

The main microbes that grow in root nodules are called rhizobium bacteria. These are able to fix nitrogen from the air and make it available to plants. These bacteria have the ability to make amino acids from the nitrogen in the air hence we call them nitrogen fixing bacteria. These amino acids are used to make proteins by both the leguminous plants and the bacteria. Thus in addition to nitrates from the soil.

The nitrogen fixing bacteria provide a further supply of useful nitrogen. Some soil micro organisms include; bacteria and fungi. These are important in the process of decomposing of organic matter and in nitrogen cycle for nitrification, denitrification and nitrogen fixation.

Activity: Investigating the presence of soil micro organisms

Materials needed

2 test tubes

Soil samples

Two muslin bags

Two corks

Cotton thread

Lime water

Crucible

Procedure

1. Work in groups, get provided soil samples and heat strongly one portion on the crucible and leave the other portion unheated.
2. Cool the heated portion. Now pack both the heated and unheated soil samples in separate muslin bags.
3. Pour an equal amount of lime water in the two test tubes A and B.
4. Suspend the muslin bag containing fresh moist soil in one test tube A using a piece of thread.

4. Suspend the other muslin bag containing heated soil sample in the second test tube B
5. Leave the experiment for some three days and observe any changes in the colour of lime water
6. Which lime water changes colour?
7. Explain why
8. Which lime water did not change the colour? Explain why.
9. Using google, text book or any other source of information, research and write a report on the importance of micro-organisms in the soil including those that live in the roots of leguminous plants
10. Present your work to the rest of the class

Solutions

A - Unheated soil sample

B - Heated soil sample

6. Test tube A changes colour because the soil sample was containing micro-organisms which respired to produce carbon dioxide which reacted with lime water and turned to milky

7. Test tube B did not change colour because all the micro organisms were killed and therefore, there was no respiration

A REPORT ON THE IMPORTANCE OF MICRO-ORGANISMS IN SOIL

Micro-organisms respire to produce carbon dioxide which reacts with in the soil.

Micro-organisms help to aerate the soil

Ans

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CHAPTER 3: NUTRITION TYPES AND NUTRIENT COMPOUND

Key words

Balanced diet

Anorexia

Bulimia

Nutrition

Nutrient

Obesity

Diet

Introduction

In this chapter, you will be able to understand the meaning of nutrition, nutrients, their sources and importance to humans and effects of nutrient deficiency in humans.

You will also identify the different food nutrients in food using specific chemical tests. You will also identify the major plant nutrients, their roles and symptoms of deficiency.

NUTRITION

All living organisms are made up of a large number of chemical substances. These substances are built up in organism using the food which has been taken in, digested and absorbed.

Activity 3.1: Finding out the meaning of the term nutrition.

In pairs, discuss and research on the meaning of the term nutrition.

Is the process by which living things obtain food and it is used through the process of respiration.

Is the process by which living things receive necessary for them to grow and be healthy.

Types of nutrition

These are divided into two as follows-

a) Autotrophic nutrition

This is a type of nutrition where living organisms make their own food from simple inorganic materials e.g. water and carbon dioxide.

Heterotrophic nutrition

This is a type of nutrition where organisms feed on already made food.

Food nutrients, their sources and importance.

The body needs a variety of food nutrients for normal functioning and growth. These are of different categories depending on their importance i.e. proteins have body building nutrients, carbohydrates are energy giving, vitamins and mineral salts are for protection of the body.

Xerubly 3.2n Researching on different food nutrients, their sources and importance to humans

TASKS: In groups, discuss and research on the different food nutrients required by the body, their sources and importance.

(ii) Record your finding in a suitable table

Food nutrients	Sources	Importance
Proteins	fish, eggs, lean meat, milk, beans in the body, mutton, peas during starvation.	Form enzymes in the body, for building up cells and repair worn out tissues

Carbohydrates	Wheat, maize, rice, sorghum, cassava	Source of energy, formation of food store, building blocks of other structural forms e.g. cell wall.
		acids i.e. DNA and RNA due to deoxyribose and ribose sugar respectively

Vitamins pawpaw, milk, fats, yeast, palm oil, wine, boosting the immune system, proper growth and proper functioning of the body.

Lipids margarine, milk, They cushion internal organs, source of energy, (fats & oil) g. nuts, sim sim, insulate the body against heat loss, source of beef, fried food, water to desert animals after being broken down sun flower They are part of a cell structure e.g. cell membrane. They are used in the health diet which is varied and diverse.

VITAMINS AND MINERAL SALTS

The body requires a variety of certain nutrients in smaller quantities to function efficiently. These are mineral salts and vitamins. The deficiency even though other nutrients. The deficiency of any of these may result in deficiency diseases even though other nutrients are supplied in the body.

