

## CHAPTER - IV

### THE PLANTS SELECTED FOR THE STUDY.

#### 4.1. INTRODUCTION :

The great and unique importance of food plants to mankind is well known. The requirements of carbohydrates, proteins, fats, oils, vitamins and minerals by the human body are met with by the food plants. Dry seeds of cereals and pulses are the chief sources of food. The underground roots, tubers, leaves and fruits of certain plants are important because of their high vitamin and mineral contents.

Various groups of food plants are selected for the study. Plants according to the nature of their usefulness can be categorized into cereals, pulses, underground vegetables, leafy vegetables, fruit vegetables, fumitories and masticatories.<sup>1-7,9</sup> In the following sections, the nature of different groups of plants selected for the present investigation are briefly described. The description is only general, and not a botanical one.

#### 4.2. DESCRIPTION OF THE DIFFERENT CATEGORIES OF PLANTS :

##### 4.2.1. CEREALS :

Among the cereals rice, wheat and maize are selected for the study. The cereals are the most important sources of plant food for man and lower animals. This is not only true today, but has been so since earliest time. The name

'cereal' has been given in honour of the Roman Goddess 'Ceres', whom they worshipped as the giver of grain.

The cereals are all members of the great grass family, Gramineae, and are alike in possessing the characteristic fruit of that family, the karyopsis. The term "grain" is applied to this type of fruit.

The reasons for the importance of cereals as food plants are many. One or more of these are available for each kind of climate. Cereals also have a wide range of soil and moisture requirements. They can be cultivated with a small amount of labour, and have a large yield. The grains are easy to handle and store because of their low water content, and they are very high in food value. Cereals contain a higher percentage of carbohydrates than any other food plants, together with a considerable amount of proteins and some fats. Even vitamins are present.

#### 4.2.2. PULSES :

Lentil, green gram, black gram, chick pea, pigeon pea, gram and pea are selected for the study. Pulses are next in importance to cereals as the source of human food. They contain more protein material than any other vegetable product, and so are nearer to animal flesh in food value. Carbohydrates and fats are also present. The high protein content is correlated with the presence of nitrogen fixing bacteria in their roots. These bacteria are able to utilize free atmospheric nitrogen and convert it into nitrates, thus augmenting the supply of

nitrogenous materials for the plants.

The pulses belong to the great family Leguminosae, which is characterized by having a special kind of fruit, a legume. They have been cultivated and used for food for centuries all over the world. The seeds are of greatest importance. The low water content and impervious seed coats enhance their value for storage purposes. Pulses are easily grown, mature rapidly and are highly nutritious. They are not only rich in proteins but also in minerals and vitamin B. About 88 percent of proteins consumed in India are of vegetable origin.<sup>8</sup> The calorific value of proteins being great, pulses are useful in cold weather or where more physical exertion is involved.

#### 4.2.3. UNDERGROUND VEGETABLES :

Radish, Carrot, turnip, beet, potato, sweet potato and onion among underground vegetables are selected for the study. The underground vegetables include all forms in which food is stored in underground parts. The storage organs may be quite different morphologically. Some are true roots, while others represent modified stems. All these structures are especially adapted to storage because of their protected position. Many wild, as well as cultivated, species have fleshy underground parts, and these have played a role in the development of civilization and agricultural, second only to the cereals and pulses. From the earliest time, roots and tubers

have furnished food for men and animals. Even though the amount of stored food material is less than that of dry fruits and seeds, these are extremely valuable since they are readily digested and have a high energy content. The food value of the underground vegetables is comparatively low, owing to the large amount of water present ( 70 - 95% ). This not only reduces the amount of available food material but impairs their keeping qualities as well. Even so, they rank next to cereals as the sources of carbohydrate food. This is usually present in the form of starch, although occasionally sugar, pectin or other substances may occur. Proteins are rarely available and fats are stored only in very slight amounts. The nutritive value of underground vegetable is increased greatly by the presence of the indispensable mineral salts and vitamins, while the roughage value of the various tissues aids in digestion.

