UNIT 14: FRUITS AND VEGETABLES

TABLE OF CONTENT

1.0 Introduction

Fruits and vegetables are from plant sources. They are noted for their supply of vitamin C (Ascorbic acid). They are also noted for their roughages which are of nutritional importance in the gastro-intestinal health.

This unit discusses fruits and vegetables under types, nutritive properties and changes in chemical composition.

2.0 Objective

At the end of this unit, you should be able to:

- List the classes of fruits with examples
- Discuss the nutritive properties of fruits
- Discuss some changes in fruits during ripening and after harvesting.
- List the classes of vegetable with example
- Discuss the nutritive properties of vegetables

Discuss some of the chemical changes and changes in composition after harvesting and during cooking.

3.0 Main Content

3.1 Fruits

Fruits are developed ovaries consisting of pericarp that encloses one or more seeds. The fruits is attached to the plant by fruit stalk that develops from the flower stalk.

3.1.1 Types of Fruits

Fruits can he classified as:

a. True and false composite fruits
b. Simple aggregate and composite fruits
c. Fleshy and dry fruits
d. Dehiscent and indehiscent

e. A true fruit: A true fruit develops from a fertilized ovary and it consists of pericarp and seeds. Mango is an example of a true fruit. A false fruit develops from ovary and other flora parts. Apart from the pericarp and seed(s) it has some additional structure. Apple, figs, pineapple and breadfruits are examples of false fruits.

f. Simple, Aggregate and Composite Fruit: A simple fruit develops from flower with a simple ovary examples are cow pea, maize, okro, tomatoes and pawpaw. An aggregate fruit develops from a single flower with several ovaries. Each ovary produces a fruitlet, therefore an aggregate fruit is a cluster of fruitlets e.g kola, strawberry and clustered apple are examples of false aggregate fruit. A composite or multiple fruit is a fruit that develops from flowers that are positioned very close to one another. The composite fruit results from the fusion of all the fruitless and the flora part and form a single large false fruit. Examples of these are fig, pineapple and breadfruit.

g. Fleshy and Dry Fruit: In fleshy fruits, either the whole pericarp or one of the layers of percarp, when it is ripe is thick, soft and fleshy. That is, it is succulent. In this group, we have the following classes, drupe, berry, pome, esperidium, sorosis, syconium. Examples of drupe are mang, oilpalm fruit. Example of berry is tomatoes. Examples of espiridium are orange and leamon, examples of pome are apples and pear. An example of syconium is fig.

h. Dry Fruit: In this type of fruit the pericarp becomes dry, hard and woody when the fruits are dry and the dry one may be dehiscent or indehiscent. The dehiscent one splits when they are ripe, example of this

dehiscent dry fruits are legumes okro. The dry indehiscent fruits cannot split when they are ripe.

3.1.2 Chemical Changes in Fruits

Fruit consists mainly of sugars, starches and organic acides. It also has cellulose and peptic substance. Thepectic substances are responsible for the firm structure of the fruit.

During ripening, the peptic substances are decomposed by pecticansses thereby softening the tissue of the fruits. During ripening, there is the hydrolysis of starch to sugar mainly glucose and some fructose.

The tartaric, inarlic, citric and succinct acid that impact the sour taste of unripe fruits are wither converted to other substances, including sugar or they may have their taste completely masked by the excess of sugar. Some esters and essential oils are distributed in the pulp of many fruits and these esters and essential oil confer some particular flavour on the fruits.

Ethyleme is implicated in the ripening of fruits and its presence speeds up the ripening of apple, pear, oranges and bananas.

When fruits are overripe, some of the sugar and the acid are oxidized, the essential oils and esters are also destroyed. This leads to loss of flavour and aroma.

When a fruit is bruised or injured, there could be spoilage as well as enzymatic actions in the bruised or injured surfaces. One of the enzymatic actions is the enzymic browning. In which phenolic compound especially catechol are converted to quinines which polymerise to dark brown pigment. To prevent brownin, we can exclude air from injured or bruised surface and we can introduce reducing agents such as acorbic acid and sulphurdioxide. Heating can also be sued to destroy the enzymes. Any form of alteration of the pH in such a way that the pH is lowered will reduce the effectiveness of the enzyme involved in enzymic browning.

3.1.3 Nutritional Importance of Fruits

Ascorbic acid is the only essential nutrient in fruits. However, there could be supply of some thiamin in fruits.

Fruits contain peptic substances from which we can extract pectin that is used for production of jam, jelly and marmalades. Fruits are a good source or roughaLves that are of importance in the gastro-intestinal health.

Most fruits contain small quantities of carotene and the B group vitamin. You should note that carotene is the precursor of vitamin A. Fruits contain little or no protein or fat. Most of fruits contain 5.20% of carbohydrate and

ripe fruits contain glucose and fructose.

Acids such as citric acid (citrus fruits, pineapple, tomatoes) malic acid (apples, plums and tomatoes) benzoic acid (cran berry) tartaric acid (grapes) oxalic acid (unripe tomatoes and spinach) are responsible for the sour taste of unripe fruits.

