and germ form durum wheat berries. it is traditionally served in south African stews.

Barley: it is one of the old culinary grains. It is used in making beers. It is used in making soups, stews and stuffing.

Buckwheat: it is not wheat not a grain. But it is includes here because it is cooked in the same manner as other grains are cooked. Raw buckwheat is ground into flour, used in making pasta, breads, pancakes etc.

Oats: after rice, oat is mostly accepted whole grain product in the American diets. Used in breakfast preparations, breads and muffins.

PULSES AND LEGUMES

Legumes are next in importance to cereals as sources of human food. They contain more protein than any other vegetables product and so are nearer to animal flesh in food value.

Legumes form an important part of the Indian vegetarian meal. A combination of cereal and pulses makes a balance diets. Legumes are dried seeds from plant which belongs to leguminosae family. They supply 22%- 25% of edible protein. Exception is soybean. It gives 40 % of edible protein.

Pulses are one of the staple foods in India, many North African countries (chick peas and broad beans) and South America (red kidney beans)

Nutritive value: it contains apprx: twise as much protein as cereals and half as much protein as lean meat. Legumes are better than cereals as a source of essential amino acids. Beans and peas are low in fat and high in

carbohydrate. Soybeans are exception. It contains more calcium than other legumes. They can be compared favorably with lean meat as a chief source thiamin (vitamin B1).

One of the characteristic of pulses is their very high energy value, averaging 330 calorie/
100 gm and very low water content compared with vegetables, which means they can be stored for longer period. Beans and lentil contains large proportion of iron. They are rich in carbohydrate (60%).

Legume composition (%):

Nam	Water	Protein	Carbohydrat	Fa
Broad beans	12	25	58	1
Common moong	11	24	60	1
Soya beans	10	37	34	18
Lentil	11	25	60	1
Chickpeas	11	21	68	5
Peas	12	24	60	1

Pulses when combined with cereals form important protein sources of vegetarians and in low and medium cost balanced meals. If they are combined with wheat in proportion of 1 part pulses with 4 parts wheat, biologically first class protein is obtained.

Most of legumes contain nitrogen fixing bacteria on the roots. These bacteria's are able to utilize free atmospheric nitrogen and convert it into nitrates, thus supply nitrogenous materials which is available in these plants, not only the seeds but also all other parts of the plant. Hence they are excellent fertilizer and increase the nitrogenous content of the soil.

The distinct characteristics of pulses are that the seeds are contained in pods.

Cooking of legumes: cooking breaks the starch and alters the texture and improves the flavor thus making legume palatable. Dried beans because of their low moisture content cooks faster if they are given an initial cooking.

Different varieties commonly used are:

- Bengal gram- chana
- Black gram- urad dal
- Red gram- arhar dal, tur dal
- Green gram- moong dal
- Lentil- masoor dal
- Kidney beans – rajma
- Soyabeans
- Kabuli chana

Uses of pulses :

- Whole / split gram can be used widely for different Indian dal preparation. Eg- red gram, rajma etc.
- Tender seeds when green can be eaten raw
- The husk powder can be uses as stuffing. Ex- kachuri
- Different pulses can be used in making soups ex- lentil soups