TASK

- 1 Researching on vitamins, their sources, functions, and effects of deficiency.
- 2 In groups, research on the different types of vitamins, their sources, functions and effects of deficiency.
- 3 Record your findings in a suitable table

Vitamins	Sources	Importance	Effects of deficiency
Vitamin A	Animal fat, liver, eggs	Helps in proper growth of the body, keeps the skin of weight, reduced resistance	Poor night vision, dry skin, loss of weight, reduced resistance
Vitamin B ₁	Milk, palm oil, vegetables	Provides of diseases	oil, fresh green energy, resistance to disease

Vitamin C	Yeast, beans, peas, liver, millet	Needed in cell respiration, normal functioning of heart, liver, nervous system	Beriberi, weakness and paralysis, heart failure, mental retardation
Nutrient B ₂	Eggs, fish	Cell respiration, normal skin	Sores on the tongue and corners of the mouth

- B₁ leafy vegetables health and functioning, of mouth dermatitis
 dairy products proper functioning of teeth
- B₂ Tomatoes, green Cell respiration Pellagra (skin diseases) Digestive
 Nico silver fish, Normal functioning of the disorder, poor growth, red tongue,
 tinic yeast, meat, grain nervous system rough skin
- B₃ Eggs, green Cell respiration, normal Nervous system disorders
 vegetables, milk functioning of the nervous Digestive disorders.
 liver system & alimentary canal
- B₄ Beef, Grapes, for synthesis of amino acids Anaemia
 Onions, avocados and carbohydrates into mediate Diarrhoea
 bread, eggs during transpiration Vomiting
- B₅ liver, beef, formation of haemoglobin. for Body weakness, loss of weight
 milk correct formation of red cells Anaemia, breathing
 and nervous tissues. difficulties

Activity 3.4 : Researching about mineral elements, their sources, functions and effects of deficiency

TASKS

- 1 In groups, research on deficiency different mineral elements, sources, functions and effects of deficiency
 - 2 Record your findings in a very suitable table
- | Mineral elements | Source | Use | Deficiency symptoms |
|------------------|---------------------------------------|---|---|
| Iodine (I) | Iodised table salt, cheese, sea fish | formation of thyroxine hormone | Goitre in adults
cretinism in children |
| Calcium (Ca) | milk, green vegetables | formation of bones and teeth, blood clotting & muscle contraction. | Rickets
Badly formed teeth
muscle cramps. |
| Phosphorus (P) | milk, cheese, bitter, liver, egg yolk | formation of bones and teeth, synthesis of proteins, formation of growth A.T.P. (Adenosine Triphosphate). | badly formed teeth, reduced growth. |

Flourine	drinking water component of bones (F) and teeth	weak bones
Iron	Liver, beef, egg formation of (Fe) yolk, millet, veges haemoglobin	Anaemia
Sodium	Green vegetables	Maintainance of body nervous break down transmission of impulses
Potassi um	Vegetables	Transmission of nerve impulses

~~20th June 2022~~ FOOD TESTS

Carbohydrates such as starch, reducing sugar and non reducing sugar can be detected in food by simple chemical tests. These testes differ in the types of reagents used, procedure and observed results.

In this section, you are going to carry out some experimental procedures to ; identify common nutrients in food . In this tests you will use a test solution which changes colour. These change colour to specific colours which indicates presence of certain nutrients

NOTE :

Carefully observe the colour of the test solution and the change in colour of the food

CARBOHYDRATES

These are organic food compounds that contain three

basic elements namely; Carbon, Hydrogen and oxygen. The ratio of H:O in a carbohydrate is always 2:1 e.g in glucose ($6\text{C}_6\text{H}_{12}\text{O}_6$) carbohydrates include sugar, starch and cellulose though sugars and starch are the most common in human diet.

Sources of carbohydrates

- I Root tubers e.g. potatoes, yams, cassava
- II Stem tubers e.g. Irish potatoes
- III Cereals e.g. millet, rice, sorghum, wheat, maize

Every carbohydrate is made of small basic unit called saccharide (a single sugar unit). A Saccharide consists of carbon, hydrogen and oxygen elements. The formation of a larger carbohydrate is as a result of a reaction called condensation. This reaction involves the removal of a H from one sugar molecule and an OH from another sugar molecule. A molecule of water is then formed as the bond between two sugar molecules forms.

Classes of carbohydrates

Carbohydrates are divided into three main common classes namely,

- 1 Monosaccharides
- 2 Disaccharides
- 3 Polysaccharides

Monosaccharides (mono = one, saccharide = sugar)

These are simple sugars that can not be hydrolyzed into any simpler form.

Examples of monosaccharides

Glucose (all sugar)

Fructose (fruit sugar)

Galactose (found in milk)

Properties of monosaccharides

They are sweet.

They are soluble in water.

They are crystalline.

They are all reducing sugars.

NOTE :

Monosaccharides are reducing sugars because they can reduce copper (II) ions in Benedict's solution to copper (I).

DISACCHARIDES (di = two, saccharide = sugar)

These are sugars which consist of two monosaccharides.

Examples of disaccharides.

Lactose (found in milk)

Maltose (found in germinating seeds and sugar beet)

Sucrose (found in sugarcane and sugar beet)

HOW DISACCHARIDES ARE FORMED

Glucose + Glucose $\xrightarrow[\text{enzyme}]{\text{Maltase}}$ maltose + water

Glucose + Glucose $\xrightarrow[\text{enzyme}]{\text{Lactase}}$ Lactose + water

Glucose + Fructose $\xrightarrow[\text{enzyme}]{\text{Sucrase}}$ Sucrose + water

Properties of disaccharides

They are sweet.

They are crystalline.

They are soluble in water.

They are non reducing sugars.

Disaccharides are non reducing sugars because they can not reduce copper (II) ions in Benedict's solution to copper. The disaccharides are broken down into monosaccharides by hydrolysis.