Students' Assessment Exercises

List the classes of fruit and example of each of the

Discuss the chemical changes that occur in fruits before and after harvesting.

3.2 Vegetables

3.2.1 Types of Vegetable

We have:

a. Green leaves for example lettuce, water crest, cabbage, spinach, broccoli, mustard and crest etc.
b. Leaves stalks — examples celery, rhubarb
c. Stems — example asparagus
d. Roots — examples carrot and beef root
e. Tuber — example potato
f. Bulb — examples are onions and garlic

3.2.2 Nutritive Properties of Vegetable

Vegetable supply has very small amount of energy and insignificant amount protein and essential amino acids. However, vegetables help to promote satiety and are of significant value in providing roughages for the gastro-

intestinal health.

Many green leafy vegetables are rich in calcium and iron. Much of the iron in the vegetable is not absorbed. However, presence of ascorbic acid may enhance greater absorption of iron. Almost all the vegetables contain Bgroup vitamin. Riboflavin is found in most leafy vegetable. The consumption of green leaves as a source of riboflavin has been found to reduce the incidence' angular stomatitic in tropics. Many vegetables supply B-carotene (the precursor of vitamin A). Ascorbic acid and folic acid. Folic

acid is very important to pregnant women. Some of these vitamins especially ascorbic acid are lost during cooking

3.2.3 Chemical changes in Vegetables During Cooking

During cooking of vegetables, there is the softening of tissues and there are a lot of other changes during cooking. One of the changes is that of colour change.

The green characteristics colour of green leafy vegetable is derived from chlorophyll in the leaf. When green vegetables are blanched or cooked, there is the breakdown of chlorophyll leading to loss of magnesium ions in the chlorophyl. The vegetable therefore turns yellowish green or brown. Acidic condition accelerates this change in colour.

Blanching in alkaline condition allow the retention of green colour. However, the alkalinity destroys some amount of ascorbic acid and affects the textural integrity of the vegetables. During blanching, the leaves become brighter, some enzymes are destroyed and there can be loss of ascorbic acid. In water blanch, there is leaching of some mineral and vitamin into the blanching water.

Students' Assessment Exercise 14.2

State the classes of vegetables and the changes that occur in vegetables during cooking.

4.0 Conclusion

In this unit, fruits and vegetables are discussed under the following headings: a. Classes

b. Nutritive Properties

c. Chemical Changes During Processing

Exercises are provided to test the understanding of the students of the content of the unit.

5.0 Summary

Vegetables and fruits are from plant origin. They are rich sources of ascorbic acid. They are also sources or roughages that are of significant importance to gastro-intestinal health.

Fruit is a developed ovary consisting of pericarp seed(s). We have tru and false fruit, simple, aggregate and composite fruits, flesh and dry fruits and dehiscent and indehiscent fruits.

Fruits consist of little or no protein and fat. It is a good source of ascorbic acid. It also has pectic substances from which pectin can be extracted for making jam, jerry and marmalades.

Ripe fruits consists of sugar, mostly glucose and some amount of fructose that confers the sweetness on the fruit. The cellulose in the fruits are good sources or roughages needed during digestion. During ripening of fruits, pectinnaise acts on pectic substances to cause the softening of tissues, starch is also hydrolised to glucose and fructose.

You have also learned the bruised or injured fruits can undergo enzymic browning from the conversion of phenolic compounds such as catechnol to quInond. which polymerize to form dark brown pigment. Exclusion of air from the bruised surface and introduction of reducing agents such as ascorbic acid and sulphurdioxide can prevent enzymic browning.

Vegetables, leaf stalks, stems, roots, tubers and bulbs like fruits vegetables are good sources of vitamin C they are also low in protein and fat content. They are rich in carotene the precursor of Vitamin A and most of the B-group vitamins. Vegetables especially leafy vegetables are good sources of calcium and iron, though most of the iron is not absorbed, however, the presence of ascorbic acid enhances greater absorption of iron.

During cooking of vegetables, chlorophl is broken down and the magnetism in it is lost, thereby resulting to yellowish green or brown colour of vegetables when blanched or cooked. During cooking, there is loss of some water soluble vitamin that are leached into the blancing water. You also learned that the acidity of the blanching medium or cooking medium accelerates the change in colour of vegetables from green to yellowish green or brown. Alkalinity of the blanching medium or cooking medium has been found to enhance the retention of the green characteristics colour. However, alkalinity has adverse effect on the ascorbic acid content and textural integrity of vegetables during cooking or blanching.

6.0 Tutor Marked Assignment

Discuss the nutritive properties of both fruits and vegetablesA

Answers to Students' Assessment Exercise

14.1 See answers in sections 3.1.1 and 3.1.3 of this unit.

14.2 See answers in sections 3.2.1 and 3.2.3 of this unit

7.0 References and Other Sources

Davidsons S. et al (1975) Human Nutrition and Dieteticse ed. Longman Group Ltd

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