#### 4.2.4. LEAFY VEGETABLES :

Leafy vegetables like Lamb's quarters, coriander, amaranth, garden spinach, mustard, potato, cabbage and fenugreek are selected for the study. Leafy vegetables have nutrient materials stored in the leaves. The chemical composition and food value are close to those of the underground vegetables. There is more water, however, and a correspondingly smaller amount of carbohydrates. They contain more protein, since the leaves are the workshop of the plant, and also a considerable amount of mineral salts and vitamins which make them an essential part of man's diet. There is also some roughage value.

#### 4.2.5. FRUIT VEGETABLES :

The fruit vegetables selected for study are brinjal, tomato, sweet gourd, bitter gourd and banana(unripe). Fruits constitute one of the ancient foods of human race. Perhaps, the nomadic life depended at least partly, on the wild fruits collected from the natural flora of the time. The mention of Adam, Eve and the forbidden apple, is enough an indication of antiquity of fruits.

Botanically, fruit is a mature or ripened ovary following fertilization. It consists of pericarp, developed from ovary wall, and the seeds developed from fertilized ovaries. Most of the fruits contain about 80% water and the remainder consists of cellulose, which have some roughage value. The nutritive value lies mainly in the presence of sugars, starches, pectin and organic acids. Carbohydrates are most abundant. Fats and proteins are negligible. Organic acids, however, are present in greater amounts than in any other plant products. These are chiefly malic, citric and tartaric acids. Mineral salts are also present in considerable quantities.

#### 4.2.6. FUMIATORIES AND MASTICATORIES (SMOKING AND CHEWING MATERIALS):

Betel leaf and its chewable ingredients like arecanut, tobacco and lime are selected for the study. People all over the world since time immemorable are known to smoke or chew various substances for pleasure, physiological effects, in connection with religious ceremonies or to find a change from the normal routine. Such substances produce a definite

effect which may be either stimulating or narcotic. This is due to the presence of alkaloids.

Tobacco, betel and arecanut produce a mild stimulation and has no effects on the consciousness of the user. If used regularly in large quantities, user gets addicted and the effects are harmful.

The major and characteristic constituents of tobacco is nicotine ( $C_{10}H_{14}N_2$ ). It also contains nornicotine ( $C_9H_{12}N_2$ ) which is more abundant in some strains. Tobacco smoke contains the common gases like nitrogen, oxygen and carbon dioxide in addition to small quantities of poisonous carbon monoxide, hydrogen sulphide, hydrocyanic acid and ammonia. Among the liquids and solids in tobacco smoke are nicotine and its derivatives, pyridine compounds, resins, essential oils, methyl alcohol, acetone, formic, butyric and acetic acids and phenols. Tobacco acts as a mild stimulant. The continuous chewing of tobacco causes oral cancers of all types.<sup>8</sup>

Betel leaf is chewed along with betel nut and lime. It produces mild stimulation. Betel leaf contains nicotinic acid, ascorbic acid and carotene. The leaves also contains acid, ascorbic acid and carotene. The leaves also contains significant amounts of all the essential amino acids except lysine. Several alkaloids are present in the nut. The arecoline is one of them, exhibiting toxic properties. The others are arecaidine, guvacoline, and guvacine. The nuts are generally

harmless, however, it causes constant irritation of the mucous membrane. Addition of lime in betel chewing appear to damage the oral mucous membrane.<sup>10</sup>

Arecanut is used either as raw or cured. For making raw nuts, only ripe fruits are collected since these keep better and are less astringent. The fruits are then husked, cut into two, dried and the shell is removed. Curing is practised to improve the quality and colour of the nuts. The curing involves cutting the nut into two pieces, boiling the kernels so that the embryo drops out and finally exposed to the sun for about 6 - 9 weeks. This reduces the percentage of tannins in the nuts.

The nuts are slowly chewed in the mouth. It causes flow of saliva into the mouth and constant irritation of the oral mucous membrane which sometimes results in oral carcinoma. It is also known to produce fibrosarcome.<sup>8</sup> The fresh nuts have intoxicating properties and produce giddiness. The cured seeds are better than fresh seeds because they have lower tannin content.

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